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European Comission

Directorate General Information Society
Information Society Technologies
System and Services for the Citizens
Applications relating to Health

4th Research & Development Framework Programme (1994-1998)

HEALTHCARE TELEMATICS
PROJECTS

Final Report

Brussels November 2001, Avenue de Beaulieu 31, B-1160 Brussels, Belgium 4th Research & Development Framework Programme (1994-1998)

HEALTHCARE TELEMATICS
PROJECTS

FINAL REPORT

European Comission Directorate General Information Society

Information Society
Technologies
System and Services
for the Citizens
Applications relating
to Health

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Executive Summary

In the context of the 4th Research & Development (R&D) Framework Programme (1994 - 1998), the Healthcare sector of the Telematics Application Programme (TAP) funded about 130 projects with a total EU contribution of 146 MEURO. Following the overall TAP regulations, each research and development cost-shared contract was required to involve a multimedia user-oriented project. The Health Telematics projects have been classified into 8 user-oriented groups representing all the components of the Health sector from the citizen to Healthcare authorities through to Healthcare professionals.

Building on previous results developed during the 2nd (1988 - 1990), and the 3rd (1991 - 1994) R&D Framework Programmes, (Advanced informatics in medicine, AIM 1 and AIM 2), the present activities involved mainly applications in line with the promotion of the Information Society. Many standardised and interoperable Health Telematics applications became immediately available, were implemented by various EU Member States and ultimately began to benefit the citizen.

A new industry, the Health Telematics industry, is being established and will play a key role in the near future for the re-engineering of the various national Healthcare Delivery Systems. Within the scope of these, each citizen will be empowered to take more and more initiatives for the care of his/her own health.

A second generation of more mobile, integrated and more user-friendly Telematics Systems and Services for health can be foreseen in the future.

In Part A of this report an overall view of the R&D activities based on the 8 user-oriented groups defined according to a "3D Red Cross" model is given. Part B presents a short description of the summary and the references of each of the projects.

4th Framework Programme (1994 - 1998) R&TD projects in Healthcare Telematics

Jean-Claude Healy, Head of Unit

Research programmes play a very powerful role in coordinating European research, and their integration with national or industrial programmes greatly increases their impact. The Telematics Application Programme (TAP, 902 million EURO) is one of the eleven parts of the 4th Framework Programme and comprises various sectors such as Health (146 million EURO), Transport (222 million EURO), Education (71 million EURO), the Environment (22 million EURO), the Disabled and Elderly (70 million EURO) etc. The programme itself is managed according to the standard rules of the Commission: calls for tender for research on a range of topics defined in the work plan, responses from consortia comprising partners from at least two European countries and an industrialist. The

financing can be up to 50% of the total cost for the R&D projects selected by a panel of evaluators. Each project is managed by a project coordinator, and at the administrative and financial levels monitored by a project officer in the Commission. The individual rules of the TAP programme mostly stress the importance of the development of the multimedia work directed towards fulfilling the user needs.

Approximately 130 R&D projects and connected activities (accompanying measures and support actions) in Healthcare Telematics are currently financed by the Commission. More than 1300 research establishments, hospitals, professional associations, industrialists or European health authorities are supported and more than 7000 European Union

citizens are directly connected with Healthcare Telematics. Representatives of all the Member States take part as project coordinators, contractors or associated partners (Figure 1). Numerous structures in the Central and Eastern European countries, or countries with which the European Union signed scientific and technical assistance agreements (Canada, Australia etc.) also take part.

The clear definition of its working principle the budget allocated, the diversity, the quality and the number of actors involved and supported by the health sector of the TAP, there are the first global tools for motivating the Healthcare operators to implement telematic solutions.

Health care Telematics (4 FP 1994-1998)



Figure 1. HC Telematics - Project Coordinators

Coordinators of Contracts

Updated situation on Nov 1997

- ABC MALE (Ancona)
 AMBULANCE (Karlstad)
 ATTRACT (Athens)
 AORTICS (Madrid)
 BEAM II (Patras)
- CANTOR (Copenhagen)
 CARDIASSIST (St Augustin)
 CARDLINK2 (Dublin)
 CATCH (Modeburn) 9. CATCH (Magdeburg) 10. CHIN (Berlin) 11. Co-Co (Odense C) 12. CONQUEST (Amsterdam) 13. DIABCARD-3
- DIABCARD-3 54
 (Oberschleissheim) 55
 DIABCARE-Q-NET (Munchen) 55
 EASI (Da Best) 56
 ECOLE/ERIP (Bordeaux) 57
 EHTO (Lisboa) 58
 EISOSH (Vontaa) 59
 ENN (Lisboa) 60
 61
- 17 EHTO (Lisboa)
 18 EISOSH (Vontas)
 19 ENN (Lisboa)
 19 ENN (Lisboa)
 19 ENN (Lisboa)
 10 EOGS HGC (Sulfulk)
 21 ET-ASSIST (Toulouse)
 22 EUMIP96 (Hwdovre)
 23 EUROPATH (La Tronche)
 24 GALENH-N-USE (Manchest
 25 GASTER (Toulouse)
 27 HANSA (Roma)
 28 HEAL SA (Eurxelles)
 29 HEALTH (Linker (Althens)
 30 HEALTH (Linker (Althens)
 31 HECTOR (Seville)
 32 HERMES (Edinburgh)
 33 HOMER D (Athens)
 34 HORIZON (Tyne & Wear)
 35 HS PRO EU (Dublin)
 36 I4C (Rotterdam)
 37 I4C-TRIPLEC (Rotterdam)
 38 IAEVA (Roma)
 39 IGOS (La Tronche)
 40 IGOS II (Grenoble)
 41 INFOCARE (Madrid)

- (Bruxelles)

 33 ISAR-T (Lille)

 43 ISAR-T (Lille)

 44 ISHTAR (Birmingham)

 45 IT EDUCTRA (Madrid)

 46 ITHACA (Bedras)

 47 MACRO (Londori)

 48 MANSEV (Ispida)

 49 G7 MARGRITE (Paris)

 50 MEDICO (Leiden)

 51 MEDIMEDIA (Toulouse)

 52 MERMAID (Thessaloniki)

 53 MOBCARE (Madrid)

 54 MOMEDA (Alberta)

 55 NIGHTINGALE (Athens)

 56 NIGHTINGALE (Athens)

 57 NIVEMISS (Athens)

 58 NIGHTINGALE (Isbida)

 59 ROPHTEL (Oberschiersshein

 50 ROLUSET (Uppsala)

 50 PATMAN (Aalborg)

 71 PLANEC (Hetisinki)

 72 PRESTIGE (Lisboa)

 73 PROMPT (London)

 74 PROREC (Seville)

 75 RECOVER (Bruxelles)

 76 REMEDES (Bruxelles)

 77 ROBOSCOPE (Salzburg)

 75 SEAHORSE (I (London)

 75 STAR (Co Meath.)

 75 YNAPSES (Dublin)

 75 YNEX (Uplands VdSBY)

 75 TARICET (Grace)
- 2. SYNAPSES (Dublin)
 3. SYNEX (Uplands VdSBY)
 4. TANIT II (Herts)
 5. TARGET (Genova)
 3. TASTE (Paris)
 7. TELECAT (Roma)
 8. TELEINVIVO (Darmstard)
 9. TELEPINAPS (Copenhagen)
 0. TELEPILANS (Napoli)
 1. TESEMED (Barcelona)
 2. TESEMED II (Bruxelles)

- 3 TESUS (Strasbourg)
 1 T-IDDM (Pavia)
 1 T-IDDM (Pavia)
 7 TRUSTHEALTH (Stockholm)
 3 TRUSTHEALTH 2 (Stockholm)
 3 VICO (Grez-Docreau)
 9 VIRTLOSO (Veenendaal)
 9 VIRTLOSO (Veenendaal)
 9 VIRTLOSO (Veenendaal)
 9 VIRTLOSO (Veene
- 90 VREPAR (Misino)
 91 WITS (Milano)
 92 WISE (Ivrea)
 93 WOMAN (Piya)
 94 G7-GLOPHIN (Bielefeld)
 95 G7-GLOBAL HORIZON
 (Tyne & Wear)
 97 G7-FACT (Roma)
 98 G7-GETS (Toulouse)
 99 G7-CARDS (Paris)
- 99 G7-CARDS (Paris)
 100. CHAINE (Leiden)
 101. EHCR sup A (London)
 102. EU/CEN workshop
 (Bruxelles)
 103. HC-REMA (Aalborg)
 104. HEALTHPLAN (Roma)
 105. NUSNET (Graz)
 106. PROGUIDE
 (Oberschleissheim)
- 106 PROGUIDE
 (Oberschleissherm)
 107 SIREN (Stockholm)
 108 TOMELO
 (HB Nijmegen)
 109 USEDHE (Roma)
 110 MSECARE (leuven)
 111 EMERGENCY 112 (Alhens)
 112 RETRANSPLANT (Berlin)
 113 TEAC-HEALTH (Turku)
 114 TELENURSE ID
 (Copenhagen)
- (Copenhagen) 115. RUBIS (Lingosheim) 116. IN EMERGENCY(Athens)

TELEMATICS APPLICATIONS for HEALTH

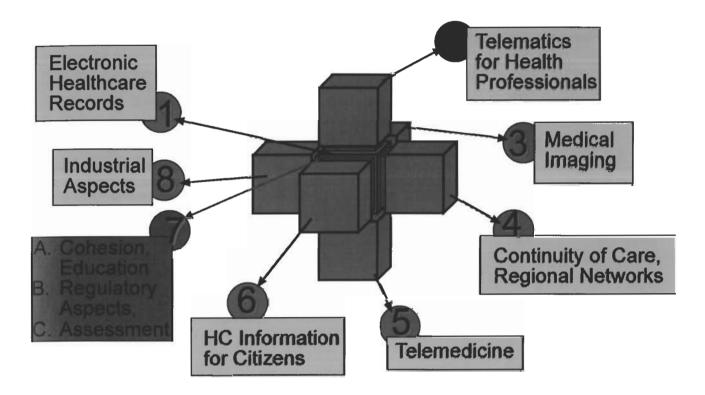


Figure 2. 3D Red Cross

Moreover, other Community research initiatives in fundamental information technology (ESPRIT, DG III), in telecommunications technology (ACTS, DG XIII B) or in support for the research infrastructures (TEN-TELECOM) are accompanying these activities in addition to contributions from the EUREKA and COST programmes. These programmes are governed by other participation rules. In addition the social affairs Directorate General (DG V) is greatly interested in the outputs of the Healthcare Telematics re-

For reasons of internal management and of external visibility, the projects are grouped according to the model of the "three-dimensional red cross" (3D Red Cross) (Figure 2).

Each of the 6 elementary branches represents a group of users having its own needs, its own logic, its own techniques, its own constraints, etc. Each branch can exchange information with the others through the centre (Group 1) representing Electronic Healthcare records. Indeed the medical records are at the heart of all the exchanges of information between the actors of the system and standardisation in this field is the prerequisite for any later exchange of information. Moreover, in order to facilitate the links between the various branches of the 3D Red Cross. there is a connection between them through a particular group (Group 7, the "glue-group") which plays a binding role for Information and Education, Regulatory aspects and Assessment of Healthcare R&D activities.

Each of the eight thus defined groups contains on average 16 projects. Each one of these projects is financed by Community funds which vary from a few hundred KEURO to 3 to 4 MEURO. The acronyms, short summary and the key-references (name of coordinator, address,

telephone numbers etc) are given in Part B of this document.

Finally each one of these 8 groups is managed by a "group leader", a member of the Commission services whose role is not only to combine the R&D projects of the sector but also to identify the group objectives and strategy for the coming years. The global overview of each group leader is presented here and is to be seen as a tentative strategic perspective on the current status and future activities in the group.

In order to facilitate the evaluation of the results of the research work, each "group leader" and each project coordinator have to identify from the initial stage of the research work, the quantitative or semi-quantitive health indicators (economic, quality of care, access to care, etc.) that could change as a result of the R & D projects. At this stage we

can not yet describe a benchmarking plan, but it could be done later.

Two topics have become special priorities as they will certainly be factors which may limit the implementation of the results of the work done:

The first topic concerns the Regulatory aspects, (legislative and deontological aspects) of Healthcare Telematics. The basic texts concern data protection for the individual. Intellectual Property Rights (IPR) etc. which exist on a European level and are gradually being implemented in each Member State. Their application to the specific problems of Healthcare Telematics is particularly sensitive, and in practice the professional associations have to define their codes of conduct or deontology for optimum use of Healthcare Telematics.

The second is that which effects the assessment of the results of the work in Healthcare Telematics: the diffuse character of Healthcare Telematics forces the development of a new evaluation methodology which takes into account not only the immediate consequences for the doctor or specialist who use the information technology, but also those consequences caused by the use of these techniques itself. For example the standardisation of medical terminology, the development of on-line epidemiological data banks, etc. are perhaps overall more important than their immediate impact on treatment

because they have contributed to a common structure. In this respect the dissemination of the guidelines for good medical practice and second medical opinions have already been shown to be exceptional, and it is predicted that within 5 years life expectancy can be improved by 50% for patients diagnosed with breast cancer thanks to the second opinion given with the aid of telematics tools.

In the past, no new surgical techniques, medicine or new diagnostic tools have ever showed such a cost-effectiveness ratio. Therefore, the dissemination of these very efficient practices could be a priority for the Member States in the short term.

It still remains that the rate of change of each component of the health system (human resources, health infrastructures, infrastructures and telematics technological means, administrative and legal regulations, financial and economic regulations. etc.) are very different: technologies change every 2 to 3 years, opinions of the involved parties change every 10 to 15 years, health infrastructures are seen to change every 20 to 25 years and the administrative protocols become gradually upgraded with time.

The success of the implementation of Healthcare Telematics research results and the global benefits hoped for as a consequence depend of course on the convergence of all these factors.

One can therefore state that we are only at the beginning of a development stage which will probably take between 10 to 15 years before the full benefits are realized. It must also be said that interim results from the current work may be seen during the next 7 to 10 years. Almost half of the 15 Member States of the European Union have already established national plans to set up various Healthcare Telematics services (health cards, information exchange between hospitals). All these elements are quite encouraging but should be reenforced not only by newly available and qualified services but also by recent initiatives for implementation coming from all the concerned parties: Healthcare authorities, industrialists, professional associations, health insurance agencies, financial groups, etc. The development of a public /private partnership gives an exceptional opportunity in this sector, not only to fulfil hopes, but also to encourage the construction of a genuine European Healthcare Telematics job creation industry.

References:

- [1] AIM, 3rd Framework Programme 1991-1994 (Volume 1 and 2), European Commission, DG XIII, 1996
- [2] Bangemann Report, European Commission, 1995
- [3] Report on status of Health in Europe, European Commission, 1995 (COM 95 357)

Group 1 PART 1: ELECTRONIC HEALTHCARE RECORDS



Group Leader: Ilias lakovidis

The Healthcare Record is the collection of all the health related information collected during an individual's lifetime. This information is usually distributed over many locations (hospitals, laboratories, pharmacies, homes) and it is kept on different media (people's memory, film, paper, computer).

The Electronic Healthcare Record (EHR) is defined as the digitally stored (subset) of the Healthcare Record with a purpose to support (shared) care, education and research. The EHR is called comprehensive if it contains all of the Healthcare Record. Synonyms: Electronic Medical Record, Electronic Patient Record, Computer-based Patient Record.

The Electronic Healthcare Record System operates on EHR in order to manage the information

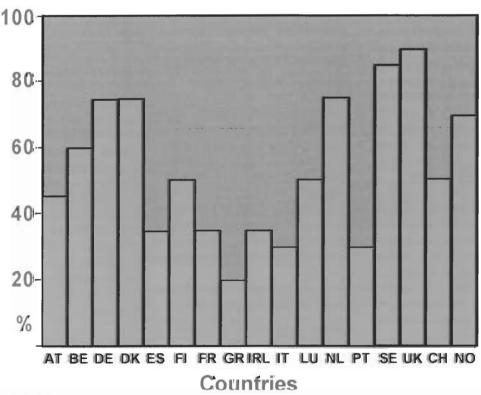
and provide information to qualified users in a user-friendly manner. The system can be a small group of PCs, a hospital information system, or a group of hospital and primary care systems in a regional network. Good EHR systems helps the users to retrieve the information in a fast and user-friendly manner (interfaces), communicate easily with others, and make a user's work more effective. An EHR system ensures confidentiality at all time by meeting strict security requirements.

Present situation and prospects

General practitioners' systems: The data below was collected from the EuroTop '96 study and the Royal College of General Practitioners of Ireland and the UK. The prospects are that the

percentages in all countries will rise, and in some countries very rapidly. It is expected that in France and in Germany the percentages will reach 80% by the end of '98, mostly due to the government requirements to submit reimbursement claims electronically. While the figure below shows the penetration of computers in physicians' practices, it is important to note that the percentage of General Practitioners keeping EHR on their computer varies greatly. For example in the United Kingdom and Sweden most of the practices with a computer use it also for keeping medical data, while in countries such as Belgium and the Netherlands about half use EHR, and in countries such as Spain and Greece the use of EHR is minimal.

Percentage of Physicians having a Computer in their Practise (1996)



Hospital EHR systems: less than 15% throughout Europe as defined (there are many administrative systems, but few systems that integrate both clinical and administrative systems). In the US, of the hospitals with over 500 beds, 100% have billing systems, 80% have laboratory systems, 75% hospital pharmacy systems, and some have medical systems with patient data (about 65%). The hospitals will move to Intranets integrating the existing systems and forming "distributed" EHR.

Homes and Internet: Software packages are available for keeping health related data at home. Internet based companies offer to keep the health records for customers on the Internet including a limited number of images. When in need, the customer/patient gives access to a physician or paramedic. Some of these companies combine this "record keeping" with medical consultation. Household software packages will appear soon on the market, especially for the chronically ill. On line health support, services for the citizen will create a new (large) market.

Market situation and prospects: Europe: 3.5 BEURO in '93, estimated to grow to 15 BEURO in 2000 for hospital-based systems. Worldwide estimates 100 Billion\$ in 2000. In hospitals large companies will provide the platform and service (Intranet, databases) and give a possibility for plug-ins for specialists to be provided by SME's and others. Overall shift from marketing hardware-software to providing services.

Keywords and attributes of EHR systems: accessibility and availability - continuous access to patient data or timely access to other information resources, reliability - ensures data integrity and permanence of original information in an agreed format and

for a given time, usability and flexibility - support for multiple user views and user-friendly interactions such as input and output of data, integration - enables integration of different administrative and clinical systems, performance - provides information fast (normally within 3 seconds), confidentiality and auditability - provides an audit trail that documents the interactions, and authentication of information using user identification, e.g. digital signatures.

Technological challenges of EHR systems '97-'99: Integration of multivendor systems to allow secure and fast communication and a "virtual" synthesis display of patient information that is located in different places (distributed record).

Relevant Projects for the technological aspects:

- 1) SYNAPSES: Specifications and validations of technical means for communication of records among different hospital systems consistently, simply and securely.
- 2) I4C: Integration & communication of multimedia data for continuity of cardiac care.
- 3) GALEN IN USE: Multilingual terminologies for EHR portability and preservation of meaning

Standardisation challenges for EHR

- architecture of the record: structure that can accommodate all types of data and support different views, and at the same time preserve the meaning and the context.
- terminology that is necessary in order to preserve the meaning, for proper coding of diseases and classification of medical procedures.
- communication: exchange format of data for displaying and
- security features (e.g digital

signature, digital keys) and other authentication systems.

Relevant Projects for standardisation:

- 1) EHCR-SUPA: Development and promotion of pre-standard architecture
- 2) GALEN in USE: Development and validation of multilingual terminologies
- 3) TOMELO: Bringing the terminology to developers of systems 4) EU/CEN: Workshop on the standards issues, on convergence of vision, and book publication
- 5) TELENURSE: Nursing terminology, standardising the nursing part of the record

Non-technological obstacles to implementation

- User acceptance.
- Lack of vision and leadership of health care managers and health authorities, and the lack of a willingness to re-engineer the health care processes for the benefits of the quality and efficiency of care delivery.
- Industrial and market issues.
 The market is very fragmented in Europe.
- The legal framework.
- The organisational and cultural matters relating to health care delivery. This applies to countries or regions where the organisation of the care delivery cannot ensure continuity of care.

Relevant Projects for industrial and market issues:

- 1) PROREC: Promotion of standards, use and benefits of good quality EHR systems, establishment of national EHR centres
- 2) TRUSTHEALTH: To provide and integrate security services
- 3) IADS and TEN-TELECOM projects: Validation of existing technologies for improving the level of user acceptance, building the vision and convincing cases.

Group 1 PART 2: HEALTH CARDS

Group Leader: Ilias lakovidis

Due to the various national plans for implementation and due to the importance of the matter, special attention should be paid to Health Cards. Since 1989 the European Commission has funded several R&D projects, Accompanying measures or Support Actions (EUROCARDS). The outputs of these activities are now clear: the agreement to foster the convergence of national initiatives on healthcards towards common or interoperable solutions, and the standardisation of several aspects related to healthcards. The healthcard now is perceived much more as a key for opening and securing the Healthcare delivery systems than just as a simple memory. As a consequence the first generation of cards is now being implemented in various Member States and a second generation has now to be designed.

Present EC situation and prospects

Millions of health cards have been issued in Europe with leading countries being Germany (over 90% of the population has Health Insurance Cards) and France where health professional cards and patient datacards (inclusion of a medical data set onto the administrative card) are planned to be distributed on a large scale. In Spain over 40 million insurance cards are being issued and recently the Italian Ministry of Health announced a decision to introduce data cards in the Italian healthcare systems. Many other countries of the EU have large pilot projects [7] as well as countries in Central and Eastern Europe (Czech Republic, Hungary, Slovenia).

Technological challenges of Healthcards '97-'99

The challenges are based on the recommendations of the Concerted action EUROCARDS and the commonly agreed data-set for administrative and clinical data (results of the CARDLINK project).

Interoperability of cards - there is a need for global standards among others for reading the cards and interfacing with existing medical information systems

Multilingual coding - the ICD 10 and medical procedures codes are not available in all languages.

Security - the security technologies/features need to be widely accepted and interoperable, development of security features as required by 95/46/EC.

Relevant ongoing projects:

CARDLINK 2 - patient health portable record for use in medical emergencies DIABCARD 3 - improved communications in diabetes care based on chip cards.

TRUSTHEALTH - to provide and integrate security services using cards.

G7-CARDS - global harmonisation of specifications for health cards.

PROJECTS in Group 1 (Health Electronic Record):

BLACK SEA TELE-DIAB, I4C, I4 C TRIPLEC, CARDLINK 2, DIABCARD-3, EHCR-SUPA, EU/CEN, GALEN-IN-USE, PROREC, SYNAPSES, SYNEX, TELENURSE, TELENURSE ID, TOMELO, TRUSTHEALTH, WISECARE

PROJECTS in Group 1 (Cards):

CARDLINK 2, DIABCARD 3, TRUSTHEALTH, G7-CARDS, NETLINK

Group 2 TELEMATICS APPLICATIONS FOR COLLABORATIVE WORK OF HEALTH PROFESSIONALS

Group Leader: Alphons J.M. Vermorken

Intensive collaboration between health professionals would allow us to diminish the time between the moment that new research results have been obtained and the moment that these are implemented for all relevant citizens and/or patients.

Telematics tools could significantly contribute to lowering the above mentioned time lag. A number of services are needed and should be provided to all relevant and interested health professionals in order to achieve this goal. The projects in Group 2 have tried to develop these services, to make them interoperable and to deliver them over a network of centres.

New research results relevant to patients and citizens often emerge from clinical trials and are published in the literature. It was, therefore, important to develop tools to speed up clinical research and to allow a large number of centres to participate in trials. The MACRO project has developed tools for remote data entry in clinical research. The data exchanged includes documents and multimedia objects.

Clinical research leads to the identification of substances which could be transformed into marketable drugs. In order to obtain market authorisation for such drugs, quantitatively very important data files have to be submitted to national and international authorities. The MANSEV project aims at facilitating and accelerating this process by developing tools for electronic submission.

The results of clinical research enable the development of guidelines for best medical practice. For the development of such guidelines, recent results have to be placed in the context of results previously published in the literature. It was, therefore, useful to develop tools for literature review and guideline development. The ECOLE/GRIP project deals with this subject.

Medical doctors would be helped if decision support systems were based on accepted guidelines. Medical work would be facilitated if patient data entry would use the same structure whether the intention is to enter a patient in a clinical trial or to obtain advice from a decision support system. An electronic patient record able to inter-operate with both the MAC-RO tools and the decision support system, would be helpful. The PROMPT project has developed both: a patient record and a decision support system.

It is not enough to include new research results in guidelines. Continuous training of medical doctors about new research results is also essential. The MEDICO project assures regular television broadcasts for health professionals about new research results and new views on all aspects of disease and health. These broadcasts are interactive due to the use of ISDN connections at the receiving centres. Moreover, the broadcasts are made available on the Internet both using real audio and on an experimental basis using real video.

Accurate diagnosis is a cornerstone of good quality medical care. Therefore, multimedia communication between pathologists and the sharing of reference image banks tumour markers, facilitates the access to expertise and actually decreases diagnostic inaccuracies. The EUROPATH project has developed the technology, operating protocols and guidelines for remote consultation and access to reference knowledge.

In case the treatment choice involves transplantation, it is useful to have common standards between all tissue typing laboratories, donor hospitals and diagnostic centres. The projects RETRANSPLANT and MARGRITE work in this field and allow transplant centres to efficiently work together.

Once a treatment schedule is applied, its execution should be carefully controlled in order to avoid mistakes which sometimes can have catastrophic consequences. The projects CONQUEST and TARGET offer tools for quality control.

Setting up a network

Telematics applications for collaborative work of health professionals are designed to promote national and international collaboration between health actors in order to improve prevention, early detection, diagnosis and treatment of disease while facilitating access to best medical practice regardless of location. Single users and peripheral centres will be able to seek decision support for patient management and referral from reference centres using tele-consultation. Each reference centre will be responsible for compiling and updating information for one or more specific aspects of one or more diseases. In this project group, as outlined above, most projects have chosen cancer as the disease for validating the

applications. A network of cancer centres has therefore been planned. The onconnected.net portal will play significant role in this respect. The mid-term outcome of the network was the promotion of inter-operability of systems and inter-communicability of medical professionals on the one hand and the formulation of guidelines for best medical practice on the other (Figure 1).

Technological challenges

The telematics applications for health professionals are potential new communication technologies as more integration and better continuity will be available. The foreseeable improvements are:

- the use of broad bandwidth communications allowing on-line tele-consultation for diagnosis and treatment planning,
- the use of voice dictation as a fast and user friendly component of multimedia files documenting any second opinion request on difficult cases in tele-radiology and tele-pathology,
- the use of wireless communications in ambulatory care and for diagnostic assistance in developing countries,
- the development of new methods and technologies that ensure integration of existing and new information systems and improve accessibility and high quality interaction between all groups of health professionals,
- the widening of the scope towards services for citizens. This would require the use of interactive TV and Internet which would support easy access to - and implementation of - certified information and guidelines allowing the citizen to interact with the whole spectrum of partners able to contribute to a healthy lifestyle.
- A major bottleneck is the fact that a standardised patient record is still missing though the use of Multimedia tool for remote consultation and treatment is becoming more user friendly by icon based interfaces (Figure 2).

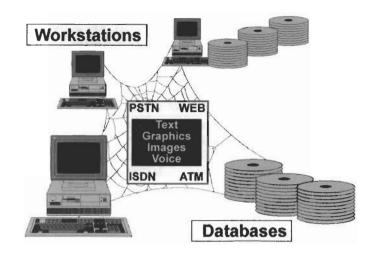


Figure 1. The professional network encompasses dedicated data bases and workstations for data exchange, storage and retrieval. The enabling technologies are becoming available on a broad basis and it can already be anticipated that inter-operability between systems and inter-communicability between health professionals will be rapidly promoted by daily use. A major outcome of the network is the accelerated set up of consensus-based guidelines and best medical practice recommendations.

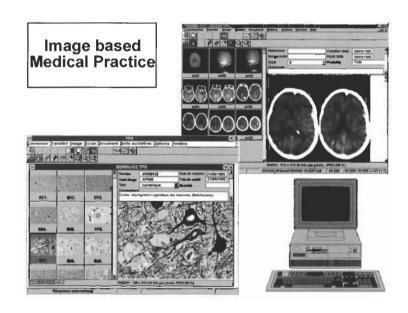


Figure 2. Icon-based interfacing makes it possible to design multimedia soft-ware packages for creating, forwarding and receiving medical documents comprised of text, images and voice files. The use of the same document formats and communication protocols in the various medical departments is expected to promote communication between different categories of health professionals (pathologists, radiologists, clinicians) thus facilitating, in the medium term, the continuity of care and the convergence toward standardised medical records.

Impact

The projects co-ordinated in the cluster dealing with health telematics applications for Oncology had a significant impact. The results can be summarised as follows: Image-based teleconsultation tools (pathology, radiology, radiotherapy) have been marketed in Europe and the

United States, shared webbased patient records have been implemented in several regions and countries over Europe, remote data entry for clinical trials is increasingly being used by pharmaceutical companies as well as in public medical research institutions and continuous medi-

cal education has been deployed through the internet. These concrete results are now monitored and amplified by industrial companies offering tools and services to regional public health networks and dedicated oncology and cardiology networks.

PROJECTS in Group 2:

CONQUEST, ECOLE/GRIP, EUROPATH, HORIZON, INTERPATH, MACRO, MANSEV, MARGRITE, MEDICO, PROGUIDE, PROMPT, RETRANSPLANT, RUBIS, TARGET

Group 3 MEDICAL IMAGING

Group Leader: Luciano Beolchi

Medical imaging in figures

The medical imaging sector is traditionally one of the areas most interested in technology development. It is user oriented and has a long history of working with industry to produce innovative solutions.

During the last two decades two synergetic phenomena have conditioned the production and the distribution of medical images: the rapid development of the technologies for capturing medical images and the development of Informatics and Telematics. In 1996 the imaging market in Europe was well described by the following figures:

2.000 MEURO: the total market 1.300 MEURO: X-rays and MR imaging + nuclear medicine 300 MEURO: ultrasound scan equipment

300 MEURO: medical electronic equipment.

The proportion between the GNP and expenditure for medical imaging equipment is shown in Figure 1.

In spite of the increasing demand for medical images in applications and services, only the first steps towards a general interoperability of image data bases and the full integration of medical images into the medical record have been taken. There are still economical, technological and legal issues which are high on the agenda of both the manufacturers and users, such as the availability of fully accepted standards, legal issues connected to image compression, profitability in the market, clear data on cost-effectiveness of integrated applications and services, confidentiality and liability.

Since the beginning medical imaging has been one of the main areas of interest for "AIM" and "Telematics Applications for Health". During the 2nd and the 3rd Framework Programmes multiple areas were explored, among others, Image processing, PACS systems, Dedicated workstations, Virtual Reality and Stereotaxy.

With the start of the 4th Framework Programme in 1995, 10 projects were clustered and named "Group 3, Departmental systems and medical imaging"; later, more simply, "Medical Imaging".

It was quite a composite group and, at the start, (January 1996), even incoherent. The projects targeted different users and customers, and were using quite distinct technologies and even addressing disparate clinical objectives. The main aspect that the 10 projects had in common was the use of images and connected problems. The common problems were mainly standards, formats, terminology and coding.

In June 1996 the group started to work on the hypothesis of a common objective to be developed. That common objective was found in integration / interoperability of medical imaging, according to the vision developed in Figure 2. Many efforts were concentrated in the preparation of a specific workshop which took place during 17-18 March 1997. Afterwards a project was initiated, named Medimedia, for integration and interoperability of Medical Imaging.

Source: OECD - GNP vs HEALTH CARE expenses in 1992

GNP: 17870 B US\$	Health care spending: 1720 B US\$	Medical industrial products 720 B US\$	Medical systems 19 B US\$	Major medical equip.: 5 B US\$
	\ 	Labs (8% 08%)	see s	0.4 (8%) Therapy 0.5 (12%) Nuclear Medicine 1.6 (16%) MRI
1720 B 9.6% G	B US\$ 296 B 6NP 17% G	NP Medi- cation Surgices supplies		1.3 (26%) CT 0.2 (4%) Litho- tripsy 0.9 (18%) Anglo- graphy

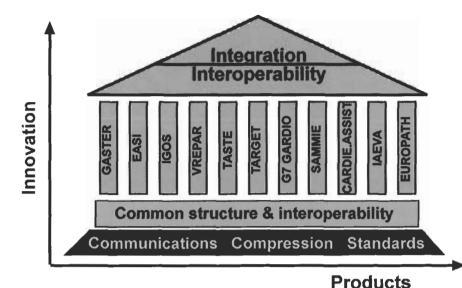


Figure 2. Integration/interoperability of medical imaging

Vision for the future

In 1895 the first x-ray film was produced. During the following century (1895-1995) a number of technologies were developed in the areas of radiology, endoscopy, pathology, ophthalmology and so on, utilising both the visible spectrum and the invisible spectrum of light. A powerful industry intended to satisfy customers' increasing demand for high quality images developed. In recent years priorities have changed.

The improvement of image quality is no more sufficient, because images are supposed to improve the overall clinical process. That means not only to facilitate diagnosis and treatment, as is obvious, but to reduce costs, and improve the efficiency and efficacy of the overall process

The industrial challenge imposed new paradigms for the research. In the past the industrial chal-

lenge, the search for "industrial quality" oriented R&TD towards the image captors, the image displayers and the contrast media: those were the main factors for image quality improvement. The sciences leading the process, if we want to see the thing from this point of view, were physics and chemistry.

Since 1990 the "informatics quality" represented the main objective of the industry and the main demand from the customers. It has been articulated into different steps. Image processing, standards and commercialisation were the main issues in the first step (90-95); integration and interoperability are the main issues at present. The leading science is Logic.

In future, starting from the year 2000, a new objective will be given to the industrial production from the customers, that is clinical quality. As a consequence Ontology will be the driving science and the objective of the research will be pattern recognition and 4/5 D imaging.

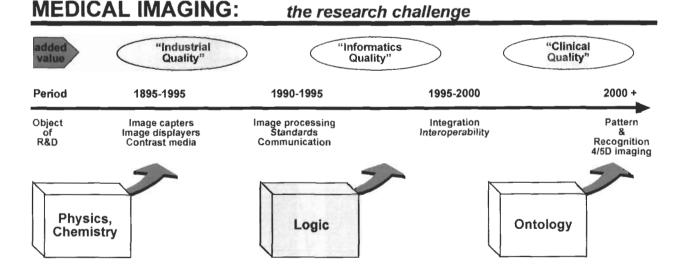


Figure 3. Medical imaging: the research challenge

PROJECTS in Group 3:

CARDIASSIST, EASI, GASTER, GASTER II, IAEVA, IAEVA II, IGOS, IGOS II, MEDIMEDIA, ORQUEST, ROBOSCOPE, SAMMIE, TANIT II, TELEINVIVO, VIRTUOSO, VREPAR

Group 4 CONTINUITY OF CARE, REGIONAL HEALTH CARE NETWORKS, INTEGRATION PLATFORMS

Group Leader: Irmgard Heiber

Continuity of care is defined as the continuous care of each patient regardless of both the distance to the care system and the time when access is necessary. This implies the aspects of equal access to care, equal quality of care and efficiency of care. Continuity of care has to be understood as a continuity when passing the patient from one service to another in a hospital, from a hospital to a general practitioner and vice versa and from these entities to any other professional in health care. Furthermore this continuity has also to be respected in the different phases of healthcare, from prevention to care itself, to rehabilitation. This continuity requires a huge amount of data to be exchanged between the different healthcare professionals who deal for the first time directly with the patient. For good planning and management of

care this data (or part of it) has also to be transmitted between the different administrative and management levels.

Regional Healthcare networks are the infrastructure necessary to facilitate the necessary data exchange. A regional network is an enabling mechanism, a technical aid but not the solution to all problems in continuity of care. The ideal network interconnects all healthcare professionals including administrations etc. in a defined region.

Integration platforms are platforms that allow the interconnection of the different available applications (e.g. departmental systems). They allow the data exchange between these different vendor dependent systems in such a way that the user does not

perceive that different and normally incompatible systems are working together. One possible technical solution is the application of a healthcare middleware which interconnects different systems.

Targeted Population

In the following table the targeted groups of healthcare professionals which will be affected by regional healthcare networks and who are involved in the continuity of care are classified. Only the first 3 groups will be involved in the process of decision on the purchase and installation of these systems, with a lesser involvement of the hospital managers themselves concerning decisions on widespread networks which go beyond the needs of a single hospital.

Project	Content - outcome - product
AORTICS	Integration of bedside monitors etc. to local / central computer
	(intensive care), especially testing of standards (Vital)
CHIN	network of basic generic services in co-operative HC information
	networks with possibility to include specific services
COCO	regional HC network using EDIFACT
Diabcare-Q-Net	guidelines for diabetes and quality control network
Hansa	integration platform via middleware
Isar-T	regional HC network for information exchange between hospital
	and GPs using different communication techniques
Ithaca	implementation of EPIC architecture for information exchange
	between HC and SC + telecare + assessment
Planec	intelligent information system for socio-economic monitoring,
	evaluation and strategic planning for elderly care
Prestige	development of guidelines for major diseases
Remedes	services and network for GPs and primary care and connection to
	secondary care
Star	open networking systems for communication on regional level
Tanit II	Integration of bedside monitors etc to local / central computer
	(intensive care)
HC-Rema	tool for economic etc. evaluation for different HC professionals
	including administrators
Use DHE	dissemination of HANSA

Keywords and attributes of regional healthcare networks

The following figure illustrates the data-flow between healthcare professionals, showing access to information about a specific patient by any healthcare professional. This implies

- the interconnection of all healthcare and other related professionals,
- the control of access with authorisation mechanisms,
- access to the information which

is relevant for the specific healthcare professional without access to all data of this patient,

- the access of managers etc. to that data needed for management, evaluation etc.,
- the control of the addition /deletion of parts of the information on each patient,
- secure and legal storage and transmission of this data.

Group 4 at a glance

Projects in the group can be classified as follows:

- Emerging regional HC networks: ISAR-T, CoCo, Remedes, Chin, Star with Remedes and CoCo being based on EDIFACT and Star and Chin on more advanced technologies.
- Integration platforms, middleware: Hansa, UseDHE, Star
- Integration platforms at a bedside level: Tanit II, Aortics
- Integration with other professionals: Planec, Ithaca
- Clinical guidelines: Diabcare-Q-Net, Prestige
- Economic evaluation tools: HC-Rema
- Quality networks, speciality transregional networks:
 Diabcare-Q-Net.

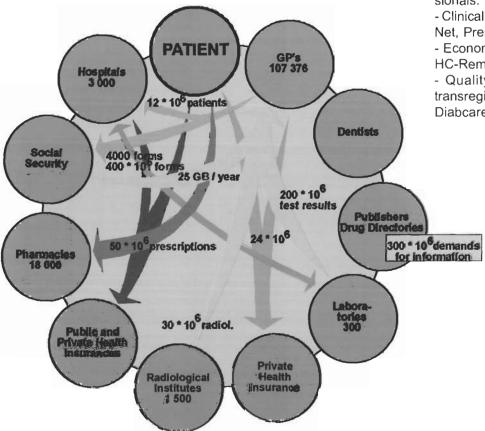


Figure 1. Communication scenarios in Germany. Data taken from the project CHIN (all exponents of 10 are 6)

PROJECTS in Group 4:

AORTICS, CHAINE, CHIN, COCO, DIABCARE-Q-NET, ENN, EUPHIN-EAST, HANSA, HC-REMA, INTERCARE, INTRANET HEALTH CLINIC, ISAR-T, ITHACA, NDSNET, PATMAN, PLANEC, PRESTIGE, PRIMACOM, REMEDES, STAR, USE DHE, WISE

Group 5 TELEMEDICINE

Group Leader: Pekka Karp



In the 4th Framework Programme emphasis has been on the development of applications for emergency telemedicine, with up to 70 % of funds directed to this area. In many EU Member States the scope of telemedicine has become larger with national

strategies pointing to the realisation of distributed citizencentred care systems. In these plans telemedicine is often referred to as one of the tools supporting the reorganisation of health services towards this goal.

The targeted populations, types of telemedicine interaction, typical applications and technologies used are shown in the following table:

Targeted population	Typical application	Technologies used		
Type of interaction				
Medical staff<-> Medical staff Live 1 Store and forward 2	Expert opinion, 2nd opinion (teleophthalmolgy, teledermatology, telepathology, teleradiology)	Videoconferencing and multimedia e- mail over ISDN and Internet, security technologies Future: mobile device technologies, including satellite; virtual reality technologies; PDA		
Medical staff <-> Medical staff + patient	Teleconsultation in conservative care	Videoconferencing over PSTN or ISDN; teleguided robotic technologies		
Live	(teledermatology, telepsychiatry); Telerobotics (telesurgery)	Future: technologies to transmit the tactile sense (haptic feedback)		
Medical staff <-> Non- medical staff + patient	Teleconsultation in emergency care	Videoconferencing, transmission of vital signs over mobile communications Future: direct information transmission		
		from microsensors and –systems		
Medical staff <-> Citizen/patient	Lifestyle counselling, home care (disease management, e.g. diabetes)	Video telephony and conferencing over PSTN, ISDN or Internet, interactive TV, multimedia e-mail		
Live Store and forward		Future: Integration of intelligent monitoring equipment, including information transmission from microsensors and –systems; PDA		
Medical staff <-> Healthcare organisation Live Store and forward	Teleworking (teleradiology, telepathology)	Videoconferencing, multimedia e-mail over ISDN and Internet Future: mobile technologies, including satellite		
Medical staff <-> Virtual university Live On demand	Teleconferencing, teletraining	Videoconferencing, multicasting, video on demand over ISDN, Internet or satellite, virtual reality technologies, data mining		

on-line connection, involving simultaneous remote presence of two or more telemedicine actors

² off-line connection whereby e.g. consultation request is sent using multimedia electronic mail for later reply and reporting

Telemedicine in Europe

In Europe healthcare is currently undergoing a paradigm change of which a shift from healthcare institution-centred care to a citizencentred care is a prime feature. The new paradigm includes the informed citizen caring for her/his own health, and stakeholders responsible for the continuity of health services within a region. Several countries foresee the wide use of telemedicine as a primary tool to decentralise health care and bring it closer to the citizen. At the same time governments in Europe are facing an increasing need to improve the accessibility, quality and quantity of health care services while trying to constrain the costs. One of the solutions to this difficult equation is the deployment of modern information and communication technologies in order to introduce new and more cost-effective services, including telemedicine.

Market Situation and Prospects

In a recent market study the total European¹ market for telemedicine in 1997 was estimated to be about 52 MUSD with sales of about 2800 diverse telemedicine units². In the US, the total telemedicine market in 1997 was 643 MUSD³. The breakdown of the market with respect to purchasers in 1997 was the following:

Purchaser	Market (MUSD)
Medical centres	463
Military	70
Correctional institutions	51
Medical schools	32
Residential	27
Total	643

The market was expected to remain below 1000 MUSD in 1999, but was also expected to grow to nearly 3000 MUSD by the year 2002, with interactive video room systems, telemedicine workstations and teleradiology systems as the leading market segments.

Some of the present telemedicine applications will be "absorbed" in general purpose health information networks. In the developed countries IST for health are moving towards deeper integration of systems and information. Following this trend

the "traditional" speciality based, separate telemedicine systems will be integrated to general telemedicine systems or regional health information networks capable of handling the full variety of teleconsultation and telecare situations.

The systems will also have integrated access to earlier patient data stored in electronic health records, and they will also feed data to the patient record and administrative systems as well (see Figure 1).

Professionals in	Need
Public authorities: ministries, regional and local HC administrations	Planning, evaluation, organisation of the whole system, epidemiology
Health insurance systems	Economic data, payment demands, evaluation
Hospitals	Planning and management, economic data, contact to all other professionals outside the hospital
Departments	Integration of systems on department level
Every entity which deals with healthcare	Contact with each other via health care networks

¹ EU + Norway + Switzerland

² Frost & Sullivan: European Market for Telemedicine, 1998

³ Business Communications Company: *Telemedicine Opportunities of Medical and Electronic Providers*, March 1998

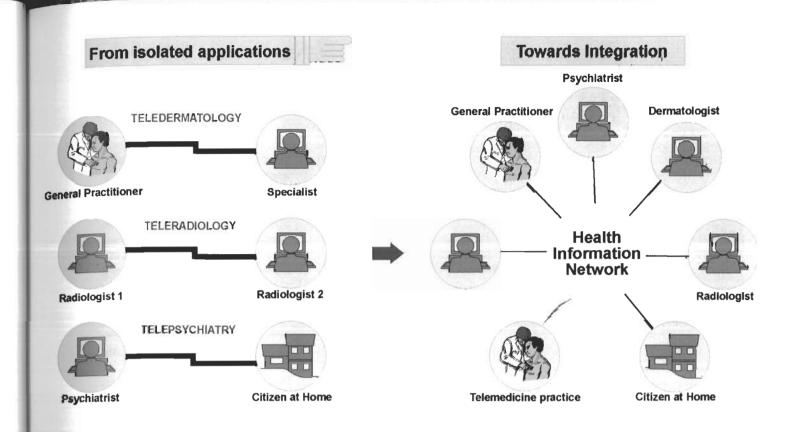


Figure 1. Telemedicine is moving towards closer integration with health information networks and integration of applications on generic platforms

Telemedicine will go mobile. Wireless communications based on wideband technologies and devices will find widespread use both inside healthcare institutions and outside. Rapid development and the decreasing cost of satellite communications will foster the development of portable telemedicine terminals, both for professional and home use. Landbased mobile networks will be complemented by satellite networks, operated through low (LEO) or medium earth orbit (MEO) satellites. These new networks open interesting possibilities for telemedicine. In the developing countries they bypass the ailing fixed network infrastructure and its limitations and make it possible to provide high-quality telecare to the most distant locations on earth.

Telemedicine will go global. In the developing countries, telematics and telemedicine presents a unique opportunity to improve the quality and accessibility of care and thereby the health of their

populations. Therefore the WHO has planned to include telehealth and telemedicine as a part of its strategy Health for all for the 21st century⁴. It is expected that telemedicine will have its major impact in health education, training of health personnel and in the management of emergency situations. Global telemedicine applications will be developed, such as lightweight portable telemedicine workstations equipped with wideband satellite communication facilities.

