

Borderless **HEALTHCARE COMMUNICATION** Collaboration IT-service



Collaboration in telemedicine between Danish and German health services



South Jutland County
Region Schleswig
County of Funen
Technologie-Region K.E.R.N.

Healthy COMMUNICATION at the international level

At the national level, expanded electronic communication between the parties in the health service has long shown its value. This applies for instance to the area of telemedicine, where a large number of projects have demonstrated the opportunities that direct exchange of images, text and sound provides for on-line healthcare cooperation.

Some of the most important benefits consist in a rise in the quality of treatment and better utilisation of resources. At the same time, the new communication technology helps remove the barriers that geography can put in the way of patient treatment. The healthcare expert is no longer any further away than the nearest PC with a network connection. The necessary specialist knowledge is available where it is needed – without the patient having to be moved to receive the best treatment.

The idea behind the ciTTis project is to make use of positive national experience at the international level. Healthcare professionals in one country are to be able to draw easily and quickly on the knowledge that other experts in the network possess. The patient is to be given the best possible treatment provided in the most efficient way possible, regardless of whether the situation necessitates crossing national borders. If it becomes necessary to trans-



fer the patient, this is to be backed up by flexible and reliable communication of patient data.

In the ciTTis project, hospitals in four regions on either side of the Danish-German border have joined forces to gain experience from international telemedicine. A service

which makes it clear which expert resources are available at any given time is being developed and tested under the project. In addition, a cooperation platform, a Collaboration IT-Service, is being established for use in flexible telemedicine collaboration. An important element in the project is the organisa-

tional development, which is to ensure that the project partners are all able to benefit from the new opportunities for cooperation.

The project focuses on both technological and organisational development. The greatest challenge is purely organisational, while the communication solutions from a purely technical point of view primarily necessitate adaptation to current conditions.

At the same time, the project intends to promote commercial IT development within the four regions.

Patients:

Equal access to the best and fastest treatment

The health service is becoming increasingly specialised. Highly specialised knowledge is possessed by a relatively small number of people, and in many ways technological developments also support the centralisation of treatment facilities. At the same time there is a great need to achieve effective utilisation of resources in the health service. These trends have to harmonise with the wish to give all patients equal access to the quickest and best treatment. Part of the solution, in popular terms, is to move knowledge, so that there is expert knowledge where it is needed, or to move the patient and patient data to the place where the treatment is to take place. Whatever the circumstances, this involves communication, and in this context, advanced information technology offers excellent opportunities.

Healthcare professionals:

Quality and development through cooperation

Healthcare experts acquire their continuing training to a great extent through collaboration in their daily work with colleagues in the same or related specialities. Previously, this continuing training in practice was almost synonymous with collaboration with colleagues in the same department and the same hospital. For the same reason, there has been a clear trend towards specialists looking for special units with a high scientific level. The new information technology provides an opportunity, in popular terms, to break down the barriers in healthcare cooperation. As a healthcare professional it is possible to look for sparring partners regardless of distance and national boundaries. This strengthens individual development of qualifications and raises the quality of the work done.



Four parties, one project

Six project participants from four regions are involved in ciTTis. These are South Jutland County and Region Schleswig, represented by the hospitals DIAKO and Malteser Krankenhaus St. Franziskus-Hospital in Flensburg, as well as County of Funen, represented by the Danish Centre for Health Telematics and Odense University Hospital and the Technologie-Region K.E.R.N., represented by Klinik für Diagnostische Radiologie am Universitätsklinikum Schleswig-Holstein in Kiel. The project has received assistance under the EU's **Interreg IIIA**, both for the regional cooperation between County of Funen and the Technologie-Region K.E.R.N. and for the cooperation between South Jutland County and Region Schleswig. The Interreg assistance finances 50 per cent of the project budget. The remaining 50 per cent is funded by the participants.

