HEALTHCARE IT MANAGEMENT

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THE OFFICIAL JOURNAL OF THE EUROPEAN ASSOCIATION OF HEALTHCARE IT MANAGERS

Approaches to EHR Design: A Case From The US

EVOLVING ROLE OF THE CMIO

TECHNOLOGY AND THE ELDERLY

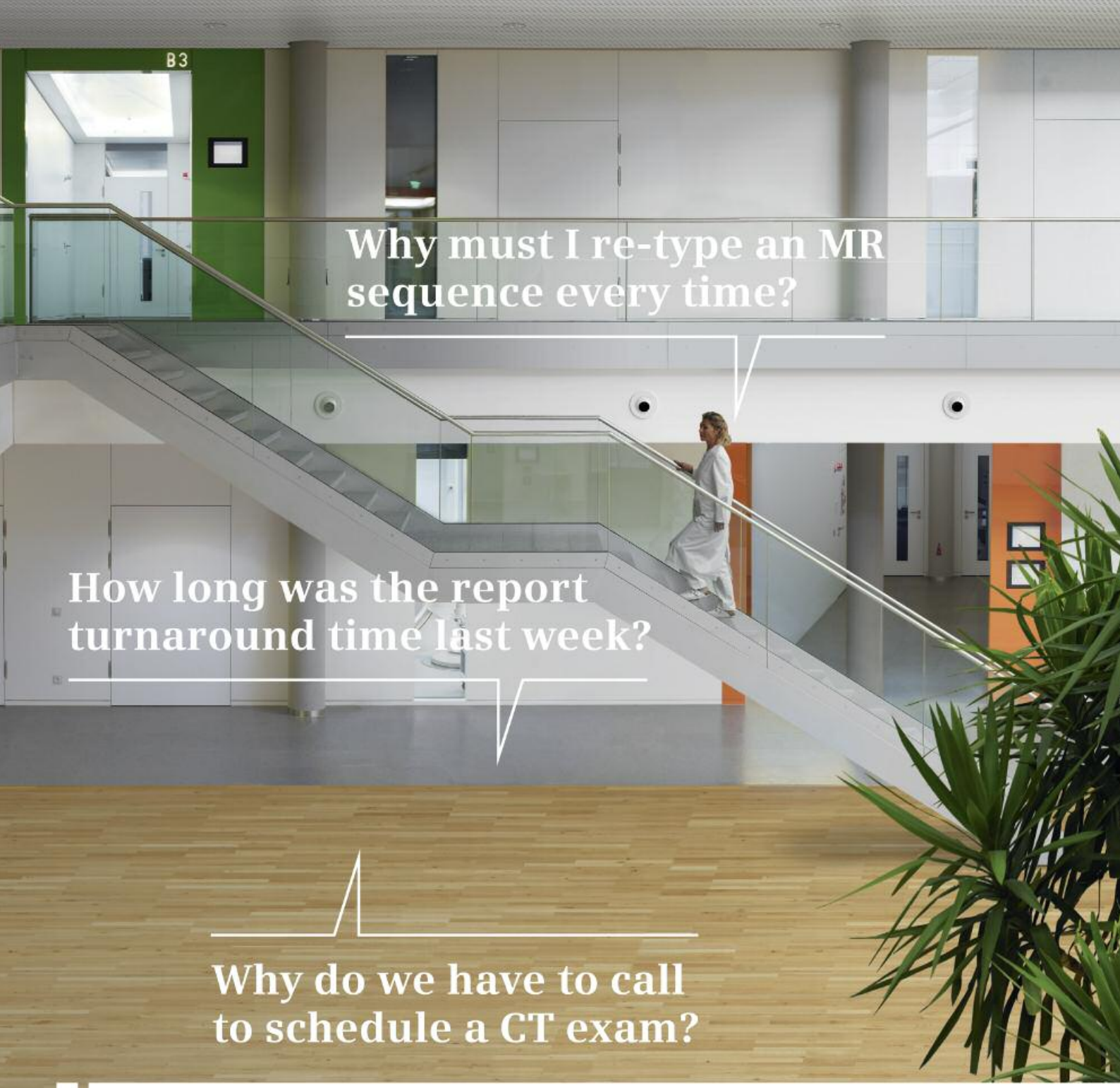
WHITHER THE AS/400 ?

TECHNOLOGY AND HEALTHCARE CULTURE

PACS: Product Comparison

COUNTRY FOCUS: Ireland

Volume 3 / Issue 3 / 2008



Dear Reader,

An HITM delegation recently returned from the EU's eHealth 2008 Conference in Slovenia. As ever, the Slovenians surpassed themselves in their role as hosts. Back in Brussels, however, we cannot help some familiar morning-after blues. This is not because we yearn for the stunning seaside resort of Portoroz, where the Conference was held.

No, what we are talking about is déjà vu. As far as eHealth 2008 went, it may well have been eHealth 2007, eHealth A, B1 or B3 - take your pick. There is a huge (and growing) gap between expectation and reality – with respect to the EU's eHealth agenda. Indeed, some healthcare IT professionals at Portoroz wondered, Hamlet-like, why exactly they were there.

Indeed, as before, we again listened to the litany of acronyms, the Big Questions – on new standards, openness and seamlessness, assisted-living. There was the customary Rabelaisian gush about demo projects, generous budgets and Vision Things, but little in the way of a reality check.

In this context, the current issue of Healthcare IT Management takes a look at EU healthcare R&D projects in its now-completed 6th Framework Programme. Many, like their successors in the current 7th Programme, aimed to establish European interoperability standards. Unfortunately, very few have made headway.

e-Health and its role as a driver for efficiency in healthcare, is not just an issue in Europe. In the US too, presidential candidates have highlighted healthcare reform and ways to cap rising costs via healthcare IT.

One of the keys to e-Health is interoperability – in the US, in Europe and beyond. Regardless of the election outcome, more attention to healthcare in the US is a given. Less clear is the fact that a US drive to establish 'global' interoperability standards would be of major competitive concern for Europe.

It will also have more significance for healthcare IT managers than Microsoft's bundling of Media-Player with Windows.

In our previous issue, we reviewed a European initiative in the healthcare interoperability and standards area. This time, we provide the views of a US expert on the state of play in his country.

Interoperability of healthcare systems and data access across time and space also poses challenges for international drugs firms now outsourcing a fast-growing number of clinical trials, especially to India and China. The ethical challenges underlying such a process, and the role of IT, are described by experts from Imperial College, London.

The globalisation of healthcare IT, and its moral / strategic implications, are just one aspect of our fast-changing world. New technologies alter cost and benefit benchmarks for hospital IT managers, every day.

As the CMIO of a leading Swiss hospital explains, his job is not to manage IT systems, but build a value-adding knowledge ecosystem. Alongside, a healthcare CIO from the Czech Republic discusses the role of IT, as both driver and passenger in changes to the hospital environment in his country, after its accession to the EU.

This issue also examines an especially intriguing topic – whether there is implicit value in being a follower, a second-mover. It is well known that hospitals have invested far less in IT than other institutions. Might such sluggishness be a blessing in disguise ?

Our Country Focus is on Ireland. In spite of significant reforms over the past two decades, more needs to be achieved. Do IT and e-Health offer any additional incentives for change ?

Yours sincerely,

Christian Marolt (CM)

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HEALTHCARE IT MANAGEMENT

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EHRs IN THE US

The US has developed clinical technology which is the envy of the world. However, access to healthcare is spotty, costs are rising, and outcomes compare unfavorably with most European countries. Will interoperable EHRs reconfigure the landscape ?

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IT IN CLINICAL TRIALS

The use of IT systems for the growing number of commercial clinical trials in a non-commercial setting is a complex and contentious issue. What lies ahead ?

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COUNTRY FOCUS: IRELAND

Ireland's healthcare system is bracing itself for meeting challenges in the years ahead. In spite of significant reforms over the past two decades, more needs to be achieved. Do IT and e-Health offer a durable incentive for change ?

European Association of HEALTHCARE IT MANAGERS

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

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

HITM MEMBERS

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Ak-MI

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Belgian Medical Informatics Association (MIM)

BOSNIA & HERZEGOVINA
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

SERBIA
JISA - Union of ICT Societies of Serbia

SLOVENIA
Institute of Biomedical Informatics, Faculty of Medicine

Slovenian Medical Informatics Association

TURKEY
Turkish Medical Informatics Association

UKRAINE
The Ukrainian Association for Computer Medicine

Association for Ukrainian Telemedicine and e-Health Development (AfUTeHD)

HITM Welcomes Its New Members

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PHILIPS

Alliance between Philips, Maastricht UMC+ and University Clinic Aachen

The Maastricht University Medical Centre (UMC+), Unir Aachen (UKA) and Royal Philips Electronics N.V. announced that they are to set up a strategic partnership, the aim of which is to pool their knowledge, expertise and experience in the field of healthcare. The planned cooperation will make it possible for new scientific findings to be made available more quickly for routine application in hospitals, thus benefiting patients. The universities of Aachen and Maastricht are also supporting the initiative.

Philips and the two university medical centers intend to work closely together and to combine their advanced clinical knowledge and research, specifically in the fields of cardiovascular disease and cancer treatment. Their partnership will cover the research, development and application of new diagnostic and treatment methods. Among other things, the partners' aim is to set up a joint research program in the field of medical imaging technology.

Dr. Henk van Houten, Senior Vice President of Philips Research, who is in charge of its healthcare research program, adds, "This alliance will give rise to advanced clinical care, as well as ground-breaking clinical research to find an integrated approach to diagnosis and therapy for cancer and cardiovascular disease. The opportunity to work together with highly reputable academic partners in order to link clinical research and healthcare to the application of new medical technologies represents a very exciting prospect for Philips."

For more information, please visit:
http://www.newscenter.philips.com

SIEMENS

Airedale hospital to pilot Siemens RFID

Airedale NHS Trust will be piloting the new Radio Frequency Identification technology from Siemens Healthcare to track 100 intravenous pumps across the trust, over 30 days.

Both Siemens and Airedale will for the first time use RFID technology to track assets across various buildings > on the hospital site, via its new wireless network with an electronic tracking tag attached to each pump.

Pumps will be tagged with Ekahau RFID badges, which can be tracked to within approximately three metres from the main tracking system. Staff at the trust are currently training to use the new technology ahead of the month-long pilot later this year. The aim of the pilot is to enable the trust to save resources in manually looking for the devices and streamline stock control, ensuring that pump availability is optimised, and ultimately minimise the time taken to allocate a pump to a patient.

Siemens will be working in partnership with the trust's IT Department and LEAN teams. The technology evaluation will also involve the collaboration of Qualcomm, who are in charge of the wireless network for use with the RFID tags and readers, and application specialist Ekahau which is supplying the Wi-fi tag tracking and query software.

For more information, please visit:
Http://www.medical.siemens.com

CARESTREAM

Carestream's progress with NHS Scotland PACS

Carestream Health Inc. marked its one-year anniversary as an independent company with an announcement of "significant progress" with the NHS Scotland National PACS Project implementation. The project now has 21 sites connected out of the country's 39 hospitals, with 10,000 general clinical users and 200 radiologists registered on the system.

Based on May 1 statistics, the system currently stores over 1 million images and is using 10 terabytes of capacity within the national archive.

For Carestream, reaching the half way stage in the seven months since being given the go-ahead to deploy, is a significant step in rewarding NHS Scotland's confidence in the company following the initial sale by Kodak.

The implementation of Carestream PACS allows cross-site exchange of data via a single clinical system, the company said. Since all studies from all hospitals are stored in a national archive, a treating clinician can query and retrieve data no matter where a patient is admitted.

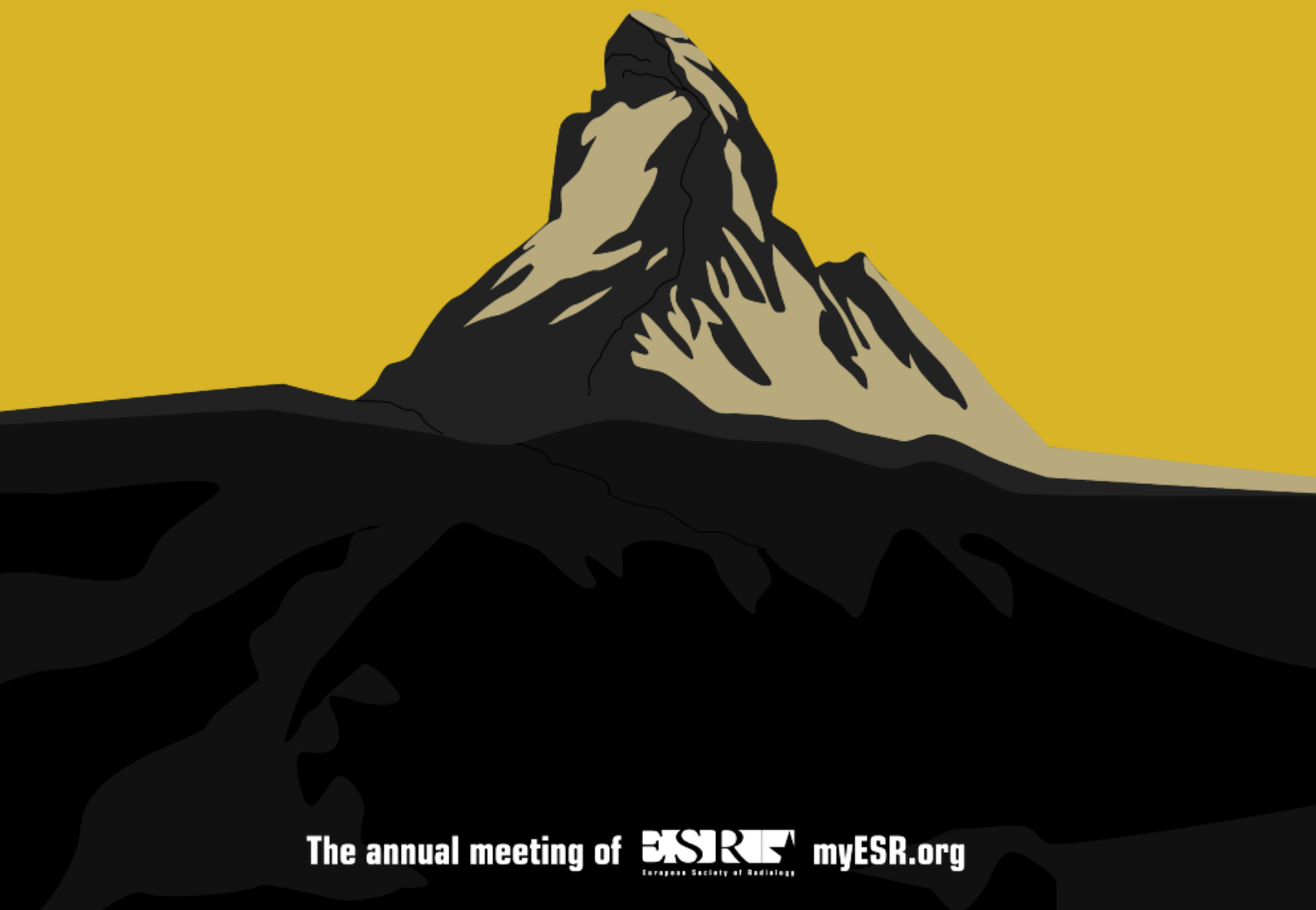
For more information, please visit:
Http://www..carestreamhealth.com

ECR 2009

European Congress of Radiology

March 6–10, Vienna / Austria

the summit of science



The annual meeting of ESR European Society of Radiology myESR.org

GREECE

Greek staff trained on telemedicine approaches

Doctors and nursing staff from several municipalities in Greece - plus four specialists from the Athens Medical Centre - have been trained in the use of telemetric systems as part of an extension of the country's telemedicine program. The municipalities are members of the Inter Municipality Health & Welfare Network OTA across Greece.

Staff took part in a training course, following a pilot program in 2006. As part of their training, the medical teams were also given equipment to record vital signs and a PDA device. The equipment given to the doctors allows them to examine patients with chronic diseases.

The Government of Greece is planning to install telemedicine devices in rural and municipal medical centers across the country to provide valuable consulting services and upgrade the health services later this year. Full plans are yet to be confirmed.

For more information, please visit: **http://www.vidavo.gr**

NORWAY

EPR Norwegian study

A study by researchers at The Norwegian University of Science and Technology (NTNU) has found that GP electronic patient records in Norway has led to better availability of records, but unsatisfactory access to information.

The study by academics Tom Christensen and Anders Grimsmo says that the deployment of EPRs at GPs facilities across the country has been successful, but problems still need tackling.

In a research paper for the BioMed Central Medical Informatics and Decision Making journal, the academics say: "Although GPs are generally satisfied with their EPRs systems, there are still unmet needs and functionality to be covered. It is urgent to find methods that can make a better representation of information in large patient records as well as prevent EPRs from contributing to increased administrative workload of physicians."

For more information, please visit: **Http://www.biomedcentral.com**

THE NETHERLANDS

Hospitallbroeders to deploy new CRM

Saturn Corporation, a database management specialist, has implemented its Eprísa customer relationship management (CRM) software, at the Dutch healthcare foundation, Hospitallbroeders. Eprisa enables users to access information according to their user profile. It displays all relevant data on one screen and restricts data so the user only sees what they are entitled to.
John Mitchell, Executive Director of the foundation, said that after considering several alternatives, "we selected Saturn's Eprísa application to manage our various programs, which include direct mail, telemarketing and door-to-door fundraising".

For more information, please visit: **http://www.saturncorp.co.uk/default.aspx**

PORTUGAL

ICT to aid unemployed Portuguese

Over 1,700 unemployed textile workers were offered intensive courses to get ICT skills. The original target was to readmit 10% of the trained people to the job market by 2009. Approaching the end of the three-year project, the organisers can hail a readmission rate of 40%. The success of the project, called TII (Technology, Innovation and Initiative), can be attributed to an effective public-private partnership while the training sessions were tailored to the needs of the workers and gave them IT skills useful for finding jobs in the evolving textile industry, increasingly steered towards high-tech and high-quality production to shun low-cost competition from emerging countries. Some sources expect that such retrained workers could find employment in lower-skilled healthcare IT jobs (e.g. data entry, billing etc.)

For more information, please visit: **http://www.citeve.pt**

CZECH REPUBLIC

First International Summer School for Biomedical Informatics

The Center for Biomedical Informatics, Institute of Computer Science of the Academy of Sciences of the Czech Republic in Prague and the Czech National Group of the International Society for Clinical Biostatistics are organising the 2008 International Summer School of Biomedical Informatics. The aim is to bring together researchers from various scientific disciplines interested in statistical, genetical and information methodologies. This event is open to all researchers and postgraduate students interested in biomedical research, especially in genetics, medical statistics and/or biostatistics, medical informatics and/or bioinformatics.

