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# Collaboration – a new IT-service in the next generation of Regional Health Care Networks

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## 1. Summary

During the past 10-15 years, Regional Health Care Networks have been established in many regions throughout the world. Regional Health Care Networks build on well-known techniques, methodologies and appropriate standards. Most of the European Countries have today set up IT strategic plans, with focus on establishment of Regional Health Care Networks. The benefits of having access to all relevant information are tremendous and provide a more cost-effective and coherent health service.

By the rapid spread and use of Internet the technology have made it possible to interconnect all kinds of applications. The most experienced regions in Europe have joined a European project PICNIC to develop the *Next Generation Regional Health Care Networks* to support their new ways of providing health and social care.

The previous generation of Regional Health Care Networks, developed in the past 10-15 years, supported the interconnection of applications by transfer of messages. This service will also continue to be one of the most important services in the future health care networks.

Messaging is an effective means of integration of isolated high-specialised systems that only needs to exchange data. *Tighter coupling* may be desirable in some instances to avoid replicating the same functionality in several applications. In other words, certain services can be common and used by a number of applications instead of building that service inside each application. These *common services* are called *middleware* services.

In PICNIC a new middleware Collaboration IT-service has been identified. This service allows the end users to perform real time clinical Collaboration, with exchange of text, structured data, voice and images.

## 2. The past generation Regional Health Care Networks

Because of the specialisation and division of labour, there is a need for extensive communication between the professionals involved in the health care sector, i.e. communication of everyday routine messages such as prescriptions, referrals, discharge letters and laboratory results. The cost of communication [1] is equal to 1-2 % of the total health expenditures.

In Denmark, a National Health Care Network has been developed during the past 10 years, based on UN/EDIFACT (United Nations/Electronic Data Interchange for Administration, Commerce and Trade) standards and simple mailbox technique. The basic idea is to send structured electronic messages from one computer to another computer. This means that data entered once can be re-used elsewhere in the Health Care sector.

The participants have computer systems from many different vendors, but the Regional Health Care Network together with the developed UN/EDIFACT standards makes electronic communication between the systems possible. The systems used by the different health care professionals can exchange structured information and not only e-mails with free text. Thus, the data entered in the senders system can be "understood" and reused in the receivers system. More than 40 different vendors has adopted and implemented the standards in their systems and in year 2001 more than 25 million messages, with clinical content were exchanged in the Danish Health Care sector.

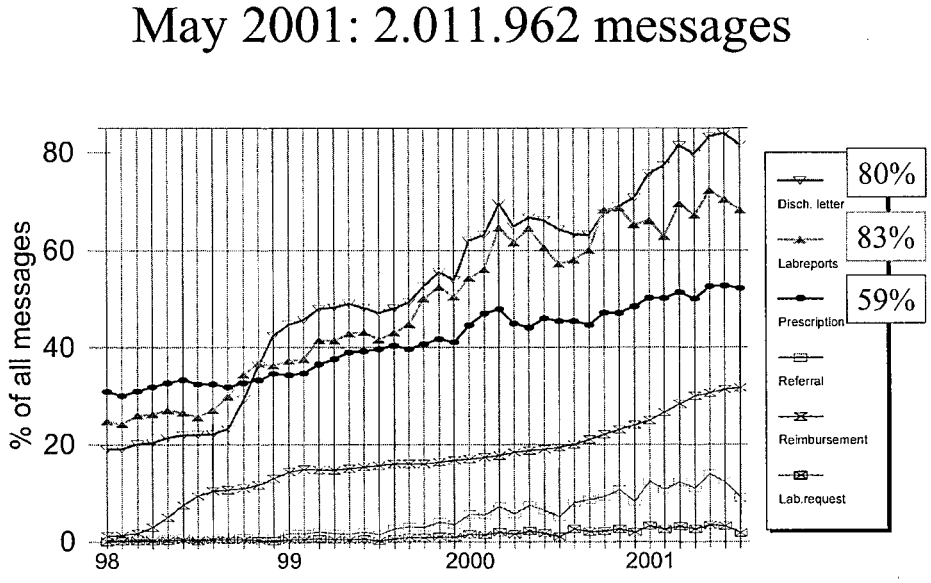


Figure 1: More than 2.0 million messages are exchanged per month in Denmark

## 3. PICNIC – Professionals and Citizens Network for Integrated Care

PICNIC is an R&D project funded under the 5th framework programme, by the Information Society Technology, European Commission. The project started in January 2000 and will finalise in March 2003.

