HEALTHCARE IT MANAGEMENT

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THE OFFICIAL JOURNAL OF THE EUROPEAN ASSOCIATION OF HEALTHCARE IT MANAGERS

MIS Dashboards

Real-time Location Systems

PROMILE: Take a Deep Breath!

EHR Interoperability

PCC: Radiotherapy Treatment Planning Systems

Country Focus: Central Europe

Volume 3 / Issue 4 / 2008

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Dear Reader,

Across the IT world, the debate about the pros and cons of the so-called twin pillars of enterprise software, JEE and .Net, has raged since the beginning of their existence. Such a question has not left the healthcare space untouched. Experts from Finland, however, make a compelling case in this issue's cover story about the growing irrelevancies of such deliberations as far as building new healthcare-specific IT services are concerned. The JEE versus .Net question has been fuelled to no small extent by big-ticket projects to modernize hospital IT infrastructures, and such a debate has many facets.

Modern hospitals are not only becoming increasingly corporatised, but are seeing no let up in pressures for efficiency and quality assurance, in order to give patients the best medical care, do so quickly and at the least possible cost. One effect of this has been an explosion in requirements for sophisticated but highly-structured management information. A specialist in predictive technologies in healthcare management provides us a whistletop tour on issues related to hospital management 'dashboards' – their strengths, weaknesses and what to consider before buying or building such an application.

Meanwhile, the above developments in the economic and operational environment have also been accompanied by a relentless pace of technological change. Real-time location systems (RTLS) are now fast becoming an area of major attention – to provide enhancements to operational efficiency. Though much attention has so far been given to radio frequency identification (RFID) systems, new alternatives are emerging. Some of these, our feature in this issue shows, have been explicitly designed with hospitals in mind.

Healthcare IT is, of course, not wholly a creature of the hospital environment. Indeed, a long-running emphasis on technology and preventive health has led to several imaginative deployments of IT – from sophisticated public health portals to computer-assisted dietary management, weight control and anti-smoking programmes. The Promile mobile telephony system in the Czech Republic provides a good example of such an angle on healthcare.

Another challenge is that of healthcare IT staffing. Consultants from Tribal Group position this question in the context of the major overhaul of healthcare IT systems now underway, such as that in Britain's National Health Service.

We have long argued that less attention by healthcare policy makers to Big New Things may be in the best interests of everybody – hospital and IT manager, patient and taxpayer. This issue of Healthcare IT Management provides the second and final part of an overview at EU healthcare R&D projects in the completed 6th Framework Programme. Not a few of the small projects have yielded results in inverse proportion to their scale, and we strongly wish that the follow-on 7th Framework Programme (FP-7) continues to encourage this.

What cannot however be ignored is the relatively dismal record of some megaprojects. Ironically, one such project – to make a comprehensive assessment of interoperability in electronic health records and e-Health systems across Europe – delivered what it promised. And yet, it has been (puzzlingly) overlooked by the European Commission in its July 2008 Commission Recommendation – on cross-border interoperability of EHR systems, which again seeks a similar exercise.

Our Country Focus is on eastern Europe. These are lands where change is heavy in the air. As reforms gather pace, there are however many questions about cost-benefits, trades-off and timelines to catch up and converge with the EU. What is the status of healthcare IT and e-Health in these countries ? We provide an overview.

Yours truly,

Christian Marolt

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of the European Association of Healthcare IT Managers

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FROM 'JEE VS .NET' TO DOMAIN FRAMEWORKS

JEE and .NET are the two major frameworks competing in the enterprise software development space, with a long-running debate on their pros and cons. This article sheds some light on whether there is more here on offer than a 'choice' between the two in relation to the needs set by the healthcare industry.

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COUNTRY FOCUS: CENTRAL EUROPE

After an initial phase of deterioration in the mid- to late-1990s, healthcare systems in central Europe (Czech Republic, Hungary, Poland and Slovenia) have begun approaching mainstream EU standards. A key driver has been an enhancement in the priority given to healthcare, healthcare IT and e-Health by both national governments and the EU.

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**

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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

FRANCE-SWITZERLAND
Fondation Franco-Suisse pour la Recherche et la Technologie

POLAND
Polish Telemedicine Society

FDR Velocity U-fp

FDR Velocity Unity

FDR Velocity Unity with table

FCR GO

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

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

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

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

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

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

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

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AGFA HEALTHCARE

AGFA HEALTHCARE TO INSTALL ORBIS IN 37 FRENCH HOSPITALS

Agfa HealthCare has obtained a contract to install its ORBIS solution at 37 hospitals in France, belonging to the Assistance Publique - Hôpitaux de Paris (AP-HP) group. The project (with a total values of 95 million Euros) is seen as an especially ambitious deployment of a healthcare IT solution in Europe, given that AP-HP admits more than one million hospitalised patients/year along with another 5 million outpatients. Using its patient-centered workflow, ORBIS facilitates the administrative tasks of medical teams and nursing staff. With ORBIS, Agfa HealthCare offers users the possibility of having an integrated Electronic Patient Record that covers all the needs of the institutions for clinical information management, management of prescriptions, scheduling and medical documentation. To bring this latest project to a successful conclusion, Agfa HealthCare will manage a consortium of three other companies: Cap Gemini, HP and Oracle.

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

CARESTREAM HEALTH

NEW RIS MODULE TO ENABLES GPS TO DIRECTLY BOOK PATIENT X-RAY EXAMS

Carestream Health and the San Salvatore Hospital in the Province of L'Aquila in the Abruzzo Region of Italy, are developing a module for a CARESTREAM Radiology Information System (RIS). This will allow General Practitioners within the region to directly book digital X-ray examinations for their patients and receive the results back on their PC. The first project of its kind in Italy, a pilot study is currently underway involving 60 GPs with plans to have the system fully operational with 90 doctors by the middle of 2009.

The RIS module is developed to enable each patient to be paired with the referring physician and provide the hospital with relevant data about all examination requests.

For more information, please visit: **www.carestreamhealth.com**

GE HEALTHCARE

GE HEALTHCARE TO BOOST $500M IN HOME MONITORING MARKET

GE Healthcare has entered into a technology and distribution agreement with New York-based Living Independently Group, Inc., which provides telecare and monitoring systems for seniors. GE Healthcare will distribute and co-market Living Independently's QuietCare products globally. As part of the agreement, the companies will use GE's Global Research Center and its advanced work in clinical parameters and monitoring algorithms to drive innovation in the field of remote patient monitoring and diagnostics. "This is consistent with GE's strategy to invest in high growth businesses with global potential," said Omar Ishrak, president and CEO of GE Healthcare's Clinical Systems business. "Demographic changes such as the growing aging population present enormous healthcare challenges in the care of seniors and the management of chronic disease. The technologies developed by Living Independently are ideally placed to help meet these challenges."

For more information, please visit: **www.gehealthcare.com**

Microsoft

MICROSOFT TO CHOOSE PHILIPS SPEECH TOOL FOR HIS, RIS/PACS

Microsoft has tapped Royal Philips Electronics' SpeechMagic solution as the preferred technology for the Amalga hospital information system and RIS/PACS. The global licensing agreement between the two companies will bring industrial grade speech recogniton to the Amalga enterprise healthcare tools. Microsoft's Amalga HIS is built around an electronic health record and includes patient and bed management in addition to a radiology information system (RIS)and picture archiving and communication system (PACS). According to both vendors, the integration of the two systems will begin immediately, ensuring seamless information sharing across Healthcare enterprises.

For more information, please visit: **www.microsoft.com**

PICIS

PICIS TO INTRODUCE EVIEW ENHANCED CARESUITE PRODUCT

Picis has introduced its eView for Critical Care Manager, part of the newly launched version 8.2 of the company's CareSuite product range. The eView release is designed to consolidate clinically relevant data gathered during the patient's ICU experience into a Web-based view, accessible to clinicians anywhere. This permits clinicians to quickly and easily identify which patients need immediate attention, while they are also getting a complete view of the overall ICU department status, from which they can drill down to specific patients.

Picis officials point out that this latest version gives them new capabilities that really strengthen and set a new benchmark for the automating of documentation.

For more information, please visit: **www.picis.com**


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LITHUANIA

The project "eHealth services" introduced to the Lithuanian medical community

The leaders of the project "eHealth services" organised five topical meetings with physicians and employees of healthcare institutions in the three largest cities of Lithuania. Key strategies and plans for creating the united national eHealth system as well as the aspects and benefits of hospital information systems being installed in healthcare institutions in Vilnius, Kaunas and Klaipeda were presented to more than 200 representatives of the medical community. The last dissemination seminar took place in the last week of August in Vilnius.

The executive manager of the project "eHealth services" Evaldas Dobravolskas emphasized that the primary aim of the project is to start installing the information systems corresponding to all international standards in Lithuanian healthcare institutions, and that successful implementation of this project will significantly contribute to the creation of the National eHealth system.

For more information, please visit: **http://esp.sam.lt**

THE NETHERLANDS

Progress with the Dutch Electronic Patient Record (EPR)

Data shows that so far sixty five doctors have been connected to the EPR infrastructure while by the end of the year, this number is expected to increase to 200.
The EPR in the Netherlands is a virtual EPR in the sense that the medical data will remain physically where it originates: it is not stored on a central server. This implies that the IT systems of the doctors involved have to be brought online in a way that makes EPR-relevant data accessible 24/7.

An additional investment of 45 million Euros will be needed to set up the first two modules of the Dutch national EPR; an electronic medication record and a record that is called "deputy GP record." Doctors who want to access EPR-data have to authenticate themselves using an electronic health professional card. Every access will be logged, so that patients will be able to reconstruct which doctors have accessed their data and when. Patients do not need a smartcard or even a PIN; they are identified via a citizen service number.
However, working with the Dutch EPR will be mandatory for all doctors and pharmacists, but voluntary for citizens. In this case, if a citizen decides not to use the national EPR, s/he can actively opt out.

For more information, please visit: **http://www.minvws.nl/en/**

NORWAY

Wireless system for personalised health care

The research project MyHealthStation was started in 2005 to develop personalised health care for patients with chronic illnesses. Originally it was built as a stationary solution, where patients with chronic obstructive pulmonary disease (COPD) could watch training videos, monitor oxygen levels, maintain a personal health diary and keep in contact with physiotherapists, trained nurses and doctors to stay fitter.
In the follow-up project MyHealthService, researchers at Norut and TTL have added mobility to the solution. Health data can now be collected by wireless sensors, read on-the-go by ultra-mobile computers, and synchronised with the home base through the Internet.

For more information, please visit: **http://www.telemed.no/**

UKRAINE

2nd International Conference "Telemedicine: Myths and Reality"

The Association for Ukrainian Telemedicine and eHealth Development and the Western Ukrainian Telemedicine Center «Meditech» are organising the 2nd International Conference "Telemedicine: Myths and Reality" in Lviv on 23-24 October 2008. Conference discussion topics include:

- Clinical telemedicine (teleradiology, teletraumatology, telepediatrics, teledermatology, telepsychiatry, emergency telemedicine etc.)
- eHealth
- Home and mobile telemedicine, telemonitoring
- Hospital information systems and telemedicine networks
- Medical electronic records, medical information safety
- Technical and software solutions for telemedicine and eHealth
- Informatization of Health Care
- IT-management in Health Care and pharmacy etc.

An exhibition of technical equipment and software for telemedicine and eHealth will be held during the conference while the conference materials will be published in Ukrainian Journal of Telemedicine and Medical Telematics.

For more information, please visit: **http://www.telemed.net.ua**

4-6 NOVEMBER, 2008

THE WORLD OF HEALTH IT

Based on the repeated success in the past two years, the 2008 World of Health IT Conference & Exhibition continues to address the perspectives of clinicians, directors and other healthcare professionals, by offering

- Educational sessions
- Vendor exhibitions
- Best practice exchange
- IHE Interoperability Showcase
- Networking sessions
- Continuing Medical Education (CME) credits

Designed for and by the healthcare IT community in the European region WoHIT08 will focus on shaping and developing the use, implementation, and evolution of this pillar of the new European marketplace.

Furthermore, prominent representatives from major public and private sector organisations will offer perspectives on emerging trends in the e-Health, while the multi-track educational programme will not only highlight current and future challenges facing the healthcare IT community in relation to efficiency and deployed services but also stimulate engaging debate around the most important topics in today's healthcare IT community.

At WoHIT08, the European Association of Healthcare IT Managers (HITM) is holding its 1st General Assembly on the 5th of November in Room 19 of the Bella Center from 18.00h.

With this occasion, the HITM will elect its Governing Board. We invite you to read the HITM Announcement on pages 12-13, for more details regarding the event.

CALL FOR 'UNIVERSAL' BROADBAND

Access to broadband Internet is a cornerstone to make e-Health meaningfull for Europe's citizens.

On several occasions, EU Information Society Commissioner Viviane Reding has expressed "two main concerns". The first is that "broadband is not yet available to all. Deployment costs are high, particularly in distant and scarcely populated areas. In these circumstances, private operators often do not offer broadband because it is not profitable to do so."

Secondly, she points out: "The gap is not just about access. In rural areas, speeds tend to be lower and prices tend to be higher, discouraging use of advanced services."

The fast growth of broadband has led the European Commission to bring forward a review of the basic telecoms services Europeans can expect.

When a majority of EU citizens are using a telecoms service, EC rules dictate that it becomes one every European should be able to enjoy.

In countries such as Denmark, Luxembourg and Belgium, 100% of the population can get broadband if they want it. By contrast, 60% of Romanians cannot have broadband access. Furthermore, in countries such as Germany and Italy, the percentage of the population that is not covered by high-speed access is about 12%.

Figures from the EC suggest that from 2003-2007 broadband use in member nations tripled to 36% of households and had an annual growth rate of 20%. Despite this, said the EC, there were "striking gaps" among member states and the coverage their citizens enjoyed.

From 2003-2007 broadband use in the EU has tripled. However, 7 percent of the EU's population are still not connected (30% in rural areas).

So far, the EU has contributed to broadband growth by giving telecoms rules for more competition and investment. The EU also implemented a new system for mobile satellite services, which can offer broadband across the EU.

"High-speed internet is the passport to the Information Society and an essential condition for economic growth," said Viviane Reding, EU Telecoms Commissioner in a statement announcing the review. "This is why it is this Commission's policy to make broadband Internet for all Europeans happen by 2010."

The Commission has published a report showing that competitive markets for broadband Internet are providing EU citizens widespread and affordable access. However, further efforts are needed to ensure Broadband for All. So far, the EU has stimulated broadband with the following 3 tools:

- Telecoms rules for more competition and investment. Europe had almost 100 million broadband lines in January 2008 and a growth rate of 20%, with 52,000 new lines connected daily in 2007. In September, 2008 the Commission published further regulatory guidance on ensuring competition and investment for optical fibre net works.

- A new system to stimulate mobile satellite services, which can deliver broadband via satellite across the EU, was set up this summer. The European Parliament and the Council created a one-stop shop for authorising such services: instead of 27 procedures, mobile satellite operators now apply to the Commission.

- In November 2007, the Commission made proposals for reform of radio spectrum management to free resources for new wireless services, which were mostly endorsed by the European Parliament this September. If the Council also accepts this new form of spectrum management, the Digital Dividend – extra radio spectrum available after the move from analogue to digital TV – can be used for new wireless broadband services, and not just new TV channels.

Furthermore, it appears that the current EU's Universal Services Obligations (USO) could force telecoms firms to roll out their coverage to outlying areas that are not currently able to get the faster internet action.

The USO currently calls for all member states to offer 'functional internet access' which was taken to mean a line that can support 28.8 kilobits per second. Actually, in the modern connected world this dial-up rate is far from ideal, and with a rising number of EU households already enjoying broadband speeds the review of the USO may well be reworded to ensure that Internet access does not mean narrow-band.

