HEALTHCARE IT MANAGEMENT

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THE OFFICIAL JOURNAL OF THE EUROPEAN ASSOCIATION OF HEALTHCARE IT MANAGERS

REMOTE PATIENT CARE

SMART CARDS AND HEALTHCARE

HOSPITAL ASSET MANAGEMENT

PATIENT CLASSIFICATION SYSTEMS

PCC: RADIOLOGY INFORMATION SYSTEMS

COUNTRY FOCUS: BELGIUM

Volume 4 / Issue 1 / 2009

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Dear Reader,

Amidst what may be the greatest economic downturn since the 1930s, 2009 promises to be a memorable year. Opinions about the impact of the recession on the healthcare sector are mixed, but there seems to be a consensus that it will be less vulnerable than many others.

Meanwhile, the recent presidential elections in the US have brought to power one its most resolute champions of healthcare reforms ever. As co-sponsor of the influential Wired for Health Care Quality Act in the US Senate in 2005, Barack Obama has long been an advocate of using IT, not least electronic health records, as a means to confront the deep-rooted structural and financial challenges faced by US healthcare. In spite of some concerns about whether the new administration will (or can) actually deliver on his agenda, it is evident that any 'new' American healthcare IT standards will have an impact on Europe and the world beyond.

Within such a context, our Cover Story focuses on another transformation, the subtle but powerful shift underway from e-Health to i-Health. While e-Health is largely about concepts and technology policy, i-Health will be about real-life use, pulled by need and finessed by experience. i-Health's most significant symbol is consumer genomics, becoming closer by the day to a mass technology, and opening up wholly new frontiers like personal medicine. Consumer genomics will be a powerful catalyst for the electronic health record (EHR). In turn, healthcare IT is seen as the only means to link and provide substance to both. Together, the EHR and genomics promise a profound shake-up in healthcare culture. For the American Health Information Community notes, a genomic EHR would begin "the transition of the health care sector from a reactive to a predictive enterprise."

However, before such a process becomes reality, healthcare IT is likely to face massive challenges – from building petabyte-plus medical databases to managing grid computing architectures hosted on supercomputers and driven by highly sophisticated collaborative computing software, providing intelligent data interpretation from anywhere in real-time.

The Features section in this issue includes an analysis by a renowned expert on standards and interoperability for the remote monitoring of patients, and another on patient classification systems as a key tool to improve the efficacy of healthcare resource use. Indeed, most observers foresee a sharp rise in home-based monitoring, to meet challenges from an ever-increasing elderly population and the growing prevalence of chronic diseases – both of which are over-extending the current healthcare delivery system.

The feature on patient classification systems (PCS) includes a case study on its use in Brazil. It is authored by the developer of one of the two most common PCS systems in use today.

Most healthcare technology developments, including those in areas such as remote monitoring and patient classifications, seek to enhance efficiencies in healthcare use. Indeed, such a goal is central to hospital asset management – not always the easiest of tasks, given the sheer scale and diversity of such assets. Our Management section provides two examples, one from Europe and another from the US, on how IT has been imaginatively deployed, to meet the challenges of managing two very different kinds of hospital assets.

Our Country Focus is on Belgium. As it moves step by step towards implementing a national e-Health roadmap, we believe it salutary to recall Belgium's often-unacknowledged role as having developed and implemented some of the most dramatic mass-use IT projects in recent memory.

Yours truly,
Christian Marolt (CM)

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e-Health programmes, now flourishing across the world, may simply be concealing a more powerful and pervasive phenomenon. This is the emerging era of personal and individual healthcare, or what can be termed i-Health. Driven digitally for you, me and everyone else, the flagship of i-Health is consumer genomics. This is expected to catalyse take-up of the electronic health record and move healthcare delivery from a reactive to predictive endeavour.

The overall strength of the Belgian health system is that care is highly accessible and responsive to patients. The drawbacks are in its cost and complexity, principally due to its competitively federal political system. The federal nature of the country has also entailed incrementalism in e-Health technology adoption, but if past experience in the mass use of high technology is a yardstick, Belgium may be one of the first countries to offer meaningful e-Health to its citizens.

Europe also has reason to be concerned about medical errors

Sir,

I enjoyed reading 'Doing The Right Thing For The Wrong Reasons' by Robert Roswell (Issue 5, 2008). With the new Obama government now in power in the US, it seems much of the author's wishlist is around the corner.

I would however like to point out that Europe too suffers from many of the same tragic problems as the US. While 98,000 people 'die in any given year from medical errors occurring in US hospitals', according to Mr. Roswell, the figures are not encouraging here either.

In Britain, a report in early January noted 3,645 deaths in 2007-8 due to errors by NHS staff and the number is rising. A few days later, Philippe Juvin, of the UMP Party (who is responsible for emergency care at the Beaujon Hospital) said that medical errors caused 10,000 deaths each year in France, and that most of these were 'avoidable'. M. Juvin in fact estimated the number of serious medical errors at between 300,000 and 500,000.

Marcel Michel
Lyon, France

What's in a name ?

Sir,

I disagree that 'an IT employee will never become a medical technician or vice versa.' (IT And Medical Technology Pulling Together, Joachim Hiller and Timo Baumann, Issue 5, 2008).

As a healthcare IT manager, I think such artificial differences in titles and job definitions have done serious disservice to patients. It is especially ironical since medical technology itself is converging and IT well on its way to becoming a utility, as clearly illustrated by another article in the same issue on SaaS (ed. 'Profile of Software as a Service'). For many years, simply recombining off-the-shelf components have been part of the new age of IT programming.

As a result, I would say that though IT staff may not yet be medical technicians, in a few years the difference will be irrelevant.

John Simmons
Manchester, UK

Privacy 'slogan' may be a barrier in race to EHR

Sir,

Congratulations for your impressive analysis (Issue 5, 2008) on the fundamental philosophical debate between openness and interoperability versus privacy and security in the field of electronic health records. This is unlikely to go away soon.

I believe it is still important to point out that there are many immature slogans about 'privacy'. As you point out, in today's age of Google, mobile telephones and GPS navigation systems, do such concerns really mean all that much ?

I also agree that the priorities given by the US and Europe to EHRs are different, and due to differences in culture. The question of interest of course is who gets there first ?

Robert Remy, Utrecht, Netherlands

We invite comments from readers at editor@hitm.eu. Please keep your letters to below 150 words. Healthcare IT Management reserves the right to edit letters for space or editorial reasons.

THE EUROPEAN ASSOCIATION OF HEALTHCARE IT MANAGERS (HITM)

The European Association of Healthcare IT Managers

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

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

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

HITM's Mission

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

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

HITM MEMBERS

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Working Group Medical Informatics and eHealth of the Austrian Computer Society (OCG) and the Austrian Society for Biomedical Engineering

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Belgian Medical Informatics Association (MIM)

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Society for Medical Informatics of Bosnia & Herzegovina

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POLAND
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PORTUGAL
EHTO-European Health Telematics Observatory

ROMANIA
Romanian Society of Medical Informatics

SERBIA
JISA - Union of ICT Societies of Serbia

SLOVENIA
Institute of Biomedical Informatics, Faculty of Medicine

Slovenian Medical Informatics Association

TURKEY
Turkish Medical Informatics Association

UKRAINE
The Ukrainian Association for Computer Medicine

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

AGFA HEALTHCARE

AGFA HEALTHCARE SIGNS AGREEMENT WITH GOVERNMENT OF ONTARIO, CANADA

Agfa HealthCare has recently signed an agreement with the government of Ontario, Canada, for a CAD$29.6 million grant to support the growth of the company's Research, Development and Regional operation centres in Toronto and Waterloo. The objective is to streamline and centralise these operations.

The investment is part of the government of Ontario's five point plan to grow the economy. In partnering with businesses, they hope to create jobs and generate investment. The capital comes from the Next Generation of Jobs Fund. One hundred new jobs will be created. In total, Agfa will employ nearly 400 people in Ontario focusing on the development, implementation and support of the company's e-Health, Regional Health and Digital Imaging Solutions.

Ontario's Minister of Economic Development, Michael Bryant stated, "Agfa HealthCare's new technology represents a step forward in the development of e-health, providing an Ontario solution to a global need and a shot in the arm to the local economy."

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

iSOFT

iSOFT SIGNS A FIVE YEAR AGREEMENT WITH CMPMEDICA FOR ESSENTIAL DRUG INFORMATION SUPPORT TOOLS

CMPMedica will supply iSOFT with comprehensive evidence-based drug information. This information solution will power iSOFT's integrated suite of decision-support tools with the objective of enabling healthcare professionals to make better informed decisions. CMPMedica combines internationally referenced alert tools with comprehensive local product information and delivers this to IT partners through a common interface.

For more information, please visit:
www.isoftplc.com, www.cnpmedica.com

CARESTREAM HEALTH

CARESTREAM SHOWCASES LATEST INNOVATIONS FOR RADIOLOGY AND IT AT ECR 2009

At the annual meeting of the European Congress of Radiology (ECR), Carestream Health will demonstrate its latest digital imaging and IT solutions.

These innovations, available worldwide in the second quarter of 2009, include latest generation RIS/PACS that will reportedly streamline the delivery of imaging services and boost productivity.

The new CARESTREAM PACS is said to increase radiologist productivity with a unified virtual desktop facilitating faster reading of CT, MR and PET/CT exams through automatic registration. It also will offer an innovative "power viewer" that builds a single virtual study with real-time volume matching of all relevant studies (new and prior) to automatically register and synchronise them in one click.

The new Web-based CARESTREAM RIS employs a Microsoft® .NET architecture. This architecture will deliver secure remote access for physicians; enable collaboration using IBM Sametime™ technology; and offer an optional portal that allows patient scheduling within parameters set by healthcare providers.

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

PHILIPS

NEW PHILIPS AND VTT DEVELOPMENT CENTRE IN FINLAND

Philips and VTT have jointly opened an InnoHub in Espoo, Finland. The objective is to produce innovative ideas and turn them in to profitable business. The focus areas are health, lifestyle and well-being.

The InnoHub provides a real life setting, including a hospital room, nurses station and home environment and can be used for the entire innovation process (ideas, concept development, prototyping and testing). Moreover, its location in the Active Life Village allows easy access to experts in other innovation organisations.

The InnoHub is for the use of multinational companies and SMEs. All Nordic and Baltic companies can also use the InnoHub for their projects and receive additional specialist support.

For more information, please visit:
www.vtt.fi and **www.philips.com**

IBA HEALTH GROUP LIMITED

LORENZO TO BE ADOPTED IN TWO MORE GERMAN HOSPITALS

The German hospital group, Krankenhaus Buchholz and Winsen, is set to become the latest iSOFT customer for LORENZO.

With iCS (iSOFT Collaboration Suite), Krankenhaus Buchholz and Winsen provide GPs access to hospital patient records using a standard web-browser. eFA, created as an electronic case record for sharing of patient data for integrated care purposes, has the potential to become the national standard in Germany. The applications are based on LORENZO technologies and provide a Microsoft .Net technology layer to underpin further developments in service-oriented architecture (SOA).

For more information, please visit: **www.ibahealth.com/html/**

GE Healthcare

Enabling e-Health
The virtual imaging department
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Imagine a healthcare system where doctors have easy and fast, worldwide access to a patient's health history?

Based on the latest IHE and XDS standards, Centricity Imaging Portal is doing just that – connecting multi-vendor healthcare systems and providing Web-based access to a singular global patient history whilst exchanging multi-disciplinary images and reports in a cross-hospital IT infrastructure. Take a step beyond radiology, enable your virtual imaging department.
e-Health Re-imagined.

Visit GE Healthcare at ECR EXPO B, Booth No. 202 & 211
To learn more visit www.gehealthcare.com

GE imagination at work

LITHUANIA

Successful Implementation of the 'eHealth Services' Project

Lithuania's "eHealth Services" Project is part of the development of a national eHealth system by the country's Ministry of Health. Jointly funded by the Lithuanian Government and the European Union, the project entails the design, installation and operation of hospital information systems (HIS) in three regional healthcare institutions of Lithuania, the Kaunas University of Medicine Hospital, the Klaipeda University Hospital and the Vilnius University Hospital Santariskiy Klinikos.

The aim of the project is to implement a uniform international standards-based electronic health records and healthcare system (NESS) covering the entire country, which would enable healthcare institutions to exchange data concerning patients' treatment and lab results.

Also being developed under the framework of this project are recommendations and draft legislation on electronic health data.

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

CATRENE

CATRENE Launches New Call for Project Proposals

The recent EUREKA programme CATRENE (Cluster for Application and Technology Research in Europe on NanoElectronics) has launched a call for project proposals. The programme is open to Europe's high tech industry, small and medium sized enterprises, research institutes and academia.

CATRENE follows other successful EUREKA programmes JESSI, MEDEA, and MEDEA+. Its objective is to provide nano-/microelectronics solutions for the needs of today's society proving that Europe can compete on a global level.

The first step project outlines must be submitted between 2nd March-30th April to be followed by full proposals. Final decisions will be made by the end of September 2009 and selected projects will commence from 1st January 2010.

For more information and guidelines please see: **www.catrene.org**

ICT POLICY SUPPORT PROGRAMME

Call for Proposals Under the ICT Policy Support Programme

The European Commission's Directorate-General for Information Society and Media has launched a call for proposals under the Information and Communication Technologies Policy Support Programme (ICT PSP). The ICT Policy Support Programme aims to stimulate innovation and competitiveness through the wider uptake and best use of ICT by citizens, governments and businesses.

The call covers a total of eight themes:

- ICT for health, ageing and inclusion;
- Digital libraries;
- ICT for government and governance;
- ICT for energy efficiency and environment;
- multilingual web;
- public sector information;
- Internet evolution and security (including radio frequency identification);
- open innovation, user experience and living labs.

Proposals must be submitted by 2 June 2009.

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

GERMANY

Setbacks for German E-health Smartcard

Due to problems encountered in the first seven pilot sites for Germany's flagship national e-health smartcard programme, several key clinical components are currently being re-evaluated.

Gematik, the German national health IT organisation, announced that their new priority is electronic referral letters and electronic insurance claims. Electronic prescriptions, electronic emergency data sets, and electronic medication safety applications will, for the time being, be put on the backburner.

An interim report shows that the electronic emergency data set and the electronic prescription with the smartcard as data medium have not worked so far. Problems included PIN code issues and the need for digital signatures.

Given these problems, Gematik has decided to do the easier things first. The rollout is still scheduled for 2009 but it means that doctors will have to go online sooner than originally planned, creating tension between doctors and health insurance companies.

For more information, please visit: **www.gematik.de**

ITALY

4th A.I.S.I.S. National Congress

The Italian Association of Health Information Systems is holding its fourth national congress February 27- 28, 2009 in Porto Vecchio, Genoa. The title of the congress is "Verso l'Ospedale Digitale: quali elementi costitutivi? ("Towards the Digital Hospital: what are the constitutive elements?")

Topics discussed will include the prospect of fully integrated digitalized management processes, reviewing the progress already made and associated organisational problems.

During the congress the new board of the Association will be elected, including a new Chairman.

For more information, please visit: **www.aisis.it**

13-14 MAY 2009, BRUSSELS, BELGIUM

THE 5TH ANNUAL HEALTH CARE CONGRESS EUROPE 2009

For the 5th consecutive year, the World Health Care Congress Europe presents business cases, best practices and strategies for addressing the pressure and current challenges facing European health care - efficiency, economic stability, access to care, quality care, patient safety, and patient mobility within and across borders. The WHCCE 2009 brings together over 100 internationally recognised leaders in health care, including health ministers, leading government officials, hospital directors, IT innovators, decision makers from private and public insurance funds, pharmaceutical and medical device companies, and health care industry suppliers.