PICNIC, was initiated by regional health care providers, who are planning to develop the *Next Generation Regional Health Care Networks* to support their new ways of providing health and social care. The regional health care providers (regional health care authorities) in PICNIC will undertake this development in a public-private partnership with industry.

The aims of PICNIC are to:

- Deliver a number of Open Source components which are used across different regions, which can be integrated into applications, which deliver services across participating regions, which can be exploited by other regions and industry to provide products for a European and potentially worldwide market.
- To develop a model for the future Regional Health Care Networks and to prepare the regional health care providers to implement the next generation of secure, user-friendly health care networks
- To make the European market for telematic health care services more cohesive and less fragmented.

The value that PICNIC adds, is important in order to have a European perspective in the reconfiguration of healthcare processes, for several reasons:

- It creates an environment for the users (i.e. regions) to define what regional services are needed and where the commonalties in these exist.
- It creates an environment where industries can take part into this and inject their expertise in IST development and deployment to this.
- It produces prototypes of such services and IST based tools to support and enable these.
- It provides inputs to European harmonisation and standardisation bodies.
- It assesses and evaluates the results and potential impact that those activities have on the creation of next generation regional solutions for professionals and citizens network for integrated care.

The PICNIC regions[1] are committed to adopt the R&D results from PICNIC for their future large-scale implementation of systems and services. However, they are now searching for optimal solutions (organisational and technical) and efficient implementation strategies based on the most developed European experience.

To reach its goals PICNIC:

- Develops scenarios of new ways of (patient centred) delivery of care.
- Models these services, so that a total picture of regional healthcare networks can be presented towards industry and healthcare authorities.
- Specifies a system architecture to support integration between services inside the region.
- Specifies and develops common components in Open Source to be used in implementing new services in co-operation with industry.
- Develops a set of regional demonstrators, with extensive prototypes.
- Together with supportive action dealing with evaluation of the prototypes and dissemination and technology implementation planning.

PICNIC develops some of the components giving them a European perspective and aiming at piloting them across several European regions. The open source approach ensures that the mechanisms are in place for creating a community of developers sharing a common interest, and creating industries around it to provide the end-users added-value services of high quality. PICNIC components will be published in Open Source.

[1] The "region" or "health region" is a geographic area where an administrative entity provides or organises health and/or social care. It is for instance represented by a County, Health trust, District, Local Authority, etc. The health care actors in a region are hospitals, laboratories, primary health care centres, primary care doctors, pharmacies, homecare centres, district nurses, etc. Additional actors are the administrations, insurance companies and the citizens/clients/patients, etc.

The development in PICNIC is concentrated in 3 groups:

- *Component Group 1: Messaging*
  Clinical Messaging offers one of the most important functionality in a RHCN, and consists of highly structured patient-related information concerning the treatment of the individual patient. Messaging makes it possible to exchange form-based information such as prescriptions, laboratory results, referrals and discharge summaries almost automatically between different providers of health. Because such messaging is suitable for standardization, national or regional standards make it possible to integrate clinical messages in IT applications already in use by the professionals.
  The messaging development will concentrate on the exchange of clinical and administrative data between different applications and will include the use of a various number of already developed standards. Messaging between Health Care Records and isolated applications will be developed and implemented by the use of CEN ENV 13606 and HL7 by the use of components which support the translation between message formats and protocols.
- *Component group 2: Access to patient data*
  Access to patient data will focus on the development of an integrated environment for professionals or citizens who need a uniform way to access parts of patient record data that are physically located in different clinical information systems. Fast, secure and authorized access to distributed patient record information from multiple, disparate sources, is the main objective.
- *Component Group 3: Collaboration*
  Access for healthcare workers (general practitioners, other doctors, nurses, etc.) to specialists is an important tool to improve quality in healthcare by means of quicker diagnosis, quicker response to emergency and guidance for correct treatment and further examinations. Telemedicine can support construction of healthcare services in regions by giving widespread primary healthcare centres support from specialised regional-based institutions. In this way citizens will be given better access to all levels of healthcare irrespectively of the place they live.
  The Collaboration IT-service will be involved in the development of an environment for the provision of examination, monitoring, treatment and administration of patients through immediate access to expertise and patient information regardless of where the patient or relevant information is geographically located. The components will be used to inter-connect applications in a medical "messenger" environment where collaboration can be performed between health care professionals. Already developed standards (SCP-ECG, DICOM, EDIFACT, XML CDA) will be used for the exchange of information. The collaboration component will assist the health care professionals to ask for second opinion (diagnose) based on an X-ray, a CT or MR image, or an ECG, and facilitate the search for finding and booking a specialist to assist in different areas. It will be a cornerstone in sharing sparse resources by diagnosing on duty.