PROJECTS in Group 5:

AMBULANCE, ATTRACT, ARGONAUTA, EMERGENCY-112, ET-ASSIST, ET-SETUP, HEALTHLINE, HECTOR, HERMES, HOMER D, IN EMERGENCY, MERMAID, MOBCARE, MOMEDA, NIVEMES, OPHTEL, SAMTA, TELEPLANS, TESUS, T-IDDM, WETS

⁴ see http://www.who.int/ism-htp/s-rptm.htm

Group 6 INFORMATION FOR CITIZENS



Group Leader: Ramón Puig de la Bellacasa

Most citizens ask for, or receive health related information: mainly at community centres (schools, leisure or sport facilities, public services places, etc), at work or during professional training, or at home, with particular emphasis on preventive, primary care and public health aspects.

Particular attention is paid to the information requirements of those who are personally, through their family or professionally, afflicted with or concerned by a chronic disease, a severe disability or a high dependency situation such as drug addicts, mentally ill persons, etc. Some population groups require adapted information: children (and their family), young people, older persons, socio-economically disadvantaged citizens.

Potentially all young, adult or older citizens are consumers of health related information (with a pro-active or a re-active motivation). But children can also be informed and educated in healthy habits through appropriated channels. Some specific segments of demand should be highlighted: mother/child health, teenagers, older persons, native populations and inhabitants of remote areas, ethnic minorities, school pupils, poor people or people subject to social exclusion.

Statistical estimates

The general public, composed of the 350 million Europeans, are potential consumers of health information through the modern telematics and multimedia channels. Particular categories of population include children/parents, youth, older citizens, athletes, etc.

These categories have specific expectations and information needs. As an example, older persons with a severe degree of dependency in Europe can be estimated at around 6 million persons. If we add the people under sixty suffering from the same conditions, we arrive at a figure of 9 million persons in a situation of high dependency, due to a health related condition.

Taking into account the family and carers, 30 million persons in the European Union are directly concerned by these situations of severe dependency, involving physical, psychological and social aspects directly connected with their health status.

The sector of health providers and social and educational services in the community (including non-profit organisations and volunteers) also needs support to give appropriate information to citizens.

The sector of health care professionals numbers 6 million, of whom 800.000 are general practitioners.

1995-1997 R&TD activities of Group 6

Without co-ordinated health and social care actions, the information provided by the services who are in direct contact with the citizen will be fragmented. It will be very difficult for persons in search of health related information to get the comprehensive view that they

need. This is the reason projects working to improve communication between citizens and professionals (Group 6) must take into account the process of services integration and continuity of care (see Group 4), as well as the evolution in health cards (see Group 1), which can be future tools for better information handling and improved communication between citizens, patients, professionals and health care services.

Projects dealing with health information for citizens were: CATCH (preventive information on prevalent health risks), HS PRO EU (Health and Safety Promotion in the European Union), InfoCARE (interactive information system for health/social care), SEAHORSE (focused health-social information for AIDS patients and their relatives and carers), and TESEMED (information on self-medication).

Outputs (types of products): Database management software, information display and navigation systems, multimedia interfaces, knowledge based systems, information kiosk hardware and software, Internet compatible software, health cards systems

Perspectives

Life-long health self-management is a challenge for many families and individuals in their ordinary life (as distinct from life in hospital).

The main goals are: to reduce risks (avoid being hospitalised), to rehabilitate and treat chronic disease or disability conditions (after hospitalisation), and to provide better quality during a longer life expectancy.

The Context of Information to the Citizens within the Person-Centred integrated Health and Social Care

AGENCIES: RE-ENGINEERING & COORDINATION PROFESSIONALS TRAINING PRIMARY & SECONDARY HEALTH CARE CENTERS The first graphic (Figure 1) UBLIC HEALTH presents the frame and the pic-PREVENTION REHABILITATION MAINTENANCE ture of this relationship among the PROFESSIONAL HANDLING technical and care-oriented areas of action addressing holistic goals. The technological areas of progress will not fulfil their RECORDS goals without progress in the other domains. The information, OL. GROUP to be meaningful, depends on HEALTH progress in the other areas. RESEARCH, PLANNING, EVALUATION

Figure 1. The frame for the context of information to the Citizens

The second graphic (Figure 2) shows that the health and social care co-ordination between secondary, primary, local and regional levels, obtained through integrated information platforms, is the necessary foundation for the planning and evaluation of services and for information and communication with citizens and self-health management. In the opposite direction: without evaluation and planning, and without involving the clients of the health services through good participative-information channels, the integration platforms will not be enough for "re-engineering" the health services.

The Context of Information to the Citizens within the Person-Centred integrated Health and Social Care

SECONDARY AND PRIMARY CARE
LOCAL AND REGIONAL LEVELS

PLANIFICATION & EVALUATION of SERVICES

INFORMATION for CITIZENS & SELF-HEALTH MANAGEMENT

Figure 2. The co-ordination of the context of information to the Citizens

PROJECTS in Group 6:

BEAM II, CATCH, CATCH II, EISOSH, HS PRO EU, INFOCARE, SEAHORSE, SEAHORSE II, TESEMED, TESEMED II

Group 7 EDUCATION - REGULATORY ASPECTS - ASSESSMENT



Group Leaders: Pekka Karp, Jacques Lacombe, Petra Wilson

Overall Objectives and Targets

The projects of Group 7 have three target areas: information and education dissemination, regulatory aspects and technology assessment. The group included 26 projects. During their active lives they were further split into three sub-groups reflecting the three issues named above and lead by three different members of the team (Jacques Lacombe, Petra Wilson and Pekka Karp respectively).

1) Information and Education -EHTO, IT-EDUCTRA, NIGHTIN-GALE, EOCS, WOMAN, EUPHIN-EAST, ALLNET, CAN-TOR.

As the most relevant Information Project in this group, the EHTO website (www.ehto.org) started as an "Accompanying Measure" to the 4th Framework Programme for raising awareness of the health community to the potential of telematics. Since July 1999 EHTO became an independent entity.

The EHTO Portal is reinforcing its strong interaction with the National Languages Affiliated Sites. It is supplemented by a growing network of "Affiliated sites" giving information in the language and in the culture of the users and extending outside the EU (Finland, France, Greece, Spain, Portugal, Romania, Ukraine).

Whilst the dissemination of information about new tools and applications is essential to their uptake, so too are education tools which pave the way for their daily use. A number of projects targeted key users groups and

produced material to assist them in using the newly developed tools in their provision of care to patients and citizens. These projects have resulted now in an impressive library of multilingual courseware (on CD-ROM) for the following key areas:

Health Care Professionals
- IT EDUCTRA
Nurses - NIGHTINGALE
Pathologists - CANTOR
Paediatrians - ALLNET
Gynaecologists- WOMAN
Public Health ProfessionalsEUPHIN-EAST
Social Care ProfessionalsEOCS:HSC

Dissemination through support to conferences

As well as supporting Research and Technological Development work, a number of pure dissemination measures and accompanying measures supporting key conferences were supported by the 4th FP. In the Health telematics Field these included: - HEAL SA, MIE 97, EURO-AMERITEL and TELECAT.

Legal and regulatory Issues - SIREN, ISHTAR

Legal and Regulatory Issues in Health Care Telematics encompass both written legislation of the European Communities and Member States which regulated directly the way in which health care telematics are used by professionals and citizens, and the wider ethical codes and policy documents which influence the way in which Health Telematics

are deployed on a daily basis and which together with written legislation affect the development of Health Telematics policy.

Two projects in particular sought to provide adequate guidance on how to comply with the legal reguirements of legislation. They were ISHTAR and SIREN which focused on the impact of data protection legislation and digital signature legislation on the legal responsibilities of Health Care providers using telematics applications in care delivery. They provided detailed information on key directives, such as Directive 95/ 46/EC on the Protection of individuals with Regard to the Processing of Personal Data and on the Free movement of Such Data, the object of which is to harmonise data protection legislation in the member states in order to facilitate the free movement of goods, services and people. The aim is to remove any objection from one member state that it cannot interact with another because the other requires too great or too little data protection. The Directive gives basic rights of consent, verification and correction to individuals and duties of adequate information and secure storage to data processors. The SIREN project focused in particular on the provision of information on compliance with data protection and security requirements, while ISHTAR developed a set of electronic training modules for three distinct audiences: Health Care Professionals, Health Care Managers and Systems Administrators, on compliance with the relevant legislation.

Development of security tools and devices - TRUSTHEALTH (1 AND 2), NETLINK, NETLINK CEE

Compliance with legislative requirements to protect the privacy of person identifiable data cannot be achieved solely by providing information on the requirements. In some cases special tools will have to be developed that can handle these security reguirements within the context of healthcare service provision. Accordingly four related projects developed a series of systems specifications and tools kits for overcoming the security problems and issues raised by the use of smart card activated healthcare networks and secure messaging systems protected by digital signatures.

Development of assessment tools - ABC MALE, AORTICS HEALTHWATCH, TASTE, VATAM, VICO, TEACHEALTH

The purpose of technology assessment in healthcare is to produce information on the safety, efficacy, effectiveness, cost, efficiency (cost-benefit, cost-effectiveness or cost-utility) of a technology and on the social, legal and ethical consequences of its introduction. This information provides a basis for rational decision-making whether or not to exploit a given technology, i.e. to promote or to prevent the diffusion of technology. The objective of assessment is to influence the diffusion of technology, either to speed up the adoption of effective technologies or to hinder the ineffective ones (Figure 1).

The information technologies for healthcare are often complex, the impact following their introduction often extends beyond the primary user organisation, and some of the benefits (or drawbacks) of the technologies are intangible or not quantifiable. In general, application of information technologies will primarily influence the process and eventually even the structure of health care delivery. As a consequence, existing assessment methodologies designed to measure directly the patient outcome such as randomised controlled trials, cannot in general be applied to the evaluation of information

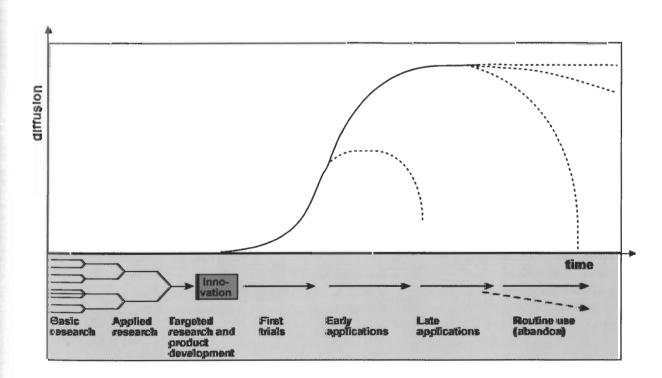


Figure 1. Diffusion of healthcare technologies as influenced by the technology assessment. Technology assess ment should provide information at the early phases of diffusion in order to be useful in the decision-making process.

technologies (see Figure 2). A fortiori, evaluations applying a non-exhaustive set of methods or unsuitable methods may have a severe negative impact on the progress of IT in health care.

However, information technologies are irrevocably pervading health care, and decisions on

their implementation must be taken. Rational decisions need to be supported by objective information demonstrating the consequences, both positive and negative. Neither the "traditional" health technology assessment nor any other discipline can at present supply a full set of proven methodologies for relevantly

measuring the full spectrum of effects of the implementation of information technologies. Therefore the development of methods needs to be continued by the international R&D community. This research should at the same time be complemented by EU projects where the methods developed are tested and validated.

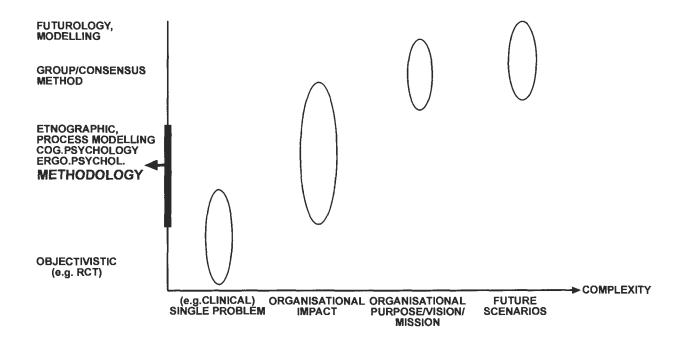


Figure 2. The assessment methodologies with respect to the complexity of the assessment task (from the IMIA WG13 - WG15 Workshop Report by N. Lorenzi and E. Van Gennip, 1998).

PROJECTS in Group 7:

ABC MALE, ALLNET, CANTOR, EHTEL, EHTO, EMG-NET, EOCS:HSC, EUMIE'96, EUPHIN-EAST, HEAL SA, HEALTHPLANS, HEALTHWATCH, ISHTAR, IT EDUCTRA, ITNICT, MIE97, NETLINK, NETLINK CEE, NIGHTINGALE, SIREN, TASTE, TAPLINK, TEAC-HEALTH, TELECAT, TRUSTHEALTH II, TRUSTHEALTH, VATAM, VICO, WOMAN

Group 8 INDUSTRIAL ASPECTS - INNOVATION & EXPLOITATION

Peter Fatelnig - Mary Fitzgerald



Introduction

Industrial aspects form an integral part of RTD projects in the Telematics Application Programme. The programme has been conceived to position European industry for new markets that will emerge as a result of research activities.

In 1994 Healthcare Services provided 6.55 %¹ of the total employment in the European Union. More than 13 million people work in healthcare services throughout Europe. It is an important player in the labour market today and will, with an ageing population and the related socio-economic change, play an even more prominent role in the future.

The vertical dimension of the employment in this sector is enormous. Highly qualified specialists, general practitioners, pharmacists and nurses have a quite different approach to the use of

technologies and especially to emerging telematics services.

Over the life-time of the Telematics Application Programme 1994 - 1998 our planet has changed face beyond recognition. In 1994 the Internet was still a tool for the gurus, the world counted a few 100.000 Internet users mainly from universities.

Just 4 years later in 1998, the web has been fully integrated in every corner of industry. Business conducted on the Internet was estimated with 40 Billion EURO with a perspective to reach 1 trillion EURO by the end of the year 2000².

Present situation of the market

Looking at the market, it is gigantic. Healthcare is the second largest social benefit after old age

pensions, it represented in 1998 expenditures of 479 Billion EURO³ for the 15 European Union countries, of which 12 Billion EURO went into IT. Until 1998 this market of Healthcare specific IT rose to 14 Billion EURO⁴ representing an annual growth rate of just 5%.

As most of these expenditures are labour costs, any impact of rationalisation can hugely effect the bottom line - or free resources to do more value-added work. But it is widely acknowledged that drastic changes will not come quickly.

- Any increased investment in a flat budget environment means reduction on another side - hence politics are involved.
- Lasting positive impact from information systems is only achieved when working patterns are changed to take full benefits - the paradigms of existing working habits can only be changed carefully.

Activities 1994-1998

The initiatives taken to promote the industrial and implementation aspects of the healthcare sector started at the begining of the programme. Figure 1 gives an overview about the industry scenario.

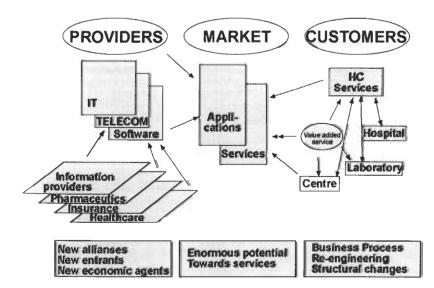


Figure 1. Health Telematics Environment

¹ OECD Health Data 1997

² Nicholas Negroponte, Global Internet survey 1998

³ EUROSTAT, Social Protection Expenditures and Receipts 1980-1995, ISBN 92-828-3717-3

⁴ Health Information Society Technology based Industry Study, Deloitte & Touche 2000

Mobile Telecom Operators

Mobile communications is one of the most dynamic segments in the telecommunications market. The health sector is a paradigm for mobile applications in different scenarios: in health institutions, in emergency cases, at home, at work or wherever people go.

Exploitation Plan - Technology Implementation Plan

A proactive approach towards implementation and commercial exploitation has been taken since project negotiation. Two contractual obligations were introduced:

- Technology Implementation Plan. All projects are contractually obliged to produce this report according to a predefined format. The TAP guidelines for this are based upon a model developed by the EU Innovation Programme. We should brief and encourage contractors to prepare it seriously, as a useful process for them and as a contribution to promote Healthcare Telematics markets.
- Exploitation Plan. The TAP guidelines indicate that all projects should include as a deliverable an Exploitation Plan. It should be ensured during negotiations that close-to-the-market projects include the development of a detailed exploitation plan as a part of the project, and that this document is included in the list of deliverables. This deliverable can be instrumental in preparing the Technology Implementation Plan and can provide more detailed and specific information. It will help contractors prepare exploitation activities as a key objective of the project, planned and budgeted as such, and with the real

participation and commitment of all partners, as opposed to a managerial report which may be produced only by the coordinator just for the Commission.

Workshops

Specific workshops dealing with industrial aspects have been organised.

- The first one in December 1995 was addressed to the industrial partners in our projects in order to reinforce the role of industry in the uptake of results.
- A second meeting in 1996, restricted to invited participants was organised to discuss specific industrial issues in relation to this group.
- In June 1998 a two day meeting, including an exhibition, with open participation was organised to clearly outline the needs for exploitation of results. Part of the workshop was devoted to a "training session" with experts from venture capital companies, banks, the LIFT¹ initiative and the IPR helpdesk².
- In November 1999 a meeting was organised to discuss the outcome of individual projects, foster project collaboration and discuss evolving industrial issues.
- In March 2000, the workshop on transfer of technology - exploitation & commercialisation was organised to ensure that TAP projects in their final phase receive support to guarantee a positive outcome.

Projects

In support of this industrial policy a number of projects have been launched. In particular the fragmentation of the players in terms of geography, products and the services offered has lead to a situation where an industry, large in terms of the market size (10+Billion EURO) actually had very little European representation.

The European Commission decided to support an initiative to create a European Forum for the healthcare IT industry and national authorities to discuss and represent common European issues. The EHTel Association3 was created in November 1999. currently representing about 70 members from industry, health insurers, national authorities and user organisations. This organisation will help to foster a strong and lasting European healthcare IT industry under a global perspective.

One other issue addressed was the involvement of mobile telecom operators in the Telematics Applications Programme (TAP). The MOBCARE project, selected in the last call of TAP, is a platform for the establishment of a group of mobile telecom operators to address exploitation issues and strategies for mobile applications in healthcare.

The project TEAC-HEALTH, an accompanying measure within the TAP programme, identified methods to be used in certification and accreditation of software applications in the domain of health. Applications have been grouped in three areas: Clinical software, Health related web-sites and Telemedicine services.

Initiatives LIFT and IPR

As a service to projects, but generally available to everybody, two new services were introduced.

¹ LIFT Linking Innovation, Finance and Technology (www.cordis.lu/lift)

² IPR Intellectual Property Rights (www.cordis.lu/ipr)

³ EHTEL HC5101, EHTel Association (www.ehtel.org)

LIFT - Linking Innovation, Finance and Technology⁴ provides projects with options and strategies to cross the border from public funded projects to commercial ventures. This support can range from advice on how to write business plans to an introduction into the research financing community. The IPR⁵ helpdesk supports projects in their efforts to protect their intellectual property. Often this is seen as a complex issue and therefore remains un-tackled till problems

arise, therefore the IPR initiative promotes the awareness of IPR and their safeguarding thus ensuring a competitive advantage.

Standardisation

In the area of standards, the activities of CEN TC251 (www.centc251.org) have experienced substantial developments. The chairman and secretariat of the committee have been replaced. The funding policy of DG Enterprise has been modified,

and this Unit has supported the preparation of a new mandate from the Commission (DG ENTR) to CEN/CLC/ETSI in order to initiate a new phase of medical informatics standards.

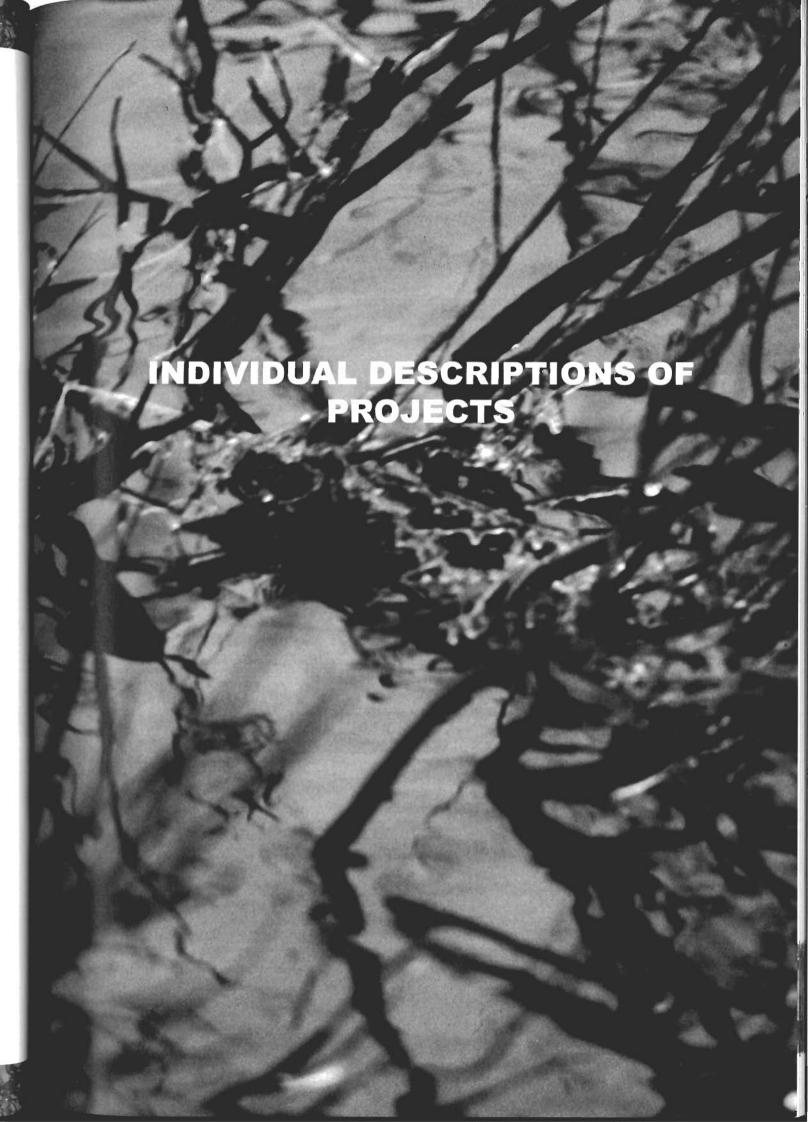
The work progressed around the working groups for Information Models, Terminology, Security, Safety & Quality and Technology for Interoperability.

PROJECTS in Group 8:

MOBCARE, TEAC-HEALTH

⁴ www.cordis.lu/IPR

⁵ www.cordis.lu/LIFT



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Keywords: accreditation, movement analysis, measurement laboratory, clinical guidelines, golden cases, rehabilitation

Group 7

ACCREDITATION BOARD OF CLINICAL MOVEMENT ANALYSIS LABORATORIES IN EUROPE

PURPOSE

The objective was to design and implement a telematics accreditation system (AS) for the clinical movement analysis laboratories (CMALs) in a domain where the relevant knowledge is fragmented and not yet formalised. The approach included:

- 1) User-driven and iterative system based on user requirements (UR).
- 2) Functional specifications for the demonstrator.
- 3) Implementation of the demonstrator.
- 4) Technical verification of the first prototype.
- 5) Verification and demonstration involving user community.

OUTPUTS

The main results are the design and the implementation of an AS for CMALs as well as the proper IT and technical tools for the procedure. The ABCMALE produced an accreditation system compliant with the EN 45000 family of norms and the ISO Guide 25, tools for operating the AS telematically: the procedures of the accreditation and the asses-



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E UROPE





sor operation implemented on the ABCMALE web site (http:// abcmale.ee.unian. it), structured domain knowledge composed of the normative references (Good Practice Guidelines-GPG) and of examples of the best practices (Golden Cases - GC), tools for collecting and developing added value services (tools for collecting and storing GPG and GC in databases and to make them available), tools for domain knowledge revision (DKR), the procedure and the telematics tools for it. The accreditation board reviews the proposals and defines the GPGs.

The exploitation policy is to transfer the right of use of the ABCMALE products to national

accreditation bodies. The costs for installing the AS can be better sustained by a transnational organism because of the limited number of CMALs in Europe. The tools for collecting and developing added-value services and the tools for the DKR seem to be of interest for the CMALs. Moreover a manufacturer of the relevant measurement systems is interested in structuring best practices.

BUDGET:

Overall cost: 686 265 €. EC contribution: 593 500 €.

CONTACT:

Università degli studi di Ancona

– Dipartimento di Elettronica e
Automatica, Ancona (I)

Porof. Tommaso Leo
http://abcmale.ee.unian.it

Timescale:

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Keywords: intensive care paediatrics, education, paediatrics

ALLNET PAEDIATRIC CRITICAL CARE TEXTBOOK

PURPOSE

While a wealth of scientific materials exists on the Internet, there has been little effort to fashion these materials into coherent educational tools. ALLNET is producing a graphically rich multilingual dynamic 'text-book' of intensive care paediatrics, entirely and freely accessible on the Internet. The textbook will be produced simultaneously in French, Spanish, English and Russian/ Ukrainian by a multi-national consortium of medical universities.

The main objectives of the project are as follows:

- 1) To produce the textbook of intensive care paediatrics;
- 2) To develop the methodology for web-based scientific educational tools that can serve as template for future similar efforts;
- 3) To demonstrate collaborative techniques for the educational, scientific and telematics communities.



The collaborative potential of the World Wide Web will be exploited in order to bring this project to fruition. Existing web-based repositories will be utilised whenever possible. The resulting methodology will be applicable across scientific disciplines.

OUTPUTS

The ALLNET project is currently in progress and is due to finish on 31/12/2001.

BUDGET:

Overall cost: 140 000 €. EC contribution: 140 000 €.

CONTACT:

University of Barcelona -Fundació Clínic (E) Xavier Pastor

E-mail: xpastor@clinic.ub.es

Timescale:



MOBILE UNIT FOR HEALTH CARE PROVISION VIA TELEMATICS SUPPORT

PURPOSE

Design and demonstration of a portable device usable for wireless emergency telemedicine in European countries. The device allows telediagnosis, remote supervision and teleconsultation of mobile healthcare providers by specialist physicians located in emergency telemedicine consultation centres.

Telemedicine can be the means of specialised pre-hospital treatment provided by paramedics in an ambulance with the support of experts located at the consultation site

OUTPUTS

A portable medical device has been developed that allows telediagnosis, long-distance support, and teleconsultation of mobile health care providers by experts located at an emergency co-ordination centre. Communications are performed via cellular networks using the GSM standard and the popular TCP/IP protocol that allows error-free data transmission over a large number of communication links. Four pilot sites have been used for verification and demonstration of the system. A brief practical and easy-to-complete Data Collection Sheet (DCS) has been designed on the basis of the considerations that the data collected on it together with the data stored in the system for each patient should constitute a



complete set, allowing retrospective evaluation and analysis. A sample of 100 patients per evaluation site was taken to establish a representative local sample and an adequate internal validity for the study. In terms of technical issues, verification results have shown the stability and robustness of the system in real-life emergency conditions. In terms of clinical results, pilots have demonstrated the potential advantages gained from use of the system.

Recommendations by users for future development include the integration of all systems (acquisition and transmission) into one module with possibly less weight. Additional recommendations include GPS/GIS integration.

The AMBULANCE demonstrator consists of two main subsystems: the mobile unit mainly consists of a biosignal monitor and a portable PC equipped with a frame grabber card, a CCD camera

and modem for communication with the server. The control of the mobile station is fully automated. The consultation unit mainly consists of a dedicated workstation on which the doctor sees the biosignals and still images received from the portable device, online from the emergency scene.

BUDGET:

Overall cost: 2 562 000 €. EC contribution: 1 200 000 €.

CONTACT:

ICCS-NTUA (EL)
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E-mail: spav@biomed.ntua.gr

Timescale:

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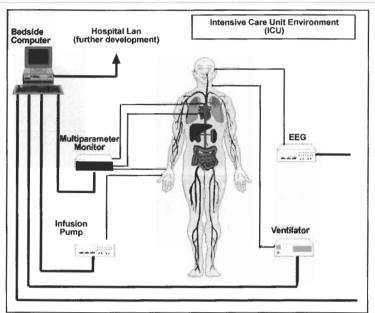
Keywords: network, intensive care, open system architecture

ADVANCED OPEN RESOURCES TELE-MATICS IN CRITICAL CARE SITUATIONS

PURPOSE

AORTICS is a network for the communication of medical devices. The project attempts to develop an open system (OS), where devices can be interconnected. An enormous amount of information is being generated at the bedside in an intensive care unit (ICU). This information is not always being captured, integrated and processed in order to achieve a better understanding of the condition of the patient. A remaining major problem is the communication between devices in this environment. Big-manufacturer solutions have not gained general acceptability. Consequently, there is an urgent need to have a set of standards for medical device intercommunication (MDI) that will provide the ability to connect devices to each other freely. The application of such standards will create a new concept of the monitoring capabilities in the different departments within a healthcare institution.

The objective is to develop, implement, demonstrate and evaluate a practical telematics platform for a local network in the critical care environment. The main contribution of this work is to create and validate an OS by implementing the normalisation work carried out by the CEN/TC251 WG5. The prototype will serve to test the norms and as the first practical feedback to guarantee that the norms will work in reallife situations. The results of this project



are expected to help to create products that can be officially certified and add specific value to customers and companies.

OUTPUTS

The project attempts to develop an OS architecture where devices from different manufacturers can be interconnected and plug-andplay operation is possible. The OS interconnection (OSI) reference model of the ISO is necessary to this end. A full family of standards for all seven layers of the OSI reference model does not vet exist. To build an OS for an ICU the existing standards have been compiled and analysed. For the lower layers publicly available hardware from telecommunication technology may be used. For upper layers the CEN/TC 251 WG5 developed standard for vital signs information (VITAL) representation shall be applied. The project development will also establish methods and software for device interoperability. The

AORTICS network will interrelate the different medical devices at the patient bedside in an ICU.

MDI makes it possible to analyse the biomedical parameters. The data obtained from several devices may be stored to register the vital parameters or for later processing. These biosignals shall be downloaded in an open format. The CEN/TC251 is working on the definition of standards for file formats to permit the interchange. End-user applications will test the network capability for the MDI.

BUDGET:

Overall cost: 874 000 €. EC contribution: 500 000 €.

CONTACT:

Software AG España, S.A. (E) Pedro Basagoiti

E-mail: pbasagoiti@dial.pipex.com

Timescale:

1996 1997 1998 1999 2000 2001

Keywords: telemedicine, education

Group 5

AUSTRAL ON-LINE NETWORK FOR MEDICAL AUDITING AND TELEASSIST-ANCE

PURPOSE

ARGONAUTA is an EU project of teleassistance and continuing medical tele-education for healthcare personnel working in remote areas of South America and Antarctica. Since the infrastructure is based on available technology the focus lies in the organisation of service contents, the formalisation of service provision and evaluation. We have used vivid scenarios to specify the system, which allow a) specification of the functionalities and the requisite hardware and software, b) identification of actors, their roles and tasks, c) identification of the new skills users must acquire, d) identification of the kind of training needed. Design and performance of an adequate training programme ensures the success of any telemedical system. The formalisation of the activity series from the analysis of these scenarios makes it possible to define medicaltelematics processes. This approach establishes a sound basis for a quality assurance strategy. Everyday medical processes will be inserted into a medicaltelematics environment more than in a system based on a purely telematics-technical concept.

OUTPUTS

Central nodes at University Hospitals of Santiago (CL) and Córdoba (RA) support the healthcare teams of four remote nodes in Chile and ten in Argentina

REMOTE NODE

(scanner or digital camera)

Internet POTS

ISDN

Satelite

Patient history

providing teleassistance and teleeducation services. The University of Bonn supports tele-assistance and provides contents for tele-education, while the Italian partners are mainly involved with the training. Tele-assistance services include synchronic and asynchronic teleconsultation and asynchronic evaluation of studies (e.g. ECG and X-ray and echographic images). Tele-education services include lectures, courses, and case discussions and consultation of databases. The consortium is engaged in a continuing evaluation process to foster quality and to refine user requirements. The approach is a successful example of telematics support to the healthcare process in regions with poorly developed telecommunications. This is of interest for East and Southeast European countries, including those needing support for restructuring their healthcare systems after armed conflicts. The approach used is of relevance for any telemedical application independently of its level of complexity or technological sophistication.

ARGONAUTA shall be made self-sustainable, at least on a regional basis. There is an increasing interest of healthcare providers in Argentina. Efforts are in course to create synergies with other providers of continuing medical tele-education contents also internationally. Other countries with a comparable reality to that of our South American partners have shown interest and are about to implement similar systems.

BUDGET:

Overall cost: 1 376 900 €. EC contribution: 940 000 €.

CONTACT:

DLR (German Aerospace Centre) (D) Luis Beck, M.D http://www.argonauta.de/

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1996	1997	1998	1999	2000	2001



Keywords: telemedicine, cable TV, homecare

APPLICATIONS IN TELEMEDICINE TAKING RAPID ADVANTAGE OF CABLE TELEVISION NETWORK EVOLUTION

PURPOSE

The main purpose of the ATTRACT project is to take advantage of emerging Cable Television network infrastructures to demonstrate how European healthcare providers can offer cost-effective care to patients at home.

Since the early development of telemedicine services, costeffective solutions have always been the result of using existing infrastructure to deploy the services. Next to the current development of the Internet, new developments in the area of broadband networks to the home, such as cable TV, are emerging now in the European market. This development will provide a cost-effective way of distributing information and services to the home users, an interesting and growing group of people who could benefit from telemedicine services.

If citizens and users could benefit from high-quality access to telemedicine services at home it would also imply cost savings for patients. The services developed can also significantly reduce the number of bed-days per episode of care, reducing the overall cost and having an important impact on the welfare of the patients, who can carry out their rehabilitation in their natural social environment.

The project aims to develop applications and services that provide an intelligent telematic environment for the patient in



Applications in Telemedicine Taking Rapid Advantage of Cable Television Network Evolution

institutions and other points of care that help the patient to continue, as far as possible, normal activities and external communication.

OUTPUTS

The project focuses on three main activities: firstly, analysis of the current possibilities to support affordable multimedia and interactive homecare services through emerging Cable Television in Europe; secondly, development and integration of broadband telemedicine applications to provide health professionals and patients at home with optimal environments for care services; thirdly, assessment of the acceptance and reliability of the supported services during a long-term, continuous period.

Services are developed, implemented and verified in specific healthcare application domains, being: Homecare, Rehabilitation, Follow-up/Monitoring of Patients and Training/Education.

Through the experience of the consortium from past developments and commercial market studies, these services were found to be extremely suited to the new services, which can be delivered through the use of broadband communication networks to the home, such as cable TV.

BUDGET:

Overall cost: 2 510 000 €. EC contribution 1 200 000 €.

CONTACT:

Universidad Politecnica de Valencia (E) Dr. Sergio Guillen E-mail: sguillen@eln.upv.es

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1996	1997	1998	1999	2000	2001

Keywords: biomedical technology, medical devices, clinical engineering, management quality control

BIOMEDICAL EQUIPMENT ASSESSMENT AND MANAGEMENT II

PURPOSE

The complexity of modern, technology-driven healthcare services requires an overall technology management system. The project focused on the development of telematics services for information compilation and exchange. The approach is based on standardization and compliance with the EU directives and standards. The telematics dimension is established to the existing status of the application domain introducing an integrated approach to management that incorporates the basic principles of quality management. The evaluation focused primarily on three aspects:

- 1) compliance of the system
- 2) the reliability and user-friendliness of the applications and
- 3) their cost-effectiveness. A total of 21 sites and one professional association were involved in the evaluation.

OUTPUTS

Timescale:

The BEAM demonstrator is a set of telematics services and locally-used applications that constitute a complete system of tools and services for the overall management of biomedical technology in European hospitals. The tools are applied locally to plan and log the activity related to medical

BEAM TOOLS MEMS
BEAM SERVICES

INTERNET

BEAM ONET / Road map

FINE DB 1

FINE DB 2

BEAM TOOLS MEMS
BEAM TOOL

devices. The tools are also used to plan the department's work and capture data of planned tasks, personnel management and financial performance. The services, BEAM@Net, focus on information collected either from official sources (listed in databases) or from information exchange between users. BEAM@Net has incorporated the existing data from both Euro MedPro and the FINE databases.

The standardized and harmonized nomenclature and codification of devices is of particular value. The results indicate that the applications developed are usable and functional and cover the needs of the users. Of great importance to the clinical engineering departments seem to be the amount, validity and updating of the information either included in the BEAM II tools and

services or managed by them. The main advantage of these tools is their use for data management (MEMS) as well as information resources (Euro MedPro and FINE).

Only a large amount of accessible information will change the internal dynamics of the biomedical technology market. Getting over the isolation of the regional markets and merging the local healthcare realities into a European one is fundamental. Also a "European Standard" of medical device management software is needed.

BUDGET:

Overall cost: 3 027 700 €. EC contribution: 1 386 000 €.

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| | E-ma



BLACK SEA TELE DIAB



Keywords: electronic health record, diabetes, medical informatics

Group 1 BLACK SEA TELE DIAB

PURPOSE

The Black Sea Tele Diab System (BSTD) has been developed within the INCO Telematic Applications Programme, to promote the development of electronic healthcare records (EHCRs) in Eastern Europe. The system uses the Good European Health Record architecture, developed within the Advanced Informatics in Medicine programme, to record standard diabetes data. The system can be used to support national and regional networks in monitoring the care of patients with diabetes.

The aim of the project is to develop a standardised software package (in the national languages of the partners) for the storage and transfer of medical information and healthcare data between participating institutions.

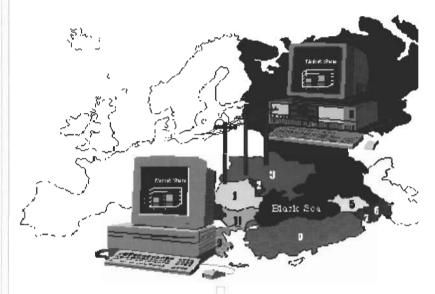
OUTPUTS

The functions of the BSTD system are: Patient Records (EHCR), Clinical Protocols, Reports and Statistics, Data Communication and System Administration.

Patient Records - allows the registration of a new patient, the recording of a new data sheet, corrections and the ability to search for and view a sheet.

Clinical Protocols - protocols that help the clinician with the management of diabetic patients.

Reports and Statistics - allows the printing of the selected sheets, the calculation of the WHO



DiabCare Aggregated Data, the creation of reports, tables and graphs.

Data Communication – a module that allows the exchange of data between centres and export of data between the versions of the BSTD system.

System Administration - definition of the healthcare facility; definition of persons; designation as users or system managers; management of passwords and access rights for the users; definition of measurement units; limited customisation of the user interface.

The first English version of the system V1.1 was released in December 2000. Formal evaluation of the system has been carried out by clinicians in the diabetes clinics. The final version of the software, based on the new object model and the additional clinical data items, was released in December 2000 for use in Romanian, Moldovan and Ukrainian centres.

Since the start of the project, the CEN pre-standard for EHCR has been published. The GEHR and EHCR-SupA project have had a significant input into the work of TC251 and the recentlypublished European EHCR standard (pr. ENV 13606). There is therefore much similarity between features in the GOM_{BSTD} model and that proposed in the standards documents. The system is in routine use in Moldova, in 3 centres in the Ukraine and 8 in Romania. It is being evaluated for use as a National Diabetes Register in the Ukraine and by WHO Europe as a means of developing the Quality Care Programme in Eastern Europe.

BUDGET:

Overall cost: 283 000 €. EC contribution: 283 000 €.

CONTACT:

University of Sheffield (UK)
Nigel Harris
http://www.telemed.ro/web_bstd/
Trio_new.htm

Timescale:

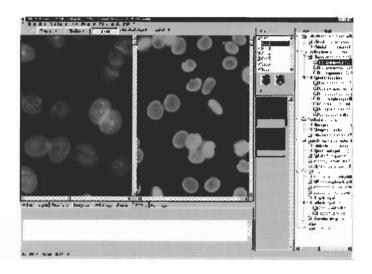


CONVERGING AGREEMENT BY NET-WORKING TELEMATICS FOR OBJECT RECOGNITION

PURPOSE

The project concerns clinical persons who are using diagnostic microscopy for subjective classifications of sera and tissue biopsies. The idea is based on the assumption that it is possible to transfer visual knowledge among such persons. This is facilitated by graphical visualisation and statistical analysis of subjective classifications of medical objects in digitised images. Moreover it has been demonstrated that using visual knowledge transfer in networking in diagnostic classification of sera and tissues has lead to a Converging Agreement in Networking Telematics for Object Recognition (CANTOR). Two healthcare sectors have been selected for use of the strategy: cancer histopathology and autoimmune serology.

The project is based on the concept and present technology of the software system 'Discrete Object Observation and Recognition System' (DOORS). The scope of the project was to further develop and integrate the DOORS software system and the CANTOR strategy into a functional and user-driven tool. More specifically, the aim of the project is to improve the networking utilities of DOORS. Furthermore. within the healthcare sectors of cancer histopathology and autoimmune serology, specific reference digitised image libraries have been assembled. These have been used for achieving



converging agreement in classification of objects. In addition, visual knowledge databases have been produced during the project. At the end of the project, these databases have been available via Internet in order to facilitate the use of CANTOR for education and training, quality assurance and standardisation.

In that context and regarding globalisation of expert knowledge via Internet, it is mandatory for the project to compete with constraints and expectations regarding commercialisation of the mentioned products. For that purpose the highest attainable quality of digitised images and expert knowledge have been aimed at regarding visual knowledge transfer.

OUTPUTS

This document reports on the elicitation of user requirements for the extended version of the existing DOORS software system,

development of the system based on these requirements and test of the system concerning the usability and the user acceptability for the required functions. Results and achievements of the CANTOR project have been reported by the deliverables presenting the outcome of the work packages. Furthermore, conference presentations and demonstrations have been reported.

Conclusions and suggestions for future versions of the product are presented in this report, while direct exploitation plans have been presented in a specific and 'restricted' addendum to this report.

BUDGET:

Overall cost: 1 438 558 €. EC contribution: 980 000 €.

CONTACT:

Risoe National Laboratory (DK) Verner Andersen http://www.risoe.dk

Timescale:



Keywords: 3-D ultrasound, echocardiography, teleconsultation, augmented reality, cardiology

Group 3

IMPROVING CARDIAC TELE-DIAGNOSIS AND SURGERY THROUGH ENABLING TECHNOLOGIES AND 3D ULTRASOUND IMAGING

PURPOSE

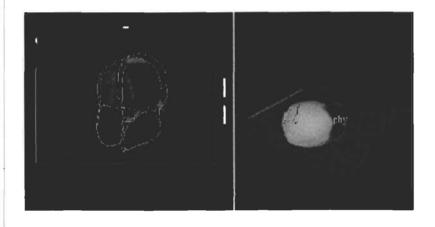
The Cardi-Assist project has enhanced accessibility of three-dimensional echocardiography by adding a virtual heart model to the ultrasound dataset as a spatial, structural, and functional orientation in diagnosis, training, and communication.

Cardi-Assist employed the augmented reality approach to improve the use of 3-D echocardiography. Databases of cardiac diseases which are documented via 3D ultrasound images and illustrated by interactive 3D graphics and animation provide a most valuable form of medical training.

OUTPUTS

The first prototype represents an extension of its SystemV ultrasound scanner. Vingmed's EchoPac3D software, used for postprocessing, anyplane viewing, measurements, and rendering, has been extended in Cardi-Assist with the virtual heart model as an orientation.

The second prototype is a new generation of EchoScan platform, an add-on device to commercial scanners. EchoView, the



postprocessing software package, can present a 3D section of the virtual model with a 3D surface rendering of the dataset created from a similar camera position as a comparison.

The third prototype, Echo-Com, represents a Windows-based stand-alone training and teleconsultation system that can read in processed datasets in Vingmed, Tomtec, and other formats. Through ISDN or local networks, two stations running EchoCom can be linked into a shared scenario that can be controlled from both sides.

Cardi-Assist has shown that augmented reality in 3D echocardiography is very useful for

diagnostic orientation, training, and communication. Systems have been developed that are ready for commercial exploitation by the project partners in the near future.

BUDGET:

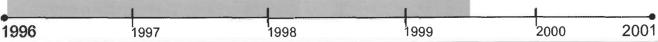
Overall cost: 3 441 000 €. EC contribution: 1 498 000 €.

CONTACT:
GMD(D)

Dr. Thomas Berlage

http://www.fit.fraunhofer.de/projects/ cardiassist/





A PATIENT-HELD PORTABLE RECORD FOR PARTICULAR APPLICATION IN CASES OF MEDICAL EMERGENCY

PURPOSE

The efficiency and effectiveness of health services are constrained by the inability to share paper-based information between healthcare professionals. Internationally also language and interpretation difficulties hamper information transfer even when paper-based records are available. This initiative demonstrates a case for a technologically sound way of sharing information in a format that is secure and economical and which improves the health gain of individuals and the overall population. CARDLINK provides smart-cardbased secure patient record that is immediately accessible to healthcare professionals in their own language regardless of what language was used while storing the data.

The objective of the CARDLINK project is to implement and demonstrate in 10 health regions in 9 European countries a patientheld smart-card medical record for particular application in cases of medical emergency. This card application will provide a seamless information key linking primary and secondary healthcare providers. The smart card contains pointers to hospital and primary care databases providing synergy with the wider healthcare networks. CARDLINK has developed a core data set of administrative, medical



and prescribing information, which forms the basis of an interoperable emergency medical dataset.

CARDLINK 2 is a major step towards providing the citizen with an emergency medical record which will make it easier to take up residence, travel and work in any participating member state because diagnoses, allergies, medications, therapies and vaccination records, next-of-kin and insurance information will be made readily available to doctors wherever the patient seeks healthcare.

The project will issue a minimum of 100,000 cards and will produce detailed evaluation on the user and service-provider acceptability of smart cards in healthcare.

Whereas the technology and application has been proven by

the CARDLINK project, a major investment is necessary to bring the concept to commercial fruition.

OUTPUTS

The project adopted a smart-card dataset for emergency medicine. The technical specification comprising the card specification, the security specification and the data structure specification were agreed. Pilot implementations were continued and reported regularly within the timeframe of the project. Interoperability was achieved and demonstrated between the cards issued in Ireland, France, Spain and Italy.