ciTTis timetable

Project	2002	2003	2004	2005
1. Project management	[Green bar spanning all years]			
2. Analysis of technical conditions	[Green bar spanning 2002-2003]			
3. Recommendations, guidelines and support			[Green bar spanning 2004-2005]	
4. Procedural analysis		[Green bar spanning 2003-2004]		
5. Development of new procedures			[Green bar spanning 2004-2005]	
6. Software development			[Green bar spanning 2004-2005]	
7. Pilot implementation of IT collaboration service			[Green bar spanning 2004-2005]	
8. Dissemination of project results	[Green bar spanning all years]			

1. Effective project management and quality assurance of all major results throughout the project.
 2. Analysis of technical standards, interoperability, laws and regulations, equipment and applications with respect to harmonisation and the preparation of guidelines.
 3. Preparation of guidelines and recommendations on the basis of an analysis of technical conditions. Support for regional implementation.
 4. Identification of relevant procedures, including problems and delays in these procedures.
 5. Based on the results of the analyses referred to above, from a workshop for clinicians on their procedures and best practice from other telemedicine projects, the new procedures where the new technology supports and contributes to a more appropriate flow are described.
 6. Development of software for collaboration service and the communication standards to be used.
 7. Installation of collaboration IT service in the various organisations.
 8. Dissemination of project knowledge and experience the healthcare sector and industry through printed matter, website and conferences.
- Start of project in the spring of 2002, end in the spring of 2005.**

Politicians:

Effective utilisation of resources, satisfied patients, regional development

The general public wants the best possible treatment of diseases and illnesses and at the same wants the lowest possible costs for the health service. It is the task of the politicians to accomplish this complex task, and in this context information technology is a useful tool.

In many ways, health service trends are leading to an increased concentration of knowledge and resources. This is a situation that may be difficult to handle in reality, where the patients also regard the proximity of treatment facilities as an important quality in itself.

Information technology makes it possible to utilise knowledge and resources regardless of distance. The result is higher quality, better utilisation of resources and more satisfied patients.

At the same time, the development work on IT solutions in itself helps support regional business development – all the participating regions attach great importance to business development in the area of IT.

Knowledge **BLAZES** trails

In many situations there may be a shortage of expert assistance when a patient needs treatment. The local place of treatment may, perhaps, lack experts in a particular area, or the experts at the place of treatment may need a second opinion. An example:

- After a road-traffic accident, a male motorist is hospitalised with a severe head injury. The patient is unconscious.
- The local hospital takes a CT/MRI scan, but wants a second opinion on the situation. The hospital looks for



an available neurosurgeon through the IT Collaboration Service and is told that a neurosurgeon at Odense Universitetshospital will be available in 30 minutes.

- A request for assistance and a reservation for this assistance is sent to Odense University Hospital from the local hospital.
- CT/MRI scans and a referral describing the patient's clinical situation are sent to Odense University Hospital.
- The neurosurgeon analyses the images and other information concerning the patient. The surgeon returns his neurological/radiological report.
- The optimum healthcare expertise has been available for treatment without the need to move the patient, it should be noted.

Patients **CROSS** borders



It is not always sufficient to exchange knowledge between experts for treatment to progress. Diagnosis, surgery and follow-up treatment may in many cases involve several hospitals, and it is vital that the communication process is smooth and effective for the sake of the patient.

- The general practitioner in Tinglev refers a female patient to Haderslev Hospital. He makes the diagnosis of lung cancer, and refers the patient for

surgery at Odense University Hospital.

- Odense University Hospital initially responds to the referral by asking Haderslev Hospital to carry out several tests before surgery can be carried out.
- The tests are performed, and the results are forwarded.
- The patient is transferred to Odense and undergoes surgery. She is transferred back to Haderslev and data on the treatment process and post-treatment are sent from Odense University Hospital to Haderslev Hospital.
- The patient chooses radiotherapy in Flensburg. Haderslev Hospital sends relevant data to the hospital in Flensburg.

South Jutland County: County of Funen:

South Jutland County

is the regional authority for 23 local authorities. The county runs three somatic hospitals and additionally has utilisation agreements with the Danish Rheumatism Association and the board of the self-owned institution Aabenraa Hospital. The total somatic capacity is 904 beds.