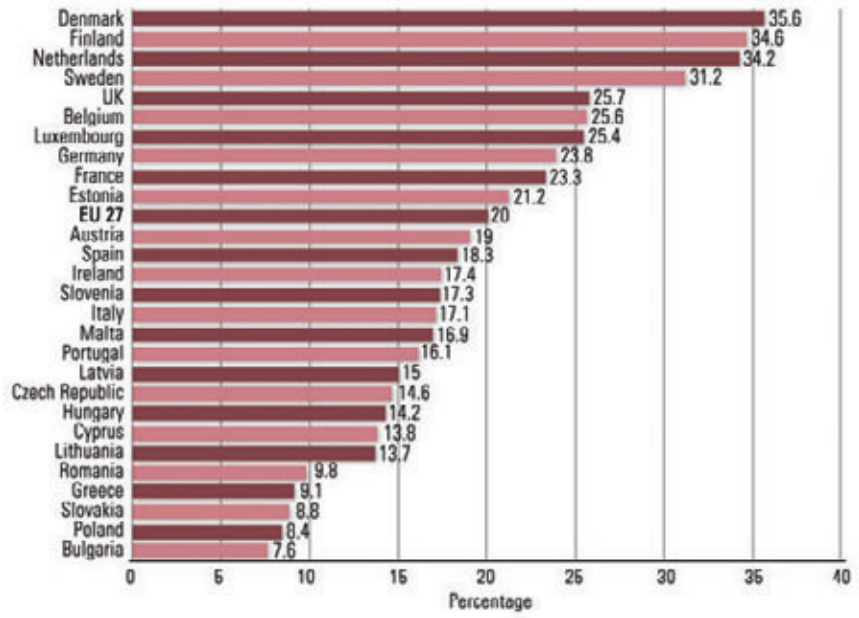
Constant monitoring

Close monitoring of broadband markets, taking into account all relevant factors, is crucial to provide a fair, reliable picture of how the broadband market evolves in each Member State and in the European Union. Extremely useful in the monitoring process is

the Broadband Performance Index (BPI) that helps to compare broadband developments in EU countries so that policy making can target the real problems. The BPI has the following components:

- Broadband coverage, reflecting developments in rural areas;
- Competition by coverage, reflecting a country's innovative capacity, readiness to invest and consumer choice;
- Available connection speeds, reflecting quality developments;
- Prices, reflecting affordability; advanced communication technologies and services.
- Use of advanced services, reflecting the willingness of individuals and businesses to take up innovative services and the perception of trust;
- Socio-economic context, reflecting factors that summarise preferences, skills and available capital that influence the preparedness to use advanced communication technologies and services.

EU Broadband Penetration Rate, January 2008 (EC)



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

European Association of HEALTHCARE IT MANAGERS

To All HITM Members:

You are cordially invited to the General Assembly of the European Association of Healthcare IT Managers (HITM) to be held at the World of Health IT Conference & Exhibition in Copenhagen, Denmark

Invitation

to the General Assembly of the European Association of Healthcare IT Managers

Wednesday
5th November 2008

from 18.00 h.
Bella Center
Meeting room 19

The World of Health IT

Conference & Exhibition

Connecting Leaders in Technology and Healthcare

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Agenda of the HITM General Assembly

1. Welcome
2. Introduction
3. Approval of the Agenda
4. Approval of HITM Statutes
5. Approval of HITM Bylaws
6. Approval of the communications collaboration
7. HITM activity report and budget
8. Report on Healthcare IT Management and communications strategies
9. Discharge of the Executive Committee
10. Appointment of the voting committee
11. Presentation of candidates
12. Election of General Secretary/Executive Director
13. Election of the HITM Board (1 President, 2 Vice-Presidents, 3 Board members)
14. Election of 2 Auditors
15. Presentation of the 2009 work program and budget
16. Application to the Council of Europe
17. Relationship with other Associations
18. Next HITM General Assembly
19. Miscellaneous
20. Review and conclusions
21. End of meeting

To register please email **c.c@hitm.eu**
or call **+32/2/286 85 01** for more details.
Pre-registration is required, limited space available.

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FROM 'JEE VS .NET' TO DOMAIN FRAMEWORKS

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JEE and .NET are the two major frameworks competing in the enterprise software development space. A debate on their similarities and differences has been running since the beginning of their coexistence. Are these comparisons relevant for what is needed in building new healthcare specific IT services? The answer can be found through some recent proposals for modern software infrastructure in healthcare. This article sheds some light on the possibilities of such competing technology families and the offerings of software infrastructure suppliers in relation to the needs set by the healthcare industry.

The battle of software technology infrastructures

The two major technology platforms in modern IT infrastructure development are JEE (Java Enterprise Edition – formerly known as J2EE) and Microsoft .NET. Both of them are software frameworks to create enterprise-level IT solutions, the kind of solutions that are needed in modernising and creating new software to solve emerging and complex challenges of healthcare. The comparisons between these technologies have been made throughout their existence (the first official versions of J2EE and .NET were released in 1999 and 2002, respectively).

There are considerable resources available on the subject: comparisons made by vendors themselves, impartial sources as well as some scientific debate (try Google: JEE or J2EE vs. .NET). The typical criteria of these technology showdowns include architectural layers, data access, GUI, connectivity, support for standards, performance or cost effectiveness.

Neither side has been knocked out by the other due to advantages derived from any specific features. The architecture and technical advancements of both platforms are mainly created by the necessities stated by the direction of the information technology industry.

It is also clear that such competition benefits the customers by requiring constant evolution and innovation on both sides. Indeed, any recent developments in one platform are closely followed on the other side; the same sort of solutions have at least been 'inspired' by the other (see Figure 1).

.NET Framework:	JEE (Java Enterprise Edition) :
Microsoft .NET Framework includes a library of pre-coded solutions (Base Class Library) and a runtime environment (CLR) for the programs made for the framework. Various libraries support server side development.	Java Platform, Enterprise Edition (Java EE/JEE) is a platform for server programming in the Java language. The Java EE provides libraries with a functionality to deploy distributed, multi-tier Java software running on application servers.
Developed by Microsoft, several programming languages and tools available from various sources. Freely available ISO/IEC standards for some specifications (e.g. Common Language Infrastructure (CLI), C# programming language).	JEE is developed via a formalised process, the Java Community Process (JCP), which allows interested parties to be involved in the definition of future versions and features of the Java platform by formal and public reviews of Java Specification Requests (JSR).
Some non-Microsoft implementations of the specifications are available (such as MONO, open development initiative sponsored by Novell to develop UNIX version of the Microsoft .NET development platform, can also be run in environments such as Linux and MacOS X).	Originated by Sun Microsystems, multiple vendors such as IBM, Oracle (now with BEA), JBOSS are also involved in the development process of JEE specifications and provide JEE Application Servers.

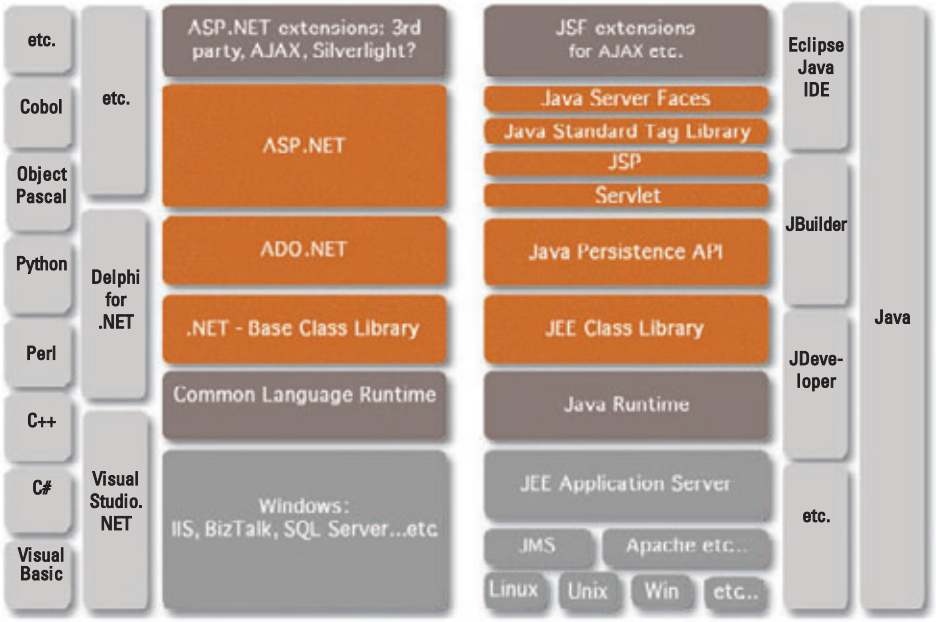

Figure 1:
Parallel architectural layers in .NET and JEE platform stacks for typical database enabled web application (updated and modified from MSDN article "ASP.NET and Struts: Web Application Architectures").

What has, however, not been studied to the same extent is how health care industry-specific needs are supported by these solutions. As a result, there is a need to consider emerging healthcare application models and standards and see how vendors endorse such developments building on these two technology families.

The criteria for software platforms in healthcare

There are several major healthcare IT development efforts to improve the availability of patient information and care processes. IT infrastructures of hospitals and healthcare facilities are facing increasing pressures for adaptability and connectivity. Many national and regional initiatives aim to enable health information sharing across enterprise and application boundaries, for example national health IT projects in England, France, Germany and Finland. Another important trend, which also sets requirements for information sharing are citizen-centric, business to consumer services such as personal health management and personal health records. Even established non-healthcare players are emerging in this space with products such as Google Health and Microsoft HealthVault. Such initiatives for service providers and consumers are typically targeted by enterprise solutions built using JEE/.NET-technologies.

A central goal in these initiatives is interoperability between applications or services. The interoperability is often based on existing but still evolving specifications such as HL7 or DICOM and IHE integration profiles. "Based on" here means that the standards cannot usually be deployed as-is, but have to be localised to their target environment to meet requirements of national legislation, different models of providing health services, or different views on patient privacy and reimbursement, to mention a few. The differences can be found not only on the process level, but also in implementation details such as patient identification, different code sets for drugs or coding of examination results. These differences make it hard to achieve 'plug and play' interoperability.

In many cases, standards concerning health and healthcare IT are provided on the level of frameworks or in terms of guidelines which need further refinement for local application. Furthermore, standards continue to be developed in rapid annual or even busier release cycles. Such a situation does not provide concrete foundations for tool support or other productivity features in enterprise software development. It also hinders the possibility for software infrastructure vendors (such as the ones developing .NET/JEE) to provide support for healthcare-specific standards. In any case, core .NET/JEE products are independent of any particular business domain, and only provide basic infrastructure components on top of which vertical solutions or frameworks for domains such as healthcare can be built.

Web services and SOA are closing the technology gaps

Most IT standardisation efforts are moving towards a common technology base and approach in developing interoperability solutions and modular systems, namely Web Services and SOA (Service-oriented architecture). These two, the platform independent technology for systems to communicate (Web Services) and architectural guidelines for creating flexible and interoperable solutions (SOA) have been the focus of development of technology frameworks and implementing readily available extensions upon them. It is indeed here where IT infrastructure building blocks, such as .NET and JEE frameworks, can provide substantial assistance. The platforms offer xml or SOAP tools to handle the basic messaging which can be extended with WS*- specifications to increase Web Services capabilities to handle issues such as messaging security, transaction, reliability etc.

Furthermore, there is a growing foundation of experience and support for these common toolsets as the technology base for system-to-system communication becomes increasingly homogenous between different fields of business. In addition, SOA-oriented integration infrastructure offerings such as Enterprise Service Buses (ESBs) provide even further abstraction and connectivity capabilities.

Healthcare-specific frameworks

It is also important to consider how healthcare specific needs are increasingly supported in the software infrastructure space by vendors such as Microsoft and Oracle and by foundations such as Apache and Eclipse.

These organisations offer implementations and support for the JEE and .NET technology families and seek to provide solutions for standardized interoperability.

It is important to note that not all such examples are directly related to the JEE/.NET platforms themselves, but extend these technological foundations to support architectural and higher abstraction level frameworks. They indicate that specific needs of healthcare IT have been taken into account by organisations which have a culture to support the productivity features of enterprise IT solution development. In addition, the commitment of leading software vendors is needed for standards to be accepted as 'de facto' through a large number of real-life implementations.

We specifically take consideration of three aspects of support for healthcare software development: architectural frameworks, application components and tool support for standards-based interoperability. To do this, we discuss a representative sample of offerings initiated from JEE and .NET bases.

.NET/Microsoft family

A few years ago, Microsoft released Connected Healthcare Framework (CHF) - a high level architectural framework to establish the direction for aligning enterprise-level systems and services to create functional and interoperable healthcare information systems. The requisite infrastructure was also illustrated using the current SOA/ESB-paradigm. Several different guideline documents were released as a result of this initiative, which was strongly influenced by development work across the world.

Another interesting development is related to Microsoft's involvement in the national NHS projects for eHealth in the UK. This has resulted in Microsoft Health Common User Interface (CUI) - a set of guidelines and a toolkit for creating user interfaces for health care applications.

Microsoft has been busy on the healthcare product side as well, acquiring solutions like Azyxxi, a software platform designed to access health related information from a variety of sources in the healthcare enterprise. The acquisition has recently led to the release of Amalga – a product family with solutions, among others, for Hospital Information Systems (HIS), Radiology Information System (RIS) and Picture Archiving and Communication System (PACS).

Healthcare IT standards such as HL7 and IHE are supported by Microsoft with various product and reference implementations (on .NET-technology, BizTalk Server etc.) and also through the release of technology oriented guidelines.

JEE/Java alliance

On the Java side, one of the products worth mentioning is Oracle's Healthcare Transaction Base (HTB), which is a JEE/J2EE based platform for healthcare application development, integration and data storage. The data model used is based on HL7 version 3 standardized data model: RIM. On the other hand, many Java-related efforts in healthcare have been more collaborative and open source oriented, such as the Open Healthcare Framework (OHF) in the Java-friendly Eclipse foundation.

The initiative has developed (or has plans) for open source implementations of several healthcare interoperability standards to be used as-is or as a basis for product deployments. The worklist includes implementations of several HL7 and IHE specifications.

Another similar project using Java as a technology base is the recently launched Open eHealth Foundation which also plans to release open source implementations based on existing standards. Forthcoming implementations will be using results of existing open source projects for security, single-sign-on, enterprise service bus, SOA governance and registry/ repository. The resulting services and components will extend Java/JEE projects such as OpenESB, Glassfish, OpenSSO and Mural.

…and mixing the two

From a technology point of view, one of the most interesting examples is the OpenMRS (Open Medical Record System) initiative, which provides an open source framework for medical records systems in developing countries. The system implementations are principally developed as Java Web Applications running in an Apache Tomcat environment. However, the demo application available at the OpenMRS site uses Microsoft Office Infopath XML as a format to download and edit medical information for a test patient.

This example is a good demonstration of the possibilities of tying together applications from so-called opposite worlds with an intermediate interoperable format (usually a suitable XML language). Our own experience from various integration and development projects also underlines that Java and .NET technologies can be (and are) increasingly designed to be used side by side.

It is thus evident that the healthcare sector is receiving special attention from providers of JEE and .NET technologies. Still, the killer application that would provide a competitive edge to gain significant market share is missing on both sides. National electronic health record initiatives or local implementation projects are making more or less steady progress using various tools that are available – using, mixing and matching different web services tools, message queues, integration engines and technology infrastructures, though as yet often without using healthcare-specific offerings built atop the latter.
The crux of the struggle in software infrastructure has moved

OF WARS, SKIRMISHES AND THINGS IN BETWEEN

Tosh Sheshabalaya, HIT

In tomorrow's history texts about computing, the JEE versus .Net debate may look more like a skirmish than a battle – let alone a war.

The fundamental reason lies in the emergence of SOA and Web services earlier this decade – even though they still have major detractors. [The latter tend to argue that there are still too few functioning real-world implementations, and that most SOA efforts remain focused at departmental rather than enterprise levels].

Nevertheless, few dispute the fact that SOA is driven more by business, rather than by the ingrained momentum of technology (all technologies) to advance, and then see their masters go scouting the market.

Both JEE and .Net, in different ways, fell afoul of the latter.

JEE was a sequential evolution from the client/server environment, and though .Net hit it lucky to be launched on a seemingly clean slate (with some savvy marketing) just as Web services technology was emerging, its roots too date back to Visual Basic.

On their part, the SOA marketing wizards at IBM too did a good job. Few today associate Big Blue's WebSphere with J2EE (the JEE predecessor on which it is based) – and instead see its SOA efforts starting afresh with a focus on Web services.

Whatever be the competitive issues at stake, SOA's relevance is especially crucial for healthcare, which is a relatively newcomer to modern IT systems and practices.

This, in turn, is due to several factors. The first is the ingrained heterogeneity of the healthcare environment - 'silos within bunkers', in the words of one expert.

Secondly, today's business processes have changed markedly from generally accepted practices of the past – when another complex industry such as banking/ financial services invested heavily in IT.

Indeed, healthcare business processes are widely acknowledged to be among the most complex, far more so than banking and finance.

As many healthcare CIOs know, building bridges between hospital managers and IT consultants is often a recipe for a migraine.

