HEALTHCARE IT MANAGEMENT

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THE OFFICIAL JOURNAL OF THE EUROPEAN ASSOCIATION OF HEALTHCARE IT MANAGERS

Hospital Information Systems

Telecoms and Healthcare IT

FP-7 AND HEALTHCARE IT

THE ELECTRONIC HEALTH RECORD

MOBILE SOLUTIONS

IT AND CORPORATE GOVERNANCE

COUNTRY FOCUS: FRANCE

Volume 3 / Issue 2 / 2008

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Dear Reader,

IT is a value-add engine to every economic sector. This is now accepted wisdom. Healthcare is no exception. Yet, healthcare IT has some special characteristics. It is more data rich and sensitive than most other economic segments. However, trends in healthcare IT spending have lagged those, for example, in banks – a sector to which it might most closely be benchmarked.

The European Union's e-Health agenda aims to change this situation. E-Health requires an ever-increasing number of anytime/anywhere data inputs and intelligent, decision-ready information. As this issue's country focus section on France shows, accelerated IT spending on healthcare is a high-level, near-term priority of the French government.

And yet, France's healthcare system, as we analyse, is an excellent example of that old adage – of beauty lying in the eyes of the beholder. Thus, even as a French government appointed body released a scathing report about the state of the French healthcare system, experts in the US were advising their own government to learn from France!

Healthcare IT, by and large, means hospitals, which account for the bulk of IT spending in the sector. The EU has long been aware about the importance of hospital information systems (HIS) in what may be termed a future European Healthcare Area, and has pioneered several early initiatives (especially in the area of EU-wide standards).

Though far less than hoped for, a post-facto analysis of such initiatives may provide reality checks for the somewhat nebulous assortment of healthcare IT projects funded under the EU's 7th Framework Programme for Research (FP-7). In other words, it would be salutary to pose a straightforward question: In an era where healthcare delivery itself is undergoing a rigorous process of scrutiny (e.g under the rubric of concepts such as evidence-based medicine), is there any systematic evidence of the outcomes of ambitious healthcare IT research projects, generously funded with public money ?
This issue of HITM provides an overview of 24 key projects financed by the FP-7 (with a value of over 100 million Euros). In our next issue, we intend to explore the subject further, by investigating the achievements of healthcare IT projects funded by the preceding (and now-complete) Sixth Framework Programme for Research.

Like HIS, the laboratory information management system (LIMS), another bedrock of healthcare IT, also faces some deep-seated, and far-reaching challenges. Not least here is the explosion in data/ workloads and the inefficient 'heritage' of legacy systems. The current issue of HIT takes a look at a decision by a US university to build rather than buy a new LIMS.

The overwhelming challenge for Europe's healthcare agenda in the near term, however, is the Electronic Health Record (EHR). This issue describes efforts by EuroRec to set benchmarks that ensure quality control and interoperability of healthcare IT systems, as well as that critical confidence-building tool, namely certification.

This issue of HIT also considers the role of Big Telecom in hospital modernisation. Given the sheer scale of these revamps and the ever-changing opportunities offered by new networking and communications technologies, telecoms companies are fast becoming key actors in healthcare IT.

Within the shifting sands of healthcare technology and policy lies another question. Can IT-mediated corporate governance systems inspired by the private sector be applied to hospitals, in particular the non-profit hospitals which underpin the European healthcare landscape ? A Belgian university expert provides our readers an incisive analysis.

Yours sincerely,
Christian Marolt (CM)

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HEALTHCARE IT MANAGEMENT

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TELECOMS AND HEALTHCARE IT

The sheer scale of hospital modernisation projects and the ever-changing opportunities offered by new technologies have combined to make telecoms companies key actors in the process.

Page 40-47
COUNTRY FOCUS: FRANCE

Recent years have witnessed a sharp escalation in awareness in France to pioneer new directions in healthcare IT. Nevertheless, the country's health system is sometimes a paradox, both for expert observers within the country and those overseas.

THE EUROPEAN ASSOCIATION OF HEALTHCARE IT MANAGERS (HITM)

The European Association of Healthcare IT Managers

The European Association of Healthcare IT Managers (HITM) is a non-profit pan-European umbrella association of all relevant national healthcare IT associations in Europe.

Believing in the fundamental importance of unifying healthcare IT professionals at European and global levels, HITM is committed to increasing the professional authority and responsibility of healthcare IT managers and representing their interests to international institutions and associations.

HITM is strategically based in Brussels, for easy access to the European institutions and associations.

HITM's Mission

- To establish common healthcare IT standards, best practices, cross-border collaboration, unifying policies and strategies at EU and international levels
- To increase the visibility, role and importance of IT management in healthcare facilities
- To educate key policy-makers, industry players and the general public about the benefits of healthcare IT
- To promote cross-collaboration in different healthcare sectors
- To promote the efficient, cost effective use of IT

HITM's Membership Opportunities

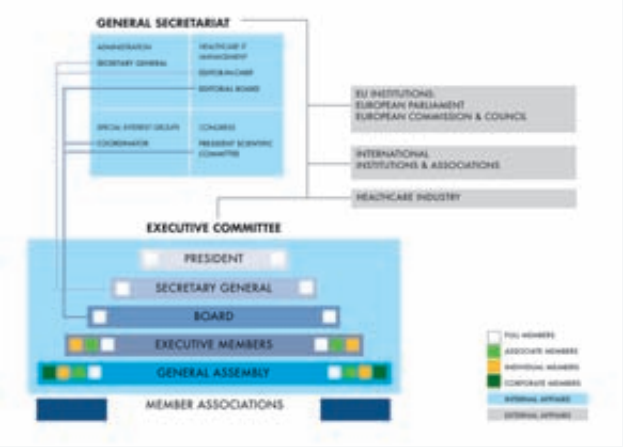
- Participate in advocacy groups that impact healthcare IT legislation
- Share knowledge with peers
- Learn about, and contribute to industry best practices and standards
- Attend the HITM Annual General Assembly and network with colleagues

HITM Membership Categories

- Full Members - are national healthcare IT associations, or if there are none, regional but nationally important healthcare IT associations or groups. Full members must be constituted according to the laws and practices of their country of origin.
- Associate Members - are healthcare organisations, academic institutions, or associations indirectly involved in healthcare IT management and constituted according to the laws and practices of their country of origin.
- Individual Members - are individuals directly involved in healthcare IT management but who are not members of any relevant regional or national healthcare IT association.
- Corporate Members - are representatives from corporations engaged in supplying products and services to the healthcare IT sector.

For more on HITM and information about membership, **please contact Catalina Ciolan, Project Director, at c.c@hitm.eu**

Organisational structure



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Society for Medical Informatics of Bosnia & Herzegovina

BULGARIA
National Center for Health Informatics

CROATIA
Croatian Society for Medical Informatics

CZECH REPUBLIC
EuroMISE Center

Czech Society for Medical Informatics and Scientific Information

GEORGIA
Georgian Telemedicine Union

GREECE
Greek Health Informatics Association

ITALY
Associazione Italiana Sistemi Informativi in Sanità (A.I.S.I.S.)

LITHUANIA
Telemedicine Center of Kaunas University of Medicine

MOLDOVA
Center for Public Health

NETHERLANDS
NICTIZ

NORWAY
Norwegian Centre for Telemedicine, University Hospital North Norway

PORTUGAL
EHTO-European Health Telematics Observatory

ROMANIA
Romanian Society of Medical Informatics

SLOVENIA
Institute of Biomedical Informatics, Faculty of Medicine

Slovenian Medical Informatics Association

TURKEY
Turkish Medical Informatics Association

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AUSTRIA

Austrian Hospital to Implement Personnel Administration System

A personnel administration system has been implemented at Allgemeines Krankenhaus Wien (AKH), Austria. AKH in Vienna is one of the country's biggest hospitals with 2,100 beds and 9,000 staff, including around 1,500 doctors. The software package, called 'on duty', will be provided by systema, a subsidiary of German IT firm CompuGROUP, and is aimed at increasing personnel administration and duty scheduling, thereby increasing the efficiency of the clinic.
"This success of 'on duty' emphasises once more that our products fit the Austrian hospital segment. We will insistently and step by step work on further establishing this solution as a motor for improving the operational situation of clinics," announces systema CEO Willibald Salomon.

For more information, please visit: **http://www.systema.info**

BELGIUM

HIT@HEALTCARE - A Unique Joint Event (8-10 October, 2008)

For the first time in the healthcare history of Belgium and The Netherlands, four e-Health professional associations have decided to join forces in order to organise an international conference and exhibition in Brussels. This event will coincide with the celebration of the 25th MIC Congress of MIM and VMBI and the 3rd SIXI International Congress completed by the NVKVV-ISV event.
The e-Health event will elaborate on improving communication and continuity in healthcare as well as data exchange and dissemination of current international/national/regional projects results.

For more information, please visit: **http://www.bmia.be/**

PORTUGAL

Portuguese Health Centers to Implement Integrated Patient Record

Five healthcare facilities in Portugal have implemented a hospital information system to integrate patient records. For this project, Espirito Santo Saúde (ESSAUDE), the private healthcare group that delivered the systems, partnered with vendor iSoft. Even within one month of the project, the five centers were using patient administration systems in several departments such as outpatient, inpatient, infirmary, and pharmacy. The system has been installed in only four months and is running on a single database (the solution provides integrated >> patient management, clinical and financial applications across the five centres). The hospital information solution allows patients' medical histories to be managed electronically with clinical tools which provide accurate information for point-of-care tests as well as providing access to previous diagnoses and test results.

For more information, please visit: **http://www.ehto.org/**

SLOVENIA

Gemalto Service to bring Slovenia's e-Health Cards

According to Gemalto, a European digital security company, the new card to be implemented in Slovenia will be the first in Europe to feature a Java public key infrastructure (PKI), which will enhance the online health system by offering digital signatures for healthcare professionals. In 2000, Slovenia was among the very first countries, together with France, to introduce microprocessor-based health cards. The country is now renewing and upgrading the two million e-Health cards currently in circulation in the country. The latest generation of Gemalto e-Health solutions for Slovenia will significantly enhance online services for health professionals by enabling them to go through their administrative tasks faster and exchange medical data and messages with hospitals and other health professionals in an easy and secure manner.

For more information, please visit: **http://www.gemalto.com/**

TURKEY

Turkish Doctors Pilot New Decision Support System

European and Turkish doctors and technicians have developed a medical support system (Saphire) which can track patients' real-time vital signs, link them to patient medical history, and provide the latest clinical guidelines for patient care. The Intelligent Clinical Decision Support System (ICDSS) can also notice the doctors when necessary and offers a range of services that combine scattered information stored in different systems into a new, more powerful application.
Doctors hope it will mean certain patients can be transferred to regular wards sooner, making beds in critical care units available. The system has also been designed to provide a boost to the training of young doctors and it is supposed to minimise the risk of medical errors, and a far better level of at home care too.
The team are now seeking to commercialise the Saphire platform for use in hospitals globally.

For more information, please visit:
http://www.srdc.metu.edu.tr/webpage/projects/saphire/index.php

MED-E-TEL 2008

The European Association of Healthcare IT Managers (HITM) invites you in the month of April to Med-e-Tel, the International Educational and Networking Forum for eHealth, Telemedicine and Health ICT. Med-e-Tel offers opportunities to meet and network with telemedicine and e-Health users, researchers, care providers, policy makers and industry representatives from over 50 countries around the world.

The event provides hands-on experience and an opportunity to discover and evaluate new products, systems and technologies and to hear about the latest telemedicine and e-Health research, trends and developments. Med-e-Tel features an extensive educational and conference program with more than 150 presentations and workshops on a wide variety of telemedicine and e-Health topics.

The event also sees active involvement and participation of the World Health Organization, World Academy of Biomedical Technologies, Continua Health Alliance, International Society for Telemedicine and e-Health and a range of other national and international organisations.

Furthermore, if your answer to one or more of the questions below is "YES" then the HITM delegates would like to meet you at Med-e-Tel 2008:

- Do you want your hospital to become paperless?
- Do you want to find information about the latest develop ments in the field?
- Are you looking for products to distribute in your market place?
- Do you want to use your nursing staff more efficiently, have them make less home visits and yet increase the overall quality and efficiency of your home care service?
- Do you want to provide your patients with professional second opinions from other locations around the world?
- Do you want to meet with colleagues to exchange ideas and discuss visions for the future?
- Do you want to find out about products and services that can make your professional activities more efficient and effective?

Med-e-Tel 2008 is scheduled for 16-18 April in Luxembourg and for more information, please visit: **http://www.medetel.lu**

2008 CIO Forum, Orlando, Florida

Presented by CHIME (College of Healthcare Information Management Executives) and HIMSS (The Healthcare Information and Management Systems Society), this year's CIO Forum provided a breath of fresh air and a motivational mix of inspiration and strategy for over 100 attendants. The CIOs present at the Forum enjoyed the perspectives of four experts on a variety of issues.

Princeton University's Dr. Uwe Reinhardt, for example, surveyed the challenges facing the American health system in the following decade and its implications for IT executives.

Dr. Reinhardt discussed the utopian solutions now being debated and explored how a more energetic application of IT, appropriately backed with substantial public funding, could address many of the challenges ahead.

On the other hand, John Timmerman, Vice President of Ritz-Carlton presented an overview of the legendary quality of services his group is known for. "What others call complaints," says John Timmerman, "we call opportunities." Ritz-Carlton was the only service company to have won the Malcolm Baldrige National Quality Award twice. Mr. Timmerman shared insights into the employee selection, orientation, training, and empowerment programmes that have earned Ritz-Carlton its enviable reputation and offered approaches on how to make the most of similar opportunities within one's own organisation.

On his part, Matthew Holt, an independent healthcare strategist, chose the topic of Health 2.0: User-Generated Healthcare. In his opinion, blogs, wikis, podcasts, user-generated videos and specialised searches have been generating a fundamental shift away from the traditional flow of information as defined by the current healthcare system. Raising questions such as the tools to be subsumed into the system, or if health system CIOs should care, Matthew Holt brought his own unique perspective on Health 2.0's economic, socio-political and competitive imperatives and what it might mean for all of us.

Last but not least, Colonel Ragsdale provided an inspiring view on the Changing Face of Leadership. He drew on lessons learned from his tenure as a technologist (the Colonel is a Ph.D), with active duty experience in the Army and a deep understanding of the new 'what's-in-it-for-me' workforce, to discuss how the leadership and mentoring models of the US Military Academy at West Point may create a practical approach for contemporary CIOs.

For more information, please visit:
http://www.himssconference.org/

The World Health Care Congress Europe 2008, Berlin, Germany

This year's 4th session of the World Health Care Congress Europe opened its doors with an executive seminar on Innovative Care Management Services sponsored by Accenture. Dr. Thomas Zahn discussed the concept of ACMS as well as the results of their pilot in Germany and the implementation phase with Health Dialog/CNAMTS in France. During the three conference days, four concurrent summits invited experts and participants in the field of Chronic Disease Management (Summit 1), Health IT Implementation (Summit 2), Health System Performance (Summit 3), Quality and Patient Safety Improvement (Summit 4) to express their views.

Within the first Summit, Prof. Richard Grol focused on the development of evidence-based medicine as a means to dramatically improve quality in chronic care after years of inadequate efforts. In his perspective, a positive attitude and culture at the workplace is seen as crucial for sustainable change. In terms of measurement of performance, Bert Vrijhoef (Netherlands) underlined the necessity of complex interventions and their evaluation in order to measure success in chronic care programs. An example of a National Strategy was provided by Israel's Prof. Shani who showed that even in a country with just four existing HMOs (and excellent IT systems), several problems persist in terms of integrating data from different sources alongside the lack of definitions and common diagnostic references.

The 2nd Summit focused on the EHR and its utility for improved care and workflow as well as telehealth and remote monitoring. Dipak Kalra's presentation on a common standard for sharing EHR worldwide was an excellent overview of why semantic interoperability remains a key challenge.

Last but not least, the 3rd and 4th Summits focused on payers and providers and focused on issues of healthcare performance and patient safety. Guenter Danner's deliberations on national reforms of healthcare under the EU's supranational economic constraints questioned the balance between State intervention and rationing on the one hand and free choice and market solutions on the other. Furthermore, the presentation on patient safety by Benedetta Allegranzi (from the WHO World Alliance for Patient Safety First Global Patient Safety Challenge) explained the reasons behind the launch of the First Global Patient Safety Challenge the following year (which aims at tackling healthcare-associated infections worldwide).

For more information, please visit:
http://www.worldcongress.com/Europe

PRESSURE FOR PROGRESS
ON LEAD MARKETS FOR E-HEALTH

In early 2008, the European Commission requested the strengthening of national co-operation on lead market opportunities for e-Health with the aim of improving the quality of health services and an increase in economic benefits. When talking about e-Health in this context, one should go back to the Aho Report on "Creating an Innovative Europe" that recognised the importance of information and communication technologies (ICT) in tackling specific challenges which the healthcare sector faces, thus identifying e-Health as a "lead market" with considerable potential and the necessity for specific and timely attention.

Therefore, a "lead market" is essentially a strategic one. It can be interpreted in terms of a market for innovative products and services or technological solutions with high growth potential; a market where EU industry can develop competitive advantage to lead in international markets; a market that requires action by the public authorities to deal with regulatory obstacles.
In late December 2007, the EU Commission published another report on accelerating the development of the e-Health market in Europe. On this occasion, it was stated that when predicting the return on investment in e-Health, it could be considered as being relatively high when compared to costs inherent in the health sector. Drafted by a Commission e-Health task force from several DGs, the report comprises a number of policy recommendations for areas of intervention up to 2010. These recommendations, directed at industry, Member States and other e-Health stakeholders, focus on four key challenges to the development of the e-Health lead market, namely:

- **Reducing market fragmentation** and lack of interoperability through pilot actions, benchmarking, standardisation and certification
- **Improving legal certainty and consumer acceptance** by possibly adopting a legal initiative for e-Health and telemedicine as well as an initiative to enforce personal data protection legislation, disseminating best practice and guidelines
- **Optimising funding opportunities** through strengthened national and community R&D co-operation on e-Health; and
- **Improving procurement** by facilitating the expression of public demand through more innovation-friendly procurement activities and networking public procurers.

As for the next steps to be taken in the field of lead markets for e-Health, it is expected that on a short-term basis, the Council should adopt the Lead Market Initiative. By mid-2008, the EU should propose concrete actions to help Member States launch public procurement actions in high-risk technological fields.