## 4. The Collaboration IT-service

During the specification phase of PICNIC the Collaboration IT-service has been identified.

The development will include 2 common components in Open Source:

1. The **Collaboration Server** provides the technological platform that will allows general practitioners and medical experts to share patient-related information in the

context of a teleconsultation session both inside and across Regional Health Care Networks.

2. The **Resource Server** provides static information on the health care actors in the region (e.g. organizations, devices, software, etc.) and the means for accessing them. Examples of resources include healthcare professionals on-duty, hospitals and clinics, clinical information systems and services offered in the region, methods and technologies available for accessing primary information, and protocols for the exchange of information.

The components of the PICNIC collaboration IT service provide the necessary functionality for healthcare agents to browse dynamic availability and possibly cost information for various regional services. Once a service is selected and booked, in the context of a collaboration session further medical data (e.g. teleconsultation) as well as reimbursement data may be exchanged.

The development will include a set of guidelines to by used by the industry to make their application compliant with Collaboration IT-service.

The collaboration IT service will keep on-line information about:

- Applications/users currently connected
- Type of health care specialists available
- Pricelist for different type of resources
- Profile for organisation and individual health care specialists
- Type of information which can be exchanged (images, video, sound, structured text, unstructured text, booking of resources, supported standards)
- Reimbursement

It is important to agree on a number of events, which can take part in collaboration. This will be implemented in an event description handler supporting different workflows for different type of "treatment"/diagnosing processes.

The events are typically message information, which are exchanged between two applications (referral, image, video, clinical e-mail, x-ray report...).

Below is a typical workflow for a person who has been injured in a traffic accident. The person is unconscious and there are visible signs of head trauma. He has been admitted to the local hospital. The local Hospital has made a CT/MR examination but does not have the optimal professional skills and is asking for a second opinion on the CT/MR images.

## 5. Towards Seamless Interregional Collaboration Services in Health Care

The collaboration component supports the following scenario:

- Search for neurologist which are on-line and who can assist within the next 2 hours.
- Reply: A neurologist in the University Hospital is available in 30 minutes.
- A booking request is transferred. (XML-request)
- A booking reservation including prices is returned (XML-reservation)
- CT/MR images and a referral describing the patient's clinical situation is transferred (DICOM images and XML referral)
- The neurologist examines the images and other information and returns a neurology/radiology report (XML-report).

In PICNIC, the Collaboration IT-service will be demonstrated by setting up a real life Collaboration between sites in Denmark and Greece. The Collaboration common components will be used by the regional application.

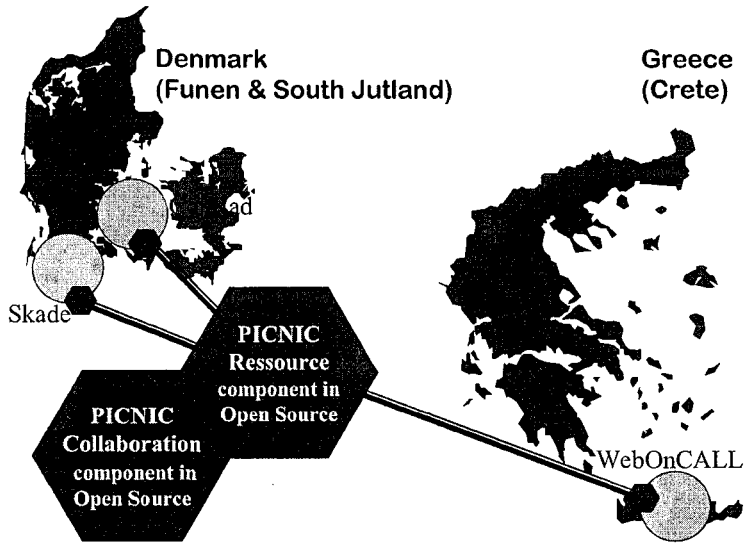


Figure 2: The Collaboration IT-service will be demonstrated between Denmark and Greece

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