Finally, there is yet another facet to such questions. The demands for healthcare IT modernization are top-down and dictated by politics and government agendas rather than the market, certainly more so than it was in banking (or many other sectors).

This is, indeed, one of the key reasons to ensure that Alice in Wonderland visions on e-Health (at the EU and elsewhere) face continuous reality checks.

from base technology towards support for healthcare standards, interoperability and management of the exploding amount of health-related knowledge and patient information (genetics, constant monitoring, data-intensive investigations etc.). Combined with strong professionalism, the 'perceived uniqueness' of processes, information and service models on national or provider levels, and an incoherent and heterogeneous marketplace, healthcare is certainly not an easy area to conquer for infrastructure suppliers.

Forget (most of the) basic software infrastructure

The properties and basic philosophies of .NET and JEE platforms are similar; indeed it is hard to tell them apart purely by their properties. If there is no straighftorward reason – such as a management decision to have a homogenous Microsoft or Java environment - it is a good suggestion to see what kind of healthcare-specific offerings are available built on top of these environments. In other words, is there readily-built support for your case of healthcare specific needs, and after that, for which platforms? Is there a need to start using healthcare-specific frameworks which provide design guidance, or do you need readily-made components or systems, or just support for standards-based interoperability?

As indicated above, IT infrastructure providers have recently begun to take serious notice of healthcare specific needs and models, and the number of offerings will surely rise as standardization and industry-wide solution models emerge.

Many healthcare projects are continuously struggling with interoperability problems. The easiest way to avoid compatibility problems is to avoid the need for interoperability between systems i.e. deploying one system everywhere. But in most cases, connected healthcare service models, the complexity of hospital environments, the long line of legacy systems to be supported and proprietary processes developed independently in isolated healthcare organisations, make this naïvely efficient solution unreasonable.

By using platform independent web services as a technology to communicate between applications, it is not necessary to exclusively select either of the technology families. The interoperability solutions or application service contracts are built as if users are unsure which platform the opposite side of the communication is using; indeed, increasingly, this issue does not matter. The solutions will probably be less high-performance than those based on proprietary technology and tightly-coupled application packages, but there is an inbuilt readiness for the day when communications have to cross platform or organisational boundaries.

Using web service and SOA models also enables users to seek solutions from third parties, not constrained by the JEE/.NET families. Smaller scale technology vendors such as Intersystems or WebMethods have also accessed markets in the healthcare sector. Their solutions remain as viable as any other as long as they maintain support services and competitive connectivity features on their platforms. The technology platform choices remain crucial for application or component developers, but the main challenges have shifted from intra- to inter-application concerns such as interoperability and management of enterprise IT portfolios. And for health IT management, this is progress.

Radiotherapy Treatment Planning Systems

Identifies the most important specifications to consider when comparing models

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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**

	ECRI RECOMMENDED SPECIFICATIONS<1>	PHILIPS
MODEL	**Radiotherapy Treatment Planning Systems**	**PINNACLE 3**
WHERE MARKETED		Worldwide
CE MARK (MDD)		Yes
EXTERNAL BEAM PLANNING		
Photon	Yes	Collapsed cone convolution/superposition
Electron	Yes	3-D pencil beam (modified Hogstrom)
Proton		No
Frame		Yes (BRW, Fisher, Leksell, Compass)
Frameless		No
3-D Conformal	Yes	Yes
4-D Conformal		No
Step and Shoot	Yes	Yes
Dynamic	Yes	Yes
MLC	Yes	Yes
Solid Block	Yes	Yes
Virtual Wedge	Yes	Yes
IGRT	Yes	Yes
Adaptive Therapy	Yes	No
BRACHYTHERAPY		
	Breast, Gynecology, Head and Neck, Prostate	Breast, Gynecology, Head and Neck, Prostate
COMPATIBLE TREATMENT DELIVERY		
LINAC		Elekta, Varian, Siemens, Mitsubishi
MLC	Any	Varian (80, 120), Siemens (3-D MLC), Elekta, Radionics
Stereotactic Frames	Any	(Conformaxx), Brainlab (M3), 3DLine (DMLC)
	Any	Radionics (BRW), Fisher, Elekta (Leksell), Compass
Afterloaders		No
Other	Any	Not specified
IMAGE DATA		
DICOM 3.0	Yes	Yes
Conventional Simulator	Yes	No
Digitizer	Yes	Yes
Digital Radiograph	Yes	No
CT, MR and PET	All	All
SPECT		Yes
Other		Not specified
Fiducial-Based Registration	Yes	Yes
Anatomy Based Registration	Yes	Yes
PLANNING METHODOLGY AND TOOLS		
Inverse Planning	Yes	Yes
Dosimetric Algorithms	Multiple	Collapsed cone convolution/superposition, 3-D modified Hogstrom
Plan Resolution	1 mm 3	Variable (down to 1 mm3)
Max Number of Beamlets	100	Limited by MLC leaf dimension
Max Number of Beam Angles	Unlimited	No restriction
Template Library	Yes	Yes
Automatic Organ Contouring	Yes	Yes (model based segmentation)
Semi-Automatic Organ Contouring	Yes	Yes
Input Prescription Limitations	Yes	Yes
Real-Time Plan Adjustment and Optimization	Yes	No
Composite Modality Planning	Yes	Yes
COMPUTING PLATFORM AND NEWORKING		
Operating System /Hardware Compatible Oncology Information System		Sun Solaris 8.0/Philips System 810. Exportation to IMPAC, Varian, Siemens OIS. Price $110,000-200,000 stand-alone server; depends on number of workstations and options selected . 1 year warranty.
LIST PRICE RANGE AND WARRANTY		
NUMBER INSTALLED		~950; 300 clinical IMRT installs
LAST UPDATED		1/09/2007
Supplier Footnotes	<1>These recommendations are the opinions of ECRI Institute's technology experts. ECRI Institute assumes no liability for decisions made based on this data.	

PROWESS SYSTEMS	PROWESS SYSTEMS	PROWESS SYSTEMS	VARIAN
Prowess Panther 3D Brachy Pro	**Prowess Panther 3D External Beam**	**Prowess Panther DAO IMRT**	**Eclipse**
Worldwide	Worldwide	Worldwide	Worldwide
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes	No	No	Generalized Gaussian pencil beam, Monte Carlo
No	No	No	Yes; double scattering, single scattering, modulated scanning
NA	No	No	Yes
NA	No	No	Yes
NA	Yes	Not specified	Yes
NA	No	No	Yes
NA	NA	Yes	Yes
NA	NA	No	Yes
NA	Yes	Yes	Yes
NA	Yes	Yes	Yes
NA	Yes	NA	Yes
NA	No	No	Yes
NA	Work in progress	Work in progress	Yes
Breast, Endovascular, Gynecology, Head and Neck, Intraoperative, Prostate	NA	NA	Breast, Endovascular, Gynecology, Head and Neck, Intraoperative, Prostate
NA	To all LINACs	To all LINACs	Varian, Siemens, Elekta, GE, Mitsubishi
NA	To all LINACs	To all LINACs	Varian, Siemens, Elekta, GE, Mitsubishi
NA	No	No	Varian, BRW
No	NA	NA	Varian/Varisource, GammaMed
Not specified	Software is capable of configuring to handle any LINAC, MLCs	Software is capable of configuring to handle any LINAC, MLCs	Proton- IBA, Hitachi, Accel, MPRI
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
All	All	All	All (For CT: Real-time coronal/sagittal sections, mean/media filters, thresholding, adaptive histogram, nonlinear scaling, multiplanar reconstruction)
Yes	Yes	Yes	No
Incorporates scanned film images	Incorporates scanned film images	Not specified	Not specified
Yes	Yes	Yes	Yes
No	No	No	Yes
Yes	No	Yes	Yes
TG 43	Real-time dose update for any beam/plan changes	Collapsed cone convolution superposition	Pencil beam convolution, convolution superposition (AAA), generalized gaussian pencil beam, electron Monte Carlo, dose volume optimizer, beam angle optimizer
<1 mm3	1 mm3	3 mm3	Convolution superposition (AAA) = 2 mm; electron Monte Carlo = 1 mm
NA	NA	No limitations	25,600 beamlets/field (IMRT)
NA	No limitations	No limitations	25 static fields
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes, Smart Segmentation
Yes	Yes	Yes	Yes
No	No	No	Yes
Real-time dose updates, Mixed Integer Program (MIP) based optimization	Real-time dose update for any beam/plan changes	Real-time optimization parameter change support; multiple constraints including EUD supported	Yes, interactive IMRT optimization
Yes	Yes	Yes	Yes
Windows XP Pro/PC. DICOM 3.0 compatible. Price not specified. 1 year renewable warranty on software.	Windows XP Pro/PC. DICOM 3.0 compatible. Price not specified. 1 year renewable warranty on software.	Windows XP Pro/PC. DICOM 3.0 compatible. Price not specified. 1 year renewable warranty on software.	Windows XP Pro/PC. ARIA, IMPAC, Visir, Lantis. Price depends on configuration. 1 year warranty.
Not specified	Not specified	Not specified	>2,500 worldwide
1/09/2007	1/09/2007	1/09/2007	1/09/2007

MIS DASHBOARDS

BUILD'EM OR BUY'EM, YOU'VE GOTTA BREAK'EM IN

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The growing trend in Europe (and much of the world) to corporatise hospitals and set performance targets has been accompanied by an escalation in management information requirements. One answer to this challenge lies in Management Information System (MIS) Dashboards. However, as with much else in healthcare IT, there is a major debate about how add-on MIS 'dashboards' compare to customised configurations built in-house. Given below is a whistle-stop tour by a specialist in predictive technologies in healthcare management on key issues related to hospital management dashboards – their strengths, weaknesses and what to consider before buying or building a dashboard application.

You've seen them, you know what I'm talking about – they are colourful, they have moving dials and flashing lights…… and they are often web based – you can even look at them at home or from a conference – they are 'dashboards'. Approving expenditure to purchase or construct a management dashboard application for a healthcare facility may seem a relatively simple task. Particularly if all it needs to do is 'hook up' to existing 'transactional systems' and start displaying all that wonderful data floating around, to assist in managing a facility. 'Lets get on with it!!' you say. But is it really that simple?

To answer this requires a closer look at the situation. Like any major investment, there is a strong case for caveat emptor (let the buyer beware)...and even if you follow that adage, in your reflective moments you may still ask yourself ...'why on earth did we do this?'

So what is a dashboard?

A dashboard, fundamentally, belongs to the broader category of Executive Information Systems (EIS) which integrate data from a variety of different sources and present it in an optimal format to decision makers.

The essential philosophy behind such systems is to help managers by providing structured information necessary to quickly make decisions which require informed judgement. They are designed to not only be user friendly; the best, indeed, claim to have a near 'intuitive' element in -built for users.

Why do hospital managers need dashboards?

Hospital managers stand to benefit from dashboards for a number of reasons, not the least being the environment in which they operate. Across the world, hospital managers are being asked to track and act on more information, in more dimensions then ever before.

An additional complexity is the lack of consistent evidence, or even guidelines, about the best decision choices in any given situation, which is partly a reflection of the complex permutations and combinations of scenarios driven by different facility types and case mix, different funding mechanisms and different regulatory environments in which hospitals sit.

Given this complex environment, it is worth underlining the following comments in a recent Harvard Business Review article titled 'The secrets to successful strategy execution'. The article, reflecting the work of a major consulting company, noted that: "The single most common attribute of…… (successful) companies is that their employees are clear about which decisions and actions they are responsible for. As a result, decisions are rarely second-guessed, and accurate competitive information quickly finds its way up the hierarchy and across organisational boundaries. Managers communicate the key drivers of success, so frontline employees have the information they need to understand the impact of their day-to-day actions."

Dashboard and information dimensions to be considered

A number of dimensions need to be considered in contemplating what a healthcare IT manager need from a dashboard. Often, these have fallen out of organisational performance monitoring frameworks like the balanced scorecard. I would argue that users can get more from a dashboard in the current technological environment by not limiting themselves to overly restrictive frameworks.

For example, the temporal dimension is a newer one to consider; many dashboards historically have used warehoused data which is out of date at the time of usage – but nonetheless potentially helpful in understanding both the recent and distant past. More and more systems are capable of delivering real time data to users. Some systems (and their attached dashboards) are now capable of delivering forecasts into the immediate or near future – for example about issues such as hospital bed usage and occupancy.

Other considerations can also be thought of as breadth, depth and complexity…… and may act as a useful guide when communicating with vendors or in-house developers.

'Breadth' means the range of data items and content areas (eg: finance, quality, access, HR) to be included in the dashboard.

Depth entails an ability to drill down on areas of concern. So for example, at COO level, if hospital Emergency Department waits are lengthening to unacceptable levels, what ability does a COO have to drill down by interacting with a GUI to find which care unit or business areas are contributing most to the delays ? This takes a dashboard beyond a purely 'data display' system to one that can inform decision making and action in more practical ways.

In relation to complexity, there is some broad guidance on what constitutes useful dimensions (or quadrants) of data to incorporate into a dashboard view for healthcare managers. A report by John King and Jeanne Jenkins in the April 2008 issue of Healthcare Financial Management titled 'Information management: why it's vital to effective service line operation' observes: "It is essential for healthcare financial managers to understand and monitor five areas of information critical for effective service line performance tracking: Market share, Operational performance, Physician performance, Clinical documentation and coding, Patient satisfaction."

These areas, however, are hardly simple or straightforward when extrapolated to a global context. A study by a University of Maryland team on a web based dashboard in managing operating theatre performance notes: "The challenge lies in aggregating and displaying these data in an easily accessible format that provides useful, timely information on current operations." [Surgical Innovation (Vol. 15, No. 1, 2008)].

It is also known that individual and role-based preferences affect what data is relevant and what are the relevant views to put into a dashboard. In the healthcare area, a variety of studies have pointed out highly variable stakeholder views about 'report card' elements to be considered in different contexts and scenarios. As a result, reaching agreement about what information content should be included in any kind of reporting mechanism (card or dashboard) can be problematic, and an area of real concern in the development of dashboards for hospital managers.

In addition, there always are new pieces of information which managers are challenged to keep track of, ranging from the useful to the indispensable – such as best practices. In real life, the trade off lies in the importance of locally keeping track of such information versus the ease and cost of implementing changes in the technical environment and business process to allow that information to be measured, displayed and actioned.

The British National Health Service has seen work on using advanced analytic techniques, specifically an SPC (Statistical Process Control) technique called CUSUM (cumulative sum) charting in a web interface to compare in-hospital mortality, length of stay and emergency readmission rate across sites and organisations. This illustrates an example of where such applications may head in the future.

Surely you just hook it up and go from there…

So if a hospital decides to proceed down the path of investing in this technology, is there anything else managers need to think about…… 'can't we just plug it in and get going'? One critical consideration is the business context in which the technology will be hosted.

There have been attempts to provide advice in this area. Dr. John Glaser, CIO of Partners Healthcare in the US, suggests five key steps in setting up an appropriate environment in which to use business intelligence technologies :

1. Establish business needs and value.
2. Obtain buy-in from managers.
3. Create an end-to-end vision.
4. Establish BI governance.
5. Implement specific roles for managing data quality.

Environmental and contextual considerations

One key consideration in purchasing or developing a dashboard are the skill sets and knowledge bases of hospital managers – in other words, the technologies they are (and feel) comfortable with. There is evidence that healthcare managers have a poor knowledge of predictive systems and techniques. Exacerbating this is a considerable level of resistance to new technologies, among both hospital employees and administrators.

A second factor concerns the specific healthcare organisational environment (the kind of facility and the services provided) and the implications of these for dashboard purchase or development. The metrics to be include in the dashboard and the relevant time and drill down dimensions may vary enormously depending on such questions.

Cost and obsoloscence should also be taken into account. The main question here is how current and future data requirements relate to the needs of funders, broader corporate requirements and those of regulators. There is little point, for example, in having to run multiple dashboards, or a dashboard to meet a range of separate and non-overlapping sets of needs around management information.

Challenges and constraints

Several challenges face both in-house developers of dashboards in hospitals and purchasers of off-the-shelf systems. On a technical level, there is the challenge of access to, conversion and integration of, disparate data sources – ranging from historical paper-based collection systems and operational databases, to warehoused data at the other end of the spectrum. Another common challenge is to find a definition for optimal data quality – for instance, real-time occupancy information versus the load this places on the system.

From an organisational perspective, the issue of cost (and hence delivery mechanism) is always a major consideration. Public healthcare in particular is often cash strapped. As a result, 'expensive' solutions, especially those impacting on end user devices or client side software, can be problematic; web based applications in a thin client model are increasingly seen as an answer to such challenges.