For more information, please visit:
http://ec.europa.eu/information_society

EU FACE TO FACE WITH THE RFID REVOLUTION

In the field of RFID (Radio Frequency Identification) chips, the European Union is losing the technological battle for mass deployment, seen as the driver of the creation of an "Internet of things," the Commission declared. RFID chips have already been deployed at a significant scale all over the world while their implementation can be found in sectors such as the auto industry, transport (luggage retrieval), healthcare (for safer blood transfusion), pharmaceuticals (against counterfeiting) etc. By allowing objects to exchange information among themselves, RFID chips have the potential to create an "Internet of things" (defined as the vision that in the future the real world will come closer to the virtual world). Although depending on many other technologies, the "Internet of Things" vision relies partially on the development of the RFID technologies, while the world market for these devices in 2007 has been estimated at 4.2 billion euros, with the Commission predicting it could grow five-fold within ten years.

What has the European Commission done on RFID?

In the field of RFID, recent actions by the Commission can be summarised as follows:

- March-October 2006: the Commission conducted a series of workshops and a first public consultation to build a consensus on key issues associated with the development of RFID technologies
- November 2006: the Commission made spectrum available for RFID in the UHF band 865-868 Mhz
- March 2007: the outcome of the previous workshops and public consultations were summarised in an official Communication. Further action was expected by the public in terms of privacy and data protection
- June 2007: the Commission established an RFID Expert Group which would, amongst other things, advise on the elements to be included in an upcoming Commission legal instrument on the implementation of privacy, data protection and information security principles in applications supported by RFID.

Still a Fragmented Market?

The answer is clearly "Yes". The European market is still highly fragmented, with different approaches developed at national level and wide intra-EU variations regarding overall knowledge and development of the new technology.
Another European shortfall in the uptake of RFID is extremely poor awareness about their benefits and even of their existence by the majority of citizens. This was indeed one of the reasons why the Commission is about to launch an Information Day on RFID (likely to be held on 23 April).
To approach this structural deficit, the EC will introduce a "thematic network" this year, aimed at making stakeholders discuss common approaches including EU standards to develop the new technology more quickly and more safely. Towards this, the Commission has allocated 800,000 euros from its budget.

Status of Privacy Issues

While there is a broad recognition of the economic benefits of RFID, the European deployment of this technology is still far behind the other main global actors. This observation is made by Gerald Santucci, a Commission official in charge of RFID who argued, "We are seeing things being shaped, but they are shaped outside Europe".
At the foundations of this low penetration of RFID in Europe lie perceived legal and privacy-related risks. As a result, instead of exploring ways to deploy the devices, the debate on RFID in the EU mainly focuses on data protection. However, EU law addresses these concerns in various legal instruments, including the 1995 Directive on the protection of individuals with regard to the processing of personal data and the free movement of such data (the so-called Article 29 Working Party which advises the Commission on Data Protection matters, including implications of new technologies like RFID). Paradoxically, despite this wide array of rules and laws, which has created a complex legal framework, concerns are still being raised on privacy matters.

EC Public Consultation for a Draft Recommendation

At the present moment, the Commission is consulting the public on whether an additional legal instrument (such as a Recommendation) could add legal certainty and provide guidance on the interpretation of EU data protection law when RFID technologies are used. The main elements proposed in the draft Recommendation can be summarised as follows:

- Operators should conduct a risk assessment prior to deploying an RFID application to ensure privacy risks have been properly evaluated
- The industry is encouraged to establish codes of conduct governing the use of RFID
- Operators should provide a minimum level of information to users of tagged products
- Operators should follow a series of information security measures when deploying RFID applications
- Specific provisions should apply to the retail sector when a product containing an RFID tag is sold; the Commission is considering a harmonised sign that would inform consumers when RFID tags are used
- Member States are encouraged to raise awareness among citizens and SMEs through information campaigns or large-scale pilot projects
- Member States should continue their efforts in Research and Development to improve the privacy features of RFID.

The final challenge for the EU will be to shape RFID-related activities within Europe and disseminate them in a constant and visible manner.

For more information, please visit: **http://ec.europa.eu/information_society**

HOSPITAL INFORMATION SYSTEM IN THE E-HEALTH ENVIRONMENT

AUTHOR
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Though their mission remains much the same as before – to deliver healthcare, hospitals have changed considerably over recent years – both in terms of appearance and content. In the face of the emergence of the new e-Health environment, one of the clearest aspects of such changes is the evolution of the Hospital Information System, with accommodation to an ever-increasing number of anytime/anywhere data inputs and decision-ready information presentation requirements.

A modern hospital has to be recognised as a complex organisation which covers two main areas of activity: patient care on one hand, and the operational functioning of an institution on the other. The hospital organisation has also been continuously changing in character and requirements. Increasing interest in quality of care and a better control of costs based on a fixed-budget system permit (and in fact, increasingly require) a hospital to be market oriented.

Meanwhile, in Europe in particular, healthcare reforms have seen the organisation of the hospital itself evolving from a vertically-integrated structure towards a set of specialised departments – each with its own clinical, as well as logistical, operational and administrative requirements.

These changes are steadily and systematically forcing hospitals to rely increasingly on computer-based information systems. This is the only way to collect, store, process, communicate, and present large quantities of data. These requirements can largely be met by a hospital information system (HIS).

The Hospital Information System: The Heart of the Healthcare IT Machine

The function of an HIS is to support hospital activities on operational and strategic levels. Particular functions of an HIS can be characterised as:

- support of day-to-day activities
- support of the planning and organisation of these day-to-day activities
- support of clinical research and teaching through use of the HIS database (particularly important for university hospitals)
- support of control and correction of planned activities and their costs, in view of agreement on medical and financial policies (usually called a management control).

The means by which an HIS can meet such requirements depend on a variety of technical and organisation factors. A hospital information system usually contains:

- facility for the data storage (i.e. database)
- facility to enter, retrieve, and edit data stored in the database
- data communication facilities
- facilities that enable the user to use the system.

Design and Implementation

The development of an information system, followed by its effective implementation, requires a close collaboration between the users (i.e. managers and physicians) and computer scientists. The first group creates favourable conditions, supply capacity and offer their knowledge of the subject matter, whereas the second group offers the knowledge of the technology to be employed and the software.

The collaboration calls for several phases. Information planning and definition study usually begin the project. Then, global design at the level of a system analysis and a system design prepare for building and testing the final application. Acceptance tests allow for implementation and clinical usage.

In order to maintain the quality of patient care in an efficient and cost-effective manner, a hospital information system needs to be created by interfacing and integrating many disparate applications. These applications will neither come from a single vendor nor run on a single server. Therefore, certain standards should be met at the system level and application level.

Electronic health information and services available over networks such as the Internet and related technologies such as digital TV/WebTV, wireless media including Web-compatible mobile phones and personal digital assistants (PDAs) open up new frontiers to medical activity able to redefine health care and change the physicians and patients requirements.

The Inherited Legacy

Systems designed in the previous century offer enormous storage space able to archive huge amount of information on patients accumulated in various healthcare institutions.

However, this creates many difficult problems to overcome in the design of new hospital information systems. Data management, extraction and processing of required information become a true challenge. The privacy of information has rapidly

become both a legal and ethical issue, and the quality and reliability of information are also important issues in the hospital information systems.

On the other hand, patient care and administrative information can be communicated to authorised users in order to satisfy their functional requirements. Access to the patient information (both image and alphanumerical) at any time and place becomes more and more crucial.

It is required, for example, both at a patient bedside as well as access from outside the hospital. Web applications implemented on PDAs have begun to make such dreams real.

Moreover, authorised users may be provided with medical services through an unmodified web browser. This web-based environment should integrate patient records and allow the discussion of medical cases and promote remote opinion request and tele-consultation. The latter may be of particular importance in an emergency case that has occurred far away from a medical centre.

E-Health and HIS: Opportunity and Challenge

One of the biggest opportunities – and challenges – of e-Health and related developments is to bridge the gap between evidence-based medicine and patient-centred medicine. This requires an access to information about the advantages and disadvantages of all courses of actions.

In other words, two types of data have to be provided to patients before they will be able to make a shared decision:

- First, the patient-related information which refers to the individual and the case (medical data, diagnosis, personal risk factors, etc.)
- Second, general information about the external medical evidence (effectiveness of different interventions for a given disease, recovery, possible risk, etc.).

Quality of information, including accuracy and completeness, is another issue to be solved. However, few could argue that such a process will lead to positive involvement by patients in the decision-making process of their future treatment.

To conclude, hospital information systems, as the hub of electronic health information and services must provide healthcare professionals with the necessary infrastructure to collaborate with their peers, share opinions, exchange clinical data, and access required information. An integrated HIS should facilitate the interaction and active participation of a large number of authorised users to satisfy functional requirements and evaluate the information repositories in the wider healthcare network to provide the greatest benefit for all patients.

The Hospital Information System

HEALTHCARE IT MANAGEMENT
ANALYSIS

The hospital information system (HIS) has several parallels to a clinical information system (CIS), and some vendors still offer 'new' solutions as dual HIS-plus-CIS.

However, it is generally accepted that HIS (will) go further as a comprehensive, integrated information system which manages all clinical, as well as administrative, financial and other supporting operations at a hospital; recently, for example, some HIS offerings extend to clinical data warehousing and knowledge management for physician decision support.

Crucially, HIS systems should be open-ended – in other words, they must remain flexible to accommodate the emerging e-Health environment, including new standards, conventions and practices.

Given that HIS are part of a still-evolving framework, they must encompass both paper-based data processing as well as both legacy and new-generation IT systems or devices – and do this with maximal efficiency.

At the moment, it is not uncommon to find HIS systems consisting of a handful of core software applications with specialty-specific extensions (e.g dermatology, orthopaedics, dialysis, the OR, blood-banks etc.).

The HIS interfaces with existing sub-systems such as the Laboratory Information System, Radiology Information System, PACS, the hospital pharmacy and computerised prescription order entry. It is also integrated with bespoke IT platforms running in areas like the ICU, ambulatory/outpatient care, admissions, appointment scheduling and post-treatment follow-up, as well as in more traditional administrative areas such as payrolls and invoicing, procurement and supply chain management.

One of the most challenging issues concerns the communications component of the HIS, usually mediated by the Internet and/or dedicated Intranets, with state-of-the-art access controls and transmission security given as an imperative. This is targeted at communications among healthcare staff, the transfer of clinical information on patients between two or more hospitals/clinics for consultations or decision support, remote retrieval of up-to-date medical information, etc.

On the design side, there is a clear trend to structure new HIS systems in a multi-layered, modular matrix, as a 'federation' of distinct, autonomous applications which are each optimised to support specific requirements of different users and user groups. Indeed, the sheer diversity of individual hospital organisations across Europe, as well as the complexity of clinical protocols in use and the variety of preferences (many innate to specific healthcare cultures in different EU Member States) has made it difficult to conceive of a unique, 'monolithic' system applicable across the entire continent.

And yet, there are powerful forces for standardisation, not least in the shape of the emerging EHR (electronic health record). Indeed, one of the greatest challenges is to future-proof new HIS systems to the EHR and to the telemedicine dimensions of the e-Health environment.

THE EDITH AND HANSA PROJECTS

The EU's First Shots at a Healthcare Information Highway

The European Union has long been aware about the importance of hospital information systems (HIS) for efficient and cost-effective European healthcare delivery. Two of its core initiatives in this respect date back to the 1990s, namely the EDITH and HANSA projects.
Their adoption and dissemination may have been far less than the EU hoped, and although there is a concerted effort to propagate them in eastern Europe, very few outside the projects' original participants are aware of either project. Part of this is no doubt the result of continuing flux in both expectations and industry's own commitments to HIS – as well as the sometimes nebulous choice of healthcare projects selected for support under the EU's healthcare RTD efforts (a topic assessed in some detail in our Feature in this issue on the Seventh Framework Programme – page 31-33).

The EDITH Initiative

The EU's EDITH (European Distributed Informatics Technology for Healthcare) project was launched in 1992 to group together several existing projects in different European countries aimed at developing a comprehensive healthcare IT reference architecture.

It aimed at proactively catalysing convergence in collaboration by independent healthcare, governmental and research organisations as well as private corporations across the EU. EDITH remains one of the bedrock EU initiatives with relevance for HIS systems. Though it has not received widespread endorsement (or even acknowledgment), it illustrates the conceptual approach of EU policy-makers to HIS.
EDITH clearly foresaw that the integration of research, clinical, technical and managerial know-how in the healthcare area would be an imperative for the identification, design and construction of futuristic HIS solutions.

The project sought an open, vendor-independent architecture, and aimed to allow interoperability of both existing and new applications, within an individual hospital and across Europe. EDITH, in turn, was based on the HISA (Health Information System Architecture) standard, to provide for effective operation and inter-working of a range of legacy and future healthcare software applications.
Some of its major achievements are listed below:

- EDITH specified the architectural kernel for specification of a hospital information system. Its principal IT components provide any generic application with a common technological platform and services specifically targeted at the hospital domain in order to facilitate both consistency and interoperability of distributed, heterogeneous applications.
- It provided a set of applications, which promised to provide advanced support for the key requirements of any hospital, from both clinical and managerial/ operational sides (including indicators on cost and quality of services).
- EDITH also built an IT-centric hospital organisational model, which could be deployed to identify strategies and plan introduction of new IT systems, if required alongside the parallel modernisation of existing ones.

EDITH architecture

EDITH's architecture aimed at both standardising and flexibly future-proofing Hospital Information Systems, especially in terms of a middleware standard known as DHE (Distributed Hospital Environment). As expected, its core objective was to integrate different, heterogeneous hospital and healthcare IT applications to obtain interoperability and mutual consistency, and achieve this from both functional and information provision viewpoints.
Crucially, while EDITH acknowledged the reality of vendor diversity, it aimed to provide a workaround for users who sought to avoid vendor lock-in.
The key to such goals was to define an open architecture with individual modules having the following characteristics:

- Individually responsibility for autonomous and self-consistent functional areas
- Interoperable through stable, non-proprietary interfaces
- The ability to operate in a distributed environment
- Evolutionary according to the IT environment, new requirements and other specific characteristics of individual hospitals

The EDITH architecture is based on two sub-systems:

- NICE (Network Independent Communication Environment). This technology platform (in reality a platform of standard APIs) aims at transparency of existing hardware and software configurations, permitting interaction of the individual modules of an IT system over a distributed, heterogeneous environment.

Bedside Information Systems

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ECRI Institute, a non-profit organisation, dedicates itself to bringing the discipline of applied scientific research in healthcare to uncover the best approaches to improving patient care. As pioneers in this science for nearly 40 years, ECRI Institute marries experience and independence with the objectivity of evidence-based research.

ECRI's focus is medical device technology, healthcare risk and quality management, and health technology assessment. It provides information services and technical assistance to more than 5,000 hospitals, healthcare organisations, ministries of health, government and planning agencies, voluntary sector organisations and accrediting agencies worldwide. Its databases (over 30), publications, information services and technical assistance services set the standard for the healthcare community.

More than 5,000 healthcare organisations worldwide rely on ECRI Institute's expertise in patient safety improvement, risk and quality management, healthcare processes, devices, procedures and drug technology. ECRI Institute is one of only a handful of organisations designated as both a Collaborating Centre of the World Health Organisation and an evidence-based practice centre by the US Agency for healthcare research and quality.

For more information, **visit www.ecri.org**

*These recommendations are the opinions of ECRI Institute's technology experts. ECRI Institute assumes no liability for decisions made based on this data.

ECRI-RECOMMENDED SPECIFICATIONS *

MODEL	BASIC BEDSIDE INFORMATION SYSTEM
WHERE MARKETED	
APPLICATION AREA	Multidisciplinary care areas
HOSPITAL SIZE, BEDS	>10
NUMBER OF USERS SUPPORTED	>1
SYSTEM CONFIGURATION	
Operating systems	By user IT infrastructure
Database management system	By user IT infrastructure
Storage media	Hard disk, optical, DAT, SAN, RAID, jukebox
NETWORK	
Communication protocols	TCP/IP, Ethernet
Architecture	Client/server or distributed, WAN, LAN
Cable type	Any
STANDARDS SUPPORTED	HL7
DATA INPUT/DISPLAY	
Bedside terminal	Stationary, wall mounted, portable (handheld or cart)
L x W x H, cm (in)	
Weight, kg (lb)	
Input device	Keyboard, mouse, trackball, light pen, touchscreen, bar-code wand, voice
Screen, cm (in)	
Input device	Keyboard, mouse, trackball, light pen, touchscreen, bar-code wand, voice
CLINICAL FUNCTIONS	
User-defined screen , nursing care plan, flow sheets, nursing, medical/surgical, ICU	Yes
OB , order entry, results reporting, QA, audit trail, printed report	Yes
ADT	Yes
Decision support	Optional
Others	As required by user
DATABASE INTEGRITY	Backup or redundant, full transaction logging
UPS	Preferred, but optional
SYSTEM SECURITY	Multilevel user ID and password
HIS INTERFACES	
NUMBER OF BEDSIDE DEVICE INTERFACES	2
SYSTEM RESPONSE, seconds	3
OTHER SPECIFICATIONS	
LAST UPDATED	