This year's in-depth case studies address the following themes:

- Performance Management: Improving quality, efficiency and outcomes
- Innovations in Health Care Technology: Developing people-centered e-Health initiatives
- Chronic Disease Management: New models of chronic disease delivery
- Health Care Financing: Investigating sustainable health care financing

Key health ministers from leading countries in Europe, Middle East and Asia will showcase their national initiatives to redefine regional health agendas for 2009 and beyond while the presentations and case studies cover countries with the best healthcare such as France, Japan, Spain, Italy, Canada, Norway, Netherlands, Sweden, Greece, Austria, Germany, Finland, New Zealand, Denmark, United Kingdom, Ireland and Portugal.

As in 2008, the European Association of Healthcare IT Managers (HITM) will be an official partner of the World Health Care Congress Europe while Mr. Christian Marolt, HITM Secretary General, will be sitting on the Advisory Board. This year, every HITM member who would like to attend the congress can benefit from a 25% discount on participation fees by quoting the FEZ447 promotional code.

For more information and registration, please visit:
www.worldcongress.com/europe

1-3 APRIL 2009, LUXEMBOURG, LUXEMBOURG

Med-e-Tel 2009

The 7th edition of the annual Med-e-Tel conference in Luxembourg will focus on proven and tested telemedicine applications and provide evidence on clinical effectiveness and economic efficiency as well as on user aspects and satisfaction, and on some dos and don'ts of telemedicine implementation into care processes.

EHTEL will be among one of the contributors to the opening session of this year's Med-e-Tel conference programme, which will feature additional contributions from the International Society for Telemedicine & eHealth, Russian Telemedicine Association, European Commission, International Telecommunication Union and several others who will provide insights into current initiatives and future directions in telemedicine and ehealth.

Key sessions include:

- A workshop by the Telenursing Working Group that has been set up within the framework of the International Society for Telemedicine & eHealth (ISfTeH).
- A regional (BeLux) hospital administrator seminar, endorsed by the Luxembourg Ministry of Health and CRP-Santé (Public Research Centre for Health) focusing on "priorities, benefits and budgets for health IT in the 21st century."
- A workshop by the European NETC@RDS project, which will focus on the deployment of an online service for the electronic European Health Insurance Card (eEHIC).

The three day Med-e-Tel conference programme will include additional sessions and workshops on the topics of disease management, services for the ageing, teleconsultation, nursing informatics, open source software, ehealth in developing countries, elearning, mobile solutions, ehealth in primary care, environmental conditions and telehealth, economic efficiency, national ehealth programmes and initiatives, and more.

Med-e-Tel promotes and enhances cooperation opportunities and is the place to meet and network with some 600 healthcare and industry stakeholders from more than 45 countries in Europe and beyond.

Med-e-Tel 2009 is scheduled for 1-3 April 2009 in Luxembourg.

For more information, please visit:
www.medetel.eu or info@medetel.eu

4-6 NOVEMBER 2008, COPENHAGEN, DENMARK

THE WORLD OF HEALTH IT 2008 CONFERENCE & EXHIBITION

The 2008 World of Health IT Conference & Exhibition continued 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 focused on shaping and developing the use, implementation, and evolution of this pillar of the new European marketplace.

Furthermore, at the World of Health IT 2008 edition, the European Commission, HIMSS Europe, the Ministry of Health and Consumption of Spain, and the Government of Catalonia announced that the next World of Health IT conference and exhibition would be held in conjunction with the European Union's annual High Level e-Health Ministerial Conference in Barcelona on March 15-18, 2010.
The joint event, which coincides with Spain's presidency of the EU in the first half of 2010 will join together the stakeholders who will together advance the development of e-Health in Europe. "We believe that there is a benefit in bringing together the constituency of this event with that of the eHealth Ministerial event. This idea is shared by all the parties involved in the organisation of both events, and I have the pleasure to invite you to a joint event that will take place in March of 2010 in Barcelona," commented Viviane Reding, European Commissioner for Information Society and Media.

For more information, please visit: **www.worldofhealthit.org**

19-22 NOVEMBER 2008, DÜSSELDORF, GERMANY

MEDICA CONGRESS 2008

The four days of the trade fair (and three days of COMPAMED) including the accompanying MEDICA Congress 2008 and the Deutscher Krankenhaustag (German Hospital Congress) saw a total of 137,000 registered visitors. The 4,313 exhibitors participating at MEDICA presented a complete spectrum of new products, services and processes for use in doctors' surgeries and hospitals. The areas that triggered great interest in this year's show were medical device technology and electrical medicine, physiotherapeutic processes and medical IT. In addition to the improved networking of health care stakeholders brought about by relevant hardware and software applications, there is an increasing trend towards compact medical devices that are also suitable for mobile deployment.

The MEDICA Congress 2008 again provided a wide spectrum of continuous medical education and training in the form of courses, seminars and discussion forums. "Quality has its price!" was the theme of the lectures, forums and seminars organised for the 31st German Hospital Congress. Almost 1,800 participants from hospitals and the field of health care policy obtained information on hospital-relevant issues here against the backdrop of the structural change currently occurring within the German health care system.
In parallel with MEDICA, 519 exhibitors also presented high-tech at its best at COMPAMED. In Halls 8a and 8b, the upstream suppliers for medical manufacturing presented an impressive variety of products and systems, such as new materials, components, packaging solutions as well as complex processes in the field of micro technology. A key theme of the talks delivered at the COMPAMED Forum in Hall 8a was built around all the aspects of product development.
It is considered that MEDICA Congress 2008 again highlighted its reputation of being the sector's foremost event for decision-makers (almost 90% of trade visitors were involved in relevant investment decisions, while 70% were decision-makers or at least had co-decision-making rights).

The dates for the next MEDICA in Düsseldorf:
18 - 21 November 2009 (COMPAMED until 20/11/2009).
For more information, please visit:
www.medica.de and **www.compamed.de**.

ROBOTICS IN MEDICINE AND HEALTHCARE

The European Commission has recently funded an investigation into the potential of robotics entitled "Roadmap for the application of robotics in medicine and healthcare."

Although still an emerging field, the use of robotics is expected to grow in importance with current demographic changes. This is likely to put pressure on the healthcare system with shortages of healthcare personnel, the need to improve the quality of life for the elderly and to produce a higher quality of care such as high precision surgery.

The objectives of the study were to research policy recommendations and to raise awareness of this new technology. To do so, research road maps of promising applications in robotics and healthcare were created with a timeframe ending in 2025.

The study focuses on three main issues; the quality, safety and efficiency of care, the move to preventive and personalised care and supporting the availability of long term care for people in need.

Research road maps were created for 6 new innovation areas

- Smart medical capsules
- Intelligent prosthetics
- Robotised patient monitoring systems
- Robotised surgery
- Robotised motor coordination analysis and therapy
- Robot assisted mental, cognitive and social therapy

The study has shown that robotics is still in its early stages, and although a promising new market, there are still many problems to overcome. From a scientific point of view, progress is dependent on separate developments in science and technology and can therefore easily be delayed. Broad diffusion is also a difficulty due to doubts concerning cost-effectiveness.

Moreover robotics is not just a technological issue, its progress is also dependent on social acceptance; there are many safety and reliability issues. From a legal perspective there are also problems concerning liability and patient claims; in case of error who is responsible – man or machine?

So far, there have been both successes and failures and at the present moment the use of robotics remains very expensive. Although doctors, patients and health authorities are interested, they are in no rush to switch to these new applications. The study has shown that robotics is an exciting new development in the healthcare sector with great potential but that final conclusions concerning its future trajectory cannot be made at present.

ASSESSING PROGRESS TOWARDS AN INTEROPERABLE EUROPEAN EHEALTH SPACE

Fostering the development and implementation of national eHealth policies and strategies has been a key goal of the European Union (EU) eHealth Action Plan of 2004. To review progress made and analyse the results so far obtained by EU Member States, the European Commission just before Christmas signed a contract with Bonn-based eHealth specialist empirica.

The objectives of the new study are to measure and assess Union Member States eHealth progress:

- whether national eHealth policies, strategies, roadmaps and/or implementation measures exist and have been updated;
- whether and to what extent the objectives defined in The European eHealth Action plan have been incorporated into them;
- what progress has been achieved, focusing on eHealth Action Plan priorities;
- which (further) national priorities and actions may support the accelerated realisation of the eHealth Action Plan.

The final output, expected during the middle of 2010, will involve a comprehensive progress report with country briefs and policy recommendations on Member States eHealth policy progress towards an interoperable European eHealth space.

Special advisor to the study and contributor will be Prof. Denis Protti of the University of Victoria, Canada, a global expert on the comparative analysis of national and regional eHealth implementations.

Contributing partners are the Finnish National Institute for Health and Welfare (THL, the former STAKES), and European law firm Time.Lex CVBA as well as further expert institutes in all the more than 30 countries to be covered by this extensive research.

Brussels-based EMC Consulting, which operates the general secretariat of the European Association of Healthcare IT Managers, is part of the consortium awarded this EU contract. EMC intends to use the association to closely interact with healthcare IT Managers and disseminate the findings of the new study.

SOURCES OF FINANCING AND POLICY RECOMMENDATIONS ON BOOSTING EHEALTH INVESTMENT – STUDY REVIEW

A major study on financing e-Health was commissioned by DG INFSO and Media's ICT for Health Unit. Its objective: to examine the financial needs of e-Health investment against the funding available and therefore assist EU Members and the Commission in their efforts to meet the e-Health Action Plan objective of "supporting and boosting investment in eHealth."

The main conclusion to be drawn from the study is that increasing finance for healthcare may not increase investment. The question is not how much to spend but what to spend the money on. The main priority should be expanding e-Health skills and knowledge; the e-Health capabilities of both healthcare staff and ICT supplier's staff must increase. This increase in capability will in turn enhance success and therefore boost investment. More capable staff increases the potential value of e-Health and the confidence of investors in the field.
The two main shortfalls concerning the resources for e-Health are defined as:

- Significant lack of skills and capabilities in the workforce to deal with all e-Health requirements
- Limited view of the potential of e-Health by many health care professionals, executives and managers, leading to narrowly defined e-Health investment plans.

Specific financing opportunities to try and fix these shortfalls are required. Something must be done to shorten the knowledge gap concerning the concept of e-Health. A clear definition of e-Health that includes both ICT and organisational change is needed. Once this is established, plans for financing investment can follow. e-Health investment, in effect, must become an integrated part of all healthcare investment.

It is correct to deny finance for e-Health if the planned investment does not show a better net benefit than other types of competing investment. The challenge for e-Health investors is choosing the best financing arrangement; a common difficulty in integrating e-Health financing into the factors that ensure success has been highlighted in this study. By over-emphasising finance for ICT, engagement, change and the realisation of benefits of these new initiatives are being hampered.

Single source financing for e-Health investment is inadequate as more often than not, this financing does not see the project right through to completion. The solution may lie in mixed financing arrangements that will help manage investments at each stage of their life cycle. This is true of both recurring and non-recurring costs. Joint financing for recurring costs is a model in which all beneficiaries must be involved in the financing stage. Current financing opportunities support a limited, and often insufficient, investment lifecycle time-period. Therefore it is feasible to use a combination of sources to support an investment with its characteristics determining the finance mix. For such investments different models of e-Health financing need to be combined.

The study has shown that public-private partnerships (PPP) can help share the burden of financing e-Health investments between private ICT vendors and public health service provider organisations (HPOs). At present, most financing in Member States, the EU and on an international level is non-recurring financing. Recurring finance, like the reimbursement for healthcare with e-Health remains an exception. Evidently this has a negative impact on e-Health investment. Moreover, recurring finance is not an attractive option for many as financing long-run recurring costs needs additional annual income.

Another conclusion of the study is the need for the streamlining and rationalisation of financing models for e-Health implementation. Many financing sources have failed to recognise the need to expand the skills base requisite to boost investment; this also must change.

Suggested improvements in these financing models include enhanced facilities to navigate the diversity of financing sources, integrating the policies and use of funds, and improving the co-ordination of EC funds. HPOs should expand recurring financing through reimbursement with e-Health and increase finance to develop new capacity for ICT-enabled change, e-Health investment decisions, benefits realisation, health informatics, as well as creating sustainable e-Health strategies that are part of general healthcare development.

The report defines the issues determining the sustainability of e-Health investments as:

- Economic and financial costs and benefits
- Timescales
- Risks
- General strategic fit
- e-Health procurement
- Reimbursement and business models

The report concludes that it is up to policy makers to boost investment in e-Health. Policy makers need to manage the core, high-value features of e-Health investment within the available resource mix and the healthcare strategy. Suggested actions include:

- Promoting e-Health as a resource in healthcare and services, not as an end in itself
- Focusing on improving several aspects of health services, not on cash savings
- Facilitating effective, comprehensive financing packages covering the whole investment lifecycle, including long-term, recurring expenditure
- Investing in more evidence on investment risks
- Promoting and facilitating stakeholder engagement, not just consultation
- Providing resources to develop skills and knowledge.


Total focus on planning and schedu
ownership. Proven, enterprise-wide
applications. Easy to integrate, HL7
and service. Web-native technology
and measurable improvements. Ru
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and service. Web-native technology
BEST IN CLASS
-native technology, low total cost of
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scheduling. Transforming efficiency
rise-wide solutions. Wide-reaching
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FROM e-HEALTH TO i-HEALTH

Traversing Tomorrow's Healthcare Frontier

AUTHOR
Tosh Sheshabalaya,
HIT

Technology is a curious creature. The most meaningful changes not only descend upon us, seemingly out of the blue, but also completely shake up the way we live and work. In addition, what may appear to be The Next New Thing often masks something else, which offers the same promises but does so in a far more effective and profound manner.

New technologies rarely arrive by leaps and bounds. Indeed, most breakthroughs seem to have been shaped by stealth. And yet, once upon us, they have turned our world upside down – achieving far more than their inventors dreamed of. Consider the printing press and electricity, the motor car and the telephone, computers and the Internet - or the impact of birth control pills and antibiotics.

On the other hand, not infrequently, as one major new frontier of technology seems to be just settling in, another – close on its heels – rides upon its back, opening up a vaster vista beneath. Remember cell phones instead of pagers, DVDs against video-cassettes, the Web rather than CompuServe, or the personal computer versus Sinclair's ZX-81.

Necessity – the mother of reinvention, and relevance

In recent decades, the most enduring new technologies have also been those which are future proofed, continuing to find additional uses and juxtaposing near-seamlessly with ever-newer breakthroughs. Think of the novel/still-emerging applications for personal computers after the inception of the Internet, and the use of the mobile phone for both computing and Web surfing.

Healthcare too will not be exempt from such trends, of technology forced to reinvent itself and grow, in order to meet real needs, and thus itself remain relevant and survive.

Indeed, even as e-Health programmes seemingly flourish across the globe, they may simply be concealing a more powerful and pervasive phenomenon.

This concerns the emerging era of personal and individual healthcare, or what can be termed i-Health. It will be driven digitally for you, me and everyone else.

Of supply and demand, from concept to experience

The differences between e-Health and i-Health are significant. While e-Health is largely about concepts, policy and infrastructure, i-Health will be about use. The first is pushed on the technology supply side, while i-Health is going to be demand-led, pulled by need and finessed by experience.

Most crucially (if subtly), i-Health is more about patients than physicians. It is about reality rather than potential, about large-scale implementation at affordable prices, instead of the bells and whistles of pilot projects.

Such developments will demand considerable advance attention from both healthcare policymakers and IT managers.