For more information, please visit: **http://www.euromise.org/cbi/ISSBI.html**

8-10 October, 2008

HIT@HEALTHCARE - A UNIQUE JOINT EVENT

The European Association of Healthcare IT managers (HITM) invites you in the month of October to HIT@HealthCare, Health Information Technology Conference & Exhibition.

According to the organisers, 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. Healthcare 2008 offers 20,000 m2 exhibition space and expects 8,000 professional visitors.

Furthermore, under the heading of "Collaborative Patient Centred eHealth" special attention will be paid to multidisciplinary, communication and active involvement of the patients in areas such as:

- Patient Health Information Systems
- Health information networks and shared care
- e-homecare and telemonitoring
- e-learning in health care
- Public health and research (secondary use of health data)
- Hospital information systems
- Nursing information systems
- Primary care systems

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

conhIT 2008, Berlin, Germany

conhIT – connecting healthcare IT has been widely hailed as a successful debut event. 144 companies, including the industry's market leaders, exhibited their products over an area covering 8,500 m2 in the display halls of the Berlin Exhibition Grounds.

The organisers had realised a new concept for Germany, with a professional programme of congress and academy events held at different times accompanying the trade fair. Separate opening times meant that exhibitors were able to attend sessions offering advanced training, and besides presenting their products were also allowed an opportunity for networking and training of their employees. A total of 2,513 visitors and 650 participants from the trade attended the various events.

The congress was certified by the Berlin Medical Association which awarded nine advanced training points for attendance of the sessions on all three days of the event. Those taking part in nursing care training were also awarded three points per day for attending the congress.

Furthermore, as of 2009, Professor Dr. Klaus Kuhn, President of the German Association of Medical Computer Sciences, Biometry and Epidemiology, and Dr. Carl Dujat, President of the German Association of Medical Computer Scientists (BVMI), announced that the KIS conference would become part of the conhIT congress.

For more information, please visit:
http://www.conhit.de

HIT Paris 2008, Paris, France

This year's 4th session of the World Health Care Congress Europe opened its doors with an executive seminar on Innovative Care ManagHIT Paris 2008, Paris, France

Following its successful launch in 2007, the second edition of Health Information Technologies Event 'Hit 2008', comprised a Congress and an Exhibition which targeted a variety of health professionals that range from Hospital General Management to doctors and pharmacists.Paris Expo /Porte de Versailles/Hall 1 was the business forum for all those involved in the modernisation of health care! Over120 exhibitors, 7400 sq. m of exhibition space, comprehensive representation of the entire Health Information Systems sector (health professionals, manufacturers, service providers and distributors) made Hit Paris 2008 a key moment on one's agenda. The Hit 2008 Congress provided a comprehensive training programme with input from experts from France and overseas and included a series of lectures, practical workshops, presentations of innovative solutions, as well as experience sharing.

Congress subject areas for 2008 included:

- **Health care processes and ICT**
  - Organising continuity of care
  - Tools for continuity of care
  - Human resources and facilities planning
- **Performance and coordination of organisations**
  - Strategies and methods
  - IS solutions to budgetary and financial challenges
  - Measuring performance
- **Governance of the health information system**
  - The new principles of cooperation and investment
  - Organising the security of the HIS
  - Integrating technological innovation

For more information, please visit:
http://www.health-it.fr

THE 2008 PORTOROZ DECLARATION

According to participants at the annual EU eHealth 2008 event, which took place at Portoroz, Slovenia from May 6-7, telemedicine and innovative ICT tools for chronic disease management will be the key to delivering people-centered health care. The annual EU eHealth 2008 conference, where stakeholders demonstrated results in the use of information and telecommunication solutions in health care, adopted the Portoroz Declaration as the basis for future work by the EU and its member countries in the field.

With the declaration, adopted on May 7, 2008, the EU 27 Member States and the Commission intend to develop people-centered e-Health initiatives, offering Europeans "smarter health environments" to deliver continuity of care and integrated health and social services.
The declaration identifies three key initiatives that "must now begin to operate harmoniously alongside each other in order to overcome the major health challenges that lie ahead over the next ten-year period". These include:

- Plans to deploy telemedicine and innovative ICT tools for chronic disease management. Until the end of 2008, the Commission intends to issue a Communication on this topic. The aim will be to enable Member States to "identify and address possible barriers for wider deployment of telemedicine and to coordinate their efforts".
- The need to introduce an enhanced focus on new research opportunities. Exploration of future research and technology development steps in Europe is needed. Government policy-makers are advised to look ahead in a prospective foresight and envisioning exercise in order to understand how new directions in R&D are to affect health policy decisions over a ten-year time horizon.
- The need for a transparent legal framework agreed between the Member States in order to define the responsibilities, rights and obligations of all the different subjects involved in the e-Health process (eg. national, regional and local health authorities, health care professionals, patients, insurance companies, and other relevant players). Special attention is directed at exploring the existing Community legislation that influences eHealth significantly, especially the Data Protection Directive, e-Privacy Directive and e-Commerce Directive. This invloves an active dialogue and participation of all the relevant national authorities in the area of health, personal data protection, technical harmonisation, standardisation, and eCommerce.

For more information, please visit:
http://www.ehealth2008.si/index.php?id=26&mid=25

BENCHMARKING ICT USE AMONG GPS IN EUROPE

E-Health applications have a growing role in the doctor's practices, according to the 'Benchmarking ICT use among General Practitioners in Europe' study carried out by consultants empirica in association with IPSOS on behalf of the European Commission, Information Society and Media Directorate-General.

The pan-European survey was recently published by the European Commission. It shows that 87% of European doctors (general practitioners) use a computer, while 48% have a broadband connection. By using e-Health applications, European doctors and medical services have already improved healthcare in Europe by means, for example, of more efficient administration procedures and shorter waiting times for patients.

However, significant differences remain in the availability and use of e-Health services across Europe. About 70% of European doctors use the Internet and 66% use computers for consultations. Furthermore, there are great discrepancies across countries: Estonia, Finland, Denmark, Sweden and Iceland have the highest broadband penetration among General Practitioners (91%), while countries such as Bulgaria, Hungary, Romania and Slovakia haven't reached the level of 50% (please see the table below).

Use of computers in European GP practices

	Total	Single GP	2-3 GPs or physicians	4+ GPs or physicians
EU27	87.4	83.8	90.6	92.6
EU27+2	87.5	83.8	90.7	92.8

Use of Internet in European GP practices

	Total	Single GP	2-3 GPs or physicians	4+ GPs or physicians
EU27	68.8	60.9	72.9	81.4
EU27+2	69.0	60.9	73.1	81.8

Use of broadband in European GP practices

	Total	Single GP	2-3 GPs or physicians	4+ GPs or physicians
EU27	47.9	41.1	53.4	59.1
EU27+2	48.1	41.1	53.7	59.7

Administrative patient data is electronically stored in 80% of general practices:

- 92% of these also electronically store medical data on diagnoses and medication;
- 35% electronically store radiological images.

European doctors often transfer data electronically with laboratories (40%), but less to other health centers (10%).
The survey indicates that the countries most advanced in ICT access and connectivity are more likely to use them for professional reasons. For example, Denmark, where high-speed Internet is most widely available in Europe, sees extensive use of email communication between doctors and patients in about 60% of practices (the EU average is only 4%).

The survey also highlights areas for improvement and further deployment, such as electronic prescriptions (e-Prescribing), which is practiced by only 6% of EU General Practitioners. This is widely used in only three Member States: Denmark (97%), the Netherlands (71%) and Sweden (81%).

Telemonitoring, however, is only used in Sweden (where 9% of doctors provide telemonitoring services), the Netherlands and Iceland (both about 3%). The Commission plans to report later this year on the potential and development of telemedicine. Exchange of patient data across borders is also reduced, done by only 1% of the EU's General Practitioners, and with the highest usage rate in the Netherlands (at 5%).

This year the Commission plans to make recommendations on cross-border interoperability of electronic health record systems and will launch, with several countries, a project on cross-border e-Health services for patients traveling within the EU. A majority of European doctors agree that ICT improves the quality of healthcare services that they provide. Doctors not using ICT accuse lack of training and technical support as major barriers. As for e-Health expansion, they request more ICT in medical education, more training and better electronic networking among healthcare practitioners wanting to share clinical information.

"Europe is starting to reap the benefits of broadband connections in the e-Health Sector. I welcome the efforts made by healthcare administrations and doctors to work more efficiently," explains Viviane Reding, EU Commissioner for Information Society and Media. "This diagnosis also shows that it is now time to use these electronic services much more widely as they have the potential to bring extraordinary benefits to all patients, all over Europe."

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

So much data, so little time !

What to do when the glass is more than half full

Europe's increasing longevity spells a boom in demand for new treatments, drug therapies and data storage ...

The pursuit of quality patient care, improved workflow and ultimately centralised patient records involves having clinical and non-clinical information available at the point-of-care. To achieve this, the right infrastructure needs to be deployed to facilitate information sharing.

Hospitals, clinics and doctors alike have always struggled to strike the delicate balance between tight budgets and increasing patient demands.

However, in recent years pressure has mounted. In Europe, for example, greater longevity and falling birth rates are leading to an ageing population, which requires a higher level of care. It is estimated that for every time a 20-year-old visits a doctor, a 60-year-old will make 26 visits. The baby boom generation is demanding better and more responsive healthcare, while new treatments and drug therapies are stretching medical budgets.

Increasing data volumes

These burgeoning patient numbers produce a huge amount of supporting data. It is predicted that more medical information will be generated in the next few years than ever before – all of which must be stored securely and accurately.

Although an electronic patient medical record itself might be a small document, attached diagnostic and other information can greatly increase data storage needs.

Different departments will hold specialist bits of information relating to particular patients and there can often be relevant non-clinical information, email comments from one physician to another or perhaps older paper documents that are still current.

"Islands of information still prevail in a typical hospital," says Mark Clark, director of healthcare at EMEA, Hitachi Data Systems. "Consolidating that fragmented data into a more manageable and accessible source brings considerable benefits, both for hospital efficiency and patient waiting times. This needs the correct information infrastructure, however, and that's our area of focus."

Ready for the revolution?

The healthcare sector is undergoing an IT revolution.

Data is its lifeblood, but hospitals and other substantial healthcare organisations have traditionally purchased IT at the departmental level: that has meant enormous difficulties in sharing data between departments.

Since such data sharing is fundamental to efficient operation and effective patient care, hospitals and national health systems are now investing primarily in infrastructure to support it. **> continued on page 27**

Figure 1

The Hitachi Content Archive Platform provides a centralised repository for clinical and non clinical, fixed content and transactional data

THE STATE OF DEVELOPMENT OF INTEROPERABLE HEALTH RECORDS IN THE UNITED STATES

AUTHORS

Jim Oakes is a healthcare IT expert, and as a CIO, has been involved in turn-arounds at three US hospitals.

Joan R. Duke founded Health Care Information Consultants (HCIC) in 1990; in 2003, she was appointed to the HIMSS Davies Award of Excellence Task Force to evaluate EHRs.

Every 10 to 15 years or so, the United States seems to awaken to the reality that our health care system is a mess. The facts are well known; we spend more on healthcare than any other country, and partially as a result, have developed clinical technology that is the envy of the world. On the other hand, access to our care system is spotty, costs are high and rising, and our health outcomes in a number of key measures don't compare favourably with most European countries. This being an election year in the US, discussion of the topic is rampant, and every major presidential candidate has a plan to "fix" our system.

Greater Use of IT in Healthcare

One common theme in virtually all proposed improvements to our system involves greater use of information technology. Again, the facts are fairly well known.

The health care industry spends a lower percentage of revenues on information technology than similar industries, often by a wide margin. For example, most US hospitals spend between 2-3% of revenues on information technology, whereas most banks spend 8-10%. It is easy to spot the disparity. Many basic functions are not automated in healthcare, have long been automated elsewhere, to the frustration of patients, physicians, caregivers, and payers. The system is ripe for change.

The Pervasiveness of Information

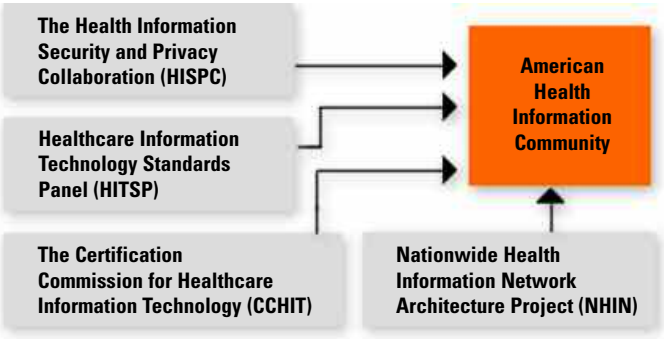
Lack of automation causes enough difficulties within the walls of an individual institution. Those difficulties explode, however, when taken outside the walls of an individual caregiver. Since most physicians in the US do not practice exclusively with one hospital, and since most patients receive care (or diagnostic tests) at multiple locations and entities even for a single encounter, the problem of transmitting information among and between entities becomes even more acute. We participated in a recent project setting up an automated information exchange for a small state, and discovered that the average clinician received patient information from an average of 5 to 9 external sources. As a result, many small physicians' offices devote the equivalent of a half-time employee to the tasks of filing and retrieving results in patient charts. An estimated 16% of ambulatory tests are duplicates, frequently due to the inability to find the original test result.

The American Health Information Community

Emerging trends in adoption of information technology in healthcare do give some reason for optimism. President George Bush, by executive order, created the Office of the National Coordinator for Health Information Technology (ONCHIT, later shortened to ONC) in 2004. Since that time, the US Department of Health and Human Services, through ONC, has awarded a number of grants to companies in an attempt to foster the development of standards, encourage the wider adoption of Electronic Health Records, and demonstrate ability to exchange information across geographic boundaries.

In addition, efforts are underway to foster an increased adoption of standards (and to harmonise those standards that are adopted), to assure privacy and security of systems, and to certify systems as meeting required standards. These efforts collectively have become known as the "American Health Information Community".

The interaction of these efforts is shown in the figure below:



The Community is a federally - chartered commission and will provide input and recommandations to HHS on how to make health records digital and interoperable, and assure that the privacy and security of those records are protected, in a smooth, market led way.

HITSP includes 358 different member organisations and is administered by a board of directors.

21 SDOs	6%
280 Non-SDOs	79%
29 Govt. Bodies	8%
14 Consumer groups	4%
12 Project Team	3%

EHRs in Europe

HEALTHCARE IT MANAGEMENT
ANALYSIS

In the previous issue of *Healthcare IT Management*, we presented a pan-European viewpoint on the EHR, with an analysis by Georges de Moor of EuroRec Institute.

The question of standards and interoperability is sweeping. Both the US and the EU face massive challenges in enabling the transfer/sharing of patient data between different hospitals in one State (in the US) or Member State (in the EU), and thereafter on a national – and eventually, international – level.

At the moment, northern Europe is clearly ahead of the US in the game.

The US-based Commonwealth Fund's '2006 Health Policy Survey of Primary Care Physicians in Seven Countries' determined that Dutch and British physicians (as well as those in New Zealand) led the world in terms use of electronic records, while their US counterparts lagged. The survey found that 28 percent of physicians in the US used electronic medical records, while 98 percent of Dutch physicians did so.

A key criterion for successful adoption of EHRs is believed to lie in the early involvement of physicians in establishing operational objectives.

In the Netherlands, for example, physicians were directly involved with the design of their system. Rapid access to patient records was seen as providing more consultations and higher income, with higher throughputs also arising from the fact that access by patients to their data and treatment histories meant that they were more informed about choices during consultations with their physician. Meanwhile, the Dutch system also secured buy-in from patients, by providing them with the ability to track viewers of their electronic records – thus addressing the major (and still ongoing) concern about privacy.

Philosophically, the final battle lines concern 'interoperability' versus 'openness', and the point where interoperable electronic patient records (already used relatively widely) become a truly open EHR. In this respect, the differences within Europe may eventually turn out to be wider than those between the EU and the US.

In Denmark, for example, the electronic record has been designed as a 'point to point' communications network to transfer required patient data between physicians, and onwards to pharmacists. Current efforts by the Danish government to broaden its scope into a multi-point input/access EHR-type system has provoked considerable resistance from physicians.

Beyond Automation – to Interoperability

One key objective of the Health Information Technology Standards Panel (HIPSP) is to enhance the interoperability of electronic health information – a problem that most users don't know they have until they have gone through early stages of automation, but one which becomes increasingly necessary as electronic information proliferates. It is not sufficient to automate health care data without ensuring that data has a standard content, format and syntax so that it may be interpreted (understood) across disparate systems.

Slow but Sure Paybacks

This increased attention is starting to pay off, slowly but surely. Evidence is accumulating that hospitals and physician offices are starting to adopt information technology, though still at low rates. Drivers for this include improvement in operational efficiency, improvement in quality of care and incentive programs that reward organisations that have implemented EHRs. The best available data suggests that around 18% of US hospitals now have functioning EHRs, while physician offices seem to have increased their automation level to about 16%. Both adoption levels, though still very low, represent significant increases over the past 4 years. However, projections indicate that goals of having all physician offices automated by 2014 will not be met.

Studies documenting the benefits of EHRs are still sparse, but are starting to accumulate. More evidence of benefits, both qualitative and quantitative, will undoubtedly speed adoption, and there is great interest in accumulating evidence of such benefits. In the meantime, some states are starting to attempt mandates to force hospitals to adopt EHRs. In Massachusetts, for example, efforts are underway to force all community hospitals in the state to adopt EHRs. Whether this initiative will succeed remains to be seen, but it illustrates the political energy that is starting to build in this direction.

Attaining a Critical Mass of Users

As more and more providers adopt EHRs, more electronic data will be available to be exchanged to provide a longitudinal view of care from various settings. These data, ideally in a standard/interpretable form will give the provider of care a more complete picture of the patient's relevant health care events. Interoperability enables:

- Reduction of redundant data capture
- Access to recent lab, medical testing and prescriptions information
- Alerts to providers to reduce medical errors and eliminate unnecessary treatment
- Improved completeness of information for better diagnosis and treatment, and
- Opportunity for consumer involvement.

The Future

Where will we go from here? As evidence of value continues to grow, the pressure for hospitals and physicians to continue to embrace automated information solutions will also grow. As information improves and data are aggregated from many settings of care, there is more opportunity to determine effectiveness of care, plan for appropriate preventive care, and perform analysis to determine a reasonable cost of care.

Although information technology is only a tool for the delivery of better healthcare information, its adoption is key to improvement in the current state we are in with our costly and inefficient healthcare system in the US.

We predict that the market will continue to be robust, with adoption spreading beyond academic and government medical centres into community hospitals and physician offices. We may finally be entering the modern era!

