HealthManagement
Promoting Management and Leadership

Volume 7 - Issue 1, 2007 - Country Focus: Radiology in Italy

Development of PACS in Italy:A National Research Programme with Worldwide Impact

Author

Prof. Paolo Inchingolo

Professor of Bioengineering

and Health Telematics

University of Trieste

Trieste, Italy

PAOLO.INCHINGOLO@BIOING.UNITS.IT

There is long-standing tradition of Italian research in the management of images, from departmental to nationwide level. Much research began at the end of the Eighties in Trieste, thanks to tight cooperation between the Group of Bioengineering and ICT (BICT) and the Higher Education in Clinical Engineering (HECE) Department of the University of Trieste, headed by myself and the department of radiology of the University of Trieste, the Centre for Research in Biomedical & Health Technologies (CRSTBS) of the Area Science Park of Trieste, the University Hospital Enterprise AOOR and the Scientific Childrens' Hospital "Burlo". These research initiatives involved the collaboration over the years of many industrial institutions, as well as various medical departments in Italy and abroad.

PACS: First European Installation

In Trieste, a CommView AT&T Philips multi-site PACS system was installed in 1988 at Trieste's Cattinara and Maggiore hospitals. This was the first European installation of a commercial PACS system in a hospital enterprise and also the first installation in Europe of two PACS systems connected over a metropolitan area network. A lot of work was done at that time by the department of radiology of Trieste to evaluate the impact and to set-up the organisation of a computer-based system to manage radiological activity.

The bioengineering research work carried out by BICT and HECE to support the expansion and the operative extension of this PACS installation started in 1991. Despite that system being so innovative for that time, it was clear that the proprietary installation was forcing users to adapt to the system and not vice-versa. The Health Telematics Laboratory (HTL) of BICT worked to open the proprietary installation by developing versatile and open source tools (essentially gateways and client workstations) for LAN, MAN and WAN communications with the PACS. In this way, it has been possible to distribute images over the hospital departments and surgery rooms of the three hospitals and the bioengineering and medical physics research centres of Trieste, with some connections overseas to the NIH in the US. In 1994, the first PACS browsing interface in the world was developed, allowing virtually worldwide image distribution without dedicated client software.

Taking the Next Step

In 1995, a totally new system named DPACS (Data and Picture Archiving and Communication System) was started. The goal of DPACS was "the development of an open, scalable, cheap and universal system with accompanying tools, to store, exchange and retrieve all health information of each citizen at hospital, metropolitan, regional, national and European levels, thus offering an integrated virtual health card of the European Citizens". In a decade, the idea of DPACS was diffused worldwide and its basic concept can be found today in the European Union Research Programmes, in particular in the FP7. A first version of DPACS was implemented in 1996-1997 at the Cattinara Hospital. In 1998 the DPACS system was running routinely for managing all radiological images (CT, MRI, DR, US, etc.).

Some new needs have been identified and used to direct developments of the project, such as a multi-lingual approach to both client and server managing interfaces and to the presentation of medical contents, a simple data & image display client interface, automatically updatable, highly portable from a PC or a MAC or a LINUX workstation to a palm or a cellular-based communicator and the ability to connect with a wide variety of communication means, both fixed and mobile. Also it requires a highly modular data & image manager/archiver, independent of the platform (UNIX/LINUX, WINDOWS, MAC) and of the selected database, improved interoperability of both server and client system components among them and with all the other information systems components in the hospital and in the health enterprise and an efficient and effective tool to "create" the integrated virtual clinical record in the hospital at home or during the travel of a citizen.

The O3 Consortium

Over the years, the EuroPACS conference has proved an invaluable platform to stimulate discussion and collaboration on these new projects. As a result, the research group of Trieste, who presented the new open source version of their DPACS-2004 project together with a universal workstation named HDW2 at the Trieste EuroPACS and the group of the radiology department of Padova, which presented the new open-source ver sion of their Raynux /MARiS project, decided to fuse and integrate their projects and efforts.