In 2008, a major EU-funded study called 'Financing eHealth' (see page 12) found an over-emphasis on e-Health technology (for its own sake), at the cost of organisational change and real, lasting benefits for health systems. The study also highlighted inadequate financing for the e-Health investment lifecycle, as well as an absence of long-term plans focusing on the entire e-Health user chain – in other words, all the way to what we call i-Health. Indeed, many seem to believe that getting e-Health projects started up was enough.

Driving down the e-Health highway

As a result, it is i-Health which is going to give flesh and blood to the e-Health skeleton. New forms of digital healthcare systems, fashioned through use, and continuously reshaped in the interests of users, is what the future will be about. The choice of terminology (i-Health rather than e-Health) may be one of the keys to adapting mindsets.

And yet, it remains vital to underline that i-Health would not be feasible without e-Health. Indeed, like other now-familiar technologies, i-Health is fuelled by the booming infrastructural spend on e-Health (from wireless/mobile systems and RFID to miniaturised sensors and more), as well as a steady fall in the enabling systems that drive both.

To use a popular analogy, good i-Health will be what drives along the e-Health highway. Both have their uses.

i-Health: The Symbols

So what then are going to be the main pillars of i-Health? There are two: consumer genomics and the electronic health record. On its part, healthcare IT both fuels and straddles these two technologies.

CONSUMER GENOMICS

The most potent, if still incipient, i-Health trend is that of consumer (or personal) genomics. Today, genomics technology is coming off the drawing board and close to making a mark on more and more people's lives.

A score of genomic vendors already offer a range of services – from selective screening for some hundred-odd major disease genes to complete sequencing of a person's genome.

Dizzying price falls, special promotions

Costs, once prohibitive, are being driven down in something akin to a price war. They seem set to drop further in the future.

Such a pattern has been seen with other technological novelties, where unit prices fall to grow the user base, and lower prices then rapidly fuel further market penetration in a virtuous cycle.

> "For the patient asking whether these (personal genomics) services provide information that is useful for disease avoidance, the prudent answer is 'Not now — ask again in a few years'." - New England Journal of Medicine.

Compared to the 3 billion dollar tag of the pioneering 2003 (Human) Genome Project (which furnished the first composite map of human DNA code), the plunge in prices for genome mapping is dizzying.

Privately-held American start-up 23andMe has been offering an analysis of DNA markers on 26 diseases for which there is an accepted genetic association (ranging from prostate cancer and Parkinson's to diabetes and Crohn's Disease), as well as another 72 where genetic factors are suspected (if not yet scientifically accepted). The cost: just 399 dollars – thanks to a special promotion which slashed prices from the previous 999 dollars.

European firms are also in the fray. Iceland's deCode Genetics has been offering its deCodeme personal genomic scanning service for just under 1,000 dollars (analysing about 1 million genetic variations, compared to 600,000 by 23andMe). More recently, in January 2009, deCode announced the launch of two scans – the first to assess major cardiovascular diseases (including heart attack, stroke, atrial fibrillation and peripheral artery disease) and the second aimed at common cancers (breast, prostate, lung, bladder, skin and colorectal). The cardiovascular conditions scan is priced at 195 dollars, and the one on cancers at 225 dollars.

Like the special promotion price from 23andMe, deCode also has taken account of marketing to galvanize demand; both scans can be ordered in a 'bundle' for 350 dollars – about equal to that of a higher-end mobile phone.

Map your 6 billion base-pair genome for 1,000 dollars

Prices for more comprehensive mapping remain high, but are also falling.

In 2007, the genome of Nobel laureate James Watson (one of the two scientists credited with the discovery of DNA) was decoded for approximately 1 million dollars.

By late 2008, American start-up Knome was offering to decode a person's entire 6 billion base-pair genome at 100,000 dollars (down sharply from 350,000 dollars at the middle of the year). The closest contender for broader appeal, however, is another US firm called Complete Genomics, now reported to be readying a whole-genome analysis for 5,000 dollars.

Industry experts foresee a trend towards a 1,000 dollar price-point for decoding entire human genomes. This would make it a near-mass market technology, and is expected to be reached sometime early in the next decade.

Personal medicine and à la carte insurance

The impact of consumer genomics will be sweeping. An especially striking new frontier will be personal medicine, where drugs, medicine combinations and dosages are prescribed according to a patient's specific genetic background rather than one grouping tens of thousands or more roughly approximate cases. Further down the horizon is an end to several inherited diseases.

A side-effect of personal medicine could be the emergence of 'à la carte' health insurance, providing choice of cover and premium based on a person's particular disease risks and (eventual) treatment requirements, rather than loading the highest-risk beneficiaries atop the lower-risk ones.

Not yet, but only a few years

In spite of warnings – from healthcare professionals to genomics companies themselves – about the danger of putting too much faith, too quickly in the technology, few doubt that it is a question of time before consumer genomics and i-Health become an everyday fact of life. While vendors of screening tools routinely warn patients that their services do not constitute 'medical advice', the Head of Genomics at the US Centers for Disease Control and Prevention notes in a review in the 'New England Journal of Medicine': "For the patient asking whether these services provide information that is useful for disease avoidance, the prudent answer is 'Not now — ask again in a few years'."

> "A genomic EHR would begin "the transition of the health care sector from a reactive to a predictive enterprise."
> - American Health Information Community.

The best illustration of the emergence of genetics-based, personal mass medicine was a January 10, 2009 feature in 'The London Times'. This reported that the prestigious University College London (UCL) was, for the first time, offering genetic tests to track the risk of breast, ovarian and prostate cancer in people without a family history of these diseases.

The UCL programme is expected to eventually cover more conditions (e.g heart disease and diabetes) as well as screening of embryos by parents who carry a defective gene. Indeed, 'The London Times' story about the UCL screening accompanied news reports about the birth at the hospital of one of the world's first babies selected to be free of a genetic risk of breast cancer, in the shape of the BRCA1 gene; this gives a woman an 80 percent chance of developing breast cancer, and also raises the risk of ovarian and prostrate cancer in her offspring.

GENOMICS AND THE EHR

Synergies from healthcare IT

Consumer genomics will be a powerful new catalyst for the electronic health record (EHR). In turn, healthcare IT is seen as the only means to link and provide substance to both.

In the most basic terms, inclusion of genomic test results in an EHR is clearly the best way to personalize healthcare decision making. The immediate advantages – from avoidance of adverse reactions to a choice of optimal interventions – are clear.

However, the longer-term objectives impact upon the broader foundations of healthcare culture itself. In the words of the American Health Information Community (AHIC), a genomic EHR would begin "the transition of the health care sector from a reactive to a predictive enterprise."

New protocols and standards

Given the novelty of genomic screening for healthcare professionals and the wide variety of tests and technologies in the field (within both the US itself and Europe), it is likely that the development of standards will take some time. Acceptance by physicians of genomics-based decision-support tools (known as Clinical Decision Support or CDS functionality) will take even longer.

In the meanwhile, efforts in terms of linking genomic data to EHRs are likely to remain focused on gaps in IT protocols, metrics and standards (covering terminology, coding, messaging etc.). Efforts in these fields are under way both in Europe and the US.

The LIS cornerstone of personalized medicine

A cornerstone of personalized medicine will consist of Laboratory Information Systems (LIS), which capture data from genomic screening. Robust standards to address communication between LIS and EHRs are crucial to guarantee two-way transfer of information in the pre- and post-analytic phases, especially by extension to the Harmonized Use Case for EHRs (Laboratory Results Reporting).

The key goal, from the viewpoint of healthcare IT, is the need to ascertain that genomic data is not only well structured but that its integrity is ensured, and that it is transferred via secure, unified user and system interfaces to bioinformatics and clinical decision support personnel as well as other concerned parties.

Intelligent reporting, CDS and the EHR

In the era of personal genomic medicine, the challenge of data design will be accompanied by a growing requirement for intelligent reporting. Most physicians are not trained to assess the significance of genomic data from their patients. As a result, streamlining and automating findings is likely to become crucial, as is the structuring of interpretations, to proactively assist physicians in the use of genomic data.

Automated CDS functionalities are therefore likely to be one of the key new challenges for healthcare IT.

The European Bioinformatics Institute

The European Bioinformatics Institute (EBI) is a centre for R&D in genomics and bioinformatics at Hinxton, Britain.

The roots of the EBI lie in the European Molecular Biology Laboratory (EMBL) Nucleotide Sequence Data Library set up in 1980 at Heidelberg, Germany. This was was the world's first nucleotide sequence computerized database of DNA sequences. The scope of the EMBL mandate grew, as direct electronic submissions of data began after the launch of genome projects, and the two (soon conjoined) projects soon found a new home in Britain at the Wellcome Trust Genome Campus, with funding provided by the latter as well as the EU Commission, the US National Institutes of Health, and 20 national governments.

The Hinxton facility (now known as EMBL-EBI) hosts two databases, one for nucleotide sequences and a second for protein sequences. In recent years, it has become a centre for excellence in bioinformatics.

The facility hosts a wide range of IT-related workgroups, one of the most crucial of which is the **Database Research and Development Group**, which focuses entirely on the massive database-related challenges (size, complexity, and real-time interconnectivity) referred to elsewhere in this article.

Other workgroups with a specific IT focus include the **External Services Group** which develops Web Services APIs for EMBL-EBI tools, including a specialised Search Engine, servers etc.

Finally, a group headed by Peter Rice is investigating and advising on **grid technology requirements** (including requisite middleware) as well as application development (for virtual, collaborative applications) and participation in standards development.

Eventually, genomic reports are likely to be delivered to the clinician via an EHR. The key purpose of the latter would be to store and update genomic data (and its interpretations) in an organised manner and provide real-time access to authorised clinicians.

IT will again hold the key to the standardisation of results reporting and the reduction of variability in their interpretation – before they are transferred to an EHR.

The future of i-Health: challenges for healthcare IT

The significance of the above factors cannot be under-estimated. Even today, most genomic data provides no more than probabilities of particular diseases (related to an average in a sample population). Thus, a 15.3 percent risk of getting prostate cancer before a patient turns 80, compared with an average risk of 20.4 percent in a specific sub-group, means little on its own.

One cannot speak of someone suffering from 15.3 percent prostate cancer. The need for correlating such a finding with other risk data and then making an interpretation will be a major challenge.

To make all this happen will require rapid growth in the number of both patient case histories and genomic databases. Such growth will in turn pose additional challenges for healthcare IT.

Most immediately, the sheer volume of information generated by genomics will drive a need for petabyte (and larger) databases. Grid computing architectures hosted on supercomputers or clusters and driven by highly sophisticated collaborative computing software are likely to become common, given the huge mass of historical data in EHRs and the need to both update it with even larger masses of new genomic information – and make all this, along with its intelligent interpretation - accessible in a distributed fashion.

As e-Health moves inexorably towards i-Health, the challenge of genomics will eventually shift from testing and data collection to IT-mediated interpretation. One of the key challenges for policy makers today is to find ways to encourage such skills and provide incentives for adequate compensation and benefits.

As discussed elsewhere in this issue (see I Have a Dream - Barack Obama's Healthcare IT Vision, page 25), one of the major challenges foreseen in the US in the near term is a shortage of IT skills to make Obama's healthcare reforms a reality. This reflects a similar situation during the Silicon Valley boom years in the 1990s.

Such a comparison is not coincidental. "Genomics today is where the computer industry was in the 1970s," according to Randal Scott, a former Chairman of Incyte Pharmaceuticals, Inc., which went on to become one of the first biotech firms to set up a dedicated genomics business.

And the i-Health wave is also irreversible. Leading US business magazine 'Forbes' foresees genomics technologies directly or indirectly contributing to about 20% of U.S. GDP by 2030. Not surprisingly, Time Magazine named 23andMe's Personal Genome Service (referred to previously) as the 'Invention of the Year' for 2008.

Genomics and EHRs: The US Case

In the US, a major step to build an official genomics framework for EHRs dates back to 2006, when the government's American Health Information Community (AHIC) set up a Personalized Healthcare Workgroup. The Workgroup, which consists of healthcare providers, drugs and diagnostics firms, laboratories and universities, patient advocacy groups and government agencies, had a mandate to find means to develop "standards for interoperable integration of genomic test information into personal e-health records."

Shortly before the Workgroup's establishment, the US Health Secretary observed that "…genomics will play an increasingly larger role in medicine, and now is the time to figure out how best to incorporate genetic information into e-health records, before multiple non-standard approaches take hold." The Workgroup is focusing on four issues:

- Genomic Tests
- Family Health History
- Clinical Decision Support
- Confidentiality, Privacy, and Security.

Genomics IT Infrastructure: An Example from Europe

Europe's EGCT (Advancing Clinico-Genomic Trials on Cancer) project is developing a unified technological infrastructure to facilitate secure, seamless access to genomic and clinical data, enriched by knowledge discovery operations and services. The project is already directed at an application area – to support multi-centric, post-genomic clinical trials, initially focused on cancer but evidently extensible to other areas.

The EGCT project has conceived an overall architecture for an integrated genomics platform. Its infrastructure uses a common set of services and service registrations for the entire cancer clinical trials community.

Key points of emphasis are:

- Standards and models for exposing web services (semantics)
- Modelling and simulation tools from the molecular to the systems biology level
- Data mining tools for knowledge discovery
- Domain-specific ontologies and data representation models to permit meta-analysis
- Customisable discovery workflows for design and secure execution by researchers

The EGCT has also set up cross-disciplinary task forces to propose guidelines on issues such as data sharing (including legal, regulatory, ethical and IP issues) and advanced security tools for data anonymisation. It is also developing enhanced standards for data protection in a web (grid) services environment.