Picture Archiving and Communication Systems (PACS)

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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 *

MERGE Healthcare

MODEL	PACS	Fusion PACS GL
WHERE MARKETED		Europe
CE MARK (MDD)		Yes
SYSTEM CONFIGURATION		
Architecture	Single server cluster	Single Server or Active Load Balanced
Hardware	Hardware-independent	Hardware -independent
Operating systems		
Image server	Windows or UNIX	WIndows
Web server	Windows or UNIX	Windows
Security	128-bit SSL	SSL
Database server	Windows or UNIX	Windows
Management	Experienced database company	MS SQL
Long-term storage		
Media	Hardware independent	NAS, SAN, DVD, tape
Hardware	RAID (SAN)	RAID (SAN/NAS)
SERVICE & SUPPORT		
Telephone	24 hr	24/7
On-site response time	24 hr	<24hr
Remote system monitoring/updates	Yes	Yes
DIAGNOSTIC WORKSTATION		
Independent login	Yes	Yes
Admin-contr. worklist/ad-hoc patient search/auto notification/ user definable hanging protcols	Yes	Yes
Prior reports (without images)	Yes	Yes
Session interruption function	Yes	No
3-D image processing	Yes	Yes
Integrated report dictation /Voice recognition	Yes	Yes, integrated with Dictaphone PowerScribe
WEB IMAGE ACCESS		
Max number monitors supported	2	2
Patient search	Name or MRN	Several Parameters
SYSTEM ADMIN		
DBase frequency	Every hour	Configurable
Auto duplication of long-term archive	Yes	Optional
Test server	Yes	Optional
INTERFACES		
IHE conformance	Year 5	all relevant profiles
RIS	Brokerless, bidirectional	HL7, ADT/ORM/ORU messaging
Electronic patient record	Yes	Yes, direct access via Web link
PLANNING & PURCHASE		
Price structure	Hardware and software separate, based on number of exams	SW only or with HW, based on # of exams
Training	1 week	On-site or remote
Delivery time, ARO	1 month	usually < 1month
Year first sold		2004
Number of full system installs		> 80 (Europe only)
LAST UPDATED		May 08

Centricity	Synapse	syngo Dynamics	IMPAX Enterprise Suite	Visage PACS
Worldwide	Worldwide	Worldwide	Worldwide	Worldwide
Yes	Yes	Yes	Yes	Yes
Central database with image cache options	Client/server distributed, Web-based	Client/server	Centralized server	Single server, single or multi-server clusters, Web-based, failover, NET
Sun, Wintel (Web)	Windows compatible	HP enterprise servers	Dell, IBM, HP, Sun (servers)	HP, Dell, Intel, IBM
Solaris, UNIX, Linux	Windows 2003	Windows 2003 server	Windows, UNIX	Windows 2003
Windows	Windows 2003, IIS	MS IIS (Win 2003)	Windows	Windows 2003
VPN or SSL	128-bit SSL	SSL	128-bit SSL	SSL
UNIX	Windows 2003	Windows 2003	Windows, UNIX	Windows 2003
Sybase	Oracle	Microsoft SQL	SQL or Oracle	Cache/SQL
Spinning disk, DVD, UDO, major HSM	Selectable to customer requirements	Dual-DVD(entry-level), HSM, PACS	Tape, DVD, spinning disk, MOD, UDO, others	RAID, backup (tape, disk, DVD)
Direct attached, area network storage	Any spinning disk technology	RAID	RAID (SAN/NAS)	Hard disk RAID (SAN/NAS)
24/7/365	24 hr	24 hr	24/7, 1 hr response	24/7/365
4 hr with agreement, 12 hr noncritical	Depends on contract	24 hr or based on contract	Depends on agreement	Same day, 1 day
Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes and user	Yes	Yes
Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes
Yes	Native thin-client MIP/MPR module available, or context integration to third-party 3-D applications	Yes , through additional software tools	Yes	Yes
Yes, third-party client	Third-party integrated	No	Yes	Yes
2	5	1	Up to 5	3+
Patient name, MRN, exam date, modality	Name, MRN, census	Name, MRN, user defined	Over 30 search criteria including Name, ID, GPI, location, accession number, doctor, modality, body part, study status, sex	Name, accession number, MRN, exam date, institution, DOB, others
Site configurable	Daily, configurable	Daily	Configurable	Optional
Yes	Optional	Yes	Yes	Optional
Optional	Yes	Optional	Yes	Optional
SWF, PIR, ARI	Selected profiles	Yes	All relevant radiology, cardiology, IT Infrastructure Integration profiles	Yes
Brokerless, bidirectional	Brokerless, bidirectional, HL7 Web interface	Bidirectional	Bidirectional using HL7, DICOM, IHE, Custom	Brokerless, bidirectional
Via URL	Yes	Broker or interface	Image enabler to EMR and EMR on radiology desktop	URL or direct
Concurrent-users license for procedure volume, workstations	Turnkey, software only, and per-usage options	Hardware and software separate	Turnkey or software-only solutions available	Hardware, software, licensing
HQ, on-site, remote	Varies	2-3 days	Variable	On-site, shared desktop, CD
90-120 days	90 days	90 days	Variable	3 weeks
1992	1998	1999	1990	2001
570	400+ (USA), 1,000+ (Worldwide)	>900	1,700 PACS systems and over 600 integrated RIS/PACS systems	>1,000
May 08	May 08	May 08	May 08	May 08

MODEL	KODAK CARESTREAM PACS	HORIZON MEDICAL IMAGING
WHERE MARKETED	Worldwide	North America, Europe
CE MARK (MDD)	Yes	Yes
SYSTEM CONFIGURATION		
Architecture	Servers: centralised, distributed; client: Web deployed	Multitiered, centralised, or distributed infrastructure serves dedicated, smart, or Web clients
Hardware	Sun, Wintel, Dell, IBM, EMC	HP, IBM, Dell
Operating systems		
Image server	Sun Solaris, Windows 2003	Windows 2003
Web server	Same server as PACS (Sun Solaris, Windows 2003)	Windows 2003
Security	128-bit SSL	128-bit SSL, VPN
Database server	Same server as PACS (Sun Solaris, Windows 2003)	Windows 2003
Management	Oracle	Oracle 9i
Long-term storage	Yes	
Media	Spinning disk (Multitiered), juke boxes, remote storage services; supports EMC and IBM Enterprise	AIT, DVD, MO, Enterprise integration
Hardware	RAID (SAN/NAS), EMC Centera	RAID (NAS/SAN), Enterprise integration
SERVICE & SUPPORT		
Telephone	Available 24/7/365	24 hr
On-site response time	Generally 4 hr for back-office	4 hr
Remote system monitoring/updates	Yes	Yes
DIAGNOSTIC WORKSTATION		
Independent login	Yes	Yes
Admin-contr. worklist/ad-hoc patient search/auto notification/ user definable hanging protcols	Yes	Yes
Prior reports (without images)	With/without images	Yes
Session interruption function	Yes	Yes
3-D image processing	Yes	Yes
Integrated report dictation /Voice recognition	Yes	Optional; PowerScribe, Lanier, Dictaphone, Fusion, WinScribe, SoftMed, eScription, Vianeta; Speech Q, Talk Technologies, DEWS, RadWhere, Fusion Expert
WEB IMAGE ACCESS		
Max number monitors supported	4	Any configuration supported by operating system and workstation chassis
Patient search	Yes	Name, MRN, accession number, date range
SYSTEM ADMIN		
DBase frequency	Yes, frequency configurable	Daily and hourly incremental
Auto duplication of long-term archive	Yes	Yes
Test server	Optional	Yes
INTERFACES		Yes
IHE conformance	Yes	Years 1-7
RIS	HL7 integration with third -party RIS, no broker required	Brokerless, bidirectional
Electronic patient record	URL activation, Enterprise storage integration, XDS repository, patient-centric clinical content viewing	Yes
PLANNING & PURCHASE		
Price structure	Software, hardware, professional services, service agreement	Hardware and software are quoted separately
Training	Yes, professional services	Yes
Delivery time, ARO	Flexible, depends on requirements	120 days
Year first sold	1994	1992
Number of full system installs	550+	1000+
LAST UPDATED	May 08	May 08

THE ROLE OF IT IN CLINICAL TRIALS: AN ACADEMIC SPONSOR'S PERSPECTIVE

The use of IT systems for clinical trial management in a non-commercial setting is a complex and contentious issue. The current drive for commercial sponsors to utilise electronic platforms for trial management is leading UK universities to explore how electronic trial management systems can be integrated into their practice.

AUTHORS

Lucy H.H. Parker and Gary C. Roper are with Imperial College, London.

In the UK law, the sponsor is the individual or organisation, which takes on responsibility for the initiation, management and/or financing of a clinical trial and any IT system designed for clinical trials would require a broad scope to maintain this oversight.

The Role of IT in Clinical Trials Management

It is important to implement an IT system for clinical trial management that reduces the administrative burden placed on investigators, enables them to collect their data in a meaningful manner and ensures that the Chief Investigator and Sponsor are able to meet their legal requirements as defined under the Medicines for Human Use (Clinical Trials) Regulations 2004.

Lack of Rules or Specific Laws in EU

At present, there is no UK or EU guidance on computerised systems in clinical investigations.

In the US, however, there is FDA guidance for Computerised Systems Used in Clinical Trials (1999 and the new draft issued in 2004), which provides a compliance infrastructure that is lacking in the UK. In the European Union Annex 11 of the GMP guidance on Computerised Systems is available but relates only to Good Manufacturing Practice rather than specifically to Good Clinical Practice (GCP) or trial management.

As there are no clearly defined standards for computerised systems for trial management, it is increasingly important for the Sponsoring Organisation to identify and adopt a formal IT structure for clinical trial management in order to meet the legal requirements implicit to the Sponsor role, specifically, project initiation, administration and management as well as authorisation, GCP conduct and training and pharmacovigilance.

Key Requirements

Any IT system used in clinical trial management should meet certain requirements in order to ensure that the system is well designed and implemented. These requirements include:

- On-line access to key study information and study documents for all stakeholders
- On-line access to document templates, SOPs, training guides
- Pre-population of basic project information in documents where possible
- Approvals tracking across at project and site level, from internal approvals to UK and international approvals
- Version control of study documentation
- Email notifications and reminders (e.g. time-based or specific milestones)
- Generating reports on key study information and status
- Discussion forum
- Ability to generate a portfolio of on-going sponsored studies
- Integration with internal systems such as finance systems.

Challenges for the Buy-In

There will of course be resistance to new IT systems from Investigators and understandably so. There has been a rapid growth in the number of regulatory systems and procedures since the implementation of the UK Medicines for Human Use (Clinical Trials) Regulations, which were transposed from the EU Clinical Trials Directive. Both Investigator and Sponsor have to familiarise themselves with a diverse number of systems in order to meet their regulatory obligations.

Any IT system that is introduced into a clinical management environment will have to ensure that it does not duplicate other practice, indeed any new IT system should reduce duplication while at the same time ensuring that data collected is relevant to the approved trial protocol.

Specific Challenges for Universities

Implementing and maintaining a computerised system for clinical trial management can be expensive. This can be difficult in an academic environment, in which many studies are funded internally, or by charitable or research council grants. Funds that could be used in research, may instead have to be diverted to an IT system and if the system is poorly developed and designed, this detracts from the research and ultimately harms the study's potential. Therefore, any system implemented in an academic environment has to be well executed and cost effective.

Heterogeneity and Diversity of Current Systems

There is a plethora of IT systems for various aspects of clinical trial management, not only from new complex Electronic Data Capture (EDC) systems but more traditional IT tools used to capture data such as Excel spreadsheets and Access databases. While many studies have developed their own databases and spreadsheets, some of which are highly sophisticated, the diversity of these systems makes regulatory auditing more difficult. By implementing a broader, more integrated solution across a portfolio of studies, there will be a more robust oversight of studies including multi-centre and international projects.

Requirements for Real Time Functionality

One of the key areas for the Sponsor is monitoring, "the act of overseeing the progress of a clinical trial, and ensuring that is conducted, recorded and reported in accordance with the protocol, SOPs, GCP and other regulatory requirements" (ICH GCP 1996).

A well defined EDC system would allow the Sponsor and Chief Investigator real time remote access to the repository of data contained within the system and would allow for closer monitoring than afforded by traditional paper based systems. This would give rise to greater pharmacovigilance control, ensuring the risk to the patient is minimised, which is of paramount importance in any trial.

The ability of an EDC system to report in real-time, any serious events, aids both the Investigator in ensuring the safety and well-being of the research participants, but also helps to ensure that the Sponsor is able to report to the relevant Competent Authority within the defined legal timeframes.

Summing up the Benefits

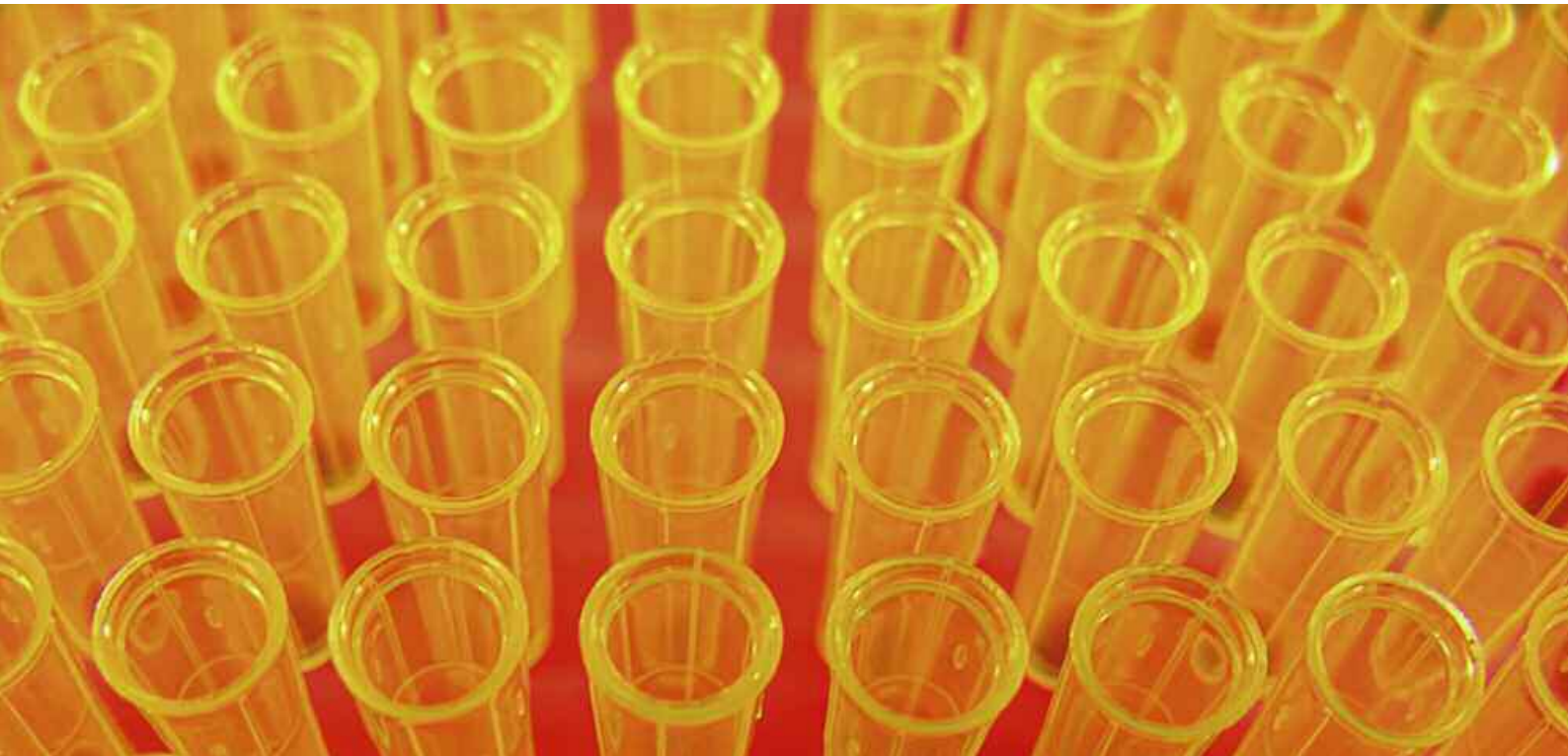
A well managed IT system implemented across a non-commercial trial portfolio will unify the manner in which data is collated, allowing for a structured approach as opposed to hundreds of individual data management systems that may not have been validated. If an EDC system is used correctly, it will aid in the collection of cleaner data, and reduce the risk of a trial being poorly managed.

A centralised system would also reduce resource requirements for trial management and promote cost effective research practice. Some benefits for the Academic Sponsor and its investigators in deploying a computerised clinical trial management system over a traditional paper based system include:

- Patient recruitment monitoring reports
- Outcome reports
- Patient management system
- Questionnaire tracking system
- Sample tracking system
- Double entry data collection of study data
- Effective data validation
- Statistical analysis of data
- Easy reporting of data to help complete
- Payment management system for multi-centre payments
- Clinical trials costing tool for per-patient costing
- Reduced manpower for trial management.

The Experience of Imperial College

Imperial College London, as an Academic Sponsor, will be implementing a system in 2008 that aims to fulfil three key criteria: a robust and transparent system for the authorisation and management of its healthcare research portfolio to ensure all regulatory requirements and standards are met, a central repository/single data source that will capture the College healthcare research portfolio, including both funded and "own account" (internally funded) research, and a reduction in the administrative burden facing Investigators in complying with research governance requirements.



E-HEALTH WITH CITIZENS AND WITH CHOICES

AUTHOR
Isabel Borges
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The use of Information and Communication Technologies (ICT) has great potential for helping older people and people with disabilities to continue to live at home, at work, and in the community. Technology can enable older people carry out daily activities as well as monitor health, create social networks, increase participation in society and augment safety. The use of technology can also facilitate social inclusion, improve professional participation and quality of life and ultimately enhance independent living. The development of new technologies and services for older people are wide ranging and include: safety-related services, healthcare and medical services "wellness services", mobility and social care services, smart homes, smart textiles, robotics and consumer electronics.

The mobility of health-related goods and services without the patient or service provider being mobile themselves has come to be known as e-Health. It is a growing market in the area of cross border health (acquisition of therapeutic aids, drugs, etc). However, e-Health tools and solutions go well beyond simply Internet-based applications. As noted by the EU Commission it in its 2004 Action Plan for a European e-Health Area, they cover not only health authorities and healthcare professionals, but patients and citizens too. Included here are "health information networks, electronic health records, telemedicine services, personal wearable and portable communicable systems, health portals, and many other information and communication technology based tools assisting prevention, diagnosis, treatment, health monitoring and lifestyle management."

There is an obvious added value in ensuring that EU-wide e-Health systems are interoperable in order to facilitate and foster the collaboration of health professionals and organisations as well as between health professionals and their patients. To achieve this, national/regional representatives and stakeholders must cooperate in order to resolve the various associated legal, organisational, policy and ethical issues, not least concerns about data security and quality. E-Health guidelines have already been published to facilitate the implementation in the various Member States and at the Union level. This initiative will enable easy and fast access to a citizen's electronic health record or a targeted extract from it (like a patient summary or emergency data), from any place, and at any time, across Europe.