DEIO/GE HEALTHCARE	GE HEALTHCARE	PHILIPS	SIEMENS
CENTRICITY CRITICAL CARE CLINISOFT	**CENTRICITY ACUTE CARE**	**INTELLIVUE CLINICAL INFORMATION PORTFOLIO ICIP D.0<1>**	**Soarian CIS**
Europe	Worldwide	Worldwide	Worldwide
Medical/surgical, ICU, NICU, NeuroICU, ER, MICU, PICU, etc	ED, OR/PACU, ICU/CCU, general care, medical/surgical, pediatrics	All ICU applications, intermediate medical/surgical, PACU, OR	Clinical applications (doc, departmental orders, CPOE, interdisciplinary plan of care)
Unlimited	All	Up to 2000 beds for ICU & stepdown	Unlimited
Unlimited	Depends on hardware selected	Unlimited	Unlimited
Windows 2003	Windows NT/2000, high-end Dell or HP server class machines; Centricity can be used on any Windows 2003 advanced server	MS 2003 (sever), MS XP Pro (client)	Windows 2000 server and advanced
Relational, SQL-Sybase adaptive server	Microsoft SQL Server 2000	SQL 2000	MS SQL
RAID 10 hard disk and DAT standard, user configurable	RAID 10 SAN CD-R	Hard disk, DAT	Database server for backup to HD
			TCP/IP, HTTP, HL7, DICOM, XML,
Ethernet, TCP/IP	Ethernet, TCP/IP	TCP/IP	OPENLink, Token Ring, Ethernet
Client/server	Client/server, Web	Microsoft .NET	Client/server
Fiberoptic CAT5	Fiberoptic CAT5	CAT5 minimum	CAT5, twisted pair
HL7	HIPAA, HL7, IEEE 802.3 and 802.11 a/b, DICOM, CCOW, SCP-ECG	CCOW, HL7, ODBC, XML, ASTM	HL7, DICOM, XML, J2EE (supported as standard for Web services)
Standard PC; laptop and flat-panel displays if requested	Portable handheld, notebook; mounted desktop	Fixed, portable, laptop, notebook, tablet PC's; minimum 1024 x 768, applications accessible from Philips IntelliVue patient monitor	Any
Size of standard PC or laptop	Varies (based on equipment selected)	Varies (based on device)	Varies
Size of standard PC or laptop	Varies (based on equipment selected)	Varies (based on device)	Varies
Keyboard, mouse, RS232/TCPIP	Keyboard, mouse, light pen, touchscreen	Keyboard, mouse/trackball, graphic tablet, touchscreen; applications can be accessed from Philips IntelliVue patient monitor	Any Web-browser device
Not specified (remote viewing station)	Varies (based on equipment selected)	Optional	Varies
Keyboard, mouse, RS232/TCPIP	Keyboard, mouse, light pen, touchscreen	Varies (based on device)	Any
Yes	Yes	Yes	Yes
Yes	Yes	No	User configurable
HL7	Yes	Yes	Yes
Yes		Yes	Yes
Not specified	Clinical messaging and alerts via fax, pager, e-mail	Progress notes; patient census; notes and forms; patient summary; image copy/paste; waveform import from IntelliVue Information center, any kind of score; diagnosis coding (ships with ICD-9-CM); implementable with other systems, including CPT-4, ICD-10, or OPCS-4; problem list; procedure list/notes, pump interface, order communication for seamless data exchange with CPOE, order management system within ICIP	Workflow management, worklists, problem list management
Full transaction logging	Full transaction logging, mirrored databases and application servers, redundant patient files, data verification process	Not specified	Yes
Optional	Server, optional clients	Yes	Yes
Multilevel user password, user ID	Multilevel security and authentication, application, network, and database	User passwords, user- and role-based permissions and access, Microsoft Active Directory, auto logout	Yes
SeeBeyond e*Gate HL7 compliant	Unlimited via HL7 or custom	ADT, laboratory, order communication, text	Yes
TCP/IP	Up to 8 per bedside via Octacomm peripheral device	Unlimited	By user requirements
Not specified	<2 per refresh	Not specified	Not specified
Not specified	Configurable without programming; census tracking and ability to view PACS and ECG images online	Comprehensive charting, including flowsheet, notes, and forms applications, configurable autocharting of vital signs and device data; reporting capability with data readily retrievable for analysis, configurable autocharting of vital signs and device data; calculation engine based on Visual basic; clinical decision support displays; structured text entry for progress notes	Not specified
Jan-07	Jan-00	Jan-07	July-05

...CONTINUED FROM PAGE 15

- DHE (Distributed Hospital Environment). DHE is a healthcare application infrastructure, which represents the hub of the EDITH architecture. It is responsible for the functional and information integrity of the system, according to clinical and procedural requirements of a specific user.
  DHE is constituted by a set of services, which are specifically oriented to the healthcare business domain, and in this respect has impressive precursors to contemporary SoA (service oriented architecture). It was essentially aimed at data management for the entire healthcare enterprise and execution of relevant activities, alongside support to interaction of the different IT applications in individual units (ward, laboratory, radiology, patient admission/ discharge, and last but not least, customisable managerial oversight including use of DRGs). The services provided by individual DHE components are invoked through client-server mechanisms.

DHE: The HIS nervous system of EDITH

In an IT architectural context, DHE consists of a set of software modules/servers, which interact with different client applications. Within EDITH, DHE has the highest pertinence for hospital information systems, and in many senses represents its nervous system. It seeks to ensure the interoperability and integration of individual applications in different units, and is independent of their origin (vendor, environment), time of installation and synchronicity or network protocols and cross-network distribution conditionalities.

Several applications are now available as products for use with the EDITH approach, thus providing a completely operational Hospital Information System. These include DALI, which supports the organisation and diagnostic activities of the laboratory, FLORENCE which supports the nursing and medical activities in the wards and HERMES which supports the managerial activities at different levels of responsibility.

From EDITH to HANSA

Subsequent to EDITH, another major effort on the HIS area by the European Union was the Healthcare Advanced Networked Systems Architecture (HANSA) in 1997.
Led by Italy's Università Cattolica - Policlinico Gemell, the HANSA Consortium included corporate and research/university participants from a number of countries, including University Hospital of Giessen (Germany), Intrasoft (Greece), GESI srl (Italy), HISCOM (Netherlands), Novabase (Portugal), Consorci Hosp. de Catalunya (Spain) and SPRI (Sweden).
HANSA aimed to set a middleware standard which would create a transparent, application development framework, inherently capable of backward integration with legacy healthcare applications. The long-term goal was to lay down the ground rules for a Europe-wide hospital/healthcare information system, which could flexibly accommodate the emergence of new IT and communications technologies as well as developments in the regulatory/policy areas.
HANSA itself was meant to validate the 1992 EDITH initiative. As noted earlier, EDITH was based on the HISA (Health Information System Architecture) standard, but HISA was restricted in scope to aspects of IT systems related to treatment. It had no direct support for administrative and management requirements – which remain key to a meaningful HIS. HANSA had the mission of facilitating such transition, by permitting the federation of the legacy systems atop EDITH's open DHE middleware. The validation of HANSA – to promote the new technology and its standardised approaches by means of demonstrations was undertaken at Università Cattolica – Policlinico Gemelli in Italy, as well as Hvidovre Hospital (Copenhagen, Denmark), University Hospital of Giessen in Germany), Areteion Hospital (Athens, Greece), Leiden Hospital (Leiden, Netherlands), Hospital del Mar (Barcelona, Spain) and Sahlgrenska Hospital (Gotheborg, Sweden). HANSA was adopted as a European HISA standard (CEN TC 251 ENV 12967-1).
In 1996, the HANSA Consortium decided to put the API of the DHE services on the public domain, citing its status as the only group adopting and promoting a common healthcare architecture which was open and accessible to all.

Developments to 2000

In subsequent years, the new HANSA EAST project sought to transfer its experience with healthcare and hospital systems to eastern Europe. HANSA EAST was focused principally on Hungary and Poland and complemented by a Concerted Action in top university hospitals in Albania, Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Slovak Republic and Slovenia.
Alongwith, Synergy Extranet (SynEX), a European Fourth Framework project (1998-2000), defined middleware architecture for the delivery and collaboration of health information components. SynEx aimed at providing an integration platform for integrating both new and legacy applications.

Enriching HIS with RICHE

RICHE (in French, Health Care Information and Communication Network) was also a part of the EU healthcare IT R&D programme in the early 1990s, with specifications (like EDITH) for a DHE distributed hospital environment.
RICHE provided a model of open information and communication systems for hospitals based on relationships and interfaces between different parts of the architecture.
Though both projects professed open standard architectures, RICHE was more collaborative rather than prescriptive – as compared to EDITH. It allowed healthcare organisations and suppliers more room to define strategy, establish supporting infrastructures and organise their markets. RICHE defined a three-layered architecture, with four main components and services.
In 1997, an EU-subsidised publication ('New Technologies in Hospital Information Systems', IOS Press) quoted experts saying: HIS projects which ignored RICHE would be "wasting money," and that "RICHE seems to be the best candidate for an integrated hospital information system."
However, over a decade after this, informed observers told HITM that operationalising the RICHE approach on a large scale was far more difficult than that of EDITH – ironically as it was more experience- rather than concept-driven, at the core.

HISA

HISA is also known as the CEN (European Standards Organisation) Architecture for Healthcare Information Systems (ENV 12967), and aims at enabling the development of modular open systems to support interoperability in healthcare. Work on HISA is the responsibility of CEN's TC (Technical Committee) 251 Working Group IV. This Committee has also been involved in aligning HISA with the EHR.

DESIGN AND DEPLOYMENT CHALLENGES OF A CUSTOM LABORATORY INFORMATION MANAGEMENT SYSTEM

AUTHOR
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The Core Laboratory for Clinical Studies (CLCS) at Washington University School of Medicine in Saint Louis, USA, conducts testing on Phase 3 and 4 clinical trial samples. In addition to pharmaceutical sponsors, the CLCS also performs testing for Washington University School of Medicine researchers, and for clinicians who service patients. In early 2002 it was determined that the legacy Laboratory Information Management System (LIMS) was to a more robust, data driven system.

Design

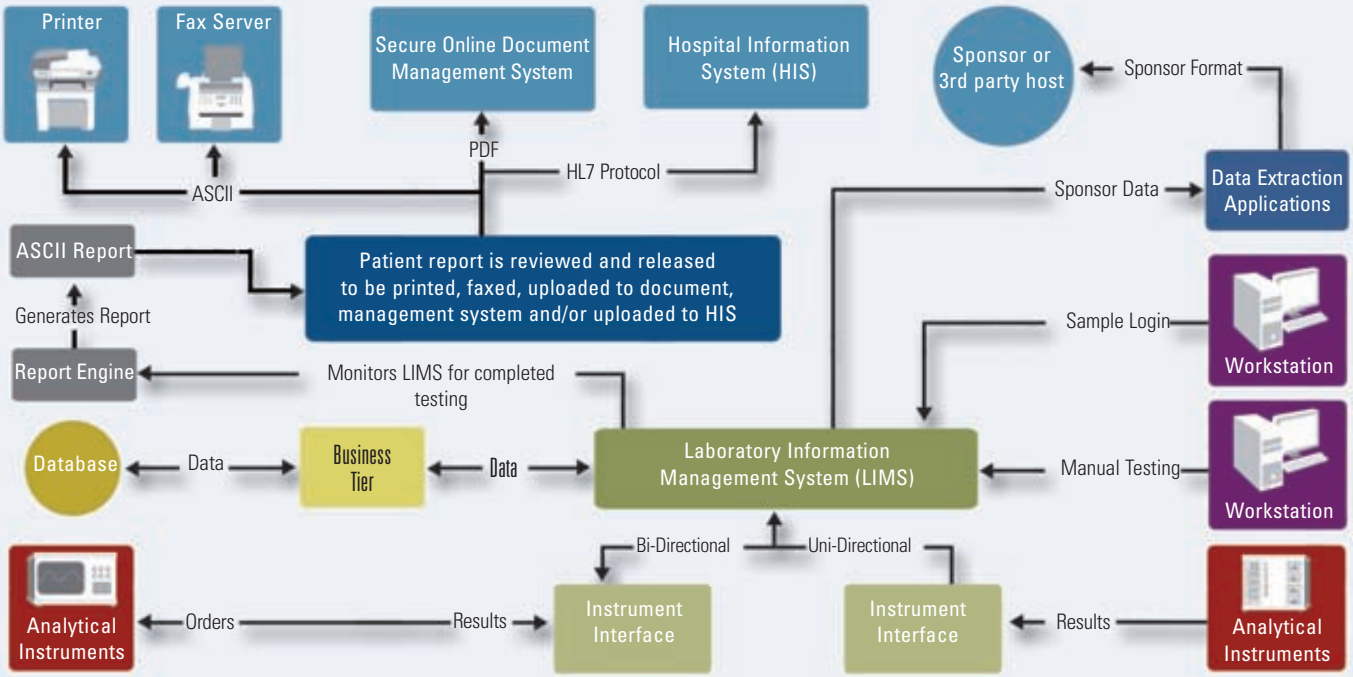
The IT department was tasked with designing a solution that would meet business, regulatory, user and client requirements. Determining where the legacy system failed was helpful in planning a system that would be extendable and maintainable. The legacy system was written in dBase 4, an application development language, and was architectured in a way that required significant re-coding of the LIMS to implement basic enhancements (such as a new test or bringing new pharmaceutical studies online). Performing these updates and subsequent testing and implementation on a rigorous schedule became overwhelming, and led to programming inconsistencies and system errors. In addition, the legacy LIMS database was not normalised, resulting in significant data duplication. When a patient's name was updated, for example, numerous tables needed to be updated in a cascading fashion. This caused inconsistencies in the database and was to be avoided in the development of the new system.

We determined that the best architecture for the new LIMS would be a data driven n-Tier system that would utilise the reusability of classes in an object-oriented programming language to ease in performing system updates or enhancements. Due to the separation of business logic, user interface and the data store, n-Tiering permits modification of one tier without necessarily impacting the others. For example, a database upgrade or a modification to allow web access can minimise the need for heavy reworking. Microsoft Visual FoxPro 6 (VFP) was selected as the development language because there was in-house expertise in the use of an x-based language (dBase 4). VFP is an object-oriented language offering an integrated development environment for both user interface and database. In addition, the VFP database is easily scalable to an enterprise database management system such as Oracle or MS SQL Server.

The next step was to map all the legacy processes to the new n-tier system. This involved creating logical maps of laboratory processes and determining the impact the new system would have on these processes throughout the laboratory. Key process changes were identified and noted so standard operating procedures and training material could be developed prior to implementation. Physical maps of the database were developed to classify how data from the legacy system would be stored. Legacy entities, attributes, indexes and data were scrutinised to maximise performance and eliminate data duplication in the new normalised database schema. The data conversion programming was developed from these maps.

The CLCS utilises numerous automated analysers to perform testing. In order to speed data entry into the LIMS and minimise the risk of data entry errors, these instruments were targeted for electronic data interfaces. Most laboratory analysers use an ASTM International or subset protocol for messaging between the LIMS and the instrument. There were two scenarios that were considered when designing instrument interfaces. In the first, the instrument only sent sample results, uni-directionally, to the LIMS. In the other, the instrument queried the LIMS for pending test orders and sent samples results to the LIMS, bi-directionally. Both scenarios used barcoded IDs to uniquely identify the sample. Instrument interfaces for each analyser were created using Microsoft C#.Net to pass data between the instrument and the LIMS. Data import processes were created for other laboratory instrumentation that did not support a messaging protocol but allowed for exporting the data in some fashion (.txt, .csv, etc.).

Since the CLCS performs laboratory testing for multi-site international clinical trials as well as physician offices, we needed to create the flexibility to route the report to clients via printed, faxed or PDF copy. In addition, we needed to mimic the report format from the legacy system so the LIMS upgrade would be transparent to clients. This was accomplished by designing a helper application that monitored the LIMS for reports to create. When the helper application found all testing was complete on a patient, it created an ASCII text file with an identical format to the legacy systems report. The LIMS user would then be able to review the report and subsequently authorise it to be delivered via the preferred client method. An important business critical requirement that was addressed was the detection of laboratory results that fell outside reasonable limits. The LIMS was designed to compare patient results to known extreme, physician alert and client requested values. If outside defined limits, the result was flagged for resolution by the technologist. This insured that no questionable



values were released to clients without being double checked for accuracy. An additional delta check, added to compare a patient's current result against a previous one, aided in identifying non-analytical errors such as switched or mislabelled samples.

Due to special data handling requests from the CLCS client base, it is difficult to predict data formats and attributes required for the client data set. In these cases, data handling applications are developed independent of the LIMS. They are controlled by a formal change control process and validated as standalone applications.
After realisation of the full scope of the development project, we began formal development of the system. Throughout the development lifecycle, numerous iterations of unit, module and system testing phases were performed to internal quality assurance standards.

Deployment

The impact of the new LIMS on workflow and lab-level operations was foreseen to be minimal. The impact on users, however, was expected to be extensive and posed a significant business risk. Standard Operating Procedures (SOPs) were created to address, in detail, all aspects of the use and maintenance of the LIMS and associated applications. Group training sessions were conducted to give users a general overview of the systems functionality. Specialised sessions targeted smaller user groups; they focused on tasks specific to particular laboratory positions and were conducted close to the 'go-live' date to provide comfort to users during transition to the new LIMS.

A new server was installed and workstation hardware upgraded or replaced prior to deployment of the LIMS. The network operating system (NOS) was updated from Novell Netware 4.0 to Windows 2000 Server and all workstation operating systems were upgraded from Windows 98 to Windows XP. The system was tested side-by-side with the legacy system before being fully implemented.

Validation

In order to bring the LIMS into compliance with the US Regulations mandated by our pharmaceutical clients, a retrospective validation was performed three years later. Such a process establishes documented evidence, which ensures that the system not only offers users the requisite functional capability but will continue to do so through the LIMS lifecycle. System validation is considered a critical instrument to ensure data quality. By improving regulatory compliance and reliability, it can help ensure that patient risks, error rates and related costs can be controlled. Costs can therefore be reduced throughout the lifecycle, as it becomes easier to perform system modifications and re-validations.

System Upgrades

Since the CLCS operates in a regulated environment, all computer devices that capture, enter or modify data are required to follow change control procedures. These allow system modifications to be traced to their origins and permit 'rollback' to a previous system state if required. A change control SOP was developed to provide an organised and consistent plan to ensure integrity and stability throughout the LIMS lifecycle.

Conclusion: Build or Buy ?

There are many commercial LIMS systems that could have performed well for the CLCS and we took account of many factors – among them, flexibility, scalability, quality, security and cost – before deciding to build a custom system. The CLCS also sought to avoid a rigid LIMS framework which required a prolonged waiting period for upgrades or entailed dependence for maintenance on an external vendor.

Our new system blends the productivity and throughput of commercial systems with the flexibility of a custom system built around the core business which we, as users, know best.

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Deploying State-Of-The-Art Imaging Solutions

The Case of Assistance Publique des Hopitaux de Paris

France's Assistance Publique des Hopitaux de Paris (AP-HP) is one of Europe's largest healthcare groups. Focused principally on healthcare services in the city of Paris and its environs, AP-HP is also well known as a medical university research establishment (working, among others, with top French RTD bodies such as INSERM and CNRS, and holding more than 250 patents – principally in biotechnology and pharmaceuticals).

Overall, AP-HP comprises 37 hospitals and clinics, employs more than 90,000 staff, and provides healthcare services to over 5 million patients per year.

In 2005, the group sought to modernise its radiology departments and implement an enterprise-wide online medical image storage solution. It set an aggressive target of installing PACS across 20 sites with full functionality, in less than two years.

Following a tender, the group selected the KODAK CARESTREAM RadiologySolution (picture archiving and communications solution) to help meet its objectives. The project was successfully completed on time and within budget.

To understand the rationale and experiences of APHP with this ambitious modernisation programme, HITM interviewed Dr. Daniel Reizine from AP-HP's Directorate on Patient Information Systems (SIDOPA) who was Coordinator of the project.

HITM: ***What are the key reasons for the implementation of a modern PACS solution? Has it addressed the problem of excessive – and growing – variety in your IT systems, and improved patient turnaround times?***
Also, what are its key salient features, technically speaking?