Radiology Information 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]

GE Healthcare

MODEL	Radiotherapy Treatment Planning Systems	Centricity RISi 4.2
WHERE MARKETED		Europe Middle East Africa, Latin america, english speaking Asia, ANZ
SYSTEM TYPE		Radiology Information System
HOSPITAL SIZE		Adapted to any facility size. Unlimited
SYSTEM CONFIGURATION		
Hardware platform	Facility-dependent	Intel-based servers
Operating systems	Facility-dependent	Windows 2003
Program languages		Java, C++, .Net
Database management system	Relational, nonproprietary	Oracle
Peripheral devices	Any standard	Document and label printers; document and bar-code scanning, Smartcard reader
Maximum capacity		Depends on configuration
NETWORKING		
Architecture	Client/server	Client/server
Communications protocols used	TCP/IP	TCP/IP
Operating system		Windows 2003
PACS COMPATIBLE	Yes	Yes
DICOM 3.0 COMPLIANT/HL7 COMPLIANT	Yes/Yes	Yes/Yes
INTERFACES AVAILABLE	HIS, PACS, billing, dictation	HIS, PACS, voice recognition and transcription, digital dictation, billing, any HL7 based system
BAR-CODE READER	Yes	Yes
DATABASE INTEGRITY		
Transaction logging	Yes	Yes
Backup system	Hospital preference	Tape or network based
SYSTEM SECURITY		User ID and password, periodic and on demand updates
SOFTWARE FUNCTIONS		
Scheduling	Yes	Yes
Patient tracking	Yes	Yes
Results reporting	Yes	Yes
Film-library mgmt	Yes	Yes
ADT	Yes	Yes
Case retrieval	Yes	Yes
E-mail	Yes	Yes
Order entry/stats	Yes/yes	Yes/yes
Quality control	Yes	Yes
Billing/accounting	Yes/yes	Yes/yes
Inventory control	Yes	Not at this juncture
Productivity reporting	Yes	Yes
Digital dictation/voice recognition	Yes/yes	Yes/yes
Other functions	Word processing, teaching files.	Word processing, teaching files. E-order validation, Fax export module, PDF/RTF Report export, Instant messenger, Screening scheduling, Audit trail, Patient radiology history, XDS registry, Conference management, Live productivity display, etc.
PLANNING & PURCHASE		
Warranty	Yes	5 years on HP hardware; 1 year software
Delivery time, ARO		4 weeks
Monthly maintenance		Possible
Last software update		Sep-08
Users' group available		Yes
Training with purchase	Yes	Yes
Year first sold		1992
Number installed		300 sites installed worldwide
OTHER SPECIFICATIONS		ICD-9, OPS coding; RIS integration to PACS database.
LAST UPDATED		Jan-09

MERGE Healthcare	PHILIPS	AGFA HealthCare
Fusion RIS GL	**XIRIS**	**IMPAX Enterprise RIS 5.5.1**
Africa, Europe, Middle East	Global	Worldwide
Radiology and nuclear medicine	Workflow and data management for radiology	RIS streamlines/automates departmental workfow
any	Unlimited	Unlimited, scalable
PC for clients, server for RIS application	Any major vendor	Windows
Windows 2000/XP/Vista, Windows 2003 server	Server: Red Hat Linux, Client: MS-Win and IE	Windows Server 2003/2008
Delphi, Java	Java, .NET	C++, Centura
Sybase	Oracle, Postgress	Oracle
Printers, fax, scanners, Philips SpeechMike, dictation handsets, bar-code reader, chip card terminals, others	Scanners, bar-code readers, printers, Philips SpeechMike handhelds and foot pedals, PC tablets	Printers, bar-code readers, voice dictation, document scanners, digital dictation systems
Platform-dependent	Not specified	Unlimited; RAID, SAN, NAS, direct attached
Client/server	Client/server	Database server, Web server
TCP/IP, HTTP, FTP	TCP/IP	TCP/IP, HTTPS, HTTP
Windows 2003 server, Windows XP Pro		Windows
Yes	Philips iSite PACS, other third-party PACS	Yes
Yes/Yes	Yes/Yes	Yes/Yes
IHE, HIS, PACS, dictation, voice recognition, portals for reports and images, Web-based order placer, SMTP, POP	HIS, PACS, billing, dictation, enterprise scheduling	HIS, PACS, HL7, DICOM, IHE, SIU
Optional	Yes	Yes
Yes	Yes	Full
\	Yes	Tape streaming, DAT, AIT, spinning disk
User ID, password, SSL for Web portal, SSL for DICOM	None specified	User ID and password, encryption, role-based access
Yes	Yes	Yes; Web-based multiresource, multientity support; can be extended into referring physician offices, bidirectional SIU interfaces available
Yes	Yes	Yes
Yes	Yes	Yes
Yes	Yes	Yes
Yes	Yes	Yes
Yes	Yes	Yes
Yes	Yes	Yes, closed system
Yes/yes	Yes/Yes	Yes/yes
Yes	Yes	Yes
Yes/optional	Yes/Yes	Yes/yes, via interface
No; material tracking	Yes	Yes
Yes	Yes	Unlimited using Cognos Impromptu
Yes, fully integrated/yes	Yes/Yes	Fully integrated reporting and sign-off management
Word processing, teaching files. Report generation, fax, custom reports, patient exam and audit logging, document management (scanning, importing/exporting), referring physician access, Web portal	Word processing, teaching files. Mammo tracking, marketing module, results auto-distribution, department dashboard, data tracking and management reports	Word processing, teaching files. Advanced security, fax, report generation, embedded document scanning, database conversions, custom reports, patient care tracking for mammography with statistical reports via MRS, results and follow-up letters, image distribution, full PACS integration
1 year	Yes	Manufacturer, hardware; 90 days, software
1-3 months	Not specified	4-6 weeks
% of purchase price		
At least every quarter	Not specified	Nov-08
Yes	Not specified	Yes
Yes	Yes	Off-site system administration, basic and advanced available, super-user on-site training, user manuals, guide
1997	1999	1985
≥260	Not specified	≥400
International solution; work flow engine; embedded document management (scanning, importing, exporting); embedded digital dictation solution; billing module with collection module; referring physician Web portal with image distribution; practice management and analysis module.	None specified.	High availability, clustered and disaster recovery options; multiresource, multientity scheduling available as a stand-alone solution; ≥300 interface library.
Jan-09	Feb-09	Jan-09

MODEL	syngo Workflow	KODAK CARESTREAM RIS
WHERE MARKETED	North America	Worldwide
SYSTEM TYPE	General radiology, nuclear medicine, mammography, multiresource scheduling, PACS integration, DICOM modality worklist, modality performed procedure step, embedded voice recognition, document management	General radiography
HOSPITAL SIZE	50-1,000 beds.	Unlimited
SYSTEM CONFIGURATION		
Hardware platform	HP Alpha, IBM pSeries, HP Proliant and IBM X-series, Linux AS V3.0[1]	Windows-based servers, Unix-based servers
Operating systems	Windows 2000, Windows XP	Windows 2003, Windows XP, Unix
Program languages	C++, Visual Basic	VB, C++, Java
Database management system	Sybase Adaptive Server Enterprise	Oracle
Peripheral devices	Various options	Printer, Speechmike, multifeel scanner, bio ID mouse, bar-code scanners, bar-code printers
Maximum capacity	Local, SAN	Depends on hardware platform
NETWORKING		
Architecture	3-tier client/server, peer-to-peer	Client/server, Web enabled
Communications protocols used	Ethernet, TCP/IP, FDDI, ASYNC	TCP/IP
Operating system	TCP/IP	Windows 2003, Windows XP
PACS COMPATIBLE	Yes	Yes
DICOM 3.0 COMPLIANT/ HL7 COMPLIANT	Yes/Yes	No/Yes
INTERFACES AVAILABLE	PACS, HIS, LIS, CIS, digital dictation, teleradiology to any DICOM 3.0-compliant supplier, voice recognition, modalities supporting MWL and MPPS	Billing, HIS, EMR, CIS, voice, PACS, document scanning, HL7, XML, DICOM, IHE framework, EDIFACT
BAR-CODE READER	Yes	Optional
DATABASE INTEGRITY		
Transaction logging	Yes	Yes
Backup system	Tape with varying capacities, supports various enterprise backup soltions	CARESTREAM information management software
SYSTEM SECURITY	User ID, password, scenario settings	SSL, password protection
SOFTWARE FUNCTIONS		
Scheduling	Yes	Yes
Patient tracking	Yes	Yes
Results reporting	Yes	Yes
Film-library mgmt	Yes	Yes
ADT	Yes	Yes
Case retrieval	Yes	Yes
E-mail	Yes	Yes
Order entry/stats	Yes/yes	Yes/yes
Quality control	Yes	Yes
Billing/accounting	No/no	No
Inventory control	Yes	Yes
Productivity reporting	Yes	Yes
Digital dictation/voice recognition	Yes/yes	Yes/optional
Other functions	Word processing, teaching files. Fax, ad hoc report generator, voice-recognition data entry, mammography, Windows, CPT and ICD coding, ACR, interfaces for diagnostic and filming workstations, modality gateway, PaXway, doctor workstation, word processing, document scanning, electronic patient signature, interactive document, clinical alerts, protocol planning and protocol transfering to MR Modalities, Portal Executive decision intelligence tools, high availability	Fully Web enabled product, document scanning, mammography, customized forms and workflow
PLANNING & PURCHASE		
Warranty	1 year	12 months
Delivery time, ARO	Not specified	30 days
Monthly maintenance		
Last software update	Regular updates	Updated quarterly
Users' group available	Yes	Manufacturer-sponsored internet-based
Training with purchase	Yes	Included with quote
Year first sold	1981	1993
Number installed	≥400	≥180
OTHER SPECIFICATIONS	Brokerless PACS integration; mammography module; multiresource scheduling module; radiologist workstation; stand-alone system historical index; user-defined management reporting; seamless HIS/RIS/DICOM interface; multiple-platform capability. Meets requirements of ACR/NEMA DICOM 3.0, HL7, and POSIX.	Fully Web enabled, Highly configurable; auto scheduling/resource management; Graphically based scheduling, seamless PACS integration; supports multiple languages; customizable workflow and reporting system; document scan server; EDI, PACS, EMR, HIS, VR integration; DMWL-MPPS integration; electronic request system; bar-code printing; Web reporting including remote transcription with integrated speech recognition software, Referring physician portal with order/enterprisewide scheduling; optional digital dashboard for virtual proactive monitoring.
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ASSET MANAGEMENT AND HEALTHCARE IT

FROM BEDDING TO SOFTWARE: TWO CASES

Asset management and control is an enduring challenge for all hospitals. The scope and scale of hospital 'assets' is both vast and heterogeneous. Nevertheless, IT has been increasingly deployed, often in imaginative ways, to meet such challenges. Such demands are likely to grow as the current economic crisis increases equipment financing pressures on hospitals.

Given below are two examples of IT solutions for asset management. One is from Europe and the other from the US. The European example concerns control of an expensive product found in most hospitals, the anti-decubitus mattress. Lessons from this case were applied by the hospital's IT management to other items such as wheelchairs and infusion pumps, and could in theory be extended to any non-fixed asset.

The US case, on the other hand, is about another kind of asset – software. Its lessons are again common, not only to hospitals but other large businesses where tracking and filing software licenses from a multitude of vendors, over different periods of time, sometimes yields priority to more pressing issues.

THE REGIONAL HOSPITAL ST. TRUDO, BELGIUM

Daniel Loos is IT Manager at the Regional Hospital St. Trudo, Belgium.

The Regional Hospital St Trudo (RSZT) is the result of a merger between the St. Anna and St. Joseph hospitals in St-Truiden, Belgium. The hospital has 310 beds and is the main regional hospital for the Belgian region of South-West Limburg and southern Flemish Brabant.

With more than 700 employees, including 90 physicians, it provides about 11,000 patients with healthcare services per year. The hospital is equipped with an electronic patient record system and continuously invests in innovative medical equipment and systems.

Anti-decubitus mattresses to infusion pumps and more

The RSZT strives to constantly improve care for its patients. In this context, we at the IT department sought a method for the management of rather expensive anti-decubitus mattresses. These are used to prevent wounds by patients who need to stay in bed for prolonged periods.

The biomedical department of the RZST has 24 standard anti-decubitus mattresses in stock. Unfortunately, these mattresses frequently disappeared after discharge of a patient, and it required considerable amounts of time for the biomedical department to track the missing mattresses. The management of the mattresses was not always optimal, which sometimes resulted in the need for making extra rental orders from an external supplier.

Together with network partner NextiraOne, we installed a powerful wireless network from Cisco. This wireless network makes it possible for doctors to consult the electronic patient records at the bedside of the patients and also have access to most up-to-date medical and nursing information.

WiFi RFID tags of AeroScout have been deployed to help the biomedical department to quickly locate critical materials. All mattresses now get a small wireless RFID tag attached which is permanently connected to the wireless network. Thus the biomedical department now always knows where each mattress is, and does not need to waste time with unnecessary searches or face the need to order extra units. This was welcome news from a business point of view, since the rental of anti-decubitus mattresses had been generating wholly unnecessary costs.

Other critical materials such as wheelchairs and infusion pumps have also been given a RFID tag, saving time for receptionists. At the reception, there are about ten wheelchairs available for the transport of patients. Previously, when all wheelchairs were in use, receptionists had to make a phys-

ical search to track a free wheelchair. Currently, it suffices to open the AeroScout web application and locate all wheelchairs. The IT department has set up the system to generate an alarm when there is only one wheelchair left, or when a wheelchair has been parked at a place other than the reception beyond a specified period of time. This ensures that patients with mobility assistance requirements always have a wheelchair available when they visit the hospital.

The RFID tags are configured to regularly transmit a localisation signal via the wireless network. To monitor these signals the hospital has installed about 259 wireless access points in its new WLAN network, which will soon also be used for monitoring cardiac patients as well as telephony.

Human assets: Tracking geriatric patients

The new technology is now also being harnessed by us to allow geriatric patients to leave their wards without a risk of getting lost or confused in the hospital – a not uncommon occurrence.

In the future, such patients will have a RFID tag so that the nurses will get a warning when they leave the department. Through triangulation of the antennas the system can determine within a few meters where a RFID tag is located.

Spinoffs from modernisation

The asset management functionalities offered by the RSZT are spinoffs from modernisation of the wireless infrastructure at the hospital. These have provided us with the technical means to master a multitude of other challenges.

Staff now complete electronic patient records at the bedside of a patient. When the lab delivers new results, the doctor has these results immediately available in a patient's room. Previously the results had to be printed and delivered to the doctor. The hospital soon intends to launch an application for doctors to prescribe medication at the bed of the patient and directly send this to the hospital pharmacy. The pharmacy can prepare the new drugs, or adapt certain doses to the new, recent lab results.

Closer to our IT department, RFID tags are also being used by the RSZT to monitor temperatures in different server rooms. Over the years, a rising number of servers had sometimes overloaded the cooling system. Overheating, in turn, led to errors in the system log files. Currently, an alarm is sent to the IT department to adjust the server cooling systems in time.

The future

By 2012, both hospitals St. Anna and St. Joseph will be located on one campus. The IT department examined the infrastructure changes needed to promote the work of the hospital staff and the welfare of the patients. A new wireless network which supports RFID technology was one of the first items on the agenda. This network is ready for the future. It has only just has been put in use and we are already getting more questions from other departments that see lots of benefits for their business.

HERE'S THE SOFTWARE, WHERE ARE THE LICENSES?

John F. Wilder is Director of Information Systems at Youville Hospital and Rehabilitation Center Cambridge, Massachusetts, US

Youville Hospital and Rehabilitation Center is a 180 bed, non-profit, hospital dedicated to providing superior care for adults with disabling health problems. Located in Massachusetts, Youville employs more than 600 individuals.

When I was hired as the Director of Information Systems at Youville Hospital and Rehabilitation Center, I knew that one of my first tasks was to assess the resources. One of the key resources is of course, software. I knew that the Hospital Information System (Meditech) was fully licensed and supported by the vendor. But, I was concerned about the Microsoft software. I had read enough about businesses being fined through various audits for not having the proper number of licenses to match the number of installed copies. By doing a quick check, I could see that over time, the hospital had purchased licenses through various channels at various times.

It is not a unique problem for IT Directors or CIOs to have licenses and software not in compliance when you have a facility with 600+ employees and 350 PCs deployed. As you change vendors and make purchases of computers and software, tracking and filing licenses can sometimes take a backseat to more important issues.

As the new IS Director for the Hospital, I needed to know what software was in house, where it was installed and what was actually documented. I also wanted to make sure our 600+ users had the "tools" they needed to do their job. In addition, I was concerned that we were at risk and may not be in compliance and this would clearly be recognised in any audit. Lastly, I wanted to do this once and do it right.

We started a manual assessment and inventory of our installed software but allocating staff to do this proved to be very time

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The new mammo DR system

Fujifilm has developed a completely new kind of x-ray detector that represents a breakthrough for upcoming applications in digital mammography.

■ **World's best resolution for detectors of its kind**

The detector uses two substrate layers of amorphous selenium and, at 50 µm pixels, offers the world's best resolution in detectors of its kind. A sharper picture and improved signal/noise ratio result, making for significantly enhanced imaging quality in breast cancer diagnostics.

■ **High pixel density and improved signal/noise ratio**

The x-rays are converted into electric signals in the first layer, and are then detected in the second layer with the help of an optical switch and presented as an image. The procedure reduces the amount of time needed for erasing and re-exposing the detector, accelerating the overall exam workflow

AMULET

■ **Optical Switch – as new development**

New procedure for selenium vacuum storage generates extremely pure selenium layers with an even thickness across each layer. Light is used as a switch for detecting electric signals. The data is thus read out from the detector directly, without first being converted. It enables the operator to lower the radiation dose while improving diagnostics and the efficiency of the examination.