Resistance to change, and adequate levels of staff engagement are other issues. The role of the clinician 'leader' or 'champion' is widely recognized as a major factor in clinical systems projects. Management leaders and early adopters can often only assist in the implementation of a developed or purchased solution.

The framework and business processes attached to such initiatives also remain crucial to take into consideration. 'We have all this information available at our fingertips…… what next'?

This question is addressed below.

So you have a dashboard ….now what…….?

In the process of deciding to purchase or build a dashboard – a quick checklist of questions which healthcare IT managers are advised to consider is provided below:

- Does the dashboard relate to an organisation's performance framework – including financial, quality, access, clinical governance and other dimensions?
- How does it relate to business processes – what actions will be taken on the back of the data ?
- What ongoing quality processes are in place in relation to the data displayed – and how does that flow on to the feeder systems?
- Can the system be easily modified in the event of new board and executive priorities or changes in funding or regulatory frameworks?
- How do prospective users evaluate a dashboard's utility. It is a tool…… is it working for you or not, and if it isn't – what are you going to do about it?

Buy versus Build

Should a hospital IT manager buy or build a dashboard ?

As with any MIS or EIS system, it is self-evident that executives be closely involved in the choice/purchase or development of a dashboard. Given the demands on their time and variable level of comfort with computer systems, the attractions of a build scenario with in-house staff are often significant.

However, there is a major trade-off here: pre-existing solutions or those requiring minimal local customisation already carry the benefit of being 'tried and tested' with a range of executives and managers from other organisations, thereby minimising the chances of not meeting the users (managers) needs.

There are a number of commercially available applications available in this problem domain, with different emphases, pros and cons.

Other considerations in the buy versus build equation include:

- Cost – for instance large licensing fees.
- Potential skills transfer or development for internal staff versus outsourcing and being vendor dependent on an ongoing basis.
- Dashboards may be better if constructed by embedded staff with the necessary technical, clinical and local organizational knowledge.
- Is the system easily maintained or improved moving forward – in terms of functionality or content, depending on user preferences, technological availability (e.g.: new end user devices such as tablets) or organizational needs?

In the final analysis, dashboards can clearly provide an opportunity to assist in hospital management, However, like any significant investment or IT implementation, the key to success lies in making sure users get what they really need, while not getting burnt along the way.

THE HOSPITAL CEO

Informed Decisions and the Case for MIS Dashboards

HEALTHCARE IT MANAGEMENT
ANALYSIS

EBDM or evidence-based decision making has been a buzz word for some time, in the context of hospital management, especially at the Chief Executive level. However, there have so far been few efforts to audit and analyze real-world hospital CEO requirements in the context of EBDM, as well as the gaps which exist between its theory and practice.

A 2006 survey of hospital CEOs funded by the Canadian Health Libraries Association/Association des bibliothèques de la santé du Canada (CHLA/ABSC)*, found that key barriers to EBDM included a lack of on-demand information, as well as limited time for the information-seeking process.

Some of their findings showed that decision making at the CEO level continues to often be based on perceptions rather than hard facts. "It has been suggested", said the authors, "that CEOs may at times merely settle for the first available answer that meets their minimum requirements. At worst, some CEOs report ignoring evidence if it does not suit their purposes."

Overall, the report suggested that there was "a need for the value-added services of screening, summarising, synthesising, highlighting, and presenting information for the CEO in a useful and timely manner." Many hospital CEOs found that there was too much data available, but not enough analysis.

This, as the accompanying article in Healthcare IT Management shows, is exactly the challenge of designing an effective MIS Dashboard. Although the Canadian study was targeted at hospital librarians, its findings were a clear confirmation of the need for intelligent (and intuitive) dashboards. Indeed, one conclusion was that hospital librarians who lacked the ability to link the hospital's strategic goals to available evidence-based resources, and communicate such expertise to the CEO, "will not be around in 10-15 years."

** Mary McDiarmid, Sandra Kendall and Malcolm Binns, Evidence-based administrative decision making and the Ontario hospital CEO: information needs, seeking behaviour, and access to sources. JCHLA / JABSC, Vol. 28, 2007.*

PROMILE

A Universal and Interactive Tool for the Prevention of Alcohol Abuse

AUTHORS

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Healthcare IT is not entirely a creature of the hospital environment. Indeed, there has long been a great deal of emphasis on preventive health, and IT can indeed be deployed imaginatively to prevent people becoming hospital patients. The Promile system from the Czech Republic provides an excellent example of such a use. It is essentially an SMS service available since 2005 across the entirely mobile telephony network of the country. Its purpose is to combat excessive drinking and dangerous driving – an issue of considerable concern in Europe, where about a quarter of deaths from traffic accidents are related to alcohol abuse. Alongside, Promile has also yielded a rich amount of data on alcohol use profiles and patterns, which will be of evident benefit to healthcare researchers.

Background

Promile is based on cognitive therapy, which supports small steps in monitoring a person's behaviour, reinforced by practical tips on how to stay in control (and not break social mores or laws).

The goal of Promile is to prevent drunk driving and provide assistance during (self) treatment to control drinking. The Promile SMS system works on both GSM and WAP protocols, providing an anonymous and socially invisible manner for self-regulating alcohol consumption.

Promile has been actively promoted in night-life settings (clubs, bars, restaurants, music festivals), and is widely considered to have achieved its goals.

A Promile SMS contains the following information, in a simple step-by-step sequence: sex, age, weight (which are templated), the hour when a customer started drinking, the number and type of beverage (coded at the Promile Website, or automatically accessed by WAP).

The response, providing information about the present blood alcohol content (BAC) and approximate time when the alcohol level will have dropped to zero, is received within a minute. The response also includes a brief summary about any specific risks associated with the reported alcohol content.

Results

Between its launch in September 2005 and July 2008, Promile was queried 31,383 times. More than half this activity occurred before the end of 2005 (during its first four months in operation). An equivalent intensity of use was recorded only once more, in July 2006.

Overall, the service was ordered from 12,624 phone numbers: 67% of customers used the service once, nearly a third repeatedly. 17% of Promile customers had their BAC checked twice, and ten or more queries were sent from 1.4% of numbers. Three phone numbers were used for over 100 messages each, while one was used for a record 640 message. Rather than hinting at incipient *Promilitis*, the real reason is believed to be that more than one person uses the same phone number, thus substantiating a higher level of individual users.

The waning in use after the first months of the Promile SMS service operation can be attributed to a limited level of promotion during the following months. At the end of 2005, the service was promoted using printed material and beer mats, but thereafter the service functioned without any serious advertisement at all.

Of Bugs and Blips

Like any IT system, the Promile SMS service had its share of alerts and howlers. 11% of messages contained values of alcohol consumed in excess of fatal doses. Others had an unlikely date for the beginning of the consumption of alcohol.

Such messages may, in reality, be considered as tests (by customers to see if the service works) - or as practical jokes. In order to avoid bias in average alcohol consumption and BAC data, all such cases were excluded.

User Profiles

The Promile service is mostly used by men (about 80% of queries). The average age of all customers is 33.4 years, with a negligible difference in the latter in terms of gender. Under-age customers (below 18) represent 1.5% of all users, while 3% were above 60.

Promile SMS service users consumed an average of 111 grams of alcohol per session. The average quantity of alcohol consumed by men was 118 g, and 84 g by women. The most typical quantity of alcohol consumed during one occasion was 40 g (corresponding to approximately one litre of beer).

Indeed, the bulk of customers (68%) stick to one type of a beverage, just under 29% combine two types while the remander combine over two types of alcohol.

One additional finding from the Promile service (of potential epidemiological value for healthcare researchers) is the weight profile of customers: 67 kg for women on average and 86 kg for men, with the average weight increasing with age until 40, and then stabilizing at 85-89 kg (though 11% of people in the sample weighed 100 kg or more).

Age Category	Quantity of alcohol (g)	N	Std. Dev.	Median
17 and less	107.2	262	65.8	98.8
18-29	114.9	9,145	74.8	98.8
30-39	111.3	6,609	75.2	98.8
40-49	113.8	3,724	69.9	98.8
50-59	99.8	1,823	64.0	95.8
60 and more	77.6	683	55.6	59.3
Total	111.2	22,246	73.0	98.8

Alcohol consumption patterns

Excluding the above-fatal dose levels mentioned previously, BAC levels varied from 0-6%.

The average BAC level was 0.79% - by gender, 0.73% for women and 0.81% for men.

It is interesting to note that average BAC levels decreased with age, with the highest values (1.18%) reported by those aged under 18. This fact may be associated with the practical joke/test messages, but a more likely explanation is irresponsible drinking among those under age.

A quarter (26%) of the customers ordered the Promile SMS service in morning hours (between 6 am and noon), more than half (51%) between noon and midnight. The highest number of queries were invariably during the last three hours of a day.

Indeed, most Promile customers (52%) started consuming alcohol between 6 pm and midnight, with (38%) doing so between 6 pm and 9 pm. The problematic users (with a 14.2% share) were those who started drinking before noon, between 6 and 12 a.m.

At the time of sending the SMS, 35.8% (or more than a third) had zero alcohol in the blood. Based on further analysis, we found that such customers tended to largely seek information in the morning (as compared to customers with a higher BAC who queried Promile at later hours).

As a result, we believe this involves a group of people who use Promile to check on their BAC on the second day after drinking – for example, to see if they can drive a car , without any risks.

Yet another interesting finding was a correlation between consumption levels and weekly cycles. Promile customers consuming the most alcohol were those who begin drinking on Wednesdays, Fridays and Saturdays; those who drink on Tuesdays reported the lowest quantity of alcohol consumed.

Conclusion

As mentioned previously, it is possible that a tapering in use of Promile may due to limited promotion in the following months.

However, it is also likely that the drop in interest may simply be due to the effectiveness of the Promile service itself: drinkers who often consume similar quantities of alcohol get a rough idea of how long it takes before they sober up, and so do not need to query the system again.

In addition, if the goal of the Promile project involved providing a tool to enable users to check their BAC level and determine when it was possible to sit down safely behind a wheel again, then it is obvious that this has been met successfully.

The final indicators involve a high proportion of customers with a zero BAC, who seek the Promile SMS service more commonly in morning hours before noon, and alongside, a high proportion of users checking blood alcohol during the consumption of drinks.

In brief, the Promile service is likely to have acquired a regular base of customers. If its capacity is, however, to be utilised fully, it may be useful to promote it more forcefully in a systematic and long-term manner – both in the Czech Republic and beyond.

REAL-TIME LOCATION SYSTEMS:

LEVERAGING RFID, WI-FI AND ULTRASOUND IN THE HOSPITAL

AUTHOR
Tosh Sheshabalaya,
HIT

Hospital managers face increased pressures from cost containment and other policy reforms, a relentless level of technological change and ever-newer product and solution choices, coupled to shortages of qualified staff. Meanwhile, there has been no let up in the need for improved efficiency and quality assurance to give patients the best medical care. Real-time location systems (RTLS) are a major area of attention in such contexts.Though much of the focus has so far been on radio frequency identification (RFID) systems, new alternatives are emerging – some of which have been designed with hospitals in mind.

RFID: Still key to 'Automating Everything' ?

Seen some time ago as an indispensable technology for a host of sectors, RFID has been on a roller coaster ride in recent years. The high point for RFID was a January 2004 story in the prestigious Scientific American magazine, which labelled it, unabashedly, as the "Key to Automating Everything".

Since then, in spite of a steady growth in use and a fall in unit costs, interest in the potential of RFID real-time location systems (RTLS) as a killer, paradigm-shift technology has tempered somewhat.
Reflecting this, a survey by Illinois, US-based industry group CompTIA (Computing Technology Industry Association) reported in August that the number of IT companies who "will or might offer RFID products and services in the next three years" fell by 14% from 2006.

From retail to hospitals

Nevertheless, CompTIA also found 75% of IT companies still planning to provide RFID solutions, and the technology has acquired considerable traction as a means to monitor closed-loop applications. This is especially true in discrete, smaller scale environments – from the automotive industry (a field where it took birth in its modern form) to transportation, warehousing and logistics. One of the major movers in the latter areas is the US Department of Defense, which has begun requiring suppliers to apply passive RFID tags on shipments.

Although the retail sector was considered to be the must-have domain for RFID, the technology seems to have found fertile soil for planting its roots in other fields – not least hospitals. According to a recent study by Menlo Park, California-based Spyglass Consulting, the use of RFID at hospitals has tripled over the past three years.

The Klinikum Saarbrücken pilot

In April 2005, RFID was launched in Europe's first major hospital trial at the Klinikum Saarbrücken in Germany. This pilot project, aimed at improving administration and reducing clinical errors, provided RFID-tagged wristbands for 1,000 patients. The tags carried a unique code corresponding to encrypted patient records, and provided data on drugs and dosages required by the patients. Hospital staff were equipped with PDAs and tablet PCs to connect to the RFID data by means of a WLAN. Patients too were provided with terminals to scan their wristbands.

Such a technological architecture, indeed, remains the mainstay of RFID use in hospitals across Europe and the US. So do the objectives – to provide positive identification of patients, track and locate patients and medical staff, and thereby enhance administrative/operational efficiency and reduce clinical errors.

New value points = New opportunities

More recently, several additional value points have begun to be exploited, such as automatic alerts/alarms on staff tags – which permits location of a surgeon or nurse to colleagues. There also have been reports of tagging mothers to newborns, to prevent mismatching – an issue of considerable concern in large hospitals.
In the long term, increased RFID use is not unlikely to dovetail into hospital-wide process improvement and quality assurance programs.

Of 30 million RFID syringes

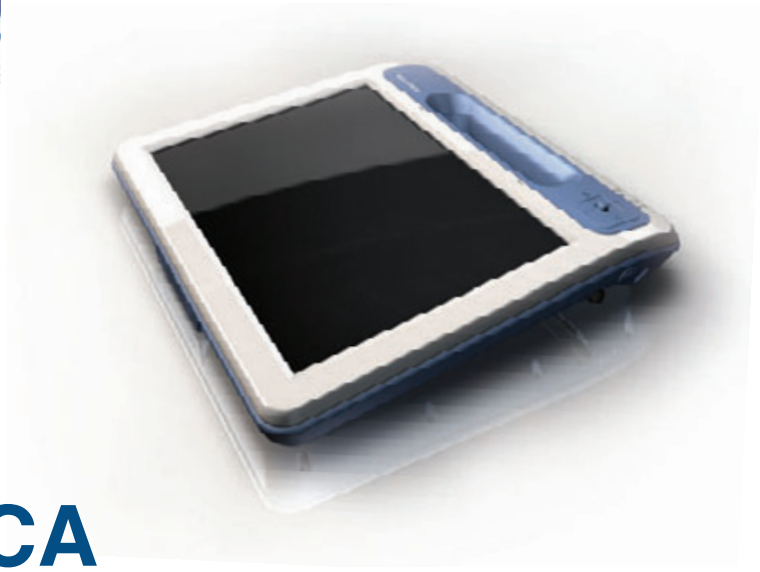
On the more generic applications side, hospitals have begun using RFID to track medical equipment and pharmaceuticals. Indeed, one of the largest RFID applications so far has been in the healthcare sector, when Anglo-Swedish pharmaceutical giant AstraZeneca tagged 30 million syringes of the anaesthetic Diprivan. The initiative was also the first to use high-volume chipless RFID tags beyond a few millimeters range.

Fight counterfeiting – US and Europe

In spite of continuing debates about standards, it seems likely that the pharmaceutical industry becomes a major player in the RFID area if the US Food and Drug Administration (FDA) mandates tagging of drugs to fight counterfeiting. As in many other emerging medical technology areas, the US seems to

ADVANTECH Medical Computing

Enabling Digital Healthcare



Advantech MCA
in the hands of Nurses

Why it is that everybody seems to be using notebooks, Smartphone's and PDA's to make their jobs easier, but not Nursing Staff in our Hospitals? Sure, you can have a PC perched on the corner of your desk running all the usual applications, but what happens if you need that information when you're with patients? You could have a laptop running those same applications - problem solved! Sounds simple and cost effective, but there are other implications which need to be considered…

- Mobility – can I actually do my daily job while carrying a tablet PC?
- Usability – do I need extra training for a new system?
- Ergonomics – will it help me do the job better?
- Durability – is it rugged enough to survive being dropped?
- Data Security – can I move around without losing data?
- Compatibility – will it run the same applications as the other systems?
- Hygiene – can it be cleaned to minimize the spread of infection, can it be cleaned easily?