BUDGET:

Overall cost: 2 318 000 €. EC contribution: 1 000 000 €.

CONTACT:

Eastern Health Board (IRL) Martin A. Gallagher E-mail: mgallagher@ehbmis.iol.ie

1996	1997	1998	1999	2000	2001



Keywords; information system, multimedia, citizen

CITIZENS' ADVISORY SYSTEM BASED ON TELEMATICS FOR COMMUNICATION AND HEALTH

PURPOSE

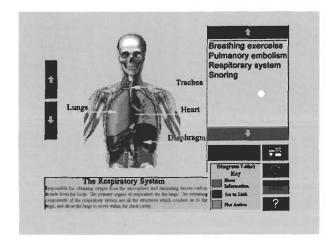
The aim of the CATCH project was to design, develop, implement and validate a 'multimedia, multilingual knowledge-based citizen advisory system for healthcare'.

The system is intended to build a bridge between qualified providers of health information and all European citizens who are, as research has shown, highly interested in information about health. The system was developed along a client-server architecture using synergism of modern information and communication technologies, allowing the system to be accessed either via modem, ISDN and computer networks or by an autonomous computer, stand-alone system.

OUTPUTS

The objectives of the CATCH project were:

- 1. Developing new access to the knowledge base this was completed with the successful implementation and integration of the anatomical user interface to the CATCH system.
- 2. Validation/testing of CATCH content (English) during the testing phase it became evident that the users were experiencing difficulties interrogating the kiosk and making selections from the touch-screen.
- 3. Marketing the system presentations were given to a



number of local and international companies along with demonstrations at major international fairs in Germany, Australia and the UK.

4. Migration Plan - a plan to migrate the functionality of CATCH to the Internet and particular the WWW, and this research is part of CATCH II.

The software was developed using Multimedia ToolBook 4.0 from Asymetrix which allows rapid development of software to create a prototype. With the recent developments of the WWW browsers such as Netscape and Internet Explorer it is now possible to create quite advanced interactive multimedia web sites. Through the use of HTML, Dynamic HTML, Java, JavaScript and CGI an improved CATCH system is being implemented on the WWW.

Development within the ToolBook, content volume and anatomical interface has had a beneficial impact on the CATCH kiosk

systems' functionality and has laid excellent building blocks for which the further development and migration of CATCH I to CATCH II can take place.

It may be suggested that any future/final implementations of CATCH be developed using a more conventional programming language such as Microsoft Visual C++ or Borland Delphi along with other multimedia authoring software packages. However, the future of CATCH should be seen on the Internet, World Wide Web (WWW), allowing unlimited access to the information by European citizens and beyond.

BUDGET:

Overall cost: 1 032 000 €. EC contribution: 500 000 €.

CONTACT:

Universität Magdeburg - Ottovon-Guericke (D) Dr. Tina Reckert http://catch.cs.uni-magdeburg.de

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1996	1997	1998	1999	2000	2001

CITIZENS' ADVISORY SYSTEM BASED ON TELEMATICS FOR COMMUNICATION AND HEALTH

PURPOSE

In the project CATCH II a methodology has been elaborated for the process of developing information resources about medical topics in such a way that these resources have a high potential of reusability, and that they allow the flexible tailoring of a variety of applications from a single pool of information objects.

The approach taken in CATCH II is based on a strict separation of issues of authoring and structuring textual information objects from the issues of delivery and flexible configuration into specific application systems.

In CATCH II both internet based systems as well as public information terminals ('kiosk') have been deployed, validated and evaluated with end users in a number of European countries.

OUTPUTS

CATCH II has developed a methodology for the lifecycle support of information objects based on enriching documents with metadata, structural markup and semantic inline tagging. The formal basis for this is the Extensible Markup Language XML.

For the validation and dissemination of this methodology authors' guidelines have been worked out and software support has been designed and implemented. The core result is a



prototype of an Internet-based authoring environment that, based on an elaborate ontology, primarily supports the work of authors or content contributors, but helps with other aspects of the life cycle of information objects as well (e.g. support workflow for translation).

From the central information pool of CATCH II — as example domains, the fields of skin cancer (prevention, diagnosis, treatment) and of cardiovascular diseases have been chosen — the information objects can easily and flexibly be configured into different types of information offers for different application scenarios.

In addition a strategic study on the next generation of services and future needs of European citizens and professionals has been carried out: Detailed research and analysis of the current and future development of the market in the area of "distance" healthcare, highly interactive services and advanced medical information distributed via the Internet or through the integration of different media (e.g. internet telephony, GSM, TV & radio, journals and books, internet and web casting, etc.)

Typical users of the CATCH II results (methodology and authoring support tools) will be all types of organisations providing health related information via 'new media' (e.g. healthcare authorities, hospitals, insurance companies, self-help groups, etc.). In a number of dissemination activities we have informed representatives of such organisations about the potential of CATCH.

BUDGET:

Overall cost: 680 450 €. EC contribution: 579 490 €.

CONTACT:

Universität Magdeburg, IWS (D) Prof. Dr. Dietmar Rösner http://catch.cs.uni-magdeburg.de





Keywords: healthcare management, continuity of care

THE COMPREHENSIVE HOSPITAL AND AMBULATORY CARE INFORMATION NETWORKING FOR EPISODE LINKAGE

PURPOSE

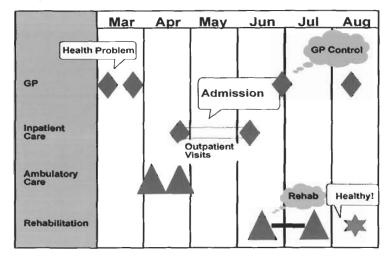
The objective is to share knowledge in defining episodes of care. Considerable progress has been made using casemix techniques for better management of health services. This has been mainly focused on acute inpatient care. Failing to consider the complete episode can cause errors. The development of 'episode groupers' as healthcare measurement tools has begun to provide more appropriate analyses.

CHAINE planned four workshops to involve all EU countries in sharing information and knowledge of better resource management. Four specific groups were defined to deal with the problems, namely: Episode classification and linkage, IT aspects, Resource Management and Education and training.

OUTPUTS

The first workshop in Stockholm and the issue group meetings at the PCS/E conference in Manchester provided useful opportunities to disseminate the initial results and discuss the requirements for episode analysis and consider some of the methodological issues. Specific projects being undertaken in Sweden and England also developed episode-based analyses and explored definitions of episodes accepted by practicing clinicians. Work by Working Group PT030 of CEN TC251 has proposed a set of terms to describe episode of care structures, which may become a

The Patients Perspective of a Health problem Episodes of Care in the Health Care Community



pre-standard in due course. These proposals should help to structure the discussion required to develop definitions of episodes that can be used with health service activity data.

From the analysis of a questionnaire for experts in a number of countries it is clear, that the need to develop the episode of carebased analyses of casemix data is recognised. There are some steps being undertaken already to provide the linkage between patient records, develop data capture from outside the hospital and support a structure of the electronic patient record that will enable the analysis of episodes of care within the record.

Arising from this survey, the work of CHAINE and the literature review, a series of recommendations are put forward which would:

- 1) Enable a clearer demonstration of the value of episodes of carebased groupings.
- 2) Support the development of standards for definition of episodes of care to be used

within the development of an electronic patient record.

- 3) Enable the construction of episodes of care records which could be used to test existing episode groupers from the USA and determine their appropriateness in the European context.
- 4) Develop the skills within Europe to exploit episode of care-based analyses.
- 5) Ensure that the issues and implications of analysis based on episodes of care are understood by a wider group of individuals, in particular those responsible for policy development at national level.

BUDGET:

Overall cost: 440 000 €. EC contribution: 440 000 €.

CONTACT:

HISCOM (NL)
Jacob Hofdijk
E-mail: jhofdijk@HISCOM.nl

Timescale:

Keywords: regional healthcare networks, on-line services, patient data integration, electronic health record, primary care

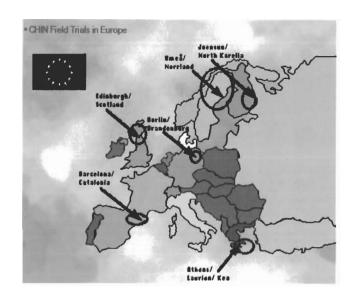


Co-operative Health Information Networks

PURPOSE

The initiative involves seven nations: Finland, France, Germany, Greece, Spain, Sweden and the United Kingdom. The aim is to establish a regional Health Information Network throughout Europe. A range of innovative services are being implemented to assist professionals in healthcare and social care in improvinter-disciplinary inter-institutional co-operation, cost efficiency and total quality management of the healthcare delivery process. The initiative addresses the communication and information needs on the primary care level and takes into account both the requirements of patients and professionals. CHIN on-line services have been introduced in rural and metropolitan areas in Germany, Greece, Finland, Spain, Sweden and the UK.

The healthcare delivery processes are cooperative and require information exchange and coordination of activities across organisational boundaries. The project makes health services more efficient and helps people to use services more effectively. The initiative provides guidelines, technical concepts and communication, application and service modules for system solutions to set up CHINs for healthcare regions. Technically CHIN offers standardised, simple, open and scalable solutions for the medical applications (DICOM, HL7) as well as regarding computer and networking technologies (ISDNbased Intranets). The integration of patient data within larger organisational units is based on a



web-based concept of a dynamic virtual patient record. Authorised users can access the records via a standard interface.

OUTPUTS

A broad range of online services started operation in Athens/ Lavrion, Berlin, Catalonia, North Karelia, Northern Sweden and Scotland. The operation of services under realistic conditions allowed evaluation of medical. social and economic implications. The project contributed to a number of product developments. The installations are expected to function as reference installations for industrial partners and to provide a pan-European validation framework. In the light of the overall objectives the project was clearly a success.

The main objective of establishing a reference system of networked regional CHINs which support comprehensive and integrated sets of healthcare telematic services for a broad range of users was reached. In

some cases results exceed the expectations. New regional services have been introduced and will remain an innovative asset and the basis for further developments in all six regions. The comprehensive health telematic trials allowed verification, validation and optimisation of the concepts. Lessons have been learnt on how to operate services in the future in an optimal way.

BUDGET:

Overall cost: 3 220 000 €. EC contribution: 1 510 000 €.

CONTACT:

T-Nova Deutsche Telekom **I**nnovationsgesellschaft mbHBerkom (D) Dr. Andreas J. Weser E-mail: info.TNova-Berkom@Telekom.de

Timescale:

1996 2001 1997 1998 1999 2000



Keywords: communication, EDI, multimedia, integration, network, continuity of care, primary care

COORDINATION AND CONTINUITY IN PRIMARY HEALTH CARE. THE REGIONAL HEALTH CARE NETWORK.

CoCo has implemented regional healthcare networks in 26 pilots in 8 European countries. Electronic links between healthcare professionals were established using structured messages and multimedia communication. CoCo is focused on IT support for the main communication flow between the primary care doctor (GP) and his/her partners.

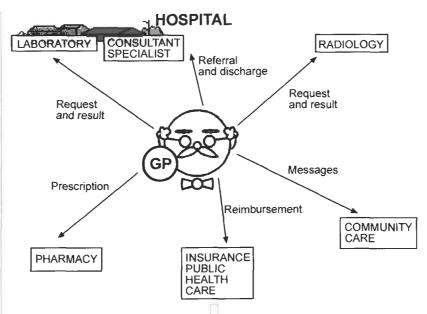
PURPOSE

The aims of the CoCo project have been to encourage the use of electronic message types between sectors in healthcare throughout Europe. The nine participating European countries, together with Canada, worked together in finding and using ways of implementing electronic communication. Concrete aims were:

- to establish networks for coordination and continuity of care;
- to encourage organisational change for efficient service provision;
- to contribute to a less-fragmented
 EU telematics market through standardisation.

OUTPUTS

Data was communicated between General Practitioners' electronic healthcare records, laboratory



systems, hospitals' patient administration systems, pharmacy systems, municipalities' home care systems, radiology systems, and many more.

CoCo developed tools and methods for regional network implementation:

- Standards, Implementation Guidelines;
- Computer tools for message development and testing;
- Guidelines for BPR with special focus on implementing electronic links;
- Tool kits for validation and evaluation of electronic healthcare networks;
- Educational material for standards implementation and BPR;

- Applications and modules (i.e. GP records) with communication capabilities.

In many countries, the CoCo pilots are expanding to a regional or national level. Some health-care networks are now running on a commercial basis, e.g. in Denmark, where more than 1 million messages are sent each month.

BUDGET:

Overall cost: 8 221 800 €. EC contribution: 4 080 100 €.

CONTACT:

County of Funen, Danish Centre for Health Telematics (DK) |Knut Bernstein |http://www.medcom2.dk/dansk/coco/ coco_side/coco.html

Timescale:

Keywords: oncology, breast cancer, quality management

Group 2

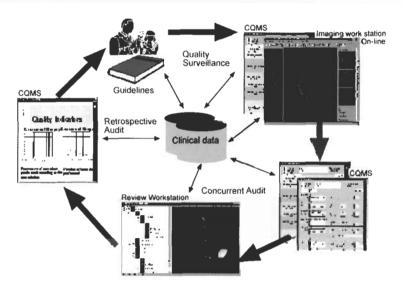
CLINICAL ONCOLOGY NETWORK FOR QUALITY IN EUROPEAN STANDARDS OF TREATMENT

PURPOSE

The CONQUEST project saw the challenge of developing a demonstrator which could illustrate the potential for improving the quality of diagnosis and treatment for breast cancer patients by presenting the treating physician with the latest protocols and quidelines available.

The project accomplished this by developing a computer-generic quality management system demonstrator which supports the various aspects of quality assurance for the diagnosis and treatment of breast cancer patients with the focus on quality management support and advanced imaging aspects of the treatment process.

Acknowledging the importance of involving the users in all phases of the development process, experimental strategies were extensively used. These strategies included workshops and intensive use of incremental prototyping techniques to specify user needs and requirements, followed by continuing validation of the intermediate results and feedback. The result was the conceptual model which introduced a generic approach to quality management systems. The research image processing tools could be converted into an image-processing library with a standardised software interface and used as the basis for developing an advanced image viewer component. Later in the process,



emphasis was put on integration and communication, hence DICOM compatibility came into focus.

Validation of the results showed that implementation of systems such as the CONQUEST demonstrator supports the application of the correct treatment procedures and has the potential for improving the outcome for cancer patients.

OUTPUTS

The results and achievements of the work undertaken in CON-QUEST span from an advanced DICOM-compatible 3-D imaging viewer to studies which evaluated the impact of introducing new methods into daily work routine to improve the quality of communication between the different medical disciplines. Furthermore, quality management support was implemented as an integrated part of formalised EPR, developed with a focus on surveillance of completeness and correctness of data.

The results achieved in the CON-QUEST project emphasise the importance of supporting quality management of diagnostic and treatment procedures regardless of whether they concern imaging or quality management support within the framework of an electronic patient record.

BUDGET:

Overall cost: $3890969 \in$. EC contribution: $1700000 \in$.

CONTACT:

Netherlands Cancer Institute (NL)

Professor Harry Bartelink E-mail: hbart@nki.nl

Timescale:



Keywords: electronic health record, cards, diabetes, security, standard, telemedicine

IMPROVED COMMUNICATION IN DIABETES CARE BASED ON CHIP CARD TECHNOLOGY

PURPOSE

The DIABCARD project is developing, testing, implementing and evaluating a Chip Card-based Medical Information System (CCMIS) for chronic diseases (exemplified in diabetes) in ambulatory and hospital care. DIABCARD aims at improving the quality of care, reducing healthcare costs, enhancing medical documentation and improving communication.

The basic idea is to have a portable medical record on a smart card. This will lead to better communication between the institutions concerned with the care of the patient with diabetes.

OUTPUTS

A prototype was developed that consists of a computer-based medical record (CPR) system and the DIABCARD smart-card enhancements. This system is modular, standardised and inter-



operable. It is based on userneeds, flexible, and can easily be adapted to any surroundings. It has been validated thoroughly and is being used routinely.

The security has been considered that covers all levels of the system.

Nearly all of the components are ready to be marketed; the data set, the data interface, the server and the chip card are ready for the market. The necessary adaptations are taking place.

Contacts for marketing the system have been set up, any company interested in exploiting the system or parts of it may contact the project coordinator.

BUDGET:

Overall cost: 1 423 700 €. EC contribution: 830 000 €.

CONTACT:

GSF(D)

Dr. Rolf Engelbrecht http://www-mi.gsf.de/diabcard





Keywords: diabetes, quality development, quality management, quality indicators, telemedicine

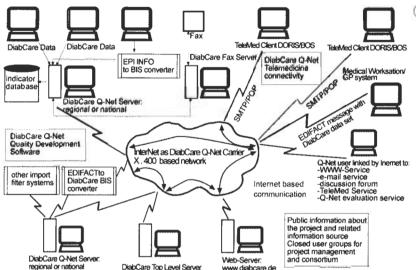
DIABCARE QUALITY NETWORK IN EU-

PURPOSE

The aim of the project was to develop a complete IT system to monitor diabetes care, according to the St. Vincent Declaration Action Programme. This project aims to implement a telematic platform for standardised medical quality documentation and evaluation across Europe.

DiabCare Q-Net is a European consortium of partners in Health-care, Industry and Research. Participant countries are Portugal, France, Bavaria, UK, the Netherlands, Norway, Italy, Sweden, Austria, and Spain, and additional partners were Finland, Malta, Poland, Romania, Greece, and Hungary.

The project implemented regional, national and central nodes for processing of diabetes quality indicators. Quality development starts with comparing of diabetes services in the Basic Information Sheet (BIS), which is filled in once a year for each patient that is cared for by a diabetes team. The local data is analyzed and compared with peer teams. This information is collected regionally. The dedicated communication lines are



used on the next level of comparing the regional information on a national basis across Europe. Participating centres get feedback by standardised benchmarking. Necessary security standards will be in use.

OUTPUTS

Functioning demonstrations were developed and implemen-ted across all levels. Because of the open architecture design, the different countries decided in favour of different systems at the entry point. This system can improve national, regional and local diabetes care.

Telemedicine applications for still images of the retina were developed. The information system was hooked up to a fundus camera. The system with the digital video images was established for the application in foot clinics.

BUDGET:

Overall cost: 3 830 000 €. EC contribution: 1 500 000 €.

CONTACT:

DIABCARE Office EURO Dr. Klaus Piwernetz http://www.diabcare.de

Timescale: 1996 1997 1998 1999 2000 2001



Keywords: image-guided surgery, neurosurgery, vascular surgery, imaging, robotics

EUROPEAN APPLICATIONS IN SURGICAL INTERVENTIONS

PURPOSE

The objective was to improve the effectiveness and quality of neurosurgery of the brain and vascular surgery of abdominal aortic aneurysms. CT and MR images can be used in diagnosing pathology and for planning of medical treatment. Diagnosing was first performed in a 'visual manner'. Planning of the treatment was performed in a similar way. In recent years advances in computer technology have made it possible to develop systems that can assist in diagnosis, planning and treatment. The project focused on two application areas: image-guided neurosurgery of the brain and image-guided vascular surgery of abdominal aortic aneurysms.

OUTPUTS

During the project tools were developed using the commercially available Philips EasyGuide™ NeuroNavigator and Philips EasyVision as starting platforms.

Conventionally aneurysms are treated with open surgery. Recently a technique for placement of an aortic prosthesis has been introduced. EASI-Vascular focused on planning of the dimensions of the prosthesis and on image-guided placement of it. The needs in image-guided surgery were analysed and possible new surgical procedures were specified, and a detailed



functional specification was derived and translated into a technical one. Based on the specifications, prototype imageguided surgery systems were built and installed. Through clinical validation the demonstrators were continuously improved.

EASI-Neuro tools were developed for planning of a craniotomy and a surgical path to a selected location in the brain and for frameless brain biopsy. CT/MR images may be spatially distorted. Tools were developed to remove distortions. Finally, tools were developed also to enable tracking of various surgical instruments. All tools were validated at National Hospital, London. As much as 96% of the users thought them to have significant advantages, especially the tools for biopsy. A frameless procedure could be performed in less than 40 minutes with an accuracy of about 1.5-2.0 mm.

In the EASI-Vascular method an abdominal aortic prosthesis is inserted through a small incision in the femoral artery. Intra-operative guidance is supplied on the basis of registering intra-operative 2D fluoroscopic X-ray images to preoperatively scanned 3D CT images. The method was clinically evaluated at Utrecht University Hospital. Technically, the method functioned well. The accuracy specified by the clinical users could however not be achieved. In addition tools were developed for automatic segmentation of the lumen in the aorta and for automatic estimation of the prosthesis dimensions. A preliminary clinical validation showed that the dimensions could be accurately estimated.

BUDGET:

Overall cost: 2 985 000 €. EC contribution: 1 800 000 €.

CONTACT:

Philips Medical Systems
Dr. Frans Gerritsen
http://home.planet.nl/~frans.gemitsen/
EASI/EASI.html

Tir



Keywords: clinical decision support, DSS, clinical guidelines, oncology



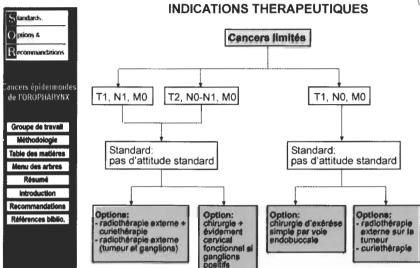
PURPOSE

The purpose of the ECOLE/GRIP project was to concentrate on support for guidelines and protocols in cancer care with the development and evaluation of telematics methods, services and tools to support the dissemination and implementation in routine care of best clinical practice as encapsulated in guidelines and protocol.

The project has based many of its results on new telematics workgroup technologies, in particular Lotus Notes ®. This has been found to offer great potential in streamlining guideline development activities.

The guidelines model developed by ECOLE/GRIP has been used by the French Federation of Cancer Care for hypermedia publishing of its evidence-based cancer guidelines. The models enable users to easily navigate into guideline documents.

The project has carried out studies into the impact of the use of hypermedia guidelines on the process of healthcare. The study compared decisions made by physicians having access to both electronic patient records and guidelines with those made by physicians with access to EPR records only. Access to best practice, as encapsulated in the guidelines, resulted in a marked improvement in clinical decisionmaking. This was most marked in the breast cancer guideline (where 300% improvement was noted).



Evaluation has been carried out of the telematics services and tools for collaborative authoring of literature reviews and guidelines, the hypermedia model for navigating and indexing electronic guidelines and of the impact on the process of care of the use of hypermedia guidelines.

OUTPUTS

The main technical result of the project is COLLATE (http://antipodes.cec.fr/collate/cohome.nsf): a telematics www-enabled collaborative workgroup environment built to support dispersed clinical groups on systematic literature reviews and evidence-based guideline development.

After having positively evaluated the technology, the French Federation of Cancer Centres adopted COLLATE in 1999 to support national collaborative activities on cancer care issues including guideline development and update.

The Aguitaine Cancer Network has demonstrated and used COLLATE within its information network and planned to deploy it for real-life use in 2000. Work with new XML technologies was carried out to achieve two goals; 1) to support the seamless integration of electronic guideline documents with electronic patient record technology and 2) to exploit XML's role as a universal data interchange language, able to support publication of the same source document on different media.

The advantages over traditional publishing methods will have a significant impact on guideline development, publication and maintenance costs.

BUDGET:

Overall cost: 1 267 319 €. EC contribution: 1 045 319 €.

CONTACT:

French Federation of Cancer Centres (F) Dr. Jean-Louis Renaud-Salis E-mail: rsalis@bergonie.org

			L		
1996	1.99.7	1998	1999	2000	2001



Keywords: electronic health record, EHCR, architecture, requirements

THE ELECTRONIC HEALTHCARE RECORD SUPPORT ACTION

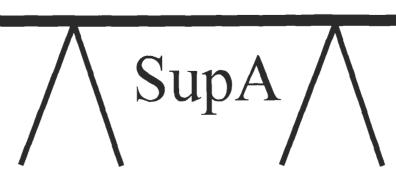
PURPOSE

EHCR-SupA is a Support Action to disseminate and promote the EHCR (Electronic HealthCare Record) standardisation work of CEN to users and developers in the countries of the European Union. The aims are 1) to provide background and educational materials to users and developers to encourage good practice in the use of electronic healthcare records; 2) to review, explain, and illustrate the EHCR-related standards developed by CEN; 3) to provide guidance on implementing the standard; and 4) to make recommendations for further EHCR standardisation work.

At the start of this project, CEN had made a start on standardisation of EHCR architecture (Foundation Standard ENV 12265). It was recognised that this pre-standard needed to be expanded and improved before useful implementations of it could be made. EHCR-SupA started before CEN was able to finance this work and continued during and after the active period of four Project Teams eventually set up by CEN to produce an improved standard. Once the CEN work programme had been established, EHCR-SupA's role became that of a complementary source of expertise to support and promote the work of CEN.

Individuals and organisations that had experience and interest in EHCRs and their architecture formed the SupA consortium.

EHCR



The approach of the work was twofold: a) to establish a wide range of contacts for the dissemination of information about the emerging standards, and b) to produce requirements, educational materials, demonstrators and implementation guidelines for the standard, and then to provide review of the standards and to make recommendations for future standardisation work.

In order to ensure that SupA's output was balanced and correct, a team of peer reviewers was given the task of reviewing the major public deliverables.

OUTPUTS

The project has achieved a powerful set of documents that provide a substantial contribution to understanding ENV 13606, with guidelines and recommendations to support implementation of the existing standard and to begin the process of its improvement.

SupA's input to CEN Project Teams consisted of two phases: a) a critical review of the earlier prestandard ENV 12265; b) a substantial response to CEN's Request for Comments on their First Working Documents.

Through its educational and dissemination activities, the project has been able to raise levels of awareness about EHCRs and about the standardisation process and its results in diverse groups of users, system implementers, healthcare providers, purchasers, and policy makers.

BUDGET:

Overall cost: 1 172 320 €. EC contribution: 914 094 €.

CONTACT:

University College London (Chime) (UK) David Lloyd http://www.chime.ucl.ac.uk/Healthl/ EHCR-SupA



Keywords: health telematics, consensus making, associations industrials

EHTEL - A PAN-EUROPEAN NON-PROFIT ASSOCIATION FOR BEST COMMUNICATION BETWEEN EXPERTS IN HEALTHCARE

EHTEL started as a feasibility study to assess levels of interest in organising a forum, then became a pan-European non-profit association which will bring together all the European actors concerned with the development of the use of Telematics Solutions in Healthcare.

PURPOSE

The project was based on the assumption that the key reason for this slow development was a problem of communication between the different categories of stakeholders.

OUTPUTS

Two main Working Groups were launched:

- Industrial Working Group, with face-to-face meetings with decision makers,
- Administrational Working Group, with an international workshop of 15 representatives from European health-care authorities.

104 delegates from 21 nationalities and institutions representing 18 countries and with a balanced representation amongst the different categories of actors participated in a two-day workshop. As a consequence, the decision to create a European not-forprofit association was taken.

M What is EHTEL?

A neutral, not for profit association of all healthcare actors for the premotion of talement solutions in healthcare across I urope.

More information:

Herve Duare
Executive Director of EHTEL
Maison Europeenne de la Protection Sociale

50, Rue d'Arlon
B - 1000 Brussels

Direct phone and fax: + 33 1 3969 0327

Ld Herve Doare mehtel.org

or contact

Jacqueline Kahl
EHTEL Assistant

EHTEL is a not-for-profit international association, governed by Belgian law. 25 founding members are from 11 countries with a balanced participation of healthcare authorities, healthcare providers and industry.

At the end of November 2000, the EHTEL association is composed of 53 institutions, 15 individual members, and 6 applicants.

EHTEL produced results which were presented at the Lille Conference in November 2000:

T1: Health Information Society Europe

T2: e-Health, Telemedicine

T6: Legal Security, Privacy and Ethics

T9: Health Telematics, Market Information and Analysis

A1: Healthcare Authorities.

EHTEL is committed to launch, in 2001, a Patient Working Group and a Healthcare Professional Working Group. In the meantime,

EHTEL is engaged in the development of a new design of its website, that will allow the promotion of best practices of e-Health solutions. More members will be encouraged to be active in the different Working Groups.

EHTEL intends to intensify the recruitment of new members: 70 institutions is the objective for 2001. This promotion will be done in the following directions:

- Patients' Associations,
- Healthcare Insurance Institutions,
- -Actors in the CEE countries and also in the south of Europe.
- Industries in the major countries: France and Belgium in particular.

BUDGET:

Overall cost: 600 000 €. EC contribution: 600 000 €.

CONTACT:

EHTEL Association (**B)** Hervé Doaré http://www.ehtel.org

Timescale:

1996 1997 1998 1999 2000 **2001**

Keywords: web server, information, multimedia, interactive services, health telematic industry, electronic market place

EUROPEAN HEALTH TELEMATICS OB-SERVATORY

PURPOSE

For many years, the over-fragmented health telematics information and decision structure in Europe has been a critical obstacle to scientific community work and to adequate interaction with the related market (industries, telecoms, SMEs). EHTO provides a web-integrated and innovative approach to dissemination of information on IT and on RTD results to the specific audiences of professionals involved in health telematics.

The objective was to create an efficient IT-health telematics market by overcoming the high fragmentation of decisional structures of the health sector. The target is to facilitate and to enhance the relations between users of technologies at all levels (health professionals, decision and policy makers, and hospital administrators) and providers of IT equipment and services (including telecom operators). EHTO approach is unique not only at European level but also worldwide. With the creation of a well-structured and daily updated Information Knowledge Base (IKB), EHTO dissemination benefits not only the European health telematics community, but also EU sponsored health telematics research participants, and finally, all TAP (Telematics Application Programme) participants, including SMEs. By its contribution to a better integration of the



health sector economy into the Global Information Society, EHTO enhances the competitiveness of European scientific expertise and industry.

OUTPUTS

Since mid-1998, EHTO has been recognised as a fundamental partner in most international health telematics and telemedicine activities, becoming a "reference" web site in this sector. The EHTO web site includes: virtual demos, a "virtual visit" to all projects in the HT-4th Framework Programme, and hosted sites of health telematics projects. The EHTO project has also contributed to standards, published 6 EHTO Journal issues (1996-1998) and organised workshops and conferences (3 workshops on telemedicine and on standards).

Started as an "Accompanying Measure" to the Commission's 4th Framework Programme for

raising awareness in the health community of the potential of telematics, EHTO has rapidly become a successful product recognised by the market and has been independent of EU funding since July 1999. EHTO has created an interactive "Electronic Central Market Place" where European industry and services can meet influential users and decision makers, discuss their needs and make them aware of the solutions they offer. EHTO dissemination promotes implementation of projects results in Europe and in other parts of the world, and establishes Europe at the centre of a worldwide "electronic health market place".

BUDGET:

Overall cost: 1 550 000 €. EC contribution: 1 550 000 €.

Ti

CONTACT:

Portugal Telecom (P) Maria Laires http://www.ehto.org



Keywords: occupational health, information expert knowledge, personal protective equipment



EUROPEAN INFORMATION SYSTEM FOR OCCUPATIONAL SAFETY AND HEALTH

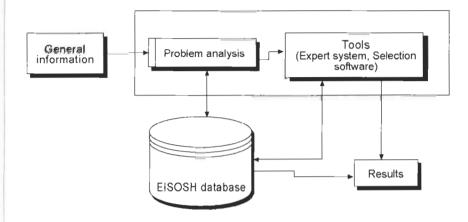
PURPOSE

The project aims to offer tools to find solutions to questions on occupational safety and health (OSH). A number of new regulations regarding OSH have been passed on the European level. Consideration of a variety of documents and expert knowledge is required when authorities and companies apply the regulations. This may be extremely time-consuming. EISOSH is to provide facilities for all those concerned to obtain information that might help them to find solutions to their questions by combining elaborated document management (DM) facilities with expert programs (EP).

The project created the functionalities of such a system and gave evidence of its practicability and benefits on the basis of a demonstrator, which currently consists of a DM system and three typical examples of expert systems. They provide means for the evaluation of noise-induced hearing loss, the selection of hearing protectors and the selection of respiratory protective equipment.

OUTPUTS

The focus has been to structure the system in a way that it can easily be extended. For the DM part as well as for the platform for EPs the system provides facilities that are specifically designed to readily accommodate more elements.



The two basic parts of the EISOSH have been developed to combine a common style guide and database. Interfaces ensure that the systems can be accessed from any part of the network. Legal and ethical issues have been studied carefully. The DM system is based on a search engine that works with a thesaurus, which covers all areas of OSH. Existing versions of three EPs have served as a basis for programs to be included in EISOSH. The system is open to the general public. Different target groups, which include authorities, enforcement agencies, test institutes, occupational health and safety practitioners, research institutes, manufacturers, employers and employees will offer feedback on the current deficiencies and difficulties within the system.

The database will be completed by indexing and adding further documents of occupational safety and health topics. The EPs will continuously be revised to improve their functions. In addition to the existing expert systems, new applications will be developed, adapted to fit EISOSH and integrated in the system. The completion of the PPE area will be the priority subject, but other areas of OSH will also be taken into account. Updating the document database will be important in development work: the intention is to provide links to the original document sources for continuous document follow-up and access.

BUDGET:

Overall cost: 955 951 €. EC contribution: 430 001 €.

CONTACT:

FIOH Finnish Institute of Occupational Health (FIN) Prof. Jukka Starck http://www.eisosh.org



Keywords: emergency, incident, incident management, health emergency response, environmental monitoring, integration

AN INTEGRATED PORTABLE DEVICE FOR EMERGENCY TELEMEDICINE

PURPOSE

EMERGENCY-112 is aimed at reducing treatment times, improving medical diagnosis, and reducing costs by developing an integrated portable medical device for emergency telemedicine. Early and specialized prehospital patient management contributes to emergency case survival, especially in cases of serious injuries of the head, the spinal cord and internal organs. The same applies for cardiac disease, where time is the basic enemy in the acute treatment of a heart attack or SCD.

However, ambulance personnel, who usually are the first to handle such situations, do not always have the required advanced theoretical knowledge and experience. The situation could be improved through the development of a mobile device, which would allow specialized physicians located at a hospital site, to coordinate remote ambulance paramedical staff via telediagnosis and teleconsultation means.

A portable medical device has been developed that allows telediagnosis, long distance support, and teleconsultation of mobile healthcare providers by experts located at an emergency coordination centre. The device allows numerous communication links, both fixed and wireless which maximise the potential use in different emergency situations. Networking links to medical



information databases, hospital information systems, and interhospital links are also provided to optimise information available to consulting physicians.

OUTPUTS

EMERGENCY-112 system consists of two basic parts: the mobile unit and hospital station unit.

- 1) The bio-signal monitor, is responsible for collecting vital patient bio-signals;
- 2) The portable PC is responsible for the collection, coding and transfer of the digitised signals and images of the patient to the base station. The PC is equipped with a digital camera and GSM modem. The base station consists of a PC equipped with a GSM modem so that it can receive data from the ambulance. It also contains a database for registration of emergency incidents, also providing links to existing EPRs.

In terms of clinical results, pilots have demonstrated that there is a significant improvement with the use of EMERGENCY-112 in the service provision through better diagnosis and treatment, which leads to better results for the patient and more possibilities for his/her survival from the emergency incident. Future plans concern application of the system to different telemedicine cases, including home-telemonitoring, provision of healthcare services in remote isolated areas, telemedicine in ships and trains. In this way, EMERGENCY-112 will be promoted as an "all-weather" telemedicine system in Europe. Exploitation, which is undertaken by a major industrial partner, ESAOTE Spa, is directed towards this concept.

BUDGET:

Overall cost: 938 800 €. EC contribution: 600 000 €.

CONTACT:

ICCS-NTUA (EL)
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Timescale:

Keywords: DSS, standardisation, knowledge-based systems, telemedicine, data mining, machine learning

byc

EUROPEAN RESEARCH NETWORK FOR INFORMATION SUPPORT OF ELECTROMYOGRAPHIC STUDIES

PURPOSE

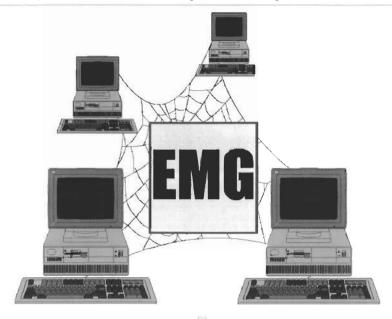
Standardisation in electromyography (EMG) will improve the quality of EMG diagnoses and reduce the number of tests required for each patient.

We have established a research network consisting of 15 partners comprising research groups in medical labs and IT research institutions. The principal objective of the network has been to capitalise EMG knowledge. This objective relies on: the completion and enhancement of medical knowledge, by extracting new knowledge from the available data; the standardisation of the EMG practice since newly acquired data and knowledge will help the physicians in their consensus negotiations; and the dissemination of the competence of each partner and, at a larger European level, the competence of the EMG-Net consortium, as a whole.

The recent IT technology developments concerning knowledge-based systems, intelligent interfaces and global information exchange through the World Wide Web, provide an ideal framework for achieving the network objectives.

OUTPUTS

The EMG-Net project has developed a multifunctional platform for EMG studies aiming to assist EMG practitioners in developing standard examination proce-



dures as well as in analysing and evaluating existing EMG methods. The proposed architecture for this platform consists of a set of modules forming four main platform layers for data collection, problem solving, learning, and education.

The data collection layer is implemented as a system for collecting and managing EMG data and cases. The database now contains 1083 consensus cases.

The problem-solving layer integrates knowledge bases issued from existing expert systems in a web-knowledge server. The knowledge server covers the clinical information, EMG knowledge, tests and procedures. It covers 800 entities of medical knowledge.

The learning layer is formed by a set of data mining and machine learning tools. This application, based on a Web interface, provides a set of functionalities allowing the manipulation of about

one thousand medical cases and more than twentyfive thousand neurological tests stored in the patient cases database.

The educational component is represented by the EMG knowledge Web server, which contains available consensual knowledge on the EMG domain. The server, in summary, reflects the current state of expertise in EMG domain and provides a possibility to access this expertise via the World Wide Web.

BUDGET:

Overall cost: 300 000 €. EC contribution: 300 000 €.

CONTACT:

INRIA (F)

Danielle Ziebelin

http://www.inrialpes.fr/sherpa/emgnet/

emg_index1.html

Timescale:

FNN

Keywords: expert system, headaches, sleep disorders, epilepsy, telemedicine

EUROPEAN NEUROLOGICAL NETWORK

PURPOSE

Sleep, headache and epileptic disorders are common health problems in the EU. The cost of treating these disorders is tremendous. Twenty billion Euros are spent every year on headaches alone. Appropriate recognition and treatment of disorders affecting 20 to 30 percent of the European Community population with the development of cost-effective approaches are the goals of this project.

The main objective of the project was the creation of a multimedia telematic network encompassing units located in different countries and giving support to experts and GPs in the medical areas of sleep, headache and epilepsy. First of all, a survey evaluating the knowledge of GPs in the target fields and their corresponding needs was conducted. The survey evaluated GPs' attitudes concerning the use of telematic tools as well as some disease-related costs (such as the costs of sleep recordings).

The results of the survey indicated that the GPs treat many patients with neurological disorders, but although in general they had many years experience there were significant gaps in their knowledge in this area.

OUTPUTS

The user need analysis led to the development of a set of prototypes to meet the user needs:



- 1) interactive tutorials on CD-ROM for the education of users in the selected disorders:
- 2) a sleep atlas establishing case-studies including examples of most sleep disorders (accessible via the WWW or on CD-ROM);
- 3) expert systems on sleep and headaches, to bring immediate help in general practice for users and experts, as far as diagnosis and treatment are concerned: and
- 4) a multimedia telematic network to support collaborative working between GPs and specialists and which can also be used for signal processing and remote monitoring systems.

The tutorials were validated by a group of GPs, the majority of whom indicated that the guides were informative and useful in their practice. A study on the costs of home monitoring of patients compared with that of

diagnosing patients in a sleep laboratory suggests savings of more than 50% could be expected.

A series of prototypes have been successfully developed to assist GPs and specialists when treating patients suffering from sleep disorders, headaches and epilepsy. However, these prototypes need further development before commercialisation, particularly regarding localisation and the user interface. They could also be improved with the addition of further neurological information in the three target domains.

BUDGET:

Overall cost: 2 798 000 €. EC contribution: 2 160 000 €.

CONTACT:

ISTEL, Lisboa (P) Prof. Teresa Paiva http://www.uni-marburg.de/sleep/enn

Timescale:

1996 2001 1997 1998 1,9,9,9, 2000

Keywords: education, healthcare, training, requirements, definition

HEALTHCARE TRAINING REQUIREMENTS DEFINITION

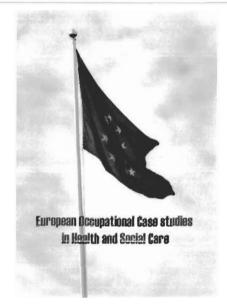
PURPOSE

EOCS:HSC was a feasibility study to explore effective ways in which multimedia telematics could be used in the training of health and social care workers to assist the development of improved standards to which the workforce is trained.

The WHO "Health for All" Campaign was followed by a set of 40 WHO "European Targets for Health" to be achieved by the year 2000. Achievement of these targets requires a workforce across all EU member states that are capable of consistently demonstrating high levels of competence.

To ensure that all workers are competent it is necessary to develop training materials which incorporate innovative and developing practice and are widely accessible to all health and social care workers.

The project aimed to assist those responsible for the training of the health and social care workforce to clearly identify the skills and competencies required and to enable them to design and implement relevant training programmes which would be consistent across EU Member States and relevant to achievement of the Targets for Health set up by the WHO.



A series of workshops were held to determine a common format, which described existing qualifications and standards for healthcare jobs, based on a sample of 4 countries. The current Araining methodologies (including the use of audio-visual and information technology resources) were researched, together with their effectiveness in training people for the healthcare qualifications needed. The results were described in a common format.

A small-scale demonstrator was prepared to give the researchers in the 4 countries a common understanding of the multimedia concept. A user group was then involved in the preparation of a format for the case studies,

identifying input sources, user access routes and key teaching areas.

OUTPUTS

A European interactive multimedia "bank" of case studies was created illustrating the skills, knowledge and competency required from those working in a wide range of occupations in health and social care.

BUDGET:

Overall cost: 160 000 €. EC contribution: 80 000 €.

CONTACT:

QUAY Interactive (UK) John Hall

Timescale:



HC1016



Keywords: workflow, multimedia, decision support, data exchange, expatriation

EUROPEAN TELEMEDICINE FOR MEDI-CAL ASSISTANCE

PURPOSE

ET-ASSIST is a secure Web platform enabling health professionals involved in medically assisted repatriation across borders. ET-ASSIST introduces an asvnchronous multimedia communication process that enables a better assessment of the medical risks, and a standardised workflow management providing a unique organisational scheme, adaptable to all assistance companies. The communication process is supported by a Web platform with high security standards, which ensures to the healthcare providers an immediate and free access to the system. The ET-ASSIST solution has been designed to limit the constraints for the healthcare providers.

OUTPUTS

An assistance scenario involves two parallel processes: a medical process to deliver care to the patient in a healthcare structure and an assistance process, carried out by the professionals of the assistance company.

These two processes are considered in the framework of continuous delivery of care and



care-related services while the patient is moved across borders or from one healthcare structure to another, and always in the context of the contract with the assistance company.

The system has been designed, developed and tested in real-life conditions with 250 assistance cases. The system supports processes such as: exchange of information of the patient record for medical follow-up; case financial processing and billing; patient transfer scheduling; acceptance and follow-up; new assistance case notification; users and access rights management; archiving; and notifications, etc. A set of additional components have

been developed: a SCP-ECG viewer (highly compressed quality ECG records); a portable telemedicine workstation supporting GSM and satellite communications; and client software dedicated to the recording of voice communications for maritime medical Advice Centres.

BUDGET:

Overall cost: 3 950 000 €. EC contribution: 1 700 000 €.

CONTACT:

MEDES (F)

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Tiı



Keywords: EHCR, EHR website, tele-learning, medical informatics, multimedia, web based learning

TUL

Workshop on the electronic healthcare record

PURPOSE

This report presents the EU/CEN workshop on EHCR (Electronic HealthCare Record) and the realisation of MI-WEB.

Workshop on the EHCR:

Since the first EU-CEN workshop on the Electronic Healthcare record, in 1993, much has been achieved in R&D Projects and in the standardisation work of TC/ 251, which produced ENV 12265 on the "Electronic Healthcare Record Architecture" and the proposals for its extension. This workshop has been a collaborative effort by representatives from all the separate initiatives. Progress towards evidencebased medicine, shared and managed care and the onset of new European security guidelines is imposing new, difficult requirements on the EHCR. The aim of the Second EU-CEN Workshop on the Electronic Healthcare record is to make a contribution towards convergence between users and R&D and standardisation efforts.

MI-WEB:

Medical informatics covers a broad spectrum of topics but centres for medical informatics are specialised only in a few areas. Combining and sharing knowledge from expert centres could be the basis for high-quality teaching. The current trend in present-day education is towards teaching students skills instead of knowledge. The knowledge becomes a means to achieve a goal instead of a goal itself. Learning



skills from a paper book is hard, if not impossible. Therefore additional types of educational material are necessary. Among these are multimedia (sound, video) and simulations.

For the development of MI-WEB the following structure was used:

- 1) the Department of Medical Informatics at the Erasmus University Rotterdam was the coordinating centre of the project;
- 2) collaborating centres selected by their expertise on specific topics will deliver exercises, examples and illustrations, questions & answers, or literature;
- 3) quality control, internal consistency and language are supervised by editorial board which is formed by experts with a broad view of the field; and
- 4) the development team which was responsible for the design and testing of the website.

OUTPUTS

Workshop on the EHCR agreed on EHCR architecture, terminology, communication, security and links to knowledge.

The educational text has been provided by the authors of the MI Handbook and has been adapted for usage on the MI-WEB by the development team. The book text has been divided in small parts and completely transformed to XML format, which enables us to use the text fragments for multiple purposes.

A website is operational and a tool has been built to support the maintenance of the website. Two reports with the final outcomes are made.

BUDGET:

Overall cost: 305 250 €. EC contribution: 305 250 €.