■ **Specifications**

- High DQE, high MTF
- Optimised compression feature
- More convenience and safety for the patient
- Detector method: a-Se with optical switch
- Exposure interval: approx. 20 s
- Pixel size: 50 µm
- Grey scale: 14 bit
- Image display after: approx. 10 s
- Availability: end of 2008

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consuming and thus, very unrealistic. Being a not for profit hospital, there was no money budgeted to bring in additional resources to perform a proper inventory.

At this point I had received a sales call from Soft-Aid, a Microsoft® Gold Certified Partner for Licensing Solutions. They were presenting an opportunity for a free assessment of our software in conjunction with Microsoft. They explained what a Software Asset Management (SAM) tool could do for us. I was reluctant at first because traditionally I am not someone who would allow anyone to come in and load software onto the network or give anyone access to the network. When I heard that it would answer all of my questions, I was a bit more interested while being cautious.

Solution:

Soft-Aid installed an inventory tool on the network, which, through an automated discovery process, compiled a precise inventory of software throughout the network. It happened very quickly and produced detailed and complete results. Through the detailed results, I was able to see what we actually had installed versus our best estimate. The next step was to check our physical inventory and records to see what documented licenses we had in house and what had been previously purchased by my predecessor. After a detailed comparison of licenses and installed software, I could see we were lacking in quite a few areas.

Of course this presented another problem with the available budget for software. I needed more licenses than I had available funds. Working with Microsoft, I found that we were able to qualify for the Microsoft Open-License Charity program. The program allows eligible organisations to acquire multiple software licenses at reduced prices. I was able to purchase the necessary software licenses within the existing budget.

The engagement with Soft-Aid did not end with the SAM assessment. They reviewed our policies for procurement and tracking. They presented me with a detailed report. The report included the software inventory as well as recommendations for SAM management based on industry best practices. The SAM report also included recommendations for implementing new policies for acquiring, distributing, and storing software. Within a few weeks, I began to rewrite our policies and procedures in this area.

After the SAM report was reviewed internally, we decided that education was the key to insuring that users do not attempt to bring in software and understand how licensing works. We used the information to supply to all users at our annual Employee Education Day.

Benefits:

- The benefits from the experience were many. I received a thorough inventory without expending resources I couldn't afford and time I could not commit. The estimated cost savings of performing a manual inventory was approximately $5000.A manual inventory would not have included the assessment and recommendations.
- Through the assessment I was able to bring the hospital in compliance and eliminate the risk and liability issues.
- I received expert advice on how to manage my software inventory. As a result of the recommendations I updated software acquisition policies and procedures.
- And of course, learning that we were eligible for Charity pricing will benefit the hospital going forward. During the first purchase, we realised a savings of $15,000.

HEALTHCARE IT MANAGEMENT

ANALYSIS

Asset planning and management, in the context of a healthcare organisation, is a detailed and structured approach to the long-term management of assets, from the valuation, purchase, and operation, to the sale of assets. The aim is to enable efficient and effective delivery of health services while respecting and following strategic objectives.

Asset management is thus a process that includes:

- identification of a need for the asset;
- a decision that is based on evaluation of alternatives that takes into account full life cycle costs, benefits and risks of the asset;
- provision of the asset, including its operation and ongoing maintenance; and
- the disposal of the asset.

Software vendors recognise the complexities of health care business and offer a range of software solutions that help health care managers to integrate asset planning and management with corporate and business plans, budgetary and reporting processes.

Even before the present economic crisis, hospitals across the world have been confronted with equipment financing pressures and asset management challenges.

Classically, the goals of a good asset management programme are to minimize the need for new capital expenditures, while increasing utilisation rates and reducing offline maintenance for existing equipment. An equally important, but 'softer' issue is to maximise the time physicians and nurses spend on direct patient care (the latter, typically, spend up to half their hours on administrative tasks). Finally, asset management programmes in hospital also seek to improve regulatory compliance and enhance patient safety and healthcare outcomes.

'I HAVE A DREAM'

Barack Obama's Healthcare IT Vision

AUTHOR
Tosh Sheshabalaya,
HIT

The November 2008 US presidential elections have brought to the White House one of the country's most resolute champions of healthcare reforms in recent memory. Barack Obama is – and has also long been – a proponent of IT as a way to bring about efficiencies to the country's bloated healthcare spend, and the deep rooted structural challenges it must confront over the next decade.
But how realistic are his plans? It may be too early to tell.

Wars, recession and healthcare costs

Alongside two wars and a global recession, Barack Obama underlined his commitment to US healthcare reform at his inaugural presidential address on January 20.

"Our nation is at war…", he said. *"Our economy is badly weakened….. Homes have been lost; jobs shed; businesses shuttered. Our healthcare is too costly…".*

Later during his speech, Obama again highlighted the healthcare sector as a means to lay the foundations for economic revival. Towards this, he minced no words about the role he saw for high technology.

"For everywhere we look, there is work to be done… "We will restore science to its rightful place, and wield technology's wonders to raise healthcare's quality and lower its cost…. All this we can do. And all this we will do."

Bringing US healthcare into the 21st century

The new US President's hopes and vision for healthcare technology is hardly that of a fresh convert. In 2005, or well before the current economic crisis, then-Senator Obama co-sponsored the Wired for Health Care Quality Act. After its unanimous passage by the Senate, he noted: "In our lifetimes, we've seen some of the greatest advances in the history of technology and the sharing of information. Yet, in our healthcare system, too much care is still provided with a pen and paper. Too much information about patients isn't shared between doctors or readily available to them in the first place. And providers too often don't have the information to know what care has worked most effectively and efficiently to make patients healthy."

The new Act, he then concluded, "is going to help bring down costs, improve quality, and bring the healthcare system into the 21st century."

The Wired for Health Care Quality Act

The Act aimed at three steps to build an American e-Health infrastructure:

- Providing grants for the implementation of regional or local health information technology plans
- Establishing a National Coordinator of Health Information Technology to develop a national health information technology infrastructure and to ensure patient health information is secure
- Establishing a process for the adoption and implementation of health information electronic exchange standards

Building on the Bush legacy

Since then, the previous Bush administration has already launched numerous healthcare IT infrastructural projects, notes Stephen Schoenbaum, executive director of The Commonwealth Fund's commission on a high performance health system.

Individual States too have pitched in. Massachusetts, for example, plans to fully computerize records at its 14,000 physicians' offices by 2012 and the State's 63 hospitals by 2014. The task of building further on this is now up to the Obama government – and the new President appears resolved to do so.

This is part of the emergency

Six weeks after his election victory, Obama returned to the theme of healthcare reform. In the middle of December, during his announcement of the appointment of Tom Daschle (previously the Senate Majority Leader) as the new US Health Secretary, he asserted that health reforms were "intimately woven" into his economic recovery plans. "The time is now to solve this (healthcare) problem," he said. It is not something that we can sort of put off because we're in an emergency. This is part of the emergency."

Healthcare IT: Down payment for the long term

On January 3, in a radio address, Obama again affirmed his intention to invest in healthcare technology as part of an American Recovery and Reinvestment Plan – whose overarching objective is to make strategic investments which "serve as a down payment on our long-term economic future." As he went on to explain, "To save not only jobs, but money and lives, we will update and computerize our health care system to cut red tape, prevent medical mistakes, and help reduce healthcare costs by billions of dollars each year."

Given Obama's record level of popularity, the US political establishment seems ready to endorse the President's plans. "Every American has a right to affordable, high-quality healthcare," says Max Baucus, chairman of the Senate Finance Committee. "And I believe," he concludes, "that Americans cannot wait any longer."

An elusive goal

If Obama eventually succeeds, he will achieve a goal that has eluded US presidents since the end of the Second World War. The nearest attempt for major reform was by President Bill Clinton in 1994. However, the Clinton initiative collapsed after concerted opposition from interest groups and members of Congress.

Nevertheless, the new President has yet to provide more details about how he intends to achieve the reforms, or how the US would pay for such a major overhaul.

Electronic health records

Carrying on from his Wired for Health Care Quality Act, Obama has said that his administration will seek to contain healthcare costs, above all by making improvements in the technology used to handle patient records and other medical information as way to make savings and achieve efficiency. Indeed, efforts to make all health records standardised and electronic, and do this within five years, form one of the most concrete reform plans (and what Obama sees as its spin-offs into a turbocharger for the wider economy).

Obama's support for electronic health records "is one of the key efforts of health reform that actually will deliver lower costs for hard-working American families," according to Larry McNeely of the U.S. Public Interest Research Group. "Long-term savings can't happen," he says echoing then-Senator Obama after passage of the 2005 Wired for Health Care Quality Act, "unless we have 21st century health information technology."

Noble but tough

However noble, such a task is likely to be a tough call. Less than 10 percent of the 5,000-odd hospitals in the US and an estimated 15-20 percent of its 800,000 physicians use any form of electronic health record.

One area on which the Obama administration is likely to push consists of fiscal carrots to help providers adopt new healthcare technology. Incentives involving the State Medicare system may firstly inspire physicians to reduce resistance to change.

Legal challenges in a land of lawyers

Meanwhile, there also are concerns and vocal resistance about patient privacy (a huge problem in a litigation-friendly culture like the US). Other than concerns about hackers and medical data theft, new online health record systems, such as Google Health are not currently subject to the Health Insurance Portability and Accountability Act (HIPAA), the national health privacy law which was conceived before the Internet age.

Alongside catalysing coordination between standalone State initiatives (such as those by Massachussets), adaptation of untested HIPAA laws to EHRs will also need to be addressed.

The IT skills gap

Another problem is that of skills. Although the programme could create as many as 212,000 jobs, the US faces a shortage of skilled IT workers required to develop and implement the technology, and train physicians to use the system.

Costs also remain a challenge. Experts from the Commonwealth Fund and Harvard University estimate that a national EHR system would cost 75 to 100 billion dollars over the next ten years. In contrast, the entire economic stimulus package being envisaged is only about 800 billion dollars. Though this makes the healthcare modernisation project one of the biggest pillars of the overall economic reform package, there is a real risk that attention to healthcare IT is eventually drowned by competing initiatives in other areas.

Powerful arguments

Still, compared to the 2 trillion dollar US healthcare industry, the annual outlay for a national EHR project seems manageable.

One of the most powerful arguments in its favour is that a national EHR system could save 200 to 300 billion dollars a year. This, in turn, could cap the rapid growth in healthcare costs (9-10% a year) and premiums, which have together slashed disposable incomes in the US even before the current recession.

In the final analysis, time will tell whether or not Obama succeeds, and how far he does so. But given the sheer size of the US economy, any 'new' American healthcare IT standards are likely to have an impact on Europe and the world beyond.

INTEGRATING THE HEALTH ENTERPRISE: THE IHE MISSION

The fast-evolving field of e-Health standards is both a puzzle and a challenge to many healthcare IT managers. As the age of electronic health records (EHRs) approaches by the day, it is self-evident that optimal patient care will require care providers to create, access, update and use these records both efficiently and securely.

Not another standard

In spite of its rather unwieldy name, Integrating the Healthcare Enterprise (IHE) is an initiative by healthcare professionals and the IT industry to assist in making a gap analysis between new e-Health standards and the challenges faced by users – as well as their requirements.
Though the two are occasionally confused, IHE itself is by no means yet another standard.

End goal remains quality of clinical care

The inspiration behind IHE dates back to 1997, when a group of radiologists and healthcare IT experts sought to establish a process through which best-of-breed healthcare standards could be assessed in real-world practice, with requirements for interoperability then implemented. IHE seeks to accelerate the adoption of EHRs by improving information exchange between healthcare systems, providing actionable information to healthcare practitioners and decision makers and thereby enhancing the quality, efficiency and safety of clinical care.

IHE studies and assembles cases, identifies available standards which it reviews, tests and documents, following which it develops technical guidelines (Integration Profiles) for manufacturers to implement. These Profiles leverage the integration capabilities of communication standards such as HL7, DICOM and other standards.

Lower costs, complexity and headaches

For healthcare IT managers seeking to buy or upgrade systems, the Profiles are a reliable means to determine compliance with standards which are sufficient to attain efficient interoperability. This translates into lower costs, complexity and above all, anxiety, as far as procuring and implementing interoperable systems in a fast-evolving landscape of standards is concerned. Both buyers and users report that systems in compliance with IHE Integration Profiles not only communicate better, but are easier to deploy and operate. As a result, they enable healthcare providers to access information more effectively and deliver better patient care.

Methodology

At present, IHE annually brings together users and developers of healthcare IT based on the following steps:

1. Healthcare providers and IT management define critical use cases which require the sharing of information; IHE chooses the areas to focus on.
2. Technical experts create detailed specifications (IHE Profiles) to address these cases, selecting and optimising established standards.
3. Industry implements the Profiles in their products and systems.
4. On the awareness-raising side, IHE organises so-called Connectathons to enable vendors to demonstrate the inter operability of their products. On its part, IHE tests vendors' systems at such events.

IHE domains

IHE is organised under clinical and operational domains, whose number has been rising over the years. The domains produce their own Technical Framework documents, but do so in close coordination with other IHE domains. These documents are released for public comment and also subject to annual expert reviews. Before they are republished (with supplements which define new profiles), a revised profile is subject to an IHE implementation testing process.

The following IHE profiles have been published (either in trial implementations or final text versions):

- Anatomic Pathology
- Cardiology
- Eye Care
- IT Infrastructure
- Laboratory
- Patient Care Coordination
- Patient Care Devices
- Quality, Research and Public Health
- Radiation Oncology
- Radiology

Current priorities

About 250 products and solutions have been released with support for one or more IHE Profiles, while current priorities include patient-ID binding, to ensure that medical data from one patient is never accidentally placed under the wrong name. Other areas of attention include user-friendly, point-of-care technology and ways to enhance device-enterprise communication.

Carestream Health Unveils Next Generation RIS/PACS

A new generation RIS/PACS platform from Carestream Health will offer advanced tools and features to streamline the delivery of imaging services and boost productivity for IT staff, radiologists and other clinicians. HITM interviewed **John Buescher**, Worldwide Product Line Manager for RIS at Carestream Health about the thinking behind the launch of the new system.

Q On the features side, your new system seems an architectural overhaul of traditional RIS systems. How true is this? Specifically, could you highlight some of the key new elements in your approach to design?

A We have updated the underlying technology of CARESTREAM RIS by being Microsoft®.NET-connected. Additionally, we have incorporated a service-oriented architecture providing the full capability to share RIS data in a highly secure manner. New elements are in our latest release, and we have preserved and greatly enhanced some of the key features. We have retained, and significantly enhanced, our approach to the design of a customisable workflow. Our three-tiered architecture separates site-specific customisation from the core code base. This provides a very easy, reliable and cost-effective upgrade path which gives customers the ability to preserve their site specific customisations through subsequent upgrades.

Q Your new system appears to offer the best of two real worlds: backward integration to legacy platforms as well as upscaling and downscaling—respectively to multi-site organisations, and to the needs of standalone sites. In addition, there are considerable freedoms in terms of customization. Surely there must have been some trade-offs?

A Certainly there are tradeoffs. We needed to weigh the value of the full richness of the set of features and architecture against the added development time. The advantage is that by creating this type of architecture, we have a RIS that can be used in many different countries and it is very feature rich. The advantages of this are that Carestream Health has only one code base to maintain. Additionally, features that were initially designed for certain countries can be leveraged into other markets. A perfect example is the 'double-blind-read' feature for mammography. This was initially developed for a few Nordic countries, but this is now being requested for other countries worldwide.