Hospital staff, whether Doctors, Nurses or IT Personnel, are focused on providing the most effective healthcare that they can, and they need the right information at the right time to do that properly. Many initiatives to deliver Electronic Medical Record/ Patient Record information, for example, are being run worldwide, and alongside these Intel Corporation has carried out research into how their mobile technology used in consumer electronics could be applied to the healthcare market. This has lead to the development of the MCA [Mobile Clinical Assistant] architecture.

Today Advantech is supporting this initiative by introducing its first product -

The Advantech MCA [Mobile Clinical Assistant]

Based on the new Intel® Atom® Processor targeted at mobile internet devices, this is a portable unit designed specifically for patient care. It's lightweight, simple to use via the touch panel, easy to clean and is offered with a range of docking station options for bedside, cart & ambulance usage. The Fanless IP54 rated device has a 1.1GHz or 1.6GHz processor, 1GByte DDR2 memory [expandable to 2GByte], integrated 3D graphics and high definition audio through internal speaker and 2 microphones. A large 10.4" XGA TFT LCD screen [1024 x 768] provides clear information and dual touch panel using digitizer & resistive technology for both pen and touch operation, wireless connections are made by integrated Intel PRO/Wireless 3945ABG network connection optional ABGN and integrated Bluetooth V2.0+ EDR and the optional 3.5G module. One power-in jack for DC input, one docking connector and one USB-Port type 1.

The standard battery provides 3-4 hours continuous operation, with a 2-hr recharge period. The Advantech MCA has a bar-code scanner, RFID active Tag function and camera with flash, storing data on the 60GB drive or optional SSD Card. There are also Webcam & Fingerprint readers available.

Examples will be on show at two major medical events in Europe this year – WoHIT2008 (Copenhagen, Denmark, Nov 4-6) and Medica (Düsseldorf, Germany, Nov 19-22).

www.advantech.eu

be setting the pace in RFID. While its Federal Register Notice (FDA-2008-N-0121) in March 2008 seeks explicit comment about RFID, the EU's 'Public Consultation in Preparation of a Legal Proposal to Combat Counterfeit Medicines for Human Use' – also released the same month – only mentions "various tamper-proof technologies … under discussion by the industry (e.g. datamatrix/2D barcoding)."

Hospitals: New issues on RFID

Unlike the pharmaceutical sector, the debate on increased RFID use in hospitals has been charged – with regard to electromagnetic interference by active, long-range tags with vital, life-support medical electronic devices.

In June 2008, the Journal of the American Medical Association published the findings from a study by Amsterdam University's Academic Medical Center (AMC). This warned that RFID may disrupt the operation of sensitive medical equipment and occasionally induce "potentially hazardous incidents."

The study, which investigated the electromagnetic effects of RFID on 41 medical devices (including defibrillators, infusion pumps and pacemakers), reported a total of 34 incidents of reproducible electromagnetic interference, 22 of which were classified hazardous and another 2 as significant.

A charged debate

The debate on RFID is expected to remain charged for some time to come.

One month after the Amsterdam study, US researchers at Indiana University Purdue University Indianapolis (IUPUI) reported that RFID systems did not result in interference with medical equipment.

The difference however lies in the details. While the Amsterdam study used two RFID systems—one passive (868 MHz tag and interrogator) and one active (124 kHz battery-powered tag and reader) – the US study used only a passive ultra high-frequency (902-928 MHz) system.

Another critical difference is that while the former studied RFID systems at very close distance (within centimeters) of medical devices, the US tests never placed them closer than 30 centimeters — a more real-world scenario. On the other hand, the Amsterdam investigators did extend their tests to as much as 6 meters.

Experts believe that such concerns will dampen enthusiasm about RFID, at least until there is more conclusive evidence to rule out its purported risks. In the interim, it is likely that hospitals are advised to test the impact of specific RFID systems on their medical electronic equipment before deployment.

Alternatives emerge: Wi-Fi RTLS

In recent years, there has also been considerable promise in a different technology. So-called Wi-Fi-enabled location systems serve many of the same purposes of RFID – at least in an indoor hospital setting. These include the location, status and movement of both people and devices.

Wi-Fi-enabled location systems use positioning algorithms, based on calibration of Wi-Fi signal strength. The systems are capable of locating Wi-Fi tags, VoWLAN handsets, PDAs and tablet PCs, barcode scanners and other Wi-Fi enabled devices. Operating as Wi-Fi network-connected devices (in some cases, with sensors plugged and played on standard electric sockets), the system integrates directly with a Wi-Fi network, at most requiring the installation of extra APs (access points). It avoids interference with existing Wi-Fi connectivity, voice telephony, data, messaging etc., but provides an option to create various levels of secure access within a user's facility.

Resonance with healthcare managers and vendors

Philosophically, Wi-Fi RTLS systems have struck a strong chord of resonance with healthcare IT managers, as well as with vendors.

For IT managers and hospital administrators, a distinct advantage is that Wi-Fi-enabled location systems capitalise on the existing wireless infrastructure in a hospital. In addition, they do not produce any electromagnetic interference, a strong argument in light of the above concerns about RFID.

For vendors, on the other hand, Wi-FI location systems address a specific challenge posed by hospitals, where every department has specialised needs and working practices – as do the different users (nurse, physician, pathologist or administrator). In such an environment, the over-arching need for any IT system is to use or build a multi-purpose backbone infrastructure that integrates different departments and users. This has clearly been met by Wi-Fi, which has decimated proprietary offerings, ranging from Voice-over-WLAN, to mobile access systems and more.

Europe takes a lead

Wi-Fi RTLS systems first made their presence felt in the US, with major deployments, among others, by the US military. The highest profile healthcare application so far is the Carolinas HealthCare System (CHS), the third-largest public hospital system in the US, with 15 hospitals and medical centers and facilities of about 500,000 square meters.

Europe has, nevertheless, also been quick to adopt Wi-Fi RTLS, especially in a healthcare setting. Some sources claim that the world's first Wi-Fi system used for patient location and tracking was in 2004 at Heartlands Hospital in the British Midlands. Europe has also taken the lead in other areas. In 2007, Belgium's Gent University Hospital was reported as the world's first to use RTLS to track not only where, but also how patients were. The hospital has integrated RTLS tags with medical monitoring equipment to despatch patient health data (blood pressure, oxygen levels and ECG images) as well as emergency alerts to nurses equipped with wireless VoIP phones.

The use of Wi-Fi RTLS in Europe intensified in 2008, with implementations from Scandinavia to Spain. Leading vendors of such systems have partnered with local resellers, to build future sales channels.

And now, ultrasound RTLS

The latest approach to RTLS is ultrasound. USID (ultrasound identification) was pioneered in Scandinavia, and uses a barcoded wrist band with a small, disposable battery-powered ultrasound tag. Receivers use proprietary DSP (digital signal processing) algorithms to acquire and transmit signals via a user's LAN/Wi-Fi network to a database with information about the tag's location and the time of reception.

Unlike RFID (or Wi-Fi RTLS systems), USID is better for room-level tracking since ultrasound does not penetrate walls or floors. This helps in precisely pinpointing assets (equipment or staff) within a room, and also avoids problems in areas such as a junction of rooms. So far, addressing such challenges have included relatively expensive solutions, such as hybrids of RFID and infra-red (IR) to enhance precision where required.

On the other hand, USID is similar to Wi-Fi location systems by capitalising on the existing wireless infrastructure and not producing electromagnetic interference. USID systems are also quickly scalable.

Enabling technologies and operational efficiency

The continuous development of new enabling RTLS technologies is likely to continue.

On the horizon are new RTLS healthcare applications to improve reporting, compliance and workflow. Overall, RTLS may eventually also have relevance for quality assurance and process improvement programs in hospitals.

RTLS: Taking a Lead

As in many other emerging medical technology areas, the US seems to be setting the pace in RFID and other RTLS systems.

However, some sources claim that the world's first Wi-Fi system used for patient location and tracking was in 2004 at Heartlands Hospital in the British Midlands. In 2007, Belgium's Gent University Hospital was reported as the first to use RTLS to track not only where, but also how patients were.

GEORGIA CLINICAL INFOSYSTEM GOES LIVE

AUTHORS

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A new clinical information system (CIS) has been launched in Georgia. Its primary goal is patient management. However, the system is also targeted at creating a unified information space in the framework of the wider medical organisation, especially in a healthcare environment undergoing both rapid transformation and no let up to economic pressures. This is the kind of challenge several other countries in the region are likely to be encountering at the current time.

The Georgian CIS has been created with .Net technology and SQL database architecture and involves a multi-user Web-based approach. This ensures local (Intranet) and remote (Internet) access of the system as well as management of databases.

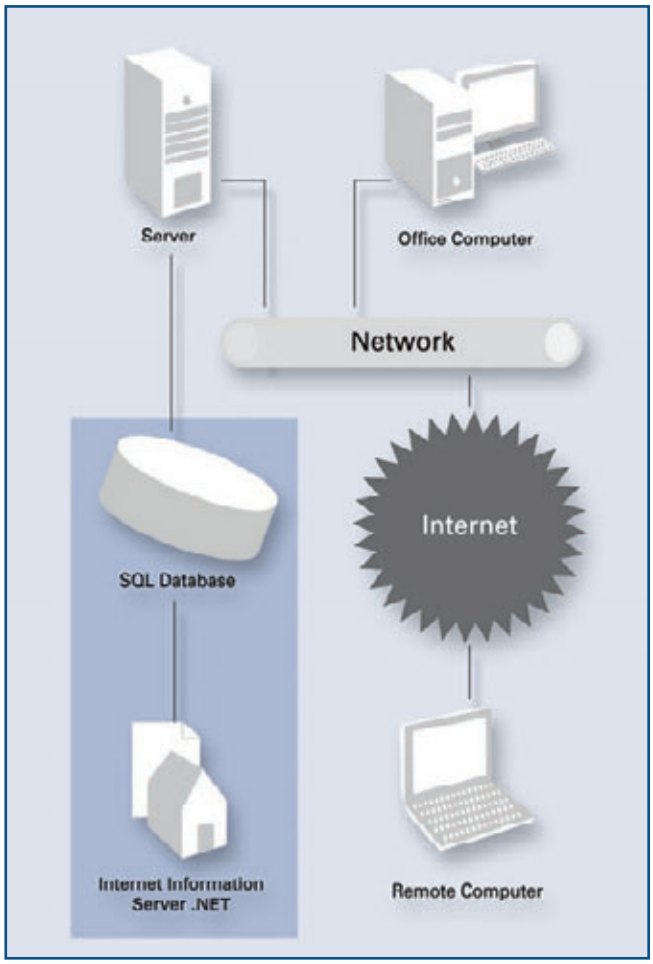
Architecture

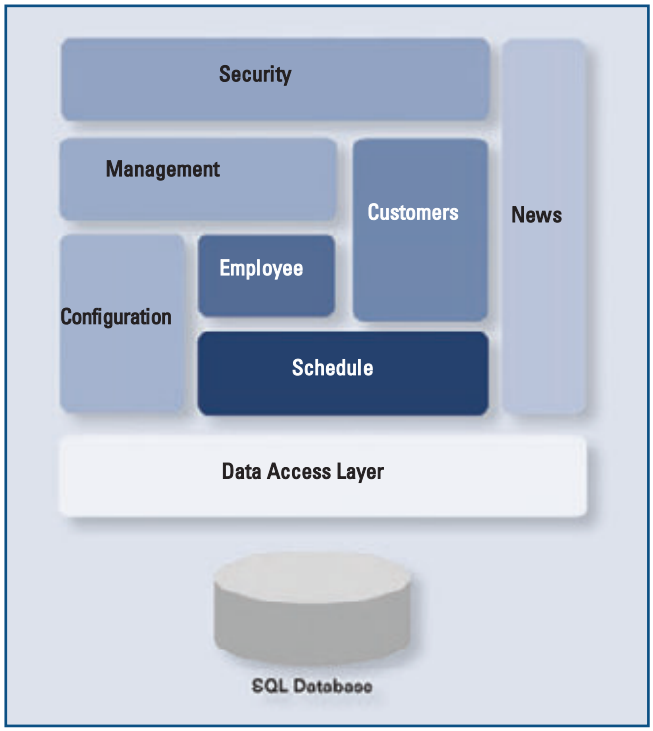
The CIS consists of three key modules:
1. Administration and configuration module
2. Working module for medical personnel
3. Reporting module.

The administration and configuration module is dedicated for the setup of basic rights. It allows users to be registered or blocked, and their rights to be defined and configured. All forms used in the clinic (consultation, clinical investigation, diagnosis, prescription, treatment etc.) are generated by the administration and configuration module as is a database of staff in a specific clinic, with each employee provided with a unique code alongside biographical and professional data.

The working module for medical personnel generates, edits and updates medical history. Patient visit planning, staff work scheduling and agendas are also realised by this module, with automatic notifications sent to concerned staff. Medical history, associated with a unique code, consists of both text and multimedia files – image, video and voice – and is generated at the first visit by a patient to a clinic.

The reporting module realises full or partial export of medical history as well as the forms used in clinical investigations, consultation and prescriptions – in a variety of formats (.pdf, .rtf, .jpg etc.). This module permits statistical analysis of medical data (patient's age, sex, diagnosis, date of investigation, treatment parameters etc.) and are designed for use in the quality control of medical services.





Evolution

Since implementation, the clinical information system has been rapidly evolving into additional areas:

- Clinical decision support. This provides users with the tools to acquire, manipulate, apply and display appropriate information to aid in making accurate, timely and evidence-based clinical decisions.
- Electronic medical records (EMRs). These contain information about patients, from personal details (such as name, age, address and sex) to details of every aspect of care given by the clinic (ranging from routine visits to major operations).
- Training and research. Patient information is made available to medical personnel for training and research. One new field is data mining of information stored in databases, as a means to provide insights into disease states and how best to manage them.

Benefits

The CIS has yielded significant benefits:

- Easy access to patient data. The system provides convenient access to medical records at all points of care. This is especially beneficial at ambulatory points, and thereby directly enhances continuity of care. Internet-based access improves the ability to remotely access such data.
- Structured information. The data captured in clinical information systems is well organised, thus making it easier to maintain, and quicker in finding relevant information. The CIS also reduces the likelihood of mistakes arising from illegible writing.
- Improved drug prescription and patient safety. The CIS enhances control of drug dosing and this leads to a reduction of adverse drug interactions, while also promoting more appropriate pharmaceutical utilisation.

Barriers

Despite such benefits, there are still barriers which prevent the CIS from being rolled out in every healthcare organisation across Georgia.

- Initial cost of acquisition. The high price of the basic infrastructure is a stumbling block for many healthcare organisations.
- Privacy and security. There are still huge concerns in the healthcare industry about the privacy of patient data on computer systems and how to keep such information secure.
- Clinician resistance. Clinicians usually have 10-20 minutes to see their patients and if their use of a CIS takes up more time than before, it leads to resistance.
- Integration of legacy systems. As elsewhere, this poses a stiff challenge for many organisations in Georgia.

HEALTHCARE AND FP-6: A LOOK BACK (Part II)

ANALYSIS

Our previous issue (HITM Vol. 3, Issue 3) provided a summary of 26 healthcare IT projects under the Sixth Framework Programme for Research (FP-6) which ran from 2001-06. We classified them into three categories used by the current Seventh Programme (FP-7): ICT and ageing, IT architecture and infrastructure, and bioinformatics and robotics. The second-part of our analysis looks at the remaining 28 FP-6 healthcare IT projects, which fall under two other FP-7 groupings.

The two groups described below, along with project numbers and EU funding are: advanced ICT for patient safety (22 projects, 102.04 million Euros) and personal health systems (6 projects, 12.19 million Euros).

Personal Health Systems: The 6 project consortia consisted of two UK-led ones and four headed by institutions and companies from Belgium, the Czech Republic, Italy and Spain. EU support ranged from 1.7-2.3 million Euros per project.

Advanced ICT for Patient Safety: The 22 projects had consortia led by organisations in the UK (6 projects), followed by Italy (5) and France (3). Philips Germany led the largest funded project (16 million Euros) to develop intelligent systems for the prevention and monitoring of cardiovascular diseases. Other major projects (10-12 million Euros) consisted of a British (University of Newcastle)-led consortium developing smart integrated biodiagnostic systems, a French-led consortium focused on clinico-genomic cancer trials and an Italian-led consortium developing a "personalised information platform for life and health services".