Over the last couple of years, the development of e-Health solutions has been seen as a fundamental and integrative part of achieving some of Europe's key and overarching shared values: universal access to healthcare; access to good quality care; equity and solidarity. The European Union has also supported research in this area and continues fostering exchanges of good practices between Member states.

Given the growing number of older people within the European Union, this represents both opportunity and value: on the one hand, national governments are beginning to integrate e-Health as part of their healthcare strategic plans; on the other, they are aiming at improving quality and efficiency of healthcare systems enabling better usage of resources. The economic benefits of e-Health have been acknowledged in a study carried out in 2006 under e-Health Impact, a project funded by the European Commission. This shows that once the development and implementation stages have been successfully achieved, e-Health can measurably contribute to meet the needs of citizens in a 'virtual health economy'.

However, the development of health technology solutions and products must enable the active participation of citizens / users / consumers from the research and development stages to implementation and monitoring. There can be no meaningful e-Health without the active involvement of citizens. Such an approach to e-Health must be taken seriously by industry, Member States, regional and local actors.

E-Health cannot also be seen as the panacea to the increasing lack of sustainability of healthcare systems. E-Health can only be part of the solution.

AGE – the European Older People's Platform - believes that technology has great potential for older people and people with disabilities to continue to live at home and independently. However, the expanded use of technologies also raised many issues. It is vitally important, for example, that technological developments do not eliminate choices and that options continue to remain for social contact and face-to-face participation.

AGE - the European Older People's Platform is a European network of organisations of people aged 50+ and directly represents over 25 million older people in Europe. AGE aims to voice and promote the interests of the 150 million inhabitants aged 50+ in the European Union and to raise awareness of the issues that concern them most.

ELDERLY HEALTH,

HOMECARE AND INFORMATION TECHNOLOGY

AUTHOR

Vivian Vimarlund is Professor at the Department of Computer and Information Science, Linköping University, Sweden.

Predictions that information technology would become a critical element in the elderly health and homecare setting of the future have proven to be true as healthcare systems grapple with the challenges of implementing and expanding IT-based services for an ageing population. There are great expectations about how IT can and will provide benefits in this area.

Among other consequences, IT holds forth the promise of enabling old-age people to live longer in their own homes, rather than to have to move into institutions. This may increase their health and quality of life, while enabling society to save scarce resources.

However, the relationship between IT and its economic effects on elderly health and homecare is not simple. Technological developments provide organisations with new opportunities in a broad sense, but may also put new demands on them. How the elderly health and homecare puzzle has to fit together to acquire the benefits of an enabling technology as IT, and at the same time avoid sources of inefficiencies, is a challenge for both private and public elderly health and homecare organisations.

Identifying Areas of Concern

↘ *Knowledge Asymmetry*

Elderly health and homecare organisations usually demand IT systems based on their current knowledge of the state-of-the-art of technology. If buyers and sellers of new IT have different knowledge about different pieces of relevant information at the time of the contract, the contract is incomplete and thus the resulting IT system can be unsatisfactory at least for one of the parties.

This imperfect or asymmetric sharing of information between the parties can be considered as one of the main sources of inefficiencies when buying new IT systems. Non-effective IT systems will inevitably affect an organisation's 'assets' and even the entire service production process – reflected in the price the organisation will pay for the final price of the new IT system.

↘ *Work–routines*

Work routines arise in repetitive situations and store organisational experience in a form that allows the organisation to transfer that experience to new situations rapidly. When a new IT system is implemented, the final impact on service quality and the effect on the work routines cannot be predicted in advance with certainty.

In addition to this, the possibilities of predicting the consequences of the new IT system decrease with time, due to one

of the most salient characteristic of the future; that we do not know it perfectly. As Henry Mintzberg says: "If we can anticipate the future, we should not plan it in detail." Meanwhile, prior experience in business is rarely (if ever) a sure guide about future performance in new or changed circumstances – something which new IT systems, on their part, often provoke.

If the new IT system is not sufficiently appropriate to organisational routines, the economic effects are more significant in this case than in other situations, because of the degree of irreversibility involved. Once a new IT system has been implemented, the clock cannot be turned back, and this entails a sunk cost for the concerned organisations.

Furthermore, since economic efficiency presupposes technological efficiency, economic growth depends upon the acquisition of an appropriate IT system that does not totally alter work routines or allows new work routines to be formatted efficiently.

- ***IT Competence***

There are several mechanisms for acquiring IT competence within an organisation – for instance, by acquiring experience through participation in a process, or by buying competence. A consequence of the implementation of a new IT system is that workers with appropriate IT abilities may be considered to replace the entire staff in an organisation.

However, this situation, at least in Sweden, would raise incalculable costs due to current work legislation. Additionally, to buy the 'correct' staff will involve advertising costs, costs for selection procedures, costs for checking references and costs for introducing the individuals into the specificities of the particular acquiring organisation.

The results can be similar to systems used in sports teams, such as football, where millions of dollars are spent on searching for new talent to lead them to victory, with the risk that investment in free individuals often does not win championships in a sport where teamwork is a sine qua non.

Due the fact that implementation of new IT systems downgrade the economic value of existing IT competence, the prime task of an organisation will be to organise/reorganise a worker's IT knowledge. Normally, this could be achieved through suitable internal conditions that steadily upgrade the current workforce's competence base, making it stronger and better.

However, new IT knowledge cannot be communicated artificially; it is often embodied (tacit) in individuals or teams of people. Similar to a bank account, or to Volvo's bonds that yield income and other output over a long period of time, an increase in IT knowledge improves work activities and/or if the knowledge can be used over much of the individual' working lifetime adds to his/her "person's appreciation".

However, even knowledge capital has to be reinvested to avoid depreciation. For this reason, it is important to create conditions that allow individuals to acquire specific knowledge in IT systems for elderly health and homecare, because of the importance of technological competence on work- flexibility: "the longer a person has been educated the more adaptable she or he is to new and varying work-challenges".

Comments

IT's value is not primarily in simplifying communication and information provision, or reducing their cost. Rather, its contribution lies in enabling new ways of working, allowing the re-engineering of processes, the integration of organisations and the changing of work routines.

These, however, often require organisations to reconsider several factors:

- Structures: Specifying how key actors and how work-practices will be impacted and changed by any new IT system
- Acquiring knowledge about the IT system:
  From the world of business, we know of many cases where new IT has been "sold" on the basis of exaggerated claims ("Your business will be dead if you're not on-line"). It is therefore often necessary to discuss the gradual changes over time – for example, organisational and procedural changes, as a new technology may at first need to coexist with older ones
- Institutional regulations and how actors will be impacted:
  The full potential of a new IT system sometimes takes years to realise, and require changes in institutions and regulations.
  The major types of impact include: the nature of work performed, financial consequences, responsibilities and risks and benefits experienced
- Governance: This issue concerns possibilities to remove obstacles for change, or increase the likelihood of successful implementation. Whether or not a new IT system is adopted may depend on rules, sharing of responsibilities and power at an inter-organisational level, informal and culturally determined traditions and habits as well.

From an economic point of view, disagreements and co-operation failures are costly and therefore should be minimised. Lots of promising effects have usually been suggested when testing IT-based applications in elderly health and homecare due to knowledge asymmetry, unavoided changes in work-routines and absence of IT-competence.

To make responsible decisions about the use of scarce resources of elderly health and homecare, it is necessary to identify sources of inefficiency before the implementation of any new IT system. In addition to this, there are usually no concrete benefits from the use of new IT-based applications in healthcare unless several actors adapt to one another, clarify regulations and define governance of the IT-system at an inter-organisational level – involving private firms, counties, municipalities, regulators, care professionals, as well as patients, and relatives, and of course, the elderly care centres and their inhabitants.

THE EVOLVING ROLE OF THE CMIO

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Healthcare informatics lies at the hub of two forceful, fast evolving trends. The first is the IT industry's own drive to provide systems developed for the very specific needs of healthcare providers – ranging from pharmacies and specialised clinical research labs to large university hospitals. This has begun to make possible a more far-reaching use of tools and technologies, which enhance healthcare delivery. Meanwhile, the healthcare sector too is on the cusp of change, with IT spending by hospitals expected to sharply accelerate towards the levels seen in areas like banking and retail, as they ready themselves for the coming real-time, data-rich and interconnected era of e-Health. Given such promises, and their concomitant challenges, it is important to anchor new healthcare IT systems in a coherent and agile but still robust information ecosystem. It is also vital to systematically metamorphose the latter into a multi-dimensional value-adding knowledge ecosystem. Such a job is the principal responsibility of today's hospital CMIO.

Exciting Times, Unexpected Challenges

We are living in exciting times. Healthcare informatics is better able than ever to deliver the long-promised and long-awaited tools needed for improving the quality, safety and efficiency of healthcare processes, and ultimately, of the health of our populations. For many decades, these tools have only been available in advanced healthcare institutions, and were usually custom-built using research and development funds, tailor-made to fit the needs of the target institutions. These projects were not products, and could not easily be transferred to other settings. It is however important to remember that most of the scientific demonstration of the benefits of healthcare informatics come from these few pioneering institutions, typically teaching hospitals.

Meanwhile, the IT industry has been evolving from failed attempts to adapt generic enterprise IT tools for healthcare, to developing healthcare-specific systems, thus recognising the particular intricacies and needs of this domain. This domain is still one of the least IT-developed, although it represents a major portion of the economy. It is most of all an information-intensive domain where the ability to bring just-in-time information and knowledge to decision makers, whether clinical or administrative, can yield urgently needed improvements: the healthcare industry is one of the least safe there is, and society is now worrying about it.

This coincidence of a recognised urgency and of existing industrial solutions has generated much excitement in the healthcare community, and a frenzy of implementation of clinical information systems with their iconic computerised physician order entry tool. Unfortunately, in much publicised situations, such implementations have led to negative outcomes, not because of inappropriate technologies, but because, as the saying goes, the "soft stuff is the hard stuff", and human and organisational factors often tend to be underestimated.

While gaining hands-on experience, users of these systems recognise that the co-existence of multiple vertical applications, even if they are technically connected, limit the ability to implement actual systemic improvements. As care and logistical processes become more complex, fragmented and distributed, the need to connect the meaning of information in each of the participating systems becomes necessary: there is a true need for semantic interoperability and consistency.

So how can institutions get organised in order to enable the implementation of semantically coherent systems that take into account the many human and organisational factors that are essential to make these systems work and deliver?

Bringing Information Systems into a Coherent and Agile Information Ecosystem

Geneva University Hospitals, a 2,200-bed group of hospitals providing primary, secondary, and tertiary care to the population of Geneva, have been developing and deploying information systems since the 1970s and is currently considered as one of the most complete hospital and clinical information systems in Europe. In 1995, it was decided to split the responsibility of these information systems into two structures, one dealing with enterprise IT, the other with the core business of the institution, in order to clarify the reporting and budgetary allocations, and to better integrate these services within their respective decision-making environments. On the one hand: the IT division, an administrative division in charge of the technical infrastructure (i.e., network, servers, and workstations) and the administrative applications, whose director, the CIO, reports to the Chief Executive Officer.

On the other hand: the Medical Informatics Division, staffed with clinicians, project managers, software engineers and a helpdesk, is a medical service whose director, the CMIO, reports to the Chief Medical Officer, and is responsible for the

design, development and implementation of clinical information systems, imaging systems, and telemedicine. The Medical Informatics Service also has a research and teaching mission within the Faculty of Medicine of Geneva University.

This CMIO position may be somewhat atypical, as it combines the strategic duties of defining the overall architecture of the clinical information system, the operational duties of building and running a 24x7, integrated, institution-wide clinical information system, and an academic mission.

However, this combination provides the scientific researchers with a 2,200-bed laboratory for inventing innovative healthcare informatics tools, while offering healthcare professionals and their patients with advanced – sometimes cutting-edge – tools for improving their work processes and their decision-making capabilities, and for supporting their own translational and clinical research.

Obviously, a clear governance structure and close strategic and operational coordination between the CIO and the CMIO and their respective teams is essential, in order to maintain the overall coherence of the information system, as boundaries between administrative and clinical applications are getting more bmurred. An overall IT strategic plan, developed jointly in 2002, and integrated in the enterprise strategic plan, defines the institution-level governance of the information system and serves as the reference framework for the urbanisation of the information system.

The Medical Informatics Division is therefore considered as a provider of transversal services by other clinical services, somewhat similar to radiology or anaesthesiology services. Clinical informatics projects can only be implemented if they comply with the architectural, technical and conceptual requirements of the strategic plan. In exchange for this discipline, which enables the tight integration of the systems, clinical services get methodological, technical and organisational support for their informatics projects, most of which get still developed or integrated by the Medical Informatics Division.

Evolving Towards a Knowledge Ecosystem

Although comfortable and efficient, this situation must evolve. It has managed to keep the institution's efforts focused during a decade of development and deployment, during which the system's users have also progressively learned to live in this digital world. These users are now in a stronger position to project their future needs, and thus assume a stronger steering role for the development of the information system. This becomes essential as the new challenges will deal ever more with the fundamentals of care production processes, and will require that the care professionals are in the driver's seat in order to achieve success.

Current challenges include the ability to manage flows and quickly reconfigure multidisciplinary care processes, the need to connect the physical world to the information world more closely and ensure end-to-end traceability of processes and materials, the need to measure returns on investments, and the mandate to prove safety, quality and efficiency gains. But these are new tasks and increased responsibilities and not all clinical leaders are ready or trained to take this charge, and specific support will be necessary.

Meanwhile, as the main elements of the information system are put in place, the time is ripe to fill them with the appropriate knowledge that will drive decision-making capabilities and systemic changes. Defining and enabling a framework for institution-wide knowledge engineering becomes a new role for the CMIO and his team. These pervasive, knowledge-driven tools become the true nervous system of the institution, the strategic instrument that enables adaptation and evolution, and therefore justify the involvement of the CMIO to the executive-level of the institution.

The role of the CMIO and his team has moved from supporting clinical information systems design and implementation, to the development of an information ecosystem that creates true synergies between humans and machines. The next step is to enable a genuine learning and knowledge-driven enterprise and guaranteeing that coherent and agile architectures and processes are put in place.

Having connected the nerves into a spinal cord, we are facing the challenge of building the electronic brain of our healthcare institutions.

GENEVA UNIVERSITY HOSPITALS

Geneva University Hospitals is a 2,200-bed group of hospitals with 4 main campuses and dozens of community clinics throughout Geneva. It counts 50,000 admissions, 750,000 outpatient visits and 100,000 emergency room visits per year. The group has 10,000 employees, 1,500 physicians and 3,500 nurses.

The annual budget is 850 million euros, of which 2.8% is spent on IT. A snapshot of the IT inventory is provided below:

- One of Europe's most 'wired' hospitals
- No mainframe, 150 servers (of which many are virtualised)
- 7,000 PCs, 1,500 palmtops
- Has an HIS since the 1970s
- 60,000 new medical images are created every day
- 25,000 logins to the electronic patient record per day (EMR, CPOE, nurse charting etc.).

IT staff includes 120 full-time employees and 30 academic researchers.

OPEN SOURCE PACS

DOES IT REALLY DECREASE COSTS OF HEALTHCARE IT?

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During the last three years, the Radiology Department at the University Hospital in Pisa, Italy, has introduced PACS technology, implementing an open source PACS. The IT team working at the Division of Diagnostic and Interventional Radiology has been involved in many projects for the development of new IT solutions. Particular efforts have been devoted to the implementation of a prototype PACS system, based on an open source solution that also offers teleradiology and e-learning features.

In 2003, the hospital was provided with a commercial RIS (RA2000, Siemens, ASP model). At that time, there was no plan for introducing a PACS system, so the IT group moved toward possible low-cost integrated solutions. The O3-DPACS solution, provided through a research agreement with the University of Trieste, has enabled two radiology departments in Pisa to have a digital archive for radiological images that allows radiologists to report exams, checking images on diagnostic monitors.

The purpose of adopting an open source PACS has been to improve radiological workflow, and to evaluate the benefits and drawbacks of open source software, with in-house radiology information system management. We present the proposed model and report the results obtained during a real-world validation.

Currently, hospitals and institutions all over the world are upgrading their systems to reach a completely film- and paperless environment. Radiological modalities have been converted into digital imaging producers following DICOM standards, and PACS is becoming an essential requirement across the hospital environment. Since images are not printed any more, every physician in the hospital must be able to access the PACS database and visualise patients' studies on monitors.

The Hub of a Paperless Hospital

Due to its central role in a paperless environment, the PACS system is one of the most critical and cost-demanding information modules in any healthcare scenario. Therefore, providing a hospital with an IT infrastructure for medical images is a big issue: it needs time and resources, starting from the project design, to server and client installations, the introduction of the system into radiological workflow and the management of the running system. In our PACS adoption project, we started by analysing the radiological requirements to evolve toward a paperless environment and we evaluated different solutions available on the market.

We found the possibility to use open source software very interesting. According to a new report by the California HealthCare Foundation, open source software will decrease the cost of health IT and help physicians share information.

What are the Advantages of Open Source?

The term open source does not actually mean 'free', but pertains to the possibility of modifying the code and allows for personalisation and customisation by the hospital IT staff. Having access to the source code and to any change in it, grants an adopter greater control of the system and more possibilities to survive failures in this support.
Another advantage of open source software lies in the possibility of interfacing PACS with other systems, for instance RIS, EPR or HIS: licencing interface software often represents the biggest upfront costs for hospital IT departments implementing system modernisation or equipment upgrade projects.

Introducing O3-DPACS to Pisa

In 2005, Pisa University Hospital signed a research agreement with the Bioengineering and ICT group of the University of Trieste. They provided O3-DPACS open source software, as well as support to the in-hospital IT team for the implementation in the Pisa environment.

O3-DPACS was implemented to provide PACS functionalities to two radiology departments (S.Chiara and Cisanello) located in buildings about 4 kilometers from each other. Through this project, digital images and associated patient data can be transferred electronically between medical staff over a 100 Mb/s network, through a dedicated fibre-optic channel, and become available throughout the departments.

The IT group started in 2005 by testing the O3-DPACS software in a laboratory, connecting just one CT and one client workstation. In this way, with the remote support of the software developers, the IT group became familiar with the O3-DPACS configuration and features.
After some weeks of laboratory testing, the analysis of the departmental image productivities guided our choice of the best low-cost hardware.

Installing PACS in the Real Setting

The solution chosen was to realise the archive server with an ordinary PC, using an AMD Athlon XP 3000+, 2 GB RAM and a 2 TB NAS storage. The RAID hard disk configuration provided

HITACHI
Inspire the Next
Hitachi Data Systems

...continued from page 13

The problem of fragmented data

For decades, healthcare organisations have suffered from highly fragmented data. With individual departments managing their own IT, a plethora of incompatible systems have arisen. This has made it exceedingly difficult for all of the information pertaining to any given situation to be gathered together where and when it is needed.