Q What about security? Are there any aspects which you wish to highlight, especially given the seeming 'virtual/grid' structure of the databases, and indeed the wider operating environment?

A The security aspects are very tight. The new architecture allows full intelligent user authentication and full SSL communication with data encryption throughout our application. Safety of patient data is an important and critical requirement for all our solutions.

Q One area of interest in customisation is adapting workflow to the needs of users. Given the state-of-the-art design of your system, is such implementation possible in real time? Secondly, will such customisation be preserved in future upgrades—and who will 'own' them?

A On a permission basis, customisation is available in real time. Customisation is separated from core code so upgrades are easy and reliable. The customisation studio that was built into the CARESTREAM RIS version 11 product makes these changes exceptionally easy. We can very easily add changes to workflow. This is important in two ways. First, on the initial installation we can tailor the RIS to the customer's workflow. So they are not constrained to an unalterable workflow. Secondly, we can make changes easily and cost effectively as the customer's workflow changes. This is extremely valuable as customers drive for increased productivity through continuous improvement efforts. CARESTREAM RIS can easily accommodate these changes and facilitate their drive toward ever increasing levels of operational

efficiency. The ideal scenario is to have the RIS adapt to what a customer wants, rather than the other way around.

Q What about IT and communications technology—in the widest sense of the term? Would you say you are also future-proofed in this respect—given the underlying .NET choice you have made?

A Yes, Microsoft has been a leader in defining usability and we have leveraged that broad base into this product. Microsoft has also been a leader in the advancement of PC computing and software. By using this technology, it helps assure that we can provide the most user-friendly software, both now and in the future.

Q Are there any IHE elements in your system?

A Absolutely, the RIS is built on an underlying IHE friendly data model. In addition Carestream Health is an active participant in the IHE Connect-a-thons in both the US and Europe.

Q The Web Portal is also an area of evident interest. Can you tell us how this would juxtapose with existing or emerging HIS systems—or do users have to make a choice?

A We introduced the Patient Portal concept in Denmark. With the nationwide mandatory mammography screening programme, patients are automatically scheduled for their regular exams. Because of this there is a high percentage of reschedules. The Patient Portal allows patients to have the convenience of being able to reschedule appointments on their own and can greatly reduce the effort in the scheduling

departments. So this basically supplements the hospitals other systems to enhance customer satisfaction and more efficient operations.

Q Have you made any ROI calculations, or do you plan to?

A This is obviously very important for our customers. We have had a detailed analysis performed on one of our installs in the US by a top business school. This analysis demonstrated that the financial returns used in the original justification were greatly understated. As we progress through our product development we will provide tools for potential customers to identify the cost savings that can be possible with CARESTREAM RIS.

Q What about training and ease of use?

A Training is critical in all organisations. Our offering goes a step beyond just training and provides a highly usable graphical user interface. This helps in a number of ways. First, it lessens the requirements for training in a new installation and provides a high degree of comfort and familiarity to end users, which helps with the potential uneasiness associated with learning a new system. On an ongoing basis it allows customers to quickly bring new employees up to speed. And the usability extends well beyond the simple familiarity with the user interface design to features like graphically based scheduling tools and a site definable rules engine that allows users to quickly come up to speed on the system.

Q Is there anything else you believe differentiates your system—both from its predecessors and other systems which are currently emerging?

A CARESTREAM RIS version 11 differentiates itself from other offerings because it offers overall feature richness mixed with usability. With this release we have taken our product features to a new level with a balance between power and versatility and the intuitive nature of our system. The inherent usability of CARESTREAM RIS coupled with the ability to easily customise the individual user's experience and the overall workflow of the customer's site is a powerful offering. Couple this with our extensive capabilities in very large multi-site installations and it's easy to see why our solution is clearly differentiated from the other offerings on the market today.

Visit us at ECR 2009 EXPO B for a demonstration

Carestream HEALTH

For more information visit:

ris.carestreamhealth.com

SMART CARDS AND HEALTHCARE: LEARNING FROM EUROPE

AUTHOR
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Having already proven themselves in Europe, smart cards hold immense promise for all segments of the US healthcare industry: insurers, public and private sector providers and patients. Convenient, portable, intelligent and secure, smart cards combine storage and processing capacities. Implementation of a smart card system could well be a major component in the Obama Administration's plan to modernise healthcare and cuts costs by making all health records standardised and electronic.

The typical healthcare smart card is the size of a credit card and is embedded with a microcontroller, microprocessor or memory chip that contains compressed, encrypted data that can be read from and written to at point-of-care using an intelligent reader linked to a computer system. Alternatively, smart cards can be read with a remote contactless electron magnetic interface.

Europe's State-dominated healthcare and health insurance system has meant that take-up of smart cards has been far more rapid than the US. A decision by the European Commission to mandate the introduction of a card-based replacement to its E-111 paper form for cross-border healthcare provided the impetus for an explosive growth in their use. Some estimates place the number of smart cards in use in the European healthcare system at about 200 million. Countries like France boast world leadership in terms of features and functionalities on their healthcare smart cards, not least in terms of security.

The US has however lagged Europe in this field. Indeed it has lagged Europe in the adoption of electronic medical records (EMRs).

There is a major gap between the amount of money which the US spends on healthcare (the world's highest per capita) and the use of electronic healthcare records. The U.S. healthcare delivery system is an information-intensive industry that is complex, inefficient, and highly fragmented, with estimated spending of $2.2 trillion in 2007. Of this, according to the American Hospital Association over 21% or $465 billion is spent on administration. For every hour spent on patient care in hospitals, skilled nursing facilities or home healthcare, 30 to 60 minutes are spent on paperwork. Despite all the time spent on paperwork, incomplete information is a leading cause of medical errors that claim the lives of nearly 100,000 patients each year. Only about 8% of the nation's 5,700 hospitals and 17% of its 800,000 physicians currently use the kind of common computerized record-keeping systems that newly inaugurated US President Barack Obama envisions for the whole nation.

As of 2005, most so-called smart cards in use in healthcare in the US were in fact magnetic strip cards, that is a card with a strip of magnetic tape material attached that can store a few hundred bytes of read only memory. These cards have no active security feature, although sensitive information such as account numbers can be encrypted.

While many observers apply the term 'smart card' to both magnetic strip cards and cards with embedded microprocessors, others do not consider magnetic-strip cards to be true 'smart' cards. True smart cards have several advantages:

- Both simplify and enforce information access management.
- Make certain that users are adhering to security standards.
- Can be used for both physical and logical access.
- Serve as secure, convenient, portable data carriers controlled by patients and healthcare providers and personnel.
- Facilitate compliance with the strictest privacy and security policies, thanks to built-in intelligence, processing capabilities and standards-based cryptography.
- Allow for the implementation of new applications to improve the delivery of accessible and convenient medical care, as well as the delivery of administrative benefits.

A well-implemented smart card programme can:

- Provide timely, secure access to medical and insurance data while protecting patient confidentiality.
- Improve patient care.
- Provide emergency medical information.
- Reduce medical and billing errors.
- Streamline operations and improve productivity.
- Improve cash flow.
- Improve medical provider relations.
- Wring costs out of the system.

Such capabilities make smart cards an excellent technology for fulfilling the requirements of the US's Health Insurance Portability and Accountability Act of 1996 (HIPAA), which aims to:

- Protect health insurance coverage for workers and their families.
- Encourage the development of a health information system by establishing standards and requirements for the secure electronic transmission of certain health information.
- Make health insurance portable.
- Simplify the administration of health care information.

HIPAA mandates that access to and storage of healthcare information meets three basic requirements: availability, integrity and confidentiality of data.

Scenarios for Development and Use of Smart Cards in the US Healthcare Industry

There are three basic format scenarios for the development and use of smart cards in the healthcare industry, each with increasing levels of functionality:

1. Providers and health plans design magnetic swipe cards for the purposes of pre-registration and verifying plan member eligibility.
2. Providers and health plans design magnetic swipe cards that add a stored value component or can access health saving accounts. In addition to identification, such cards can be used to handle expenditures, replacing out-of-pocket payments for office visits and copays for prescriptions on the part of the patient. These cards would benefit both insurers and providers. Additionally they could obviate the need for patient submission of paper claims for reimbursement to their benefit plans.
3. Providers, health plans and vendors design a microchip-embedded card that identifies each patient's insurance carrier, contains details on the features of the patient's plan and formulary information, identifies the primary care physician; lists chronic conditions, current medications, and allergies; and carries other critical clinical and emergency information. This data may be incorporated into electronic medical record (EMR) systems. Data can be updated (uploaded and downloaded) real time at point of service locations such as hospitals and medical practices.

Applications

Under the third scenario above, smart cards permit a number of interesting applications. Dual card systems can be designed to meet the specific needs of healthcare professionals as well as patients.

Barriers

For all their potential benefits, smart cards have been slow to catch on in the US. Barriers to acceptance are formidable, not least because of the fragmented nature of the healthcare system in the country.

- Unlike Europe where smart cards are widely used in healthcare applications, the United States does not have a unified national healthcare system. Rather, its massive system is highly fragmented, with healthcare provided by a wide variety of private and public sector payers and providers, many of whom are in competition with one another.
- Faster claims processing means that insurers must pay sooner; and if payers don't support smart cards, healthcare organisations may be discouraged from using them.
- High programme costs are a significant barrier to large-scale deployment, especially as reimbursement for patient care has been declining steadily.
- Healthcare providers have lacked the necessary card readers, but some computers are now manufactured with built-in readers, and insurers and vendors are coming up with more user-friendly technology, including contactless cards.
- Despite gains, smart card technology is still relatively new in the US, and many Americans have not yet been persuaded that it is a good thing.
  - > Americans are concerned that smart cards may jeopardise their privacy and make it easier for employers and insurers to exclude those with existing (costly) conditions.
  - > They are also concerned that such cards would and make it easier for identity theft artists to operate.
- Interoperability has been considered a big problem. Smart cards only work on readers from the same supplier, where other forms of authentication such as passwords and tokens will work on any computer.
  - > No standards exist to ensure that cards can be used at different sites. There is a real need for the industry to develop interoperability. According to the Smart Card Alliance Healthcare Council until now, no one has wanted to fund the interoperability effort required to move to electronic medical records.

Healthcare Provider Card Applications

- Access Control (cards can provide different healthcare professionals, for example a nurse and a doctor with different levels of access)
- Audit Trail Generation and Transaction Accountability
- Control Initial Card Possession
- Speed Reimbursement
- Facilitate sample distribution

Patient Smart Card Applications

- Access Insurance Information
- Access Emergency Medical Information
- Access Medical History
- Access Personal Information
- Access Formulary Information
- Authorise Decisions Electronically
- Prescription Transfer
- Control Initial Card Possession
- Authorise Payment
- Automated Payment for Samples
- Biometric Authentication
- Graphics Storage

However, about to be enacted US government mandates and funding are likely to change the picture substantially (see below).

Europe's State-dominated healthcare and health insurance system has meant that take-up of smart cards has been far more rapid than the US....

The Smart Card Investment: Costs

Implementation of a smart card programme can be very labour- and cost-intensive — or less so — depending on the extent and complexity of the desired features, number of covered lives, geographic coverage, and whether the insurer develops the programme in-house or contracts with an outside integrator to create the plan from scratch.

- Costs can range from hundreds of thousands of dollars for a small programme, to hundreds of millions for a national system.
- The key cost components are: cards, readers, software purchase or development, project design, data base modification, systems integration, installation. Cards and readers account for only 10% of the total cost.
- Independent studies from Harvard, RAND and the Commonwealth Fund have shown that getting EMRs up and running in the US could cost at least $75 billion to $100 billion over the ten years.

The Smart Card Investment: RoI

Despite the high costs of installing a system, payers could stand to reap a considerable return on its investment. Elements to consider include:

- Replacement of manual, paper processes
- Elimination of the need to reissue member cards annually
- Real-time and accurate access to eligibility, benefit and formulary data
- Elimination of costly phone queries to insurers call centres
- Ability to make payments from consumer-driven healthcare accounts (health savings account [HSA], health reimbursement account [HRA] and flexible spending account [FSA])
- Provision of health outcomes data
- Reduction of medical errors
- Reduction of duplicate tests
- Improvement of healthcare provider relations
- Facilitation of HIPAA compliance
- New levels of security
- Flexibility and intelligence in transaction processing.

Outlook for Smart Cards in the US

To date, US healthcare system has been slow to adopt smart cards. The key challenge is to develop a system which offers providers an integrated view of a patient's health status and medical history, which experts believe would cap costs, reduce medical errors and improve access to information. At the moment, this is a tough call as most healthcare providers cannot share data with other providers.

- To correct this situation, there have been discussions on regional health information organisations (RHIOs) as means to lay the foundations for a national healthcare information network (NHIN).
- A few major commercial and government smart card programmes, like American Express's 'Blue Card' and access cards being implemented by the Departments of State and Defense, indicate that smart cards are beginning to catch on.
- New wireless technologies, permitting contactless card use, may solve the reader problem.

Programmes designed by the new Obama administration may slice through this Gordian knot. President Obama is proposing a massive effort to modernise health care, while wringing costs out of the system by making all health records standardized within five years. The new president forecasts that having insurers and providers to adopt electronic claims systems, electronic medical records, and patient safety reporting systems, will cut overall health care costs by up to 10 percent or more. The Obama administration plans to make the "immediate investments necessary to ensure that within five years, all of America's medical records are computerized." Obama has proposed investing $10 billion a year for five years to move toward standards-based electronic health care systems.

The just passed House version of Obama's stimulus bill contains provisions requiring:

- Health information technology architecture that will support the nationwide electronic exchange and use of health information in a secure, private, and accurate manner, including connecting health information exchanges . . .

- Funding for acquisition of hardware or software or for the use of an electronic health or medical record, will only be allowed for certified products that would permit the full and accurate electronic exchange and use of health information in a medical record, including standards for security, privacy, and quality improvement functions adopted by the Office of the National Coordinator for Health Information Technology.

To meet these mandates, such a system will have no choice but to take serious account of the role of smart cards.

REMOTE CARE OF PATIENTS

The Personal Health Devices Standard - ISO/IEEE 11073-20601

AUTHOR

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With an ever-increasing elderly population and the growing prevalence of chronic disease, current healtcare systems are struggling to cope. Home based monitoring, with a patient taking data measurements at home and relaying the data automatically to remote data servers, is seen as an important solution to reduce reliance and demand on care services.

Interoperability and Standards

It has become essential for systems to interoperate and this has created a need for health devices to have a common standard. The healthcare industry has recognised such a need, and the Continua Alliance (www.continuaalliance.org) has been formed to develop industry standards for interoperability between sensors, home networks, telehealth networks and health and wellness services. The first set of standards due for release has been developed for the sensors by the IEEE 11073 standards group.

The IEEE 11073 Family of Standards

The ISO/IEEE 11073 family of standards for medical devices has existed for many years and was originally developed for hospital based equipment and specifically for the intensive care environment. The original protocol, based on the full OSI 7 layer model, was often criticised as being heavyweight and complex. In its current form, it was not considered appropriate as the basis of a new standard for personal health data (PHD) devices. However, with the expected rapid increase in the demand for health devices in the home with capability to communicate results, a standard capable of operating in this environment is essential.

The 11073 family of standards is partitioned into a set of standards covering the many aspects of communicating the semantics of medical data from device to manager. This includes a Domain Information Model (DIM), nomenclature, device specialisations, device behaviour, communication transports, and communication protocol. The 11073 family of standards has also acted as an umbrella for medical device standards.