Odense University Hospital

is one of the largest Danish hospitals, with a standard capacity of 1,193 beds and with almost 120,000 treatment episodes a year. Its work encompasses both basic tasks and a large number of national and regional tasks. The hospital has significant research and training activities.

The Danish Centre for Health Telematics

is an office community of project organisations, all of which are working on the development of healthcare communication at regional, national and international levels. These include FynCom, the regional healthcare data network in County of Funen, MedCom, the national healthcare data network in Denmark, and International Office, which takes part in international healthcare IT activities and EU projects.

The vision: **BORDERLESS** communication

Within a period of around ten years, telemedicine will become an essential, decisive factor in medical practice. Telemedicine will be part of the day-to-day treatment, with healthcare professionals involved in virtual collaboration to strengthen the treatment of patients.

Technology is gaining ground in this area from one year to the next. It is now technically possible to carry out on-line videoconferencing and transfer texts, images, video clips and audio data between different healthcare professionals and between healthcare professionals and



patients. The general public can access healthcare experts regardless of geographical location.

The regions and hospitals outside the traditional educational centres have better prospects of attracting and holding onto experts by establishing virtual specialist teams. Hospitals, specialists and others will be able to offer their services on virtual markets for healthcare services.

In the light of the standardised solutions and healthcare processes, the IT industry will be able to develop projects for growing markets.



Good prospects

Digital information, including the digital transfer of diagnostic X-ray images, is developing at a rapid pace, and great opportunities are presenting themselves. The Department of Diagnostic Radiology at Odense University Hospital has joined the ciTTis project in order to be in the vanguard of the development of digital image transfer and the transfer of descriptions. The immediate prospects are improved cooperation with the other hospitals in the southern region and cooperation with major north German hospitals, in the transfer of patients and in the discussion of specific diagnostic problems that require specialist knowledge.

*Senior Consultant
Jens Karstoft, M.D.,
Odense University Hospital*



Research enters a new technological phase

The Klinik für Diagnostische Radiologie will, among other things, use the ciTTis project to strengthen the clinic's research profile. With Germany's second largest university hospital behind us, we can move our research collaboration forward into a new technological phase. This applies to all levels, regionally, nationally and internationally.

The particular type of research we carry out is well suited to the electronic exchange of information. Aspects such as the synergy effect generated by international collaboration mean that we can step up our research initiatives without having to make significant investments. Researchers in Kiel will be in the frontline, and positions in Northern Germany will become more attractive.

In the longer term, our treatment and training programmes will be improved. New research results can be disseminated much more rapidly, and by using flexible distance-teaching facilities, we will be able to offer in-service training to many more doctors.

*Professor and Director
M. Heller, M.D., Klinik für
Diagnostische Radiologie am
Universitätsklinikum
Schleswig-Holstein in Kiel*

K.E.R.N

Klinik für Diagnostische Radiologie am Universitätsklinikum Schleswig-Holstein in Kiel.

The department has all modern equipment for imaging diagnostics at its disposal. The department takes part in national and international research cooperation, serves patients in the north German area and trains specialists and scientific staff in its specialist field.

Region Schleswig:

DIAKO, Diakonissenkrankenhaus Flensburg.

This hospital consists of specialist departments with capacity and skills roughly equivalent to a regional hospital in Denmark. The hospital has 542 beds in 15 specialist departments and treats more than 50,000 patients a year. The hospital takes part in the training of students at the universities of Kiel and Lübeck.

Malteser Krankenhaus St. Franziskus-Hospital

with nine specialist departments, 350 beds and 750 staff treats about 23,000 patients annually from the northern counties, as well as South Jutland County. It cooperates closely with DIAKO.

We have the **TECHNOLOGY** at our disposal

Telemedicine enables healthcare professionals to collaborate quickly and directly with other specialists on patient treatment.