For example, discharging a patient requires the gathering together of a wide range of clinical and non-clinical data, including labo-ratory and pharmacy data, doctors' notes and a range of administrative information. With different data types being held on separate systems, collating all of the required information is a significant task.

This in-built complexity drives up costs, slows the entire process down and increases the risk of errors. And such errors can have serious repercussions: in the UK alone, 1,200 patients die each year as a result of medication errors, 5% of all patient safety incidents occur as a result of documentation errors in paper-based records and one in ten hospital in-patients are affected by adverse drug reactions.

Problems arise at the organisational level, too. Some 5,000 patient procedures are cancelled each year as a result of lost paper or film, and 13.5 million GP appointments are missed each year, in part because of incorrectly addressed letters.

The solution: a virtualised multi-purpose infrastructure

The Hitachi Content Archive Platform (HCAP) addresses all of these challenges, and more. It provides a centralised repository for all kinds of digital information, including clinical and non clinical, fixed content and transactional data. Interfacing via industry-standard communications protocols, it accepts data from multiple applications, protects and preserves it, and makes it available when and where it is needed.

Built to an open architecture, HCAP stores data so that it will be retrievable, despite technology refreshes, well into the future. With some clinical data required by law to be retained for 30 years, this is of key importance. Data integrity is maintained at standards demanded by courts of law, providing protection for the organisation in cases of legal challenge, and minimising the occurrence of diagnostic and prescription errors.

With compliance a major issue for healthcare organisations, the ability to set up policies in HCAP is an important feature. Where data must be retained for a set period, a policy can be set up accordingly. Once the policy is set up, if a user attempts to delete protected data at the application level, HCAP will stop it from being deleted at the physical storage level.

In some countries data must be irretrievably destroyed in certain circumstances. HCAP provides the ability to electronically shred such data at the physical storage level, making it, for all practical purposes, irretrievable.

We're ready

HCAP is a remarkably powerful solution. Protecting and securing content, and with the ability to grow with the organisation, it saves time and money and supports regulatory and corporate governance requirements. It will deliver significant value in organisations such as regional hospital networks, medium-to-large hospitals and regional and national bodies.

In today's healthcare environment it's all about data. In fact the PACS concept is now moving quite rapidly through cardiology, pathology, endoscopy and many other image centric disciplines. Once any institution has made the decision to go digital it is only a matter of time before they begin to want the "asset" or image or report to make its way through the healthcare workflow process. While standards like DICOM, HL7 and XML have helped to promote more openness and collaboration with regard to patient data, the next evolution will be with hospitals and national health systems investing in infrastructure so such that they can leverage the market for applications without being locked in to any specific vendor. In many of the cost saving and efficiency initiatives it is the infrastructure that is being heavily contemplated and contested and not the application. Governments are investing millions of Euros in national projects and infrastructure will be key to the success of these projects.

Simply put, invest in infrastructure and applications can become modular. Connected systems can all be best of breed if, and only if, you have a stable and thought-out infrastructure plan.

Hitachi are helping to facilitate data sharing and improve workflow through the clinical applications module, a fully integrated grid based component of HCAP where all clinical and non-clinical information can be managed shared and protected across the organisation ultimately providing information where it is needed at the point of care.

Once the information is available then it can be mined to facilitate knowledge and ultimately decision making.

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a security level against hardware failure. Security breaches are handled through encryption and firewalls.

The first production step involved the S.Chiara radiology department. All the DICOM modalities belonging to different vendors (CT, MR, CR and DX) were connected to the archive server and several clients (testing different DICOM software) were configured to query-retrieve images from the PACS server.

Some integration issues were resolved, occasionally with modality-provider support.

The second step involved the Cisanello Radiology department. To improve the DICOM server performances, another off-the-shelf PC was used to store images from Cisanello modalities. In this way the workload was divided between the two PC processors, but the clients of both departments were configured to access images on both archives.

All the modalities are now configured to automatically send results to the archive servers, so that they are immediately available for reporting. Radiologists from any client in both departments are able to access the images and share all relevant current and prior clinical information pertaining to any patients.

This PACS-guided workflow, characterised by rapid retrieval and presentation of a current study and comparison studies, resulted in a speeding up of the production of an imaging report from an image study and related tests.

Performance Metrics

From a user perspective, good performance for a PACS means that a query against current tests should last less then five seconds, regardless of the acquisition date, and the time for retrieving results should remain in the order of the network transfer time. At Pisa, radiologists have to wait a very short time; for example, to retrieve a CT of more than 500 images, they need about 25 seconds. Obviously, such a performance time should remain stable in the long term and not degrade in a significant way.

The department's IT group developed sufficient competencies in hardware, systems and applications: all the available internal knowledge was used to plan and implement the system. Once the system was in production, fast failure response times could be controlled by the department's IT group itself. They were in a position to promptly react to malfunctions, solve more than 95% of the problems and provide the best information for the most effective intervention by the developer team.

The IT departmental group acts also as an interface to users, physicians and other personnel, teaching them how to use the system and helping in solving personal issues with it. High level support is the key to a good implementation of any technology in the real world scenario.
Within two years, both radiology departments collected 7 TB of images and O3-DPACS was appreciated for its stability, robustness, interoperability and reliability.

Scalability

During the course of the project, we also evaluated the scalability feature of the adopted PACS. A healthcare informative system should ideally be capable of implementing solutions in both low-load environments as well as at multiple centres, reaching up to regional environments.

This fosters vertical integration and a reduction in costs, due to a larger user base.

We also observed the economics of using an open source PACS: a healthcare informative system should not force unncessary high investments upfront and attempt to guarantee greater reliability at the lowest possible cost.

DEFINITIONS:

Technically, open source offers access to software source code, with relaxed or non-existent copyright restrictions, no reference to trademarks and patents, or distribution, re-development and use.

To some, open source is just one of a range of possible design methodologies. To others, it is a strategic choice, principally in terms of acquiring and retaining ownership of a software product.

The open source system allows concurrent inputs of a variety of approaches and, unlike proprietary products, allows anyone to become part of the software development cycle.
Over the past two decades, open source has become a buzzword and acquired a cult following - especially after the widespread dissemination of PCs Internet made it possible to quickly exchange and share information, and thereby build a learning community.

Open source is, however, different from free software or open content licenses, which have more formal rules to prevent deliberate misleading of end-users.

Examples of open source healthcare products include OpenEMR and openEHR (respectively, covering medical and health records), FreeMed and France's MedinTUX (for medical practice management), OpenClinica (for clinical trials) and Ipath (telemedicine). Given the costs associated with PACS, there also are a variety of open source products for imaging. Aside from O3-DPACS (used by the Pisa University Hospital), these include Opensource PACS, MedINRIA, Drishti, O3-RWS, CTSIM (for simulation) and OsiriX (which is targeted specifically at the Macintosh environment).

EVOLUTION IN HEALTHCARE IT DELIVERY

AUTHOR
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Just after the turn of this decade, it quickly became apparent that investments by the healthcare sector in the emerging e-business infrastructure were simply not keeping pace with other industries. For many analysts of paradigm shifts in technology, however, this was a blessing in disguise. The dotcom Big Bang, as we all know, was followed by an almost equally frenzied Big Whimper.

Of Early Birds, Band Aids and Expensive Lessons

Not a few early birds flying into the dotcom maelstrom paid a price. Major league insurance firms like Cigna saw a near meltdown of their IT systems – and their operations – for embracing new e-business much too hastily. There were other casualties, though only some are known. Many have managed, sometimes expensively, to Band-Aid their blunders, go back to the basics, and start again.

For healthcare, a sluggish commitment to immerse itself in the new e-World may very well have avoided the expenses and broken dreams of a boom-bust. However, it is clear that the time is now ripe for change. As *Healthcare IT Management* has described in a previous issue, nothing illustrates this better than the commitment by Big IT firms to develop healthcare-specific offerings.

A Robust New Substructure

In spite of continuing concerns about interoperability and standards, such resolve by the major league players provides a solid sub-structure. Astride it are hundreds of smaller, nimbler players, who have begun designing, testing and implementing new products and solutions, knitting together what will inevitably become a seamless, operational e-Health superstructure. Like an iceberg, what we are now witnessing is only the tip of the new e-Health edifice. Only the ostrich-like would argue there is little beneath.

Delay in Adoption = Flatter, Cheaper Learning Curve

Some experts believe that healthcare has been one decade behind on the technology curve. Indeed, if this is accepted, healthcare IT is exactly where eager beavers in other industries sat – just before the dotcom bust. If played correctly, healthcare IT can acquire the benefits of new technologies, without paying too high a price for the learning curve.

Journeys to the Centre: The Age of the Mainframe

Any analysis of the evolution of healthcare IT in Europe would begin in the late 1950s and early 1960s. These were years marked by the emergence of massive new centralised hospitals, as urbanisation gathered pace. This was the period of bringing huge, multi-speciality hospitals to the people, in the new metropolitan conurbations.

On the IT side, both the above periods would be symbolised vividly by the IBM 360 series. This was the Age of the Mainframe. Corresponding to the move by hospitals into the midst of patients, mainframes entailed a move by users to the computer, hosted – often underground, in their silos of power.
In the early 1970s, Europe witnessed a major spurt in suburbanisation, and many new, usually smaller hospitals began to be built around the fringes of the larger cities. Community clinics served as feeders to regional and metropolitan hospitals.
By the mid-to-late 1970s, the prior Zeitgeist of concentration had reached its peak. The two oil price shocks during the period also resulted in some powerful countervailing pressures, and reality checks, for example, by putting brakes on the building of new highways.

Minicomputers: Computing Moves out of the Basement

As the decade turned, so did the focus of healthcare IT. New mid-range offerings in the shape of minicomputers became ubiquitous. Technically speaking, minicomputers formed a clear group with their own transistor/core memory 16-bit hardware and operating systems - including multitasking pioneers such as VMS and UNIX (whose origins as a minicomputer OS remain largely unknown). Digital Equipment, with its PDP and VAX series, was the leading minicomputer vendor, for some time the worlds second largest computer firm (after IBM).

An important factor to note here is that minicomputers, for the first time, permitted not only multi-tasking but also multiple users at different locations, via hardwired local networks. These lighter-weight computing engines not only found favour in the new smaller community hospitals, but also in individual departments within the big metropolitan hospitals.

But the Era of Minicomputers was to be short-lived. Today, almost all the flagship vendors of that period – some near iconic – are only memories: think of Control Data, Data General, Honeywell, Nixdorf, Norsk Data, Prime Computer, or Wang Laboratories.

The Age of the Personal Computer

The reason for the demise of the minicomputer lay in the advent in the late 1980s and early 1990s of the personal computer. These were powered by the Intel x86 processor, and accompanied by (what now seem almost elementary-school level) networks from the likes of Novell.

Although personal computers could not immediately take up the increasingly data-intensive tasks, which minis were doing, mainframes – whose costs per unit of processing power had begun to decline sharply – could, and did, fill the gap. And there were gaps to be filled. Users had, alas, become used to computing.

Healthcare Data and Automation

In the US, in particular, the driver for the kind of data processing intensity only computers could offer came in the shape of Diagnostic-Related Groups (DRGs) in the mid-1980s. Hospitals were obliged to use DRGs (and associated codes) for services based on a range of criteria and classifications: age, gender, principal diagnosis, secondary diagnosis, medical or surgical procedure, complications and outcomes. Adding further impetus was the beginning of managed care.

In a variety of forms, such computer-friendly, data-intensive metrics also began to creep into Europe. In spite of early resistance, they began to become the rule, especially since they were seen as a weapon against the sharply rising costs of healthcare – already a major issue in the recession of the early 1990s.

During this period, in spite of some Last Stands by minicomputer vendors to develop so-called superminis, the value perception curve on the user side had begun to become increasingly binary. The Vision Thing for IT managers now lay in two directions: towards robust mainframes on the one side and to the newer PCs on the other. Thanks to the geniuses at Intel, the processing power of PCs was doubling every two years (according to the now-famous Moore's Law), but their capacities (on the software and networking side) was accelerating, too.

While Bill Gates and Microsoft's Windows proceeded to open the floodgates for an explosion in the use of PCs, the last nail in the minicomputer coffin was hammered in by the development of Unix to run on Intel x86 architecture, including Solaris as well as NetBSD (Net Berkeley Software Distribution or NetUnix), as well as its cousins and clones.

Meanwhile, falling prices and proliferation in use were fuelling the traditional virtuous circle for new technologies to the tipping point. As the personal computer soon transformed itself into a commodity, the traditional hospital patient was metamorphosing into a healthcare consumer.

The Internet and the Informed Patient

Looking back, it is hard to imagine the look and feel of a European hospital in the 1980s and early 1990s. Most still greeted patients with paperwork (literally speaking) at the front desk. Some had dumb terminals linked to the mainframe. By the late 1990s, however, it had become almost impossible to find an admissions desk without a personal computer or workstation, or patients nearby stepping outside to use their mobile phones.

The Era of the Internet and mobile healthcare was just beginning. On the healthcare side, one consequence of the Internet is the enormous boost it has provided to what can be termed the Informed Patient. Patients, especially young and middle-aged ones are/or certainly can be armed to the teeth today with information about health. Such empowered patients have forced changes in their interaction with physicians, many of who have been (or will be) brought down from their traditional pedestals as benevolent dispensers of health to professionals providing a service.

Governments in Europe too have plunged into the fray, supporting an arsenal of Internet enablers, from healthcare information portals to hospital quality-of-care comparator sites. Forcing further change in driving healthcare IT to new frontiers will be mandates to enact laws like the Health Insurance Portability and Accountability Act, of policy makers to devise standards such as HL-7, C Electronic Data Interchange, ACR/NEMA Digital Imaging and Communications in Medicine Standard Medical Terminology and Code Sets, and last, but not least, lay the framework for the electronic health record, and anywhere/anytime treatment.

A Brief Look at The Future

Down the road, however, there is more to come. Our own publication *Healthcare IT Management* has portrayed developments such as smartcards, new-generation mobile clinical/laboratory information systems and computerised prescription order entry, bedside data entry/access terminals and PDAs with digital pens/voice-recognition through to RFID, robots and wearable VGA Head Mounted screen projection devices. Many such technologies have gone live in Germany's Asklepios, billed as the first 21st century Hospital.

The eventual challenge is however going to be philosophical. Healthcare has always been a people business. While cold, gleaming (but large) medical devices could be accepted at a distance by patients as a necessity, the growing pervasiveness of PDAs, RFID scanners and voice-recognition units, driving their healthcare data across invisible digital pathways around the world, may alter acceptance dramatically.

This aspect of the healthcare IT and the emerging e-Health infrastructure – to balance the quantity of sophisticated well-managed data, with still-personalised and quality-focused healthcare delivery - is one that will demand attention in the years to come.

HEALTHCARE AND FP-6: A LOOK BACK

HEALTHCARE IT MANAGEMENT
ANALYSIS

In our previous issue, we provided an overview of healthcare IT projects awarded under the EU's Seventh Framework Programme for Research. As noted, many underscore the EU's response to its e-Health agenda and pathways to use IT to cope with the challenges of an ageing population. Given below is a summary of healthcare IT projects under the Sixth Framework Programme.

Healthcare IT Projects in FP-6

The EU's Sixth Framework Programme for Research (FP-6), which ran from 2001 to 2006, had 54 key healthcare IT projects, with total EU funding of 197.4 million Euros. Though most projects fell under the e-Health sub-heading of FP-6's Information Society Technologies Activity, we have re-classified them according to the five categories used in the current Seventh Programme.

This is designed to facilitate comparison and assess elements of continuity and/or re-prioritisation. Given the difficulties with demarcation, we have preferred the 'IT architecture and infrastructure' category to profile projects, which might well have an applicative element in patient safety, but where the over-arching challenge involves IT, above all in terms of interoperability, real-time access to distributed data, and standards.

The five groups, along with project numbers and EU funding are: IT architecture and infrastructure (18 projects, 53.1 million Euros), advanced ICT for patient safety (22 projects, 102.04 million Euros), personal health systems (6 projects, 12.19 million Euros), ICT and ageing (4 projects, 9.93 million Euros), bioinformatics and robotics (4 projects, 19.95 million Euros).

In this issue of *Healthcare IT Management*, we provide an overview of projects in three categories: IT architecture and infrastructure, as well as ICT and ageing and bioinformatics and robotics. We shall describe the remaining two (advanced ICT for patient safety and personal health systems) in our next issue.

ICT and ageing: The 4 project consortia were led by organisations in Germany, Italy and Spain (2 projects), with EU support averaging about 2.5 million Euros per project.

IT architecture and infrastructure: The 18 projects had consortia led by organisations in Italy (7 projects), followed by the Netherlands and Turkey (3 each), and one each for Austria (the single largest project in terms of funding), as well as Belgium, France, Germany and Sweden. Interestingly, in the light of intense debates on the subject, three key health systems interoperability projects were headed by Turkey's Middle East Technical University.

Bioinformatics and robotics: 4 projects with consortia led by organisations based in Italy, the UK and Spain (2 projects). The most ambitious (and expensive) effort seeks to provide decision support systems for cerebral aneurysms and is led by Spain's University Pompeu Fabra.

[ICT and Ageing]

CAALYX:

Complete Ambient Assisted Living Experiment **(www.caalyx.eu)**

Developing a wearable light device able to measure specific vital signs of the elderly, to detect falls and to communicate automatically in real time with his/her care provider in case of an emergency, wherever the elderly person happens to be, at home or outside.

EU Funding: 1.85 million Euros.
Contact: Telefónica Investigación y Desarrollo SA Unipersonal, Spain.

EMERGE:

Emergency monitoring and prevention **(www.emerge-project.eu)**

To model the 'typical' behaviour of elderly people with medical risks following an integrated approach that uses ambient and unobtrusive sensors, in order to detect deviations from typical behaviour, reason on acute disorders, and prevent emergencies.

EU Funding: 2.45 million Euros.
Contact: Fraunhofer Gesellschaft Zur Förderung Der Angewandten Forschung e.V., Germany.

K4CARE:

Knowledge-based homecare eservices for an ageing Europe **(www.k4care.net)**

To design, implement and validate a new ICT knowledge-based Homecare Model by integrating skills, procedures and experiences of several eastern and western European countries, and use this to develop an EHR.

EU Funding: 3.13 million Euros.
Contact: Universitat Rovira i Virgili, Spain.

OLDES:

Older people's e-services at home **(www.ofseth.org)**

To plan and develop a technological, cheap and easy to use platform for tele-assistance and tele-company.

EU Funding: 2.5 million Euros.
Contact: ENEA, Italy.

[IT Architecture and Infrastructure]

ARTEMIS:

A Semantic Web Service-based P2P Infrastructure for the Interoperability of Medical Information Systems **(www.srdc.metu.edu.tr/webpage/projects/artemis)**

ARTEMIS is developing a semantic web services based interoperability framework for the health care domain.