The IEEE 11073 PHD Working Group

The IEEE 11073 PHD Working Group (WG) was established to develop a new medical standard that would be used for the typical PHD device. It was accepted that any new standard would need to be implemented within the limited resources of such devices, and also align with current developments in the Bluetooth SIG and USB SIG to develop health profiles. The work group set itself the task to develop a common base protocol that would work with an initial set of six device specialisations (pulse oximeter, pulse/heart rate, blood pressure, thermometer, weighing scale and glucose). The group currently consists of 205 members from 112 organisations, with 57% from USA, 19% from Far East and 24% from Europe. It has weekly telephone conference calls and meets every 2-3 months in face to face meetings.

The Standards Process

Initially four proposals were submitted to the group for consideration as a basis for the standard. However no one proposal satisfied all the requirements and a process to develop a combined proposal was adopted. This included identifying a template of a set of minimum requirements, a set of preferred requirements, and a set of mandatory behaviour. Proposals were compared and strengths of each identified to inform the final proposal.

The final proposal was mainly based on the 11073 standard but included important changes to accommodate the resource requirements of PHD devices and to incorporate advantageous characteristics of the other protocols.

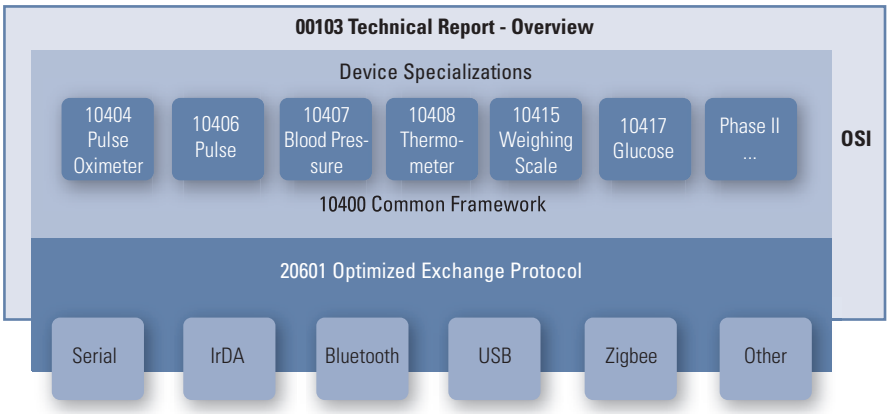

Fig. 1. Overview of the IEEE PHD 11073 Framework

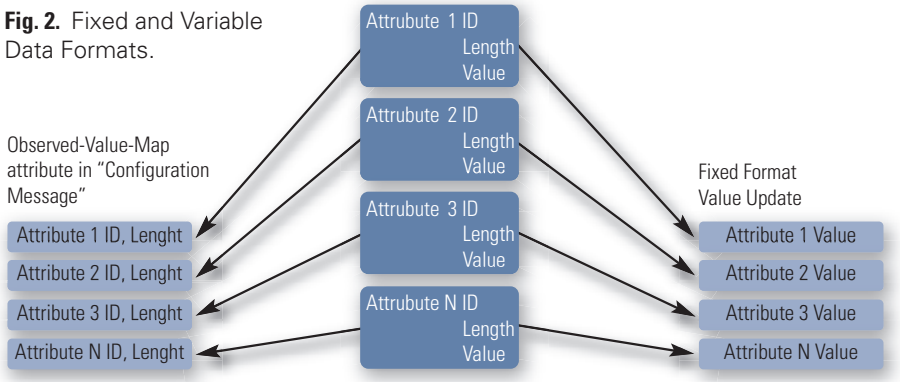

Fig. 2. Fixed and Variable Data Formats.

The Protocol

Overview

A typical IEEE PHD 11073 system is defined by the framework as shown in Figure 1. The overall task is concerned with defining the protocol at layer 7. The transports which provide layers 1-6 are defined elsewhere and outside the scope of the work of the group, although there has been close liaison with groups such as Bluetooth SIG to ensure compatibility. However note that the group set an objective to make the protocol transport agnostic in order to allow use with future transport technology.

The existing 11073 standard uses OSI layer 7 and utilizes existing functionality of CMISE and ROSE. It was quickly apparent that an optimised exchange protocol was required. This would provide the same functionality as OSI layer 7, but implement it in a lightweight fashion, eliminating any redundant features, and be fully defined in the new standard 20601, which would simplify implementation.

Domain Information Model (DIM)

The existing DIM of 11073 was used, but it was simplified for PHD devices by constraining the scope of the model and restricting and flattening the hierarchy. Abstract Syntax Notation (ASN.1) is used to describe the model, and this may also form the basis of definitions of data structures for other languages.

The current optimised DIM for the PHD has three objects to model the data of the device; the Medical Device System (MDS), the Numeric and the Real Time Sampled Array (RT-SA). The MDS has as attributes all the information pertaining to the device and its operational status, such as unique device ID, device configuration, and time functions. Attributes also contain product specification in text form. Attributes may be determined by using the GET method defined in 20601.

Numeric objects relate to the physiological parameters and have as attributes the mechanism to obtain an observed value and its status such as units and the timestamp. The numeric object is defined to permit intermittent observations to be reported. Observations may be reported using four methods: the manager may make a specific request for currently available data; the manager may request data to be reported as they become available for a specified time; the manager may request data to be reported as they become available for an unbounded period of time; the agent may send an unsolicited observation. The RT-SA is optimised to report an array of observed values as a single data transmission, which reduces protocol overhead and would be used for real time streams with high data rate and requiring low latency, such as the plesythmogram.

The protocol is further optimised by allowing for fixed and variable format of data transmission (Figure 2). In variable format, each observation carries its attribute ID, the length of the entry and the numeric value. If a stream of observations is established, each having the same attributes, then the common attributes can be defined in advance of the transmission so that only the values need to be reported each time. This common attribute list is defined as the Observed-Value-Map and is applied to each set of values reported and will reduce the transmission burden. The idea is further extended to the concept of defining standard devices with standard configuration. In this case there may be no need to define the Observed-Value-Map in advance, so reducing transmission burden during association further. A device may define itself as supporting extended functionality and use the variable format to allow flexibility.

The Medical Device Encoding Rules (MDER) are used to convert ASN.1 structures to binary transmissions. Although essentially the same as DER, they apply some optimisations to the protocol by having fixed size coding and removing some of the features, and so align with the needs of PHD devices.

Communication Model

The transport layer has been assumed to appear as a point to point link and be connection-oriented. It is further assumed that whenever the transport indicates a connection, the state machine moves to the connected state and the agent is placed in the unassociated state. The agent will initiate the association between itself and the manager by issuing an association request and will enter the associating state.

Configuration of a Device

IEEE 10073-20601 includes the concept that agents self describe in order to support plug and play. This is supported initially by the association request, which will contain the configuration ID of the agent and allow the manager to determine if it should accept the request and if it already has configuration information from an earlier association. If the manager does not have the configuration information it must request that configuration information is sent by the agent prior to entering the operating state. The configuration information sent by the agent will include information on the objects in the device and a handle number by which they may be accessed. This step is bypassed if the configuration is already known and assumed unchanged. Manager and agent will then enter the operating state. An association release and its response will take manager and agent back to the unassociated state, and this is the preferred method to disconnect devices.

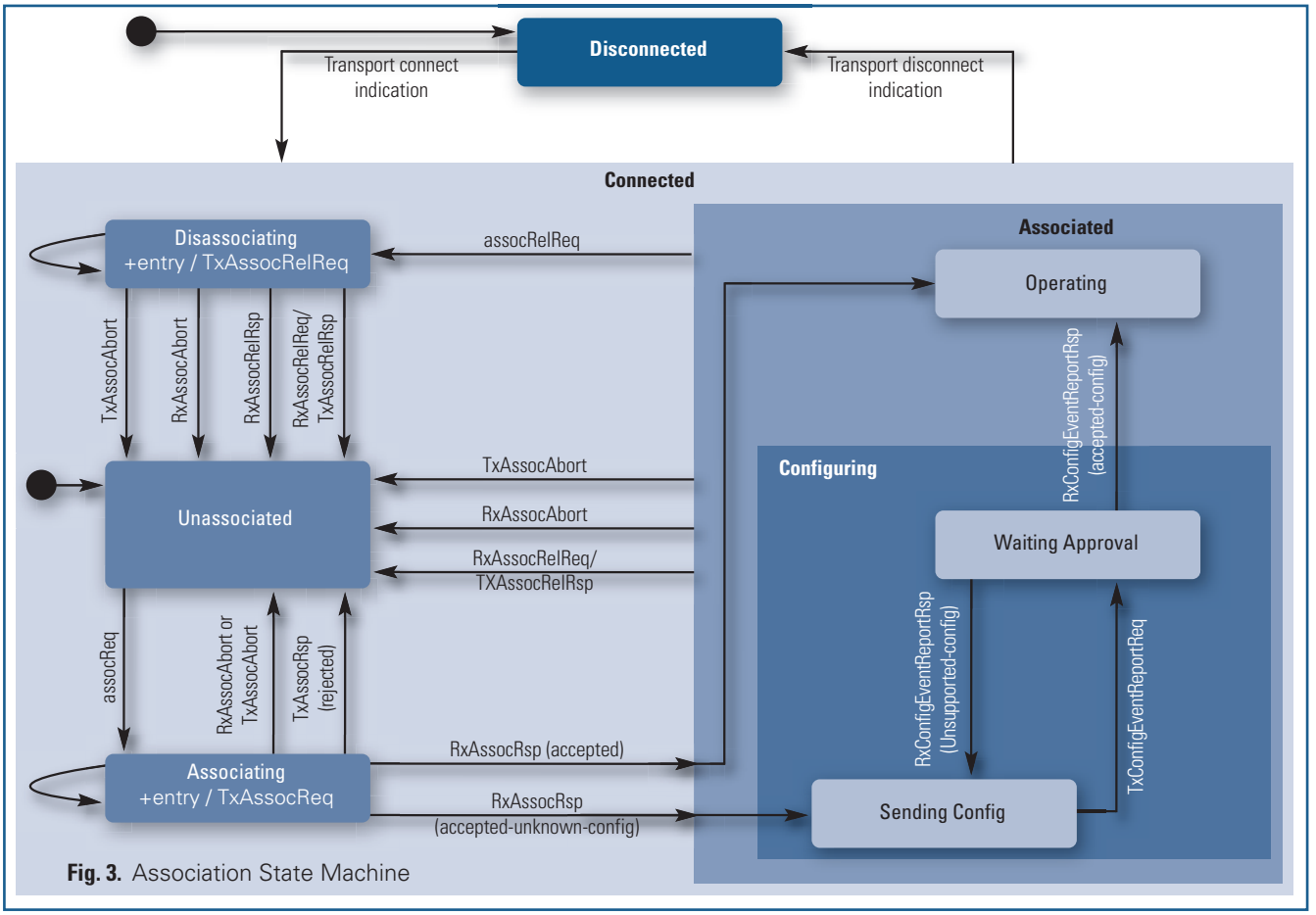

Fig. 3. Association State Machine

Current and Future Plans

Currently the base protocol ISO/IEEE 11073-20601 and the specialisations listed below have been announced as phase I standards that will appear in early 2009, with commercial devices being announced for release shortly thereafter. The Continua Alliance hold regular interoperability events and pre-standard devices have been demonstrated.

- ISO/IEEE 11073-10404 Pulse oximeter
- ISO/IEEE 11073-10407 Blood pressure
- ISO/IEEE 11073-10408 Thermometer
- ISO/IEEE 11073-10415 Weighing scale
- ISO/IEEE 11073-10441 Cardiovascular
- ISO/IEEE 11073-10442 Strength fitness
- ISO/IEEE 11073-10471 Independent living hub

The devices announced for phase II are shown below.

- ISO/IEEE 11073-10406 Basic E.C.G. (1 to 3 lead)
- ISO/IEEE 11073-10417 Glucose meter
- ISO/IEEE 11073-10418 INR (blood coagulation)
- ISO/IEEE 11073-10419 Insulin pump
- ISO/IEEE 11073-10443 Physical activity
- ISO/IEEE 11073-10472 Medication monitor

Conclusions

The IEEE 11073-20601 protocol has been developed as a protocol for medical devices that is optimised for low capability agents that have limited resources of processing power, memory and power for communication.

It has reduced the complexity of the existing 11073 standard by reducing data transmission sizes through defining a lightweight application layer, removing the session and presentation layers of OSI, and making assumptions of the transport layer.

The DIM has been constrained and its hierarchy flattened to create simplified models more appropriate to PHD devices. An optimised reconnection protocol can remove the need to transmit the configuration of an agent already known to a manager or for standard devices. The protocol aligns with the existing DIM and utilizes the existing nomenclature to leverage the 11073 standards and to provide a framework for extensibility.

Acknowledgment

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PATIENT CLASSIFICATION SYSTEMS

The Brazilian Experience

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Patient Classification Systems (PCSs) are an important tool in healthcare management to improve the efficacy and effectiveness of resource use. An overview of the concept, benefits and limitations of the use of a PCS, their development and implementation in Brazil, as well as the difficulties still faced and perspectives are discussed.

Patient Classification System - Concept and Structure

Patient classification systems (PCSs), also known as patient acuity systems, consist in the identification of individual care needs of patients grouped in categories. Since their development in the US in the 1960s, their utilization has been internationally acknowledged as being highly important to assist management decision making.

Originally used to determine the workload of the nursing team and, thus, support staff allocation and the calculation of staffing requirements, the range of applications of PCSs gradually expanded during the following decades, marked by the proliferation of innovative systems, mainly in the United States and Canada.

Due to the difficulty in determining the entire range of patient care needs, the amount of nursing care required is established by the use of a number of indicators, highlighting the most representative dimensions of the care process such as breathing, locomotion, personal hygiene and therapy among others.

In general, every care indicator is scored from one to four (a few systems use one to five) demonstrating an increasing level of care complexity; in other words, score one corresponds to the lowest level of care complexity and four to the highest level. Thus, the sum of scores of the different care indicators classifies patients in specific care categories: minimum care, intermediate care, semi-intensive care and intensive care.

Each tool is composed of a different number of care areas and so each one is tested in respect to its reliability and validity. Reliability is the extent to which results are consistent over time or the degree to which an instrument produces an identical result each time it is used under similar conditions with the same subject. Validity refers to the degree in which the tool is truly measuring what it is intended to measure.

Assessing validity and reliability of a measuring instrument is extremely important to guarantee that users have confidence in the information generated and utilize it to make management decisions.

Why utilize Patient Classification tools?

The utilization of PC tools enables the construction of a database favoring decision making and supplying information to healthcare managers on the:

- Characterisation of the institution's customer care profile such as minimum care, intermediate care, etc;
- Identification of the amount of nursing care provided thereby allowing planning of care and of patient discharge;
- Nursing workload and hence support staff allocation and nursing staff requirements; measurement of the workload, i.e. the amount of nursing care provided, constitutes the basis on which staffing needs and nursing costs are calculated. The main purpose of classification tools is to achieve optimal resource utilization in relation to patient care needs;
- Productivity and hence nursing service costs.

Additionally, other benefits of using PC tools may be identified, such as assisting in providing quality nursing care by the individualisation of patient care needs, thus backing arguments in the process of negotiation and supporting managerial decisions regarding service organisation.

PCSs have also been criticised and questions have been raised concerning their task-oriented approach which does not take into account the significant scope of patient care and the complexity of nursing. It is important to note that the activities performed by the nursing personnel are complex, dynamic, simultaneous and interrelated making a measurement of all their scope difficult and also that the perfect tool for measuring nursing workload still constitutes a challenge.