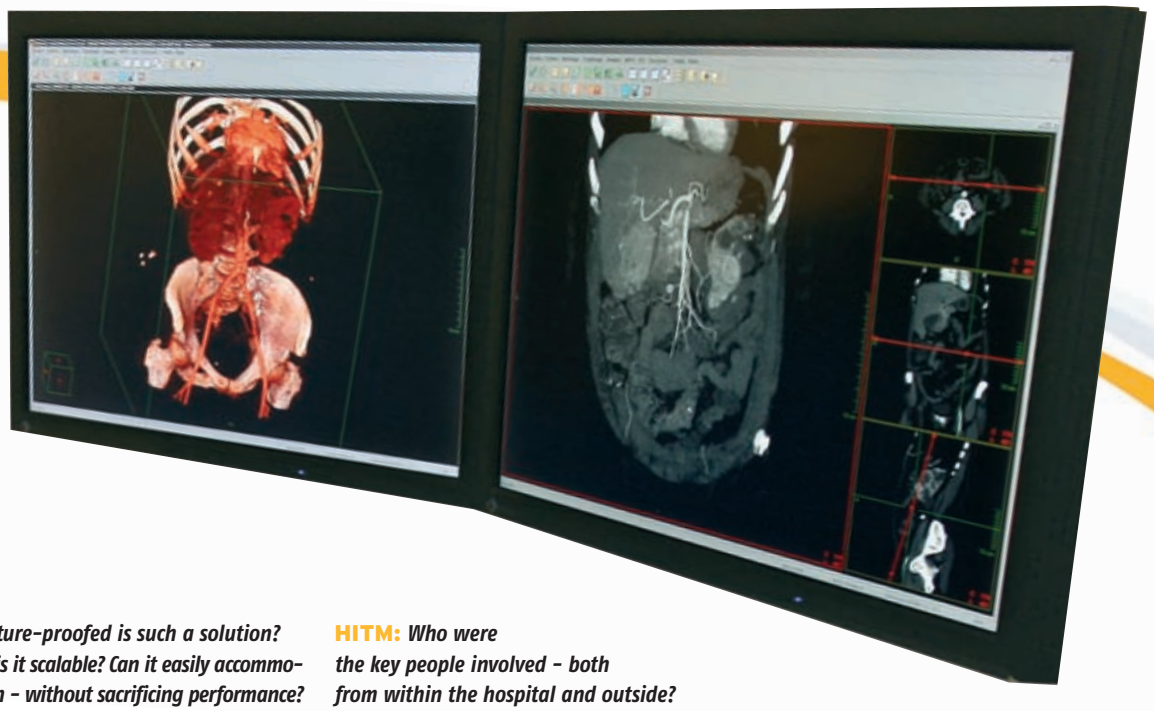
Dr. Daniel Reizine (DR): Our choice was made after a rigorous tender process.
A lot of criteria were involved here.
Principally, we were keen to see a streamlining of workflow. We thought this would be best done by establishing a seamless virtual community to access and share patient-related clinical information.

We also insisted on a great deal of flexibility in allowing the mix-and-match of classic technology standardisation advantages with real-world customisation requirements. Our aim was to satisfy our own unique and established workflow requirements as well as the specific priorities and objectives of each hospital within our group.
The result we sought was a tailored solution that intelligently – and in many instances, almost intuitively – integrates and automates each of our radiology departments. As a result, we have optimised user efficiency and minimised non-essential tasks, and we believe this is one good way to deliver better patient care.

Technically, modern PACS solutions are thin-client. What we now have is a virtual desktop environment which allows users to access any application, including 3D processing, from any desktop – inside or outside the organisation – provided they have the necessary authorisation. On the performance side, its dynamic streaming capabilities allow reducing the need for large bandwidth network connections

HITM: ***Does the KODAK CARESTREAM Radiology Solution provide an answer to interoperability, and high-level IT management control?***

DR: Yes, very definitely. As I mentioned, we specified the need to establish a seamless virtual community, with full functionality at our group's 20 sites (including backwards integration with systems and devices from other vendors).
Modern PACS systems provide administrators with a way to accurately monitor equipment performance, storage utilisation and volume changes.



HITM: ***How future-proofed is such a solution? In other words, is it scalable? Can it easily accommodate user growth – without sacrificing performance?***

DR: The solution is equipped to manage the growth of patients images in Assistance Publique; in the radiology departments of course but also in the other departments producing patients images (nuclear medicine, cardiology, endoscopic sudies). At the present time we store more than 100,000 radiologic exams per month.

HITM: ***Can you tell us something about the timeline for choice of the KODAK CARESTEREAM Radiology solution and its implementation?***

DR: We firstly did a pilot validation of the PACS architecture and software at Trousseau Hospital.

Alongside, we distilled and defined three generic operational environments within our group, shaping the broad contours of a solution for each, and then replicating them with the necessary adaptation. This, we upfront sought to minimise, and our success here was indeed one of the key reasons for the rather rapid speed (below 24 months) at which the entire project was completed.
After this, we set a goal, a rather challenging one, to begin equipping one site per month, and then double the pace to implementation at two sites per month.
As each site went live and became fully functional, the PACS was integrated with both image capture systems and the backbone RIS to simultaneously manage and archive medical images and information.
We hit our targets of deployments at 20 sites, with full functionality, in less than two years.

HITM: ***Who were the key people involved – both from within the hospital and outside?***

DR: Internally, we had our own a multi-disciplinary team (other than myself, also including a biomedical engineer and an IT expert). We set out to evaluate a full range of PACS offerings. Externally, we sought an 'intelligent partnership' with a vendor – and this had some stringent criteria, especially on the qualitative side. So, we were not only looking to find a technically robust and state-of-the-art solution, but a partner company able to proactively find answers to all the usual problems arising in the course of such a complex project, and build confidence in our own people. But, I must add, to succeed in such a manner, we also counted greatly on an 'intelligent' and value-adding partnership.

From the first pilot at Trousseau through to full rollout and going live across the group, consultants from Carestream Health worked closely with our teams to resolve issues surrounding integration with the existing network and equipment such as MRI and ultrasound from other vendors. They not only helped us get to grips with the Big Picture deployment, but also stayed close at hand, giving everyone the feeling of a true partnership.

HITM: ***How happy are you with the Carestream Health solution – both in operational terms such as simplicity of use and in financial terms such as return on investment (RoI)?***

DR: Our staff quickly adopted the new PACS solution. It took just about ten minutes or so for our radiologists to be at ease for 90% of basic activity.
As I mentioned earlier, the system is not only user-friendly but also intuitive and quite personal.

For example, is has the ability to create a virtual desktop. Users can access their personal preferences, such as display protocols, menus and tools, from any workstation at any location either inside or outside of the hospital.

On the financial side, we are happy with the system's unique 'floating license' structure, which follows a user regardless of location. This not only gives greater flexibility but also reduces licensing costs.

It is still to early for us to determine RoI on the system. We do see the consumption of films dropping. I have also mentioned the advantages of the floating license system. Finally, again, the deployment was done within time and budget, which, as you know, is an exception rather than the rule in large IT modernisation projects.

HITM: ***Do you plan to share your experiences with other French/EU hospitals?***

DR: Yes. A wave of new PACS implementation is now under way across Europe in several places, and I believe it would be mutually beneficial to share approaches and experiences. In our profession, we are used to doing this kind of thing.

For more information visit:
www.carestreamhealth.com

IT AND THE ICU

COMPUTER-SUPPORTED DECISION MAKING: AN EVALUATION

AUTHORS

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A hospital's intensive care unit (ICU) has several characteristics which make it favourable for extensive use of information technology. Firstly, it has an overwhelming amount of data, often leading to data-overload and loss of information. Secondly, intensive care medicine has a short diagnostic-therapeutic cycle compared to other medical disciplines. IT can therefore play a pivotal role in supporting and supervising the process of medical decision making. Thirdly, intensive care medicine is extremely expensive and consumes a large portion of available healthcare resources. In the U.S.A., it is estimated that ICU medicine costs between 0.5% and 1% of the gross domestic product. An integrated computerisation of the ICU could optimise use of resources, leading to substantial cost savings.

Current situation

The development of a dedicated ICU-IT-system is now so complex and time-consuming that on-site development is nearly impossible. Commercially available products are purchased and adapted to match as closely as possible the local needs of the ICU. Only a few bigger companies and maybe a dozen smaller companies currently offer dedicated software solutions for the ICU. None of the available software products are perfect and although they share many common features, they differ in smaller ways, resulting in product-specific advantages and disadvantages.

All of the software products share two main functions:

- recording and automatic storage of data from the different monitoring devices surrounding the patient, including the data from the monitor and the mechanical ventilator and automatic capture of syringe pump infusion rate, and
- the replacement of all handwritten forms by computerised equivalents such as the Computerised Physician Order Entry (CPOE), including the electronic prescribing of medication.

Most ICU-IT-systems offer some basic form of workflow management and some even have basic alerting properties, but advanced computer decision support is still lacking.

Potential benefits

Benefits of IT systems: These are hard to measure. From the management viewpoint, only direct financial benefits are important. Unfortunately, an immediate financial return of investment (RoI) is – at least now – hardly achievable. Non-financial benefits are however at least as important, such as improving the quality of care, decreasing the length of stay in the ICU and achieving a higher survival rate. In an indirect way and seen over a longer time span, this will also lead to minimized ICU costs.

Time: Several studies have investigated the impact of IT in the ICU on nurse time. The older studies showed no time benefit, but a recent well-designed study showed that the introduction of an ICU-IT-system in a cardiosurgical unit reduced documentation time of the nurses by 29 minutes for every 8-hour shift (Bosman et al. 2003). This time was completely re-allocated to direct patient care.
In our ICU, nurses generally experience the new system as time-neutral. However, it is important to take into consideration that the computer-based ICU file is now much more complete and accurate. ICU physician workload is considerably higher, especially for physicians in training, but again, the amount and quality of the patient information is substantially more valuable.

Computerised Physician Order Entry (CPOE): In 1999, the Institute of Medicine declared in their report "To Err is Human - Building a safer Health System" that at least 7,000 patients die in US hospitals annually as a result of medication errors. These errors frequently result from problems with the paper-based medical record. Increasing prescription complexity also means that the physician's memory is not always a reliable bridge between research advances and clinical practice. Not only do adverse drug events (ADE) cause patient harm, their costs are estimated to be at least $2,000 per ADE.

CPOE features thus help to minimise human error, improve medication management, facilitate reporting and improve resource utilisation. Even in its most basic form, a CPOE system can reduce the number of poorly written prescriptions, which can lead to the wrong drug, wrong dose or wrong route of administration.
Evidence for CPOE use generally is shown in the box on page 25. Only a few studies have been published evaluating the impact of CPOE on medication errors in the ICU. A recent prospective study conducted in our adult SICU demonstrated an impressive decrease in medication prescription errors after the implementation of an ICU-IT-system with CPOE (27% vs. 3.4%, $p<0.001$; Colpaert et al. 2004). This was mainly due to the almost complete elimination of true prescription errors and incorrect orders, which have no real potential to cause serious harm. However, there was also a six-fold decrease in the more important ADEs.

Decision Support And Computerised Guidelines: Some ICU-IT-systems already have basic alerting possibilities, but sophis-

ticated computer-based decision support is still a sort of "Holy Grail". The lack of computerised decision support is not only a technological problem but is also due to a lack of well-tested, effective and universally-accepted decision support models and rules for the ICU.
Some groups have already developed extensive and computer-based detailed treatment guidelines. These guide the clinician by using embedded decision rules and combining them with the actual physiological data of the patient to provide immediate bedside decision support.

ICU Management and Research: An ICU-database is an essential tool for benchmarking, for comparing ICU performance using standardised outcomes and for controlling ICU costs. An even greater potential lies in ICU research. Using large databases, which combine data from different centers, will undoubtedly lead to significant research advances, particularly in outcome research.

Future trends

Although current ICU-IT-systems succeed in providing a paperless ICU, many of the above-mentioned benefits have yet to be realised. Many problems remain unsolved: a too rigid user-interface, the technological complexity of the systems, the poor integration of ICU-IT-systems with other hospital information systems and the high implementation and maintenance costs. All these factors help to explain the fact that after decades of development, only a minority (probably less than 5%) of ICU departments currently make use of one of the available systems. Another essential factor is that current ICU-IT-systems only provide very limited support for the interpretation of the massive amounts of data that far exceeds human decision-making limits. Indeed, current systems do not have advanced bedside clinical decision support or advanced support of the ICU workflow processes.

However, it is universally believed that the next major progress in ICU-IT-systems will be the implementation of a whole range of (semi)-intelligent software programs, providing continuous assistance to the ICU team while caring for the critically ill patient. These software programs are often called "intelligent" agents, because they perform a clearly defined task, normally performed by a human. In the ICU, many smaller tasks are performed simultaneously. Medications are added and infusion pump rates are continuously adapted against specific monitoring parameters (e.g. insulin pump according to glycaemia levels). In some cases, a hierarchy of agents is needed. An example is the prescription of medication, where one subagent is responsible for the right dosing in the presence of renal failure, another in the presence of hepatic failure and a third one for checking interactions between the different prescribed drugs.

Other IT developments such as telemedicine, robotics, use of personal digital assistants (PDAs) and use of web-based ICU registries also hold considerable promise in the future.

Conclusion

Computers have been used for more than thirty years in the ICU and currently available programs automatically record all monitoring data and replace all paper forms by an electronic equivalent, resulting in a paperless ICU. However, widespread implementation is still lacking due to the high implementation costs, the complexity of hardware and software configuration, interfacing problems with other hospital departments, the lack of proven benefits, the fear that computers will replace physicians in decision making, and concerns about security.

It is our conviction that within the next few years, full ICU computerisation including advanced real-time and bedside decision making capabilities will become essential to guarantee the highest quality of care for patients, to optimise nurse and physician work flow, to ensure economical ICU management, and last but not least, to support advanced research by using large multi-centre patient databases.

For references and citations, please contact **editor@hitm.eu.**

PRESCRIPTION ERROR CAUSES AND CPOE SUPPORT

Reasons for prescription errors:
- a continuously increasing number of available drugs
- dosing regimen complexity
- changing drug indications
- numerous contra-indications
- numerous adverse effects

CPOEs support by:
- recognising drug allergies
- showing relevant laboratory results
- automatically calculating the correct drug dose
- recommending dosage adjustments in renal or hepatic failure
- showing evidence-based guidelines

EVIDENCE FOR CPOE BENEFITS

Application	Results
CPOE in general wards	Non-intercepted serious medication errors were decreased by 86%
CPOE with a more sophisticated computerised decision support system or prescribing antibiotics	Significant reduction of: - duration of antibiotic therapy - cost of antibiotics - total costs - length of hospital stay

MOBILE HEALTHCARE AND INFORMATION TECHNOLOGY

GATHERING SPEED, SLOWLY BUT SURELY

AUTHOR
Tosh Sheshabalaya
HITM

The promise of mobile solutions for healthcare has some parallels to the US Bill of Rights; its truths are self-evident. They are also the result of three convergent trends. The first is the explosion of hospital data. The second is the increasing requirement for specialist advice and care. Last but not least is the demand that healthcare intervention be delivered as close to a hospitalised patient as feasible. Taken together, it is clear that there is now a growing mobility of specialist physicians within a modern hospital, alongside a need to remotely access data at all times, from anywhere.

IT clearly plays the key role in the metamorphosis from the departmental approach of traditional hospitals to a patient-centric one. As explained in a feature on the Asklepios 21st Century Digital Hospital in the previous issue of Healthcare IT Management, this transformation has seen a measurable and impressive increase in productivity, with average patient times declining by 0.7 days.

Adoption Still Sluggish

The take-up of mobile solutions has, however, been slow.

There are two reasons for this. Firstly, users have resisted, or at least not embraced such solutions passionately. There is a direct correlation, certainly in Europe, between the years of experience of a physician and his or her resistance to change. This is of specific relevance given that mobile healthcare solutions are one of the most tangibly disruptive aspects on clinician workflow.

Secondly, healthcare IT vendors have not integrated mobility upfront into their new offerings, but rather as a layer atop a network or an add-on to their other offerings. One reason is that the emerging healthcare environment has been, and continues to be, in a state of flux - both in technical and regulatory terms. New standards on data privacy and security – or the need to avoid electromagnetic interference - are neither fully fixed and embedded in stone, nor necessarily consonant with other aspects of the pervasive, digital e-Health world of tomorrow, such as interoperability, distributed access – or even operating systems. In the context of mobile technology evolution, for example, new broadband solutions seemingly emerge by the week.

In the face of all this, the parallels between Big IT firms and senior surgeons are, to say the least, impressive. Neither is happy with transitional realities.

HITM sources believe the best mobile solution would not only deliver remote access to patient data, patient scheduling, appointment reminders etc., but do this interchangeably through both voice and the Web in a synchronised manner.

Indeed, it is difficult to argue that voice commands provide one of the most easily tangible experiences – especially for users outside the IT domain, and may be the best way to engender 'pull' from the healthcare professional community for adoption.

Some Evidence of Productivity Gains

So far, the experience of hospitals with mobile solutions has been scattered and ad-hoc, in both Europe and the US. There is still insufficient data on their effectiveness or the enhancements they bring to workflow productivity and patient quality-of-care to make an authoritative assessment. At best, mobile deployments are reported to result in 'significant' or 'impressive' gains.

However, an Intel-sponsored mobile solution piloted in Britain's George Eliot Hospital (see adjoining box) found an impressive set of time savings. These included:

- Locating pathology results during a clinic visit by consultant or nurse: 25 percent
- Community monitoring of chronic patients by nurses: about 10 percent
- Recording and filing surgery notes by administrative staff and consultant: 20 minutes per procedure
- Retrieving surgery notes at follow-up visit: about 50 percent per patient visit
- Charting of inpatients by medical staff in wards: 6 percent
- Scanning of pre-op patients by nurses: approximately 10 percent

Indirect evidence, too, remains compelling. Several studies have shown the sheer scale of patient deaths due to medication errors – an area which would be attacked head-on by mobile solutions that bring the medication administration process to the patient's bedside.

As a result, very few would argue that mobile healthcare IT is approaching an inflexion point in adoption. Led by new bottom-up initiatives such as the Asklepios Clinic, or sweeping modernisations underway elsewhere, mobile solutions are already standard requirements in calls for hospital modernisation proposals. They will no doubt continue to gain traction in the years to come.

FDR Velocity U-fp

FDR Velocity Unity

FDR Velocity Unity with table

FCR GO

FDR Velocity Unity is a recent extension of Fujifilm's DR product line. This single-detector, motorised, U-arm system performs a full range of radiographic exams (both stable-based and upright, for any clinical area, from chest to extremities). It is key to providing a flexible, cost-effective alternative to multi-detector systems.