EU Funding: 1.99 million Euros.
Contact: MIP - Consorzio dell'innovazione nella gestione delle imprese e della Pubblica Amministrazione, Italy.

COCOON:

Building knowledge driven and dynamically networked communities within European healthcare systems **(www.cocoon-health.com)**

To improve healthcare by reducing medical errors and helping diagnostic and therapeutic risk management. The project is developing a semantic-based healthcare information infrastructure capable of integrating medical information and e-Health services.

EU Funding: 5.99 million Euros.
Contact: MIP - Consorzio dell'innovazione nella gestione delle imprese e della Pubblica Amministrazione, Italy.

DOC@HAND:

Knowledge sharing and decision support for healthcare professionals **(www.doc-at-hand.org)**

An advanced platform aiming to easily access a wide set of clinical data, allowing healthcare professionals transparent access to heterogeneous and geographically dispersed information, allowing to query the system using natural language.

EU Funding: 2.3 million Euros.
Contact: TXT eSolutions, Italy.

EURESIST:

Integration of viral genomics with clinical data to predict response to anti-HIV treatment **(www.euresist.org)**

To develop a European integrated system for the clinical management of antiretroviral drug resistance. To this end a huge European integrated data set will be created, linking three of the largest existing resistance databases: ARCA, AREVIR and Karolinska.

EU Funding: 2.14 million Euros.
Contact: Informa S.r.l., Italy.

HEALTH-E-CHILD:

(www.Health-e-Child.org)

Aims at developing an integrated healthcare platform for European paediatrics, providing seamless integration of traditional and emerging sources of biomedical information - from genetic to epidemiological to clinical. This will be followed by enabling tools for deployment in a real-life healthcare setting.

EU Funding: 12.19 million Euros.
Contact: Siemens AG, Austria.

LHDL:

Living Human Digital Library **(www.livinghuman.org)**

To develop the infrastructure, based on state-of-the-art ICT systems, to support the Living Human Project aimed at creating a worldwide, distributed repository of anatomo-functional data and of simulation algorithms, directly accessible by any researcher in the world.

EU Funding: 2.25 million Euros.
Contact: CINECA, Italy.

MULTI-KNOWLEDGE:

Creating new knowledge in networks of medical research **(www.multiknowledge.eu)**

To integrate different biomedical information from heterogeneous sources (clinical, laboratory and metabolic) with data on gene and protein expression provided by new high throughput technologies in a system committed to cardiovascular risk profiling.

EU Funding: 2.44 million Euros.
Contact: Centro di Cultura Scientifica A.Volta, Italy..

NEUROWEB:

Integration and sharing of information and knowledge in neurology and neurosciences **(www.neurowebkc.eu)**

To integrate clinical and genetic databases with different structures and language into a single virtual database and foster vertical integration between clinical and genetic data in other common and complex diseases (i.e. cardiovascular diseases and tumours), in order to improve and personalise healthcare delivery.

EU Funding: 1.89 million Euros.
Contact: Istituto Nazionale Neurologico Carlo Besta, Italy.

NOESIS:

Platform for wide scale integration and visual representation of medical intelligence **(www.noesis-eu.org)**

To provide health professionals involved in research and cure of cardiac and cardiovascular diseases with an everywhere accessible Knowledge Management system equipped with a Decision Support System tool, to be used for supporting them in their clinical decision.

EU Funding: 4.4 million Euros.
Contact: Boehringer Ingelheim Italia S.p.A., Italy.

Q-REC:

European quality labelling and certification of Electronic Health Record systems **(www.eurorec.org)**

To develop formal methods and to create a mechanism for the quality labelling and certification of Electronic Health Record systems in Europe, in primary and in acute hospital care settings.

EU Funding: 1.3 million Euros.
Contact: Euro-Rec, Europe/Belgium.

RIDE:

A roadmap for interoperability of e-Health systems in support of com 356 with special emphasis on semantic interoperability **(www.srdc.metu.edu.tr/webpage/projects/ride/)**

A roadmap to assess and validate best practices for interoperability of e-Health systems, leading to recommendations for actions and to preparatory actions at the European level.

EU Funding: 1.16 million Euros.
Contact: Middle East Technical University - Software R&D Center, Turkey.

SAPHIRE:

Intelligent healthcare monitoring based on semantic interoperability platform **(http://www.srdc.metu.edu.tr/webpage/projects/saphire/)**

To develop an intelligent healthcare monitoring and decision support system on a platform integrating the wireless medical sensor data with hospital information systems.

EU Funding: 2.04 million Euros.
Contact: Middle East Technical University - Software R&D Center, Turkey.

SemanticMining:

Semantic interoperability and data mining in biomedicine **(www.semanticmining.org)**

To develop generic methods and tools supporting the critical tasks of the field: data mining, knowledge discovery, knowledge representation, abstraction and indexing of information, semantic-based information retrieval in a complex and high-dimensional information space.

EU Funding: 5 million Euros.
Contact: Linköping University, Sweden.

SHARE:

Supporting and structuring healthgrid activities and research in Europe: developing a roadmap **(www.eu-share.org)**

To ensure the successful take-up of HealthGrids over the next 10 years by creating a roadmap for essential technology development. It aims at introducing Grid concepts in e-Health or e-infrastructures directed at medical research, address citizen mobility and provide cross frontier interoperability of data.

EU Funding: 980,000 Euros.
Contact: CNRS, France.

TMA-BRIDGE:

A bridge towards coordinated e-Health implementation **(www.esa.int/telemedicine-alliance)**

The first phase of the Telemedicine Alliance formulated a vision for citizen-centred e-Health services but found that interoperability was a major obstacle. TMA-Bridge plans to provide a Strategic Plan for transnational e-Health interoperability with creative, citizen-centred, action-oriented, strategic actionable recommendations.

EU Funding: 550,000 Euros.
Contact: European Space Agency, Netherlands.

VIROLAB:

A virtual laboratory for decision support in viral disease treatment **(www.virolab.org)**

Genetic information is likely to become increasingly significant in many areas of medicine. ViroLab enables easy access to distributed resources as well as the sharing, processing, and analysis of virological, immunological, clinical and experimental data.

EU Funding: 3.3 million Euros.
Contact: University of Amsterdam, Netherlands.

SEALIFE:

A Semantic Grid Browser for the Life Sciences applied to the study of Infectious Diseases **(www.biotec.tu-dresden.de/sealife)**

The Web started with a browser and a handful of Web pages. The vision of eScience with an underlying Grid and Semantic Web will only take off with the development of a Semantic Grid browser.

EU Funding: 2.2 million Euros.
Contact: TU Dresden, Germany.

SemanticHEALTH:

Semantic interoperability deployment and research roadmap **(www.semanticHEALTH.org)**

To develop a European and global roadmap for deployment and research in health-ICT, focusing on semantic interoperability issues of e-Health systems and infrastructures.

EU Funding: 968,860 Euros.
Contact: Radboud University Nijmegen Medical Centre, Netherlands.

@neurIST:

Integrated Biomedical Informatics for the Management of Cerebral Aneurysms **(www.aneurist.org).**

Seeks to provide decision support systems and transform management of cerebral aneurysms. New personalised risk assessment and methods will help to design improved medical devices as well as treatment protocols.

EU Funding: 12.6 million Euros.
Contact: Universitat Pompeu Fabra, Spain.

IMMUNOGRID:

The European Virtual Human Immune System Project **(www.immunogrid.org)**

To create computational simulator models for the real-size human immune system, standardise immune system concepts, bioinformatics tools and information resources to enhance the computational models for preclinical and clinical applications, and validate these models with experimental data and disseminate the tools to users such as vaccine/immunotherapy researchers.

EU Funding: 1.95 million Euros.
Contact: Interuniversity Consortium of Northeastern Italy for Automated Computing, Italy.

INFOBIOMED:

Structuring European biomedical informatics to support individualised healthcare **(www.infobiomed.org)**

To enforce European biomedical informatics as an integrative discipline with a view on supporting individualised healthcare.

EU Funding: 4.85 million Euros.
Contact: Fundació IMIM, Spain.

SYMBIOmatics:

Synergies in medical informatics and bioinformatics **(www.symbiomatics.org)**

To identify and exploit synergies between bioinformatics and medical informatics.

EU Funding: 550,000 Euros.
Contact: EMBL-European Bioinformatics Institute.

…. to be continued

TRANSFORMATION OF FIVE HOSPITALS
INTO ONE ORGANISATION AND RELATED CHANGES IN IT

AUTHOR
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The accession of the Czech Republic to the European Union has entailed dramatic changes in its hospital structures and healthcare delivery policies. IT has been both a driver and a passenger in such a process. An analysis of the experience of RHC, the Czech Republic's largest hospital group, shows the challenge of boarding a moving bus (namely the EU) and running ahead to its front. Its lessons may have relevance well beyond the country's borders.

RHC: The Czech Cutting Edge of Change

Regional Health Corporation ("Krajská zdravotní, a.s.") consists of five hospitals with a long history – the regional Masaryk Hospital in Ústí nad Labem, and four district hospitals: Decín Hospital, Teplice Hospital, Most Hospital and Chomutov Hospital.

The RHC group has total of 3,350 beds and about 6,500 employees (838 doctors and 2673 nurses), and is the biggest healthcare provider in the Czech Republic.

RHC was created in September 2007 after the merger of the four district hospitals with Masaryk, owned by the Ústí Region, and itself already one of the country's largest and most modern health care institutions, ranging from super-specialised interventions to undergraduate and postgraduate medical education.

The RHC Center of Information Systems operates a proprietary regional optical network on the basis of dark fibre technology with a 10 Gbps backbone interconnecting all hospitals.

It also provides indirect connection via the national research network CESNET2+ for institutions in the entire region, using optical DWDM (dense wavelength division multiplexing).

As a data/communication RHC Center, Masaryk Hospital is the first Czech filmless healthcare facility and its PACS is used by all RHC hospitals.

Initial Situation: IT Background

Organisation structure
Each of the five RHC hospitals inherited its own IT department, whose position (and roles) in the organisation structure was different in each hospital.

In Masaryk Hospital, the CIO was a member of the top management. All communication, information, security and reprography services, including medical devices services, were consolidated in the IT department – as were the medical archives, central and ancillary receptions, switchboard and help desk services. The CIO's responsibilities covered coordination of projects financed from structural European Union funds as well as a variety of development and research grants.

On the other side, it excluded activities such as those connected with clinical control, healthcare statistics, performance indicators, DRG etc., which fell under the purview of the controlling department of the organisation.

The intention during transformation was to create a shared IT services structure. However, such a radical change did not prove feasible in a short period. The main obstacles were major differences in the structure and culture of the original five hospitals, procedural differences as well as limited resources. So too were sensitivities about the potential impact on employees and patients.

What was therefore sought was a gradual shift of competencies in the field of IT from hospitals to headquarters. This is now in progress, while the IT substructure is itself intrinsically reorganised.

Heterogeneous information systems
Three RIC hospitals have clinical information systems (CIS), but they are different from one another. Two do not yet have a CIS. They also use three different financial systems, as well as different laboratory, radiology and pharmacy systems.

While the biggest hospital, Masaryk, uses advanced solutions, such as mySAP ERP 2005, data warehouses, modern middleware for integration of RIS – CIS – PACS, grid storage infrastructure, blade servers and IP telephone communication and videoconferences, other hospitals have been saddled with PCs running MS-DOS as well as entire buildings without a local network or connection to the Internet.

IT Transformation Strategy within the New Company

Parameters of IT transformation
At the beginning of 2007, start-up conditions for IT were defined as follows:

- ERP system mySAP in all hospitals
- Data and communication center in Masaryk Hospital
- Consolidation of IT and communications infrastructure and levelling the processes in all parts of the company
- Converging services to be managed together, as Information Systems/ Information and Communications Technology (IS/ICT)
  - IT devices and information systems
  - Medical devices

- Communication and security devices
- Telecommunication devices
- Reprography and reprography devices

- Connection of medical libraries
- IS/ICT to be managed in compliance with ISO 9001:2000 and ISO 27001:2005 standards requirements and national accreditation standards
- Filmless and paperless hospitals conception
- Changes in IS/ICT and their management to support and speed up processes to make the new company more agile and effective (faster, more simple and cheaper)
- Taking note of future possibilities to become a part of a bigger group of health care providers in compliance with globalisation trends of this service sector.

Minimum required parameters at the day of hospitals merger

- All hospitals have broadband connection to Internet
- System mySAP is filled with data to the extent that assures continuous operation of the hospitals after merger
- All mySAP users, necessary for transformation process, have suitable hardware configuration and Internet connection
- The adjustment and appropriate management of processes for transforming mySAP implementation into a routine operation status in the short-term
- All other information systems to attain an operation status, which protects the company from any kind of operating failure
- The change of IS/ICT is able to demonstrate the advantages of chosen form of legal status and organisation of the hospitals in the region.

Goals during the period of transformation time

- Creating the regional optical network for hospitals
- Implementation of mySAP ERP
- Audit, analysis of ICT area
- Formulation of strategy and conception of IS/ICT area
- Launch of project realisation:
  - Information and communication center of The Ústí Region hospitals – infrastructure for secured exchange of information and image health care documentation.

Creation of regional optical network for hospitals

One feature of IT supporting the transformation of hospitals into one company was to create a regional optical network for hospitals with parameters that enable access to geographically remote working sites as one organisation, with a single information and telecommunication infrastructure. Masaryk Hospital in Ústí nad Labem completed the realisation in the period September 2006-August 2007 of a major project called "Public Internet in The Ústí Region hospital network", co-financed from EU structural funds. This enabled the creation of a regional high-speed communication network among The Ústí Region hospitals on the basis of rented dark fibre connection between towns and the realisation of last mile access via the same technology. Modular active elements used in individual localities are equipped and ready to be transferred to 10 Gbps Ethernet. Protocol MPLS of the backbone network enables operation of a variety of information systems, including the regional health care information system, PACS etc. A cross-regional PC network, owned and run by RHC, is connected to the Internet and the national academic network.

Realised goals

The transformation of RHC has proceeded under conditions where target dates have been shifted several times, and in a way which disabled advance readiness, the conduct of audits and analyses of function areas and the formulation standardised strategies. Crucial projects were realised under time pressure and with parameters continuously changing, alongside implementation of information systems.

- Implementation of uniform enterprise information system
  - Common mySAP ERP 2005 system, salary information system, system for HR management, electronic ordering system and pharmacy system
- Implementation of electronic medical record
  - Uniform data storage for digital image medical documentation, common web browser for PACS
  - CIS in two remaining hospitals
  - Exchange and sharing of electronic patient records within the company, including the whole region
- Preparation of patient portal with services, e.g. booking of health care
- Consolidation of IT infrastructure and services
  - Implementation of uniform identity management
  - Consolidation of telecommunication services
  - Central HelpDesk
  - Common intranet with uniform document management system
  - Uniform security systems
  - Consolidation of IT and communications environment
- Solution of critical status of IT in the second biggest hospital in the region.

Conclusion

We have recently undergone one of the biggest reorganisations in the health care sector in our country. Without any prior experience, we have been forced to face changes we were expecting for several years.

However, the real character of these changes is being revealed to us as and when it is happening. Although we can review model situations describing ICT structures in hospital networks from overseas, we are now going through a unique experience with a real-life situation in a specific country.

Trying to reach optimal effectiveness and use innovations while simultaneously implementing modern e-Health concepts has required learning new approaches, which were previously applied by business and commerce - not healthcare at public hospitals.

However, knowing and adopting these new approaches is the only way to enable IT to drive company strategy and change management.

The requirements for this are likely to intensify in the years ahead.

TO PUT OR NOT TO PUT ... TO PASTURE

WHITHER THE AS/400 ?

AUTHOR
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HITM

It is a question on the minds of several healthcare IT managers, and their counterparts in other fields of business. What is the future of IBM's AS/400, a workhorse in hospitals and other enterprises across Europe ? In spite of a blizzard of technology and marketing firsts, IBM itself seems to be seriously reconsidering the future of this robust but veteran system, born two decades ago.

When one of the world's largest companies begins to serially rename the same product, it is a sign of challenges ahead. The AS/400, which was born 20 years ago as the Application System/400, proved to be one of the biggest success stories in the history of computing. The first computer to use a 64-bit processor, the AS/400's accomplishments, speed of take-up and durability exceeded the expectations of IBM's own marketing wizards (a rare occurrence in a profession whose raison d'etre is to shoot metres over the bullseye). The AS/400 was the first off-the-shelf IT system to attain the highest security rating from the US National Security Agency (the CIA's electronic Big Brother, last in the headlines in 1998 when the European Parliament accused it of wiretapping phone conversations).

What's In a Name?

Since 2006, IBM has called the AS/400 the System i after shrugging off a re-branding exercise dating back to 2000, when it had been renamed as the iSeries (as part of the US giant's e-Server initiative). In April 2008, however, IBM announced yet another rebaptism, after integrating System i with the System p platform to a new product range called IBM Power Systems.

Robust and Serious

For IT veterans, the key advantage of the AS/400 was that it was built for programming applications – robust ones (a reason why one of its biggest customers has been the US military). Making this possible was an integrated relational database management system and seamless set of development tools, alongside a virtualised hardware with rapid access to its DB2/400 database and its RPG (Report Program Generator) programming language.

Many IT managers at large institutions (hospitals included) swore by the AS/400, given that RPG was by far one of the best languages to devise and implement business rules and create applications closely tailored to their own specific business requirements.

As with much in IT, there are strong views and camps about the future of the AS/400. Some believe that the AS/400, though venerable, is still popular. 'Serious' users, they say, prefer what works, and explain the lack of any new applications precisely because they look for new tools to enhance productivity, or provide a new feature for system administrators – or top management, especially those (and there are many at such levels) who loath having to 'be trained' on a new system. Indeed, even a company like Microsoft was reported to be running AS/400s in the late 1990s.

IBM's Approach: Adapt and Stay Tuned to Change

Though sales are tapering off, the AS/400 is also believed to be still profitable for IBM, which renews a bundled package of support and services with the system. Meanwhile, IBM has taken a Darwinian approach to RPG – and adapted it continuously, in order to stay relevant and survive. The current RPG IV can be edited via PC using IBM's Websphere Development Studio, although the success of the latter has been less than IBM hoped (principally because it is viewed as being complex and cumbersome).
Most importantly, from a strategic point of view, IBM provides tools to link to Java objects, write CGI programmes and other Web-enabled packages. There also are options for users who wish to maintain their RPG code (especially to handle business rules), but seek new GUIs to replace the green screens. In addition, new interface extension products assist developers in writing new XML or HTML interfaces, while new interfaces to RPG programmes can also be developed with Microsoft Visual Studio .NET.

For many of its proponents, however, the key advantage of an AS/400 machine running RPG is that it is not only robust but retains backward compatibility. In the healthcare area, within the fast-shifting sands of the evolving e-Health framework, the AS/400 can therefore still be counted on.