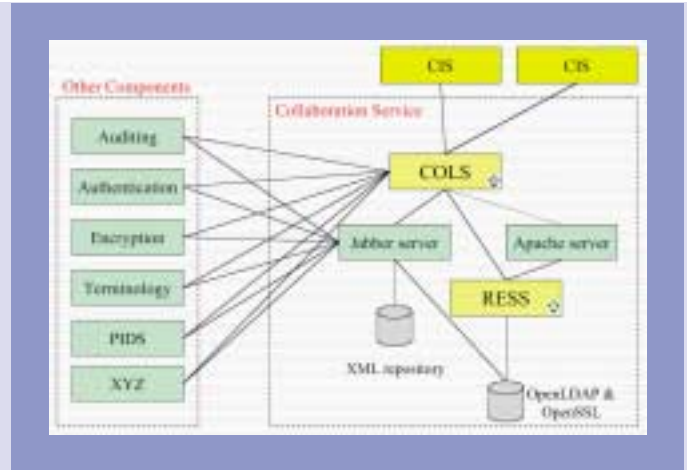
It is a network-based IT service, developed and tested successfully over a large number of projects. Telemedicine solutions normally focus on a very specific area of work, where the parties concerned agree on working methods and a technical solution. There

are many benefits to it, but the potential of telemedicine is not least in establishing a system that makes it possible to join all kinds of telemedicine applications together, regardless of technological platform and commercial interests. This is precisely where the ciTTis project comes in.

The EU project PICNIC has identified a number of software components – Collaboration IT – that can link together different software



The diagram shows the technical architecture behind Collaboration IT-service. Its core is an Open Source Java Server, which among other things handles the two main components. Res handles the user administration, and Cols deals with the actual inter-user communication.

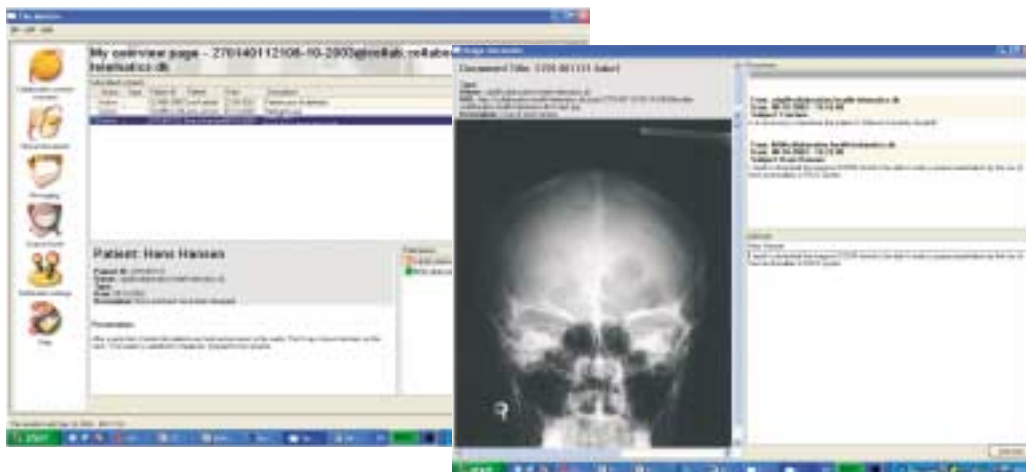


applications and services in a regional healthcare network. Some of these components will be used in ciTTis and will constitute a set of technical tools, which are to be usable by all IT suppliers in Open Source. Standards already developed will be used to exchange information – for example SCP-ECG, DICOM, EDIFACT, XML CDA.

Collaboration IT-service will contain information on:

- Connected users/applications
- Available healthcare specialists
- Price list of different types of resources
- Profiles of organisations and healthcare specialists
- Definition of the exchangeable types of information
- Billing

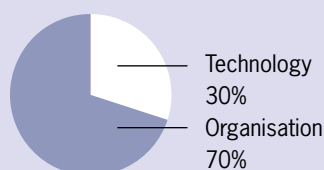
Screens:



These screens show how two or more healthcare professionals use the program to discuss an X-ray. One of the benefits of using Collaboration IT-service – instead of sending the images and then discussing the images over the telephone – is that the discussion is saved and can serve as documentation later on.