FCR Go is Fujifilm's first portable digital X-Ray system. It integrates a customised version of our FCR Capsula XL–CR reader and a notebook version of the CR console with a portable X-Ray generator system. FCR Go is the first system to provide remote users with the same functionality and sophisticated image processing and optimization features as a portable digital X-Ray, without additional intervention from another workstation.

FUJIFILM MEDICAL IMAGING

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Complete Solutions for Hospitals and Clinics fulfill this ambitious target. Fujifilm merges maximum image quality with minimum radiation.

Fujifilm and its 263 subsidiaries worldwide strive to meet ever-growing customer needs for high–end imaging solutions. As part of a business re-orientation, Fujifilm Medical Systems has become a showcase of our new global strategy.

Our line-up ranges from X-Ray film and digital radiography to PACS and other hospital IT systems. With over 7000 CR devices in use across Europe's health-care landscape, Fujifilm is determined to strengthen its leadership in the market with newer, top-of-the-line products and high-quality solutions.

A clear, unequivocal diagnosis is integral to effective healthcare. In examinations such as mammography, advanced imaging systems play a crucial role. Fujifilm delivers solutions which allow minute micro-calcifications in the breast to be detected more readily.

We are now focusing greater R&D effort on the new Velocity DR family for digital cassette-less radiography. DR (for direct radiography) represents a generational shift in digital radiography. DR systems are lightning fast – processing up to 240 images an hour – while exposing patients to a very low dose of radiation.

Both this speed and resolution, with an DQE (detected quantum efficiency) of about 40%, rank at the top of the direct radiography league table. Velocity DR Products are offered together with an X-Ray system, allowing for a complete, workflow-optimised system.

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MOBILE SOLUTIONS AT HOSPITALS IN EUROPE - A BIRD'S EYE VIEW

Belgium

As part of a larger federal project in Belgium to manage patient files, nine hospitals in the province of Liege have chosen mobility solutions from France's Groupe Bull subsidiary Evidian. They will implement the Enterprise SSO, Policy Manager and Identity Manager modules of Evidian's IAM Suite. The solution targets 4,500 hospital staff who need to move from one hospital to another, to access their applications and patient history in each hospital. The IAM suite allows implementation of role management, workflow, user provisioning and single sign-on access control.

Denmark

Frederiksberg Hospital is one Copenhagen's largest hospitals. It has adopted a turnkey, scalable solution from Symbol, a US vendor, with the key purpose of maximising patient care by reducing the potential for hospital error during the process of administering medication. The Hospital has equipped nurses and doctors with Enterprise Digital Assistants (EDA) and mobile computers, along with wireless switches and access ports, as well as the vendor's Mobility Services Platform (MSP) to securely capture, move, and manage patient information, including vital data and chart information. On their part, patients are provided bar code identification on their wristband.

Germany

The University Hospital of Leipzig has deployed a mobile solution which enables electronic patient files for neuro-surgery inpatients. The solution was designed and implemented by an in-house IT team. Its components include a terminal server and WLAN infrastructure, alongside a Tablet PC for mobile tasks.
On the IT side, an interesting facet is that rather than actual patient data, the application transmits screen output in secure RSA-RC5 bit streams to the mobile terminal device. This offers users their traditional work environment. It also prevents data loss in case a wireless transmission is interrupted.

Spain

The Hospital Universitario Son Dureta in Palma de Mallorca is piloting the use of the new RFID-integrated Intel Motion C5 mobile clinical assistant (MCA) platform. The MCA reads patient wristbands, allowing healthcare professionals to access patient information including clinical results such as blood tests, scans etc. The MCA is supported by Orion Health's clinical software which enables patient data to be available at any point of decision (bed, stretcher, or wheelchair). Son Dureta uses Oracle Healthcare Transaction Base (HTB) as a centralised, standards-based repository for clinical data.

United Kingdom

In a pilot conducted with Intel Solution Services, the George Eliot Hospital deployed 20 wireless tablet or notebook PCs to a cross section of care providers, who in turn used the devices with a mobile application portal to access electronic patient records as well as standalone radiology/pathology results. A dashboard application was provided to monitor patient status. The supporting infrastructure consisted of wireless networks and LAN (with TKIP/RC4 encryption), and two servers (one for the SQL database and the other as an IIS Web server). The UK pilot found mobile access to clinical information systems produced significant time and resource savings.

New Demands on IT Staff

For hospital IT professionals, mobile solutions will lead to several demands.

Routine new tasks would consist of ensuring alignment and synchronisation of mobile physician inputs (e.g via PDAs, tablet PCs or mobile ECG/imaging systems) with those made through other mobile systems or workstations – both by the physicians and/or their assistants.

More demanding roles would be to allow collaborative data sharing in hybrid settings made up of both multiple mobile and fixed systems.

On the infrastructure side, therefore, one pressing challenge will be to keep connectivity up to speed, given the need for sharing and managing multi-site inputs on digital medical images (whose size, in spite of ever-increasing sophistication in compression algorithms, continues to rise relentlessly).

In a related sense, there will also be requirements for scalability, seamlessness and redundancy in connectivity - especially as fixed, wireline and wireless platforms converge, and do so within hospitals, with ambulatory platforms as well as external healthcare facilities.

Technology Challenges Lie Ahead for Vendors

Such seamlessness sounds easier than it is in the real hospital world, not least because of issues such as network access control – a crucial consideration for privacy and patient data security.

Many hospitals have traditionally deployed two wireless networks: a private one for in-house staff, accompanied by an accreditation/sign-in process for visiting physicians, alongside an open network for the public based on different technologies.

More recently, some have sought to set up quarantine zones which all users – in-house and the public – are first required to connect with to determine the level of access rights.

Some sources also point to the inevitable need to deploy or build middleware for existing legacy equipment, especially the swathe of bedside equipment (such as cardiac monitors) which are commonplace in hospitals, and unlikely to be discarded in the near future.

Overall, the state of play in European hospitals with regard to mobile solutions is heterogeneous. Some institutions have build their own customised solutions. Others have chosen vendors from the US or Europe.

IMPROVING EHR SYSTEMS THROUGH QUALITY LABELING

AUTHOR
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is with EuroRec Institute

If Electronic Health Record systems are to provide an effective contribution to healthcare across Europe, a set of benchmarks need to be set to ensure quality control and interoperability of systems. This article describes why EuroRec's initiatives are important, considering the present trends where patients need to be put at the centre, clinicians be involved in the design of their applications and healthcare delivery itself be reorganised to become more data driven. EuroRec's aim is to promote development and use of high quality EHR systems. One of its main missions is to support the development of EHR certification.

IT has the potential to make a significant contribution to the better management of healthcare provision. This cannot be achieved without the availability of trustworthy Electronic Health Record systems (EHRs) that provide all necessary clinical information requirements, thus enabling the sharing of timely and up-to-date patients' medical data to support "high quality care" and "continuity of care".
Interoperability and security to protect privacy and confidentiality of patients' data are prime requirements for such EHRs.

The Rationale for Quality Labelling and Certification

Investment in healthcare IT has been comparatively low compared with other sectors. High investment risk for purchasers and low definition of European market requirements for suppliers has contributed to such a situation. This is particularly the case with large-scale investment at regional or national levels.
As EHR system requirements become increasingly complex, accompanied by a growing risk of system deficiencies or failure to meet expectations, there is a need for an assessment process to assure the quality of EHRs on the market and to ensure their interoperability with other systems. Without an agreed set of functional criteria to underpin the introduction of robust, sustainable EHRs, major IT investments could potentially be at risk.

Given a set of quality criteria around which suppliers and their healthcare customers can collaborate openly, the introduction of effective EHR solutions across European member state boundaries can become a reality. Several EU member states have already proceeded with EHR systems quality labelling and/or certification, but these differ in scope, in legal framework under which they operate, in policies (legal and financial incentives) and organisation, and perhaps most importantly in the quality criteria used for benchmarking.
Harmonisation, therefore, is a must. Now, through EuroRec and the QRec Specific Support Action (IST-27370-SSA, 2006- 2008), the possibility to achieve this for EHR systems in Europe is in sight.

EuroRec - Its Current Activities and Future Plans

The European Institute for Health Records, dubbed the EuroRec Institute, was formally registered in 2003 as a not for profit organisation. It is organised as a permanent network of National ProRec centres in Europe and provides services to all interested stakeholders: industry (the developers and vendors), healthcare providers, (the buyers), health care authorities and policy makers and patients.
EuroRec's aim is to promote the development and use of high quality EHR systems. One of its main missions – as a de facto recognised European certification body – is to support the development of EHR certification by defining functional and other criteria for testing and assessment. EuroRec is liaising at international level with other bodies such as CEN/BT and TC251, ISO/TC215, WHO, openEHR, HIMSS, CCHIT and many others to follow (e.g. IHE).

The QRec Specific Support Action

By means of the EU FP6 (Sixth Framework Programme) funded project QRec, EuroRec has brought together European experts in the EHR field and is developing formal methods and creating mechanisms for the quality labelling and certification of EHR systems in Europe (starting with primary and acute hospital-care settings; others will follow: e.g. for personal health record systems).

The aim of such an initiative is to also encompass other e-Health software products and services at a later stage (e.g. decision support and other systems that might impact on patient safety).
QRec has already provided several deliverables:

- The first series of validated, fully indexed and translated quality criteria and functional requirements (over 2,000 in number) for EHR systems
- A typology of indexes : business functions (50 in 8 subcategories), care settings (18 in 3 subcategories) and component types (18 in 4 subcategories)
- A series of tools (the EuroRec Composer, Certifier, Documenter, Procurer and Scripter) for profiling EHRs (e.g. for national certification processes, for product documentation or for procurement purposes)
- Quality assurance of EHR archetypes (i.e. formal sharable models of clinical domain concepts (open EHR/EN 13606 archetypes) for enabling the semantic interoperability in e-Health
- A repository of European and International coding systems in use in EHRs, as well as a complete inventory of EHRs related international standards
- Test scenarios and proposed certification mechanisms enabling both self-certification (e.g. by the industry) and external certification (e.g. by health care authorities)
- EHR tutorials and events.

Q-REC AT A GLANCE

Q-REC is developing formal methods and creating a mechanism for the quality labelling and certification of EHR systems in Europe, as well as specifications for EHR procurement.

Its main lines of work are:

EHR Systems Quality Labelling and Certification Development

- Producing a State of the Art Report on EHR-Certification Schemas as already implemented in some European countries
- Performing a Pan-European Requirements Assay
- Proposing a Labelling Terminology and Functional Profiles for EHRs to be certified
- Comparing and Harmonising the EHR-Certification Procedures at a European level
- Drafting Model Certification Guidelines and Procedures
- Planning Validation of the Guidelines

Resources for EHR Interoperability:

- Register of Conformance Criteria and Guidance Documents for obtaining EHR Certification
- Inventory and Guidelines for EHR Archetypes
- Registration of Coding Schemes in Europe (as mandated by CEN/TC 251)
- Inventory of relevant EHR related standards
- Register of XML Schemas and Open Source components for EHRs
- Benchmarking Services Manual for Quality Labelling and Certification
- Business Plan for new EHR-Certification related Services

The Future

EuroRec intends to increase the momentum of its efforts in the years to come.

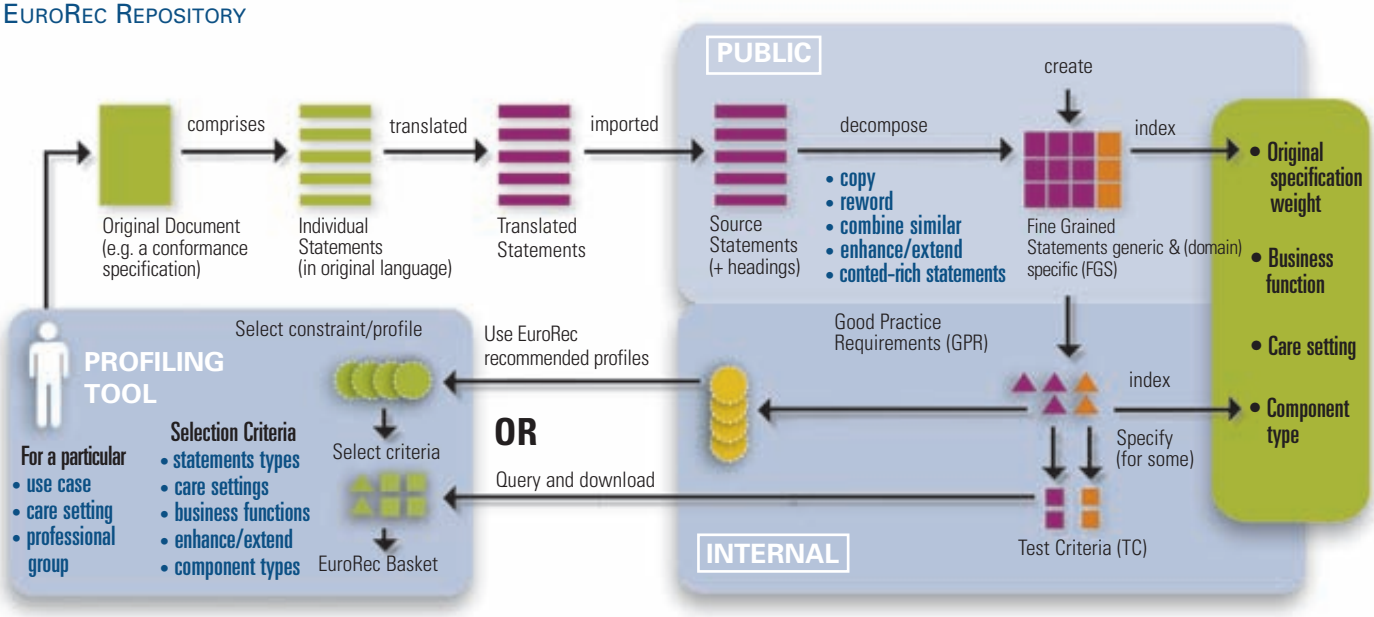
Its key priorities are to maintain and enrich its central repository of validated criteria, and deepen its involvement in studying quality criteria related to the secondary use of EHRs as potential e-sources - for example in e-Clinical Trials and other e-Research. It also aims to investigate certification of EHRs in other care settings, such as e-homecare and personal health records. Yet another priority area is the validation of clinical archetypes, which provide a useful formalism for reconciling and reusing detailed clinical data specifications across different use cases.

As the barriers between the different types of Electronic Health Record systems and other e-Health related applications whither away, EuroRec intends to broaden its future scope of work to the quality labelling of other types of Health-IT systems, such as Decision Support Systems.

In the near future, EuroRec sees it appropriate to pilot and implement the EHR quality labelling and certification process across Europe, including Eastern Europe. This would be in compliance with the 'good practice requirements' it has elaborated. A number of member states (already certifying at national levels) have been seeking to participate more actively in a Europe-wide effort.

These kind of services are highly resource intensive and EuroRec has seen a need to ensure more continuity and follow-up for its efforts, to give them further traction. It is seeking greater funding for its activities, along the lines of support from the US Department of Health and Human Services to CCHIT, EuroRec's American counterpart. As a result, EuroRec is exploring avenues to complement its self-supporting activities and EU-project-based revenues with more structural funding mechanisms.

EuroRec Repository



HEALTHCARE AND FP-7: A SNAPSHOT

HEALTHCARE IT MANAGEMENT
ANALYSIS

IT projects with healthcare implications awarded under the EU's Seventh Framework Programme for Research (FP-7) are ambitious in scale. Many underscore the EU's emerging response to its e-Health agenda as well as the possibility of using IT to cope imaginatively with the challenges of an ageing population. Nevertheless, many observers in the healthcare IT community believe there is a piecemeal, pick-and-choose approach to the projects, accompanied by the absence of a cohesive e-Health facing superstructure.

For example, no efforts to date have inventoried and analysed the existing IT infrastructure in EU hospitals. This especially concerns the mainly COBOL legacy systems which face serious limitations in terms of real-time connectivity. Such systems, for example, already pose major challenges to initiatives like the Single European Payments Area – a fact which senior EU officials have publicly acknowledged.

In our forthcoming issue, we intend to take a look back at the fate of major (and now completed) healthcare IT projects under the previous Sixth Framework Programme, to determine if they provide any lessons for the future.

Healthcare IT Projects IN FP-7...

The overview below describes 24 key projects funded by the EU Seventh Framework Programme (with a value of over 100 million Euros) and awarded by the middle of February 2008. We have grouped them into five categories.

IT architecture and infrastructure: 3 projects with consortia led by organisations based in Belgium, Greece and the UK, with funding of 6.76 million Euros.
Advanced ICT for patient safety: 8 projects with consortia led by organisations based in Belgium, France, Germany (two), Italy, the Netherlands, Portugal and the UK, with funding of 32.66 million Euros. One project is targeted at using European telemedicine standards in Latin America.
Personal health systems: 6 projects with consortia led by organisations based in Austria, Denmark, Germany (two) and Italy (two), with funding of 46.16 million Euros.
ICT and ageing: 5 projects with consortia led by organisations based in Austria, Italy (two), Spain and the UK, with funding of 17.94 million Euros.
Bioinformatics and robotics: 2 projects with consortia led by organisations based in Italy and the UK, with funding of 6.75 million Euros

....and a quick glimpse ahead

Many healthcare IT veterans may have been more comfortable with a nuts-and-bolts Master Plan to build a coherent e-Health infrastructure in Europe. However, the financial scale of the above projects will add momentum to several other facets of healthcare (such as hospital modernisation). Above all, it will (hopefully) make the sometimes sluggish, inward-facing policy makers in Europe's Member States aware that issues like patient safety and an ageing population, bio-informatics and nanotechnology are not Vision Things, but will emerge on the EU public's radar during their terms in office.

[IT Architecture and Infrastructure]

ADMIRE:

Advanced data mining and integration research for Europe

ADMIRE seeks to empower users and developers of data mining and integration processes via a set of gateways connected together over the Internet and Grid, and will no doubt have implications for hospitals.

Budget: 4.35 million Euros.
Contact: University of Edinburgh, UK.

AWISSENET:

Ad-hoc PAN and wireless sensor secure network

AWISSENET focuses on security and resilience across ad-hoc PANs and wireless sensor networks. It seeks to offer self-configuration and secure roaming of data and services over multiple administrative domains and across insecure infrastructures of heterogeneous ad-hoc and wireless networks.

Budget: 1.96 million Euros.
Contact: Elliniki Aeroporiki Viomichania AE, Greece.