The Sceptics

Sceptics, however, believe RPG's medium-term outlook is at best clouded. They point firstly to a lack of genuinely new true-blue applications for the AS/400 RPG environment, over the past 5-6 years, and RPG is rarely (if ever) used in new projects. This is of course a consequence of the shift in programming to the Web browser (with the myriad possibilities offered to access an application on to a PC screen and bring up data).

Meanwhile, the frequency of releases for RPG has begun to wither, accompanied by a decline in IBM's own training programmes. This has itself coincided with a shift in the IT curriculum at computer science schools, given preferences by IT aspirants for Microsoft Visual Basic, C++, and Java, rather than RPG or even COBOL (although there are some recent excep-

tions in the latter case). Meanwhile, adding further pressure is the fact that the average RPG developer today is close to retirement age.

Indeed, a search on the Internet finds no more than a handful of RPG training courses and programmes. They are not prohibitively expensive. Britain's Sandline Learning (www.sandline-learning.co.uk), for instance, offers a 13-module online program on RPG IV for GBP 149.

Programmes in the US are similarly priced. However, digging a little deeper yields evidence of some truth behind the claims of the sceptics. Missouri-based Staffkit (www.staffkit.com), for example, has RPG courses on offer, but none of its news releases over the years mentions the course.

Those who have chosen to move off the AS/400 environment have usually done this as part of a mission-critical application modernisation project. Others – especially in high-customer sensitivity areas, have faced pressure from users to modernise their user interfaces.

For example, HITM learned about a hospital website, which had to be written four years ago in PHP, but could not at the time be hosted on their AS/400, necessitating a move to another server. Finally, there are cases of difficulties in deploying and integration with other custom products.

Paying the Proprietors Price

The hospital IT manager interviewed by HITM said that much of the reason for a grim outlook for the AS/400 is that it took off in the years when IBM was at the peak of its 'Daddy knows best' mindset.

In the early 1990s, he said IBM did not even imagine the need to make RPG an open standard, like was the case with other procedural languages like COBOL, which claims hundreds of different compilers. Though the AS/400 has a strong user community, it lacks a strong community of independent vendors, like COBOL – whose roots also go back as far as RPG, he explained. As a result, there are few (if any) RPG applications on non-IBM platforms.

This kind of approach, he said, has not really changed much. Since 2004, IBM has sought to compel buyers of the AS/400 (at the time the iSeries) to also purchase WebSphere Development Studio (which permits PC users to edit RPG).

A more serious error at the time was to force buyers to move applications from 5250 'green screen' terminals to a graphical user interface, or pay more for their iSeries machines (which critics attacked as the '5250 tax'). These were not mere allegations. It was published in IBM's pricing manual.

THE IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON GP PRACTICES

AUTHORS

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If those of us of a certain age (in other words, no longer in their teens!) think back to our childhoods and the occasional visit to our local GP (General Practitioner), many of us will remember how the doctor handwrote our details onto cards or files as the consultation was ongoing. At the end, we were handed a handwritten prescription that we possibly couldn't read but that our local pharmacist would interpret. For most of us today, this experience is but a memory – the GP practice of 2008 is a much more technologically-equipped establishment.

IT, GPs and Patients – From Paper to Real Time

According to research by the GPIT (General Practice Information Technology) Group in 2003, 83% of Irish GPs have a PC in their practice, while 88% have one in the consulting room. This is clear evidence of the embracing of modern IT by Irish general practice, recognising the positive impact that this can have for themselves, their patients and their staff – though, rather surprisingly, the GPIT survey found that 57% of patients are not in any way influenced in their choice of GP by whether the practice was computerised or not.

Most practices avail of the generic administrative applications of IT – using the PC for billing and accounting purposes and for scheduling appointments, for example. These applications are common to the majority of businesses in all sectors. However, the more advanced and astute GP sees further opportunity here.

Electronic Records

One of the most noteworthy and time saving uses is to maintain the patient's details in an Electronic Health Record (EHR). This replaces the traditional paper system, whereby details of the consultation, such as ailments, allergies, medications used and medications prescribed, are recorded in real-time as the GP and patient converse – 30% of patients surveyed by GPIT felt that the personal quality of the consultation was very much improved by the use of a computer. Benefits of this for the GP include increased efficiency and a reduction in filing errors, but this is only the tip of the iceberg.

EHRs and EBM: Injecting Efficiency into Healthcare

With the move to Primary Care Teams in Ireland, patients' records will (with the consent of patients) be shared amongst appropriate personnel, such as dieticians and physiotherapists, to provide the patient with an improved and all encompassing service.

Team members will be able to search the record in a more efficient and exacting manner, allowing them to focus in on their area of expertise and the issues of greatest concern. In time, there is the possibility of bringing this even further along by issuing patients with 'smart cards' that act as a portable health record – wherever they go, they will carry their essential details with them, which could prove particularly relevant if they are travelling internationally.

EHRs also allow GPs themselves to conduct their own clinical audits, to facilitate quality assurance. For example, the GP may wish to know what percentage of patients over 65 years of age have received their flu immunisation jabs and whether this is showing any specific trend, given the extensive media advertising taking place in Ireland about its importance. As primary care is seen as the 'gatekeeper' to a secondary care system that is under extreme pressure, any efforts at enhancing quality of service by the GP has considerable knock on benefits – in order to do this, reliable and accessible data is essential. This is particularly important in the context of chronic disease management, where the application of clinical protocols and Evidence Based Management (EBM) is facilitated by IT.

The UK Experience

In the UK, some practices are using the power of IT to action the electronic transmission of prescriptions. This facility has a benefit that is immediately apparent – eliminating fully the risk of misreading. The prescription is transmitted to the pharmacy as nominated by the patient or, if they have not selected one, is downloaded onto an ePrescription token, which has a barcode on it.

There is no doubt that the whole issue of repeat prescribing in general practice has been greatly enhanced by modern IT and communications technologies. The process is safer, more efficient and allows

for drug interactions and allergies to be more easily spotted, while also facilitating rational prescribing and the application of EBM.

Strengthening Links Between Primary and Secondary Care

Similarly, improved linkages with secondary care are facilitated through the use of IT. GPs who have availed of a 'Lab Links' facility, whereby they are able to download the results of blood tests directly from the laboratory, speak of the improved speed of response that this leads to – particularly when time-pressured interventions are required.

A further facility that could be considered is the electronic transmission of radiology results from the hospital to the practice. Indeed, practices themselves are seeing the merits of scanning documents into soft copy versions, which frees up more space in the practice building as well as providing a safer means of storage.

The Real Killer Application: The Internet

The massive knowledge base, which the Internet is today, may yet prove to be the real 'killer app' for GPs and their patients. For those who know how (and nearly 50% of Irish households in 2006 had Internet access), the web can provide the answers to a multitude of health related issues, from new products to new techniques. Many of the key health journals, such as the British Medical Journal, are available online, meaning that up to date information is a mere click away. However, the dark side of all of this is that the less informed user – in many cases, the patient – may be ill equipped to determine fact from fiction.

Jekyll and Hyde: The Internet's Other Face

One of the great features of the Internet is the fact that information is not controlled – this is also one of its worst failings, particularly when patients attempt to self-diagnose without knowing the full information or consequences of their actions.

The majority of GPs believe that their patients use this source before visits, though GPIT's research found that less than a third actually did. A possible solution to this problem is for GPs to produce lists of recommended or approved sites for patients, having already consulted the sites themselves – perhaps even putting links on their own websites.

Indeed, the increasing use of general practice based websites, focussing on service provision as well as relevant health information, is a real step forward in the development of patient partnership in healthcare. In the near future, it is hoped that these websites can become interactive in real time, allowing patients to not just make appointments, but to also access relevant results from their patient record.

Day-to-Day Challenges

There are other issues that GPs must also deal with in the use of IT.

Many of these are faced on a daily basis by all businesses – systems breaking down, security and data protection concerns, and the need for staff training would be some of these issues. In general, such questions can be resolved with external assistance that is readily available from trusted local suppliers.

The GP as an SME

However, another problem faced by Irish GPs is funding the ongoing computerisation of their practices. While their UK equivalent is, in most cases, a salaried employee of the NHS and receives capital funding for IT purposes from Primary Care Organisations (PCO's), Irish GPs receive very limited contributions from either the HSE (Health Service Executive) or Department of Health and Children in this regard, such as savings on drug budgeting.

Going forward, this could create a problem, particularly for the smaller and single-handed practices – the GP in Ireland is an SME operator and is subject to the same financial strains and stresses as so many others.

Spending on IT – Cost or Investment?

It is clear that the impact of IT on GP practices in Ireland has been mostly positive, certainly for those who have willingly embraced it. Ireland's health service is under considerable pressure and primary care is seen by many as the 'valve' that can ease this.

Thus, efficient, well-run and technologically astute practices are the order of the day. Certainly, there are some issues to be dealt with but these are mostly solvable. One area where help is needed is in the area of capital funding for practice improvement – those who control the purse strings need to view such spending as an investment for the future in a resource that can generate a much needed return on same, in both tangible and intangible terms.

Whether such forward thinking exists remains to be seen. As the old saying goes, a stitch in time saves nine!!

DEFINITIONS

GPs (and physicians in general) have hardly been early adopters of IT. Indeed, in the 1990s, while much attention was focused on making computers user friendly, several studies sought to find ways to make doctors more computer-friendly. Two of these had medically -suggestive titles:

- An Approach to Physician Computer Exposure [Springer-Verlag New York]
- Dissemination of Computer Skills Among Physicians: The Infectious Process Model [Springer Netherlands]

Little, however, comes close to a 1994 study by Emory University School of Medicine in the US, which sought to measure «changes in physicians' computer anxiety». This was a period before psychotropic drugs went around in search of new indications, or we might well have ended up seeing doctors prescribing themselves medication against Computer Anxiety Disorder.

THE HEALTHCARE SYSTEM IN IRELAND

In spite of some persistent concerns, Ireland's healthcare system has been bracing itself for meeting challenges in the years ahead. The country has a mixed public and private healthcare system. These have been subject to considerable reforms in the past two decades. Yet, there is considerable anecdotal and statistical evidence that healthcare delivery in Ireland lags behind the rest of Europe, and that structural reforms to provide better bang for the buck have achieved less than expected.

COUNTRY FOCUS: IRELAND

		YEAR
Population (million)	4.24	2006
Live births/female	14.8	2006
Deaths/1,000 pop.	7.8	2007
Life expectancy (years)	79.5	2005
GDP (billion CHF)	161.2	2005
Total healthcare expenditure (% GDP)	7.5%	2005
Total healthcare expenditure per capita (PPP USD)	2,926	2005
% of healthcare system financed by public funds	78%	2005
Number of hospitals (per 100,000 inhabitants)	NA	2007
Number of CT scanners (per million inhabitants)	10.7	2005
Number of MRIs (per million inhabitants)	10.3	2005
Number of acute care beds (per 1,000 inhabitants)	2.8	2005
Length of stay (average in days)	6.3	2006
Number of physicians (per 1,000 inhabitants)	2.8	2005
Number of nurses (per 1,000 inhabitants)	15.2	2006
Percentage of households with Internet access	48.7%	2006
Percentage of households with broadband access	13%	2006
Percentage of individuals using the Internet for interacting with public authorities	15.5%	2006

Source: OECD, Eurostat, WHO, Central Statistics Office ad Department of Health and Children (Ireland).

Mixed System Seeks to Protect Lower Income Groups

At present, a range of health services (emergency services, maternity care and out-patient treatment) are provided free of charge at public hospitals to all residents in Ireland, while long-term prescription drug treatment is also subsidised (for payments over a monthly threshold). However, hospital stays incur a daily accommodation charge, and GP services too are billed.

Lower-income groups (known as Category 1 patients) are provided a medical card, which entitles them to free healthcare for all procedures – medical/hospital and pharmaceutical, as well as ophthalmology and dental services.

Private Sector Relief for Others

Ireland also has numerous private health clinics, and a rising number of residents have begun subscribing to private health insurance. This is largely due to lengthy waiting lists for a variety of treatments at public facilities, for extras such as single room accommodation, and to bring out-of-pocket spending under affordable and predictable ceilings.

The roots of Ireland's private insurance system date back to the VHI (Voluntary Health Insurance) Act in the late 1950s, which set up a non-profit body called the VHI Board. The users of VHI consisted of the highest 15% income group, which was at the time not entitled to public healthcare paid for by the State. VHI's monopoly was broken in 1996 by the entry into Ireland in 1996 by BUPA. These insurance schemes now compete head-to-head and, more recently VIVAS Health. Their entry has increased the sophistication and range of choice available for private insurance subscribers.

Overall, about half the Irish population has some form of private insurance coverage. This is one of the highest rates in the European Union.

Healthcare Financing Reforms Date to the Late 1970s

On its part, the public funding of the Irish healthcare system was reformed dramatically in 1977, when local districts ceded powers of taxation for public health services to the central government in Dublin. In some senses, such a step – barely a few years after the country joined what was then the European Communities – paved the way for more fundamental and profound reforms in healthcare financing and delivery. In 2001, Ireland launched its Health Strategy, as a ten-year plan to meet emerging healthcare challenges. The Strategy identified four goals: Better health for everyone, Fair access, Responsive and appropriate care delivery, and High performance.

Persisting Challenges

Some such challenges persist, and do so worryingly. Though Ireland's breast cancer incidence is among Europe's lowest, the death rate in 2001 from the disease was the highest in Western Europe. Yet another area of concern is cardiovascular disease, whose incidence is far higher than the rest of Europe. In 1997, cardio-

vascular treatment accounted for as much as 17% of national spending on medicines and medical appliances, just under 20% of all prescriptions. In spite of some reversals, there is still very much to be done.

In 2004, per capita deaths from cardiovascular diseases in Ireland were over twice that in Germany and 70% higher than in Spain.

Waiting lists for medical treatment, too, have long been a key structural problem and a deep source of concern for the Irish public and its healthcare authorities. In a 1997 survey, it was found that the hospital waiting list numbered over 30,000, with 68% of people waiting for 12 or more months for cardiac surgery and 48% for orthopaedic surgery; in addition, one of five cardiac patients died while awaiting surgery.

These numbers have improved significantly in the years since. One of the main reasons has been an incentive case-mix/quality program, by virtue of which allocation of finances to hospitals was determined by their performance, including a decrease in waiting lists. This system is similar in several respects to that being implemented in France (discussed in the previous issue of *Healthcare IT Management*).

Indeed, in 2007, the Health Consumer Powerhouse Euro Health Consumer Index (EHCI) ranked Ireland's public health system 16th of 29 European countries - a massive rise on its performance the previous year (at the bottom of 26 European countries. However, there is still some way to go. In 2007, three of four in-patients were admitted to hospital immediately, 11% had to wait up to one month, 4% for three months, 1% up to six months. 4% had to wait for over six months for operations. For outpatients, 23% were seen on time, 44% in 30 minutes, 18% after an hour and 7% for two or more hours.

Healthcare Spending Rises Sharply, Overtakes UK

In the meanwhile, Ireland has seen one of Europe's sharpest increase in healthcare spending. Between 1990 and 2005, OECD figures show per capita spending on healthcare rising 3.7 times – far higher than that of the United Kingdom (2.8 times), or continental counterparts from a variety of healthcare traditions, such as Belgium (multiple of 2.5), France (2.3), or even Spain (up 2.6 fold). Indeed, in purchasing power parity dollars, Ireland spends more on healthcare per inhabitant than the UK (in 2005, 2,926 dollars against 2,724 dollars), and is not far behind France (3,374 dollars) and Germany (3,287 dollars).

Reforms at the Bottom: The Role of the GP

Given such financial pressures, the government's focus has shifted to enhancing the quality and efficiency of primary care, especially at the general practitioner (GP) level. This is in line with the general Europe-wide move to emphasise preventive care and avoid adding to further burdens on over-extended and expensive hospital-based interventions - especially given the demographic pressures from an ageing population. Indeed, across Europe, GP utilisation rates closely correlate to specific national healthcare cultures and trends towards reform.

Against such a backdrop, the distinctive feature of Ireland's healthcare system is the pricing of GP services. For lower-income patients with medical card cover, GP visits are free. For others, GP consultations are paid out-of-pocket on a fee per service basis. This cost is not reimbursed, even when patients have health insurance). GPs, in turn, are free to set their fees and cover both cardholders and others. The situation therefore contrasts in a major way with other EU countries, where primary care is either free or massively subsidised, for the entire population. GP visits in Ireland are about 3.5 per person per annum, approximately at the EU median, but slightly higher than the United Kingdom. Some experts indicate that GP use in Ireland is especially high at the level of lower-income groups, precisely those eligible for free consultation.

Given the political sensitivities of such an issue, it remains to be seen how exactly the government manages to rationalise access to GPs. Critics already point out that the share of Category 1 card holders in the population has fallen significantly, from 35% in 1996 to 28% in 2005.

Symbiosis or Dependency: Private and Public Healthcare

A related challenge is the role of the private insurance component in healthcare delivery. Physicians have the right to treat privately-insured patients in public hospitals, which in fact account for about half of total 'private' hospital care. Insurers reimburse both the physician and the hospital (although so far this has been principally for the residency rather than the treatment portion of the care).

Complicating matters further is the fact that physicians provide services for Category 1 patients in public hospitals as part of their salary, but treat private patients on a fee-for-service basis.

From Past to Future

To bring the Irish healthcare system up to speed, experts believe far more remains to be done. The government has made some moves in its new National Development Plan (NDP) for 2007-2013.

The previous NDP 2000-2006 had outlays of approximately 3.3 billion Euros for new or upgraded healthcare services. Included were over 1,300 inpatient and day treatment places, alongside a variety of capital projects in both acute and non-acute hospitals, additional spending for the aged and people with disabilities, and the development of 13 nurse-training centres.

Healthcare and the National Development Plan 2007-2013

Health Infrastructure:
4.7 billion Euros. 2.7 billion Euros will be spent on acute care hospitals, including the new National Children's Hospital in Dublin. Another aspect is the location of private hospital facilities on public hospital sites to free up to 1,000 additional public beds.
The rest will be earmarked for primary community and continuing care facilities, including establishing 500 primary care teams by 2011 and extending community care services to enable older people to live independently in their own homes for longer periods.

Health Research:
301 million Euros, part of a 6.1 billion Euro commitment to Enterprise, Science and Innovation.

IT and e-Health:
490 million Euros (see next article).

Explicit healthcare projects also play a (small) role in Island Investment and Social Inclusion projects.

IT AND THE IRISH HEALTHCARE SYSTEM

HEALTHCARE IT MANAGEMENT
ANALYSIS

Information technology has a major role in terms of meeting the objectives of Ireland's 10-year Health Strategy 2001 Plan. The Plan consists of three pillars: Setting the Scene, Improving the System, and Implementing Change. Explicit IT-related elements are concentrated in the second, on determining ways and means to improve the healthcare system. The Plan was buttressed in 2003 by a National Health Information Strategy, which paid specific attention to issues such as mobile communications, electronic patient records and information sharing, and a secure nationwide health communications infrastructure.