Hence, the “Open Three (O3) Consortium” Project has been formally constituted by HECE (see www.o3consortium.eu). O3 deals with open source products for the three domains of tomorrow’s e-Health, in the frame of the European e- Health programmes: hospital, territory and homecare/ mobile-care/ambient assisted living (AAL) in a citizen-centric vision. The main characteristics of the O3 open source products are multi-language support, high scalability and modularity, use of Java and web technologies at any level, support of any platform, high level of security and safety management, support of various types of databases and application contexts, treatment of any type of medical information, i.e., images, data and signals and interoperability through full compliance to the “Integrating the Healthcare Enterprise” (IHE) project.

The first set of O3 products cover all the needs of image management in radiology and in nuclear medicine at intra- and inter-enterprise levels. The most important are: O3-DPACS, the new version of DPACS enriched with many new features as, e.g., the XDS (Cross-Enterprise Clinical Document Sharing) and the XDS-I (Cross-Enterprise Document Sharing for Imaging) profiles, which allow images and data be exchanged very easily within any territorial environment; O3-RWS, a revolutionary radiological workstation, including managing of and access to MIRC (Medical Images Resource Centre) data and structured reports; O3-MARIS, a “super” RIS offering many new integration features and MIRC support; O3-XDS, one of the first XDS document repository and registry;

O3-PDA, a first step toward the opening to the home-care and mobile-care world and finally, O3- TEBAM allowing true reconstruction of the electrical brain in 3D in the presence of pathologies.

How is the O3 Community Structured?

From an organisational point of view, the O3 Community is made by all the institutions having an agreement with HECE. They are, in particular, those belonging to the international networks ABIC-BME (Adriatic Balcanic Ionian Cooperation in Biomedical Engineering) and ALADIN (Alpe Adria Initiative Universities Network), and the institutions - about 60 healthcare and industrial enterprises and governmental agencies, each having a bilateral agreement active with HECE.

In the O3 Community, an O3 Users’ Community and an O3 Developers’ Community are identified. Every member of the O3 Community can in principle ask to participate to both communities.

The developers’ community started under the responsibility and administration of HECE, with the main contributions of the Universities of Trieste and Padova and grew with many other European and US contributions, from universities to research centres and from industrial institutions. It provides the active members of the Users’ Community with all the necessary project design, site analysis, implementation, logging, authoring, bug solving, and high-level 24-hour, full-risk service. Additionally, training is highly monitored by HECE, starting with preparing clinical engineering professionals at three different levels, offering both traditional and e-Learning courses with particular skills in clinical informatics, health telematics, e-Health integration standards and IHE-based interoperability, and providing also specific courses and training on site.

Industrial Cooperations

The growing cooperation of O3 with large industries belonging to the O3 Community is another very interesting aspect, as it is especially focused on integration with territory and home-care. Two important examples are noteworthy.

Firstly, the latest developments of Technology in Ultrasound, with the introduction of High End Compact machines, are at the centre of the cooperation with GE Healthcare, focused on integration. The challenge is to improve solutions to move health services from hospitals to patients, with regards to such social groups as the elderly, children and disabled patients. Compact Ultrasound, with their capabilities to receive and transmit full patient data and exams to a remote location for a real time consultation, could help to overcome territorial or physical restraints providing high quality health services at the patient site, from prevention to treatment.

Secondly, the development of a Cardiologic Information System (CIS), able to address the patient at home, mobile or in the hospital, in relation to all the types of cardiologic information collected from him/her and with the goal to coordinate the integration with all other his/her clinical data, will be at the centre of a cooperation with AGFA Healthcare. In this way, Trieste has, over the last few decades, been at the epicentre of technological advances, with the end result of more accurate and accessible healthcare for all patients.

Published on : Thu, 1 Feb 2007