GRIFS:

Global RFID interoperability forum for standards

GRIFS is support action for global RFID-related standardisation activities, involving participants from Europe, China, India, Japan, Korea and the US. Following the establishment of a worldwide view of the status of RFID standards, it is envisaged that a follow-on Forum will continue to work constructively thereafter.

Budget: 450,000 Euros.
Contact: GS1 aisbl, Belgium.

[Advanced ICT for Risk Assesment and Patient Safety]

AVERT-IT:

Advanced arterial hypotension adverse event prediction through a novel Bayesian neural network

AVERT-IT is aimed at a novel bedside monitoring and alerting system dedicated to the prediction of variations in the condition of a patient likely to lead to hypotension adverse events.

Budget: 1.78 million Euros.
Contact: Pera Innovation Ltd, UK.

ALERT:

Early detection of adverse drug events by integrative mining of clinical records and biomedical knowledge

ALERT seeks an alternative computerised approach for the early detection of adverse drug events, based on rapid assessment of signals from EHRs and biomedical databases, rather than relying on the physician.

Budget: 5.88 million Euros.
Contact: Erasmus University Medical Centre, Netherlands.

EPILEPSIAE:

Evolving platform for improving living expectation of patients suffering from Ictal events

This project intends to develop an intelligent alarming system, based on multi-signal information (EEG, ECG and others), intelligent data processing and wireless communications. It will be patient-transportable.

Budget: 2.92 million Euros.
Contact: Universidade De Coimbra, Portugal.

MedNET:

Latin American Health Care Network

MEDNET seeks to develop a medical network that addresses the problems of providing health care from a distance to rural areas in Latin America. MedNET will use European standards for communication, storage and medical data presentation.

Budget: 1.4 million Euros.
Contact: Fraunhofer Gesellschaft Zur Foerderung Der Angewandten Forschung E.V, Germany.

COMOESTAS:

Continuous monitoring of medication overuse headache in Europe and Latin America: development and standardisation of an alert and decision support system

COMOESTAS aims to develop an innovative 'all-in-one' ICT alert and decision support system which allows patients with a chronic condition to receive constant monitoring and personalised diagnosis.

Budget: 1.6 million Euros.
Contact: Fondazione Istituto Neurologico Casimiro Mondino, Italy.

PSIP:

Patient safety through intelligent procedures in medication

PSIP seeks to use facilitate the systematic production of epidemiological knowledge on adverse drug events and ameliorate the entire medication cycle in a hospital environment. To achieve this, it will mine hospital databases and other data sources.

Budget: 7.27 million Euros.
Contact: Centre Hospitalier Regional et Universitaire de Lille, France.

DEBUGIT:

Detecting and eliminating bacteria using information technologies

Increased antibiotic use have led to major new challenges, such as growing resistance. DEBUGIT will mine data from Clinical Information Systems to obtain patterns and trends via a virtualised Clinical Data Repository (CDR), featuring, transparent access to the original CIS and/or collection and aggregation of data in a local store.

Budget: 6.41 million Euros.
Contact: Agfa Healthcare, Belgium.

REMINE:

High performances prediction, detection and monitoring platform for patient safety management

REMINE seeks to mine data to model, predict, and detect Risks Against Patient Safety (RAPS), and then build a management support system for a patient safety framework. RAPS represent one of the most important causes of death in hospitals.

Budget: 5.4 million Euros.
Contact: Gesellschaft Fuer Medizinische Datenverarbeitung Mbh, Germany.

[ICT and Ageing]

COMPANIONABLE:

Integrated cognitive assistive and domotic companion robotic systems for ability and security

CompanionAble targets social inclusion of the elderly suffering from chronic cognitive disabilities. Its USP is a synergetic combination of the strengths of a mobile robotic companion with the advantages of a stationary smart home.

Budget: 7.8 million Euros.
Contact: University of Reading, UK.

CONFIDENCE:

Ubiquitous care system to support independent living

Confidence will develop and deploy innovative, cost effective, non-intrusive and reliable technologies for the detection of abnormal events or unexpected behaviours that may be related to a health problem in elderly people.

Budget: 3.5 million Euros.
Contact: Centro De Estudios E Investigaciones Tecnicas De Guipuzcoa, Spain.

HERMES:

Cognitive care and guidance for active aging

HERMES provides an innovative integrated approach to cognitive care. This is achieved through an advanced, integrated, assistive technology that combines the functional skills of older persons to reduce age-related decline of cognitive capabilities and assist users where necessary.

Budget: 2.82 million Euros.
Contact: Center For Usability Research And Engineering, Austria.

SENIOR:

Social ethical and privacy needs in ICT for older people: a dialogue roadmap

SENIOR aims to provide a systematic assessment of the social, ethical, and privacy issues involved in ICT and Ageing, to understand what lessons should be learned from current technological trends, and to plan strategies for governing future trends.

Budget: 950,000 Euros.
Contact: Centro Studi Su Scienza, Societa E Cittadinanza srl, Italy.

[Personal Health Systems for Monitoring and Point-of-Care Diagnostics]

CHIANTI:

Challenged Internet access network technology infrastructure

The rapid growth of nomadic, mobile Internet is creating demand for ubiquitous connectivity. CHIANTI seeks to improve disconnection and disruption tolerance and promises considerable implications for the trend towards mobility in pervasive e-Health infsatructures.

Budget: 968,262 Euros.
Contact: University of Bremen, Germany.

HEARTCYCLE:

Compliance and effectiveness in HF and CHD closed-loop management

HeartCycle will provide a closed-loop disease management solution to serve both HF and CHD patients, by multi-parametric monitoring of vital signs, analysing the data and providing automated decision support, to derive therapy recommendations.

Budget: 21.99 million Euros.
Contact: Philips Technology GmbH, Germany.

DIADVISOR:

Personal glucose predictive diabetes advisor

DIAdvisor is a large scale-integrating project to develop a prediction-based tool which uses past and easily available information to optimise the therapy of Type I and II diabetes. It does not depend on specific sensor technologies.

Budget: 7.1 million Euros.
Contact: Novo Nordisk A/S, Denmark.

PHS2020:

Road-mapping personal health systems - scenarios and research themes for FP-7 and beyond

The PHS2020 project aims to produce a post FP-7 RTD roadmap on ICT supported Personal Health Systems, identifying emerging technologies and potential applications, taking account of users demands, business aspects, ethical and legal considerations.

Budget: 450,000 Euros.
Contact: Consorzio Per 'innovazione Nella Gestione Delle Imprese E Della Pubblica Amministrazione Denominato Anche MIP (Master Imprese-Politecnico), Italy.

POCEMON:

Point-of-care monitoring and diagnostics for autoimmune diseases

POCEMON aims at hardware and software development for a multi-purpose autoimmune diseases diagnostic platform interfaced with Laboratory Information Systems. It will combine Lab-on-Chip (LOC) technologies, genomic micro-arrays of HLA (human leukocyte antigens) typing, microelectronics, mobile devices, intelligent algorithms and wireless communications.

Budget: 8.4 million Euros.
Contact: PCS Professional Clinical Software GmbH, Austria.

CHRONIOUS:

An open, ubiquitous and adaptive chronic disease management platform for renal insufficiency

CHRONIOUS seeks to develop a smart wearable platform, based on audio signals, vital sensors and activity sensors. It would continuously monitor patients suffering from chronic diseases in long-stay settings and detect any sign of abnormal health status and possible alerting incidents.

Budget: 7.25 million Euros.
Contact: Tesan SpA, Italy.

[Bioinformatics and Robotics]

SMILING:

Self Mobility Improvement in the elderly by counteracting falls

SMILING seeks to diminish age related impairments by interfering with mobility disability and improving carry-over into real life situations. It will provide a wearable non-invasive computer-controlled system, aimed to perform chaotic perturbations to lower extremities during active walking by small alterations of the height and slope of weight-bearing surfaces.

Budget: 2.87 million Euros.
Contact: Istituto Nazionale Di Riposo E Cura Per Anziani V.E. II, Italy.

RENACHIP:

Rehabilitation of a discrete sensory motor learning function by a prosthetic chip

RENACHIP's objective is to develop a full bio-hybrid rehabilitation and substitution methodology; replacing the

aged cerebellar brain circuit with a biomimetic chip bi-directionally interfaced to inputs and outputs of the system.

Budget: 3.3 million Euros.
Contact: The University Of Newcastle Upon Tyne, UK.

ROBOCAST:

Robot and sensors integration as guidance for enhanced computer assisted surgery and therapy

ROBOCAST aims to develop ICT scientific methods and technologies which focus on robot assisted keyhole neurosurgery.

Budget: 3.45 million Euros.
Contact: Politecnico Di Milano, Italy.

HOSPITAL GOVERNANCE AND IT

AUTHOR
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Can IT-mediated corporate governance systems derived from (and generated by) private sector companies be applied to hospitals, in particular the non-profit hospitals which underpin the European healthcare landscape ?
Across most of Europe, hospital boards oversee policies/strategies, financial plans and other operational activities, and many review and occasionally contest strategic plans and directions. In the private sector, it is clear that a solid, intelligently structured board can greatly enhance an organisation's performance. The key to this is coherence and transparency in authority and responsibility. In spite of parallels, there is however so far little comparative data available for the healthcare sector, and thus little in the way of guidance. Emerging IT solutions are expected to play a key role in both auditing performance and setting transparent metrics and scorecards for governance.

Since several years, governance issues have received considerable attention, and interest in the concept remains on the rise, both in the corporate world and beyond. Indeed, nine years ago, a commentary by then-World Bank President J.D Wolfensohn in the 'Economist' noted that "the governance of corporations is now as important in the world economy as the government of countries."

In essence, governance concerns the design of the top structures of an organisation such that appropriate goals are defined, suitable people placed at the helm and management pursues organisational goals as effectively as possible.

Interest in governance issues has been spreading quickly among non-profit organizations too, as they increasingly recognise that for them too, governance is a matter of importance.

As large organisations using vast amounts of resources and fulfilling key societal needs, hospitals in particular are under rising pressure to create decent governance structures. This raises the question as to what extent recipes from the corporate sector can be used by hospitals too.

The underlying theme of this article is that the core concepts and ideas derived from the corporate world are perfectly applicable to hospitals. However, the latter usually face extra challenges in the creation of a good governance structure (as compared to a corporate setting).

IT may contribute to solving these specific problems.

The Root Of The Governance Problem: Top Management Has No Hierarchical Boss

One of the main challenges in designing a governance system is the fact that, contrary to the remainder of the organisation, top management has no hierarchical boss. Hence, unless appropriate structures are put in place, it is not straightforward to ascertain that top management positions are filled with appropriate people, management chooses the right objectives and finally goals are effectively and efficiently pursued; these are, after all, the functions normally performed by a "boss" relative to subordinates.

The answer to such questions lies in the development of a system of checks and balances. This consists of controls whereby separate parties within the governance system of the organisation are made accountable to define "appropriate" goals for the organisation and limit each others' power to deviate from these goals.

Such a technique presumes that the system can be constructed to align the long-term interests of individual managers and board members with those of the entire enterprise and its stakeholders. Self-interest then becomes an important incentive for mutual steering and control.

To that end, the parties involved and their interests must be well defined and made known throughout the entire organisation. This implies a clear demarcation of responsibilities, and a transparent structure with a timely flow of appropriate information.

Non-Profit Hospital Governance: A Fascinating But Difficult Problem …

The above description comprises the essence of all existing governance models. Hence there is no reason why it should not apply to the non-profit sector, to which many hospitals belong.

Yet the actual configuration of checks and balances will depend on contextual elements and therefore demand knowledge of regulations and other characteristics of the organisation. This is certainly true for hospitals. However, in their case (as compared to corporations), the design of the governance system generally requires facing some key additional problems, as explained below.

What are the goals of the hospital and who defines them ?

In the case of corporations, the last decade has seen growing pressure on firms from owners to pursue profitability and shareholder value. As a result, the question of goal setting has been solved while the realisation of the goal (i.e. profits and stock market value) is relatively simple to evaluate.

For non-profit hospitals, however, the problem is much more complicated. In particular, although the originators of the organisation (general meeting) and board typically have a perspective on the underlying mission of the hospital, goal setting and the weighting of conflicting interests is difficult, especially as one is dealing with fundamental societal issues like human health.

How to involve independent physicians in decision structures ?

Contrary to the corporate case, where all "workers" are typically employees, in many hospitals physicians are simply users of the facilities. Hence, although they have a major impact on all aspects of the organisation, these physicians are not subject to a hierarchical relationship with the management of the hospital.

This poses the question of how to involve them in the organisation, taking into account conflicting interests among physicians on the one hand, and conflicting interests between the latter and the hospital on the other.

An Important Role for IT In Hospital Governance

The challenges mentioned above enhance the importance of a clear definition of the mission, of an explicit translation of the mission into goals and a further specification of responsibilities and measurable outcomes (e.g. through balance scorecard techniques).

In reality, hospitals increasingly pay attention to the development of such an encompassing plan for care activities as it improves transparency, offers opportunities to involve all parties intervening in the care process (i.e. the physicians too) and generally helps reduce disagreements. Both the construction and the implementation of such a plan involves correct and timely information and hence an appropriate IT-management. In fact, the latter should support the organisation in effectively and efficiently realising its goals in all its aspects.

In a hospital in particular, goals are often qualitative, measurement is complex and therefore usually involves the gathering of significant amounts of information. Furthermore, in an efficient hospital organisation, IT should also support the physicians, nurses and other workers in realising high quality services to meet rising patients demands as well as providing increasingly complex and integrated care programs.

Simultaneously, it is evident that systems too should be cost effective. Thereby operational risks, like a breakdown in IT infrastructure or incompatibilities causing erroneous measurement in treatment processes, should be kept under control. Finally, IT may become strategic in nature when choices in configurations involve large investments and fundamental options.

Conclusions

The quality of a governance system is driven by the quality of its checks and balances. Keeping these checks in balance however is quite difficult, and hence it is not surprising that once in a while some governance problems occur within an organisation.

However, given that transparency and information flow are both crucial, IT systems supporting the organisation can be brought to play an important role and significantly contribute to keeping the overarching structures of governance in balance.

Furthermore, not only at the top, but also at all levels of the organisation, correct information flow is crucial in effective functioning. The board should be aware of the strategic impact of IT, and how it contributes to the improvement of the organisation.

The leveraging of IT for enhancing corporate governance in hospitals is still in its early stages, and consists principally of bespoke adaptations to existing ERP/MIS packages.

The core challenge in the coming years is to define and use agreed criteria (including benchmarks and best practices) to continuously collect, collate and present high-level information.

The IT systems and sub-systems for corporate governance need to be permanently "boardroom ready", to provide structured results on demand – and communicate this intelligently both upwards to the Board and downwards to concerned hospital staff.

COMMENT:

In many European countries, hospitals are owned or co-owned by local and/or regional and/or federal governments, as well as universities.

The boards of many such hospitals encompass representatives of local, regional and federal governments, as well as employees and external professionals – to engender close (often informal) ties between owners and managers.

The underlying interests of these groups are often not consonant. Medical and financial performance targets are also rarely of the hard kind usually associated with private corporations. As a result, corporate performance is not a clear priority, and disputes can lead to higher managerial autonomy at the expense of 'owners'.

CHECKLIST:

- Independent/non-executive/politically-appointed directors have clear guidelines on roles and responsibilities.
- Internet Alert service for hospital directors on new regulatory developments.
- New directors orientation programme.
- Code on Best Practices, Minimum Good Practices.
- The role of IT in the operation and review of internal control methodologies, including routine audits – especially of financial systems.
- Is the IT system outsourced to specialists ?
- How often is an audit undertaken ?
- Is there continuous improvement and benchmarking?

EXPLORING TELECOMS MARKETS AND THEIR IMPACT ON HOSPITAL MODERNISATION

AUTHORS

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Drivers exist for implementing IT services within the healthcare industry on a large scale. Their interactions, however, are highly dynamic and remain largely ad-hoc. Nevertheless, the sheer scale of hospital modernisation projects and the ever-changing opportunities offered by new networking and communications technologies combine to make telecoms companies key actors in the process.

At first glance, IT projects that support the modernisation of hospitals appear to be mainly about on-site infrastructure with a few connections into the outside world. However, there are several factors that drive requirements on a geographically much larger scale:

- **Interoperability:** The health service needs interoperability between systems, functions and geographies, not just within the health service but inter-agency (police, social care, etc.). For example, a doctor in one area of a country needs access to records of a patient's hospital visit elsewhere in the country, or a General Practitioner (GP) arranges a patient's appointment at a local hospital and then later needs to access the test results. In England, this level of interoperability is being developed through the construction of a national infrastructure and consequently, only a few large companies are capable of managing the complexity of implementation, but even they have struggled! The approach employed in each project will vary, but a large secure network (called 'N3' in England) is essential. The extent to which the applications using the network are centralised or locally deployed is debateable, but some (e.g. patient records) seem to be good candidates for deployment on a regional or national rather than local scale. If a single national database doesn't exist, then interoperability between various systems is essential.
- **Mobility:** In recent years there has been an increasing focus on treating patients in the community rather than in hospitals and this has increased the geographical coverage requirements of certain healthcare services. This is a big driver in the transformation of the ambulance service where there has been a shift in policy towards improving workflow from the outset at the incident location. To achieve this, there is a requirement for effective access to relevant information (e.g. patient records) whilst mobile. The digital radio replacement programme for ambulance trusts in the UK has a significant focus on improving data, for getting better information to/from the patient as well as for more effective fleet management. Often, a (mobile) telecom operator's influence over mobile devices can put them in a strong position to offer services to address the mobility requirement.
- **Self-serve:** Technology, and the policy to support it, is enabling patient's to use 'self serve' mechanisms to access healthcare services or be connected to online 'telecare' services. However, information security and technology developments such as Fixed Mobile Convergence (FMC) are just some of the issues that these sorts of services will need to address to be effective and trusted.

Consequently, the large geographical scope and complexity of new healthcare services means the sophisticated and real-time (or near real-time) integration of networked IT services are required. By and large, these tend to be the domain of large telecom operators and system integrators.

Large, complex contracts attract larger, more sophisticated companies

As explained above, healthcare IT projects can be large and complex. They also draw upon all of the generic elements of the IT offering, namely:

- Telecommunications services e.g. telephony, switched data services
- Hardware products e.g. network equipment and computer hardware
- Software products e.g. systems and application software
- Core IT services e.g. implementation and operations

This in turn tends to attract the resources of large telecom operators (telcos) and systems integrators, who tend to occupy the role of prime contractor in partnership with other organisations.