CONTACT:

Erasmus University (NL)
Dr. Jan H. van Bemmel
http://www.mieur.nl/mihandbook/r_3_3/
handbook/home.htm





HC9231



Keywords: conference, EU telematics applications programme, CEEC, awareness

MEDICAL INFORMATICS EUROPE CON-GRESS 1997

PURPOSE

This project was aimed at supporting some specific activities of the MIE 97 Congress. MIE Congress is the main Medical Informatics Event in Europe, which combined with the MEDINFO Congress of IMIA has become the world top event of Medical Informatics.

The MIE conference is the place where users meet industry, where decision makers are presented with the available informatics and telematics solutions to major challenges in modern medicine and its delivery. Researchers and developers draw a picture of tomorrow's systems and services.

The objective is to disseminate the results of the EU Telematics Applications programme - Health Sector in Eastern Europe and particularly in the Balkan countries, to organize a promotion platform for the EU Health Telematics Applications Programme, to fund the invitation of internationally recognized keynote speakers and to support the participation and dissemination of the results of EU Telematics Applications Projects.



OUTPUTS

The project was able to fulfil the goals. In particular the Eastern Europeans were urged and notified via ordinary mail and E-mail to contribute to the MIE 97 scientific programme and to apply for financial aid. The invited keynote speakers were four. The themes, covered by the MIE 97, were Health Telematics, Computer Patient Record, Images and PACS and Education/Technology Assessment. These talks were broadcast live through the Internet for the first time worldwide.

The MIE 97 advertisement was accomplished through the distribution of pamphlets and the development of a WWW site at the site of the Laboratory of Medical Informatics (http://www.med.auth.gr/~mie97).

The printing of the MIE 97 Proceedings published by IOS Press was partly funded by the MIE 97 programme.

BUDGET:

Overall cost: 80 000 €. EC contribution: 80 000 €.

CONTACT:

European Federation for Medical Informatics (CH) Costos Pappas http://www.med.auth.gr

Timescale:

EUPHIN-EAST

INCO-COPERNICUS20645

Keywords: public health, information systems, statistics, indicators, DSS, CEEC, networks

byc Group 7

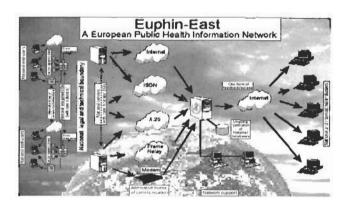
THE EUROPEAN PUBLIC HEALTH INFORMATION NETWORK FOR EASTERN EUROPE

PURPOSE

Healthcare policy making and planning and the efficient management of healthcare services rely on up-to-date information that is flexible and user-friendly and enables comparative analysis. Where such information is not available or thought to be unreliable, the answer lies not in collecting more information but in making the existing information more accessible to users to allow for effective comparison. This requires coordinated, permanent and cheap access to health and health-related data and indicators, which is what the EUPHIN-EAST project seeks to provide by creating a one-stop shop offering real-time, online access via the Internet to distributed national databases. The EUPHIN-EAST project is part of a concerted action between the World Health Organization - Regional Office for Europe, the European Commission and 23 countries of Central and Eastern Europe and the Newly Independent States (CCEE/NIS) of the Former Soviet Union.

OUTPUTS

The EUPHIN-EAST network interlinks (via the Internet) national databases based in and permanently maintained by the CCEE/NIS countries, and also connects to and replicates the



data with a central EUPHIN hub. The distributed database system is based on standard software such as Microsoft SQL Server and open programming languages such as Java. This design has eased implementation and is keeping operational and maintenance costs to a minimum. In a staged approach, a pilot network interconnecting a limited number of CCEE/NIS countries was set up to demonstrate and validate the functioning. feasibility, constraints and benefits of the system, with more states joining as local systems are put into place. Application software for pilot networking and a national Health Service Indicator package for the NIS states were developed for the purposes of this project. Pending connection of all CCEE/NIS countries. the EUPHIN-Hub hosts health information and health-related data and indicators (1971-) of all the 51 WHO/EURO Member

States, users of the databank may choose whether only data from the EUPHIN EAST hub are to be used or whether access is sought to all available EUPHIN EAST national servers. The EUPHIN EAST database can be accessed through the EUPHIN-EAST Network webpage (http://www.euphin.dk), which also provides other information concerning the project.

BUDGET:

Overall cost: N/A.

EC contribution: 400 000 €.

CONTACT:

WHO - Europe **Ar**un Nanda **E**-mail: am@who.dk

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11996	1997	1 1998	1999	2000	2001

Keywords: pathology, telediagnostics, video-microscopy, multimedia database, DICOM, imaging

EUROPEAN PATHOLOGY ASSISTED BY TELEMATICS FOR HEALTH

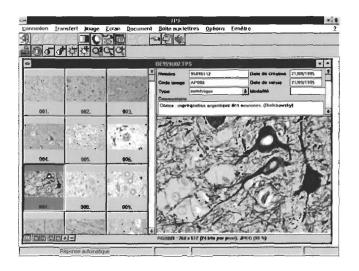
EUROPATH is providing diagnosticians with tools and services to exchange, store and retrieve multimedia documents for routine, research and education.

PURPOSE

The EUROPATH project aimed to implement prototypes (work-stations and databases) in remote consultation and quantification based on still images, investigation based on moving images, consensus sessions involving tele-conferencing with multi-access to specimen exploration, reference image banks, case-report storage, retrieval and electronic publication, and a biological marker database.

OUTPUTS

Major and tangible achievements of the EUROPATH project are: European Tele-Pathology Software (EPS/TPS) including complementary modules for remote consultation based on point-topoint sessions through TCP/IP communication protocols and offering facilities for case description, image grabbing, interactive (dual-cursor) discussions and archiving (DICOM compliant) and which is capable of dealing with all medical imaging techniques including general radiology, MRI, ultrasound echography and microscopy.



Remote diagnostics based on distant driving of microscopes through Internet/Intranet networking based on HTML conversion and JAVA applets.

100 EPS systems have already been distributed world-wide. http://www.sambatechnologies.com

European Pathology Databases based on ORACLE: the reference database offers resources for cases, images and markers in oncology practice and research. The fields presently covered are breast, uterine cervix, prostate, liver and brain tumors. Euroquant database provides a routine service for daily DNA ploidy quality assurance and is a material part of the European Consensus on Diagnostic DNA Image Cytometry.

http://euroquant.med.tu-dresden.de

GroupWare facilities developed in the LOTUS environment giving an access to a managed network of experts for Second Opinion in Pathology (expandable to Radiology)

Setup of Quality Assurance programs (Intranet & Extranet)

Distributed resources for Education and Training in Pathology. Working groups of experts. http://pathconsult.imag.fr

XML, JAVA technological evolution to come.

BUDGET:

Overall cost: 4 856 555 €. EC contribution: 3 259 700 €.

CONTACT:

University of Dresden Technical (D)

Tiı

Pr. Gérard Brugal http://pathconsult.imag.fr

Timescale:



EUROPEAN RADIOLOGIC DATABASE

PURPOSE

EURORAD is a project aiming towards an electronic radiological database consisting of a collection of multimedia case records, each of which contains one or more radiological images and a text file for case comment with keywords and codes. This database can be used in the domains of practice, training and research.

The compliance of the database is ensured by the European Association of Radiology (EAR), which establishes academic quality assurance by means of anonymous peer-review. The reviewing process consists of a three-level system with one editor-in-chief, 13 section editors dealing with the different sub-specialities, and 10 reviewers concerned with a subspeciality.

All data exchanges between the authors, section editors, and the reviewers are carried out on the Internet. For each accepted case the author is reimbursed with 20 Euros. In the journal "European Radiology" the name of the author, Institution, and the title of the case are regularly published.

OUTPUTS

Support for the project is growing because during 2000 agreements were signed between EURORAD and 18 European National Radiological Societies. Since 2000 EURORAD has had an official ISSN number (1563-4086). The indexing of accepted cases in Index Medicus is progressing. Now the number of submitted cases has

ISSN 1563-4086

The Online Database of the European Association of Radiology

:: Certified Radiological Teaching Cases ::

increased to 445, of which 207 have been published. Advertisements have been and will be published in European Radiology and National Radiological journals, promoting the database; courses have been organized at Cyber-theatre. EURORAD awards have been distributed at the ECR and in meetings of sub-speciality societies cooperating with EURORAD; the industrial sponsors maintain the database.

The technical developments of the database have been finalised. The tool has been working in a very satisfactory way and without bugs for several months. During the year 2001 the potential authors will receive the off-line tool to facilitate submission in a DICOM-compliant environment. The review process is functioning well because over a hundred radiologists are collaborating on a voluntary basis towards this effort, ensuring the scientific quality of the teaching cases. The language of all accepted cases is English and an English native professional translator is currently being tested.

The Project Director, Scientific Director and Publication Coordinator have telephone conferences every week and an Action Plan is being updated and distributed to the Steering and Executive Committees.

BUDGET:

Overall cost: 722 590 €. EC contribution: 472 990 €.

CONTACT: CITEC SpA (I) Giuliano Salcito

http://eurorad.org

1996	1997	1 1998	1999	2000	2001

G7CARDIO



Keywords: information society, multimedia databases, cardiovascular diseases, G7

GLOBAL CARDIOVASCULAR DATABASES PROJECT

PURPOSE

The quality of care and its cost effectiveness could be greatly enhanced by a telematics-based stratified system capable of:

- 1) providing on-line expert advice:
- 2) coordinating patient referrals; and
- 3) establishing specific databases for updating computeraided decision-support tools and for monitoring the cost/benefits of diagnostic and therapeutic strategies. The goal of the G7CARDIO concerted action was to develop common standard clinical databases integrating patient care data and health economics analysis in a stratified system of care in response to professional user groups' needs.

OUTPUTS

The Global Cardiovascular Databases project included a feasibility study and a demonstrator project. The first stage involved the evaluation of user needs, analysis of existing initiatives, and development of a user-oriented specification for testing in a working communication model. At the end of the feasibility phase, a test application was implemented in Italy, with a starting network including 15 sites/cardiology centres. The test pilot



used an integrated research ISDN/ ATM network, accessing an SQL patient database with a Web-JAVA application. The G7CARDIO project laid the groundwork for cooperation with national and international cardiological scientific societies and has had a catalytic effect in terms of the implementation and use of Internet/intranet technologies among users by building the G7CARDIO demonstrator as a multimedia web-centric application. The project also fulfilled an emerging need among the cardiology community to improve communication abilities, share best practices, federate data-bases, and improve clinical outcomes. In terms of the social aspect, two specific achievements can be mentioned:

- the G7CARDIO component for heart health promotion dealing with issues of process evaluation for educating different user groups (professionals and citizens) and implementing the most suitable heart health policy for each target. - the multimedia demonstrator of the G7CARDIO HH working group, which demonstrated how to provide effective information and consistent education with a multimedia application designed by physicians.

Overall, the project has shown the feasibility of the worldwide deployment of a database built on the commitment of existing user

- the commitment of existing user groups;
- internet technologies;
- a modular structure for clinical descriptors (dynamic standards);
- enrichment with qualitative elements (best practices, case studies, protocols);
- proficient use of the methodology (user-friendliness, education).

BUDGET:

Overall cost: N/A.

EC contribution: 300 000 €.

CONTACT

Università Cattolica del Sacro Cure Policlinico Gemelli Rome Cardiology Institute (I)
Dott. Domenico Cianflone
E-mail: d.cianflone@caspur.it

Timescale:

Keywords: information society, cards, interoperability, G7



PURPOSE

G7 CARDS is the extension at the G7 level of the consensus-making process on the promotion of Data Cards in healthcare. Already 1 million health cards are in circulation today and another million are expected in the next 2-3 years. The problems of interoperability and harmonisation of data sets are becoming crucial as the card is more and more considered as the security tool for the Healthcare Information Society, and a failure in this domain would put at risk the interoperability of the health telematic programmes implemented in the member states.

On a strategic level, the objective was to set up in the 6 participating G7 countries a framework for co-ordination comparable to the EUROCARDS framework in order to facilitate the development of coherent and interoperable programmes in the countries. In addition, the group of national representatives appointed by the countries composed the "management committee" of the feasibility study.

On a technical level three work packages were defined: (WP7) technical issues for inter-operability involved not only representatives of the Card projects but also European and Japanese industries; (WP8) health professional cards; and (WP9) Global Emergency Cards.

OUTPUTS

1. Confirmation of the results of the European project EURO-CARDS by the G7 countries.



- 2. Technical specifications for interoperability with different aspects: a) specifications that allow CARDLINK and DIABCARD to demonstrate their interoperability; b) definition of the European interoperable platform; c) specifications of the solution that allow interoperability between European and Japanese platforms (see www.clinical-info.co.uk).
- 3. Health Professional cards: Points of agreement were identified and solutions presented.
- 4. Patient data cards: one deliverable updated the evolution of the views of the participating countries in terms of the role of the pilot sites, security features, data sets and rights of the patients.
- 5. In parallel to this work some political results were obtained for the promotion of the use of data cards in healthcare: a) recommendation of the European Parliament for a Health Passport; b) decision of France, Germany and Italy to prepare the implementation of

coherent solutions for Health Cards and Telematic Network in healthcare; c) co-operation between France and Belgium in the social security telematic domain; d) co-operation with Slovenia and the Czech Republic with the NETLINK consortium; e) significant progress for feasibility studies of the Cards/Telematic programme carried out in coordination or co-operation with the EUROCARDS/G7 CARDS experts: Norway, Finland, The Netherlands, Québec, the USA and China.

BUDGET:

Overall cost: 300 000 €. EC contribution: 300 000 €.

CONTACT:

National representatives of France, Germany, Italy, Canada, Japan and partially UK Hervé Doaré E-mail: hdoare@capgemini.fr

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G7 GLOBAL HORIZON

Keywords: health services, extranet, Internet audio-video, oncology, G7

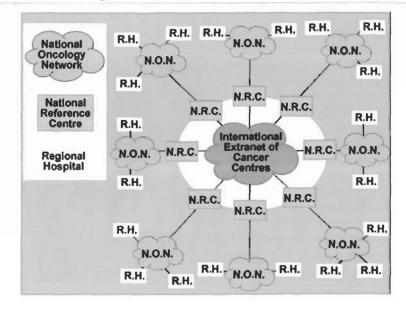
FEASIBILITY STUDY ON THE IMPLEMENTATION OF THE EUROPEAN COMPONENT OF THE G7 GLOBAL CANCER NETWORK SUB-PROJECT

PURPOSE

The project aims to demonstrate technologies in the fight against major health-threatening diseases. A cluster of ACTION projects addresses various aspects of the use of telematics in cooperation between healthcare professionals and in particular to facilitate discussion of protocols for cancer diagnosis and treatment, best practice guidelines, exploitation of miscellaneous expertise during the process of care, improvement of quality diagnosis and treatment, use of remote experts in pathology, continuing professional development of clinicians and speeding up the development process for drugs and other methods or treatment. The project concerned also non-G7 members.

OUTPUTS

The concept of a G7 oncology network became a manageable platform. The international Extranet of Cancer Centres then came to life as a self-supporting initiative of the participating centres. Finally, only 4 centres were designated: Holland, Germany, Italy and France. Other countries did not succeed in nominating one centre for the feasibility study. This platform provides private IP connections for desktop services for the reference centres, which may in



turn service national or regional healthcare centres. This platform can be used for peer services and for private broadcasting of video and audio for continuous education. An institute can webcast a local presentation and any institute having access to the platform can view it. Content providers can feed the platform with simple software, which is replicated to national reference centres. At the end-nodes it can be included in national and/or local information services. In return, content providers receive the access statistics of each replication server.

Global Horizon assisted in making existing and evolving national initiatives in this area complementary, inter-operable and compatible in a G7 context. Links with related developments in Japan, Canada and the USA have been established. By the end of 1999 the platform will include three to

five content providers, three or four reference centres and links with national networks. The standards are on the point of being handed over for further actions in their member centres. Member institutes will link up with this initiative to create a common cancer service platform. Reference documents have been issued for feasibility, telematics services in oncology, extranet demonstrator, content replication service, node implementation guide, content provider guide and end-user guide.

BUDGET:

Overall cost: 400 000 €. EC contribution: 400 000 €.

CONTACT:

VITAMIB Association (F) Pr. Gérard Brugal http://oncology.vitamib.com

Timescale:

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Keywords: public health, telematics, Internet, database, communicable diseases, statistics, G7

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GLOBAL PUBLIC HEALTH INFORMATION NETWORK

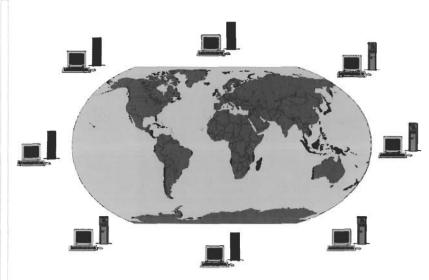
PURPOSE

The project investigated the feasibility of linking existing and emerging public health data telematic networks in Canada. Europe, Japan, the USA, WHO and other international healthrelated organisations. The main technical objective was to develop a network within the G7 states. A user-friendly navigation tool in the Internet linked to hosting databases seemed most appropriate. The main service was chosen to be a www server. In order to facilitate communication between participants and with the interested public discussions have been set up. For possible action two sectors had been identified: Communicable diseases and vital statistics.

OUTPUTS

Information has been collected i.a. on the database language, the update policy, security comments and the possibility of access. The answers have been stored in a meta-database. Furthermore an online database query was installed on the server. The results of this query have been fed automatically into the database. In addition a successful attempt has been made to link existing bibliographical databases.

With regard to communicable disease surveillance the study focused on two models: The expansion of Salm-Net to all partners, incorporating into the scheme the members not yet



participating and the design of an early warning system for emerging and re-emerging diseases reported to WHO. In the field of vital statistics a main objective was to test the feasibility of the linking of pre-existing databases to exchange information on public health and to show the potential end-products that can result from such a network. The prototype demonstrator was decided to be an adaptation of the WHO European Health for All database system. In co-operation with CDC, Atlanta this concept was extended to provide an on-line system that could access also distributed databases. Five schools of public health, representing all Europe, have been contacted for taking part in the assessment activity. The overall impression concerning the usability of the system was positive: Once accessed, the system proved to be quite transparent and auto-explicative.

In conclusion the GLOPHIN pilot has achieved its goals, however, its continuation as an Internet-based active system could not be assured. The granted project-

period was much to short. Nevertheless in the public health sector much more investment is required if its lagging behind could be compensated. One of the few immediate outcomes is the creation of the Internet Journal of Public Health Education, which hopefully will provide a forum for publicising the achievements of public health and health sciences.

BUDGET:

Overall cost: N/A EC contribution: 200 000 €.

CONTACT:

University of Bielefeld - Faculty for Health Sciences (D) Prof. Dr. med. U. Laaser http://health.ibs.uni-bielefeld.de

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G7 MARGRITE



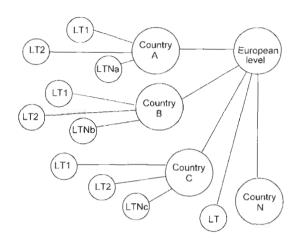
Keywords: transplantations, bone marrow, G7

MARROW GRAFT INTEGRATED TELEMATICS IN EUROPE

PURPOSE

MARGRITE is developed to help bone marrow transplantation clinicians. It aims to establish the telematics interconnectivity between international donor registries. Donor registries are queried when an allogeneic graft is the indication for a patient for whom an unrelated donor is being sought. Since the clinical teams gather graft-related information under a common format, it has been decided to aggregate this information and to make it available. The registry model has three levels: the clinical team level, the national level and the European level. The clinical teams have access to elementary statistics extracted from the central base. This organisational layout is generic to a large number of clinical and epidemiological fields. The telematic solution offers transcodification facilities to ensure compatibility with other European projects in the field of oncology (pathology).

The probability of finding a suitable unrelated donor increases if the donor search is made among populations of the same genetic origin as that of the patient. Only a worldwide interconnection will meet the need of patients living in certain parts of the world. An international association sets prenormative standards for data and reliable interchange of donor search messages.



The objective of the project is to establish interconnectivity between various donor registries in order to find the best donor within the shortest period of time, to establish the access of grafting physicians to national and European databases and to constitute a resource for planning protocols.

OUTPUTS

Internet database technology has been used to build a three-station demonstrator and to establish the feasibility. Examples provide preliminary data of some transplant procedures and incidences of transplant outcomes to target promising therapies for clinical testing. The link between MARGRITE's EMDIS line and the National Marrow Donor Programme of the USA has induced an increased number of donor/patient matches.

By using state-of-the-art technologies MARGRITE has addressed the real user needs defined in its preliminary phase, tested them and validated the technical options chosen. A database containing donor phenotypes accessible with a personal identification code is a commercial service already available.

The concepts and software developed for the demonstrator have resulted in a real product which is now at the prototype stage. PROMISE is intended to be sold as a package adaptable to a variety of clinical contexts. The future of MARGRITE resides in its industrialisation and the future of MARGRITE's EMDIS line in the generalisation of registries links.

BUDGET:

Overall cost: 360 000 €. EC contribution: 300 000 €.

CONTACT:

Bone Marrow Donor Worldwide (NL)

Tir

Prof. Norbert-Claude Gorin E-mail: gorin@ext.jussieu.fr

Timescale:

GALEN-IN-USE

HC1018

Keywords: EHR, terminology, coding and classification systems, description logic, decision support

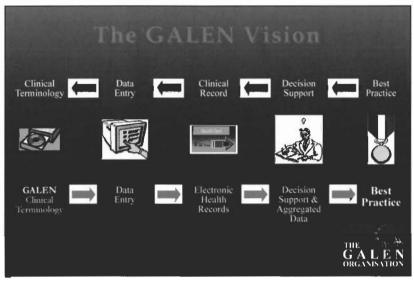
PURPOSE

GALEN-IN-USE has produced methodologies and tools for developing, integrating, and maintaining multilingual clinical terminologies. GALEN-IN-USE is the second phase of the GALEN programme which has developed and validated a new, radically more effective and less costly approach to managing re-usable clinical terminologies. GALEN is designed to master the Tower of Babel of current terminologies without imposing uniformity, and to provide a sound basis for multilingual systems.

The clinical focus in this phase, at users request, has been on terminologies for surgical procedures.

The technical focus has been on making the technology easy to use and approachable for clinical users.

GALEN-IN-USE' approach to reconciling users' needs for simplicity with the demands of software and re-use for rigour is to provide separate environments: one for clinical experts using a user-friendly Classification Workbench (ClaW) using an 'Intermediate Representation' and one for knowledge engineers using a rigorously formal representation language, GRAIL, through specialist tools, the Telematic Knowledge Management Environment (KNOME) and Template Integrator (TIGGER) which supports the transfomation between the ClaW and KNOME.



Local versions of the Intermediate Representation allow different centres to work independently in different ways. The central integration with the KNOME guarantees overall coherence. The GALEN approach separates language and concepts and is intrinsically multilingual. Users are presented with concepts in their own language generated from the concept representation. Underpinning the GALEN approach is a rigorous 'description logic' formalism, GRAIL, for describing medical concepts which has been specially tailored to the needs of medical applications.

OUTPUTS

Two comprehensive sets of tools were developed: the Classification Workbench (ClaW) aimed at clinical experts and classification workers, and the TeleKNOME aimed at professional knowledge engineers.

Also natural language generation for making terminology services comprehensible to users was demonstrated

A total of nine centres used the tools in the validation phase, with staff having training of only a few days in each case. Three externally developed clinical interfaces based on the GALEN technology were also validated during the project. The results confirm that the GALEN approach can be used to develop easy-to-use interfaces for clinical end-users.

BUDGET:

Overall cost: 3 912 094 €. EC contribution: 2 037 500 €.

CONTACT:

Victoria University of Manchester (UK) Alan Rector

E-mail: rector@cs.man.ac.uk

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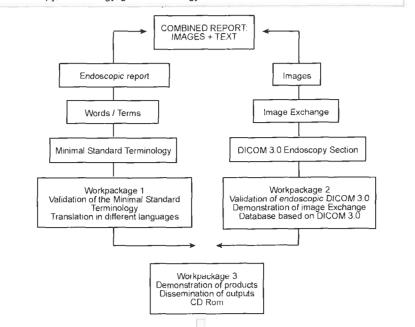
Keywords: imaging, standardisation, digestive endoscopy, terminology, gastroenterology

GASTROINTESTINAL ENDOSCOPY APPLICATIONS FOR STANDARDS IN TELECOMMUNICATIONS AND RESEARCH

PURPOSE

In gastroenterology, endoscopy has dramatically improved the work-up of digestive diseases. However, documentation of the endoscopic procedures remained poor until the last decade, when electronic endoscopes became available. Consequently, standardisation of the data became a necessity. Efforts were initially put on standardisation of the text report and a Minimal Standard Terminology (MST) was developed on the initiative of the European Society for Gastrointestinal Endoscopy (ESGE). Over the same period, the interest for standardisation of colour pictures for medical use rose. The DICOM format was supplemented for visible light images.

Based on the analysis of the current situation and considering the previous efforts in the field of standardisation that were undertaken by the ESGE, the GASTER project was divided into 3 main work packages. WP1 dealt with the standardisation of the text data. WP2 was devoted to standardisation of endoscopic images and exchange of these images. WP3 was intended to promote the results of the project and organise various educational activities supporting the dissemination of the standards amongst the scientific and medical community and develop a reference material for future courses.



OUTPUTS

The Minimal Standard Terminology was validated in a prospective trial that included 6,232 endoscopic cases. The testing concluded that 95 % of routine procedures were fully described with the MST and did not require any additional description. The results of the trial have been published in a peer-reviewed journal and have resulted in the full publication of a version 2.0 of the Minimal Standard Terminology.

The GASTER application was installed and tested in all academic centres participating in the project. It fulfilled its goals, as it was able to collect images, combine these images with the text generated by the report editor and send all the material in DICOM format to a central database. This database contains several thousands of endoscopic images, which are all referenced with the Minimal

Standard Terminology, have been reviewed by external experts, nominated by the ESGE and are all in DICOM format. The database is available over the Internet and using a common browser and it has been included in the network of medical image databases, run by the MEDIMEDIA project (HC 4013).

Several courses have been organised in the main meetings for Gastroenterology and Digestive Endoscopy, to promote the dissemination of the standards and the group has participated in the activities of standardisation of the DICOM for Visible Light.

BUDGET:

Overall cost: 850 000 €. EC contribution: 500 000 €.

CONTACT:

European Society for Gastrointestinal Endoscopy (I) Michel Delvaux http://www.gaster.org

Timescale:



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Keywords: imaging, standardisation, digestive endoscopy, terminology, castro enterology, CEEC

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Group 3

Gastrointestinal Endoscopy Applications for Standards in Telecommunications and Research – Extension to Eastern Europe

PURPOSE

GASTER II was intended to aggregate new centres to the running GASTER I project and thereby, promote the dissemination of the output of the GAS-TER project in the eastern part of Europe. In GASTER I efforts were initially put on standardisation of the text report and a Minimal Standard Terminology was developed on the initiative of the European Society for Gastrointestinal Endoscopy (ESGE). Results of GASTER II consisted mainly in the production of official translation of the Minimal Standard Terminology into Polish, Czech, Hungarian and Russian.

Based on the analysis of the current situation and considering the advances provided by the GASTER I project, GASTER II was designed to link four university hospitals from Eastern Europe to the framework of the GASTER I project.

The approach was similar to the one used for the GASTER I project. WP1 dealt with the standardisation of the text data. WP2 was devoted to standardisation of endoscopic images and exchange of these images. WP3 was intended to promote the results of the project.



OUTPUTS

The translation of the Minimal Standard Terminology was achieved in all languages and they have been introduced in the dissemination programme of ESGE. These translations have been officially approved by the National Societies for Gastrointestinal Endoscopy.

The GASTER application was installed in all academic centres participating in the project. This application is designed to collect images, combine these images with the text generated by the report editor and send all the material in DICOM format to a central database.

The Minimal Standard Terminology, in its version 2.0, includes several translations (15 Ianguages), all of them approved by

the National Societies for Gastrointestinal Endoscopy.

Several courses have been organized in the main meetings for Gastroenterology and Digestive Endoscopy, to promote the dissemination of the standards, and the group has participated in the activities of standardisation of the DICOM for Visible Light. Users of the countries engaged in the GASTER II project have attended these meetings.

BUDGET:

Overall cost: 182 000 €. EC contribution: 149 000 €.

CONTACT:

European Society for Gastrointestinal Endoscopy (I) Michel Delvaux http://www.gaster.org

Timescale:



Keywords: architectures, middleware, components, open systems, standard

HEALTHCARE NETWORKED SYSTEM
ARCHITECTURE

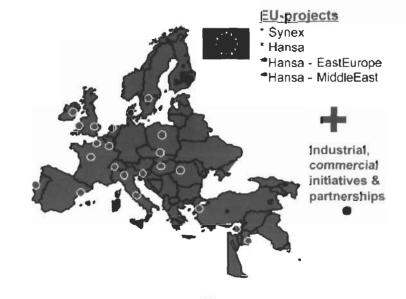
PURPOSE

A group of industries and healthcare organisations participated in the HANSA project, which has had the mission of facilitating a transition of existing legacy systems to interwork and evolve towards a new open standardisation and modular architecture using the CEN HISA standard and the open DHEâ middleware. Under the present circumstances, the primary need for supporting the evolving requirements of health informatics markets is to make the utilisation and information exchange as easy as possible.

OUTPUTS

The DHE represents an open platform of common services, capable of making the digital information of the healthcare organisation integrated and available whenever needed. It provides all stages of the information chain with healthcare-specific information to support healthcare management utilising technologies such as component-based architectures (e.g. DCOM and Corba), as well as message-based approaches (e.g. HL7, HTML, XML, etc.).

A significant contribution has been given to this standardisation process by DHE and the result of this has been the finalisation of the



European standard ENV 12967 'Healthcare Information Systems Architecture', which formalises the characteristics of the middleware-based architecture promoted by Hansa. Moreover, the Consortium has put the API of the DHE services in the public domain.

The activities of the project have related to the installation and the demonstration of the DHE in the live environment of hospitals from several European countries, by integrating legacy applications already operational in the hospital on top of it. In parallel, new developments have been carried out and national user groups have been organised.

As an outcome of this project, concrete results have been reached in terms of utilising the HISA standard as a reference for large national procuring measures

as well as in terms of commercial contracts done by the Hansa partners to the supply the DHE.

Further evolution is also happening in the framework of the SynEx project, aiming at extending and complementing the DHE with specific functionalities for the management, sharing and distribution of healthcare records.

BUDGET:

Overall cost: 5 000 000 €. EC contribution: 1 700 000 €.

CONTACT:

Consorzio EDITH (I) Fabrizio Massimo Ferrara E-mail: fmf@gesi.it

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Keywords: architectures, middleware, components, open source, standard, DHE

HEALTHCARE NETWORKED SYSTEM ARCHITECTURE

PURPOSE

A group of industries and healthcare organisations, using the CEN HISA standard and the open DHE(r) middleware, have come up with the concept of HansaMed, which ran between 1999-2000 to promote and demonstrate the CEN HISA standard in the Middle East region.

OUTPUTS

The DHE represents an open platform of common services capable of making the digital information of the healthcare organisation integrated and available whenever needed. It provides all stages of the information chain with healthcare-specific data to support the healthcare management process by utilising the provisions of the CEN ENV 12967-1 HISA standard, healthcare information system architecture, and DHE middleware. By disseminating and promoting the standards in the Middle East region, the aim is to establish further industrial and end-user collaboration in the area.

EU-projects

- Synex
- * Hansa
- ′ Hansa EastEurope ′ Hansa MiddleEast



Industrial commercial initiatives & partnerships



BUDGET:

Overall cost: 450 000 €. EC contribution: 300 000 €.

The HISA standard and the DHE middleware used in the Middle East region has been demonstrated and verified in practice in three hospitals in Lebanon and Jordan. The system has been modified for the American University Hospital of Beirut, integrating the AS400 system and a new radiology application that has been autonomously developed locally on top of the DHE middleware.

A centre of competence and support for the region has been set up by Intermedic, by founding a new company named Biocare Sarl.

CONTACT:

Consorzio EDITH (I) Fabrizio Massimo Ferrara E-mail: fmf@gesi.it



Keywords: decision models, resource allocation, ontology, cost-effectiveness, cost-benefit, resource management

HEALTHCARE RESOURCE
MANAGEMENT

PURPOSE

The general lack of sound methodological approaches, standardisation and international collaboration among experts is an obstacle to development of healthcare resource management.

The challenge for HC-REMA was to provide healthcare operations with a method and tools for building, using and sharing decision support systems for cost-effective resource allocation.

OUTPUTS

HC-REMA developed and made available over the Internet a decision support system, based on decision-analytical models, which incorporates an explicit knowledge representation of the medical domain knowledge and economic evaluation theory. Application models are built on top of meta-models, which are used as guidelines for making both the cost and effectiveness components. The original project aim was to provide different types of healthcare professionals with a set of tools for building decision support systems for resource management optimisation and quality control of healthcare.

HC-REMA has produced:

1)Tools for persons responsible for content and maintenance of the web services, which include such products as Tadzebao and Webonto specialising in the area of ontology;



2)Tools for the users, i.e. decision makers, who have been provided with a prototype, the Economic Evaluation Tool EETWeb, running on the Internet.

This tool presents available meta-models for each selected application area (diagnostic testing strategies, therapeutic interventions, instrumentation purchase), on top of which application-specific models are built by the users.

The database is one of the most important system components, as it stores certified and up-to date information to aid:

The diagnostic strategy choice for the occult cancer screening in patients with deep venous thrombosis (DVT). The choice of the empirical antibiotic treatment in urinary tract bacteremia. The conditioning regimen to be performed before the bone marrow transplantation in children with acute myeloid Leukemia. Treatment choice for a patient with acute gastrointestinal tract bleeding. The choice of the testing

strategy for breast cancer investigation.

HC-REMA architecture has been shown to improve the construction of economic evaluation models and the comprehension and transferability of results. The created database is an exploitable by-product in itself. Future work may concern additional meta-models, the extension of the database to consider a larger number of diseases, and the updating and maintenance of the system, for which it is necessary to have a continuous link with the recent scientific literature.

BUDGET:

Overall cost: 500 000 €. EC contribution: 500 000 €.

CONTACT:

University of Aalborg – V-CHI (DK) Stig Kjaer Andersen http://aim.unipv.it/projects/hcrema

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Timescale:

Keywords: conference, health telematics, assistive technologies, RTD projects, awareness

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JOINT CONFERENCE AND EXHIBITION OF THE EU AND SOUTH AFRICA ON TELEMATICS APPLICATIONS AND ASSISTIVE TECHNOLOGIES

PURPOSE

The HEAL SA diffusion conference was held in South Africa close to Johannesburg on 16-18 May 1996. The objective of this conference was to identify the new social deficits within South Africa and the common challenges faced by the EU and South Africa.

The costs of the conference were covered to a major part by the EU funding of a selected proposal HEAL SA. This was a so-called Support Measure in the framework of the Telematics Applications Programme. Another substantial part came from the European Programme for Reconstruction and Development in South Africa at the specific request of the Ministry of Health of South Africa, prioritising this event.

OUTPUTS

More than 200 participants attended the conference "Telematics for Health and Disabled and Elderly People". The secret of its success was the quality of the participants. This was important for raising awareness on a wide scale. Not only participants from Europe and South Africa but also a quite significant number of



participants from Sub-Saharan countries attended the conference thanks to additional funds, which the Commission made available to aid these participants in being able to travel.

The programme was focused around 6 plenary sessions, some parallel sessions and workshops and an exhibition, displaying the results of twelve EU-funded RTD projects and of one G7 project. In addition, two industrial companies and four industrial sponsors guaranteed interesting exhibitions addressing a wide spectrum of health telematics and assistive technologies

The main goal was to examine how "state-of-the-art" telematics provides solutions to the complex health problems of South Africa and the South African region and

improves the quality of life of disabled and elderly people in the context of the creation of a national health information system. Another goal was to promote the dissemination of both expertise in healthcare telematics and in the assistive technologies in South Africa and open-up potential markets for European RTD projects. Collaboration in telepathology between the University of Johannesburg/RSA and the University of Oxford/UK has been launched as one outcome of the conference.

BUDGET:

Overall cost: 250 800 €. EC contribution: 200 000 €.

CONTACT:

Club de Bruxelles (B) Catie Thorburn

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HEALTHLINE HC4007



Keywords: telemedicine, health networks, teletraining information dissemination

SECURING THE SUCCESS OF HEALTH TELEMATICS PROJECTS IMPLEMEN-TATION THROUGH INFORMATION DISSE-MINATION AND TRAINING

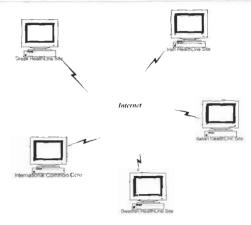
PURPOSE

The EU-funded initiative for Telematics in Healthcare introduced a new way of providing HealthCare Services combining new technologies with new organisational models. The Health-Line project aims at the creation of a European-wide TeleMedicine Internet service for the dissemination of results and strengthening of on-going and concluded TeleMedicine projects, as well as for the provision of a number of web-based services to Health/ Medical-related professionals and non-professionals.

OUTPUTS

The HealthLine infrastructure and service backbone has been formed through the realisation of four (4) independent national HealthLine sites and the development of the HealthLine International Common Core, which bridged the different user requirements, the linguistic and cultural differences among the participating National User Groups.

The pan-European dimension of the project was ensured by means of creating an International Common Core Repository that holds an index of all information included regardless of the site and language in which it was submitted.



The HealthLine system has been installed in four European countries (namely Ireland, Greece, Italy and Sweden) and successfully underwent the verification and validation procedures necessary for the demonstration of the intrinsic characteristics of the design and the determination of possible additional development efforts.

The main service modules/functions that comprise the Health-Line system are the following: The Articles & Postings, The Special-Interest Groups (SIGs), The links to existing information, The link to NIVEMES and RISE TeleMedicine Networks, The Onthe Job Training Module and The Site-Specific Service Modules developed in order to fulfil the special needs of the local user groups.

The HealthLine project realised:

A focal point for the strengthening of previous telematic health projects and the dissemination of the results and information obtained.

An integrated set of health-related Internet-based services realised as a series of innovative software modules. An Internet system and a web portal aiming to provide an on-line meeting place for health related professionals and non-professionals as well as the necessary infrastructure for the submission, review and dissemination of health/medical-related information.

The HealthLine consortium has specific plans for promoting and exploiting the HealthLine project results. In general the partners in the consortium plan to exploit the HealthLine services, the administrative mechanisms realised and the service provision framework developed by means of the franchise concept, which is considered as the ideal method to exploit a federated services framework as HealthLine.

BUDGET:

Overall cost: 1 562 043 €. EC contribution: 810 001 €.

CONTACT: ATKOSoft (EL)

Yiannis Samiotakis E-mail: yiannis@ATKOSoft.com

Timescale:

Keywords: healthcare telematics, planning, development models, regional government



A CONCERTED ACTION TO SUPPORT NATIONAL AND REGIONAL HEALTH AUTHORITIES IN DEVELOPING PLANS FOR THE INTRODUCTION OF HEALTHCARE TELEMATICS

PURPOSE

The role of HealthPlans has been to assist user groups (mostly healthcare authorities and enduser organisations) to reach consensus on principles and requirements on the development of enlarged Europe-wide implementation of healthcare telematics in key strategic areas, by helping the countries involved to reach common understanding on principles and requirements concerning the dissemination of information, experiences and plans for establishing HCT systems and services.

The Telematics Applications Programme supports international consortia in developing and establishing enlarged, visible pilots of key telematic services. These pilots are designed to demonstrate that the proposed solutions are not only technically feasible at a prototype stage, but are also cost-effective, organisationally acceptable and beneficial when applied on an enlarged scale. There is a general feeling that for many aspects a harmonised European approach would be more effective than several fragmented national or regional initiatives, and that confrontation of approach and results might be beneficial to this goal.

The HealthPlans Consortium represents key national or regional Healthcare Authorities and delegated organisations from most of the coutries of Europe:

BELGIUM DENMARK FRANCE GERMANY GREECE SPAIN UNITED KINGDOM ITALY



AUSTRIA FINLAND PORTUGAL LUXEMBOURG IRELAND SWEDEN NORWAY

OUTPUTS

Three streams of action have been carried out:

- 1. Profiling the participation of public healthcare authorities, industry and users organisations in the national and international R&D programmes (with special focus on the EC HCT Programme) and establishing a directory of interested participants and contact persons;
- 2. Critically reviewing requirements, priorities and strategies expressed by the healthcare authorities and end-user organisations, and matching them with the provision of products and services;
- 3. Fostering the development of coherent plans for implementation of healthcare telematics at the local, regional, national and

international levels, by focusing on the areas that are recognised as common priorities.

The results have been published both electronically and in paper form.

The most important result is that a forum has been actually established between the healthcare authorities of most of the participating countries. A further concerted action (named EhTel) has been proposed to and accepted by the EC, to give a stable structure to the forum and to involve the industry in the process.

BUDGET:

Overall cost: 320 000 €. EC contribution: 320 000 €.

CONTACT:

FINSIEL (I)
Giuseppe Chili
E-mail: g.chili@finsiel.it

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1996	1997	1998	1999	2000	2001



Keywords: telematics, assessment, database

PURPOSE

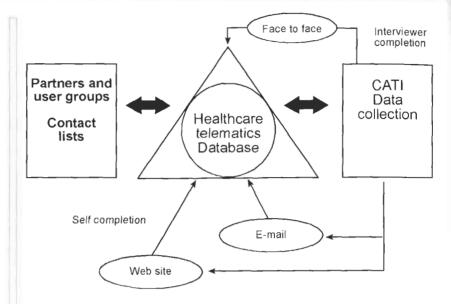
The multiplicity of funding mechanisms for healthcare in the EU Member States hinders a clear understanding of achievements and obstacles to progress.

By identifying current and planned healthcare projects using telematics throughout the EU, the Healthwatch database was planned to improve the capability of the health community to assess the status and trends in the Member States, and enable Community resources to be allocated on an effective basis.

The Healthwatch project developed a database of healthcare telematics projects in the EU, Norway and Switzerland, together with a preliminary assessment of the impact of these projects on the quality of healthcare and the adoption of innovative technologies.

OUTPUTS

A database containing a total of 419 entries was created, which contained information on European projects or applications together with an assessment of their impact.



A user advisory panel consisting of 75 members was established, with representatives from each EU Member State, Switzerland and Norway, from industry, academia, healthcare authorities and government.

The user advisory panel participated in the design of the project evaluation methodology, and in the selection of projects to be included.

Following design of the database a pilot trial involving 20 projects/applications was carried out using computer-assisted telephone interview methods (CATI) and the evaluation questionnaire refined.

A preliminary database of projects/ applications in the healthcare telematics sector was created, including an assessment of their impact.

To be representative, however, a more comprehensive database containing a larger sample of the work in this area is needed. The market research techniques used to collect the data could benefit from further adaptation for use in the field of technology assessment.

BUDGET:

Overall cost: 386 000 €. EC contribution: 386 000 €.



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HEALTH EMERGENCY MANAGEMENT AND CO-ORDINATION THROUGH TELEMATICS OPERATIONAL RESOURCES

PURPOSE

HECTOR is a project devoted to improving the performance of Health Emergency Care through the use of state-of-the-art technologies in the telecommunications and data processing domains.

HECTOR was born with the objective of improving the quality of emergency services by developing tools that worked in an interoperable manner and made an intensive use of information and telecommunication technologies, and that could be inserted in their routine environments, therefore helping healthcare professionals to deliver their care in a more efficient way.

The HECTOR Consortium had two main objectives. First, it was aimed to define and build an interoperable system based on existing open technology and incorporating multimedia and telecommunication new capabilities focused on improving coordination and management in health emergencies organizational models for the HECTOR system. The second objective was to verify that innovative telematic technology is effectively and realistically able to improve the performance of the healthcare organisations devoted to urgency and emergency situations, and thus improving citizen's attention and professional's work.



OUTPUTS

The HECTOR Portfolio of results consists of the HECTOR Reference Architecture, the HECTOR Minimum EHCR Data Set and the HECTOR Scoring System. In the compendium of telematic applications obtained from HEC-TOR, different solutions exist for expanding already existent coordination systems with medical tools and a good amount of knowhow has been accumulated in topics such as procedures, training, legal aspects, dissemination, guidelines, etc. Solutions are, for example: image transmission systems using GSM or any other existing communication infra-structure (even from a helmet); Mobile Unit's Portable Terminals able to share Electronic Healthcare Records (EHCRs) as well as GeoPositioning Data with the rest of scenarios via GSM, satellite or trunking; Coordination stations able to manage mobile units using

GPS and GIS tools, sharing EHCRs with any other scenarios and activating Mobile Units using predefined messages reducing the voice communications; Hospital stations that broadcast the Hospital ward's bed availability, and share EHCRs, facilitating the continuity of care; Telemedicine Workstations that locate only one call away the specialists from the isolated points of care (from mountains to ships at sea) allowing the interchange of EHCRs, biosignals and X-ray images, etc. All these components were tested and continue in routine use in eleven different pilots across Europe.

BUDGET:

Overall cost: 7 816 383 €. EC contribution: 3 640 000 €.

CONTACT:

SADIEL (E) Miguel Camacho http://www.sadiel.es/europa/hector





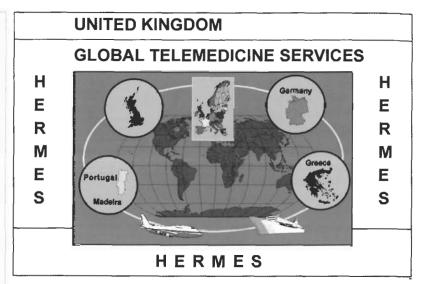
Keywords: telemedicine, health networks, teletraining, information awareness

TELEMATIC HEALTHCARE:
REMOTENESS AND MOBILITY FACTORS
IN COMMON EUROPEAN SCENARIOS

PURPOSE

Telemedicine provides a new digital environment for healthcare delivery and has the potential to support equal access to highquality seamless (interoperable) services, across boundaries. sectors and international borders. Resource factors, immature technologies, the need for fundamental service reorganisation with a lack of overall standards and a poor understanding of the new services and technologies are currently hindering acceptance of implementation and further dissemination.

In order to provide solutions. HERMES has researched a "platform paradigm" for designing, constructing, implementing and evaluating quality-assured telemedicine services. The developed platform needed to take into account the technical, medical, service quality and business aspects of service delivery. The provision of a quality policy, of electronic user tools and of user evaluations of all prototype products and services were the methods of ensuring the input from all stakeholders. From this work, a user-driven functional specification was to be derived and real-life services for evaluation were to be implemented in four member states. These services were to support tourists and other mobile citizens as well as specialised, decentralised services for local communities.