[Personal Health Systems]

AUBADE:

A wearable EMG augmentation system for robust emotional understanding **(www.aubade-group.com)**

An innovative tool to enable a deep study, analysis, understanding, and comprehension of neurological diseases and human emotions. AUBADE has developed an intelligent, multisensor, wearable system for assessing the emotional state of humans under special conditions. Other areas of application include the racing car sector.

EU Funding: 2 million Euros.
Contact: Siemens SA, Spain.

DICOEMS:

A diagnosis collaborative environment for medical relevant situations **(www.dicoems.com)**

A portable system to support the management of medical emergencies. It aims to enable more effective decision support and risk management in primary diagnosis, pre-transfer arrangements and treatment of critical situations.

EU Funding: 2 million Euros.
Contact: Synergia 2000 S.p.A, Italy.

HEALTHPLUS:

Improving knowledge and decision support for healthy lifestyles **(www.health-plus.eu)**

To design, develop and validate a HEALTH PLUS system to become a leading web-based weight control, food intake monitor, lifestyle assistant and certified information provider positioned on the European market for ICT-based e-Health systems and services.

EU Funding: 2.2 million Euros.
Contact: IDS Scheer, Czech Republic.

INTREPID:

A virtual reality intelligent multi-sensor wearable system for phobias' treatment **(www.intrepid-project.org)**

To develop a multi-sensor wearable system for the treatment of phobias and situational anxiety in an unobtrusive, personalised and intelligent manner.

EU Funding: 2 million Euros.
Contact: Manchester University, UK.

OFSETH:

Optical fibre sensors embedded into textile for healthcare **(www.ofseth.org)**

To develop optical fibre based sensors to continuously assess vital parameters of a patient, taking account of issues linked with textile and wearability for the efficient and continuous care of patients.

EU Funding: 2.32 million Euros.
Contact: Multitel, Belgium.

WOUNDMONITOR:

Mobile system for non-invasive wound state monitoring **(www.manchester.ac.uk/woundmonitor)**

To produce a non-invasive state-of-the-art sensor based device which monitors a patient's wounds by detecting bacteria in the air emitted from the wound.

EU Funding: 1.67 million Euros.
Contact: University of Manchester, UK.

[Advanced ICT for Patient Safety]

ACGT:

Advancing Clinico-Genomic Trials on Cancer **(www.eu-acgt.org)**

To present the 'next-step' in cancer research and fill-in technological gaps in clinical trials. The project will define common standards of data storage at each level of investigation, develop new ontologies for cross-referencing terms and biological contexts and implement a bio-medical GRID infrastructure for seamlessly mediating data sharing and data processing.

EU Funding: 11.89 million Euros.
Contact: Institut National de Recherche en Informatique et en Automatique – Healthgrid, France.

ALLADIN:

Natural Language-Based Decision Support in Neuro-Rehabilitation **(www.alladin-ehealth.org)**

To provide solutions for a worldwide need to tailor rehabilitation of stroke patients, to meet both their functional and societal needs, and restore their independence.

EU Funding: 3.3 million Euros.
Contact: Arteveldehogeschool, Belgium.

ASSIST:

Association Studies Assisted by Inference and Semantic Technologies **(www.iti.gr/db.php/en/projects/ASSIST.html)**

To provide medical researchers of cervical cancer with an integrated environment that will virtually unify multiple patient record repositories, physically located at different laboratories, clinics and/or hospitals.

EU Funding: 2.63 million Euros.
Contact: Centre for Research and Technology Hellas - Informatics and Telematics Institute, Greece.

BIOPATTERN:

Computational Intelligence for Biopattern Analysis in Support of eHealthcare **(www.biopattern.org)**

To develop a pan-European, intelligent analysis of a citizen's bioprofile; to make the analysis of this bioprofile remotely accessible to patients and clinicians; and to exploit bioprofile to combat major diseases such as cancer and brain diseases.

EU Funding: 6.4 million Euros.
Contact: University of Plymouth, UK.

CARDITIS:

Simulation based automated diagnosis, treatment and prognosis of cardiovascular diseases **(www.carditis.info)**

To develop a user-friendly, fast and reliable tool that will provide access to heterogeneous health information sources (MRI, IVUS, CT, Biplane angiography) and will introduce new methods for decision support and risk analysis.

EU Funding: 2.2 million Euros.
Contact: TeliaSonera, Finland.

CARE-PATHS:

An intelligent support environment to improve the quality of decision processes in health communities **(www.carepaths.eupm.net)**

To set up an intelligent operational environment for making Clinical Governance effective, to support health professionals in continually improving quality of care.

EU Funding: 2.2 million Euros.
Contact: AIRIAL Conseil, France.

CLINICIP:

Closed Loop Insulin Infusion for Critically Ill Patients **(www.clinicip.org)**

To establish glycaemic control on an automated basis in order to improve survival chances in intensive care units.

EU Funding: 7.5 million Euros.
Contact: Joanneum Research Forschungsgesellschaft mbH, Austria.

DESSOS:

Decision Support Software for Orthopaedic Surgery **(www.dessos.org)**

To develop decision support software for orthopaedic surgery so as to reduce variability in surgical outcome and maximise the longevity of orthopaedic devices and in particular, total knee replacements.

EU Funding: 3.98 million Euros.
Contact: University of Southampton, UK.

HEALTHAGENTS:

Agent-based distributed decision support system for brain tumour diagnosis and prognosis **(www.healthagents.net)**

To improve classification of brain tumours through multi-agent decision support over a distributed network of local databases. It will develop new pattern recognition methods for analysis of high-resolution magic angle spinning (HR-MAS) and DNA data, and define a method to assess the quality and usability of new candidate local databases, based on a quality score.

EU Funding: 3.79 million Euros.
Contact: MicroArts, Spain.

I-KNOW:

Integrating information from molecule to man **(www.cfin.au.dk)**

A knowledge discovery IT - based tool designed to aid early stroke diagnosis, stroke treatment, drug development and identification of risk factors as targets in disease prevention.

EU Funding: 3.09 million Euros.
Contact: Aarhus Sygehus, Aarhus University Hospital, Denmark.

HEARTFAID:

A knowledge based platform of services for supporting medical-clinical management of heart failure within the elderly population **(www.heartfaid.org)**

To develop and validate a knowledge-based platform of services, able to improve early diagnosis the clinical management of cardiac diseases in an ageing population.

EU Funding: 2.09 million Euros.
Contact: University of Calabria, Italy.

MATCH:

Automated diagnosis system for the treatment of colon cancer by discovering mutations on tumour suppressor genes **(www.match-project.com)**

To develop an automatic diagnosis system to support treatment of colon cancer diseases by identifying mutations that occur at the genetic (tumor suppression) level.

EU Funding: 2.02 million Euros.
Contact: Fondazione Istituto Oncologico Del Mediterraneo, Italy.

PALLIANET:

Decision support and knowledge driven collaborative practices in palliative care
(www.pallianet.eupm.net)

To set up an Information and Communication system that will improve communication and real time access to information, enabling a multi-disciplinary palliative care team to support both medical professionals as well as non-medical support staff.

EU Funding: 2.35 million Euros.
Contact: GFI Benelux, Belgium.

MICROACTIVE:

Automatic detection of disease related molecular cell activity
(www.sintef.no/microactive)

To develop an instrument for molecular diagnostics in the doctors' office which will firstly be used to screen patients for human papilloma virus. The project is based on microfluidics and biotechnology, which are believed to be more sensitive.

EU Funding: 1.6 million Euros.
Contact: SINTEF, Norway.

MY HEART:

Fighting cardio-vascular diseases by preventive lifestyle and early diagnosis
(www.multiknowledge.eu)

An Integrated Project aiming to develop intelligent systems for the prevention and monitoring of cardiovascular diseases.The project develops smart electronic and textile systems and appropriate services that empower the users to take control of their own health status.

EU Funding: 16 million Euros. Contact:
Philips GmbH Forschungslaboratorien, Germany.

PIPS:

Personalised information platform for life and health services
(www.pips.eu.org)

To create a new Health and Life Knowledge and Services Support Environment, improving current healthcare delivery models, and encompassing the entire set of business processes, professional practices and products, using the latest innovations in Information Technologies.

EU Funding: 9.8 million Euros.
Contact: Scientific Institute Hospital San Raffaele, Italy.

SMARTHEALTH:

Smart integrated biodiagnostic systems for healthcare
(www.smarthealthip.com)

To develop and deliver the next generation of smart diagnostic systems fully integrated into healthcare systems in Europe. Driven by key applications in cancer diagnostics, the project will develop prototypes aimed at making instrument action.

EU Funding: 12.3 million Euros.
Contact: University of Newcastle-upon-Tyne, UK.

RIGHT:

Reducing diagnosis and treatment risks by leveraging knowledge and practices of health care professionals (www.mip.polimi.it)

To provide healthcare professionals of new Member States with a semantics-based solution accessible from mobile devices. This is meant to offer access to information and the possibility of sharing knowledge with all the levels of care to minimise errors in diagnosis and treatment.

EU Funding: 1.94 million Euros.
Contact: Consorzio per l'innovazione nella gestione delle imprese e della Pubblica Amministrazione, Italy.

SIMAP:

Simulation modelling of the MAP kinase pathway
(www.simap-project.org)

To develop a comprehensive simulation biochemical model of the cancer related MAP-kinase pathway, integrating and analyzing data from various types of resources, which may assist in the development of better cancer treatment, and eventually more efficient drug discovery.

EU Funding: 3.1 million Euros.
Contact: Compugen Ltd., UK.

STEP:

A Strategy for the EuroPhysiome
(www.europhysiome.org)

To coordinate European activity relating to the physiome - a description of human physiology that will span multiple levels from the whole body down through the organs to the cells and beneath in an integrated manner. Currently developing concept of Virtual Physiological Human (VPH).

EU Funding: 1.18 million Euros.
Contact: University of Bedforshire, UK.

TACIT:

Technologies augmenting clinical insight
(www.tacit-ist.org)

To unlock some of the tacit knowledge of Europe's highly experienced senior clinicians and to combine that with readily accessible explicit knowledge, in a self-learning manner. The project aims to enhance decision making at all levels of care, while reducing chemical risks and improving the quality of healthcare services.

EU Funding: 2.5 million Euros.
Contact: Guys and St Thomas' Hospital, UK.

HEALTHCARE IT:
THE BUSINESS OF THE PROFESSION

AUTHORS
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Successful IT supports a business environment by adding value to the organisation in achieving its strategic goals. In healthcare terms, this could mean better health outcomes for patients and safer, more effective services. It could also mean better value for money. Despite changing perceptions, the thought of IT successfully adding value to strategic business goals is still relatively novel in the health environment. There are a number of reasons for this, including questions about healthcare IT as a profession (staff experience, quality, accreditation etc.).

Healthcare IT Industry is still immature

Modern, ubiquitous IT has been with us in health for only about 20 years. Email was not implemented in the vast majority of NHS organisations in the UK in 1991/92. Electronic Document Management (EDM) was just developing but remained primitive.

Commercial, standards-based relational databases were virtually non-existent. Overall, inelegant, clunky, home-grown applications were far more common.

Interoperability between systems and integrated health care records were things of fantasy.

We know from the uptake of mobile phones and satellite TV that technology-uptake is accelerating rapidly. However, the IT industry's maturity is best compared with the development of the automobile. In the not too distant past, there was a high frequency of breakdowns, do-it-yourself skills were needed and there were constant punctures. These are a thing of the past. Few cars today even need a spare wheel.

There is also still evidence of immaturity in the implementation of IT-enabled change. Efficiency improvements can only be delivered with relevant, structured change-management to ensure that the potential benefits available from newly computerised processes are fully delivered.

IT standardisation

Compared with 20 years ago considerable progress has been made; standards have proliferated and are crucial to future developments. Whilst at a high level, consistency in the application of standards is beginning to make a positive difference, at an operational level there is a massive amount of legacy applications and implementations to deal with.

There is no better example of this than in the NHS in the UK. The introduction of new clinical systems is a long-term project and will take many years to achieve all the benefits.

However, throughout the course of implementation of new, improved systems, inter-operability with existing systems needs to be maintained. For the clinician trying to manage a patient's care, improved functionality in new systems is something to look forward to – electronic transfer of referral information, previous medical history and results reporting are all essential now.

Health IT versus private sector IT

Is health IT any worse than the private sector? There is a widespread assumption that the private sector "does it better", whilst our experience indicates that there is little evidence to support this.

There are certainly areas where the private sector has made more progress, for example Total Cost of Ownership for IT equipment and in 'managing the assets'.

However the delivery of effective information technology within the NHS is an unique challenge. From a technical perspective, health data is more complex and sophisticated in its interrelationships than data in other industries, which has hampered the production systems that support clinicians in the practice of medicine and caused an excessive focus on administrative systems, resulting in IT being a back office function.When you consider IT in the NHS, politics is never far from the agenda. Is the NHS a single entity run by the Department of Health, or a system of related independent organisations? The answer differs markedly depending on what you believe.

Finally, the public's faith in the government impacts directly on whether they trust government institutions to handle their data. Whilst the track record of the NHS in managing confidential data compares favourably to any organisation, the scrutiny to which it is exposed is orders of magnitude greater. This creates a very difficult environment in which to drive forward the use of IT.

None of these challenges makes the attempt to implement high quality IT in the NHS any less worthwhile. Indeed, what could be more worthwhile than using IT to save lives, relieve pain and improve life chances?

Health IT professionals

The last decade has seen many changes in terms of professional developments and qualifications for IT staff working in health. There is a growing recognition that people working in healthcare IT need to be able to demonstrate their fitness to practice – they need some form of professional qualification or accreditation. Other NHS staff groups such as finance and human resources have their established professional bodies, while in health IT this is just emerging.Organisations like Tribal Consulting, working with over 2,500 organisations, including schools, colleges and universities, the NHS and primary care trusts, local and central government departments and agencies and the UK Council for Health Informatics Professionals (UKCHIP), are developing a range of schemes that towards improved accreditation of services and individuals.

For example, the NHS Connecting for Health (CFH) has implemented an accreditation process for Local IT Service Desks based upon ITIL (Information Technology Infrastructure Library) Service Management Best Practice principles. There is also considerable effort being placed upon other benchmarking schemes and maturity models. UKCHIP has introduced an individual professional registration and accreditation process based upon a number of criteria (such as qualifications, experience, continuing professional development etc.) and these are currently being revised.

Our surveys of healthcare IT staff have highlighted a number of concerns which included:

- Significant recruitment problems, primarily due to uncompetitive rates of pay.
- Vacancy rates range from 12% for Information Managers to 4% for Senior Managers and Clinical Informatics staff. Staff retention is being affected by low morale; informatics staff feel embattled, overworked and under-valued.
- Future skills shortages are anticipated in Project/Programme Management (2006/07 but not 2007/08); Business and Systems Analysts, Information Analysts, and ICT and System Trainers.
- There is strong support for establishing a formal health informatics profession.

The NHS CFH has also identified a number of gaps through its Capability and Capacity Programme. The actions resulting from this appear to have addressed some of the concerns about the potential future shortages of project and programme management staff. However, questions still remain about the consistency of the professional development of health IT staff.

Accreditation scheme for healthcare IT staff

The most significant recent changes have come with the publication of the Health Informatics (HI) Review report by the UK Department of Health in July 2008 and the appointment of the first CIO for health, with responsibility for professional staff development.

An earlier Tribal Consutling report in March 2007 outlined the four possible components of an accreditation scheme for IT staff:

1. Training of generic (i.e. not healthcare specific) skills and knowledge assessed by examination.
2. Approved work experience in the healthcare domain acquired through progress along designed career pathways.
3. An independent accrediting authority (which could be UKCHIP).
4. Approval by the accrediting authority that the employer provides a suitably professional environment for the work experience.

Training and examination

Some examples include:

- British Computer Society (BCS) qualifications through the Information Systems Examinations Board (ISEB).
- Vendor-related schemes for gaining certification in using the vendor's products, from a wide range of vendors.
- Qualifications in project, programme and service management.

NHS stakeholders agreed that the examination component of accreditation should be generic rather than health domain specific.

This is because they favour a regime that would enable movement of qualified staff between health and other industries. Health domain-specific examinations might inhibit this.

Work experience and CPD

The second component of accreditation is concerned with approved work experience and CPD (Continuous Professional Development). UKCHIP has developed three registration levels:

- For those who are either relatively new to the profession, or whose work does not require a particularly high level of healthcare informatics (HI) knowledge or experience.
- For those who have begun to develop a career in HI.
- For those whose careers in HI have reached a stage where they have the knowledge and experience to pro vide professional leadership.