The case studies below are examples that illustrates the size and complexity of healthcare modernisation:

The UK's National Programme for IT (NPfIT)

The UK's National Programme for IT (NPfIT) is an initiative by the National Health Service (NHS) and is said to be to be the world's biggest civil information technology programme. The UKs incumbent operator (BT) is prime contractor for four of the largest contracts to the value of circa £1.4 billion over 10 years. The aim is to connect more than 30,000 general practitioners to 300 hospitals and to move towards an electronic care record for patients, providing secure and audited access for authorised health professionals to patient records.

The Department of Health agency, NHS Connecting for Health, are responsible for delivering the Programme which will provide the following capabilities:

- The NHS Care Records Service (NHS CRS)
- Electronic Transmission of Prescriptions (ETP)
- A New National Broadband Network (N3)
- Picture Archiving and Communications Systems (PACS)
- IT supporting GP payments, the Quality Management and Analysis System (QMAS)
- Choose and Book
- Communications – a central email and directory service.

The sheer scale and complexity of the contracts meant BT got off to a slow start, but they now claim to have 'upped their game' by adopting a traditional large-programme organisational structure plus a new systems approach based on large programme methodology. BT built a dedicated network service operations centre in order to provide an end-to-end view of the services they are delivering under the NpfIT contracts.

The UK's Department of Health (DoH) Ambulance Radio Programme (ARP)

The UK's Department of Health (DoH) Ambulance Radio Programme (ARP) is currently being rolled out nationally to provide NHS ambulance services with a new digital radio network and associated communications services, including a managed service for the radio terminals, Integrated Communications Control Systems, and mobile data applications.
The £390 million, 13-year contract to deliver the programme was awarded by the DoH to O2 Airwave in July 2005, after a national procurement exercise. A key objective is to provide better data communications to help NHS ambulance services improve patient care and meet efficiency and response targets. Mobile data traffic already accounts for some 80% of ambulance communications, using legacy analogue systems as well as commercial bearers.

Since contract award, the NHS ambulance services in England have merged from 31 to 13 new ambulance service trusts. One of the key challenges during roll-out therefore, has been to maintain the programme implementation, while adapting the solution to meet the requirements of the new merged bodies.

Fixed line telco incumbents are investing heavily in next generation networks

Given their stagnating revenue and the decline in their core service propositions, most incumbent telcos are embarking on Next-Generation Network (NGN) transformations. The reasons that operators give for this investment are:

- Network will be better suited to supporting data networking requirements of customers
- Conveyance of voice, data and video traffic over the same platform (i.e. self contained segment of infrastructure)
- Voice and data traffic can be integrated at the customer's premises
- Supports scenario of ubiquitous customer services i.e. services everywhere, all the time
- Operational cost savings

There is also the possibility of a single NGN supporting multiple customers to increase the level of supplier competition.

There are three main approaches to NGN investment:

- Move to a full NGN core (such as that being carried out by BT),
- Investment in next-generation access (NGA) with a core overlay (like that by Deutsche Telekom)
- Full-IP strategy of rolling out NGA and NGN at the same time (like that of KPN).

Of course, operators will immediately seek to maximise revenue from their expensive new investments; they will do this by looking to develop extra value from the synergy between their acquisitions in IT applications / services and their new networks i.e. they will constantly look to innovate in the design and delivery of IT services.

IT is an important market for traditional telcos

The decision by BT Group to go after networked IT and broadband services, rather than just traditional carrier services, has been the main driver of their growth in revenues over recent years. This move is evidenced by the small rise in BTs staffing levels, which has been fuelled in part by acquisitions of IT services companies. These staffing changes are reflected in **Figure 1.**

Within BT, the focus on IT has been developed within the business unit facing global multinational customers, which is called 'BT Global Services'. Consequently, BT enjoyed a 38% growth to £6.28 million in what they term 'new wave revenues' which is mainly generated by IT, broadband and mobility services. New wave revenues represented 33% of all revenues in the 2006 financial year. This growth more than offset the decline in traditional revenues as shown in **Figure 2.**

However, our own report [(Wood, R. and Sale, S., Next-Generation Network Architecture: what and when?, Analysys Research (Cambridge, 2008)] forecasts that revenue from broadband services are likely to saturate in around two years, with growth opportunities focused as a result

TELECOMS OPERATORS AND HOSPITAL IT MODERNISATION

HEALTHCARE IT MANAGEMENT
ANALYSIS

Most EU telecoms operators are closely involved with e-Health programmes. However, they have also sought to leverage such still-emerging opportunities by working closely with hospital IT managers to provide systems integration expertise in modernisation projects.

In previous issues of Healthcare Information Technology, we have looked specifically at cases such as Telenor's leading role in the modernisation of St. Olaf's in Norway – billed as the largest project of its kind in Scandinavia. We have also analysed other cases in France, Germany, Spain, the UK and elsewhere.

Overall, hospital solutions from telecom operators are adapted from corporate IT offerings – such as converged voice and data, wireless communication and tracking (of patients, clinical samples and other assets), remote operations and the broader field of generic 'business' transformation.

In the near future, however, it is clear that they will have to take greater account of key healthcare sector specificities – not least in the shape of new standards, which, so far, have been mainly in the form of bolt-on modules.

The principal EU telecoms operators with explicit healthcare business units include BT and Swisscom. While the former's BT Health is a key contractor in the multibillion pound NHS modernisation programme, Swisscom has established a dedicated Centre of Competence to provide comprehensive solutions for healthcare customers – from hospitals to insurers.

Some EU telecoms firms have also begun to offer their healthcare-sector services outside the continent. For example, Germany's T-Systems has procured a major contract to provide SAP implementation in Durban, South Africa. One central feature is the end-to-end automation of medical and hospital administration processes at the South African hospital, based on the i.s.h.med HIS system T-Systems co-owns with Siemens Medical Solutions.

And yet, there are sometimes contradictory signals. Hubert Haag, head of the international healthcare business at T-Systems, has indicated that i.s.h. med is not a strategic priority for his company.
In the final analysis, telecoms operators themselves are bracing for the huge skills requirements which e-Health and hospital modernisation opportunities will inevitably demand. Some have been turning to India, the world's offshore outsourcing hub, following in the footsteps of IT firms with specific healthcare offerings – such as France's Steria (which recently acquired Indo-British Xansa), or Scandinavia's TietoEnator (which inherited its flagship iMedOne HIS offering from an India-based firm). On its part, Britain's BT has a long-established and major telecoms software joint venture with India's Mahindra, and Belgium's Belgacom with Infosys.

As the current issue of Healthcare Information Technology goes to press, T-Systems announced a major deal with India's Cognizant (a Nasdaq-listed IT firm with a market value of USD 8.5 billion, and 55,000 staff). By virtue of the deal, 1,150 T-Systems' employees in Bangalore and Pune would be transferred to Cognizant in the first phase.

Figure 1: FTEs in BT Group, by division
[Source: Analysis Research and BT 2008]

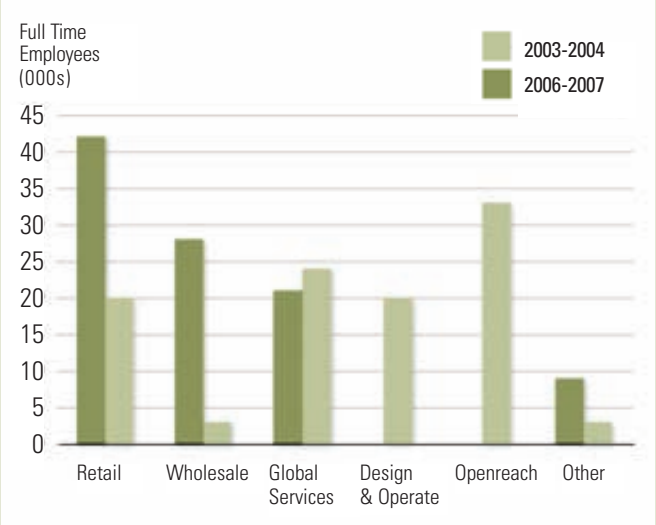
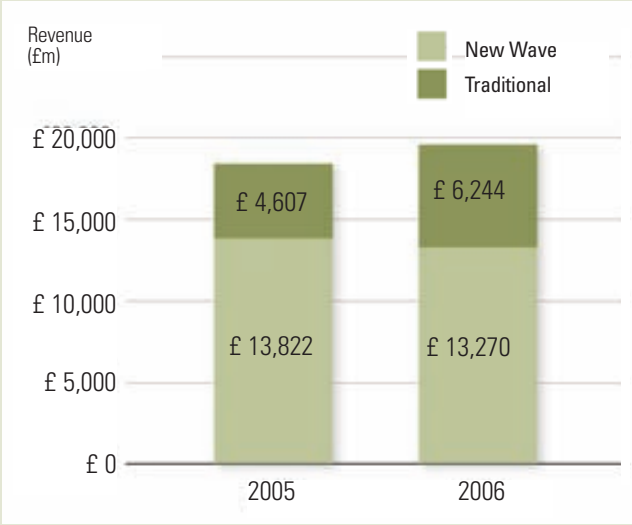


Figure 2: BT Revenue Growth
[Source: BT annual report, 2006]



on IT and mobility services. Thus, BT are interested in demand for IT services from a variety of customer markets and not just from multinational companies. Healthcare is one such example, and indeed BT have set up a business unit called 'BT Health' specifically for this purpose.

Telcos have entered into partnerships to address the IT opportunity

Our report states that:
"Faced with little prospect of growth in enterprise telecoms, many incumbents, such as BT and Deutsche Telekom, are placing more emphasis on the market for networked IT services. Opportunities lie in caching, hosting, back-up and security, but also in less familiar territory, such as applications integration and desktop management. As networking and IT markets converge, telcos will come into increased contact with a range of new competitors, such as the following:

- **Systems integrators.** Systems integrators have a strong position in networked IT and are advancing into core telco markets by, for example, buying Layer 2 connectivity services and managing LANs and WANs for enterprise customers, thereby further squeezing telcos' margins.
- **IT providers.** These existing players in the enterprise IT space include Accenture, HP, IBM and (India's) Infosys."

Although BT are effectively transforming themselves from a connectivity oriented business to a services business, BT has recognised that it lacked the requisite IT skills to offer the full IT proposition and has addressed this issue through partnerships with some of the IT providers mentioned above .

Telcos are considering their marketplace options for software and content

In order to further develop future revenue opportunities, telcos are considering repositioning themselves to occupy new positions in the IT industry value chain. For example, in a September 2007 newsletter to industry analysts, BT's Group Director of Strategy and Portfolio, stated that: "…Five years ago we made strong decisions to go after broadband and global IT ….We've got to make the same decisions for the two or three years ahead…..I think we're confident that it's probably software and maybe content, but we need to identify exactly where in software and exactly what it would look like in content.." Thus it appears that the current trend for the turnkey provision of all IT services from increasingly large suppliers will continue.

Do telco trends change the business case for modernisation?

The preceding paragraphs have highlighted several trends in the telecoms industry that are all important to the healthcare industry.

The market profile for IT services is changing due to:

- A developing supplier market for turnkey IT services that should lead to economies of scale and increased competition
- Deployment of NGN's by European incumbent telco operators that should significantly reduce their operating costs for delivery of voice, video and data services, and enable the development of innovative services in order to maximise the return on their expensive investments
- Importance of information security and associated technologies underpinning trust in technology deployments
- Uncertainty in telco markets as NGN's, Fixed Mobile Convergence and new technologies vie for dominance.

These trends will be important because the modernisation of hospitals requires the consumption of significant volumes of new, bandwidth-hungry, IT services delivered over a wide geographical area.

Therefore, the current developments in the telecommunications industry are likely to have a material impact on future business cases for healthcare modernisation.

FRANCE'S HEALTHCARE SYSTEM
REFORMS, MORE REFORMS...

HEALTHCARE IT MANAGEMENT
ANALYSIS

France's health system has in recent years been a paradox, both for expert observers within the country and those overseas. In June 2000, the World Health Organisation ranked the country's healthcare system as the "best in the world". This was in spite of the fact that in terms of standard benchmarks for high-tech healthcare, France lagged most of Europe. In 2000, for example, it had just 180 MRI scanners, and even today has one third the per capita level of Finland or Switzerland. In August 2004, an authoritative French body warned that the country's health system was in the throes of a severe crisis and called for sweeping reforms – in both structures and mindsets. Such self-criticism, however, did not prevent the prestigious New England Journal of Medicine urging the US government a short while later to learn from the French healthcare system. One of the article's authors noted that the French system resembles what would ensue from 'Medicare for all' reforms in the US.

The organisation urging a shakeout of France's healthcare financing system in 2004 was known as the High Council for the Future of Health Insurance, and was appointed by the French government. It called for sweeping changes – principally to cut waste and increase efficiency.

More crucially, it warned that citizens must pay more and both doctors and insurers alter their behaviour. Otherwise, it concluded, France faced an untenable extra load of 66 billion euros per year in its public budget deficit by 2020, over six times more than the 10.9 billion Euros deficit in 2004.

Parallels With Other EU Members

In some senses, the French health financing crisis echoes that of other EU countries, in the face of an ageing population and rising costs – especially for advanced new therapies.

These have to be accommodated alongside a legacy of healthcare infrastructure, the bulk of which dates back three decades or more.

However, certain factors make France's case special. At 11.1% of GDP, its health expenditure is the European Union's highest. French physicians also have a far higher tendency to prescribe medicines than their other EU counterparts.

The 1996 Reforms: Effects Short-Lived

Indeed, in 1996, the French government had already seen the need to start implementing major health care reforms– principally by strengthening quality and improving professional practices. Some of the measures included the founding of a healthcare accreditation body, new regional hospital agencies (RHAs), the establishment of cash-limited budgets at both national and regional levels and a contracting procedure between health authorities and hospitals.

These moves, however, did little to ensure long-term control of escalating costs, and led the way for the far more drastic moves which were proposed in 2004. Adding fuel to this process was the globally-publicised shortage of emergency staff and hospital beds in summer 2003, when a heat wave killed an estimated 15,000 (mainly elderly) people in France. A shortage of hospital beds was also obvious in December the same year, during a nationwide influenza and bronchitis epidemic.

2004: Call for Better Regulation and Governance

Although the High Council for the Future of Health Insurance emphasised in 2004 that the standard of care provided by French physicians remained among the world's best, it also underscored the fact that the system was "badly regulated and badly governed", with "general confusion" over who was in charge explaining some of the structural deficiencies.

Hospital 2007: Reform at the Roots

One of the first major moves for reform in France was known as Hospital 2007. This sought to improve overall management within the hospital sector – both public and private. The measures introduced not only additional modifications to financing systems but also the rules and frameworks for hospital planning and governance.

The hospital sector accounts for almost half total healthcare spending in France. Of this, just under half is directed at existing infrastructure, with 30% going to upgrades and renewal, and 20% to new projects.

Overall, the French hospital sector has long been associated with a lack of transparency, along with little incentives for efficiency at individual facilities. Equally important is a sharp deterioration in the quality of buildings, partly the result of dwindling outlays on maintenance – ironically,

as a direct result of the 1996 reforms. As many as six of 10 university hospitals, for example, are reported to have inadequate safety standards in 25-75% of their surface area.

The Hospital 2007 Plan had three lines of action:

- Decentralisation and investment in healthcare facilities – especially for the modernisation of hospitals. The Plan called for 6 billion Euros as direct government subsidies, with additional self-financing by hospitals.
- Introduction of payment by results (T2A, in French 'tarification à l'activité'). This stipulated a stepped up introduction of activity-based (DRG-like) payments for both public and private hospitals, to replace the previous system by which public and private non-profit hospitals availed of global budgets dependent on historical costs (private for-profit hospitals had an itemised billing system). The aim is to go from 10% coverage by the T2A scheme in 2004 to 100% in 2012.
- Reformed governance for public hospitals, in order to provide greater autonomy to medical staff in managerial decisions. Public hospitals have also been incentivised to create hubs of medical excellence – under the responsibility of individual doctors who contract with the hospital management - in order to organise and regroup activities more efficiently.

A Look Back at Hospital 2007

Overall, the 2007 Plan has led to serious modernisation programmes at hospitals, not least by several hundred smaller institutions which have (or are being) merged or regrouped – into larger and more viable entities. One important side-effect is growing concentration: as little as 6% of French hospitals account for about 58% of total spending.

There have, meanwhile, been many criticisms of the Plan, not least due to the unpredictability of new technologies on overall costs, and the difficulties of developing multi-year investment plans as a result. The biggest criticism is that the reforms have paved the way for a two-tier hospital system.

Though reforms have improved the internal organisation of public hospitals, their boards remain under the control of the government, alongside old, bureaucratic mindsets regarding investments and recruitment.

In addition, the new system entails a potentially far higher risk for public hospitals – who are compelled to respond to the full range of healthcare demands (including lower-margin, higher volume services - the so-called public service obligation).

For them, the challenge is to control costs rather than manage and fine-tune the range of services on offer. In contrast, the private sector has more flexibility to specialise, and most concentrate on surgery, maternity care and sophisticated specialty areas.

The Next Step: Hospital 2012

Hospital 2012 (Le plan hôpital 2012) was announced in February 2007 by French Health Minister Xavier Bertrand as a follow-on to Plan 2007. Like its predecessor, it is focused on hospitals – both private and public, as well as achieving excellence in medical science and healthcare delivery.

With an outlay of 10 billion Euros (in two equal tranches in 2007 and 2009), the new Plan intends to build upon the positive results and experiences of its predecessor, while ameliorating the negative ones.

Analysts have identified two principal thematic pillars for Hospital 2012. The first is a continuation of the organisational and financial restructuring elements from Hospital 2007.

The second is to "accelerate" the implementation of high-tech hospital information systems, with the aim of increasing outlays on healthcare IT from 1.7% of spending to 3% by 2012.

COUNTRY FOCUS: FRANCE

		YEAR
Population (million)	60.8	2007
Live births/female	12.9	2006
Deaths/1,000 pop.	8.5	2006
Life expectancy (years)	80.6	2006
GDP (billion CHF)	1,871	2006
Total healthcare expenditure (% GDP)	11.1	2006
Total healthcare expenditure per capita (PPP USD)	3,374	2005
% of healthcare system financed by public funds	79.8%	2005
Number of hospitals (per 100,000 inhabitants)	5.2	2007
Number of CT scanners (per million inhabitants)	9.8	2005
Number of MRIs (per million inhabitants)	4.7	2005
Number of acute care beds (per 1,000 inhabitants)	3.7	2005
Length of stay (average in days)	5.5	2000
Number of physicians (per 1,000 inhabitants)	3.46	2006
Number of nurses (per 1,000 inhabitants)	7.85	2007
Percentage of households with Internet access	41%	2006
Percentage of households with broadband access	30.3%	2006
Percentage of individuals using the Internet for interacting with public authorities	70%	2004

All figures for metropolitan France – i.e excluding overseas territories. Source: OECD, WHO, INSEE (France).