OUTPUTS

The involvement of all stakeholders in the platform development process and the provision of electronic WWW-based user tools have led to successful alignments with acceptances of the new telemedicine service organisation and the new technologies. These acceptances included those of evidence-based best-practice guidelines and conformance to ISO 9000+ service quality standards.

HERMES partners have defined a technology implementation plan with an exploitation framework and timetable for this activity. The HERMES work has highlighted the need for a standards-based platform approach in order to overcome uptake and dissemination hindrance factors. This is necessary for the development of seamless (interoperable) services and includes the technical, medical, service quality and business aspects of service delivery.

There is a requirement for crosssector activities with the efficient use of ICT and infrastructures. The alignments for reaching contractual service-level agreements with proper resource allocation, and the acceptance of the new service organisation and the new technologies at the point of delivery (the patient-carer interface), are crucial to future successes. Business planning and clinical governance with evidence-based approaches and education and training 'on the job' are important aspects of this effort and the involvement of all stakeholders in the development process is the most important factor determining success.

BUDGET:

Overall cost: 4 865 164 €. EC contribution: 3 000 000 €.

CONTACT:

University of Edinburgh (UK)
Dr. Ken Boddy
http://www.hermes.ed.ac.uk

Timescale:

Keywords: dialysis, satellites, telemonitoring, teleconsultation, ISDN, homecare

HOME REHABILITATION TREATMENT — DIALYSIS

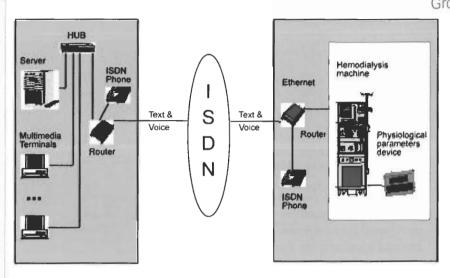
PURPOSE

Although end-stage renal failure patients requiring haemodialysis treatment, especially those living in remote areas, would benefit from treatment at home or at satellite centres, the implementation of outside-centre dialysis has been hindered by the so-called "supervision gap", i.e. the lack of on-line supervision and support during the dialysis process.

Filling the "supervision gap", the HOMER-D project (http:// www.ergo.com.gr/homerd) offers an integrated platform for telemonitoring and teleconsultation services to support renal patients in performing home or satellite haemodialysis. Bi-directional telecommunication links between a Central Control Station located in a hospital dialysis centre, available 24-hours per day, and Remote Terminal Units in patients' sites enable the remote on-line supervision of each haemodialysis session and possible consultative intervention by the medical/nursing staff.

OUTPUTS

- 1) Implementation of the central control station and multimedia terminal units in the hospital dialysis centre.
- 2) Modifications to an existing advanced haemodialysis machine to meet the bi-directional communication requirements.
- 3) Implementation of remote terminal units in patients' sites.
- 4) Development of a networked non-invasive physiological parameter device.



Central Control Station

- 5) Development of an external autonomous verification box.
- 6) User-interface of multimedia terminal units and remote terminal units.
- 7) Definition and implementation of scenarios and clinical protocol for on-line remote supervision and control of the haemodialysis session.
- 8) User interface of multimedia terminal units and remote terminal units.
- 9) Integration of implemented services and modules into a unified telematics platform, including laboratory tests for adequate functionality of the industrial prototype.
- 10) Determination of validation criteria.
- 11) Development of training guidelines and tutorial courses for users of the services.
- 12) Validation in four European hospital dialysis centres involving 29 patients (verification "clinical approval" phase).
- 13) Validation in the patients' home environment (demonstration "home approval" phase).

Remote Terminal Unit

14) Technical and socio-economic assessment (stakeholder analysis) proving that HOMER-D meets evaluation criteria and offers a cost-effective alternative.

In view of the successful performance of the system and its acceptance by hospital staff and patients, the consortium was determined to continue with field trials and the development of business and financing plans prior to applying for CE Marking certification.

BUDGET:

Overall cost: 2 068 000 €. EC contribution: 1 000 000 €.

CONTACT:

ERGO S.A. (EL) Marios Skiadas

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Timescale:

Keywords: health services, extranet, Internet, XML, medical information portal, oncology

HORIZONTAL ACCOMPANYING MEAS-URE FOR THE ACTION CLUSTER FOR TELEMATICS-ASSISTED COOPERATIVE WORK FOR HEALTHCARE PROFESSION-ALS

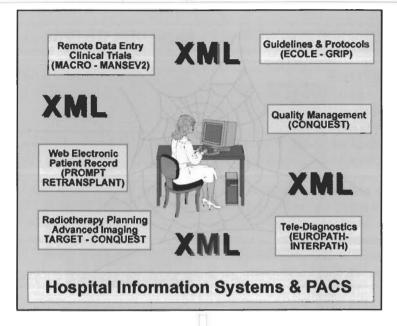
PURPOSE

The HORIZON project was positioned as an observatory of the efforts in the fight against major health-threatening diseases made in 12 EU projects dealing with healthcare telematics applications to oncology during the last 4 years, each addressing a different aspect of the use of telematics to support such information flows.

The emphasis was put on the interfacing of networks and applications for improving diagnosis and treatment of cancers. Concretely, it contributed towards implementing an extranet between international centres of expertise in cancer, to promote and support the use of XML interfacing between applications and to provide a dynamic web platform to facilitate the co-operation between technology providers and medical users.

OUTPUTS

The HORIZON project collected information and proposes some technological solutions intended for all the manufacturers and their academic collaborators having developed concrete telematics applications in oncology with the



hope that they will be actually used in the very near future of routine medical practice.

In order to maximise impact, the projects focused on oncology as a target area while keeping the applications as generic as possible. In addition, three specific achievements were reached by the HORIZON project, such as:

- * The setup and assessment of the Onconnect.net Extranet for Cancer Centres aimed to further support any delocalized medical information portal;
- * The identification, discussion and dissemination of the XML technology as a consensus interfacing means between the AC-TION projects respective achievements, and any further

applications requiring information sharing;

* The development and demonstration of a collaborative platform based on GroupWare technologies to facilitate the further take-up of telematics applications by the medical end-users and their collaboration with the technology providers.

Directly or indirectly, the HORI-ZON project had to deal with more than 20 manufacturers including a few start-up companies in the field.

BUDGET:

Overall cost: 846 606 €. EC contribution: 735 000 €.

CONTACT:

VITAMIB Association (F) Prof. Gérard Brugal http://www.onconnect.net

Timescale:

Keywords: occupational health, health and safety at work, occupational accidents, workplace health promotion, Internet

Group 6

HEALTH AND SAFETY PROMOTION IN THE EUROPEAN UNION

PURPOSE

The HSPro-EU project has produced a prototype service for the dissemination of occupational safety and health information across Europe via the Internet with linked sites initially in four countries.

There is a widespread information gap in relation to the availability of health and safety information in the European workplaces. Of particular concern was a perceived lack of health and safety activity amongst small to medium enterprises due to lack of information. This project addressed the problem through the development of a remotely accessible informatics system, providing a range of health and safety and workplace health promotion information to a range of user organisations.

A set of requirements was established by a review of available literature and under-taking requirement interviews. A national version of the demonstrator was built in each of the four participating countries to accommodate language requirements, variation in national legislation and business mentality. The 4 versions shared the same physical layout, logical design and methodology of use.



OUTPUTS

The HSPro-EU Project has produced a prototype service for disseminating Occupational Safety and Health information across Europe.

The main end result is a prototype of telematics-based service, which gives remote access to a range of occupational health and safety and workplace health promotion information. Access is given via a homepage to a number of facilities including HTML pages, databases and links to other relevant sources. Information content includes legislation databases, guidelines and safety precautions, library and bibliographical resources, news, announcements and events.

Within the lifetime of the Project the information content has been

constantly developed so that the system now contains a wide range of information resources and tools.

The system utilises linked Web sites in each country with a common core structure. Links are made horizontally at each level allowing the user to move directly between equivalent parts of each site. Outside the common core the individual sites in the system may vary in content and structure.

The HSPro-EU system has been used as the prototype for the European Agency for Safety and Health at Work's Information Network.

BUDGET:

Overall cost: 1 223 422 €. EC contribution: 595 635 €.

CONTACT:

Health & Safety Authority (IRL)
Jim Heffernan
http://www.hsa.ie/hspro

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1996	1997	1 1998	1999	2000	2001



14C

Keywords: systems integration, electronic health record, electronic data interchange

INTEGRATION AND COMMUNICATION FOR THE CONTINUITY OF CARDIAC CARE

PURPOSE

In Europe, heart disease is one of the main causes of early disability and premature death, with the number of patients steadilyincreasing. Since most patients suffer chronically from heart disease, the continuity of cardiac care provided by general practitioners, nurses and cardiologists is essential. The I4C project (http://www.eur.nl/fgg/mi) intended to address this need by offering healthcare professionals a workstation to access all relevant patient data, images and cardiac signals and providing a means for exchanging such information. A number of representative digital user sites in different European countries (Netherlands, United Kingdom, Germany, France, Italy, Greece) were involved.

OUTPUTS

A flexible multimedia workstation developed within the I4C project allows the collection, storing and transmission of patient record data (history, physical examination, laboratory data, prescribed drugs, diagnoses, etc.), as well as cardiac images (e.g. coronary angiograms) and cardiac signals (e.g. ECGs). The use of legacy systems, plugs and encapsulators guarantees that the I4C workstation can connect with other existing applications. Patient data may be accessed through the workstation (located in a practice, a consultation room,

Angio Research Retrieval Client Server Encapsulator Compon UMLS Encapsulato Angiogram Encapsulator

an outpatient clinic, or a hospital) and interconnected and integrated through a network and electronic data interchange. I4C has multilingual capabilities (completed at time of report: English, Dutch, French, German, Italian, Czech, and Greek) and specific software components of the workstation can be implemented in existing computer applications for healthcare. In addition to direct patient care, data may be used for quality assessment, research, education, management, and planning.

The core of the software is the ORCA system (Open Record for CAre) that supports structured data entry (SDE). To provide the most suitable interface, a fixedform approach for the entry of domain-independent data (medication and diagnosis) and a dynamic approach for the entry of domain-dependent data (complaints and physical examination) were chosen. The dynamic

approach is based on knowledgedriven data entry supported by a knowledge base that determines which terms can be used and how they can be combined to form medically meaningful expressions. Using this knowledge, the SDE interface provides the user with context-sensitive options during data entry. ORCA can be used in a generic way for the entire domain of healthcare and can be adapted both to continuously changing and expanding medical knowledge and to the local traditions of a hospital or healthcare practice.

BUDGET:

Overall cost: N/A.

EC contribution: 2 000 000 €.

CONTACT:

Erasmus University (NL) Jan H. van Bemmel E-mail:vanbemmel@mi.fgg.eur.nl

Tiı



Keywords: systems integration, electronic health record, electronic data interchange

Group 1

Integration and Communication for the Continuity of Cardiac Care Triple C

PURPOSE

In this follow-on project to the I4C project, the ORCA software developed within the I4C project was installed in selected hospital sites in the Czech Republic (University Hospital, Prague, Municipal Hospital, Caslav) and Slovakia (Slovak Cardiovascular Institute) for evaluation and validation. Other partners in the I4C-Triple C project (http://www.mieur.nl) were Erasmus University, Netherlands; Aristotle University, Greece; EuroMISE Centre, Czech Republic; and an industrial company, Cardio Control.

OUTPUTS

Prior to carrying out the project, existing computer facilities at the sites had to be upgraded to the necessary standard (one SQL server, network infrastructure, workstations). For the evaluation and validation of the ORCA software, each of the sites developed its own research plan. The outputs of the project included the following:

- Formulation of local research plans utilising patient records created by the system.
- Successful installation and configuration of the hardware and software in all centres.
- Localization of the knowledge base and user interface of the ORCA system.



- Adaptation of the knowledge tree using the knowledge editor including terms needed for the research projects in the know-ledge base.
- Testing of the CardioPerfect ECG device and software (donated by CardioControl) in connection with the ORCA software, including translation of menus and dialogues into Czech.
- Data collection using the ORCA
 1.3 electronic patient record.
- Development of user-friendly programs for statistical processing of the collected patient data:
 a) the ORCA data extractor allowing the definition of data to be extracted by selecting relevant concepts from the knowledge tree; b) a program exporting the patient medication. Both programs export the selected data from the database to the CSV format (comma separated values), which can be imported into other programs.

- Development of modifications, improvements and patches.
- Development of an automatic installer to facilitate installation.

 As a further result of the project, a new cardiology clinic was set up in the EuroMISE premises, with healthcare provided by the two Czech hospitals involved in the project and data collection based on the ORCA system.

BUDGET:

Overall cost: 247 650 €. EC contribution: 211 600 €.

CONTACT:

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Keywords: 3D modelling, virtual endoscopy, distant learning, education, decision support system, imaging

AN INTERNET SERVICE FOR FAST VIEWING AND MANIPULATION OF 3D MODELS OF HUMAN PATHOLOGIES

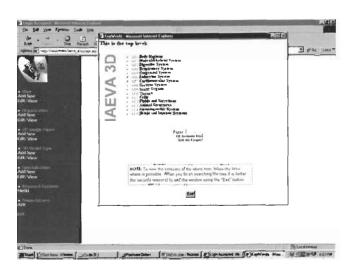
PURPOSE

The aim was to use multimedia databases to disseminate research and clinical information by setting up a www service based on a library of 3D models of human organs (pathological and normal). Although the emphasis is on teaching medical students and continuing education for physicians, the library is also a valuable resource for diagnostic investigation and decision support. Another relevant objective is the promotion of 3D modelling (3DM) and virtual endoscopy.

To set up an Internet service (IS) with growing capability and self sustainability the following issues have been addressed: State-ofthe art technical developments to enhance speed and to also allow visualisation of volume rendering fly-through and manipulation performed on radiological postprocessing workstations; remote training and educational support tools have also been introduced as well as an integrated classification and terminology system; using the Internet via satellite has been investigated; the medical community was involved both in the production of cases and models and in the evaluation and validation of technical and content results.

OUTPUTS

The I2 IS site is now fully operational and commercially exploitable. It supports all above-



mentioned key features. The I2 database includes 47% of originally planned contents and keeps growing on a self-sustainability basis. The software needed by users is available from the home page.

Information providers can use I2 tools or software for high-end PCs for production of multi-resolution 3D models. Tools for educational activities are also available on the site.

All functions for any category of users run on any current Windows or MAC OS platforms, except IMP and IMV, which currently run on Windows NT. Commercial agreements among main partners are being finalised on joint exploitation of the I2 site and other products. An agreement with TELESPAZIO on distance learning, teleconsulting and decision-making support exploitation is being negotiated. Many improvements have been and are being made after the end of the EU-funded project. Further

technological development is planned on full compatibility with Windows 2000 and MAC OS. Content development, particularly of multi-resolution models and of building up distance learning and tutoring are planned.

Ajoint venture with TELESPAZIO using the Internet via satellite is planned to have first commercial objectives in virtual teleconsulting and research group panels as well as preventive medicine education for citizens.

BUDGET:

Overall cost: 2 640 400 €. EC contribution: 1 425 000 €.

CONTACT:

CITEC SpA (I) Giuliano Salcito

http://iaeva.unicampus.it/iaeva_ii/

Timescale:

Keywords: orthopaedic surgery, computer assisted surgery, augmented medical reality, surgical navigation, robotics

Group 3

IMAGE GUIDED ORTHOPAEDIC SUR-GERY

PURPOSE

Modern orthopaedic surgery tends towards minimal invasiveness, increased and quantified quality, and relies on multimodal sources of information and expertise. These medical objectives can be met only by introducing new sensors and navigational aids in the Operating Room (OR). The size of the orthopaedic surgery "market" makes it an excellent target for Computer Integrated Surgery Techniques (CIST).

IGOS intended to develop innovative solutions to the medical objective of improving the quality and reproducibility of complex orthopaedic surgical procedures by introducing new Computer Vision sensors and guiding systems in the Operating Room, thus making it possible to assist the surgeon in performing a 3Dplanned surgical strategy by using augmented reality systems or robotic devices and to validate the feasibility and clinical interest of these techniques and to disseminate the obtained results.

OUTPUTS

The following development results were achieved: integration into Sofamor's industrial navigation system for spinal repair of prototypes for X-ray based spine surgery and ultra-sound based



sacroiliac screwing; demonstration of the technical feasibility of robotics and navigational approach to total knee arthroplasty; clinically validated demonstrators of template-based surgery; clinically validated navigational demonstrator, demonstration of the technical feasibility of 3D CT scan-based planning of orthognathic surgery.

The following validation results were achieved: clinical validation of the developed systems took place in all the targeted clinical applications - orthognathic surgery, spine surgery, pelvis surgery, hip surgery and knee surgery; cooperatively edited recommendations for ergonomics analysis, and list of IGOS techniques and assessment criteria formed the common basis for the validation; demonstration of the feasibility of safely introducing IGOS in an OR, with all kinds of perception devices (from 3D- localizers to

ultra-sound systems), and all kinds of navigation devices (from passive navigators to robots).

Dissemination of the project was carried out in scientific conferences.

BUDGET:

IGOS I:

Overall cost: 3 634 471 €. EC contribution: 1 799 318 €.

IGOS II:

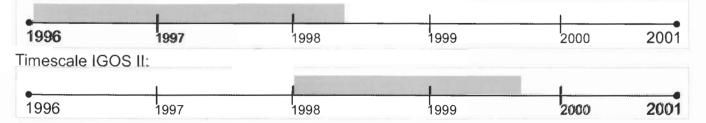
Overall cost: 2 627 717 €. EC contribution: 750 290 €.

CONTACT:

Universite Joseph Fourier (F)
Philippe Cinquin

E-mail: Philippe.Cinquin@imag.fr

Timescale IGOS I:



IN-EMERGENCY

Froup 5

Keywords: emergency, incident, incident management, health emergency response, environmental monitoring, integration

INTEGRATED INCIDENT MANAGEMENT, EMERGENCY HEALTHCARE AND ENVIRONMENT MONITORING IN ROAD NETWORKS

PURPOSE

Integrated incident management, healthcare, emergency response, and environmental monitoring are used to reduce traffic delay, increase safety, provide teleconsultancy and increase efficiency of emergency response systems in Europe.

The key motivation for IN-EMER-GENCY is the need for an integrated system to aid road users in an emergency, facilitate the work of health providers, and warn the elderly, the ill, and the general public of developing adverse road and environmental conditions. The project brings communities closer to the Information Society through performance improvements and innovative integration developments in three key Telematics sectors: Transport, Healthcare, and Environment.

Performance improvements have been sought in the three Telematics sectors and in the synergistic effects from their integration: 1) in the Healthcare sector integration ensures more effective provision of incident response management information, thus enabling improved provision of care, 2) in Transport, more effective provision of information on developments at the scene of road incidents and air quality leads to improved road management, and 3) in Environment, coordinated reaction to environmental conditions - including



dissemination of information through multi-user networks - is substantially upgraded.

OUTPUTS

The following modules have been developed:

- 1. Collect/Verify Data (CVD): to collect and store traffic, environmental, and incident data, and verify incidents.
- 2. Traffic Delay: to provide information on road conditions, traffic delay, and route delay.
- 3. Emissions: to provide information on emissions and pollution from traffic and stationary sources.
- 4. Medical Assistance: to provide instructions to operators on major medical incidents.
- 5. Response Actions: to determine the optimal or appropriate response in a traffic, medical or environmental incident.

- 6. Data Dissemination: to disseminate IN-EMERGENCY information to a wide range of end users.
- 7. Statistical Analysis: to provide the data for statistical analysis by sites, and for evaluation of system performance.
- 8. Prediction and Analysis: to provide guidelines to system operators on major incidents.

Partial integration of the modules and specifications for demonstration has been achieved. Demonstration results are expected by application of the new methods on top of an existing infrastructure at four sites: Oslo (Norway), Thessaloniki (Greece), South Wales (UK), and Genova (Italy).

BUDGET:

Overall cost: 8 236 352 €. EC contribution: 3 500 000 €.

CONTACT:

TEI-A (EL)

Evangelia Ponta and John

Chrisoulakis

E-mail: jchris@netor.gr

Timescale:

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Interactive Information System for Health/Social Care

PURPOSE

The general objective of the InfoCARE project is to provide information services for European Citizens, to allow them remote access to information which is relevant to improving access to and use of the social and health resources available in their geographical area.

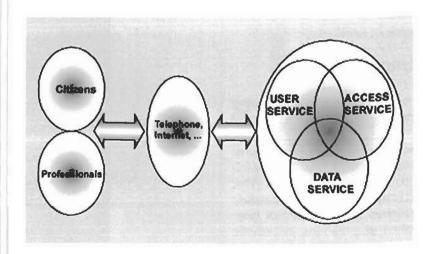
A significant number of existing experiences show a market of systems offering extremely fragmented social/health information to the citizen and to professionals. Recent statistical studies are revealing dissatisfaction among users of this social/health system.

The general approach to the aim of the project has been to provide three different measurable outcomes:

- 1) Selection and integration of the appropriate technology and telecommunication services;
- 2) Installation (within the system) of procedures and tools for analysing service costs and for assessing service quality from the points of view of the clients and the professional users involved:
- 3) Installation and evaluation of real applications (pilots/demonstrators) for achieving the two previous objectives.

OUTPUTS

The InfoCARE platform can be a significant contribution to those EU policies which respond to the emerging challenges: disease prevention, consumer education,



health education, health promotion, early intervention, help of people with multiple needs and in chronic or lifethreatening conditions. After the user-requirement identification from the user groups of the three project pilots involved, three prototypes were designed, developed and then tested. They satisfactorily passed an evaluation phase providing certain services in health centres at the pilot sites. Finally, an exploitation plan was generated in order to analyse the potential for the prototypes to become profitable products on the market. In this sense, Italian and Spanish prototypes developed have completely achieved the original objectives initially foreseen for the InfoCARE project.

As the main result of the exploitation plans has been achieved, profitability for future InfoCARE products is expected: factors such as the appearance of new telecommunication and Internet-based technologies or the Euro and Year-2000 goals are currently increasing the demand for IT

services and helping the IT market grow greatly in Europe. Products derived from the InfoCARE project fulfil the conditions for introduction into this market and for profitability, because they use these new technologies, because they have had the opportunity to pass an evaluation phase which many products in the market have, and also because they are targeted to a sector with great needs to be satisfied as soon as possible and the goodwill of providing better and more complete services to the citizens.

BUDGET:

Overall cost: 1 066 000 €. EC contribution: 500 000 €.

CONTACT:

Prodimed S.A. (E)

Alejandro Mendoza Garcia-

Monzon

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Timescale:

INFOPHARMA

INCO962024



Keywords: self-medication, health information, information, pharmacy telematics, Latin America

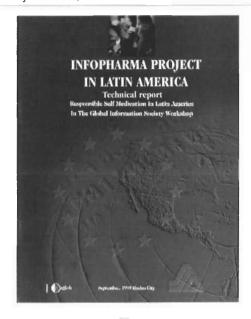
PROMOTING TELEMATICS FOR RES-PONSIBLE SELF-MEDICATION IN LATIN AMERICAN PHARMACIES

PURPOSE

In view of the worldwide growing tendency to use medicines legally available without prescription for the prevention and treatment of minor ailments, the TESEMED and TESEMED-II projects (TAP HC1114 and HC4022) successfully explored the potential of telematics applications to provide community pharmacy users and professionals with information and education on responsible selfmedication. The need to ensure sufficient informative support to both the population and healthcare professionals has been acknowledged as a main priority also by health authorities in Latin America. However, there was little knowledge available on the situation and characteristics of Latin American pharmacies and the informative systems available to support responsible self-medication. In this situation, the INFOPHARMA project was set up to disseminate the experiences acquired by the TESEMED and TESEMED-II projects and explore their applicability in Latin America.

OUTPUTS

1) A survey was carried out in Mexico and Argentina to assess the professional and technological status of LA community pharmacies, the role of pharmacy professionals as health advisors, and existing information systems for the general population on self-



medication. The survey combined both direct (samples of pharmacy staff and citizens) and indirect approaches (interviews with key actors).

- 2) Two workshops were held in Mexico DF and Helsinki that brought together 100 professionals and authorities from 15 countries. These workshops were so successful in stimulating active participation, creating a *de facto* network of key actors in the process, that a third workshop was arranged.
- 3) Awebsite (http://www.imim.es/infopharma) was set up to provide access to publications arising from the project (survey results, workshop proceedings, bibliographic references).
- 4) Reports on the state of the art were produced and distributed among partners.

- 5) Short-term visits of key LA professionals were organized.
- 6) The project has been presented widely (congresses, committees, specialised publications, press, TV) and a further RTD action on the development and implementation of telematic information systems for LA community pharmacies has been designed.

BUDGET:

Overall cost: 278 000 €. EC contribution: 278 000 €.

CONTACT:

Fundació IMIM (E) Ferran Sanz Carreras E-mail: ferran@imim.es

Timescale:

Keywords: healthcare models, cards, electronic health record

Group 4

THE INTERWORKING AND INTER-OPERABILITY OF NETWORKED SERVICES FOR HEALTHCARE USING INTERNET-BASED TECHNOLOGY

PURPOSE

InterCare is an umbrella project combining and demonstrating the results of the best of the 4th Framework Healthcare projects to build new Internet-based services and end-user applications to deliver seamless care in six regions across Europe. The results have major commercial potential and also relevance to CEN/TC251.

Healthcare delivery across Europe is changing; it is becoming more dispersed and therefore putting greater demands on systems to support seamless care processes. InterCare has used the following results of five complementary projects to provide large-scale solutions to the needs of national demonstration sites in six countries: 1) electronic patient record (Synapses), 2) security (Trusthealth), 3) mobile communications (Hector), 4) patient data cards (Cardlink 2), and 5) regional telematic services (Star).

The six regions are in Ireland (Eastern and North Eastern Health Boards), Italy (Lombardia), Sweden (Stockholm County), The Netherlands (Schiedam), Greece (Crete) and Finland (Helsinki & Uusimaa).

At first, regional needs were collected and analysed. Detailed specifications were produced. Thereafter started parallel development of the InterCare

* InterCare *

common products and 25 enduser applications that would use the services. Site preparations commenced. The systems were extensively tested and reported within the validation activity.

OUTPUTS

The main achievements of the project are in three areas:

- 1. Software products. The Inter-Care products are the five common services (Card Management Server, Electronic Patient Dossier Server, Security Server (Access Control), Healthcare Information Server, and Patient Identification and Reference Manager) plus the 25 local applications developed at the demonstration sites.
- 2. Six demonstration sites in Italy, Ireland, Netherlands, Sweden, Finland, and Greece. All demonstrations had a preliminary evaluation.
- 3. Models and systems architecture. These started in the earlier

phase and continued through to the end of the project. The results form a significant exploitable result.

Each participating country also has its own plans to continue with the demonstrator sites, rollout the systems to a wider user-base, and to exploit the results. The commercial participants also have plans for selling the products outside the InterCare demonstrator regions.

BUDGET:

Overall cost: 8 506 000 €. EC contribution: 3 469 000 €.

CONTACT:

Irish Medical Systems (IRL) Paul Cooper http://intercare.imsgrp.net





Keywords: telepathology, spectral imaging, remote consultation, pathology, imaging

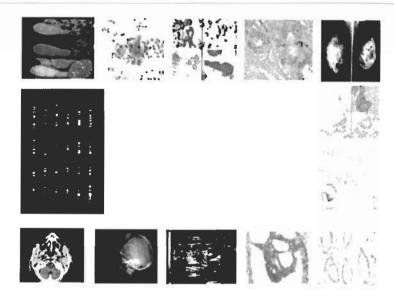
INTERACTIVE HISTOPATHOLOGY CONSULTATION NETWORK

PURPOSE

The aim was to help Hungarian and Russian pathologists and surgeons to perform site experimental casting of histological and cytological documents. INTER-PATH demonstrated the use of an ISDN network for the transmission of both high-resolution digital images and teleconsultation in real-time. The project covers some of the emerging IT advances in diagnostic histopathology. The technology has been transferred to the participating Central and Eastern European Countries (CEEC).

OUTPUTS

For the majority of pathologists, most diagnoses are straight-forward and can be reached without requiring any IT system. The benefit of IT comes from enhancements to the reporting process; improving efficiency and accuracy and accessing an expert at a distance for difficult or rare cases. Imaging spectroscopy (IS) has the potential to greatly enhance the practice, but requires prolonged training. In time pathologists will move away from the simple recognition of morphological patterns. Until we reach the stage of molecular diagnosis, seeking expert opinion through telepathology and multi-spectral imaging systems is likely to be of more value than automated decision support.



The workstations were interconnected in Hungary to develop a pathology consultation network, HungaroPath. The following step was to use telecommunication via ISDN line and satellite in order to transmit information from the University of Semmelweis in Budapest to the Institute Albert Bonniot, Grenoble and to the Moscow State University. Pathologists and surgeons examined the validity and accuracy of telepathology services in the histological diagnosis of biopsy specimens from transplanted kidney and liver using traditional imaging techniques. Then, given the assistance of Laser- und Medizintechnologie GmbH in Berlin, (LMTB) IS techniques were implemented and tested.

The use of medical multimedia image transmission in pathology and telepathology was applied mainly to enable rapid diagnosis of kidney and liver biopsies during organ transplant using an IS

method integrated into a multimedia imaging microscope and to establish consultation with experts in difficult and rare cases of histopathology and cytopathology.

The first international telepathology consultation system in CEEC and in the new independent states (NIS) was developed. LMTB has developed the IS system. The imaging and IS systems have been evaluated with reference to conventional practice.

INTERPATH developed a telepathology network, which can be combined with IS and successfully used for expert consultation of intra-operative frozen sections, panel discussions of difficult carcinoma cases, and in assistance to organ transplantation.

BUDGET:

Overall cost: 360 725 €. EC contribution: 246 000 €.

CONTACT:

LMTB Laser und Medizin Technologie GmbH (D) Prof. Gerhard Muller E-mail: g.mueller@lmtb.de

Timescale:

PURPOSE

The objective was to provide an Internet-based communication system for clinical data in a user-friendly, secure and fast way. Health system integration objectives, although mainly related to clinical aspects, are also focused on monitoring, assessing and optimising their efficiency.

Many applications for specific healthcare needs of diverse end users have appeared lately. They have to be linked to support the overall needs.

Getting information of telecommunication infrastructure and surveying the available technical solutions in each participating country was necessary to identify the characteristics of available technological products as potential components of the IHC systems. The user group consisted of specialist physicians and patients. The lack of co-operation between healthcare players and the industry in the participating countries was noticeable.

OUTPUTS

The core system which integrated all pilot projects comprises a generic reference system in which the extensible markup language (XML) was used as the means for data transfer. The definition of the common information structure was also implemented. The clinical partners produced a data dictionary containing all the data items that should be included in the IHC application. In order to maximise



uniformity among sites, a central coordination of data dictionary definition was adopted. The IHC includes the CPR which contains the medical data of patients. The database access component works through the ODBC mechanism and exports the data in a welldefined form, suitable for web publishing. It is actually the interface between the site-specific clinical system and the common IHC software and the web page generator, which transforms patient data to web pages, suitable for presentation to the users. Customisation depending on the application and user group was also implemented. The web server contains the static informational material and the pages corresponding to the patient data and the client component. The security component supplements the access control and provides the security functions. The IHC service is configurable to virtually any environment. A key step towards achieving standardisation and uniformity of IT technology in

healthcare services was also taken. The partners succeeded with the application of the markup languages used for structured data (XML/XSL) in designing their systems. The inclusion of Java applets into the XML pages has added interactivity to the web pages. The partners envision further cooperation in the aspects of intellectual property, market research, maintenance of a broadpurpose master data dictionary, as well as further research on XML and XSL use for accessing patient databases.

BUDGET:

Overall cost: 2 542 304 €. EC contribution: 950 000 €.

CONTACT:

ALMA (B)

Yannis Skalkidis http://www.biomed.ntua.gr/intraclinic

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Keywords: regional healthcare networks, continuity of care, evaluation methodology

INTEGRATION SYSTEM ARCHITECTURE -TELEMATICS

The ISAR Telematics project was devoted to the study of the communication between hospitals, GPs and other healthcare professionals in order to improve the quality of care by improving the quality of information communication. This led to the development of an architecture for a regional healthcare information server, together with a methodology for evaluating it.

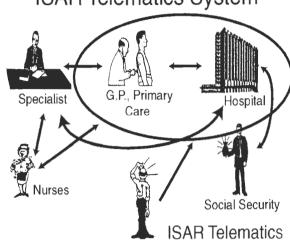
PURPOSE

ISAR-T identified, prototyped and evaluated a kernel of telematics applications geared at offering services within hospitals and general practitioners, or between all of them to support continuity of care, enhance its quality and control cost.

User requirements were identified from GPs and hospital staff in 5 countries, and from this the architecture for a Regional Healthcare Information Server was designed to provide the following services:

- Referral, liaison and discharge letters
- Results of laboratory analyses

ISAR Telematics System



- Movements of the patients (with their consent)
- Drug information

An assessment methodology was developed and 2 specific methods were elaborated:

- 1. Cognitive evaluation
- 2. Cost-effectiveness analysis

OUTPUTS

An example of the Regional Healthcare Information Server architecture was implemented and was successfully used for communication between hospitals and GPs in France and Belgium.

The ISAR-T project has designed an architecture for a Regional Healthcare Information Server to improve continuity of care by enabling hospitals and GPs to exchange information. This is based on the common requirements of users in 5 countries and is expected to be widely applicable throughout Europe. The design has validated on a prototype, which continues to be used after the end of the project.

BUDGET:

Overall cost: 1 676 000 €. EC contribution: 1 009 000 €.

CONTACT:

HÖPITAL CALMETTE - CHRU de Lille (F) Prof. Régis Beuscart http://www.univ-lille2.fr/isart

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IMPLEMENTING SECURE HEALTHCARE
TELEMATICS APPLICATIONS IN EUROPE

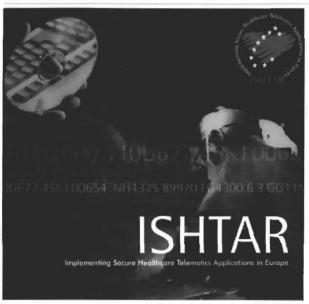
PURPOSE

Objective of the project was to verify, test, review and integrate the SEISMED Security and Data Protection Guidelines in a wider setting for European Healthcare Establishments (HCEs).

The technology utilised by HCEs is moving forward rapidly with the Information Systems being utilised ever more closely with the processes of delivering healthcare and with these systems being more and more networked together and to the outside world. Both these developments open the possibility of damage to patients as a result of systems security failures. The AIM SEISMED project [A2033] developed a series of Security Guidelines and a High Level Security Policy for HCEs.

The ISHTAR project was established to:

- 1) review the security issues in healthcare,
- 2) review the legal issues arising from the EC Data Protection Directive and the Council of Europe Recommendation on the Protection of Medical Data as well as exploring the liability issues in Health Telematics,
- 3) review, verify and integrate the SEISMED Guidelines and develop a convenient user interface to them,
- 4) develop training and awareness courses for managers, users and technical staff, and



5) to provide a web site for easy access to healthcare security information.

OUTPUTS

Third Framework material and experience was integrated with that from the consortium and a number of Fourth Framework Health Telematics projects. This material was processed and integrated within the project using the 10 Verification Centres as well as the expertise of other project participants. The commercial results from the project are the

- 1) ISHTAR Security Manager, SecureMan and
- 2) healthcare security training courses for managers, users and technical staff.

SecureMan, provides an integrated set of Security Guidelines developed from the SEISMED Guidelines & from the standards work of TC251 WG6 [ENV 12924]. A database of security areas, control functions, control objectives &

controls has been developed that can be utilised in a cross-sectoral fashion. SecureMan will be marketed for security management both inside the healthcare sector and beyond.

The non-commercial products of the project include:

- -White Paper outlining the security issues in Healthcare
- -Reports on Healthcare Security issues
- -Reports on liability and Data Protection issues in Healthcare
- -ISHTAR Web site including a security tutorial & access to key information
- -An Association for Security in Health Care Information Systems [ASHCIS] to pursue issues of Healthcare Security and Data Protection.

BUDGET:

Overall cost: 1 570 000 €. EC contribution: 600 000 €.

CONTACT:

NHS Executive (UK) Barry Barber http://www.ishtar.org.uk

Timescale:

IT EDUCTRA



Keywords: education, needs analysis, curricula design, videoconferencing, training

INFORMATION TECHNOLOGIES EDUCA-TION AND TRAINING

PURPOSE

In European universities there used to be only a few courses on telematics, most of them merely for training purposes in using software tools. The aim of this project has been to create awareness, to stimulate diffusion and to transfer information technologies to the healthcare sector, by means of a broad, flexible and modular educational, training and information programme, it's final goal is to reach an audience of thousands of beneficiaries.

The project has had qualitative and quantitative objectives. The quantitative objectives may be summarised in the following way:

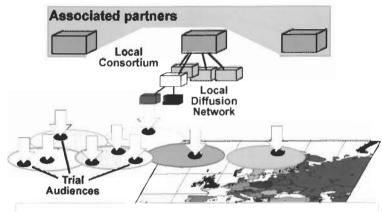
- Around 81 information and training modules of new creation, some of them in full multimedia format, distributed by CD.
- First audiences at least in English, German, French, Italian, Spanish, Portuguese, Finnish, Danish, Dutch and Czech.
- 14 diffusion sites for the demonstration phase.
- 10 courses per site.
- 8 seminars per site.

OUTPUTS

To succeed in this objective, 82 products concerning informatics and telematics applied to healthcare sector have been developed. The products have been

IT EDUCTRA (HC 1108)

InformationTechnologies for Education and Training



IT Eductra national diffusion networks

implemented in a CD-ROM and on a web site, so that all the various audiences among healthcare professionals, and in all the different learning environments. could use them free of charge. The project is a programme that includes guidance on how the materials may be used by the diffusion sites in today's learning environment. Therefore, telematics is not only recognised as a subject in the programme, but as a key catalyst towards innovative ways of education and training. The 82 products included in the CD-ROM are grouped according to collections and worksets. Each collection is structured according to products of similar format, type, level of detail and purposes, and not according to subject; however, a workset is a grouping of products by subject area or similar thematic likeness. Each workset contains at least one product from a collection, but may contain more than one product from a particular collection; and some products appear in more than one workset. All the products have been designed and authored to be capable of

standing alone, allowing users a range of combinations.

At the end of the project several thousand copies of the CD-ROM in its final and definitive version are provided by the consortium. No other formal commitment is made in the sense of going on with diffusion of the results attained in the project. After the demonstration phase, in which the diffusion sites have tested the courses and seminars, the project opens for an exploitation phase where it should be selfsustaining over a period of time. The materials will be delivered to the diffusion sites free of charge.

BUDGET:

Overall cost: 1 700 000 €. EC contribution: 1 700 000 €.

CONTACT:

FUNDESCO(E)

Mr. Luis Gallud

E-mail: luis.gallud@fundesco.es

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1996	1997	1998	1999	2000	2001

Keywords: person-centred care, integrated applications, generic, multidisciplinary, primary care

Group 4

TELEMATICS FOR INTEGRATED CLIENT-CENTRED COMMUNITY CARE

PURPOSE

The main purpose of the ITHACA project was to develop information systems which support multi- and inter-disciplinary working within the health and social services for people within the mental health services, elderly services and maternal and child services.

The aim of the ITHACA project was to improve the quality of care provided to people living at home through the development and application of information systems which support the sharing of relevant information between health- and social care professionals. An important challenge is to overcome the lack of coordination and collaboration between health- and social care professionals and between different agencies involved in home care; at the same time there is a shift in policy towards caring for more people in their own homes.

OUTPUTS

The ITHACA project produced several results which meet the objectives of the project. The end results are as follows;

- Application for maternal care implemented in the Costa del Sol primary care centre and hospital with supporting communications application developed by Inge-niA.
- Application for child health implemented in the Costa del Sol primary care centre and hospital developed by Prodimed.



- Maternity and child health application implemented in the Porto primary care centres and maternity hospital developed by INESC.
- Application for community care for Turku developed by Tiedonhallinta Oy.
- Application of mental health and elderly care implemented in Belfast, Athens and Bergamo.
- Home telecare management station and automatic appointments and patient information system developed by UPM.
- Excel Software for evaluating healthcare systems developed by HOCT.

Within the timescale of the project it was not feasible to undertake socioeconomic assessment. However the results from the pilot suggest good potential for improving the quality of care provided to vulnerable people in the community and greater efficiency in the use of resources.

As can be seen from above, the project has produced several exploitative products and some of the sites will be involved with the further development of the demonstrators to help them reach the market. In addition, based on the experience gained from the collaboration, which took place in ITHACA, there are plans to establish a network to take forward further research and development for person-centred care in Europe.

BUDGET:

Overall cost: 3 700 000 €. EC contribution: 1 500 000 €.

CONTACT:

South & East Belfast HSS Trust (UK)

Dr. Leslie Boydell

E-mail: lboydell@dial.pipex.com

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ITNICT

byc [

Keywords: transplantations, CEE

Information Technology for National and International Cooperation in Transplantation

PURPOSE

The project aims to support the use of IT in kidney and bone marrow transplantations (KT, BMT) in the Czech and Slovak Republics and in Hungary. For KT the waiting list and communication between transplant centres is important. For BMT the volunteer bone marrow donor registers are critical. In both situations software for selection of most suitable donor-recipient pairs is of the utmost importance. For BMT a new European system was completed in 1996. A special session was opened and professionals from Poland. Slovenia and Lithuania participated.

OUTPUTS

In Prague IT was improved by the software for donor-recipient matching and handling of the cross-match and organisation of the work at the national HLA typing centre. For BMT, software for the national BMT register was ascertained and full participation in worldwide integrated donor registries was established. This enabled an increase in the Czech donor list up to 5000, handling of more then 2000 search requests from abroad and performance of 30 searches for Czech patients with a resulting donor for 15 patients mostly from Western Europe.



Information Technology for National and International Cooperation in Transplantation.

Practically identical results were achieved for BMT in Budapest. The Hungarian donor database integrated interfaces to be ready to join the European system. For organ transplantation (OT) in Budapest, the project introduced and implemented a new user-defined selection and communication software. A network was established between typing laboratories in Hungary.

For OT in Slovakia the Slovak Transplant network was established in 1995. The ITNICT project worked out a new database for the waiting list, selection criteria, cross-match results and communication with peripheral transplant centres and donor procurement centres. For BMT in Slovakia IT has been operational from 1998.

The national transplant systems in the Czech Republic, Slovakia and Hungary were improved by the project. The results of the project

have been widely used by the respective transplant organisations.

A workshop is planned for all participants and the directors of the transplant organisations. The RETRANSPLANT project allows continuation on critical points of the ITNICT activities. The new project includes participants in the ITNICT project and is extended to three Central European countries, namely: Poland, Lithuania and Slovenia. Thereby the idea of the work to be extended to other CET and East/South European countries will be fulfilled.

BUDGET:

Overall cost: 267 998 €. EC contribution: 267 998 €.

CONTACT:

Central Lab. Blood Transfusion Service (NL)

Pavol Ivanyi, MD, PhD

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1996	1997	1998	1999	2000	2001

Keywords: healthcare, RDE, clinical research, oncology, telematics, clinical trial



Multimedia Application for Clinical Research in Oncology

PURPOSE

The MACRO project has produced an integrated trial system for designing clinical research studies and running network-based multicentre trials, with remote data entry, automated task scheduling and decision support.

The clinical research environment is facing major changes. There is a need for more effective and rapid evaluation of new therapeutic strategies to address the issues of efficacy, safety, survival, quality of life and health economics. As more effective treatments are established, studies must become larger, with greater populations required in order to show improvements. MACRO has demonstrated a telematics-based solution for more efficient means of data collection and better communication between researchers.

The availability of standards and modular systems will promote a more unified approach to the work of health professionals. The results of MACRO supports good practice in the form of active computer support for the enactment of clinical research protocols.

OUTPUTS

The MACRO project has developed a demonstrator of the telematics-based interaction between parties in clinical research. It has produced results in three main areas: a comprehensive set of user requirements for clinical data collection; an assessment of and contribution to the domain of standards for clinical data



exchange; and prototype software that has developed into a marketable product: MACRO Trial Manager.

At a central office, MACRO provides tools to define the data entry screens (electronic case report forms) and a mechanism to distribute these data entry screens over the network to the remote sites. At a remote site, MACRO provides tools to enter data and transmit it to the central office, and to receive feedback. When the study definition is complete, it is transferred to investigators and data managers and used to control the Remote Data Entry (RDE) and Remote Study Monitoring (RSM) processes. MACRO also has a mechanism for receiving and viewing multimedia objects.

MACRO offers a modular approach with clearly defined interfaces. This provides scope for standardisation while still allowing the flexibility to adopt alternative modules for reasons of specialised functionality or compatibility with existing systems. The huge

investment in databases, hardware and software that cannot be replaced at once makes this modular approach critical.

MACRO's work on standards for clinical data exchange is a significant step towards European standards for communication in clinical trials.

A new company, InferMed, dedicated to the further development and marketing of the outcomes of the projects MACRO and PROMPT, has made MACRO their major target product

BUDGET:

Overall cost: 1 668 502 €. EC contribution: 1 050 000 €.

CONTACT:

European Organization for Research and Treatment of Cancer (B) Patrick Therasse http://www.eortc.be/MACRO/

Timescale:

Keywords: telemedicine, clinical research, EDC, healthcare, telematics

Market Authorisation through Networked Submission and Evaluation

PURPOSE

MANSEV-2, phase 2 of the MANSEV project, concentrates on electronic data capture (EDC) of data in clinical research, and its preparation for submission to regulatory authorities. It also addresses linking to other clinical systems.

Data capture in clinical research is still largely paper based, resulting in re-entry of data that already exists in other systems, transcription errors, no opportunity to provide data validation checks at the time of data capture, and the photocopying of large volumes of paper Case Report Forms.

The project extends work undertaken in a previously completed project, MACRO, Multimedia Clinical Research EDC system. MANSEV-2 addressed regulatory issues, technical issues, and validation in use. The objective is to ensure that Electronic Data Capture can be deployed cost-effectively and integrated with existing systems, that it actually provides the promised savings in reduced data errors and elapsed time to achieve drug approval, and that the resulting dossiers are readily accepted by regulatory agencies such as the European Medicines Control Agency, and US Food and Drug Agency.