Independent Health Information and Quality Authority

To deliver high-quality services, based on evidence-supported best practice, the Health Information and Quality Authority will be set up as an autonomous, statutory body. It will ensure that healthcare services meet nationally agreed standards (at both clinical and managerial levels) and determine whether best possible outcomes are attained within the resources available. The Authority, which will provide regular reviews and reports, has a sweeping mandate. It will:

- Develop health information systems in line with the forthcoming National Health Information Strategy.
  The Authority will be provided with top-level responsibility for standards, as well as best-practice and other guidelines - on information access, security and privacy, and patient safety; the latter includes liaison with the proposed Irish Clinical Negligence Claims Agency on risk management. On its part, the government has committed to introduce new legislation to enable attainment of such objectives
- Promote and implement structured programmes of quality assurance
- Promote education, training and skills development for information staff
- Promote and co-ordinate national research and development on e-Health
- Develop a national e-library to guide decision-making
- Oversee accreditation and development of formal health technology assessment (HTA) programmes. In 2001, a Value for Money Audit revealed that Ireland lacks a coherent structure for carrying out evidence-based HTA, resulting in a slow response to changes in health technology
- Ensure effective procurement of health information technology. This will include working closely with the forthcoming Hospitals Accreditation Body.

National Health Information Strategy 2003

Inadequate information was cited by the 2001 Value for Money Audit as a critical weakness which limits prioritisation, planning, evidence-based decision-making, efficient service delivery, and the monitoring and evaluation of healthcare at all levels of the system. In turn, this impacts negatively on healthcare delivery.
The government strongly believes such a challenge can be faced by leveraging

global developments in IT and communications technology, which provide the foundations for comprehensive and efficient flows of high-quality shared information. Its Strategy paper is emphatic: «Information plays a central role in supporting strategic goals and in underpinning the principles of the Health Strategy. It must not be seen merely as an add-on.»

One specific goal of the Strategy is to develop and maintain a national health information database inventory. Ireland, like other EU Member States, also plans to synergise IT infrastructure for eGovernment as a critical enabler of e-Health, and increased responsiveness by the healthcare system. Once again, in parallel with developments elsewhere in Europe, there are several initiatives to provide and improve public access to health information, above all via a national health information Portal (which will provide data on health and medical/surgical care as well as the availability of local health services and entitlements).

Modern IT systems can also provide rapid access to clinical and administrative records as well as a range of knowledge to assist with decision-making and evaluation of best practices. On its part, the government intends to pay specific attention to pilots and early-stage implementation projects under way. Ireland's Healthlink messaging project, for example, provides laboratory results, radiology results, discharge summary, A&E attendance notification, waiting list updates and outpatient appointment information. It is already being used by 6 hospitals and another 14 are preparing to join.

Mobile Communications

One specific area earmarked for attention consists of mobile communication technologies, especially for new anytime, anywhere specialist e-Health service delivery models. In addition, the government also hopes to use IT for making an «evaluation of the real service impact of investment decisions.»

Phased Introduction of Electronic Patient Records and Information Sharing

The introduction of electronic patient records (EPR) is to be achieved in a phased manner, given that it is a developing technology. The EPR, in turn, offers considerable support for the clinical process and quality of care; their eventual interconnection into an electronic health record (EHR) will provide further benefits.

In Ireland, the government has proposed an extension of the personal public services number (PPSN) (which covers all public services) to e-Health systems.

National Secure Health Communications Infrastructure

The government is aware of the need for a robust and secure communications network for the effective sharing of health information. While individual agencies and organisations have developed networks on a local or regional basis, experts are now considering a government network for healthcare services.

The REACH project is a cross-departmental project set up to deliver specific eGovernment services in Ireland. It is managed by a Board drawn from the Departments of Health, Environment and Local Government, Justice, Social and Family Affairs, Agriculture as well as the Revenue Commission.

REACH's mission is to develop and operate services collectively known as the Public Services Broker (PSB). In essence, the PSB is based on a Services Oriented Architecture (SOA) approach, with a flexibly-coupled messaging hub based on XML messaging.

One specific area of attention (especially in terms of the vast bandwidth requirements for secure video and imaging transfer in e-Health) is scalability; this is under study by REACH.

Making Good with Investments

The Irish government acknowledges that considerable development of the IT infrastructure will be required to support improvements in the availability and quality of health information as well as the operational delivery of health services.

However, it also admits that healthcare IT funding has fallen short of its counterparts in other industry sectors. It has therefore committed to a "sustained programme of investment in the development of national health information systems," in line with the National Health Information Strategy.

In summer 2007, the government put hard money behind its healthcare modernisation plans by announcing a half billion Euro investment in e-Health, covering a period of 7 years.

Spending will be focused on patient-care systems, with a particular emphasis on supporting community-based health professionals in the areas of chronic disease management, emergency medicine, medication management and health surveillance.

Further investments are planned in e-Health supporting services such as radiology and hospital laboratory systems. Overall, outlays on healthcare in the 2007-2013 period are specified in the pre-vious article.

KEY PRIORITIES OF HEALTHCARE STRATEGY 2001

- Action 48: A national standardised approach to measurement of patient satisfaction will be introduced
- Action 49: Best practice models of customer care including a statutory system of complaint handling will be introduced
- Action 52: Provision will be made for the participation of the community in decisions about the delivery of health and personal socials services
- Action 84: The organisation and management of services will be enhanced to the greatest benefit of patients
- Action 85: The operation of outpatient departments will be improved
- Action 86: A substantial programme of improvements in accident and emergency departments will be introduced.

Treating the health sector's IT ailments

The debate over how healthcare can best be provided is one in which we all have a vested interest. Improving healthcare IT infrastructures will bring real benefits for both patients and medical professionals, says Charles Scatchard of Oracle, who explains how modern trends are affecting the roles of medical establishments.

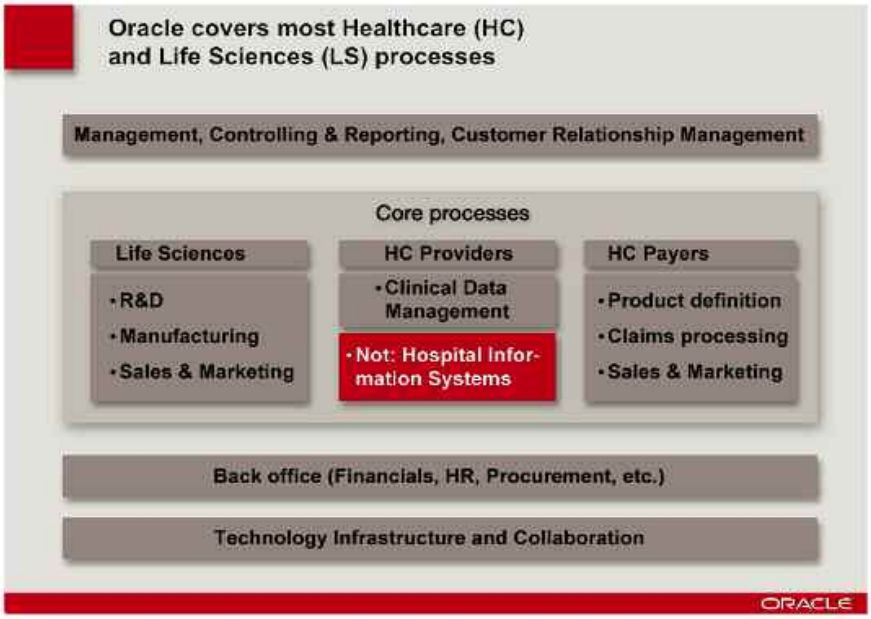
The effectiveness of healthcare provision has long been one of the key measures by which societies have judged their governments. Improving the efficiency, effectiveness and reliability of healthcare is always near the top of the political agenda, particularly so in the modern context where the twin pressures of an ageing population and our increasingly sedentary lifestyles are combining to make it even more of a priority. "Governments increasingly see the provision of healthcare service to the community, including disease prevention and disease surveillance, as being very high on the political agenda," says Charles Scatchard, Vice-President of Healthcare for Oracle's Europe, Middle East and Africa (EMEA) division. The world's biggest enterprise software company, Oracle is committed to building on its already well-established presence in the European Healthcare IT sector. "Oracle has 138 offices in 58 countries in the EMEA region," continues Scatchard. "We want to be recognised as the leading provider of back-office applications, particularly in the shared services environment. We also aim to be the leading provider of healthcare life sciences platform and infrastructure software."

The pursuit of such ambitious objectives demands that the company respond directly to the needs of the medical professionals themselves if they are to be successful. For his part, Scatchard says this was uppermost in the company's mind during the development stage. "Clinicians are very exacting people.

They are very proud people and they work in a proud profession. They have established protocols and they have their own culture and psychology," he acknowledges. "When you're introducing change into a clinical environment then change management – and winning the hearts and minds – is crucially important. You could introduce the best system in the world but if you don't get clinical leadership involvement at every stage of the process then it will almost certainly fail, regardless of it merits."

Of course, demonstrating that a new approach brings tangible improvements over the existing situation can also help accelerate adoption of innovative technologies. In Oracle's case they were able to bring real improvements in the recording of patients medical data, an area in which Scatchard says the traditional, paper-based systems are severely limited. "Information is locked in that paper and it can only be seen by people who view that paper physically, while there is also a transportation issue," he points out.

"By contrast, if you have an electronic medical record then you have the information in a useable form and it can be viewed by people in a range of different positions associated with that patient, not to mention that it can be viewed simultaneously in multiple remote locations. It can also form the basis of a more novel, innovative way of presenting information. For instance, drawing information from different systems and presenting it in a view of the patient from the point of view of different lab tests, clinical encounter records, diagnosis referrals and so on. So it's analogous to any information management service. When information is managed correctly in a computerised form there are far more possibilities for its effective use than if it is in a paper form."



When you're introducing change into a clinical environment then change management is crucially important. You could introduce the best system in the world, but if you don't get clinical leadership involvement at every stage of the process then it will almost certainly fail, regardless of its merits

Changing habits

Such an approach towards information management reflects the changing attitudes of both the public and administrators towards healthcare, along with the wider debate about how best it can be provided. Although many still view healthcare as a service, the underlying philosophy is subtly shifting. The enterprises that have been formed to deliver healthcare services are growing bigger and bigger because of the consolidation of regional and national government activity around healthcare and social services," explains Scatchard. "Because they are bigger and bigger they can seek more economies of scale, and also effect better integration between primary, secondary and tertiary care so that resources can be deployed in a different manner. Evidence suggests that the closer to home you can treat a patient and the earlier the intervention can occur the more cost-effective and successful it's going to be from the point of view of treatment."

The effectiveness of this kind of approach is greatly enhanced if the condition itself is diagnosed at an early stage of its development. This, combined with growing cost pressures within the healthcare sector, points towards an increased role for the patient in managing their own health. "Early diagnosis is crucial," agrees Scatchard. "Similarly it will be important to involve the patient in their own healthcare regime. This means compliance with prescribed drug regimes and the avoidance of acute care episodes. People must take responsibility for two things: their own healthcare, and the actual provision of healthcare when they need it. Prior to that it is important that people take more responsibility in the way the shape their own lifestyles. What healthcare organisations are trying to do is give incentives so that if you are part of an exercise programme or a smoking cessation programme then it affects the way the reimbursement is managed and payments are made."

All of which has major implications for hospitals and the part they will play in healthcare in the future. "The role of hospitals will have to change," says Scatchard. "The very nature of chronic diseases means that it isn't always possible to satisfy the demand for their treatment in a traditional hospital setting. Indeed, it is now possible to closely monitor these diseases in the home. We need to devolve healthcare more into the home-based, or clinic-based setting. In any case this represents a lower overall cost per unit. Even in the most highly esteemed medical centres in the US you just will not be able to satisfy the demand for outpatient clinics in the future in areas like diabetes, mental health and asthma, in the traditional way of people going to a hospital when they think they're sick. You've got to intervene and prevent sickness, more and more people are living longer and longer with a greater collection of chronic disease states which need to be monitored very closely. That includes taking drugs at the right time, keeping your weight down, monitoring your diet so that metabolism is maintained in a controlled state because the fastest growing diseases are some of the most expensive – like diabetes type 2."

Faced by such challenges it is clear that the sharing of experience and best practice between nations can bring real improvements. For his part, Scatchard believes private companies have an important role to play in this process. "One of the factors accelerating the sharing of best practice is the fact that there are an increasing number of international companies associated with the sale, systems and services involved in their projects from one country to another," he says. "The evolution of the healthcare IT industry has meant countries are much more willing to listen to what other nations are doing. It's no longer seen as a cottage industry, while academic medical contacts between countries are also increasingly being used. The EU is taking an ever keener interest in the proliferation of best practice, so the sharing of information, best practice and experience between countries has grown exponentially."

With these kinds of conditions stimulating rapid development and a number of countries showing a great willingness to invest significant funds, these are exciting times in the healthcare IT industry. Research is ongoing, and the coming years will see significant changes in the field. "The use of telemedicine, which includes home monitoring of diseases and the participation of the patient electronically in the disease monitoring and treatment, is increasing. Similarly, the quality of business intelligence associated with the provision of healthcare is improving disease surveillance and enhancing the electronic provenance of drugs – from manufacture right through to treatment," says Scatchard. "This is important because there are a tremendous amount of counterfeit drugs out there. Clinical trials management is increasingly being undertaken on an electronic basis and the recruitment of investigative physicians into clinical trials management is getting more efficient."

Charles V Scatchard

joined Oracle in September 2002 as Vice President, Healthcare, Oracle Europe, Middle East and Africa (EMEA). He is responsible for the Healthcare & Life Sciences Sector in Oracle in EMEA – including all strategy, SI and ISV relationships, the HTB programme, marketing and sales programmes and operations, and the entirety of the revenue plan for the EMEA sector. During his leadership the H & LS Sector in EMEA has quadrupled in size to embody the best in best practice and has become the fastest growing sector within Oracle's EMEA business.

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IRELAND UPS THE ANTE ON IT FOR THE ELDERLY

AUTHOR
Catalina Ciolan,
HITM

Ireland's commitment to the elderly is reflected by its Minister for Older People, Ms Máire Hoctor, an ambitious young representative for the Fianna Fáil party from the constituency of Tipperary North. Ireland has more than 1 million people aged over 60, and like the rest of Europe, their share is increasing.

Since her appointment as a Minister last year, Ms. Hoctor has been instrumental in driving elderly issues to the top of Ireland's political agenda.

One promising initiative is CARDI, a new non-profit organisation, developed by leading researchers in the area of ageing. The second is TRIL, the Technology Research for Independent Living Centre at St James's Hospital in Dublin.

The CARDI Centre for Ageing

CARDI (The Centre for Ageing Research in Ireland) was launched in March as an umbrella organisation to ensure the proactive and interdisciplinary coordination of research into specific problems faced by the elderly in Ireland. CARDI is hosted by the Institute of Public Health and supported by Atlantic Philanthropies. During the launch, Ms. Hoctor pointed out an all-too common issue – that "all too often the figures and statistics surrounding older people are used in relation to issues such as care, illness and talk around the 'burden' of an ageing population", rather than their "enormous contribution" in a variety of areas – including "politics, literature, music, amateur drama, voluntary work, community development and family life."

CARDI not only aims to induce more effective collaboration between researchers on ageing but also promote the dissemination of age-related research and introduce into the agenda of policy makers. CARDI also makes clear that such an agenda will be relevant to real-world practices.

TRIL: Technology and Independent Living

CARDI was launched less than a month after the opening by Ms. Hoctor of the TRIL (Technology Research for Independent Living) Centre at St James's Hospital in Dublin, an initiative supported by Ireland's Industrial Development Agency.

Based on a Common Technology Platform (see box), TRIL aims to discover and deploy solutions to support autonomy in the elderly. It combines clinical knowledge with cutting-edge IT to conduct research into the physical, psychological and social consequences of ageing.

Areas already identified by the TRIL Clinic as priorities include investigations into cognitive decline and dementia. TRIL also intends to explore how technology can encourage social interaction among older people who often end up lonely, depressed and isolated.

One explicit goal is to show that connecting people with the community and their friends and families, using the latest IT and communications technologies, can improve their quality of life.

One facet of the TRIL effort is to obtain inputs from caregivers who directly interact with older people in their own environments – so as to provide 'real world' input into the design and implementation of new technologies.

As assessed by a by a Swedish expert in this issue of Healthcare IT Management ('Elderly Health, Homecare And Information Technology'), such an approach is often a missing ingredient in otherwise-ambitious initiatives to find IT solutions targeted at the elderly.

Indeed, TRIL is already considered to be one of the largest such efforts of its kind. Other than St. James' Hospital, other participants include three leading Irish academic centres: Trinity College Dublin, University College Dublin and the National University of Ireland at Galway, as well as Intel.

TECHNOLOGY@TRIL

In spite of a diversity of research projects, the TRIL Centre is developing a Common Technology Platform directed at the real-life needs of the elderly, now and as they (are perceived to) evolve in the future. The platform consists of software and hardware for devices such as home sensors, - mobile physiological status monitors, communication assistants. It is designed as an open architecture, and will provide the core technologies and operational elements for all activities by the TRIL Centre, allowing researchers to focus on domain issues rather than tackling redundant core technologies for demonstrations and experiments.

The development of the Common Technology Platform is two-phased:

- **First Phase**
  This will involve creation of rapid prototypes for TRIL Centre research themes which enhance the delivery of data collection and aggregation systems.

- **Second Phase**
  In parallel with the implementation of the first phase rapid prototypes, researchers will gather essential parameters from tests on different themes, so as to create the specifications and requirements for a re-usable open architecture system. This will collect, collate, and correlate user data from a portfolio of building blocks and components, which will in turn serve as the foundation for a common sensor, computing and communications platform.

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www.telemed-berlin.de

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www.cars-int.org

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www.world-academy-of-science.org/
worldcomp08/ws/conferences/swws08

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www.waset.org/mhst08

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in Healthcare
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www.each-conference.com

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08 - 09 September 2008
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www.electronic-health.org

October

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06 – 07 October 2008
Nice, France
www.internet2008.eu

HIT@HEALTHCARE, HEALTH INFORMATION TECHNOLOGY ONFERENCE & EXHIBITION
08 – 10 October 2008
Brussels, Belgium
www.bmia.be

ISQUA 2008
19 – 22 October 2008
Copenhagen, Denmark
www.isqua.org.au/isquaPages/
copenhagen08.html

ADVANCES IN EHEALTH AND TELEMEDICINE INTERNATIONAL
23 – 26 October 2008
Warsaw, Poland
www.aehti.eu

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04 - 06 November 2008
Copenhagen, Denmark
www.worldofhealthit.org

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19 - 22 November 2008
Düsseldorf, Germany
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Lyon, France
www.ec.europa.eu/
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