Major CHALLENGES for communication and organisation

The technology is far from doing it alone. In relation to a project like ciTTis it is not unrealistic to estimate the effort made with respect to development of the technology at around 30 per cent, while the requirements for organisational development constitute the remaining 70 per cent.



Alongside the development of the necessary technical tools, a set of guidelines will be developed which describe the necessary healthcare basis for using Collaboration IT services in healthcare organisations. In conjunction with this, ciTTis will focus on identi-

fying the requisite organisational changes to make Collaboration IT-Service work as effectively as possible across organisations and frontiers.

The telemedicine solutions will additionally include a number of protocols specifying the data and technical standards which are to be exchanged in different sequences of events. The events are typically information in the form of a referral, image, video clip, clinical e-mail, X-ray report, etc.

An important product of the project is therefore harmonisation of clinical and administrative practice in diagnostics and patient treatment and therefore a stronger cultural community.

which the project gives rise. The project will probably inspire inter-regional and international technology cooperation and contracts. External suppliers and interested parties who monitor the project will acquire valuable knowledge of procedures and standards.

At the same time, the telemedical solutions developed during the project will help retain and attract healthcare staff who would otherwise not have a



Great potential in collaboration

In South Jutland County we are well aware of the great potential that exists in expanding our national and international collaboration. In many areas, the last ten years have brought significant development in the working relationships within what is commonly referred to as the southern region – Funen, Southern and South Jutland. This applies, for example, to the hospital area. We are accustomed to thinking in terms of cooperation where our German neighbours are concerned. It is only natural for us to expand the cooperation further, and the new technology is a fantastic new tool in this area. In the ciTTis project we see an obvious opportunity for the hospitals in the Danish and German regions to supplement and strengthen one another. This will benefit the patients, who receive the best possible treatment in the most straightforward way. At the same time, it benefits the healthcare sector, because the experience sharing is synonymous with a valuable growth in quality.

*Claus Toftgaard,
Hospital Director,
Haderslev Hospital*

professional, interdisciplinary network in support of local treatment facilities.



Experienced and focused on development

Participating in the ciTTis project will allow DIAKO to utilise the experience we have gained from regional and international collaboration. We have already been taking part for many years in a telemedical network with the St. Franziskus-Hospital in Flensburg and the Association of General Practitioners in Flensburg. In addition, we have had five years of successful collaboration in teleradiology with three other hospitals. Transnationally, we treat patients from Denmark and Norway. With ciTTis, we anticipate expanding the good specialist networks to include multinational specialist networks and consequently improve the joint treatment of patients in all four regions. The close personal contacts that consequently emerge between specialists from both countries promote this development. Of further interest is the development of a new chip-based patient card, which is due to replace the present-day health insurance card in 2006. The Federal state of Schleswig-Holstein has been given the task of testing this patient card in the model region of Flensburg and is conducting a pilot project, which is expected to be of significance to the whole Federal Republic. ciTTis and the patient card project are part of a mutual relationship of development, which in its trans-boundary dimension encompasses the whole of Europe.

*Medical Director
Ulrich Schroeder, M.D.,
DIAKO, Diakonissen-
krankenhaus Flensburg*

Regional development

Regional development – an important added bonus.

The project includes the development of hardware and software solutions, which will be of interest to all suppliers of telemedical equipment. The project will emphasise the involvement of potential suppliers in all the regions, so they receive information on the content, aims and results of the project and on relevant technology services to



Secure electronic health information

The EU supports health projects that could potentially pave the way for a joint e-health strategy. Wide-ranging experience has already been accumulated through the ciTTis project, providing a basis for developments that will first and foremost mean better healthcare services for EU citizens, but which will also offer major gains in terms of health and medical research.

The secure exchange of vital health information now plays an ever-increasing role in individual EU countries and is also a high priority in the EU's common health policy initiatives. This is one of the areas where the ciTTis project will bring its experience of electronic communication to bear as a useful tool for exchanging health-related information across borders. The project will benefit health sector workers and patients alike. The EU Commission is following the ciTTis project with interest and has high expectations in respect of the further benefits to be gained from the project.

*Jean Claude Healy,
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