HEALTHCARE IT IN FRANCE

HEALTHCARE IT MANAGEMENT
ANALYSIS

Healthcare IT in France is a mix of gems and some persistent dark spots. The former arises from its world-class 'dirigiste' policies for high-technology in general. The latter are mainly due to the complexities of its welfare system (in the shape of enduring healthcare budget deficits) and its generally slower adoption of the Internet – ironically, a legacy of that erstwhile Internet-like early bird, the Minitel. Nevertheless, recent years have witnessed a sharp escalation in awareness about the need to take up a leadership role and pioneer new directions in healthcare IT.

Doubling Healthcare IT Spending by 2012

France's 2012 Hospital Plan seeks to double the share of spending on hospital information systems (HIS) from 1.7% - a level at the bottom rungs of the EU league table - to 3%, and their modernisation constitutes one of the Plan's over-arching objectives.

The outlays are impressive. According to leading French financial daily Les Echos, the Hospital Investment Plan 2012 would entail 5-year investments of 10 billion Euros.

The ATIH

The roots of this resolve date back to 2000, when France established the Technical Agency for Information on Hospitalisation (known by its French acronym ATIH). ATIH is a public authority responsible for the technical coordination of the country's backbone hospital information system(s).

Its mission has been to replace slow, inefficient and expensive manual processes for data processing and exchange between hospitals and regional healthcare agencies, as well as meet the demand for increased frequency of administrative data filing on areas like pathology, patient treatment, and diagnosis.

Its own IT system, built on JEE architecture, automates the generation of healthcare activity metrics, manages data exchanges across secure connections and speeds up healthcare budget evaluation and allocation.

Smartcards and Biometrics

ATIH, on its part, coupled into another bellwether IT initiative in France focused on smart cards, a technology area where the country has long been considered a pioneer. The key goal of the so-called smart health card (first rolled out in 1998) has been to computerise and thus simplify and speed up medical treatment.

Currently, there are almost 600,000 users of the CPS smart card – targeted at giving healthcare professionals access to the e-Health infrastructure. In addition, there are almost 60 million recipients of the Carte Vitale – for patients. A new version of the Carte Vitale was introduced in 2006 (initially in Brittany and the Pays de la Loire), and in stages, is expected to cover the entire population by 2010.

The new smart card, Carte Vitale 2, includes a digital facial biometric photograph to cut down on fraud and includes a host of other patient data: personal contacts for an emergency, blood group, the name of the GP, details on membership of a sickness fund and position on organ donation.

Activity-based Hospital Financing

In 2004, France added further momentum to its healthcare IT modernisation drive with the establishment of new activity-based funding systems at hospitals. This has compelled them to optimise IT systems to ensure they accurately record clinical activity in order to get paid. Alongside, wider awareness of factors such as RoI and quality of care metrics are also driving demand for healthcare IT.

The DMP: Anytime, Anywhere Patient Data

2004 also saw the legal foundations of the Dossier Médical Personnel (DMP) or 'personal medical file', which has sought to create Electronic Medical Record for all French residents covered by health insurance.

As with similar initiatives elsewhere in Europe, the DMP seeks to improve healthcare efficiency and quality by facilitating information exchange and coordination between health professionals as well as medical facilities, during consultations, diagnosis and treatment. Overall, the DMP seeks to improve the continuity and quality of care by enabling access to patient data from anywhere at any time.

Building e-Health Bottom Up, Too

Meanwhile. a host of pilots and standalone regional efforts seek to draw mileage from the DMP and, in turn, add value in a bottom-up positive feedback loop which strengthens the wider e-Health infrastructure in France.

For example, Paris-based Institut Curie has developed Promethee, a meta-search engine which allows physicians and other healthcare professionals to access its own DMP (known as Elios) and the hospital's entire database, and find both patient data as well as compare/evaluate medical best practices and treatment pathways.

E-Health initiatives targeted at patients too are on the upswing. The Auvergne Mobil'Assistance project begun last year,

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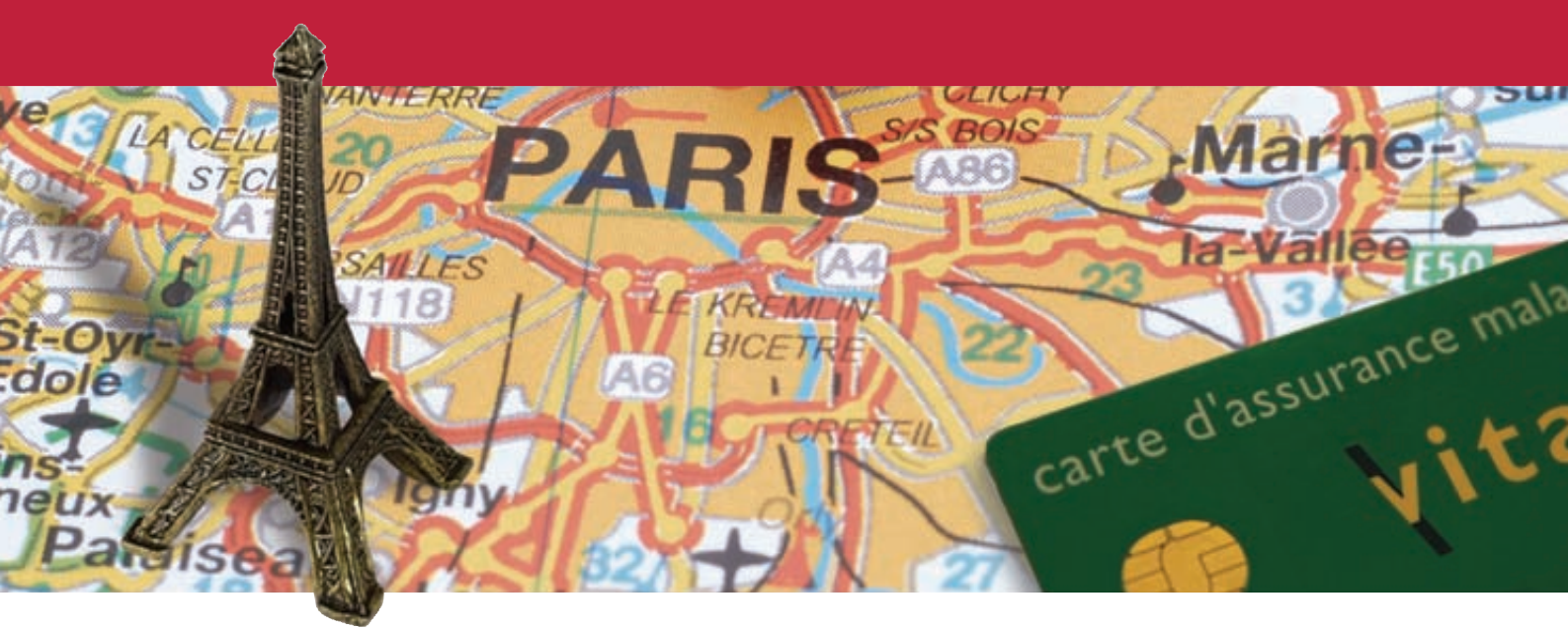

for example, aims to establish a tele-warning service via the local mobile telephone network. This project falls under the broader e-Health rubric of 'medical teleassistance', which were investigated in depth by an official study on the possibilities in healthcare arising from the broadband revolution. Another instance is a joint initiative by Grenoble and Toulouse University Hospital Centres, to enable diabetic patients to send their glycaemia data via mobile phones to their patient records hosted on a dedicated web server. The updated records are consulted by doctors, who then advise patients by SMS or synthesised voice message.

One of the most advanced regions in France (and Europe) in terms of e-Health is Nord Pas de Calais, where a swathe of telemedicine efforts have been conceived and kicked off in the late 1990s. The region's hospitals share networks, and videoconferencing for multi-centre consultations have long been commonplace. One direct result is a decline in the number and urgency of inter-hospital transfers. Follow-on efforts are embedded within a discussion group called the e-Health Circle (Le Cercle e-santé), which proposes pilot projects.

A Mood of Cautious Optimism

Nevertheless, French industry and hospital sources consulted by HITM remain cautiously optimistic about future directions in healthcare IT and e-Health. Some are outright sceptical about the e-Health hype.

They cite a 2006 White Paper from Lesiss (the French association of healthcare IT professionals and industry), which found only 10% of French healthcare facilities had shared patient dossiers at the hospital level – while 30% had partial sharing. Meanwhile, it is not uncommon to find some of the most advanced hospitals in the country having 50-60 different IT systems.

One of the first challenges is to ensure that local and regional initiatives do not duplicate one another, and instead plug seamlessly into a national healthcare IT/e-Health infrastructure, and one which does not neglect the role of hospitals in smaller Tier II and III cities and towns.

Equally, it is important that such developments remain consonant with still-emerging EU and international standards and regulations. France has a strong tradition of technological elitism. There is thus a real risk of an undue focus on technology for its own sake, rather than the increasingly user-facing requirements of the present cost-sensitive healthcare mood and culture in Europe.

Alongside, some healthcare opinion leaders believe that politicians do not appreciate the real revolution that IT and e-Health can provide for the general public and that the legislative agenda is neither quick enough or in tune with the sheer scale and pace of technological change.

The other challenge is that of information to the general public. As elsewhere, many French citizens remain seriously concerned about the security of confidential data in the DMP, especially since its access from anywhere at any time is a critical component of its utility.

At the end of 2005, French Senator Jean-Jacques Jegou submitted a highly critical report on the DMP, calling it "unrealistic" and describing the scheme as an airplane without a flight plan and a cockpit without a pilot." Some of the Senator's 10 proposals have specific relevance for the healthcare IT community – in terms of making physicians more IT friendly (and doing so on a continuing education basis), as well as anchoring the DMP more strongly within the wider landscape of modernising hospital information systems.

The French mass media too have stoked up bouts of hysteria over the DMP, especially in terms of security issues. At the end of 2006, the daily Liberation carried an article on the DMP headlined: 'De big docteur à Big Brother' (From Big Doctor to Big Brother), and warning its readers of the potentially grave consequences of misuse of patient data.

At the end, enhanced acceptance in France will depend on encouraging public involvement and use of the e-Health system. Some experts believe the answer will lie in growing integration of popular, mobile technology and imaginative projects which deliver healthcare to the home, and call on the healthcare IT industry to take a leadership role in such a process.

On its part, the French government has also sought to get its population e-Health ready. The official health portal www.sante.fr provides the general public with information and links to all government health agencies.

Such umbrella initiatives have been bolstered by ad-hoc efforts on high-concern areas such as bird flu, where a dedicated official site (set up in 2006) catalysed an enormous number of visitors – and also acquainted them with the reach and benefits of the Internet in terms of healthcare.

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THE MINITEL:
FRANCE'S HIGH-TECH EARLY BIRD

AUTHOR
Tosh Sheshabalaya
HITM

From the Eiffel Tower through the tail-free delta wing Mirage III fighter jet to the TGV supertrain, France has an enviable reputation for taking an iconoclastic, but surprisingly successful approach at the cutting-edge of high technology. Today, when the Internet becomes as commonplace as a dishwasher in Western households, it may be salutary to look briefly at a precursor technology, France's Minitel system. Unlike similar initiatives elsewhere (Germany's Bildschirmtext and Britain's Prestel), this French project enjoyed resounding commercial success.

Launched 25 years ago, the Minitel is essentially an online videotexting service designed for access through the public telephone system. To build a critical mass of users in what was then (and still is) a very 'dirigiste' top-down techno-political culture, millions of Minitels were handed out free to both private phone subscribers and business enterprises. This was of course, still possible in the age of Europe's Post, Telephone and Telecommunications (PTT) monopolies, before they were split a decade later into separate telecoms and postal units.

The Mid-1980s Internet Experience

By the mid-1980s, subscribers in France could use the Minitel to search the phone directory, determine prices on the French bourse, make certain purchases, book reservations on airlines and trains, and even chat online – indeed, very much like the modern Internet, but predating it by well over a decade.

In the late 1990s, Minitel users (including those accessing it through personal computers) were estimated at some 25-30 million (or about half the total population of France). In the mail-order catalogue business, in particular, the success of Minitel was astounding: it accounted for almost 15% of sales at La Redoute and Les Trois Suisses, France's biggest mail order companies

Down But Not Yet Out

Though the speed and convenience of the Internet has nibbled steadily at Minitel use, news about its death still remain slightly exaggerated.
In 2006, there were still about 4 million terminals retained by users. Overall, the Minitel system generated some 300 million calls, and though revenues had fallen from their peak of over 800 million Euros in the late 1990s, they still accounted for a respectable 200 million Euros.

According to France Telecom, key Minitel deployments comprise banking and financial services, largely due to its (well-proven) security features – a factor which many Internet users (especially the elderly) are not yet wholly comfortable with. Indeed, nothing better illustrated the residual loyalty of French Minitel users than the compliment by US Internet giant Yahoo Inc., which in 2001 began its own Minitel service called 3615 Yahoo, and allowed its e-mail subscribers to send and receive mail via the Minitel. More crucially, Yahoo acknowledged that its analysts were studying (and learning from) Minitel's billing and fee-for-service models.

e-Health and the Minitel

Healthcare has been no exception to the reach of Minitel. In the 1990s, more than half French doctors used it for consulting services. More recently, France Telecom states that 12 million updates to the state-of-the-art Vitale personal health card have been made via Minitel.

Indeed, in the health and e-Health context, Minitel arguably made some of the first demonstrations of operational telemedicine. One example was NutriExpert, a diet self-monitoring tool for diabetic patients, which provided access to patients via Minitel and featured intuitive elements of information, instruction and gaming. It was designed by the CHU (Centre Hospitalier Universitaire) Rangueil in Toulouse under the leadership of the late Prof. Jean-Pierre Tauber, who might be called an icon of modern e-Health. An evaluation project of the Minitel/NutriExpert system called DIABETO found measurable and clinically significant improvements on the part of users – for example, a drop in HbA1 from 11 to 9.9%, and fructosamine from 5.00 to 4.57%, within the space of six months.

Marrying Minitel to the Net – and Beyond to Chinese Tourists

Over the years, France Telecom has sought to increase the shelf life of Minitel and retain its relevance. It firstly provided users with a dial-up Internet gateway called i-Minitel.

In April 2005, the company extended Minitel access to its broadband ADSL network. France Telecom also continues to emphasise the upfront/in-built security and anonymity aspects of the Minitel network. Nevertheless, use levels will inevitably taper off, and sometime in the next decade, it is very likely that Chinese tourists pick up discarded Minitels on the flea markets in Paris.

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02 – 05 September 2008
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www.each-conference.com

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www.isqua.org.au/isquaPages/copenhagen08.html

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www.worldofhealthit.org

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Düsseldorf, Germany
www.medica.de

RSNA 2008
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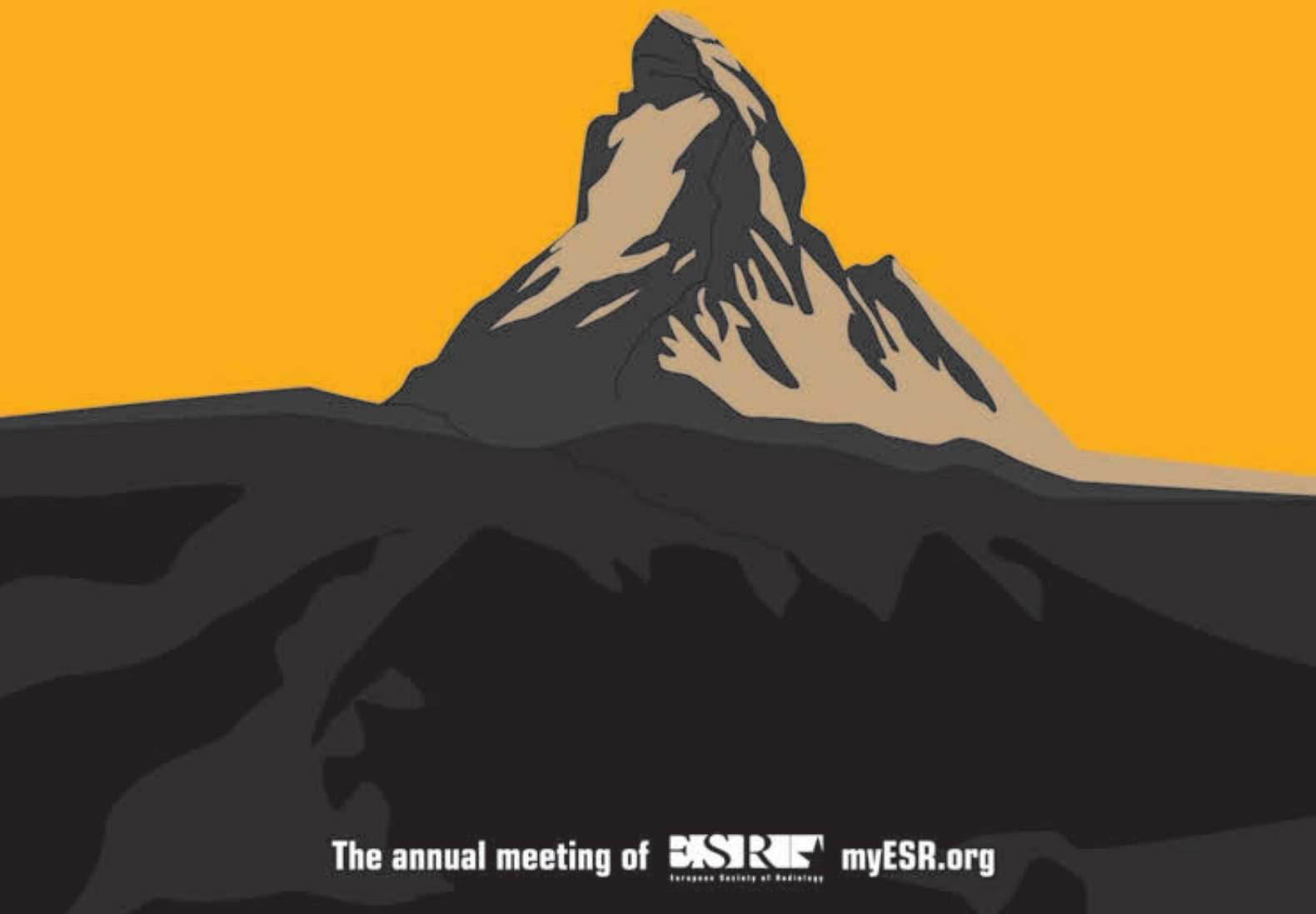

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