Regulatory issues are: authentication of data entered directly into the computer, compliance with data privacy as required by EU



and national legislation, and studying how data management aspects of Good Clinical Practice change when data is captured and processed electronically.

Technical issues included Integration with back-end clinical research systems such as OracleClincical^R, data exchange between clinical systems notably a shared patient record, DPWeb, used in the Aquitaine regional cancer network see RUBIS-2 Project, and partial integration with other telemedicine software from the ACTION cluster of cancer-related projects.

Evaluation was carried out in largescale research studies by the European Society of Cardiology, and by a large pharmaceutical company.

OUTPUTS

Extended versions of the MACRO Electronic Data Capture product incorporate MANSEV-2 results and are marketed and supported

by InferMed Limited. http://www.infermed.com/

Configurable data capture forms and data interchange are available with the CROSSWAY clinical systems developed and marketed by Integrated Care Systems France (ICSF). http://www.cegedim.fr/cegedim-fr/sante.htm

A software workstation for shared care had been integrated in Bordeaux and is being deployed in the regional cancer network.

The European Society of Cardiology regularly publishes the results of the European Heart Survey. www.escardio.org

BUDGET:

Overall cost: 2 669 000 €. EC contribution: 1 399 000 €.

CONTACT:

InferMed (UK)
Dr. Alan Montgomery
E-mail: Alan.Montgomery@infermed.com

Timescale:

Keywords: education, CME broadcast, CD-ROM, WWW, intranet, server replication, oncology

Group?

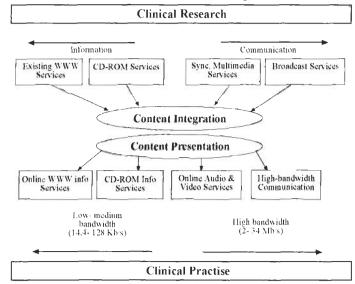
Multimedia Education Datasystemin. C. Inical Oncology

PURPOSE

Traditional dissemination methodologies for evidence-based medicine and continuing medical education offer insufficient reach and speed of dissemination. Medico's clear objective was to demonstrate the ability of Telematics tools to accelerate the dissemination of information from clinical research to clinical practice, thereby improving and harmonising health outcomes. MEDICO disseminated high quality content to a wide clinical audience using a range of Telematics tools that were integrated into the MEDICO operational platform.

The project demanded inclusive solutions for target user groups: hospital-based doctors and other groups of healthcare professionals. The objective demanded the widest possible dissemination of content through ATM and ISDN networks but also needed to reach doctors restricted to 14 kbps on line access. ISDN became the standard bandwidth for server replication and RealVideo™ but 14 kbps was adequate for text-based materials and RealAudio™. Satellite and video technology can be integrated into WWW-technology, using server replication to: overcome bandwidth restrictions; control quantity and quality of content to PC workstations; centrally update/remove outdated CME content; adapt/ augment content to local conditions/ practice.

Medico technical platform



The effectiveness of evidence-based best practice in improving outcomes is determined by effectiveness of its distribution channels. The Internet offers wider distribution than limited-circulation peer-reviewed journals but less quality control. User groups also complained of information overload and excessive search times to required content.

The work of all MEDICO partners was independently evaluated. The success of telematics tools for healthcare professionals will be directly related to the quality of the content they deliver in appropriate and easily managed quantities. New telematics providers must offer quality before quantity.

OUTPUTS

Traditional CME has revolved around journals, symposia and lectures, which all have their strengths and weaknesses. To

these are added interactive satellite delivered symposia; CD-ROM-based teaching packages; Internet or Intranet-accessed text, audio and video files of CME materials. All these can be accessed and managed through the MEDICO operational platform.

The MEDICO vision is clearly demonstrated at the Netherlands Cancer Institute in Amsterdam where doctors can: 1) watch and participate in live CME satellite broadcasts; 2) access recorded CME programmes in audio or video; 3) access CD-ROM teaching packages or call up sections to inform patients; and 4) utilise a discipline specific search engine for on-line reference material.

BUDGET:

Overall cost: 800 000 €. EC contribution: 400 000 €.

CONTACT:

EuroTransMed (NL) David Bellin E-mail: d.bellin@etm.nl



MEDIMEDIA HC4013



Keywords: imaging, standardization, interoperability

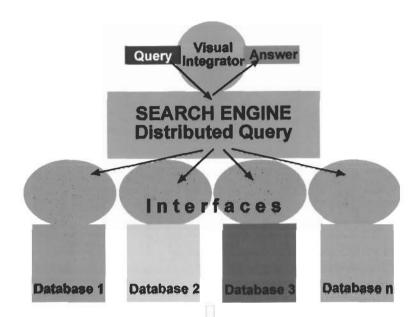
MEDICAL IMAGES INTEGRATION FOR MULTIMEDIA EUROPEAN DATABASES INTERCONNECTION AND COMMON ACCESS

PURPOSE

MEDIMEDIA is an umbrella project that clustered the activities of 7 projects in the field of Medical Imaging.

Medical imaging has become one of the main tools for diagnosis and treatment of a number of diseases. Medical images are produced by different speciality practitioners. There is a growing need for integration of these various types of images in the patient folder or in large reference databases. Up to now, standardisation of the data has mainly dealt with the technical aspects of the images or with large terminologies and encoding systems, which are poorly accepted by the users.

Based on the analysis of the current situation and considering the continuously growing availability of Internet connection for healthcare professionals, it has appeared that a distributed network of medical databases could allow the users to access medical images of different types in a "one-step query". 7 projects of the 4th Framework programme, each running a database of medical images for various purposes, joined their efforts to build such a network. The approach was based on the following requirements: 1) flexibility of the system to integrating images of various types, 2) adaptability to various users' scenarios: practice, education, reference material, 3) compliance with existing standards for image



format and coding systems, 4) avoidance of duplication and transfer of data sets to large computing facilities, 5) compliance with protocols in use for data transfer over the Internet.

The actions were organised in three main sections. In the first phase of the project, the Users' Requirements were analysed and a market survey was performed and, based on these results, the Technical Specifications were defined. Then the applications were developed in the following way: the Visual Integrator, the Search Engine, the Interfaces and the Observatory of Standards. After the completion of the development phase, the project entered the Verification and Demonstration phase.

OUTPUTS

The project has developed the applications supporting a distributed network of medical image databases, allowing the users to access directly on line the content

of these databases through a unique search engine and obtaining the results of the query in a unique interface. Thereby, MEDIMEDIA promotes the integration of medical data for clinical use and education.

The achievements of the MEDI-MEDIA project were also presented during the workshop in Brussels in March 2000. Main presentations at the workshop are available on the website of the project: (http://www.medimedia.org).

BUDGET:

Overall cost: 2 454 000 €. EC contribution: 1 365 000 €.

CONTACT:

Olympus Software Europe (D) Michael Delvaux, PhD http://www.medimedia.org



Keywords: Internet, telematics, telemedicine, navigation

MEDICAL EMERGENCY AID THROUGH TELEMATICS.

PURPOSE

MERMAID is a maritime telemedicine project with global reach 24-hour, multilingual capability, so as to serve multinational crews working in the isolation of the world's oceans. It provides a model for the provision of healthcare services based on the electronic transmission of medical information, via ISDNbased videoconferencing.

The MERMAID objective has been to establish a transnational and multilingual health emergency system that will make telemedical intervention more effective and widely distributed and improve the interconnection of the emergency points of care with the providers of telemedical services.

Visual inspection is a cardinal part of formal medical examinations, and since modern telecommunication technologies permit remote patients to meet face-toface with their doctor, MERMAID insists that voice-only teleconsultation is no longer an acceptable



means for practising telemedicine The system that MERMAID developed involves all types of INMARSAT A, B, C and M links, so as to accommodate all types of users. This was done over and above the original MERMAID requirements.

OUTPUTS

MERMAID has provided valuable experience even outside MER-MAID. The experiences and expertise needed for the development of maritime telemedicine (and telemedicine in general) has been carefully documented. These

MERMAID results should be regarded as essential reading for anyone involved in or considering regional healthcare networks.

MERMAID has been expanded in other markets such as: delivery of telemedical services to prisoners, delivery of telemedical services to rural areas, and delivery of telemedical primary healthcare services in Balkan countries.

BUDGET:

Overall cost: 176 000 €. EC contribution: 2 400 000 €.

CONTACT: BIOTRAST S.A. (EL) Dr. George Anogianakis



Group 5

Keywords: healthcare services, mobile communications, home care

HOME/ AMBULATORY HEALTH CARE SERVICES BASED ON MOBILE COMMUNICATIONS

PURPOSE

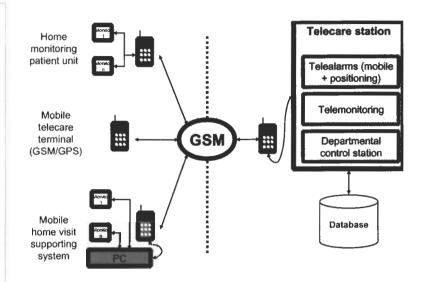
The Mobcare project was aimed at identifying the potential of mobile communications for home and ambulatory health/social care and developing products and services to cope with these needs. Besides this, both the key success issues and the organisational and professional changes which these services require to become cost-effective components of healthcare models throughout Europe were identified.

Mobcare has developed new products for supporting the care of elderly and chronic patients at their homes and also when carrying out the normal activities of their daily life.

Mobcare has proposed a taxonomy of home care services: telealarm, telemonitoring, access to health and social information, connectivity with social/health-care information systems and support tools to field workers.

Three demonstration systems have been set up: 1) highly vulnerable user groups, 2) the elderly and people with mental handicaps, 3) care to chronically ill patients.

Technical implementation is based in two components: 1) the patient units, 2) telecare centres based on GSM.



Evaluation methodology was based on the main aspects of learning, usability, costs, risks, ethics, reliability, acceptability and transferability.

OUTPUTS

Two new products have been developed: Advanced Telecare System and the Mobile Home Nursing Network. The first includes applications for client positioning and telemonitoring. integrated with any legacy telealarm centre. The telecare system is completed by the patient units: The Mobile Telecare Terminals and the Elderly Telemonitoring Patient Units. The Mobile Home Nursing Network consists of a set of portable units carried by home visit nurses and a central unit at the department of the hospital, integrated with HIS.

The main conclusions of the commercial exploitation analysis of the telecare products and services are the following: 1) market potential is very large and strong and it is expected to increase as social sensitivity for assistance is growing across Europe; 2) market segments are identified: mobile telecare, user geographical positioning and monitoring; 3) the mobile assistance market is very incipient and underexploited by existing companies; 4) the business potential of these services appears attractive: revenue after ten years is estimated at 47 million Euro and rate of return at about 40 million.

BUDGET:

Overall costs: 1 941 000 €. EC contribution: 910 000 €.

CONTACT:

Fundación Airtel Móvil (E)

Rafael Lamas

E-mail: rlamas@airtel.es



Keywords: healthcare, telematics, telemedicine, wireless data, home care

Group 5

MOBILE MEDICAL DATA

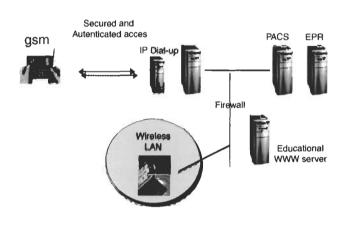
PURPOSE

MOMEDA project designed and developed a compact personal information terminal for hospital and home care environments. It also developed a demonstrator that allows the consulting physician to access electronic patient record data and radiological images from outside the hospital, using a Nokia Communicator 9110 connected to a GSM network.

Today's patients need to continue their routine daily activities as much as possible while in hospital or during rehabilitation at home. On the other hand, wireless telemedicine enables physicians to diagnose patients remotely enhancing the effectiveness of healthcare.

Technically the MOMEDA demonstrator consists of two terminals: the Physician and the Patient Information Terminal. Images for consultation and thumbnail images are converted to a smaller file format and passed together with the narrative files extracted from the hospital medical record to a MOMEDA server. This makes a data connection with the Physician Terminal and transfers the information package via GSM. A special emphasis was on developing a user-friendly MOMEDA medical viewer for the client terminal. A client ECG transmission module has also been developed.

The Patient Terminal includes:
a) GSMES Module for interaction
of the patient with his workplace,
b) the Personalised Medical
Information Service (PMIS) and
c) the Virtual Interactive Environment (VIE) module, which allows



young islolated leukaemic patients to interact remotely with physicians and relatives in the same virtual environment.

Regulatory issues are: data security issues, especially for mobile transmission (authentication of data, network security, compliance with data privacy as required by EU and national legislation). The aspects of infoethics were covered in a separate report.

Evaluation was carried out in a real clinical setting at the Oulu University Hospital (Departments of Neurosurgery and Neuroradiology) with good results in feasibility and user satisfaction studies. Results showed it is medically sensible to use pocket-sized terminals for consultation.

OUTPUTS

The physician terminal is marketed by CCC Mobile Ltd/Celesta Ltd Finland as part of their Celesta mobile tool product line. <u>Http://www.celesta.com/</u> It has been used as a model for further product development for mobile homecare tools.

The physician terminal has been put into clinical use at the Oulu University Hospital, Finland. <u>Http://www.ppshp.fi/</u>

The scientific results of the project have been widely published in journals and congress abstracts.

BUDGET:

Overall cost: 1 520 850 €. EC contribution: 1 035 000 €.

CONTACT:

CCC Automation Ltd (FIN)
Pentti Timonen
http://www.biomed.ntua.gr/momeda

Timescale:

Keywords: distributed healthcare information systems, nephrology, dialysis

HARMONISATION OF NEPHROLOGY DATA SYSTEMS WITHIN REGIONAL NETWORKS

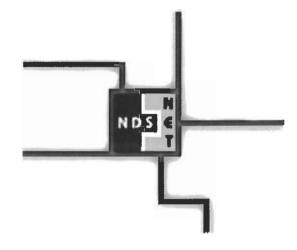
PURPOSE

NDSNET is the consequence of the situation where many organisations in the area of Nephrology are already equipped with local Nephrology Data System (NDS) based on heterogeneous hardware and software components, which do not allow the direct interconnection of them. To achieve interoperability between those systems it is necessary to provide ways for harmonising the data exchange and also to develop an interface that allows the interconnection of the different sites

There are more than 2,700 European Nephrology centres (most of them located in EU member states), more than 30,000 registered new patients and in total more than 100,000 patients. The average reply rate to EDTA (European Dialysis and Transplant Association) questionnaires is only ca. 70%. Reply information also often lacks actual patient treatment data, which is needed if transplantation has to take place. Therefore efficient Renal Information System is needed.

OUTPUTS

The NDSNET project produced a communication concept including both the communication infrastructure (software components of the demonstrator) and content descriptions in the form of application profiles (describing the structure of requests/responses and the corresponding messages).



Furthermore the validity and usability of the concept were shown with the demonstrator system.

The demonstrator software consists mainly of the following four components: a client, a server, data manipulation routines and the so-called OEDR form (a data entry form named after the Austrian dialysis and transplant registry). The NDSNET client is an interactive application, which allows users to submit requests and receive corresponding responses. The NDSNET server is the backbone of the NDSNET client/server network and provides the communication layer. It also hosts the user and profile information. The NDSNET data manipulation routines show a generic example for the integration of the NDSNET software with already existing database systems. The OEDR form allows showing a whole real-world user scenario from the beginning

where a nurse enters data about a patient and where the data are then communicated with the NDSNET networking components.

The implementation was done in the Java language. The utilised communication platform is CORBA (Common Object Request Broker Architecture) and security is provided by the means of SSL (Secure Socket Layer). The message exchange format is XML (Extensible Markup Language). The interactive components of the demonstrator have an integrated XML/HTML viewer. The use of style sheets also allows different views on the data and even the displaying of data in a multilingual format.

BUDGET:

Overall cost: 561 000 €. EC contribution: 280 000 €.

CONTACT:

Joanneum Research, Graz (A)

Kurt Majcen

http://iis.joanneum.ac.at/ndsnet



Keywords: healthcare, cards, telematics, telemedicine

VALIDATION AND CO-ORDINATION OF IMPLEMENTATION OF INTER-OPERABLE DATA CARD SYSTEMS AND INTRANET SOLUTIONS BEFORE NATION WIDE IMPLEMENTATION

PURPOSE

The aim of this project is the validation and coordination of implementation of interoperable data card systems and intranet solutions before nationwide implementation.

In these implementations modern technologies are used, such as: smart cards used by patients and healthcare professionals; computers used by hospitals, healthcare professionals, and health insurance funds. Large networks and trusted third parties for security purpose are included in these modern technologies. The purpose is to make these nation-wide information systems interoperable.

Countries involved in the NETLINK consortium are France, Germany, Italy and the Province of Quebec. They have set up or they are in process of setting up new nation-wide information systems in the healthcare sector of these countries.

OUTPUTS

NETLINK has developed a complete environment for the implementation of interoperable

Server (e.g. database system) Directory Service TTP Application Application RA, CA etc. Security Security Toolkit Toolkit PDC access PC (e.g. office computer) and Session HPC/PDC Interface Interworking Interface Application Application Security Public Card Security Toolkit Network PDC Terminal Toolkit PC / Server (e.g. office PC, health insurance Mail Inter-HPC face Patient Data Set server) and other data relevant Interoperability Scenario to interoperability

healthcare systems. It has produced requirements for interoperability specification, implementation and validation methodologies. These requirements for interoperability specification are adopted by the G8 SP6 HC group (including Japan and USA) and several other countries as the basis for the interoperability of health smart cards.

Based on the requirements in the countries involved in NETLINK they have developed pilot sites which demonstrate not only interoperability of health cards between the countries but access to distant medical databases and administrative procedure simplification for reimbursement of medical fees.

NETLINK has organised several workshops and has participated in many conferences and exhibitions. It has established direct links with standardisation projects concerning health cards and other European initiatives (e.g. ISO/TC 215 WG5, NETLINK CEE).

BUDGET:

Overall cost: 3 345 000 €. EC contribution: 1 140 000 €.

CONTACT:

GIE SESAM VITALE (F)

Noël Nader

http://www.sesam-vitale.fr/html/projets/ netlink



NETLINK CEE



Keywords: health telematics, e-health accompanying measure, implementation strategies, CEEC

CENTRAL AND EASTERN EUROPE NETLINK

NETLINK CEE was an Accompanying Measure which aimed

- to establish a liaison between the members of the NETLINK Consortium and the CEE countries
- to stimulate the preparation of national health telematics strategies in Slovenia and the Czech Republic coherent with the EU members policies

PURPOSE

The project aimed to facilitate the exchange between EU and CEE views at the managerial and the technical levels: this implied in particular:

- bilateral communication of all relevant reports, standard and recommendations drafts in the domain especially the health professional cards
- bilateral exchange in the framework of the regular workshops in order to communicate the practical experience of the Slovenian project and their own views in the field of security.

OUTPUTS

Two main Working Groups Czech Republic - Data Protection: a Guideline for the Implementation of European Legal Regulations Netlink-CEE

Dealing with Personal Data Protection in Central and Eastern European Countries has been produced.

National Strategy and Conference on health Telematics:

A formal proposal for a national strategy for implementation of telematics Solutions in healthcare was prepared after a conference on health telematics wihch was organised in December 2000.

Slovenia

Evaluation Report of the Health Card programme

An evaluation conference was organised in Slovenia in October 2000 with the participation of all categories of Slovenian actors and European experts.

Analysis of the consequences of the NETLINK recommendations on the Health Card programme.

National strategy: A proposal for a national strategy of further development of the card system has also been prepared in the perspective of the recently-launched national health sector management project.

Co-operation between EU and CEE Countries: benefits for the EU Countries.

NETLINK CEE events created new opportunities to meet new actors and consolidate the collaboration.

BUDGET:

Overall cost: 200 000 €. EC contribution: 200 000 €.

CONTACT:

EHTEL Association (B) Hervé Doaré http://www.ehtel.org

Timescale:

Keywords: nursing, nursing informatics, multimedia, education, training, curriculum development

b Y c

NURSING INFORMATICS: GENERIC HIGH-LEVEL TRAINING IN INFORMATICS FOR NURSES; GENERAL APPLICATIONS FOR LEARNING AND EDUCATION

PURPOSE

NIGHTINGALE is contributing towards the appropriate use of the developed telematics infrastructure across Europe by educating and training nurses in a harmonious way across Europe in the upcoming field of Nursing Informatics.

The scope of the project is to provide curriculum development in the multidisciplinary field of Nursing Informatics by a consensus process at all levels of nursing education and training, as well as implementation and demonstration of the courseware material at various pilot sites across Europe. The training will be implemented using existing or extended multimedia tools of learning and education.

Four groups participated in the project. The users' group contributed to the development of the Nursing Informatics curriculum and the placement of the priorities for the development of the other products. The developers' group studied the priorities that had been placed by the users' group and provided the multimedia and training requirements for the development of the products. The users' group tested the developed material, while the educational ability and penetration of the developed material were tested by the educational sites that participated in the project.

NIGHTINGALE developed courseware material based on the



curriculum development process using multimedia technologies. Computer-based training software packages in Nursing Informatics were the basis of the training material and the corresponding courses.

OUTPUTS

Products concerned with informatics and telematics applied to the healthcare sector were developed. These products had been implemented in the curriculum in Nursing Informatics, and can be used for free in all the different learning environments.

The main results of the project were the 3 CD-ROMs (CD1 Multimedia, CD2 NIIexicon, CD3 Transparencies), publication of books (Health Telematics Education, Advances in Health Telematics Education, Health and Medical Informatics Education in Europe), the initiation of a series of conferences (HTE: Health Telematics Education) and the development of the NIGHTINGALE Web site.

The project includes guidance on how the materials may be used by the educational sites in today's learning environment. Therefore, telematics is not only recognised as a subject in the NIGHTIN-GALE project, but as a key catalyst towards innovative ways of education and training.

The intention at the end of the project is that several thousand copies of the 3 CD-ROMs in their final and definitive version are provided by the coordinator to interested educational institutions. The web site of the project will be still in use for an adequate period of time to sustain the dissemination effort.

BUDGET:

Overall cost: 936 800 €. EC contribution: 936 800 €.

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HC1035



Keywords: healthcare, telematics, telemedicine, multimedia, patient record, health network, navigation

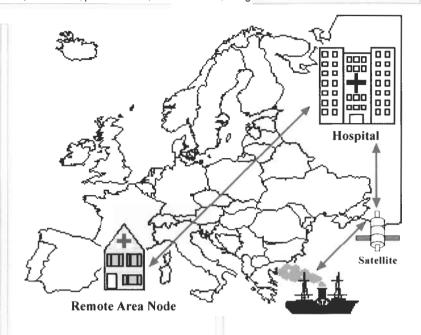
NETWORK OF INTEGRATED VERTICAL MEDICAL SERVICES TARGETING SHIP VESSELS AND REMOTE POPULATIONS

PURPOSE

The evolution of the telematics of today renders the application of telemedicine feasible in a practical, everyday-use manner that was considered to be only a fantasy only a few years ago.

The NIVEMES project adopted telemedicine in order to address the above problem by creating a telemedicine network of healthcare providers and developing the software that supports the practice of telemedicine in everyday use by integrating actual medical data and administrative features.

The rationale for the development of NIVEMES telemedicine has been to serve those populations that have limited access to traditional medical services. A primary use of telemedicine is the direct service to those populations in remote areas and mobile stations (ships), while a secondary one was the exchange of data between remote medical institutions, in order to be able to serve their patients in the traditional sense.



OUTPUTS

The project created:

- 1. A set of integrated telemedicine services, which are realised as a series of innovative software modules.
- 2. A terrestrial network of electronically interconnected (WAN) healthcare organisations.
- 3. A number of potential interconnected points to the above network, which will be either on board ships or remote-area sites.

The NIVEMES system has been installed in four European countries (i.e. Ireland, Greece, Portugal and Sweden) and it has successfully passed through its verification and validation phases. Further to the central nodes that have been set up in the premises of the health organisation partners, several remote-area nodes and ship nodes have been installed. These have been installed in local GP offices or in the district healthcare service facilities.

BUDGET:

Overall cost: 2 808 000 €. EC contribution: 1 500 000 €.

CONTACT:

ATKOSoft (EL)

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Keywords: telemedicine, ophthalmology, knowledge-based information systems, monitoring systems, image processing

Group 5

TELEMATICS IN OPHTHALMOLOGY

PURPOSE

Ophthalmologic diseases, especially glaucoma and diabetic retinopathy, are relevant problems for public healthcare in Europe. Besides their burdens for patients, these diseases have a strong socio-economic impact. For both diseases therapies exist in case of early detection. Telemedicine has the potential to provide services for early detection, and support of shared care.

The teleconsultation/tele-screening systems enable physicians to communicate via multimedia mailbox and teleconference systems. The ophthalmologic knowledge-based information system (OKIS) offers up-to-date information about ophthalmic diseases. With the image-processing technique images can be analyzed with respect to quality and pathological findings. Classification and follow up of patients with diabetic retinopathy is supported by a register system, Save Eyes in Europe (SEE).

OUTPUTS

In co-operation with the project By-OPHTEL a teleconsultation network consisting of seven private ophthalmologists, the Department of Ophthalmology of the Technical University of Munich, the Diabetes Centre Munich-Bogenhausen and the GSF was established.

The telescreening system has been evaluated within a controlled multicentre study. A prototype of the ophthalmologic knowledge-based information system (OKIS)

automatic monitoring of specific patient data

synchronous (video-conference) asynchronous (multimedia mailtox)

limited based conference) asynchronous (multimedia mailtox)

INFORMATION HIGHWAY

digital analysis and synthesis of images

for diabetic retinopathy has been developed. The system with the title "Diabetic Retinopathy: Diagnosis, Management and Reference Images" is published as a CD-ROM by Elsevier Science B.V. The online version will be soon available from TEN-Telemed (International Telematics Service Organization) and DGN (German health network).

The image processing supports the monitoring and telescreening system. Output data of the automatic image analysis are used as input data for the monitoring system.

Data from patient management systems were imported to the SEE-register for quality assessment, benchmarking and statistical analysis.

Within OPHTEL various modules and applications have been developed in the field of information technology for ophthalmology. As a result a spin-off company of the GSF-MEDIS Institute was founded

in July 1998, MTA (Medical Telematics Applications), aiming at further development and marketing of knowledge-based systems. The applicability of the tele-screening system is proved within another medical project, Cooperative Health Research in the Region of Augsburg (KORA). OPHTEL already transferred its results to the field of nutrition-dependent diseases.

BUDGET:

Overall cost: 2 572 000 €. EC contribution: 1 000 000 €.

CONTACT:

GSF(D)

Dr. sc. hum. Gerd Mann E-mail: mann@gsf.de

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1996	1997	1998	1999	2000	2001



Keywords: oral health, decision-support systems, electronic health record, epidemiology, evaluation, image analysis

A TELEMATIC SYSTEM FOR ORAL HEALTH QUALITY ENHANCEMENT

PURPOSE

The ORQUEST project intended to achieve the following objectives:

To provide OHC professionals with a comprehensive multimedia based telematic system, OR-QUESTTS, comprising a number of advanced IT&T tools for Quality Assurance in combination with increased cost-effectiveness in order to minimize:

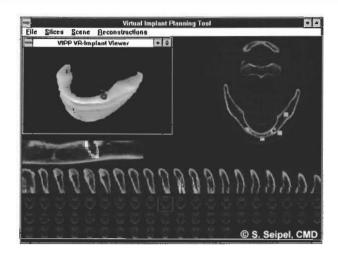
- 1. Absence of knowledge on own performance in relation to quality goals;
- 2. Absence of decision support tools for adequate clinical patient management;
- 3. Lack of adequate means for patient information;
- 4. Deficiencies in the communication between dentists and dental technicians.

To provide OHC professionals with a multimedia-based telematic system, ORQUEST TS, that covers three main areas:

- 1. Chairside support to the dental team;
- 2. Patient information;
- 3. Retrospective evaluation of the care delivered.

OUTPUTS

The core of ORQUEST TS is the ORQUEST Multimedia-Based IT&T-Platform, providing standard interfaces for linking dental software products comprising the following six application modules, implemented and interlinked on this platform:



- 1. ORQUEST-PRODRS, a Proactive Dental Record System, including an advanced facility for the management of image databases; 2. ORQUEST-QUASIMOR, a support system for Quality Assessment and Improvement of Oral Radiographs;
- 3. ORQUEST-TELEDECS, a multimedia-based Telematic Decision Support System for diagnosis and treatment-related quality assurance in oral health care;
- 4. ORQUEST-LABCOM, an interactive telematic support for improved Dentist-Dental Laboratory Communication;
- 5. ORQUEST-PATEDU, a multimedia based system for Patient Education, Information and Motivation:
- 6.ORQUEST-REVAL-NETWORK, a network for Retrospective Evaluation of the quality of delivered oral healthcare.

The second ORQUEST element consists of four modules supporting diagnosis, treatment and clinical management, ORQUEST-PRODRS, ORQUEST-QUASI-MOR, ORQUEST-TELEDECS, and ORQUEST-LABCOM, listed above.

The third ORQUEST element is a patient education and information tool that can be used at the chairside linked to the basic module and operated on the same hardware platform. In addition the patient information tool can be purchased as an individual portable system to be used separately from the other modules.

BUDGET:

Overall cost: 1 342 000 \in . EC contribution: 1 000 000 \in .

CONTACT:

Uppsala Prosthodontic Clinic (S) Dr. Ina-Veronika Wagner E-mail: veronika.wagner@dis.uu.se

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1996	1997	1998	1999	2000	2001

Keywords: workflow, careflow, guidelines, decision support system, resource management, ontology, Internet service



PATIENT WORKFLOW MANAGEMENT SYSTEM

PURPOSE

PatMan proposes a methodology for building a decision support system that integrates two key aspects of health care delivery: clinical procedures and organisational functioning integrating guideline-based care with patient workflow management.

PatMan provides support for site customisation of generic health-care GLs and produces tools supporting the acquisition, modelling and management of both medical and organisational knowledge, based on conceptual models and assists health practitioners in the management of healthcare protocols by means of patient workflow management systems (WfMS).

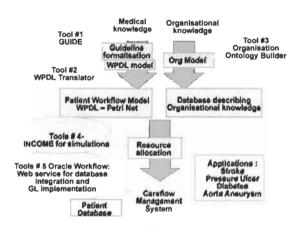
OUTPUTS

The principle objective of this project was to demonstrate that health care organisations can benefit by the application of a care flow management system by simulating the work flow process evolution to clarify where and when information and/or resources are produced and consumed and by implementing GLs in the real clinical setting, by efficiently allocating the necessary resources.

The PatMan tools comprise the following: Tools 1-3 that were completely developed under PatMan, Tools 4-5 adapted within the PatMan project, and Tool 6 that was adapted and refined from the previous HC-REMA project.

PatMan TOOLS

Tool #6 Guideline Discussion Forum: Management of medical and organisational knowledge



- 1. The Guideline editor, GUIDE, which computerises the representation of a guideline or protocol. The editor is written in Java. A GL written with GUIDE may also embed decision analysis models, such as decision trees.
- 2. The WPDL translator is a program that produces a representation of the Guideline as a WPDL (Workflow Process Definition Language) file.
- 3. The Organisation Ontology Building tool is used for modelling the organisational aspects of the careflow.
- 4. INCOME is a commercial product from the partner PRO-MATIS. This tool exploits a relational database. INCOME is able to simulate a Petri net representing the guideline/protocols. It embeds facilities to represent the behaviour model, the organisation model, and the information model.
- 5. Oracle workflow is a commercial product from ORACLE, which permits describing and implementing a workflow model on a real world setting. Three main modules compose this tool. The Builder allows the user to build the model as a sequence of tasks. The Monitor allows for viewing and administering the status of a specific instance of a workflow process. The Notification Mailer lets people receive notifications of work-items awaiting their attention via E-mail, and acts based on their E-mail responses.
- 6. The Guideline Discussion Forum (GDF)

BUDGET:

Overall cost: 650 000 €. EC contribution: 425 000 €.

CONTACT:

University of Aalborg – V-CHI (DK) Stig Kjær Andersen E-mail: ska@v-chi.dk

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1996	I 1997	l 1998	1999	2000	2001

Keywords: efficiency, effectiveness, economy, quality of care, performance of care, planning, bench marking

PLANNING OF THE CARE OF THE ELDERLY IN EUROPEAN COMMUNITY

PURPOSE

The PLANEC-project has designed, developed and demonstrated an intelligent information system for trans-European use in the health and social care for the elderly (elder care). The PLANEC system is primarily a tool for strategic monitoring, socio-economic evaluation and planning (MEP) of elder care, but it contributes also as a tool for (comparative) research. The PLANEC system enables monitoring and evaluation of performance of the existing care systems, drawing up alternative scenarios for care policy and projection of their consequences to compare the expected performance of a new model to the current practice. The project was carried out during the years 1996-1998, and has resulted in a validated demonstrator which will commercialised on an European level in 1999.

An increasing differentiation of care, together with a growing interdependency between various providers, makes coordination in the care provision a challenge of utmost importance.

There is more need for cost- and need-effectiveness of care, caused by the cost constraints related to the transformation of welfare states and the ageing of their elder populations.

A shift in focus from supply to needs poses a need for a more information-driven planning and policy development. Developments of IT- technology facilitate Planec application in 32-bit Windows environment

Databases
Aggregated data on:
-demography
-service-use
-manpower
-costs

Analyses

Socio-economic
monitoring and
evaluation

Output

-Tables
-Graphics
-Reports

Planec data expot/import

other applications relevant to Planec

www.service-use
-vosts

Models

-Trendextrappolation
-Balance of care
-Optimization

WWW SERVICES

Data strorage
Comparable Planec deta from different countries

User interface using generic technology

a creation of information tools that enhance development of a common, integrated information policy.

The Planec development process was research based, iterative and user driven. Intensive interaction with potential end users already started in the stage of the inventory study of user needs. Functional specification of the system was carried out, using object-oriented analyses and modelling techniques, again involving intensive and frequent interaction with the user panels. A high level of user involvement was maintained during the system design and system development stages. User-driven approach found its conclusion in the validation of the demonstrator, using a standardised validation approach of Megatag and SUMI.

OUTPUTS

1. A validated prototype application, containing a multi-dimensional database, analysing and modelling modules, a reporting

module as well as facilities for electronic data interchange.

- 2. Validated and scientifically underpinned standard PLANEC performance indicators.
- 3. A client-level Target Efficiency Model prototype.
- 4. An iterative model of application design, development and evaluation.

BUDGET:

Overall cost: 2 300 000 €. EC contribution: 1 500 000 €.

CONTACT:

STAKES (FIN)

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E-mail: marjav@stakes.fi

Timescale:

Keywords: guidelines, protocols, model, protocol management, electronic health record, EBM, diabetes



Guidelines in Healthcare

PURPOSE

Results from earlier EU-funded research & development projects in telemedicine have confirmed that IT technologies are now capable of delivering guidelines in healthcare as evidence-based clinical practice guidelines to be disseminated, used and consulted as part of the delivery of healthcare to the individual patients and citizens.



OUTPUTS

The project drew notably on results from the DILEMMA, GALEN and NUCLEUS projects. The technical approach centred on the creation of a suite of generic tools and components based on a shared set of conceptual models, capable of interfacing with existing legacy implementations of the Electronic Health Care Record (EHCR).

This approach makes it possible for a clinical guideline created by a variety of European bodies to become available for consultation by clinicians in many practice settings. Industrially, it enables existing vendors to add value to their existing product, capitalising on the heavy recent investments in advanced implementations of the EHCR.

Core elements of Prestige technology include a model of guideline knowledge which enables its content to be encoded with specially-designed authoring tools in a common, structured format; a software module, the Protocol Manager, which can be integrated in legacy systems to derive patient-specific recommendations from guidelines and an EHCR; and a set of tools and interface definitions allowing guidelines to be written with and converted across different clinical terminologies and healthcare business settings.

The applications demonstrated the versatility of the project's generic technology and the range of healthcare contexts in which it can be usefully deployed:

- 1) Implementing national standards for cervical screening and influenza vaccination in Dutch primary care;
- 2) A hospital system for guidelineaided management of epilepsy in Portugal;
- 3) Applications for managing Type-2 Diabetes mellitus in primary care centres in Portugal and UK, and for GPs managing chronic asthma in the UK;
- Hospital cardiology systems for managing angina patients in UK and Germany;

- 5) Long-term managment of anticoagulation therapy in a regional health network in Denmark;
- 6) Supporting a provincial health authority's primary cervical screening and influenza vaccination programmes in Italy.

An important result of this project was the creation of shareable methods and a growing community of shared experience.

Formal standard work is expected to advance during the 5th Framework programme, building on the recent results of CENTC251 and ISO in the domain of EHCR architecture.

BUDGET:

Overall cost: 5 301 630 €. EC contribution: 3 509 980 €.

CONTACT:

CENTIS (P)
Dr. Mário Véloso
E-mail: marioveloso@centis.pt

started at 1.12.1995		1	1	1	
1996	1997	1998	1999	2000	2001

Keywords: healthcare, communications, integration, standardy, regional health care networks, primary care

PRIMARY CARE PHYSICIAN'S COMMUNICATION NETWORK

PURPOSE

On average, each hour of consultation with a general practitioner (GP) results in more than one message to another part of the healthcare sector, generating a large flow of routine messages such as prescriptions, referrals, examination requests, discharge letters and laboratory results. Consequently, the accurate, fast and safe communication of information has become decisive to the cost, quality and patient service of the entire health service. Regional healthcare networks facilitate the flow of information between members of the healthcare system. The purpose of the PRIMACOM project (http:// www.primacom.dk) was to establish regional healthcare networks in Hungary and Slovenia based on European standards and experiences from the European Community.

OUTPUTS

In a public-private partnership, two regions in Hungary and Slovenia established regional healthcare networks for the exchange of routine messages (initially, discharge letters) between hospitals and GPs using European standards for the exchange of medical data developed by CEN TC 251. In developing the networks, PRIMACOM benefited from knowledge transfer and methodology provided by two European Community countries



with experience in implementing regional health care networks: Denmark and Italy. Specifically, the project's objectives were realised by

- providing the necessary tools and applications (handbook, implementation guidelines, training, guidelines, expertise);
- establishing links between software companies in Denmark, Italy, Hungary and Slovenia;
- establishing electronic links between healthcare professionals:
- using structured message communication to ensure re-use of data in different systems building on European standards and existing infrastructure and systems in the regions.

As a result of the project, it has been shown that once a technical

solution has been developed it is possible to transfer the knowledge across borders and promote establishment of regional and national healthcare networks elsewhere. Moreover, standardisation and consensus activities carried out within the project remain valid irrespective of the technology platform used. To facilitate future implementations, the project included detailed documentation of the experiences and expertise needed to develop a regional healthcare network.

BUDGET:

Overall cost: 436 366 €. EC contribution: 300 000 €.

CONTACT:

County of Funen, Danish Centre for Health Telematics (DK)
Morten Bruun-Rasmussen
E-mail: mbr@health-telematics.dk

Timescale:

Keywords: telematics, webservice, WWW, health, quality of care, clinical guidelines, clinical protocols



PROMOTING THE DEVELOPMENT, DIS-SEMINATION AND EVALUATION OF GUIDE-LINES IN CLINICAL PRACTICE

PURPOSE

ProGuide is aimed to enhance the Union-wide access to guideline-relevant information for users, healthcare agencies, developers and implementers by establishing an infrastructure for different elements of validation, quality control, approval by authoritative bodies and education.

OUTPUTS

As a part of the project management, a Web presentation (www-mi.gsf.de/proguide) was installed for the purpose of:

- 1) external representation of ProGuide, containing a description of the project, a list of the partners, the missions of the organisation and prior relevant works;
- 2) communication between ProGuide partners through a subsection of the server which is protected by a password.

This way of electronic communication has proven to be effective and efficient.

An analysis of the web resources on guidelines has been carried out. As a useful result there is an inventory of the most interesting sites found.

A state of the art report of telematics for supporting guidelines has been produced with reference

Timescale:

ProGuide

to the most relevant research projects in Europe and in the United States.

The literature review focused on development, dissemination, compliance and evaluation of guidelines of primary care.

In close co-operation with ProGuide partners the survey questionnaire was specified, developed and successfully tested.

The realisation of the survey led to results which were a basis for the second phase of the project as well as for other European activities.

A standard European Interchange Format will help to achieve harmonisation of users, developers and payers of guideline development and dissemination by providing a common intermediate format for translation of guidelines between languages.

The availability of a standard interchange format for electronic clinical guidelines will have many benefits for industry, notably by encouraging interoperability and communication between products and opposing the current fragmentation of the industry which weakens competitiveness.

BUDGET:

Overall cost: 420 000 €. EC contribution: 420 000 €.

CONTACT:

GSF(D)

Prof. Dr. W. v. Eimeren

http://www-mi.gsf.de/proguide



Keywords: clinical guidelines, decision support system, protocol-based care, electronic health record, healthcare networks, oncology

PROTOCOLS FOR MEDICAL PROCE-DURES AND THERAPIES

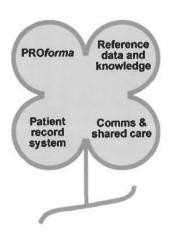
PURPOSE

The main goal of the PROMPT project has been to develop the components of a clinical care station (centred on electronic patient record and decision-support technologies) in order to provide relevant and timely support for clinical decision-making at the point of care.

PROMPT technologies, largely based on prototypes built in the 3FP DILEMMA project, form the components of an integrated care station: multimedia electronic patient record, decision and protocol support software, multimedia knowledge reference systems and communications technologies.

OUTPUTS

The PROMPT multimedia electronic patient record has been designed to be at the centre of a pilot regional shared care health information network (Aquitaine Cancer Network) developed in S.W. France. The network aims to decentralise, expand and improve the co-ordination and quality of continuing care (particularly in cancer) at regional and local levels. A communications infrastructure based on the EDIFACT standard messaging format for electronic data interchange is being used to link hospital, primary and shared care sites on the network.



PROforma technology for capturing clinical guidelines and delivering decision support at the point of care, developed at the ICRF, London, is based on techniques in mathematical logic and Artificial Intelligence. It encompasses the lifecycle of clinical guideline computerisation, from design and implementation to execution. The technology comprises a formal knowledge representation language, a graphical editor and the PROforma engine (which tests and executes guidelines).

Both the electronic patient record and PROforma technology have been shown to offer state-of-theart functionality in the field of healthcare telematics products, and validation activities undertaken by the project have highlighted their potential for impact on the process and quality of healthcare.

The PROMPT EPR as a commercial product started in June 1999. XML technology is being adopted by PROMPT, in compliance with recommendations published by CEN TC 251, to support EPR data communications AWWW version of the EPR is now being implemented. PROforma technology and healthcare applications are being developed and marketed by InferMed Ltd, London. These include the largest PROformabased application built to date, the MACRO Clinical Trials Manager, which has been adopted by the EORTC and the MRC Cancer Trials Office. PROforma is currently being web-enabled.

BUDGET:

Overall cost: 1 226 402 €. EC contribution: 1 000 000 €.

CONTACT:

Imperial Cancer Research Fund, London (UK) Professor John Fox E-mail: jf@acl.icnet.uk



Keywords: electronic health, health information systems, records, standards, promotion, network of centres

TULP Group 1

PROMOTION STRATEGY FOR EUROPEAN ELECTRONIC HEALTHCARE RECORDS

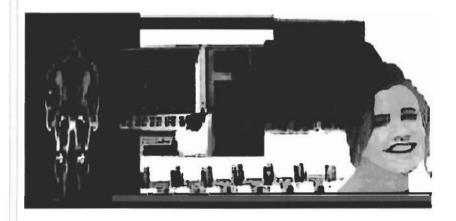
PURPOSE

The main objective of PROREC is to promote the widespread use of Electronic Healthcare Records by installing in Europe a permanent network of centres focused on the dissemination of information related to electronic healthcare records. The activities envisaged, both on the international as on the national level, can be found on a scale ranging from informative, over advisory and controlling, to accreditation. This will be done through organisation, coordination and concentration.

A consortium composed of nine organisations of repute was formed, where specialists from different fields involved shared efforts and experiences.

The consortium has worked in the establishment and foundations of the various national PROREC centres as well as in the preparation and development of national and international activities.

PROREC is devoted to promoting and coordinating the European-wide convergence towards comprehensive, communicable and secure Electronic Healthcare Records. This is being carried out in concertation with other related organisations in the field (standardisation bodies, authorities, EU initiatives, etc.). To perform the project activities, PROREC has formed a consortium composed by nine



organisations from nine European countries encompassing a wide range of professional profiles.

OUTPUTS

Collection and dissemination of relevant information related to EHCR is one of the main missions of the centres, as well as organising actors in different platforms or groups depending on their nature (industry, authorities, vendors, suppliers, users, hospitals, physician, etc.) and the maturity of their respective market. Each group holds forums periodically and interacts among them.

PROREC has organised three international events. The EURO-REC conferences are becoming more important at international level. These annual events have served as "meeting points" for actors to exchange experiences

and knowledge on developing or implementing Health Information Systems and Electronic Health Records. Finally, concertation and collaboration with strategic organisations in the EHCR field have been two decisive issues for the appropriate achievement of results. Interaction links with standardisation bodies like CEN, EU-funded projects and other related initiatives have been achieved and have allowed establishment of bi-directional channels to obtain updated information and to provide them with useful feedback.

BUDGET:

Overall cost: 1 148 325 \in . EC contribution: 610 000 \in .

CONTACT: SADIEL (E) Mario Canivell E-mail: mario.canivell@sadiel.es

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1996	1997	1998	1999	2000	2001



Keywords: disaster medicine, resource management, emergency

RED CROSS OVERALL EMERGENCY RESOURCE MANAGEMENT

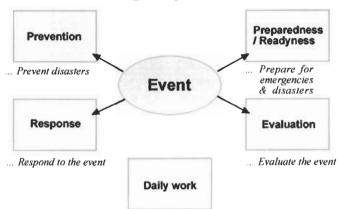
PURPOSE

The objective of The Red-Cross Overall Emergency Resource Management System (RECO-VER) project was to provide National Red Cross Societies with a telematics application, a platform for the co-operative management of resources and disaster information during the phases of the disaster life-cycle.

A major part of the daily activity of the Red Cross consists of efficient resource management and location requiring national and international coordination. That can only be achieved through the exchange of information between the international, national, regional and local levels. For a correct evaluation of the disaster situation, the information from different sources must be gathered, stored and analysed in the most efficient way.