The scheme is mainly based on assessing work experience. However, it is presently being revised, and is designed to encompass all categories of HI staff – not just IT practitioners.

A similar model has been produced by the Government IT Profession (GITP) and is being applied across the wider public sector in the UK.

In conclusion, despite some progress with IT in the NHS becoming a key enabler to service change, there is still some way to go in terms of applications, standards, suppliers and people. For the latter, universities and colleges will play a key role in training the health IT professionals of the future with the skills and competencies required for a modern health service.

This will go beyond traditional technical skills and into the realms of leadership, business transformation and people management, which are critical to ensuring that future IT systems meet the needs of clinicians and patients.

HOSPITAL CAPACITY PLANNING

Keeping Space in Mind

AUTHORS

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Most European hospitals will have to expand their examination and treatment capacity in the future, as well as restructure core functions. Whether to remain competitive or for other reasons, it will be essential to maximise short and long-term performance. Healthcare IT can play a key role in providing data, monitoring and making recommendations on optimising capacity use. SINTEF Health Research has been doing capacity planning projects on national, regional and hospital trust levels for specialist health care services. This review draws on our experience in the role of capacity in relation to buildings and space in strategic hospital planning.

Hospital expansion plans are usually a product of institutional dissatisfaction with a legacy of working conditions built up over several years. This is often due to ongoing changes in medical technology, models of care, demographics/epidemiology, and emerges from a lack of proactive planning. Investment projects for solving problems with cramped space, poor capacity and functionality, however, often derive from a process based upon clinicians' judgments of their own treatment capacity. Such projects may not always fit with paramount objectives.

We studied plans by a Norwegian teaching hospital for a 7000 sq. meter expansion, aimed at solving their need for more beds. The activity analysis showed that the hospital had a lower utilisation of beds, a higher amount of personnel per patient and per bed day, and a lower outpatient production than comparable hospitals.

The combined capacity/space analysis of the project showed a lower and unevenly distributed use of beds and available space between clinical (sub)specialties. This led to a sub-optimal use of hospital space. After an examination of possibilities for reshuffling the functional elements of the hospital, our study concluded that at present, there was no need for the expansion project.

To reach this conclusion, we did a complete analysis of the activity and physical capacity at the actual site. We found the number of beds had been reduced by approximately 150 units since 1991. Most of the released space was devoted to new activities without any master plan or strategy.

As a result, overall hospital functionality during this period was reduced, physically and organisationally. When our project was executed, the bed units were too small. An average of 16 beds per unit correlated with sub-optimal costs and staffing. 9 inpatient units had less than 10 beds.

Free space within bed units had been converted to offices with very low actual utilisation over the day. Outpatient and day-care units had been established as small units within the inpatient units where space was available. Early on, this was an effective approach, but as non-inpatient activity grew, space became more cramped, and coordinated use of space and personnel more difficult.

By identifying all units, regrouping them into cost effective and coordinated solutions for beds, outpatient clinics and day-care units, we could free space for new demands. We also recalculated utilisation rates and showed there was room for more activity within the occupied space of all organisational units/departments.

We projected future activity demands and, to show causes and effects, also compared our findings with information from other hospitals (based on national level data for inpatients, day patients and outpatients). Capacity and space use was measured, and the results for all functions and rooms were organised in a special, self-developed classification database.

To illustrate the lack of functional connections and their consequences for the overall hospital structure, we analysed drawings of all buildings and floors, identifying main functional space types with color coded schema. Our concluding advice was to start a regrouping and reorganisation process within the hospital to save space, and more importantly, for the hospital to become more cost effective.

Functional capacity is related closely to efficiency, and organising workflow is the key to expanding capacity. On a hospital level, this may lead to an extensive rearranging of work. The ability of hospital administration to encourage better utilisation of the existing rooms may lead to improving results up to a given point.

After such a threshold is reached, creative rearranging of work may be the only answer to such problems. Existing ways of organising work should be questioned. The planning on hospital/trust level will always have to take the existing facility into account, in terms of activity, capacity and space.

While positive results may not be reached immediately, but every hospital should be capable of monitoring activity, capacity and space use.

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MUCH ADO ABOUT SOMETHING?

Commission Recommendation on cross-border interoperability of EHR systems

AUTHOR
Tosh Sheshabalaya,
HIT Analysis

While much of Europe slumbered through its summer vacation, the program to build a pan-European e-Health network shifted up one notch, after the European Commission published a Recommendation on cross-border interoperability of electronic health record (EHR) systems.

At first sight, the Commission paper, released in July, appears lukewarm. A Commission Recommendation is a non-binding legal instrument. To many Eurosceptics in the healthcare IT industry, it is the equivalent of pulling out a BB gun, while other global actors are priming heavy-caliber hunting ammunition.

Devil in the details

And yes, the devil does (again) lie in the details. The Recommendation continues to seem lukewarm, even after a few readings.

Formally known as 'COM (2008) 3282 final', it comes less than a year after a draft which was published for public consultation.

That draft outlined both the salient points - and the challenges - around the issue of e-Health interoperability: privacy and confidentiality versus security, its organisational contours and processes, the semantic, architectural and technical factors involved, and the final packaging (certification and accreditation, as well as monitoring and evaluation).

Structural weaknesses

There were, nevertheless, two structural weaknesses in the draft. Both were significant, given the importance of interoperability to any meaningful European e-Health space (e-Healthscape, if one coins one's own bit of Eurojargon).

The first lapse concerned the definition of the draft as a document for 'informal' consultation. This qualifier of informality is reflected in the final Recommendation, which avoids any mention of such consultations – who was consulted, how they were consulted, what they stated and whether or not their comments were taken into account – and why.

This is very unlike the practice in some other parts of the world (especially Anglo-Saxon countries), where considerable attention is given in public consultations to the viewpoints of actors outside the realm of a professional civil service.

In addition, several such exercises explicitly identify and provide either the text or the summary of such submissions (Australia being one good example).

Nanny knows best

Sadly, this lapse is a reflection of what many criticise as an ingrained propensity for secrecy in the corridors of the Berlaymont. The litany about the "Nannies in the Brussels Superstate" knowing what is best and never needing to explain why - is not just the preserve of British tabloids.

Of sensitive information and competence …

At Healthcare Information Technology Management, we were given a good example by the CEO of a top contract research organisation.

While increasingly paperless/cross-border clinical trials are an evident area of attention for e-Health, EudraCT, the European Union's 'e-Registry' of such activity, remains closed to the public.

So, he asked, should a European need information about 'stem cell trials' on the 'elderly' – and can there be more red alerts than these in a search phrase ?

Well, such a trial is taking place in an EU Member State. It has a EudraCT registration number (2005-002156-17), but access to the database (http://eudract.emea.europa.eu) remains closed to all but "competent authorities of the Member States, the Commission and the Agency," warns a document at the Website.

Uncle Sam lends a hand …

Across the Atlantic, life is different, not just for Americans but Europeans too. Typing in the EudraCT number into the American government's counterpart to EudraCT (www.clinicaltrials.gov) not only provides detailed information about this sensitive European trial, but tens of thousands of others across the world.

From interoperability and vacations …

In the final analysis, the draft Recommendation on the Titanic challenges of healthcare IT interoperability focused on four rather-trivial factors as its raison d'être:

- The needs of vacationing EU citizens who fall ill in another Member State
- Those who travel for medical care to another EU country.
- Remote healthcare diagnostic services (a near-repetition of the previous two factors).
- Transnational issues focused on "referral thresholds, admission

rights, liability and recompense, and reimbursement" – again, more or less, a recap of all the above.

Via the Real World

The draft made little if any reference to other, more real-world and harder realities of global first-mover market-facing standards (European, American or even Asian), of scale, of pan-EU Best Practices benchmarking etc.

This then is the real world backdrop for e-Health and interoperability - of cross-border fast becoming borderless, of massed healthcare SoA teams at a variety of places around the globe, of Websites like Kiesbeter in the Netherlands - which allow patients to window-shop hospitals on the basis of performance, and more.

… To interoperability and travel

After all this, even the final Recommendation leaves much to be desired. Its third paragraph, once again, repeats the problems faced by "travelling persons" in Europe, as a need for cross-border interoperability for healthcare IT systems. The seven proposals in the Recommendation (final) are listed below:

1. The political level of cross-border interoperability of electronic health record systems.
2. The organisational level of cross-border interoperability of electronic health record systems.
3. Technical interoperability of electronic health record systems.
4. Semantic interoperability of electronic health record systems.
5. Certification of electronic health record systems.
6. Protection of personal data.
7. Monitoring and Evaluation.

The key issues of concern to healthcare IT managers are (3) and (4), namely technical and semantic interoperability. The others are little more than a rear-view rewrite of the Vision in the Draft, with a glut of references to issues like "financial indirect incentive mechanisms", to five-year programs (rather like the current FP-7), to the "governance process", "policies and incentives", to "mutually recognisable conformity" etc.

Of Survey(s) and More Survey(s)

The biggest lapse, however, in the Recommendation is its advice to "undertake a comprehensive survey of existing technical standards and infrastructures that may facilitate the implementation of systems supporting cross-border healthcare and the provision of healthcare services throughout the Community, especially those related to electronic health records and exchange of information", and to "analyse the use of standardised information models and standards-based profiles when developing and implementing interoperable electronic health record systems and services solutions."

Indeed, someone in the Commission seems to have forgotten that the entire "comprehensive survey" of standards and infrastructures is actually over, and paid for (to the tune of 1.16 million Euros, by the EU, under FP-6, its Sixth Framework Program for Research).

It was delivered in late 2007, both as a report to the Commission and on the Turkish National TV Channel, TRT2.

Riding an overlooked roadmap

The so-called RIDE project (Roadmap for interoperability of e-Health systems) is an encyclopedic exercise; its final report is 276 pages long. It took 24 months, and involved medical informatics organisations and experts from 7 countries (Belgium, France, Germany, Greece, Ireland, Italy and Turkey).

RIDE was mandated to lay the foundations for the Commission's action plan on e-Health (COM 356) by explicitly studying and coordinating efforts on e-Health interoperability across Europe – with "special emphasis" on semantic interoperability.

The RIDE project investigated both the current state-of-play and techno-policy interoperability challenges in EHRs across a wide range of EU and other associated countries; the consortium was headed by Turkey's Middle East Technical University. RIDE made an analysis of e-Health systems in 8 key countries (Austria, Estonia, Germany, Ireland, Netherlands, Poland, Sweden and the UK) and an in-depth survey of interoperability systems and practices in 14 countries: Belgium, Bulgaria, Cyprus, Hungary, Latvia, Luxembourg, Malta, Portugal, Romania, Slovenia and Spain, as well as Australia, Canada and the US. The RIDE experts also analysed specific challenges related to semantic interoperability in another four countries: the Czech Republic, France, Greece and Norway, and separately collated insights into both Current Practices and Best Practices at the EU level as well as a professional gap analysis for the future.

Crucially, RIDE acknowledged the impracticability of "a single universally accepted clinical data model." They sought to both assess current limitations in the field and evaluate European best practices in providing semantic interoperability. The eventual aim – to "draw up a realistic roadmap" for "achieving interoperability" and "deploying interoperable e-Health solutions".

Of USB Sticks, Cellphones and Health Records

In the final analysis, the debate on EHR interoperability in Europe seems to swing manic depressively between pies-in-the-sky and periods of total stasis. At the baseline, as one cynic told *Healthcare Information Technology Management*, the really crucial (and meaningful) health records of tourists could be easily accommodated on a USB stick or even a cellphone.

It is also unlikely that such basic data would pose concerns about security – least of all to a European holidaymaker requiring urgent medical attention at another end of the continent.

This is not to question the major, serious and laudable goals of an interoperable EHR in Europe. However, it is evident that the RIDE project was (and remains) a very good place to start.

It is puzzling why the Commission Recommendation mentions its action plan on e-Health (COM 356) in several footnotes, but has nothing to say about RIDE, which was "mandated to lay the foundations" for the very same COM 356, and by all accounts, appears to have done a laudable job.

HEALTHCARE IN CENTRAL EUROPE: TRANSITING TO CATCH-UP

After an initial phase of deterioration in the mid to late 1990s, healthcare systems in central Europe (Czech Republic, Hungary, Poland and Slovenia) have steadily begun moving towards mainstream EU standards, albeit at different speeds and facing different sets of challenges.
A key driver of this process has been an enhancement in the priority given to healthcare by both national governments and the EU.

In spite of such positive developments, considerable work still remains to be done. The systems predating EU accession were characterized by significant inefficiencies, with gaps in areas like primary care accompanied by over-supply in others (not least, in terms of specialist physicians, hospital beds and staff).

Meanwhile, the growth of private hospitals and practices (pioneered by Poland and Hungary, and followed by the Czechs) has catalysed new structural imbalances.

The key issue remains one of financing. In spite of greater budgets, needs continue to overwhelm availability. All central European countries have introduced cost-containment mechanisms, beginning with competitive tendering via health funds (both private and public) and the decentralisation of hospital management.

Further along the road are proposals for setting up a gatekeeping system, introducing diagnosis related group (DRG) payments for hospitals and reducing the number of specialists. The single biggest challenge, however, concerns the cost of pharmaceuticals, whose share in total health expenditure in the region is about two times more than in the EU.

Given below is an overview of the healthcare system in each of the four surveyed central European countries.

Czech Republic

Reforms to the centralised Czech Semasko healthcare system began in earnest in 1990, with the aim of developing a German-inspired social insurance model.

This was accompanied by the emergence of a variety of insurers, who finance healthcare providers on the basis of a fee-for-service reimbursement, and also compete for members.

Most physicians have private practices and work under contract with insurance funds to offer a basic package of services.

In early 2003, ownership of public hospitals was transferred to regional authorities. The Health Ministry is however responsible for

legislation, medical research, the licensing of drugs and operation of university hospitals.

Privatisation has been the key means to decentralize healthcare delivery, above all at the primary level. The Czech Republic has a small but growing number of private clinics and small hospitals. Various surveys indicate three out of four Czechs favouring the growth in private healthcare provision.

The Drug and Technology Control Institute, an institution of the Ministry of Health, was set up to assesses the cost-benefits of medical technology. The Deputy Minister for Health Insurance has direct responsibility for information technology.

In recent years, facilities such as the Institute of Clinical and Experimental Medicine in Prague, two (national government-managed) Teaching Hospitals at Bulovka and Motol, the Central Military Hospital Prague and the Masaryk Institute of Oncology have reached Western European standards. Czech hospitals have also shown they are second to none in some trailblazing medical applications. In November 2005, the country saw performance of its first robot-assisted surgery at the Na Homolce Hospital and the Military Hospital in Prague.

COUNTRY FOCUS: CENTRAL EUROPE

	CZECH REPUBLIC	HUNGARY	POLAND	SLOVENIA	
Population (million: 2007)	10,33	10,6	38,06	2,02	IFC
Birth rate (per 1,000) [latest available data]	9,1	9,5	9,2	8,8	WHO Regional Office for Europe
Mortality rate (per 1,000) [latest available data]	10,61	13,1	9,6	9,5	WHO Regional Office for Europe
Life expectancy (latest available data)					
Males years	72,15	68,2	70,5	71,3	WHO Regional Office for Europe
Females years	78,79	76,5	78,9	78,8	
GDP (billion Euros: 2007)	113,46	101,08	308,64	33,54	ECB
Total healthcare expenditure (% GDP: 2004)	8,6%	7,8%	6,1%	6,8%	WHO Regional Office for Europe
Total healthcare expenditure per capita (PPP dollars: 2004)	1 361	1 276	805	1 812	IFC, OECD data and HITM estimates
% of healthcare system financed by public funds: 2004 or latest available	89,20%	71,9%	68,6%	86,0%	OECD
Number of CT scanners (per million inhabitants: 2004)	12,3	7,1	7,9	NA	OECD
Number of MRIs (per million inhabitants: 2004)	3,1	2,6	2	NA	OECD
Number of acute care beds per 1,000 inhabitants (latest available)	6,3	5,9	4,7	4,6	WHO Regional Office for Europe
Number of hospital admissions (per 1,000 inhabitants)	204	232	NA	161	WHO Regional Office for Europe
Length of stay (average in days)	8,4	8,6	NA	7,6	WHO Regional Office for Europe
Number of physicians per 1,000 inhabitants (2004)	3,5	3,3	2,3	2,2	OECD
Number of nurses per 1,000 inhabitants (2004)	8,1	8,6	4,9	5,9	OECD
Percentage of households with Internet access	19,1%	32%	36%	54%	Český statistický úřad, 2005 (Czech) and Eurostat 2006 (other countries)
Percentage of individuals using the Internet for interacting with public authorities	12%	54%	41%	32%	Eurostat data 2003 (Czech) and 2004 (other countries)

Source: European Central Bank, OECD, WHO, EU Commission and national statistical agencies

In 2002, the Czech Republic had a total of about 165 hospitals. While the national government owned only 19, they accounted for almost 30% of total beds, owing to their size. In addition, the country had 82 hospitals administered by regions and cities or municipalities. 64 private hospitals accounted for just over 10% of total bed capacity.