This project was based around the existing pan-European Red Cross Border Disaster Relief Working Group (German, French, Belgian, Dutch and Austrian Red Cross Societies). The Red Cross European Liaison Bureau acted as cooperator in the definition of the user requirements.

Emergency Phases



The typical disaster life-cycle for a non-governmental institute such as the Red Cross consists of:

-prevention by informing and educating the public;

-preparing for emergencies to get people through the disaster safely and respond to it effectively;

-readiness by encouraging state and local planning for resources, facilities, equipments and the training of emergency personnel; evaluation of the disaster (e.g. measurements from field sensors, phone calls, press releases) when detected; -response to the disaster (mobilising and positioning resources, getting people out of danger, providing food, water, shelter and medical services and bringing damaged systems back on line.

OUTPUTS

A preliminary prototype was produced based on a specification of user requirements developed with help from several European Red Cross societies. More financial resources would have been needed as well as greater user participation in order to develop a successful product.

BUDGET:

Overall cost: 1 000 000 €. EC contribution: 338 000 €.

CONTACT:

Spacebel Informatique (B) Patrick Assis-Arantes E-mail: paa@spacebel.be

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1996	1997	1998	1999	2000	2001

Keywords: regional health care networks (RHCN), electronic health records, booking services, continuity of care

RÉSEAU MULTIMÉDIA EUROPÉEN POUR DOCTEURS ET ÉTABLISSEMENTS DE SANTÉ

PURPOSE

To improve healthcare delivery through telematics means solving the problem of daily, bulky information exchange between primary and secondary care. The effectiveness of solutions in this field depends on their ability to fit smoothly into the normal working environment of healthcare professionals. Affordability of equipment and limited requirement for high-performance networks are keys to improving healthcare delivery through telematics. The REMEDES project (aimed to address this issue by developing appropriate software).

OUTPUTS

Based on object-oriented development methodology (Systems CRAFT/OO) and tools (SELECT OMT) a number of software products/services was developed to fulfil a large variety of telematics functions. All the software was developed in JAVA for ease of software distribution and porting from one system platform to another.

- REMEDESÔ is the trademark of a family of telematics services encompassing Booking; Test Request; Result Reporting; Outpatient Booking/Referral; Hospitalisation Request; Hospital Discharge Summary; Shared Care (Clinical Balance); Medical Statistics. Developed by Olivetti Sanità, it has been implemented at several sites in Italy as trials or commercial provision of services. Service REMEDES TM
Server

Server

Interface

ISDN Network

REMEDES TM
Interface

REMEDE

- Medidoc/Clinidoc is a family of EHCR systems developed by Datasoft Management. The products feature Windows 95/98/ NT compatibility; full GUI; multilingual facility; multi-country configurability; and links to REMEDESÔ and MediBRIDGE telematics services.
- REMEDES Service Manacor, developed by the Fundación Hospital de Manacor coupled with an EHCR accessible through intranet.
- REMEDES Service Montpellier, a portal which giving access through the R.S.S. (health and social service network in France) to a multi-hospital EHCR (virtual EHCR) and up-to-date data about drug dispensing in the area.
- A consultancy offer derived by Sema Group, UK.

Exploitation of the project results began even before the end of the European project due to market pressures. REMEDES and Medidoc/Clinidoc have been sold to end users in Italy and Belgium, respectively. The experience acquired during the project in developing with JAVA has been transferred to a family of new products under preparation within Olivetti Sanità. Moreover, some parts of REMEDES (e.g. the user interface) have been re-used for new projects (CUP 99) and REMEDES has been retained as the healthcare component of the IADS CITIES project. As a result, the REMEDES services will be deployed in Brussels, Marseille and Rome.

BUDGET:

Overall cost: 7 631 360 €. EC contribution: 3 001 700 €.

CONTACT:

Olivetti Sanita (I) Marco d'Angelantonio E-mail: mdange@attglobal.net

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1996	1997	1998	1999	2000	2001

RETRANSPLANT



Keywords: organ transplant, medical information portal, transplantation

REGIONAL AND INTERNATIONAL INTE-GRATED TELEMEDICINE NETWORK FOR MEDICAL ASSISTANCE IN END STAGE DISEASES AND ORGAN TRANS-PLANT PROJECT

The RETRANSPLANT project aims to develop and install telematics tools to bridge the various and geographically dispersed institutions playing a role in the complex process of organ collection from a donor and transplantation into one or several recipients.

PURPOSE

The generic model used was kidney transplantation and the information and communication technologies developed so far networked dialysis centers, organ transplant surgery clinics, tissue typing laboratories, organizations coordinating recipient to donor selection, and other health care facilities for organ transplant services in the Central and Eastern European Countries.

OUTPUTS

The starting point is the implementation of a networked electronic patient database playing a pivotal role to combine information from transplant waiting list, donorrecipient immunological typing, organ allocation, and patient selection.

An Electronic Medical Record system at the organ transplant centers in Hungary (Budapest, Szeged), and Slovenia (Ljubljana) that can be accessed through the



web and that compiles all clinical records including diagnostic codes (ICPC/ICD10), drugs, procedures, investigations, laboratory tests, etc. in the working language. The major integrated achievement of the project was to create a continuum between the patients professionals and health SmartCard, the Electronic Patient Record shared through Internet and a Transplant Information Portal including several web-based services that are actually used by the concerned healthcare actors.

The RETRANSPLANT portal and connected resources can serve as a very concrete and realistic basis for any further step toward actual use of ICT in any medical activity requiring multiple access over regional, national and international networks.

The Transplant Information Portal is on the way to be distributed to any potential users. The major

advantage is that, owing to the open-source technology used and the low cost for implementation, the translation into any regional language and the implementation in any hospital environment are easy, feasible and of obvious cost benefit to the patients and the health professionals.

BUDGET:

Overall cost: 2 185 000 €. EC contribution: 1 530 000 €.

CONTACT:

Universite Joseph Fourier (F) Prof. Gérard Brugal E-mail: Gerard.Brugal@imag.fr

Τi

Timescale:

Keywords: neuro-surgery, intra-operative, ultrasound, image prosessing, robotics

(%)

ULTRASOUND-IMAGE-GUIDED MANIPU-LATOR-ASSISTED SYSTEM FOR MINI-MALLY INVASIVE ENDO-NEUROSURGERY

PURPOSE

The project aimed to provide a unique combination of intraoperative 3D-ultrasound monitoring (through the standard endoscopic trepanation) with an active robot manipulator for guidance and on active constraint control.

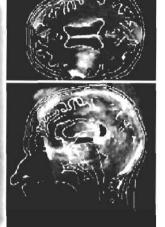
This system is built from:

- 1) a new special-purpose 4 degrees of freedom robot manipulator, a force-control system for "virtual mechanics" and a softwarecontrolled active constraint control;
- 2) a new 3D ultrasound imaging system with a miniaturised, intracranial array transducer and a 384channel digital beam-steering unit;
- 3) a new generation of image processing software for cross-modality alignment of the acquired ultrasound volume data sets with pre-operatively acquired MR data;
- 4) a new generation of surgical simulation and planning software that allows 3D visualisation and manipulation of actual patient data.

OUTPUTS

This system is called the NEUROBOT Manipulator system. With this prototype the consortium has developed a robot that is adapted to keyhole surgery and is

Endoscope
Robet base
Burr hole
Mobile table
Vertical positioner Phantom skull
Foot switch



completely force-controlled. Further modification to this prototype will be completed in bilateral cooperation between Fokker Control Systems and Imperial College. FhG in cooperation with Kretz Technik are improving two prototype ultrasound transducers. They will eventually be extremely flat, coin-shaped and capable of being placed under the patient's skull during surgery. INRIA has developed software tools for cross-modality image processing. One module concerns nonrigid 30-ultrasound-versus-MR registration and the other module non-rigid tracking of structure deformaions in sequences of 30 ultrasound images. In addition to these 2 core modules, software is being developed by INRIA, ISM, Max Planck Institute, Munich and FhG, that will soon allow real-time processing of deformation of MR volume data-sets (according to deformation fields obtained from ultrasound tracking) and for deformation of the active constraint data, ISM, TU Braunschweig and SGI have developed software tools

for simulation of surgical procedure based on real patient data. This software is different from current simulators, which are based on pre-segmented datasets. The new simulation software, ROBOSIM, is capable of using raw MR image data without interactive preprocessing for 3D visualisation. It is controlled by manipulator as an input device and uses high-end visualisation hardware from SGI. Further testing of this software is needed but current signs are excellent. Further work by the consortium on these prototypes is planned in order to develop commercial products.

BUDGET:

Overall cost: 3 113 000 €. EC contribution: 1 709 000 €.

CONTACT:

Fraunhofer Institut für Graphische Datenverarbeitung (D)
Dr.-Ing Volker Paul
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1996	1 1997	1 1998	1999	2000	2001



Keywords: RDS, integration of services, digital sites, health information portal

RUBIS IS A EUROPEAN PLATFORM FOR VALUE-ADDED SERVICE DEMOS, EVALUA-TIONS AND DISTRIBUTION, IN THE SECTORS OF HEALTH, EDUCATION, TRANSPORT AND GOVERNMENT SERVICES.

PURPOSE

Tested since 1999 on 5 different Digital Sites in 3 Member States of the European Union (Germany, Finland and France), RUBIS already proposes an integrated range of online services to over 200 doctors from some of Europe's leading hospitals (Berlin, Strasbourg, Bordeaux, Oulu), to hundreds of academics (in Oulu and Berlin, in the form of correspondence courses), as well as to users of public transport and local government services of the towns of Ulm and Strasbourg.

OUTPUTS

The online services RUBIS offers include:

1. An E-Health portal for professionals and the general public

RUBIS sets up, for each region, a portal of services integrating the electronic "patient record", multidisciplinary chat forums, training services, clinical trials and medical imaging, as well as medical knowledge bases. This panel of services is distributed within the framework of an Application Service Provider (ASP) offer. Security is ensured by a specific card, approved by the health authorities.



The Rubis Distributed Searching, RDS, is a facility that enables users to search in web applications distributed over the Internet on the basis of the indexing terms of the de facto standard 'Dublin Core Metadata'.

Using RDS, a work of integration of ACTION CLUSTER products has been completed throughout the RUBIS portal.

The following projects have been integrated through the RUBIS portal: EuroPATH (PDB2000), MANSEV (MACRO), MEDICO (EVA), ECOLE / GRIP (RISA), PROMPT (DPWEB), RETRANSPLANT (TPWEB).

2. E-Learning services in the health sector

RUBIS contributes to the expansion of the correspondence course industry through the creation of

training activities by correspondence dedicated to the university and medical worlds.

3. Online help for users of public transport and government services

RUBIS provides town and urban community authorities with products for the planning and management of inter-urban traffic, thereby offering public transport users the apportunity to optimise their movements.

The RUBIS project falls within European policy concerning the spreading of IST tools and services through the development of interoperable technical solutions and the creation of standardised industrial products.

BUDGET:

Overall Cost: 10 728 000 €. EC contribution: 4 400 000 €.

CONTACT:

Centre Européen de la Communication Region Aquitaine (F) Jean-Pierre Trieau http://hip.rubis-aquitaine.org

Timescale:

Keywords: education, departmental system, workstation, ISDN, telemedicine, imaging

(M)

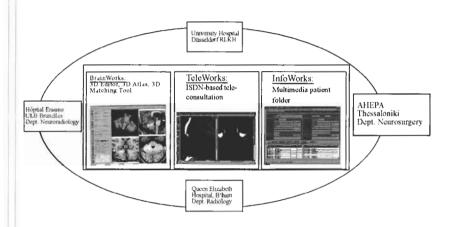
SOLUTION AVANCÉE POUR LE MARCHÉ MÉDICAL INTRA-HÔPITAL EUROPÉEN

PURPOSE

The neurosciences and neuromedicine are good examples of where new technologies, such as CT (Computed Tomography), MRI (Magnetic Resonance Imaging), PET (Positron Emission Tomography) and SPECT (single photon emission computed tomography), improve diagnosis and therapy. However, it is not sufficient to have the diagnostic machinery produce data. For the objective diagnosis, data needs to be analysed, quantified and understood. The clinicians therefore have to be supported by tools to quantify the findings, e.g. in terms of size and location. They have to be supported by reference data, e.g. atlases and similar cases. Finally they have to be given advice by experts to whom they can talk and discuss cases.

The objective of the project was to provide CLINWORKS, an integrated departmental system for neuromedicine, to support patient data management, teleconsultation and diagnostic tools for diseases of the brain. CLINWORKS consists three modules:

- 1) BrainWorks, a diagnostic workstation for 2D and 3D display and editing of images of the brain from various sources, and incorporating atlases and tools for matching the atlases with modality images;
- 2) InfoWorks, the departmental multimedia electronic patient folder for documentation and archiving of medical patient data; and
- 3) TeleWorks, for remote consultation and sharing of diagnostic



expertise using co-operative work on radiological images. TeleWorks is particularly designed for narrow bandwidth (ISDN) communication.

OUTPUTS

The two main achievements of this project were:

- 1) the development and implementation of CLINWORKS, a departmental system composed of BrainWorks, TeleWorks and InfoWorks and the submission to the four clinical test sites;
- 2) the tests, the validation and demonstration of CLINWORKS at the four hospitals.

Common to all software components is the support of PC hardware under Windows NT 4.0. It therefore opens diagnostic imaging, teleconsultation and multimedia document handling to a wide community of clinical users. This was clearly appreciated by the clinical test sites.

CLINWORKS increased the availability of distributed medical information from different sources:

- 1) human expertise via TeleWorks;
- external knowledge via Brainwork (atlases and case collection); and
- 3) databases and the modalities via InfoWorks. CLINWORKS decreased time needed to access the distributed medical information, made diagnostic findings more reproducible and objective via the BrainWorks reference data, i.e. the Atlases and Case Collection and quantitative measurements of the brain with the BrainWorks 3D Editor.

BUDGET:

Overall cost: 1 832 487 €. EC contribution: 1 200 000 €.

CONTACT:

Bull (D/F)

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PL961144



Keywords: telemedicine, cardiology, architecture, platform communication, narrowband network, multimedia, imaging

SAMTA IS FOCUSED ON THE MEDICAL FIELD OF CARDIOLOGY IN CENTRAL AND EASTERN EUROPEAN COUNTRIES (CEC/NIS)

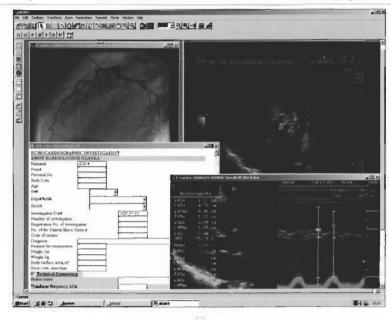
PURPOSE

The 'challenge' of the SAMTA project was to develop an open scaleable architecture for multimedia telemedicine applications allowing system designers to choose features which make appropriate use of available network bandwidth. Such a scaleable architecture improves the safety of investment for telemedicine users when faced with an uncertain future regarding the availability and cost of network infrastructures.

An integrative part of the SAMTA project was the development of a prototype application which should be integrated into a clinical environment in two "validation countries" (Hungary and Lithuania). The validation sites (four in Hungary and four in Lithuania) allowed testing, evaluation and assessment of the project developments in "real" hospital environments.

OUTPUTS

We have defined an architecture called SAMTA (Scaleable Architecture for Multimedia Telemedicine Applications) and have developed an application software based on that. With this application we can write reports, digitize ultrasound movies directly from the machine's SVHS port (in MJPEG or MPEG2 format), read



DICOM Angio CDs, cut and store these clips, process them (e.g. scaleable compression) and communicate them among the cardiac centres for telereporting and teleconsultancy using DICOM. We are using and have evaluated JPEG, MJPEG, MPEG2 and our own compression techniques.

During the SAMTA development phase we oriented towards the next-generation Internet data access tools such as XML and SMIL. XML has been tested as a tool for textual and numeric data distribution (even over GSM line with Palmtops for emergency). SMIL has been tested for the synchronised authoring and playback of texts, sounds, images and movies for multimedia telereporting over dial-up, ISDN or leased lines.

Most of our results can be used in local cardiac networks (PACS) inside the hospitals (where we use 100 Mb/s Ethernet) or in Intranets.

BUDGET:

Overall cost: 287 411 €. EC contribution: 249 911 €.

CONTACT:

Kuratorium OFFIS e.V. (D) Prof. Dr. Peter Jensch http://samta.offis.uni-oldenburg.de



Keywords: HIV, AIDS, self-help, infectious diseases

SUPPORT, EMPOWERMENT AND AWARE-NESS FOR HIV/AIDS — THE ON-LINE RESEARCH AND SELF-HELP EXCHANGE

PURPOSE

The SEAHORSE II project (www.seahorse.oxi.net) addressed the problem of providing information and support services for complex configurations of user groups in the HIV/AIDS domain. It aimed to develop a 'European Clearing House' of information and knowledge about HIV/AIDS in the form of an 'evolving knowledge base' accessible via the Internet and providing generic, peer-validated information. It can be described as a Collaborative Knowledge Production and Content Management System for healthcare aimed at people living with HIV/ AIDS, NGOs and carers providing support, and health professionals.

OUTPUTS

In developing SEAHORSE a proprietary software package (Information Repository Management system, IRM) was developed and implemented, including an Internet front-end, a suite of data mining tools and an evolving knowledge database available via the WWW. Registered users can contribute directly to the site by commenting on existing websites and articles, suggesting new websites and adding articles of their own. In addition, two supporting applications were developed: the Interactive User Monitoring Tool (IUMT) and the Clinician Information Exchange. The IUMT captures quantitative and ethnographic data

SE/HORSE

THE ONLINE HIV AND AIDS INFORMATION EXCHANGE

about SEAHORSE users, allowing users to enter their personal, clinical. lifestyle and treatment data. This was linked to the Health Professional Information Exchange providing discussion groups and access to online databases. Data from the IUMT was made available to stake-holders in order to promote 'collaborative health management'. The tools and applications were tested in seven pilot sites reflecting different configurations of user and organisational scenarios. Evaluation data included a record kept by the evaluation managers in each of the pilot sites (technical and design issues); focus groups with small groups of users; and a pre-test/ post-test self-administered questionnaire survey involving 140 of the 500 registered users.

Seven local versions of the IRM were established in four EU countries, the UK, Greece, Spain and Italy, and also in Romania, providing culturally relevant support

and information in the users' own language. Exploitation included adoption for two health and welfare initiatives of the UK Government and two new EU RTD projects developing SEAHORSE tools and services further (HERO and CAMP) to create the basis for an emerging European Clearing House for HIV/AIDS.

BUDGET:

SEAHORSE I:

Overall cost: 254 000 €. EC contribution: 157 000 €.

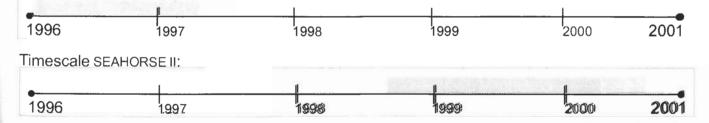
SEAHORSE II:

Overall cost: 1 327 000 €. EC contribution: 689 000 €.

CONTACT:

The Tavistock Institute (UK)
Dr. Joseph Cullen
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Timescale SEAHORSE I:





Keywords: security, privacy, regional networks, legal aspects, identification of professional users, harmonisation, awareness

SECURITY IN REGIONAL NETWORKS

PURPOSE

The scope of this project was to assist healthcare providers using regional healthcare networks to establish security services required both for protection of patient privacy and to provide legal accountability on the part of medical professionals and administrative staff. The key function is to achieve a secure identification of professional users of digital patient archives and, in the future, also of patients. The challenge for the SI-REN project was to provide a general reference point for users. bringing together experience and knowledge to provide a researched and professional approach to security issues.

The main objectives of the SIREN project were:

- How can confidentiality be protected in healthcare messaging systems or remote access in wide area networks?
- -How is it possible to ensure compliance with the legal requirements not only for privacy protection but also for the legal validity of electronic documents, e.g. for prescriptions sent over networks?

OUTPUTS

The result of this project provides a sound basis for the harmonised introduction of security services for healthcare in Europe, focusing specifically on digital signatures. From these bases the project has made a number of recommendations to the European



Commission and to other projects for the continuance of work in this important area.

Four main activities that were undertaken:

- Educational seminars/workshops and conference activities
- Publishing a collection of experiences dealing with security issues
- Studies on legal issues

The results and achievements can be described under the following headings:

- Regional reference centres, workshops, presentations and educational material.

Four reference centres were established, eight SIREN workshops run in Europe, and fifteen presentations made at national/international congresses. Educational material was produced and is available on the Web from the SIREN home page.

The project has provided a wellresearched and comprehensive set of material covering the issues and solutions to security services required in regional healthcare which are available for users and other projects working in these and related areas. The exploitation of the work provides reference material for organisations working in the area of secure regional health networks. This accompanying measure supports the protection of patient privacy in open, regional, national and cross-border networks.

BUDGET:

Overall cost: 350 000 €. EC contribution: 350 000 €.

CONTACT:

Spri(S)

Dr. Gunnar Klein

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Timescale:

Keywords: seamless care, architecture, continuity of care, regional health care networks



SEAMLESS TELEMATICS ACROSS RE-GIONS

PURPOSE

The star project demonstrates the sharing of healthcare information between one or more hospitals and their surrounding healthcare providers. This is achieved through the development of middleware services and end-user applications so that parts of the medical record are shared, the scheduling of events via an interactive referral process, the facilitation of more informed management decisions, and the provision of the building blocks for cooperative care. All of this is based upon emerging de facto and CEN standards.

Star selected key regions across Europe in which the benefits of sharing healthcare information between one or more hospitals and their surrounding healthcare providers are demonstrated.

The main focus of work was on delivering the star services and demonstrating them in a limited set of star satellites (demonstration sites). The star architecture was produced by means of a jointly developed architecture repository tool (the ART).

Two main sites – Milano (Italy) and West Middlesex (London) are used to demonstrate project results.

OUTPUTS

The Milano site demonstrates remote consultation with image management, the healthcare yellow pages, remote booking and access to medical information, all

stor

across the private health intranet. It has been such a success that it has been rolled out across the region. Furthermore, the star architecture now forms a component in the Lombardia regional healthcare infrastructure strategy. The system development in Milano has been incremental in its refinement and consolidation.

In West Middlesex a protocoldriven direct booking system was implemented using the same components as defined by the star local services. This system proved to be of significant benefit but had to be re-engineered due to new security directives in relation to the UK NHS's national network. It now forms the cornerstone of a new web-enabled strategy for the hospital and is beginning to attract a great deal of attention at regional and national level.

The star project contributes to emerging European healthcare telematics business by developing services that allow systems to interwork across a geographical region. Star has a set of products upon which the commercial companies involved can build a service business. The enduser participants are also benefiting from greatly enhanced seamless healthcare between providers. The project has also been addressing the exploitation of the results as described in the Exploitation Plan. Equally significant exploitation channels are the relationship with the new InterCare project (in which many participants in star are also participating) and also the feeds into standards work at the international level such as CORBAmed.

BUDGET:

Overall cost: 5 000 000 €. EC contribution: 1 500 000 €.

CONTACT:

North Eastern Health Board (NEHB) (IRL) Anthony Reilly http://www.nehb.ie

Timescale:



Keywords: electronic health records, distributed systems, open systems, federated records, shared data

Federated Healthcare Record Server

PURPOSE

The delivery of healthcare is undergoing major changes. It is no longer the responsibility of a single professional, but is shifting to a shared-care approach. Everyone involved has to have access to all the relevant information. The Electronic Healthcare Record (EHCR) is at the heart of the developments. The project provides a standard for an EHCR server. Synapses solves the problem of sharing data between heterogeneous health information systems. The task was to provide client applications with a view of the patient records obtained from other information systems storing or generating relevant information. The resulting shareable record is a Federated Healthcare Record (FHCR).

OUTPUTS

The brief for Synapses was to provide proof of concept and validation in the clinical and technical sense. Its primary output is a specification of the FHCR server and its interfaces using ISO Open Distributed Processing Model. The FHCR server is responsible for receiving and interpreting requests from the clients, decomposing them into requests to individual feeder systems and receiving and combining the results into a single integrated response. The server presents the record in a customisable form to the client applications. Interaction between





clients and feeders is driven by the Synapses object dictionary (SynOD), which is based on the Synapses Object Model (SynOM).

To prove that the solution is generic, the results have been validated in five clinical domains: intensive care. St James's Hospital, Dublin, transmural management of diabetes, Academic Medical Centre, Amsterdam, oncology, Royal Marsden Hospital, London, internal medicine and general surgery, Akershus, Oslo and general patient dossiers, University Hospital, Geneva. Each site implemented the server with the standard specification, but using a variety of technologies. Thus Synapses has not simply developed a solution but rather a generic standard for sharing EHCRs and related data.

Synapses has proven that the technical problems associated with sharing EHCR data can be solved and the specification is generic. The objectives are now to

incorporate the essential security, reliability and performance and to promote the solutions. The first objective is being handled principally through the SynEX project. It is also being applied in the InterCare project (smart cards and network systems). The second is being approached through on-going work in CEN, by the industrial partners and presentations at conferences, and on the web. The extension of the basic EHCR into FHCR opens the way in which healthcare is delivered in a more citizen-centred approach.

BUDGET:

Overall cost: 5 000 000 €. EC contribution: 2 700 000 €.

CONTACT:

St. James's Hospital (IRL) Prof. R.R. O'Moore http://www.cs.tcd.ie/synapses/public



Keywords: architectures, middleware, components, open systems, electronic health record

SYNERGY ON THE EXTRANET

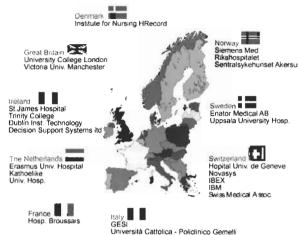
PURPOSE

The strategic understanding of Synex is that any type of healthcare information may be part of the HC record. Consequently, originators and users of HC records are any possible actors from different units and organisations, who perform different activities but need to share a common set of data.

With such a view, the overall goal of Synex has been the integration. demonstration and industrial promotion of a set of complementary components (i.e. the Synex framework) of the healthcare information system, capable of providing an advanced support to the manipulation and exchanging of healthcare records between different healthcare organisations, actors and technological environments.

Fundamental components of the SynEx framework have been the results of some previous EU projects: Synapses HC record server, Galen terminology, I4C Structured Data Entry, Telenurse Nursing Record, and the Hansa common DHE middleware and business objects, combined with independent industrial initiatives.

By adopting the architectural approach defined by the CEN ENV 12967 HISA standard the various components have been adapted and evolved to make them consistent and synergic in the overall environment of the healthcare information system. After the initial delivery, the various modules have been installed and experimented in the seven demonstration sites



An open application and for accessing and managing healthcare records and healthcare organisations in a distributed, heterogeneous scenario

based on public interfaces; - centred around patient and professional activities;

comprising complementary products from different vendors:

directly extensible and customisable by the users capable of interacting with

existing legacy systems; conformant to the CEN 12967-1 Standard Healthcare Information Systems

Architecture

A synergic collaboration between hospitals and industries, leading actors throughout Europe Suppliers: delivering the companents and promating them on the market Hospitals: validating the components in practice and providing live show-cases for supporting the promotion

participating in the project, where they have been experimented in the real environment.

OUTPUTS

By combining results of previous projects, existing industrial products and new developments carried out through the SynEx project, the SynEx framework represents a unique and almost complete mix of multi-vendor portfolio of products capable of supporting an ample set of actual operational requirements of the healthcare organisations.

The modular approach adopted for the architecture has facilitated the definition of the bilateral business agreements between the various partners of the consortium for the mutual promotion and commercialisation of the components of the SynEx framework. Such agreements have already led to significant results on the external market, as it is demonstrated by the contracts signed by GESI and TietoEnator with the Copenhagen

Hospital Corporation (HIS) and Copenhagen County Hospitals (KAS), where the DHE has been installed in the production environment as a common platform for integrating existing systems and for supporting new developments.

Through the commercial contracts already finalised, the collaborations established during the project are continuing and evolving, complemented also by the new developments carried out by the various partners, aiming at delivering additional products, complementary with the already available framework.

BUDGET:

Overall cost: 6 060 000 €. EC contribution: 3 199 000 €.

CONTACT:

GESI(I)

Fabrizio Massimo Ferrara

E-mail: fmf@gesi.it





Keywords: intensive care, information system, evaluation and verification, user acceptability and usability, telematics support

TELEMATICS FOR ANAESTHESIA AND INTENSIVE THERAPY II

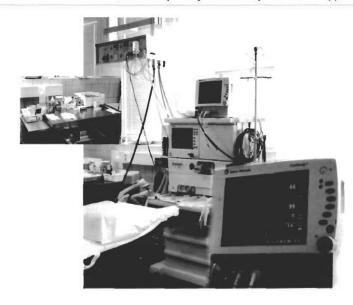
PURPOSE

The aim is to provide IT support for critical care (CC) and anaesthesia departments (AD). TANIT I delivered frameworks for CCs. Using the AD and the general adult intensive care units (ICU) as examples, partial implementations of these designs were achieved. These represented scaleable prototypes.

In TANIT II, the evaluation activities focused on user acceptability of the pilot systems. The verification methodologies were tailored to ensure essential feedback. The methods included questionnaire studies, assessment of tasks, interviews of priorities and logs recording the reliability and user problems. The priority areas identified by expert user panels were compared with the interview results and user panel discussions.

OUTPUTS

The results of the pilot systems have shown that the direction of the ICU development is correct. Particularly strong features are its ability to give a rapid overview of patient state and its reliability. It can be linked seamlessly with other IT systems. Nurses rated the system slightly higher than the doctors. Nurses maintain the majority of the information in the ICU. The doctors review the information and make decisions.



Healthcare professionals with greater clinical experiences rated the system slightly higher than those with less experience. Priority areas were decided with the help of independent expert user panels. Three key areas were identified: costing care, planning and interoperability.

The major results for the anaesthesia pilot can be summarised as follows: the IT experiences of the hospital personnel are sufficient, the possibility of configuring the system for every hospital is very high and the introduction training before the early verification can be done within a short time. The interoperative phase of the system is the most important.

It has been confirmed that the users, department managers and financial managers have a real need to have a real-time tool for resource management. The professionals are learning how to improve their organisation and better medical pathways are developed.

Seventeen hospitals from six European countries were included in the verification studies. TANIT II obtained verification of the priority areas for extending the ICU and anaesthesia systems. Each hospital site had local user panels and trained personnel in the validation process. Good feedback concerning the priority areas for development was obtained. Results are already available in commercial products and are currently being successfully used in numerous European hospitals.

BUDGET:

Overall cost: 978 404 €. EC contribution: 500 475 €.

CONTACT:

KONTRON Instruments Limited (UK)

Dr. Claire L. Bowes

E-mail: claire@kontron2.demon.co.uk

Timescale:

Keywords: Latin America, information, accompanying measure

PURPOSE

The TAPLINK project disseminated, through targeted workshops, specific project information relating to results within leading sectors of the Telematics Applications Programme (TAP), as well as its objectives and benefits, to the six most advanced Spanish and Portuguese-speaking South and Central America economies (Argentina, Brazil, Cuba, Mexico, Chile, Peru).

TAPLINK revolved around the need for the TAP community to inform Latin America representatives in government, industry and the academic world of progress and practical results among the Telematics Application Programme (TAP) specialists in the different selected topic areas (Administration, Transport, Healthcare, Libraries, Training and Research, and SMEs), and receive feedback that could assist European and Latin American enterprises to increase cooperation.

To ensure optimal penetration and participation, the workshops used support mechanisms offered by CAIBI, the Conference of Informatics Authorities of Caribbean and Latin America States, and by a number of Latin America ministries and administrations.

The approach adopted was one of informing these countries of what was being done in Europe in each of the most important TAP target sectors. These sectors were chosen because of their relevance on the economy of the recipient country and because they led to priority work programmes that had



an even larger effect on the deve-Iopment of the Information Society.

Clearly, this being a pioneer information project, the objective was one of informing and not lecturing on technology. This ensured that discussions followed a logical flow and were within the understanding of participants - generally personalities responsible for policy making and structure building in the target countries - and not hightech scientists.

Especially significant were examples of distance training and learning and telemedicine, all highly appreciated and debated given the requirements that these countries have to create a framework that may reach all populations and cover large distances.

OUTPUTS

Aside from the general objectives of diffusion and information we also achieved individual results that reflected the needs of each of the

countries visited. These results derived from discussions of the individual topics such as Transport, Health, Training, Libraries, Administration and SMEs.

The workshops were especially successful, well received and supported at national level. We received this support by thoroughly using our contacts in Latin America, holding early discussions with and ensuring the intervention of the most powerful Latin American organisation supporting ICT, CAIBI, and finally, by directing ourselves to the highest government organisation we could reach in each of the target coun-

BUDGET:

Overall cost: 331 000 €. EC contribution: 300 000 €.

CONTACT:

XCOMS International SA (B) Alfredo Sarich http://taplink.gaia.es/taplink.htm





Keywords: radiotherapy, 3D image processing, remote treatment planning, collaborative working, user validation, oncology

TELEMATICS APPLICATIONS FOR RADIA-TION AND GENERAL ONCOLOGY TREAT-MENT

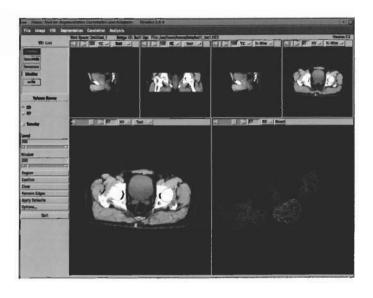
PURPOSE

TARGET has addressed the realisation of a consolidated, multihospital system where specialist and peripheral centres work closely to increase the quality of services delivered to citizens. Key features are the rationalisation of investments in new equipment based upon individual institutional specialities, and the access to skills and knowledge to increase the quality level of diagnosis and treatment. TARGET relies heavily on the integration of intra-system management teams and the centralisation of the technology specification, assessment and approval process.

The main thrust of TARGET was aimed at establishing a framework for implementation of health professional collaboration, accompanied by a thorough validation and clinical trials. In radiation therapy, only a few radiation therapy centres are provided with the most modern facilities for studying complex treatment plans. At the same time, there are a lot of small peripheral hospitals that lack specific radiotherapeutical background and budget resources to afford for them.

OUTPUTS

The validation scenarios addressed the real need to establish an efficient infra- and inter-hospital system that makes better use of available resources, equipment and human skills.



The growing availability of network infrastructures now makes it feasible to share expensive human available for healthcare.

The 3D treatment planning process can be speeded up by 14%, mainly due to the improvement of the target volume delineation process (up to 30%), giving rise to a better utilisation of the facilities and better planning of staff. Higher quality radiotherapy can be obtained by increasing the quality of target and critical organ delineation, this point being very important with the current trend towards treating smaller volumes with complex techniques and high doses. In the distributed scenario, the costs compared with the existing model are balanced, while the benefits are significantly higher.

The possibility of sharing resources and expertise via fast and reliable connections will pave the way for the effective realisation of a digital multi-hospital system.

The consortium believes that the demonstrator set-up has a very high replication potential, with potential to serve a number of other clinical specialities and applications.

BUDGET:

Overall cost: 768 000 €. EC contribution: 500 000 €.

CONTACT:

University of Genoa - DIBE (I)
Dr. Franco Fontana
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Ti

Timescale:

Keywords: telemedicine, teleradiology, medical evaluation, cost effectiveness analysis, health technology assessment



THE TASTE (TECHNOLOGY ASSESS-MENT OF TELENEUROMEDICINE) PRO-JECT IS AN ACCOMPANYING MEASURE WHICH PROVIDES METHODS AND TOOLS TO ASSESS TELEMEDICINE APPLICATIONS

PURPOSE

The overhead objective of the TASTE project is to assist decision-makers when they have to decide on investment in telemedicine and is to further generation of relevant information on telemedicine.

OUTPUTS

Methods and tools delivered by the TASTE project are based on the Health Technology Assessment (HTA) approach. HTA deals mainly with evidence-based information on the medical benefits, the safety and the financial costs of proposed technologies and with the decision-making process to allow scarce resources for and between technologies. Moreover, HTA addresses ethical, legal and organisational issues of technologies. In essence, HTA is in essence a multidisciplinary approach.

1. Guidelines for setting priorities in teleneuromedicine

Priority setting at a global level is the process through which a decision on where to invest scarce resources is made. After needs assessment to know which applications exist and what the benefits of these applications could be, priority setting is to choose between applications in the context of resource constraints.

The role of HTA in priority setting is to ensure that this process is as well informed as possible.

1) technology and organisational issues of clinical relevance and of expected benefits have to be set

2) application prerequisites (technical capacity, knowledge capacity, communication capacity)

3) hardware, software and infrastructure requirements

Prioritisation consists in listing, measuring and weighing selection criteria. A list of criteria, distinguishing primary criteria related to health importance and economic importance of the applications and secondary criteria, is available.

Assessment method

The assessment method is focused on measuring medical and economic effects of TNM. The application selected to validate the method is "emergency hospital-tohospital tele-consultation systems" and more specifically the teletransmission of CT brain-scan images for neurosurgical emergencies

To measure the medical benefit, two approaches may be taken:

- the process-oriented approach based on the fact that telemedicine is in essence a process and on the assumption that the process has an effect on the medical outcome.

- the Dynamic Health State approach based on the relationship between the illness severity (measured with the Glasgow Coma Scale (GCS) and the medical outcome (GOS).

3. Assessment guidelines in teleneuromedicine

Assessment guidelines are a set of recommendations to assess TNM applications. Recommendations are ranged according to the different steps of the HTA process and deal with the different dimensions of HTA: medical benefits, financial costs, ethical and legal issues.

BUDGET:

Overall cost: 500 000 €. IEC contribution: 500 000 €.

CONTACT:

Assistance Publique - Hôpitaux de Paris (F) Dr. C. Viens-Bitker http://www.taste.shb.ie

Timescale:

2001 1996 1999 1997 1998 2000



Keywords: health care, telematics, certification, telemedicine

Towards European Accreditation and Certification in Health

PURPOSE

In this work methods are identified which can be used in accreditation and certification of telematic application in healthcare. Telematic applications are divided into three groups: clinical software, health-related web sites and telemedicine service. Telematic health services have many users: patients, professionals, administrators etc. who would benefit from high-quality telematic services.

Healthcare services are suitable for electronic commerce, but the product/service has to be reliable and professional. The possibility for sickness funds to reimburse telemedicine application seems to be increasingly likely and national authorities in EU accept that traditional healthcare services and telemedicine service are equal and the same ethical and legal rules should apply. Thus, in telemedicine the quality of services have to be assured and service providers identified, otherwise the consumers will be increasingly at risk. There is an urgent need in Europe for the key recommendations of TEAC-Health. This will promote health and protect the citizens, and will also put European providers in a leading global position.

Three parallel strands of working was established: the classification of different types of telematic products and services, the identification of evidence of needs and the study of different approaches to and methods of certification and accreditation within the health and



several other sectors. The results are also available on the web site (www.multimedica.com/teac).

OUTPUTS

Lack of adequate protection for the citizen and health professional must be addressed. The CE Marking approach is an appropriate way towards protection. Besides European Directive 83/189/EEC, specific tailoring is needed to accommodate the issues rising from clinical software.

Europe is recommended to take a lead by developing an integrated framework based on a new "EuroSeal". The seal would be protected by a law and offer a verification to Codes of Conduct. It also would be supported by hotline procedures.

The consumer has to be able to confirm the qualifications of a person who is giving telemedicine services. A healthcare professional has to have a clearly defined authority, which grants the licence to his/her practice. Therefore all

telemedicine service providers have to have a physical address and be registe ed by the authority in the country of residence.

These ideas and recommendations have been tested e.g. at stakeholder meetings and by an expert Advisory Board. Strong support has been consistent in all these consultations. It is strongly recommended that the European Commission urgently allocates funds towards the continuation of the work.

BUDGET:

Overall cost: 176 000 €. EC contribution: 171 000 €.

CONTACT:

University of Turku (FIN) Jari Forsström E-mail: jari.forsstrom@atuline.com

Timescale:

TELECAT

SU1120(HC)

Keywords: conference, telematics implementation, healthcare information systems, healthcare information services

b C

SYMPOSIUM AND EXHIBITION ON THE IMPLEMENTATION OF TELEMATIC SYSTEMS IN HEALTHCARE

PURPOSE

TELECAT support action has the objective of identifying the most relevant critical factors that hinder the implementation of telematic systems/services/applications in healthcare.

Its main goal is efficiency in healthcare telematic systems and services implementation. The project is addressed to the main responsible agents of local or trans-European telematic applications. A support action is an immediate consequence of the conclusions of the G7 ministers' meeting of February 1995 on the implementation of information systems in healthcare, and of the interest of the Health Care Department of the Autonomous Government of Cata-Ionia in the implementation of telematic applications.

The development of integrated healthcare services (including those for therapeutics and patient management, drug databases, adverse drug-reaction control, clinical trials, medical protocol management, etc.) is embedded in the telematic systems/services/applications. It is then important to envisage new perspectives and the sociocultural changes that telematics can introduce into the healthcare panorama, to determine what adaptations shall be made so as to move towards the Information Society.

OUTPUTS

The first result is that the implementation of telematics is

Face to Face interviews

Pace to Face interviews

Pramework

Oeiphi Inquiries

Analysis of Selected Projects

Consensus Conference

Barcelone Workshop

Own Experience Interviews

Final Integrative Document

* Critical Success Factors

* Guidelines

* Guidelines

Consensus Conference

Own Experience Implementation

strongly influenced by the general framework in which healthcare plays in Europe. The main points to be considered are:

- 1) The welfare society
- 2) European healthcare harmonisation
- 3) Social and demographical evolution
- 4) Science and technical evolution
- 5) Changes in healthcare managerial paradigms: organisational overload
- 6) Healthcare market regulation

The most relevant set of critical success factors for healthcare telematics implementation can be ranked by decreasing influence as follows:

- 1) Organisational key points
- 2) Financial key points
- 3) Healthcare key points

4) Technical and industrial key points

A set of critical success factors for telematics implementation in healthcare has been identified. The problems are however extremely complex and a European Consensus Conference could help towards further clarification.

To prepare the conference documentation with the main findings of Telecat should be distributed, along with a set of selected papers among the international societies that represent all streams that would participate in the conference. Knowledge and the adequate leadership of participants are conditions for a successful conference.

BUDGET:

Overall cost: 100 000 €. EC contribution: 100 000 €.

CONTACT:

Health Care Dept. of Catalonia

Ferrer Salvans

http://www.ehto.be/projects/telecat/

Timescale:

Keywords: telemedicine, teleconsultation, 3D ultrasound

TELEINVIVO: 3D ULTRASOUND TELEMEDICINE WORKSTATION

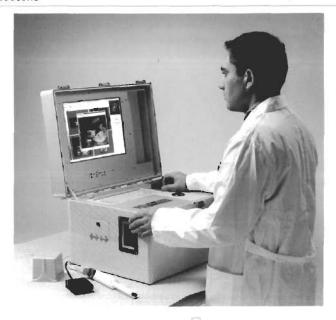
PURPOSE

The principal objective of this project was to design, develop and evaluate under real conditions a low-price, transportable and nonradiating telemedicine workstation to be used in isolated areas such as: islands, rural areas and crisis situation areas. It integrates a portable PC with telecommunication capabilities and a light, portable 3D ultrasound station in one custom-made device.

TeleInViVo involved both technical and clinical partners. The first group designed and developed the system and provided technical support to the medical partners. Some of the clinical partners participated in the first phase of the project defining a set of requirements for the TeleInViVo device, namely the specifications of the ultrasound device, its function and features, the probes needed, etc.

The second phase of the project focused on field tests and clinical trials. These began in July 1999 and finished in November 2000. The first trials were performed within Europe (Azores and Canary Islands). In April 2000 the trials began with the non-European countries, Uganda and Kazakhstan.

The system developed has a low price (cost kept within the planned budget), is transportable and nonradiating. The weight and size of the current prototype are comparable to the size of a commercial portable computer, considering the



fact that it also includes a complete ultrasound scanner with a special tracking system, which allows acquisition of 3D ultrasound data. Ultrasound supports a very large range of applications varying from gynaecology to cardiological examinations and is currently the only economically and practically affordable imaging modality.

OUTPUTS

The TeleInViVo device has been tested in different socio-economic conditions and adjusted accordingly to meet the needs of developing countries and countries in transition. During the evaluation and validation of the system at the field trial sites, the results have not only been promising, they even exceeded all predictions in terms of accuracy of the diagnostic value of the developed technique, ease of use and acceptance by physicians and patients.

Over 500 cases have been transmitted to the University Hospital of Coimbra (the medical centre of excellence) by the medical trial

sites and have been discussed during on-line teleconsultation sessions. In addition, the project's implementation in sites such as rural areas in Uganda and ecological disaster areas in Kazakhstan had multiple benefits for the local population and provided these countries with valuable experience of telemedicine issues at national and international level.

BUDGET:

Overall cost: 2 430 000 €. EC contribution: 1 425 000 €.

CONTACT:

Fraunhofer Institut für Graphische Datenverarbeitung (D) Prof. Dr. Georgios Sakas http://www.igd.fhg.de/teleinvivo

Timescale:

1996 1997 1998 2000 2001 Keywords: nursing, interactive cable television (iCTV), interactive television, video-on-demand

MIL

TELEMATIC APPLICATIONS FOR NURSES

PURPOSE

The Telenurse Project promotes the use of the International Classification of Nursing Practice (ICNP) in Europe through various dissemination activities, and by supporting the translation of the ICNP into 11 European languages. The overall objective of Telenurse is the promotion of consensus in Europe about the use of ICNP as a common language for nursing. The ICNP was launched by the International Council of Nurses (ICN), which represents 118 national nurses' associations worldwide. The ICNP was initiated in response to the growing demand for structured data about nursing practice. The need for structured data derives from two current trends in nursing: the trend towards daily systematic documentation of care, and the trend towards the development of clinical outcome quality based upon evidence.

Telenurse promotes the use of ICNP involving the following approaches: Organisation of dissemination conferences on a European level and dissemination meetings on a national level; Building of simple demonstrators illustrating possible real uses of ICNP.

OUTPUTS

Dissemination conferences on a European level and dissemination meetings on a national level: On a European level two dissemination



conferences were organised and held in 1996 in Greece and in 1998 in Portugal. The presentations are published by IOS Press. In addition several dissemination meetings have been held on a national level. Amajor achievement includes the translation of the alpha version of ICNP from English into 12 European languages (http://www.telenurse.net). Telenurse dissemination activities have also been presented in workshops in Chile and Taiwan.