Hungary

Healthcare reforms in Hungary have focused principally on cost containment and structural decentralisation. Purchasing and spending falls under the purview of the National Health Insurance Fund, which is financed by the National Tax Office and whose annual budget is determined by the National Assembly (Parliament). The Fund is, however, under tight government control after removal of a self-governing system in 1998, to contain spiralling expenditure.

Reimbursement for acute care and rehabilitation is based on diagnostic-related groups (DRGs). In 1987, the government established an Information Centre for Health Care (Gyoginfok) with responsibilty for managing the country's DRG system. Gyoginfok is

the key institution in the design and administration of provider payment methods.

Since 1993, DRG-based reimbursement applies across Hungary. DRGs do not, however, apply to certain high-cost medical interventions such as bone marrow transplantation, which are reimbursed on a case basis. Reimbursement for chronic care is based on patient-days adjusted to the complexity of the case.

The responsibility for service provision in Hungary has been transferred to local governments, which own the bulk of the country's health care facilities, including hospitals, clinics and operating theatres of most primary care physicians. They are however permitted to outsource service delivery to private providers.

Overall, nevertheless, private participation in the delivery of services remains limited, for example, compared to the Czech Republic. The only significant private presence is in primary care, where 85% of Hungarian physicians work as independent contractors. Specialist care is still largely provided by medical staff on hospital payrolls. On the hospital side, the only private presence is in a few hospitals earlier owned by the Church (although some have been returned to the Church or charities).

One recent development of interest is training in public health and health services management. The government has supported the setting up of a School of Public Health at Debrecen and a Health Services Management Training Centre at Semmelweis University.

Both schools offer Master of Science training curricula for medical graduates and other professionals, with the latter recently expanding its offer to continuing education programmes for hospital managers. In recent years, management qualifications have been made mandatory for hospital managers in Hungary.

Hungary had 182 hospitals in 2002, excluding those run by the Ministry of Justice.

Poland

Poland has one of central Europe's longest and most far reaching legacies of healthcare reform, followed (ironically) by considerable back-tracking and politics in the early 2000s.

In the 1970s, Poland created integrated networks for healthcare and social services in each district across the country – in the shape of ZOZs (Zespól Opieki Zdrowotnej), or integrated healthcare management units. Follow-on efforts in the 1080s sought greater decentralisation, beginning with an increase in power for the ZOZs, a bolstering of the primary care infrastructure and the launch in 1999 of compulsory health insurance and sickness funds.

In 2002, however, a change of government saw the abolishing of the sickness funds and their replacement by a centralized National Health Fund (NHF). The NHF was however deemed to be unconstitutional by the Polish High Court, and a new Law on Health Care Services Financed from Public Sources was passed in August 2004 to accommodate the court ruling.

At present, Poland has a mixed public-private financing system for healthcare. The public system accounts for the bulk of financing and consists of mandatory universal health insurance contributions (based on income).

These are supplemented by budgetary allocations from the national and local governments. Private financing includes formal insurance plans as well as co-payments and out-of-pocket spending.

The NHF finances health services for insured persons from social contributions. It contracts with service providers for the supply of health services. Reimbursement is based on a classification system (with more than 1,000 categories of hospital services and procedures). Physicians are financed by the NHF on the basis of a capitation system (patient list) – which is split into three age groups (below 6, 7–64 and 65+).

The management of healthcare is shared between the Ministry of Health and territorial self-government administrations which operate country hospitals and primary care centers. The Ministry is responsible for national health policy, major capital investments and medical science as well as education.

Its operational responsibility is however limited only to health care institutions which it directly finances. University hospitals (and the so-called medical Academies) are semi-autonomous but remain accountable to the Ministry of Health.
In 2003, Poland had 732 public hospitals, and 72 private hospitals (including those run by religious orders or NGOs).

Slovenia

The run-up to independence in Slovenia was accompanied by growing financial problems in funding its communist-era inspired healthcare services. The country sought to couple such challenges with a broader push to modernise its healthcare and social welfare structure.

In 1992 (one year after becoming a sovereign nation), it adopted new healthcare legislation accompanied by sweeping structural reforms. These essentially replaced Ministry of Health funding (via general taxation), with a new public health insurance agency funded from employee payrolls.

The reforms also separated compulsory and voluntary insurance schemes, and provided for the possibility of optional supplemental insurance, via the private sector.

Alongside, parts of the public health service network were privatised, with provision for free choice of physicians and gatekeeping functions in primary health care. Provider contracting processes were also formalised and restructured.

Statutory insurance now accounts for over 80% of funding, while tax-based financing has seen a sharp drop in its share to below 5%. Supplemental insurance contributes the balance. At the present moment, Slovenia's priority is on converging legislation with the EU, fine tuning resource allocation to increase incentives for cost-effective care, and improving health information systems.

An electronic health insurance card is meant to register all prescriptions electronically and is seen as a means to reduce irrational consumption. IT is also crucial to the hospital payment system, moving steadily towards a sophisticated case-mix payment model.

According to latest figures, Slovenia has 26 hospitals. These include nine regional and three local general hospitals as well as the Clinical Centre in Ljubljana, which is an academic facility. In addition, there are about a dozen specialised hospitals.

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HEALTHCARE IT PROJECTS IN CENTRAL EUROPE

Czech Republic

A National Action Plan eEurope+, dating back to 2002, includes an on-line Health (Zdravotnictvi) program. This is focused on enhanced usage of the Internet to improve quality and cost-effectiveness in the delivery of health care and covers telemedicine and medical documentation. Specific objectives include replacement of health insurance cards with EU-standards compatible smart cards, and a data network connecting domestic points of care to counterparts in other EU countries. The program also urges active participation activity by insurance companies to establish an electronic portal for reimbursement, and to motivate healthcare professionals to make more extensive use of IT.

National legislation in the Czech Republic addresses the following e-Health-related issues: data protection, telecommunications and authorised digital signatures. The latter enables legal validity of electronic documentation as well as provision of ePrescription services and medical professional registries.

The legislation enacted in the Czech Republic with impact on the EU-level harmonisation process includes coverage of the community directives on data protection, on a community framework for electronic signatures, on privacy and electronic communication, as well as on electronic commerce.

A national EHR system used by insurees and health care institutions already operates nationwide and includes functions such as ePrescription, eMessages and eAlerts. Meanwhile, to support its objectives, the government is implementing EU-compliant rules and laws on data protection and confidentiality, as well as digital signatures.

In 2005, IZIP - the Czech nationwide electronic health record system - was awarded a United Nation's 'World Summit of the Information Society' award in Tunis, where it was judged by the experts as one of the top five projects in the world in e-Health. The same year, IZIP was selected as one of 12 EIPA (European Institute of Public Administration) best public eServices projects in the world.

The system insures about 2/3 of all Czech citizens. It has spread over the whole of the Czech Republic since the beginning of 2003. Discussions with healthcare authorities in other countries are underway to expand similar services to their jurisdictions.

The principal role of IZIP is to provide both the technical and the service infrastructure for the comprehensive record integrating medical data from individual healthcare professionals and healthcare provider organisations (HPOs), and assuring full control by the insured citizen. They have the right to access and read their own EHR, but they cannot change them. They can authorise healthcare professionals to view and update their data, converting citizens to an active participant in the healthcare system. They are thus better placed to make responsible decisions about their health, cooperate better with healthcare providers and gain a picture of the technical, resource and financial possibilities and limitations of the proposed or available services and procedures.

This is a basic change compared to the conventional system of health record administration, where the HPO, not the citizen, had the power to disclose information. Lastly but not least, it took almost seven years to achieve an annual net benefit (eight years on a cumulative basis). The estimated net annual benefit in 2008 exceeds 60 million euros while the estimated productivity gain, measured as the decrease in the cost of using a record, was found to be 74%. Citizens, having control over the information on their health history and access to it, as well as avoiding unnecessary interventions, are estimated to receive about 10% of total gains.

Hungary

Hungary launched a Health Portal in 2003 to provide healthcare professionals with access to information on drugs, evidence-based medicine and medical eBooks. It includes links to:

- The MSDC: the multifunctional smart card for doctors functions both as a professional medical ID card and a bank card, to be used by physicians in Hungary. The chip-based implementation of this smart card also allows the use of further functions, such as authentication, certification of medical education, digital signiture, etc.
- MD-PACS: the aim of the research and development was to develop a digital archival system for medical images based on widely accepted international standards.
- Dialysis card: Dialysis and transplantation Card System supports the follow-up of patients in need of dialysis, patients already dialysed, patients in need of transplantation and those having already undergone transplantation. The chipcard is to be seen as additional data storage and management tool on the one

hand and as a communication tool on the other hand.
- Virtual information space for healthcare: the core of the virtual information space is a virtual patient data base through which health care providers in different institutions can have access to patient data.
- ProRec - Promotion of Electronic Healthcare Records: the core task of the Hungarian ProRec centre is to collect and make publicly available information about different IT products and developments in this area, as well as to raise the awareness of the developers of the individual domestic healthcare telematics applications so that these systems become interoperable both within Hungary and between the country and the EU.
- Voluntary health fund card: the MediSmart Card System operates a contract based system to manage the transactions between the funds and the service providers. To this end, MediSmart issues smart cards that support cash-free payment between the funds and the service providers.

Follow-on objectives and planned activities of the Hungarian eHealth Program include:

- Converting health care databases to digital format.
- Introducing digital documents in the health care system: eCase-History (of a patient), eConsultation, eTestresult, ePrescription.
- Setting up eHealth information databases for patients: eData, ePatient, eOperation.
- Preparation for the introduction of the digital signature in the healthcare system.
- Launching a web site for the disabled;
- Providing information on evidence-based therapies.

In the first half of 2004, the Ministry spent 300 million HUF on 29 projects in the field.

An interactive public site known as Dr. Info followed the next year – essentially focused on general healthcare information (as well as details on medicines and physicians). In 2005, a portal directed specifically at the needs of disabled patients added a further layer to the country's e-Health effort.

New legislation in October 2006 set the foundations for ongoing and future developments in Hungary's e-Health Program. The law foresees far-reaching (but phased) changes in drug prescription and dispensing, which will be enabled by the Health Portal.

In parallel, Hungary has set up a PKI (public key infrastructure) to provide a technological anchor for the e-Health Program. Its key elements include formalising of data models and communication standards for electronic prescriptions, consultations and results, patient records, and reimbursement. It also covers digital signatures and implementation of TTP (Trusted Third Party) health and social services as well as secure access to Electronic Certified Public Registries via the Portal.

By 2007, Hungarians had been issued over 350,000 European Health Insurance Cards (EHIC). Through the NETC@RDS consortium (of which it is a member), Hungary is also participating in the pan-European Initial Deployment phase (2007-2009) of the EHIC.

Poland

Poland's Centre for Healthcare Information Systems is the flagship body responsible for the provision of e-Health solutions. The Centre is part of the Ministry of Health, and coordinates with other ministries and organisations involved with broader Information Society programs in the country.

Medical information for the public (with restricted sub-domains for healthcare professionals) is one of the lighter elements of the Polish e-Health program. This is available on Portals hosted by both drug companies as well as the Ministry of Health.

Formally, e-Health programs in Poland are based on an internal Health Ministry policy document in 2004 called 'Poland – eHealth Strategy for 2004 – 2006'. This reinvigorated earlier efforts in the area (principally in the form of pilot projects on health records and electronic registries – some funded by the World Bank).

The 2004-2006 strategy paper was, in turn, buttressed in March 2005 by a position paper on a 'Strategy of information infrastructure development in health care and introduction of the European Health Insurance Card'. Key elements of both were formally adopted in December 2005 by the Polish government.

As elsewhere in the EU, enabling laws and regulations on e-Health in Poland are principally directed at issues of data protection, digital signatures and Health-IT product liability.

On the e-Health systems and infrastructure side, key initiatives underway in Poland at the moment include interoperability of IT solutions, the launch of a secure messaging system between healthcare facilities called ZOZMAIL, the establishment of secure central data bases and registries (covering health service providers, pharmacies, and other organisations), and last but not least, an acceleration in the availability of telemedicine services.

The specific tasks conducted in the context of e-Health area enlisted in "The Strategy of Development of Health in Poland for years 2007-2013" encompass:

- Development of the system of health information with the aim of the analysis of the level of health services demand.
- Promotion of the access to health-related and services provision information to citizens (repositories of health contents, national health portal).
- Development and implementation of the information system supporting management in hospitals and other health facilities.
- Development of information system on medication orders and consumption.

No dedicated healthcare network is available in Poland. Some health care institutions maintaining the cooperation in specific areas use VPN-based communication through available physical networks.

Recently, a broadband network based on fibre-optic connections was developed in Kujawsko-Pomorskie Voivodship; it also became the basis for a telemedicine network including several healthcare providers in this region.

Teleconsultation/second opinion services were implemented in some regions between providers representing specialities such as oncology, cardiology, pulmonology, etc.

Furthermore, telemonitoring services based on the Internet were offered to patients with specific long-term conditions, e.g. arterial hypertension, bronchial asthma within pilot projects.

The plans for development of a e-Health network, however, seem to remain in the conceptual phase only. Results of the some studies focused on the delivery of e-Health care to patients with specific medical conditions are also available.

Poland has some of Europe's leading telemedicine centres. These include the Kajetany-based International Centre of Hearing Disorders, the Polish Network of Severe Asthma, the Institute of Cardiology at Anin, the Krakow Centre of Telemedicine and the Malopolska Centre of Advanced Technologies.

Slovenia

Slovenia's e-Health program is directly inspired by convergence with trends and developments in the European Union, and described in a policy paper called 'Action plan for a European eHealth Area'. Targets include residents and healthcare professionals as well as managers and purchasers.

In December 2005, the government released a position paper called 'eHealth 2010 – Strategic plan for the Slovenian health sector informatisation', with three main lines of activity:

- To establish a strong IT infrastructure and database definition in order to achieve implementation of a national electronic health record.
- To inter-connect health information systems on a national level via a health portal, which would provide secure data exchange between all concerned parties in the health system, and connect to other systems across Europe by the end of 2010.
- To establish eBusiness as a common means of work in the Slovenian health sector by the end of 2010.

One of the key and most expansive tasks in realising the Slovenian e-Health strategy by 2010 will be the renewal of the system. The renewed card with digital certificates and an on-line system also opens up possibilities for the healthcare sector's cooperation with other sectors in the country.

The new electronic identity card, which will also include the functionalities of the health insurance card, will be among the first such solutions. However, the system will be introduced gradually.

The introduction to a group of healthcare providers in the pilot area (Nova Gorica region) is planned for October 2008. Based on the experience gained, the system will be upgraded with necessary modifications, if any, whereupon in 2009 a national implementation from region to region will follow.

While introducing the new system, the authorities aim to gradually eliminate the self-service terminals network, as there will be no need for refreshing the data on the health insurance cards.

Several e-Health pilots have already become operational in Slovenia, especially those focused on other new EU members as well as neighboring countries like Italy. These include:

- PRIMACOM, to enhance exchanges of primary and secondary healthcare data with Hungary, which has developed a prototype middleware-based application for the transfer of distributed software technologies across Eastern Europe. PRIMACOM have used European standards, developed by CEN TC 251, for exchange of medical data and experience by implementing Regional Health Care Networks from Denmark and Italy.
- NETC@RDS, designed to improve mobile access to pan-European health services, and based on advanced Web-oriented applications. It also aims to implement and evaluate technical solutions for the European Health Insurance Card and for improving additional services such as the inter-European health costs clearing/billing processing.

Some of the future activities in the e-Health field include the creation of a National Health Information Portal by 2010, providing interlinking of all stakeholders, security infrasctructure as well as tools for communication between the citizen and the healthcare system.

Conclusion

In each country, e-Health investments focus on addressing well-defined needs, either of citizens, or related to the process of health and healthcare provision.

This can take the form of solutions to problems, as well as process optimisation addressing the need for more timely, more accurate, or easily available information about health and lifestyle, or any other health related service.

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