Demonstrators illustrating possible real uses of ICNP: Firstly, entry of ICNP data in relation to daily systematic documentation of nursing care (DataIn: Data Entry and Terminology Services) and secondly, statistical analysis of ICNP data extracted from the electronic patient records in relation to the development of clinical quality and resource management (Data Out, Data Extraction and Information Feed Back Tool). Prototypes of electronic patient records have

been build by KMD (Denmark), HUG (Switzerland) and HISCOM (Netherlands). In addition, demonstrators have been build by GAGNALIND (Iceland) and CSA (Italy). A small-scale demonstrator has also been built showing feedback to clinical practice using Microsoft Excel.

The effort to equip emerging shared electronic patient records with ICNP is to be continued in TelenurseID (1998-2000), in the EU umbrella project SynEx together with other projects of the Health Telematics Programme.

BUDGET:

Overall cost: 500 000 €. EC contribution: 500 000 €.

CONTACT:

A2000 (NL) Felix van Rijn E-mail: f.h.m.van.rijn@foo.hva.nl

1996	1997	1998	1 1999	2000	2001

HC/IN4029

TELENURSE ID

ULM aroup 1

Keywords: nursing, international classification for nursing practice, ICPN, EHR, coding, health telematics

TELEMATIC APPLICATIONS FOR NURSES - INTEGRATION AND DISSEMINATION OF EUROPEAN NURSING TERMINOLOGY IN INFORMATION TECHNOLOGY.

PURPOSE

This project promotes the use of the International Classification for Nursing Practice (ICNP) as a common language for nursing throughout Europe. This has involved translating the ICNP into 14 languages and building demonstrators to illustrate the use of ICNP in shared electronic patient records. The project is the continuation of two earlier projects, Telenursing and Telenurse. The development of ICNP enjoys broad international support and is the first attempt made in nursing to develop a common nomenclature and classification reflecting the clinical realities of nursing practice. ICNP provides firstly a tool for collection of data on the individual patient for purposes of daily documentation, and secondly analysis of data about groups of patients for purposes of quality development. The use of ICNP also needs computer support in the form of integrable telematic applications.

OUTPUTS

Dissemination and translation: Both the á- and the â- versions of ICNP have been published and translated from English into 14 European languages. Six conferences have been held in the EU and CEE countries (Greece, Portugal, Slovenia, Romania, Czech Republic).



Software development of demonstrators: Data Entry and Terminology Services: Marketable versions of electronic patient records equipped with ICNP have been produced by CSA (Italy) and HINZ (Germany). A showcase of an electronic patient record has been built by HUG-BI (Switzerland). A small-scale demonstrator has also been built showing the Galen-In-Use approach as applied to ICNP.

Data Extraction and Information Feed Back Tools: Records and demonstrators have been equipped with data extraction mechanisms in order to allow export of data from patient records to external databases. Small-scale demonstrators have also been built showing feedback to clinical practice using Microsoft Excel.

Links to the standardisation process in Europe are of the utmost importance. A European

pre-standard has been produced regarding categorical structures for nursing systems of concepts. The work is to be taken further within the International Standardisation Organisation (ISO).

The plan is to continue by developing electronic patient records fully equipped with ICNP, and marketing these products both as standalone tools and as integral parts of electronic patient records. The consortium has launched the idea of a Federation of User Groups in a United Europe (FUGUE). A common contact point of a web site will be established.

BUDGET:

Overall cost: 755 000 €. EC contribution: 620 000 €.

CONTACT:

Danish Institute for Health and Nursing Research (DK) E-mail: dihnr@diss.dk

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1996	1997	1 1998	1 1999	2000	2001

Keywords: telemedicine, telehealth, health telematics, planning

TELEPLANS - TELEMEDICINE FOR CITIZENS

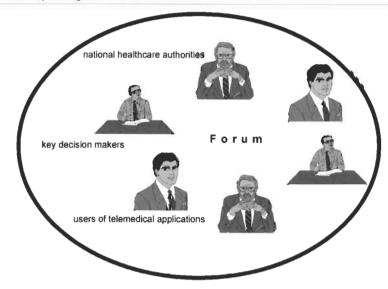
PURPOSE

The objective of TELEPLANS is to establish a forum that brings together national healthcare authorities, key decision makers and users of telemedical applications, to share their views and experiences on requirements. results of assessment studies and planning for the establishment of telemedicine services.

TELEPLANS Forum consists of the various national actors in telemedicine from the EU member states as well as from Australia and Canada. In the project, national pilot implementations are analysed and a European model for the provision of telemedicine services defined. Also, a special reference to the situation in the USA and Japan is made. Though consensus on requirements and methodology exists, TELEPLANS supports telemedicine by monitoring progress and validating results of the RTD&D projects on telemedicine. TELEPLANS also draws the attention of influential national decision makers to the potential of telemedicine, and will catalyse strategic actions at international, national and regional level.

OUTPUTS

The keywords for summarising the work done within a Concerted Action such as TELEPLANS, having the above-mentioned objectives and indirectly involving quite a large number of interested parties, are "concertation" and "agreement". These have been



reached through regular meetings of all the involved parties, in order to monitor activities and intermediate results and for implementing the requested corrective actions if necessary.

Although various problems made the progress of activities very difficult, the consortium was able to finalize the three deliverables describing the telemedicine situation over Europe, taking into account EU projects, national policies and technological assessment and cost-effectivesness. During February 1999, as requested by the EC, TELEPLANS was presented at the Melbourne workshop on cost effectiveness of Telemedicine. The audience at Melbourne judged that the TELE-PLANS Project was successful when presented with the preliminary findings and best practice assessment. The presentations were very well received, and this was strongly emphasised during the discussions and 'wash-up' periods.

The work carried out, documented by the deliverables prepared following the adopted methodology, fulfils completely the first Project objective, i.e. to draw a clear picture of Telemedicine politics, implementation, and effectiveness across Europe, versus USA, Japan, Australia and Canada.

At the moment, the final goal of defining the European Model of Telemedicine seems to be suspended due to the anticipated. unpredictable, closure of the Project.

BUDGET:

Overall cost: 220 000 €. EC contribution: 220 000 €.

CONTACT:

University of Naples "Federico II"

Prof. Marcello Bracale http://biomant.die.unina.it/teleplans





Keywords: brand names equivalencies, computer-assisted instruction, distant education and training, drug information

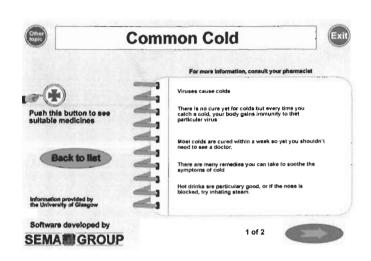
TELEMATICS IN COMMUNITY PHARMACIES FOR RESPONSIBLE SELF-MEDICATION.

PURPOSE

TESEMED was a Concerted Action funded by the TAP Programme of the European Commission with the aim of exploring and disseminating the use of telematics applications to provide community pharmacy users and professionals with information and education on responsible self-medication.

TESEMED had the following particular objectives:

- 1) Analyse the regulations on selfmedication in EU states.
- 2) Investigate the needs and priorities on information and education on self-medication in European pharmacies, as well as the possibilities of using telematics for such purposes.
- 3) Design, develop and assess a prototype of a telematic system to help the community pharmacists to act as self-medication advisors.
- 4) Design, develop and assess a prototype of information kiosk for the community pharmacy customers.
- 5) Design, develop and assess applications to help community pharmacy professionals and customers to identify equivalencies between the brand names of self-medication products between different European countries.
- 6) Analyse and disseminate the resulting knowledge and experience.



OUTPUTS

TESEMED results:1) The observed great variability of the self-medication regulations and practices in the different EU countries revealed the complexity of the national adaptations required in the applications.

- 2) The EU community pharmacies are mature to evolve from the administrative uses of the telematics to its use in more sophisticated health information tasks.
- 3) The prototype for community pharmacists includes a hypertext and an encounter simulator, developed on the basis of an ad-hoc developed protocol on Cold&Flu.
- 4) Information kiosks for pharmacy customers, covering health topics and self-medication products.
- 5) An equivalencies module was implemented in the kiosk to help foreign pharmacy customers to search for non-prescription medicines available in the local market which have similar indications to those available in their country of origin.

6) A professional brand-name equivalencies application was also designed to help community pharmacists to search for non-prescription medicines available in other countries which are similar to those available in the local market.

TESEMED appreciably explored the potential of IT in community pharmacies to supply health information and education. The identified requirement of improvement of the prototypes, extension of their contents, additional testing activities and exploitation studies motivated the TESEMED-II project (HC 4022).

BUDGET:

Overall cost: 477 000 €. EC contribution: 477 000 €.

CONTACT:

Fundació IMIM (E) Ferran Sanz http://www.imim.es/tesemed

Timescale:

Keywords: brand names equivalencies, computer-assisted instruction, distant education and training, drug information

Group 6

TELEMATIC SERVICES IN EUROPEAN COMMUNITY PHARMACIES FOR RESPONSIBLE SELF-MEDICATION EXECUTIVE SUMMARY

PURPOSE

TESEMED-II was a R&D project funded by the TAP Programme of the European Commission with the aim of improving and extending the former TESEMED (HC1114) project's developments with respect to both the applications themselves (ailments covered, languages) and the real-world testing activities derived. The project also comprised exploittion studies and an enhancement and extension of the dissemination activities carried out under TESEMED.

The particular objectives of TESEMED-II were:

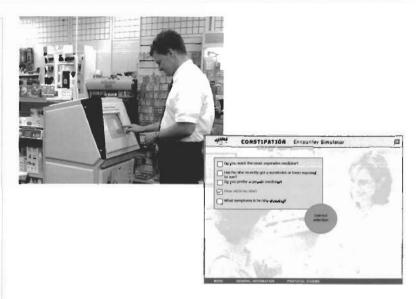
- 1) To improve and extend the TESEMED application for community pharmacists.
- 2) To improve and extend the TESEMED kiosk for citizens.
- 3) To test in real-world scenarios the above-mentioned applications.
- 4) To analyse and disseminate the resulting knowledge and experience.
- 5) To prepare the commercial exploitation of the results.

To fulfill the TESEMED-II objectives, the former TESEMED Consortium was complemented with Italian partner ARAKNE.

OUTPUTS

TESEMED-II results:

1) 16 pharmacists' applications were produced. Functionality was



greatly improved and a new interface was provided to the application

- 2) 4 kiosk units were produced. The information contained was revised and improved.
- 3) Mean scores of all the characteristics of the pharmacists' application explored in the testing activities were above 3.5 (5-point scale). The improved version was proved to be more useful than the original, improving the knowledge of users on the protocol by 40%.
- 4) A new web site allowing for users' feedback and distribution of prototypes was designed and developed. New brochures were designed and produced. Dissemination was actively carried out at congresses, workshops, exhibitions and meetings with national associations of pharmacists were held.
- 5) Market research was performed and a business plan was produced. Suitable sources of revenues for

both products were identified, and meetings with prospective customers held.

TESEMED-II improved and extended the TESEMED results. The powerful network of actors created, the user-centred design and the wide testing activities performed offer a sound basis for future developments. The pharmacists' application has a significant competitive advantage in a market currently unpopulated by similar alternatives, and the commercial potential is very high. The information kiosk also has competitive advantages but its financial viability is dependent on the ability to reduce the estimated unit production costs.

BUDGET:

Overall cost: 1 047 000 €. EC contribution: 475 000 €.

CONTACT:

Fundació IMIM (E) Ferran Sanz http://www.imim.es/tesemed

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199 6	1997	1998	1999	2000	2001	ĺ



Keywords: tele-surgery, telemedicine, videoconference, videoconferencing tools

TELE SURGICAL STAFF

The TESUS project aims to integrate new existing communication techniques into the framework of surgical staff meetings in order to enable several teams to communicate and to realise medical exchange from remote sites, as developed through telemedicine, using video-conferencing tools and standard technical solutions facilitating access to the network for all university hospitals by avoiding equipment compatibility problems.

PURPOSE

The main challenge of the TESUS project was to provide the surgeons with a communication tool permitting one to treat special clinical cases at a distance without any distortion, at the best price.

OUTPUTS

Databases, including video (experimental surgery and human surgery), CD-ROMs (3), web site (www.TESUS.org) and the first draft of an electronic multimedia database (WebSurg), have been experimented throughout the project and their interest and technical functionalities have been evaluated. The TESUS project allowed us to carry out and evaluate the possibilities of new surgical practice through several

TESUS Project

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real-size tests as "State-of-the-Art" in surgery, to be proposed as the first aspect of a "gold standard" in surgery; surgical hotline available for surgeons, Tele-Teaching, Tele-Training and Tele-accreditation as well as Tele-Mentoring/Tele-Proctoring.

TESUS has shown the firm will among the participating surgeons to ensure that the TESUS network develops and lasts, in order to allow the access for all surgeons in Europe or internationally to this type of link. Connections were established with European and international hospitals in the framework of the TESUS project (USA-5 centres, Canada, Great Britain, France, Germany, Greece, Norway). Many hospitals have

shown their interest in including the TESUS network and to actively participate in the surgical staff meetings.

At the present time, the TESUS network is on the threshold of its globalisation and represents a fantastic potential for hospitals that want to address their knowledge in order to optimise surgical procedures.

BUDGET:

Overall cost: 1 654 019 \in . EC contribution: 799 908 \in .

CONTACT:

IRCAD – Strasbourg (F) Dr. Didier Mutter http://www.tesus.org

Timescale:



146

Keywords: telemedicine, diabetes mellitus, chronic patients management, web-based services

TELEMATIC MANAGEMENT OF INSULIN DEPENDENT DIABETES MELLITUS

PURPOSE

In the T-IDDM architecture, a Medical Unit (MU) and a Patient Unit (PU) communicate through a telecommunication system (see picture): the Medical Unit assists the physician in the definition of the basal insulin regimen and diet through a periodic evaluation of the patient's data, while the Patient Unit allows for automatic data collection and transmission from the patient's house to the clinic.

The T-IDDM service was developed by taking advantage of the current state of telecommunications technologies and infrastructures to define, develop, validate and evaluate a telemonitoring and teleconsultation tool for diabetic patients care. The T-IDDM modules, the Medical Unit (MU) and the Patient Unit (PU) communicate through a telecommunication system that can be represented by the Internet or by PSTN. The first option has led to the development of an Internetbased demonstrator, while the second has led to the development of an intranet-based service.

OUTPUTS

The purpose of the system design was to achieve a strict medical control of patients even when outside the hospital environment, avoiding frequent office visits (thus reducing costs) for monitoring



those variables influencing therapeutic decision-making; the system is able to collect and store data, analyse it, and provide the most appropriate personalised medical advice. From the interface point of view, the system was designed with a user-friendly approach.

Internal exploitation will be achieved through the sale of a turn-key service package to healthcare provider services in charge of patients with insulin-dependent diabetes, and/or health authorities responsible for regulating and purchasing health: these include clinics, hospitals with own departments of endocrinology, and local health authorities reponsible for outpatient care.

The outcomes of the demonstration phase let us conclude that the project's main objectives were met: the T-IDDM service is a feasible system for telemonitoring a

virtually large number of patients, following each of them more strictly in respect to standard clinical practice. In this way, insulin therapy can be better customised, thus leading to a better metabolic control. More-over, the tele-consultation service that T-IDDM provides patients with allows continuous education, and ensures a good level of care even for isolated patients, at their home. In the future developments, we aim at making the software more user-friendly, and at customising the PU according to user categories, by defining different levels of patient interaction within the T-IDDM architecture.

BUDGET:

Overall cost: 1 417 000 €. EC contribution: 710 000 €.

CONTACT:

Consorzio di Bioingegneria e Informatica Medica (I) Prof. Mario Stefanelli http://aim.unipv.it/projects/tiddm

1996	1 1997	1998	1999	2000	2001



TOMELO

Keywords: medical records architecture, terminology, coding and classification, EHR

Towards a Strategic Alliance BETWEEN DEVELOPERS OF MEDICAL TERMINOLOGY AND HEALTHCARE RECORD SYSTEMS

PURPOSE

ToMeLo has been concerned with preserving the meaning of detailed patient documentation between different healthcare providers. It has as such heavily influenced new emerging standards of CEN/ISO.

The main objective of this accompanying measure is to bridge the gap between developers of healthcare terminologies and healthcare information systems. As such, ToMeLo has been an important step towards realising the overall objective of the Health Telematics Programme: improving continuity of care through the integration of a diversity of medical and administrative systems in one coherent, interoperable and multilingual environment. The need for safe and sensible communication between applications is already well understood and covered in several ongoing projects.

However, next to a good insight into what information it is really necessary to exchange, the structure and the language used are important. These urgent needs are reflected in the many ongoing projects around the Electronic Healthcare Record, and projects for a unified medical language. Because of the sheer size of medicine all these projects are



necessarily limited in their scope. There is a need for a broad view on the further development of medical language not only from the point of view of grouping (ICD, DRGs etc.), but above all from the perspective of patient documentation and systems integration.

The general approach to the aim of the project was to:

- initiate, through a series of moderated workshops, a closer and lasting cooperation between developers of terminology and healthcare documentation system builders, using 4FW technology;
- determine the scope of the terminology problem for patient documentation, and to formulate recommendations for future actions to insure increasing levels of interoperability between systems;
- deliver a proposal for natural problem holders for issues relating to terminology and medical records;

- -deliver working-example prototypes to show the principles of sensible connections:
- broaden the awareness of terminological issues in patient documentation.

OUTPUTS

The project has raised the awareness of the need for an integrated view of record architecture. The project has directly led to the Domain Termlist standard (CEN/TC251/PT27).

BUDGET:

Overall cost: 185 000 €. EC contribution: 185 000 €.

CONTACT:

University of Nijmegen (NL) Pieter Zanstra E-mail: p.zanstra@mie.kun.nl

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Timescale:

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TRUSTHEALTH 1

HC1051

Keywords: security, cryptography, digital signature, cards, TTP services, legal issues, data protection

Group 1

TRUSTWORTHY HEALTH TELEMATICS 1

PURPOSE

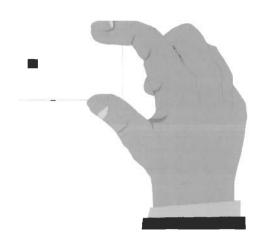
The TrustHealth 1 project has developed specifications on how to establish key security services. This includes cryptographic techniques and smart cards for secure identification, digital signatures and confidentiality. A major part has been to demonstrate how Trusted Third Party Services need to support the techniques.

The open systems paradigm, with connectivity based on standards and complex healthcare, requires a new approach to the security problems. We cannot rely on the physical locking of a computer system and protected private networks. Instead, modern security solutions are logical and use cryptographic techniques, not only for the protection of confidentiality, but also for secure user identification and proof of document authenticity.

The solution used by TrustHealth is based on modern asymmetric public key encryption with the RSA algorithm. Furthermore, the technical approach of TrustHealth includes personal smart cards used by the Healthcare Professionals. These security cards protect the private keys and allow portability to any PC working place. The TrustHealth solution is to provide a set of application programming interfaces for easy use of the security services in various healthcare applications.

OUTPUTS

The project has defined a set of security services to be used in an application programming interface.



Specifications include interfaces to directory services for retrieval of public key certificates and interface to the card and card terminal services. Aguideline for implementation was also produced. The project has also generated reports on functional specifications, interfaces and the security policy of Trusted Third Party services.

The project also studied various legal aspects related to healthcare telematics, including an overview of the implications of the Data Protection Directive, an introduction to the legal acceptance of digital documents and a first proposal for actions in the legal area. Dissemination of information has been accomplished, making the material available on the web, and through a brochure describing the basic concepts and results of the project.

Interest in the TrustHealth approach has increased rapidly during the project period and similar developments are now also under

way in other sectors. A continuation project has been approved, called TrustHealth 2, which will provide extensive validation in a number of healthcare applications in six countries.

BUDGET:

Overall cost: 1 926 000 €. EC contribution: 620 000 €.

CONTACT:

Spri (S)

Gunnar Klein

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Timescale:

TRUSTHEALTH 2



Keywords: security, cryptography, digital signature, smart cards, TTP services, legal issues, data protection

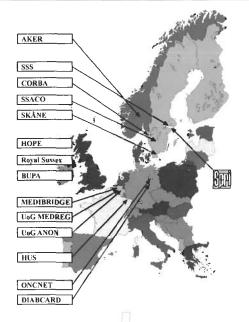
TRUSTWORTHY HEALTH TELEMATICS 2

PURPOSE

TrustHealth 2 is a study of methods for information security in healthcare, ranging from administrative and technical questions to legal aspects and user reactions, when a smart card becomes the key to patient information. In an extensive validation and demonstration effort, thirty partners from different organisations and skills have cooperated to implement modern cryptography-based security techniques in all kinds of health care applications.

A prerequisite for the routine use of telematics in healthcare is an infrastructure of security services to make the use of telematics comply with the legal requirements, and to maintain public confidence in the way in which sensitive personal information is managed. Without such security services, there is a risk that many of the promising telematics projects will never be able to move from R&D experiments to real exploitation of results.

The work within the TrustHealth 2 project was organised in six different work packages and implementation of the TrustHealth security concepts in fourteen validation sites. The six work packages formed a framework of planning, preparation and evaluation. The planning and preparation



activities in the work packages provided support, direction and harmonisation to the validation sites.

OUTPUTS

The foremost result of Trust-Health 2 is probably the fourteen validation sites established in six countries. These have made information security in health telematics visible. Each site is the result of about two years of effort, where both project partners and national/regional specialists have worked together towards common goals. TrustHealth 2 made a considerable contribution towards standardisation of very successful contributions to over 10 published standards and several ongoing activities in CEN, IETF, ISO/IEC JTC 1, and HL7. (Work package 6).

In all six countries of the Trust-Health 2 project (Belgium, France, Germany, Norway, Sweden and the UK) there are very significant uses of IT for health documentation and process support. The TrustHealth 2 project has demonstrated integration of cryptographic security techniques and public key infrastructures with a large number of different health applications that are in large-scale routine use at the sites.

The TrustHealth project is convinced that support of PKI with smart cards should receive very high priority. The lessons learned from TrustHealth 2 should be very useful in this process of establishing national health PKI with also cross-border interoperability.

BUDGET:

Overall cost: 4 714 012 \in . EC contribution: 2 278 000 \in .

CONTACT:

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Göran Ribbegård

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Keywords: healthcare information systems, standard, HISA, middleware, architecture, DHE

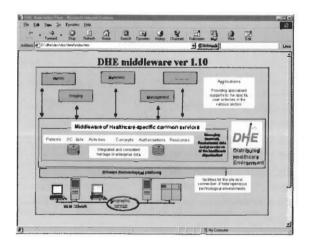


User group on the architecture of Healthcare Information Systems

PURPOSE

The organisational structure of healthcare in all European Countries consists of networks of centres distributed over the territory, characterised by a high degree of heterogeneity and diversity, from the organisational, logistical, clinical and even cultural perspectives. In such an overall scenario a huge number of applications (mutually isolated and incompatible) are already installed and operational, effectively supporting specific needs among the users. The fundamental primary need for supporting the evolving requirements of these users is to make it possible for such an existing (legacy) system to interwork and to evolve towards new open, standard and modular architectures, while at the same time securing the investments already made and ensuring the continuity of the work in the organisation. Not only is such evolution required to improve clinical treatments, but it is also pushed by the urgent necessity for all European countries to control and optimise the current level of expenditure for health, while nevertheless ensuring the necessary qualitative level of services to all patients.

The technological solutions adopted by the DHE middleware are based on industrial standards so as to facilitate the evolution of existing legacy systems towards a distributed architecture, characterised by openness and modularity.



Furthermore, the functional and informational characteristics of the DHE fully conform to the provisions defined by the CEN ENV 12967-1 Standard 'Healthcare Information System Architecture'.

OUTPUTS

To support the dissemination and demonstration activities of Hansa, the UseDHE accompanying measure has carried out several initiatives, with a view towards facilitating dissemination and discussions on the key issues related to the organisational, functional and engineering aspects of the healthcare information systems.

In such an approach, UseDHE has:

- organised a conference on Healthcare Information Systems Architecture;
- set up a WWW server hosting documentation;
- published and disseminated training and documentation material aimed at facilitating different

types of users in the practical implementation of open architectures through utilisation of the common DHE middleware.

On behalf of the whole Hansa consortium, UseDHE has been managed by Consorzio EDITH and by SPRI, two user-driven organisations, who have co-operated with the whole group of Hansa participants on logistical aspects in the individual countries.

According to its nature as an accompanying measure, it was not within the objectives of UseDHE to define its specific exploitation plans for the future, but only to help the dissemination work of Hansa.

BUDGET:

Overall cost: 150 000 €. EC contribution: 150 000 €.

CONTACT:

Consorzio EDITH (I) Fabrizio Massimo Ferrara E-mail: fmf@gesi.it





Keywords: evaluation, validation, guidelines, verification, demonstration, assessment

VALIDATION OF TELEMATICS APPLICA-TIONS IN MEDICINE

PURPOSE

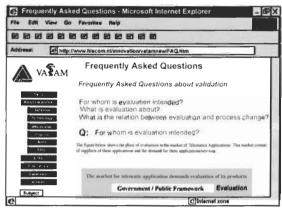
Healthcare policy makers, professionals and managers demand insight into the effectiveness of new telematics applications, so as to be able to cope with a changing healthcare environment. Assessment of effectiveness of telematics applications in medicine requires a solid methodological approach. VATAM provides this methodology and supports its application.

Evaluation of health telematics has been at the centre of attention for some time now. The need for methods and measures to assess the validity and impact of telematics applications has increased because:

- 1) the actors in the healthcare market must control costs;
- 2) the health telematics industry is confronted with increased competition.

A large variety in health telematics applications exists. In the course of the European Union 3rd Framework research programme, various workshops were organised by the project ATIM to explore this diversity in two specific domains. The results revealed that further research in this area was necessary.

The aim of the VATAM project is to bridge the gap between theory and practice of evaluation by developing guidelines for validation of telematics applications in the future, while at the same time providing practical support to the projects in the current health telematics programme.



VA****AM

The necessary framework for this should be usable by any party involved in the development or purchase of a health telematics application. This framework should:

- 1) provide a model of any health telematics application in its life cycle from the viewpoint of validation;
- facilitate and promote the use of validation methods in healthcare;
- 3) provide access to the huge but currently unstructured amount of information on validation.

OUTPUTS

VATAM's results can be summarised as follows:

- 1) The foundation of the VATAM work, the framework for validation. This is the central operative model in the project, developed through interaction with experts and other 4th framework projects;
- 2) Network development through IMIA WG13-15 and other workshops/tutorials, so that validation as an expert group may be approached through one access point;

- 3) Web-based guidelines, an introductory guide to validation, including an extensive repository of validation experiences and methods;
- 4) Market survey of validation to be used to develop;
- 5) Consultancy services, the targeted exploitable result for VATAM partners and others. Unfortunately, the VATAM market survey revealed that as of yet there is no market for validation that is sufficiently structured to approach it through consultancy and services.

BUDGET:

Overall cost: 900 000 €. EC contribution: 500 000 €.

CONTACT: HISCOM (NL) Onno Weier http://www-vatam.unimaas.nl

Timescale:

Keywords: cultural diversity, management of project development, cultural values in information

VICO EXPLORES THE PROCESS THROUGH WHICH CULTURAL VALUES IN-FLUENCE THE DECISIONS THAT ARE TAKEN DURING THE DEVELOPMENT OR THE PURCHASE OF TELEMATICS APPLI-CATIONS. PRACTICAL EXPLOITATION OF THE RESULTS BY ANOTHER PROJECT (BABEL TE 2002) SHOULD LEAD TO CONCRETE METHODS & TOOLS.

PURPOSE

The 'challenge' of the problem addressed by VICO is to elaborate a methodology to explicitly incorporate culture in the requirements of telematics application projects.

OUTPUTS

VICO has pursued four action lines:

- 1. Exploration of the transferability issues of telematics projects results, analysis of the work of management researchers such as Hampden-Turner.
- 2. Development of a framework to describe the elaboration of key decisions along the telematics project development lifecycle ('change governance framework'').
- 3. Elaboration of a methodology to handle culture in relation with healthcare telematics project development that is exploitable by other projects.
- 4. Production of basic material & knowledge for further use by other projects; some of the material already produced and the lessons already learned on the project are important and useful outputs from the project.

Culture
Cultural dimensios

Cultural competency

The decision process structured as the Change Governance framework

Project life cycle

The methodology is based on the following major theoretical elements:

- 1. The Metrology Framework makes explicit the detailed interpretation of the concept "methodology".
- 2. The "change governance framework" is the basis for modelling decision-making throughout the lifecycle of system development & integration. It is the mediator between culture and the major events/acts in the project's lifecycle.
- The Seven Dimensions Framework provides us with the basic means to identify cultural profiles and reconcile cultural diversity.
- 4. The identification approach of cultural preferences is based on scenarios constituting decision-making dilemmas. Reconciliation is an approach to solve cultural conflicts in a win-win manner.

The VICO model for the development of quidelines on how to take into account the impact of cultural diversity at -the development, integration and/or deployment of healthcare telematics applications was the ISO 9000-3 standard "Guidelines for the Application of ISP 9001 to the Development, Supply & Maintenance of Software". As for the ISO 9000-3 standard, the VICO quidelines provide recommendations rather than specific rules for what and how to make determinations. Where feasible, the quidelines are prepared as extensions for the ISP 90001-3 standard.

BUDGET:

Overall cost: 546 111 €. EC contribution: 400 850 €.

CONTACT:

Universite de Lille (F) Prof. Regis Beuscart E-mail: beuscart@univ-Lille2.fr

Timescale:

Keywords: virtual simulation, oncology, CT-data transfer, radio therapy

VIRTUAL SIMULATION AND TREATMENT VIA TELEMATICS APPLICATIONS IN CLINIC RADIO-ONCOLOGY

PURPOSE

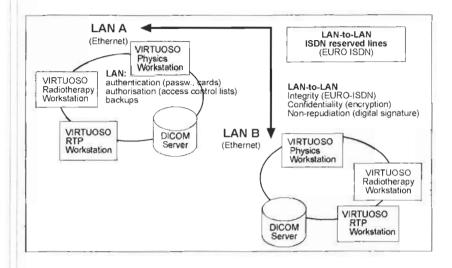
The project scope is the "virtualisation" of the complete treatment planning procedure, which will mainly increase efficiency of personnel and accuracy (quality) of treatment and to make the virtual patient available on different sites than those of their physical location, and therefore allow telematic cooperation among radio-oncology centres, which will mainly reduce costs by allowing virtual sharing of extremely expensive devices as well as remote expert assistance/service.

Although generic as a system, the VIRTUOSO demonstration is based on a world-wide commercially available radiotherapy planning system (PLATO) which will extend its efficiency by adding telematics components, mainly based on generally available networks (Internet, ISDN, phone lines).

Due to the availability of telematics components expensive devices such as CT (Computer Tomography) scanners will become "virtually available" to hospitals without such devices being physically present. In addition, remote experts can generate the treatment plan of a patient and/or validate plans of their colleagues on-line (consultation conference) or off-line (desktop system).

OUTPUTS

Functional and technical specification of the implementation, installation, validation and re-design



of the system prototype are made. A prototype is completed and integrated in the PLATO system. Also the necessary laser system for aligning the patient is completed. The industrial evaluation of the system is carried out by the commercial partner and was verified to the existing Virtual Simulation Package VSS.

The connection and security software has been validated. The system has been installed in the three clinical sites of Offenbach, Innsbruck and Cyprus. Staff in those hospitals is trained on the system.

The potential products are software modules for the Nucletron PLATO radiotherapy treatment planning system. Parts are used in the Virtual Simulation (VSS) package of Nucletron. In particular, algorithms for Digital Radiograph Reconstruction (DRR) will be used. Nucletron has developed a Virtual Simulation package parallel to Virtuoso.

The VIRTUOSO project has produced a validated system specification and prototype that can subsequently be used as the basis for the development of commercial products and services.

Commercial introduction by Nucletron of a product developed from the Virtuoso prototype is dependent on further validation of the prototype and the feasibility of further developments to meet requirements for products. The Virtuoso prototype is validated by several European hospitals during the project.

BUDGET:

Overall cost: 1 417 000 €. EC contribution: 930 000 €.

Tir

CONTACT:
Nucletron BV (NL)
Nol Nuijten
E-mail: nnn@nucletron.nl



Keywords: virtual reality, healthcare, eating disorders, stroke disorders, movement disorders

Oraun 3

VIRTUAL REALITY ENVIRONMENTS IN PSYCHO-NEURO-PHYSIOLOGICAL ASSESSMENT AND REHABILITATION

PURPOSE

The main goal of VREPAR is to demonstrate a so-called "virtual reality all-purpose modular system" (VRAMS), based on a PCbased modular architecture, for psycho-neuro-physiological assessment and rehabilitation. VRAMS will be used by psychologists, neurologists and other specialists at hospitals, universities and research centres. It is economical and straight-forward, with a capacity for interconnection and interoperation lacking in other systems. The system will be developed through three hardware/ software modules in a clinical environment. Development areas are eating, movement and stroke disorders.

With the development of VRAMS, VREPAR had the following objectives:

- a) To develop a PC-based low-cost virtual reality system for the medical market that can be marketed at a price which is accessible to its possible endusers (hospitals, universities and research centres) and which would have the modular, connectability and interoperability features that the existing systems lack;
- b) To develop three hardware/ software modules for the application of VRAMS in psycho-neurophysiological assessment and rehabilitation. The chosen development areas are eating disorders (bulimia, anorexia and obesity), movement disorders (Parkinson's



disease and torsion dystonia) and stroke disorders (unilateral neglect and hemiparesis);

- c) To define reference standards and parameters relating to technological and experimental factors, which can also be used by third parties. In particular, VRE-PAR aimed at:
- defining a standard for software development and a series of hardware specifications to be used in the development of further VRAMS modules;
- identifying the factors affecting individual experiences in a virtual environment.

OUTPUTS

The final outcome of the project, as indicated by the three peer reviews prepared by external researchers, is very good. Even with the crippling constraints of funding (1/8 of the original budget) and time (12 months) the project developed three working predemonstrators all showing the validity of the rationale followed in

the project. Actually the cost of the VR system used in the trials is about 12 000 Euros. This price, even if affordable for departments or hospitals, is still slightly high for the single therapist. However, the quick improvements in information technologies should lower the final price of the product to 8 000 Euros within a year.

From a clinical viewpoint the issues that we have to address in the future are further testing of VRAMS, by comparing it with different approaches and a follow-up study to check the long-term efficacy of the proposed approaches.

BUDGET:

Overall cost: 346 000 €. EC contribution: 300 000 €.

CONTACT:

Istituto Auxologico Italiano (I) Giuseppe Riva, Ph.D. http://www.psicologia.net





Keywords: eating disorders, obesity, virtual reality, therapy

VIRTUAL REALITY ENVIRONMENTS IN PSYCHO-NEURO-PHYSIOLOGICAL ASSESSMENT AND REHABILITATION 2

PURPOSE

The number of Virtual Reality (VR) applications in medicine is increasing. Virtual Environments (VEs) for healthcare are being developed in the following areas: surgical procedures; medical therapy; preventive medicine and patient education: medical education and training visualization of massive medical databases; skill enhancement and rehabilitation; and architectural design for healthcare facilities. However, there is a growing recognition that VR can play an important role in clinical psychology, too.

To verify this assumption the project defined the characteristics of Experiential Cognitive Therapy (ECT) - a VR-based approach to be used in the assessment and treatment of eating disorders - and evaluated its efficacy using clinical trials. The approach was developed to support an in-patient eating-disorder treatment programme. Core feature of ECT is the use of VEBIM 2 and 3, the virtual environments developed within the project.

Virtual Environments developed in the project:

- present assessment and therapeutical tools: the Body Image Virtual Reality Scale (VE 3);
- reproduction of real environments: a furnished flat (VEs 1 and 2), a mall (VEs 4 and 6) and a holiday resort (VE 5).



A French version of the environments was prepared by ISMRA-GREYC.

OUTPUTS

The outcome of the two case reports, five uncontrolled studies and two controlled studies involving more than 100 patients was very promising. The obtained data, collected in two different institutions - Istituto Auxologico Italiano (I) and Centre Médical de Nutrition (F) - showed that ECT could be an effective method for the treatment of obese and eating-disordered patients.

Its multidisciplinary approach, ranging from cognitive behavioral therapy to motivational group sessions, seems to be suitable to the multifactorial charateristics of these disturbances.

In particular, in all the studies the Experiential-Cognitive therapy was able to address at least one of the key features of these disturbances

usually not adequately addressed by classical behavioral cognitive therapy: body experience disturbances and motivation for change. Of significant interest are the results obtained in the two controlled studies. The data showed that in both studies ECT was more effective than the traditional low-calorie diet plus cognitive-behavioral nutritional groups in reducing overeating and the overall anxiety level of the patients.

HC1055

From a clinical viewpoint the issues that we have to address in the future are further testing of ECT, by comparing it with different approaches and a follow-up study to check the long-term efficacy of the therapy.

BUDGET:

Overall cost: 215 000 €. EC contribution: 190 000 €.

CONTACT:

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Timescale:

Keywords: emergency, continuity of care, biomedical engineering, information technology

C POUR 5

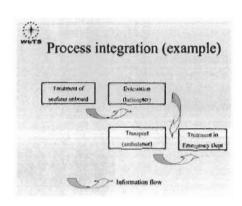
Worldwide Emergency Tele-medicine Services

PURPOSE

The objective of WETS was to demonstrate the feasibility and effectiveness of a common infrastructure capable of giving support to any mobile unit in case of medical emergency on land, sea, and air. In WETS common infrastructure means integration of different processes in emergency, i.e. continuity of care. In the project context, integration was considered at the organisational level (protocols and procedures) and at the technological level (information exchange).

WETS started from the outcome of the European HECTOR and MERMAID projects. WETS developed three «extended» pilots (in Greece, Italy and Spain), integrating the pilot functionalities of the two aforementioned projects and one additional pilot in Iceland, which was not involved in the Hector and Mermaid projects. Due to its specific geographical and demographic situation, Iceland runs a national health emergency system integrating both land and sea components. Therefore, this aspect constituted an added value to WETS, allowing comparisons among different European approaches to medical emergency, due to different real-life situations.

Project aims were to ensure continuity of care, to optimise management of emergency events, to promote professional competencies and to overcome language barriers.



OUTPUTS

The above-mentioned objectives of WETS were also reached by building into each pilot a unique database repository equipped with an interoperable application for transferring data structures (properly "standardized" and, wherever possible, coded) among the different sites.

The main activity of WETS was centred on the validation of the pilots on a large scale, involving quite a broad range of user groups, both at the end-user level (seafarers, fishermen and citizens) and at the professional level (medical doctors, ship-owners).

The consortium included all the appropriate actors (university hospitals as medical referring centres, front-end support centres, industries, etc), many of them already experienced in the management and development of large healthcare telematics R&D projects.

The main conclusion of the WETS project is that the main significance of emergency telemedicine is that of being a form of effective and efficient cooperative work among all the involved actors thanks to ICT.

This is reflected in the main WETS product, i.e., the WETS electronic folder, by means of which the actors can exchange information and strategies of action, while still keeping their original data formats and protocols. The project ended in a European-scale business plan for the commercial exploitation of emergency telemedicine services.

BUDGET:

Overall cost: 2 169 808 €. EC contribution: 1 200 000 €.

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1996	1997	1998	1999	2000	2001



Keywords: regional health care networks (RHCN)

Working In Synergy FOR EUROPE

PURPOSE

WISE is a relevant attempt to derive from the experience of the main Regional Health Care Networks (RHCNs) actors in the field, a common view and a set of recommendations aimed at the decision makers, who are already facing today or will soon face the challenge of implementing an RHCN.

WISE has enabled a tremendously useful sharing of experience among people who are likely to lead the way towards a large-scale deployment of RHCNs in Europe. These same experiences, properly rationalised and compared with one another, have also been made available to the larger community of healthcare decision makers as an attractive and easy-to read book.

Several projects in the 4FP Health Telematics Programme - and in previous programmes - had addressed the problem of implementing RHCNs, with varying degrees of ambition and success. Each project had used its specific approach to the issue and had found its own solution to the problems encountered.

The WISE consortium has gathered under a single umbrella some of the most experienced managers and ICT professionals who over recent years have built up practical experience in dealing with the complexity of RHCNs.

Views, opinions and recommendations, distilled from the joint work of the Editorial Committee, have been subsequently submitted Public Health Info

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to an Advisory Panel of users, representing different realities in terms of culture, healthcare organisation and involvement in operational RHCNs.

OUTPUTS

WISE has resulted in:

- 1) A Final Report, published by IOS Press under the title of "Building Regional Healthcare Networks in Europe".
- 2) An 8-page promotional brochure which gives, in a nutshell, the rudiments of RHCNs and recommendations representing the global wisdom of the project team.
- 3) Two Internal User Workshops, which have allowed a most enriching dialogue between the WISE Editorial Committee and a highly representative selection of current or potential RHCN users (the WISE Advisory Panel).
- 4) A WISE Workshop, held in Thessaloniki in the context of the International Workshop on User

Acceptance of Health Telematics Applications and Services.

WISE has represented an extremely worthwhile exercise for the project partner. New alliances have been forged thanks to the joint work in WISE and some of them have already materialised in joint proposals for the new IST Programme.

Dissemination of the project results continues after the end of the European project, through the intense participation of the project partners in national and international events dedicated to health information management, telematics applications and RHCNs, in particular.

BUDGET:

Overall cost: 803 040 €. EC contribution: 449 850 €.

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Timescale:

Group 1

Workflow Information Systems for European Nursing Care

PURPOSE

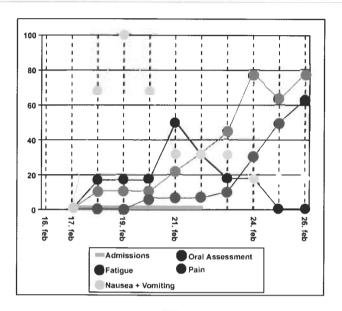
WISECARE is a knowledgesharing project on quality of life indicators for oncological nursing care. The project, focused on fatigue, nausea & vomiting, pain and oral care, was able to network 15 oncological sites in 10 European countries.

WISECARE focused on the use of existing data for the use of clinical management, resource management and knowledge sharing. For clinical management purposes, four domains of quality of life are focused on: fatigue, pain, nausea and vomiting and oral care. Standardised scales (EORTC-QLQ-30 and Oral Assessment Guide) are used.

These data are collected during ten consecutive days after a clinical event (chemotherapy, surgery). For resource management purposes, the intensity of nursing care (Moffitt patient classification tool), the hours worked and the qualification level of the nursing staff are collected on a random day per week. For knowledge sharing purposes, an Internet network was set up to exchange guidelines and protocols.

OUTPUTS

A network of oncological sites across Europe has been established. In December 1999, fifteen oncological sites in ten countries were participating in the network. A tool, called WiseTool, was developed to collect the data, to produce first feedback and to



structure guidelines. During 18 months, more than 13000 patient assessments were made for 280 patients and 590 treatment cycles.

The local feedback graphs are used to discuss symptom control with patients, nurses and physicians. The data were sent on a quarterly basis to the project data warehouse, called WiseHoos, to develop global feedback. The global feedback serves as a benchmark for the oncological sites.

Main results are a decrease in the average fatigue score of 44% in the beginning of the project (04/98-12/98) to 33% in period 3 (04/98–09/99), a decrease in the average nausea & vomiting score from 11,8% to 5,6%, a decrease in the average pain score from 23% to 19% and a decrease in mouth problems (OAG) from 22,3% to 18,5%.

For measuring the impact of the project, a WiseCompass Tool based on EFQM was developed. Main results are an improvement

in job satisfaction on the part of the nurses, by being part of a larger network. However, the project has imposed more mental demand and effort upon nurses, because of the focus on effectiveness and outcome.

Main plans are the enlargement of the WISECARE Network by the European Oncological Nursing Society. More clinical indicators have to be developed. The data collection design and toxicity adjustment profiles have to be updated. AWISECARE knowledge centre (on scales, guidelines and benchmarks) has to be developed further.

BUDGET:

Overall cost: 1 034 950 €. EC contribution: 938 000 €.

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Keywords: menopause, European network, web portal

INTELLIGENT TELEMATIC SERVICES FOR WOMEN CARE BY AN EUROPEAN NETWORK

PURPOSE

The average lifespan of the female population has increased in the last century from 40 to 82 years. The mean age of Western women at menopause is around 50, so women live almost 30 years of their lives in the postmenopausal period. The menopause is not a disease, but it can be associated with discomfort, decreased quality of life, and an increase in serious disease risks such as osteoporosis, heart disease and cancer. It has been demonstrated and reported that the lack of correct and useful information is one of the greatest problems for women who face the menopausal transition. Health professionals are also asking for continuity of care and interactions between different healthcare providers (GPs, gynaecologists, menopause centres).

Differences in the various European regions in terms of genetic, cultural, dietary and environmental factors can influence the menopause and its related consequences in terms of morbidity and mortality, and thus in terms of individual and social costs.

The main objective of the WOMAN project is the improvement of every day clinical practice in the menopause centres by optimising effectiveness, quality and continuity of care and by offering informative services to women and health professionals.



www.womanlab.com

Different questionnaires were designed to acquire the women needs as well as the healthcare professional's requirements. Based on the requirements, the main services were individuated and modelled. Using web-based telematic tools, the individuated services were implemented. The WOMAN project has transformed the already existing resources available (knowledge, information, databases) at the healthcare centres involved, in cooperative work facilities to improve the coordination of shared data and to create tutorial and assistant services for both women and health professionals.

OUTPUTS

The WOMAN consortium has created a true menopause related web "Portal": this portal offers not only information but also real services to medical staff and to women (online consulting, online

booking). A web-based Electronic Patient Record has been developed that will finally permit homogeneous data collection within Europe. These results have already been presented to the Research Community. The EMAS, European Menopause and Andropause Society Executive and Committee Boards have met the WOMAN consortium in different meetings and have officially decided to consider the WOMAN results as the European standard, in order to create a real network to collect data and experiences in a homogeneous way. This very important achievement is significant and will grant dissemination of results and effective consensus within the European market.

BUDGET:

Overall cost: 785 000 €. EC contribution: 570 000 €.

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