Patient Classification Systems in Brazil

The Brazilian Healthcare System

The healthcare model adopted in Brazil is divided in two; the public and private sectors. The first, the Government Health-

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care System (SUS in Portuguese), is based on principles of universal and equal access for all and, integrates government healthcare providers, including hospitals and primary health centres that belong to federal, state, and local governments and private profit- and nonprofit-making providers contracted by the system.

The second sector constitutes the supplementary medical care system represented by group medicine and medical cooperatives with predominance of a pre-payment medical health insurance system.

Data from a census carried out in 2005 regarding healthcare in Brazil listed 77,004 healthcare institutions, including government healthcare centers, polyclinics, emergency clinics and hospitals. Healthcare services for inpatients total 7,155 institutions. It is possible to observe that private institutes are more numerous than government institutions (62% of the total) and are also more specialised. About 78.9% of the institutions provide care for government healthcare patients.

History and development

In Brazil, the issue of patient classification systems was first addressed in 1972, as a concept of Progressive Patient Care (PPC), i.e. a way of organising medical and nursing care according to the degree of the disease and the required care (for example, intensive, intermediate, minimal care, etc). However, despite this study, it was not until the middle of the 1990s that PCSs started to be developed and applied in healthcare settings.

Their use was recommended in 1996 in the guidelines of the Brazilian Nursing Council (COFEn). These guidelines suggested that the calculation of nursing staff requirements should be based on PCSs and also that their implementation should be exclusively the responsibility of nurses. However, patient classification tools have not been employed to a great extent regardless of the Brazilian Nursing Council's (COFEn) recommendations and are still in the initial development stages.

Concern about the quality provided in healthcare services in the country, led to the foundation of the National Accreditation Organisation (ONA) in 1998 aiming at promoting and evaluating the care provided in institutions nationwide. This evaluation instrument is organised by increasing the level related to complexity or to quality performance, so that, to reach a higher classification, the previous levels must have been satisfied. In this way, hospitals can be certified at three levels:

- accredited (reliable and organised),
- fully accredited (reliable, organised and with quality practices),
- accredited with excellence (reliable, organised and with quality practices, emphasising the standards of outcomes).

To achieve higher levels of quality, hospitals need to assess their results using indicators that reflect the performance of the services provided. Classification instruments may be considered a performance indicator of human resources regarding nursing staff.

Since the accreditation programme was implemented, the use of PC tools has gradually increased. However, considering the large number of hospitals throughout the country, its use in the nursing practice is still inexpressive.

Currently, the Fugulin and Perroca systems are the most commonly used instruments. Fugulin's tool, developed in 1994, comprises nine indicators and classifies patients in five care categories: minimum care, intermediate care, high dependence, semi-intensive care and intensive care.

Perroca's instrument was constructed in 1996 for adult patients and is composed of 13 care areas. The total score obtained classifies patients in four care categories: minimum care, intermediate care, semi-intensive care and intensive care. Investigations were conducted to monitor the reliability and the validity of the instrument.

At present, Perroca´s instrument is undergoing a systematic review of its structure and content in order for it to be updated to more accurately measure the degree of complexity of patient care and the nursing resources used.

It is important to highlight that PC tools in Brazil have been used mostly to identify patient care needs and to measure workload, contrary to other countries including the USA, Canada and some European countries where, for a long time, they have also been used for the purpose of costing.

Difficulties faced and perspectives

There are some factors that have influenced the use of PCSs in Brazil. The senior management of hospitals is usually unaware of their significance.

Moreover, a great number of nurses still do not have knowledge about the instruments available and how to implement them in their clinical and administrative practice, mostly due to insufficient access to information on this issue.

Over the last decade, the expansion of scientific online databases of different national nursing journals that provide free access has enabled nurses to become more familiar with the concept, as well as the experience of the utilization of PCSs in some hospitals. Additionally, nursing schools have gradually included workload measurement in their curriculum thereby helping to spread knowledge about PCSs.

Another aspect to be considered is that many nurses do not understand the importance of using this kind of tool and the benefits that emerge from its implementation. Its daily use is still seen by many professionals as more paperwork to be filled in and consequently a greater workload. Indeed, the use of computers can be extremely helpful to reduce the time involved with this activity.

As the cost of acquiring and using information systems is considerably high a more appropriate use of the information provided would assist in the management of care provided to patients.

Many services do not use the tool in their daily practice as internationally rec-

ommended. Utilization is occasional and mainly when calculation of nursing staff is required. Moreover, the information obtained through PCSs in hospitals is still underutilized.

There is a trend towards an increase in the use of PC tools in the hospital setting and an expansion in the application of the information generated. To remain competitive in the market, organisations need to improve their quality standards and productivity. The implementation of PCSs may contribute to achieve certification of services and in the management of costs, which is a widely sought goal.

The growing interest in the cost of care in health services has led to the need of monitoring and analysing resources employed or to find a balance between care quality and viable costs.

Remembering that patients do not require the same amount of resources due to variations in the complexity of care, the use of PCSs may identify these variations and more accurately estimate the cost of the involvement of nursing staff in the care process. Hence, the assessment of patients by means of PCSs may become a valuable instrument to monitor expenditure in healthcare institutions.

BRITAIN MOVES TO LIFT MOBILE PHONE BAN IN HOSPITALS

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While much of Europe slumbered through its summer vacation, the programme 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.

Hospitals in England should allow the "widest possible use" of mobile phones by patients as well as staff and visitors, except in areas where they interfere with medical equipment or invade privacy. The advice, in a January 2009 Guidance Note from the Department of Health, is likely to have considerable repercussions on vendors of dedicated in-hospital telephony systems.

A decade-long controversy

The Guidance Note follows recurrent controversy over the past decade over the issue.

In 1999, the British government commissioned a group of scientists known as the Independent Expert Group on Mobile Phones (IEGMP), to explore the purported health hazards from mobile phone use and living close to base stations.

The group reported back in May 2000, but did not settle the debate conclusively. Though it ruled out a "general risk" to people living near base stations, it did note that radio waves at current guideline levels did "cause a change in brain activity, although it is not known why." The IEGMP recommended a limited use of mobile phones until there was more scientific knowledge about the subject.

'2007: Too early to say'

The IEGMP was followed by a Mobile Telecommunications and Health Research Programme (MTHR) which released a progress report in 2007. This concluded that there was "no evidence linking short-term mobile phone use with cancers of the brain and nervous system." Yet it too concluded that it was "too early to say whether mobiles are safe in the long term," and called for further research in the area.

Nonetheless, in May 2007, the Health Department recommended that mobile phones be banned in sensitive areas such as pediatric wards, ICU units and operating theatres.

Though caveats remain …

The latest (January 2009) guidelines go a considerable distance in freeing up mobile phone usage in hospitals. However, they still add a caveat – requiring the hospital administration to make a "local risk assessment" that such use would not represent a threat to:

- Patients' own safety or that of others
- Operation of electrically sensitive medical devices in critical care situations
- Privacy and dignity.

The third point above specifically concerns the use of camera phones, which can breach patient confidentiality.

Overall, hospitals must therefore clearly indicate where mobile phones can and cannot be used, the guidelines state.

… Patient groups welcome decision

The new guidelines have been welcomed by patient advocacy group. The vice-chairman of the Patients' Association Michael Summers told the British media that in the average ward there was "absolutely no reason" why a mobile phone could not be used - provided it was done discreetly and without upsetting those nearby.

THE BELGIAN HEALTHCARE SYSTEM

AUTHOR

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Belgium is a federal state. There are three levels of government: federal, regional (three regions and three communities) and local provinces and municipalities). The Belgian healthcare system is mainly organised on the federal and regional level.

The federal government is responsible for regulating the compulsory health insurance, determining licensing criteria for healthcare facilities, financing the operations of healthcare facilities, regulating qualifications of healthcare professionals and registration and price control of pharmaceuticals. Regional governments are responsible for preventive care and health promotion, maternity and child health services, different aspects of elderly care, implementation of licensing criteria of healthcare facilities and financing of infrastructure (within basic rules enacted at federal level).

In 2005, total health expenditure as a percentage of gross domestic product (GDP) was 9.7%. Public sector funding as a percentage of total expenditure on healthcare fluctuates around 70%.

Key features of the Belgian healthcare system are:

1. Compulsory health insurance, managed jointly by the major stakeholders of the sector (insurers, healthcare providers and public authorities)

2. Liberal ideas of medicine (majority of providers are self-employed, with predominantly fee-for-service payment) and

3. Freedom of patients to choose both their healthcare provider and their hospital.

Healthcare financing and expenditure

Compulsory health insurance is financed through employer and employee income contributions as well as through taxation. It covers the whole population and has a broad benefits package.

A public body endowed with legal personality, the National Institute for Sickness and Disability Insurance (RIZIV/INAMI), is charged with the implementation and control of the compulsory insurance scheme. All individuals entitled to health insurance must join or register with a sickness fund: either one of the six not-for-profit and privately managed funds or a regional service of the public Auxiliary Fund for Sickness and Disability Insurance. Since 1995, Belgian sickness funds are held financially accountable for a small proportion of any discrepancy between their actual spending and their so-called normative, i.e. risk-adjusted, healthcare expenditures.

Patients participate in healthcare financing via co-payments (fixed amounts) and co-insurance (percentage of the overall charge). For ambulatory care, patients pay the full costs of services to service providers and afterwards receive a refund from the sickness fund. For inpatient care and pharmaceuticals there is a third-party payer system, which means that the sickness fund directly pays the provider, leaving the patient only to pay the co-payment or co-insurance.

Healthcare provision

In the mid-1990s a supply planning system was established for healthcare providers. A quota mechanism is applied immediately after basic training, at the moment of application for recognition as a dentist or physiotherapist and at the application for specialisation for a physician (GP or specialist). In order to achieve these objectives, the communities, which are responsible for education policy, were requested to limit the number of medical and dental students. In 1997, the Flemish community introduced entrance examinations to limit the number of students entering

medical schools. The French community has chosen to limit the number of medical students after their third year of medical education on the basis of the first three years' results.

Delivery of ambulatory care in Belgium is mainly private. The vast majority of physicians work as independent self-employed health professionals. Medical specialists can work in institutions (mostly hospitals) and/or on an ambulatory basis, in private practice. GPs mostly work in private practice. Because there is no referral system between these two different types of physicians, every citizen has free access to medical specialists and hospital care, even as the first point of contact with the health system.

Hospital care is provided either by private non-profit or by public hospitals. The hospital legislation and financing mechanisms are the same in both sectors. In 2005, there were 215 hospitals, of which 146 were general and 69 psychiatric. The basic feature of Belgian hospital financing is its dual remuneration structure according to the type of services provided: Services of accommodation (nursing units), emergency admission (accident and emergency services), and nursing activities in the surgical department are financed via a fixed prospective budget system based on diagnosis-related groups (DRGs); while medical and medico-technical services (consultations, laboratories, medical imaging and technical procedures) and paramedical activities (physiotherapy) are predominantly remunerated via a fee-for-service system.

Pharmaceuticals are exclusively distributed through community and hospital pharmacies. Only physicians, dentists and midwives can prescribe pharmaceuticals. About 2,500 pharmaceutical products are on a positive list and therefore partly or fully reimbursable. The reimbursable percentage of the cost varies depending on the therapeutic importance of the pharmaceutical.

Strengths, weaknesses and recent reforms

The overall strength of the Belgian health system is that care is highly accessible and responsive to patients. The drawbacks of the Belgian system are in its cost and complexity. Although the system has not undergone any major structural reforms since the 1980s, various measures have been taken mainly to improve its performance. Reform policy included: hospital financing reform; strengthening of primary care; restriction of the supply of physicians; increase of accountability of healthcare providers and sickness funds; tariff cuts; and more emphasis on quality of care, equity, evidence-based medicine, healthcare technology, benchmarking with financial consequences and economic evaluations.

Prospects

Three recent policy initiatives are worth mentioning:

Until recently, a difference was made between a general scheme of social health insurance and a scheme for self-employed persons. The latter were only insured for major risks, which mainly coincide with hospital care. As from January 2008, this distinction has been abolished progressively. No difference is made any longer based on the professional situation of the insured.

A second reform concerns the introduction of a so called "maximum billing". In Belgium, 5% of the patients consume 61% of the total social health insurance expenditure. The same 5% are also charged 35% of the total amount of co-payments and co-insurance. In case of a long-term or serious illness, the financial burden can be high. Some years ago, the maximum billing-system was introduced as a solution to this problem. This reform aims to limit the healthcare cost of each family to a maximum amount per year that varies according to the income of the family the person belongs to. Nearly 10% of households are concerned with this reform.

A third reform area consists of pharmaceutical policy. To advance the use of generic pharmaceuticals, a reference pricing scheme was introduced for products with generic equivalents. Furthermore, a lump-sum reimbursement system for pharmaceuticals was introduced for in-hospital patients. And finally, the gross annual budget for pharmaceuticals is now established in consultation with the industry. If the budget is exceeded, a claw-back mechanism is applied and the pharmaceutical industry has to finance part of the overspending.

COUNTRY FOCUS: BELGIUM

		DATE
Population (million)	10.67	2008
Live births/1,000 pop	11.3	2005
Deaths/1,000 pop.	9.9	2005
Life expectancy (years)	82.4	2004
GDP (billion EUR)	327.1	2007
Total healthcare expenditure (% GDP)	9.3%	2004
Total healthcare expenditure per capita (PPP USD)	2,922	2005
% of healthcare system financed by public funds	70.9%	2004
Number of CT scanners (per million inhabitants)	29.8	2005
Number of MRIs (per million inhabitants)	6.8	2003
Number of hospital beds (per 1,000 inhabitants)	680	2005
Number of acute care hospital beds (per 1,000 inhabitants)	500	2005
Length of stay (average in days)	11.2	2006
Number of physicians (per 1,000 inhabitants)	4.0	2005
Number of nurses (per 1,000 inhabitants)	6.1	2006
Percentage of households with Internet access	56%	2008
Percentage of households with broadband access	51%	2008
Percentage of individuals using the Internet for interacting with public authorities	NA	2006

Source: INS (Belgian National Statistics Institute), BNB (National Bank of Belgium), OECD, Eurobarometer, EU Commission, WHO.

THE HOSPITAL SYSTEM IN BELGIUM AND THE DIRECTION OF REFORMS

The Belgian healthcare system is a mix of mandatory national insurance and private medicine, a system of collective agreements between healthcare providers and insurance companies (national healthcare funds), and regulations issued by the public authorities. The Ministry of Public Health is responsible for defining laws on hospital programmes, the number of beds and major equipment.

Healthcare and hospital services

Overall, Belgium's healthcare system is extremely fragmented and the various levels of healthcare are not well coordinated. Patients have access to hospitals and specialists without having to obtain a referral from a general practitioner. Providers are generally, both in hospitals and for outpatient treatment, self-employed and paid on a fee-per-service basis.

Belgium has a population of about 10 million and there are 146 general hospitals and 60 psychiatric hospitals, 70% of which are private, non-profit organisations. Public and private hospitals are subject to the same financing rules.

Decline in bed numbers and length of stay

The number of hospital beds has decreased significantly since the beginning of the 1980s, from 92,436 to 70,795.

This decrease is attributable to the conversion of hospital beds into retirement and nursing home beds for the elderly, as well as incentives for hospitals to merge, a reduction in the length of stay, an increase in hospital outpatient treatment and the development of alternatives to psychiatric hospitalisation.

Since the 1980s, the length of stay has decreased (11.9 to 8.3 days) and the number of admissions has increased (13.6/100 to 17.4/100). Length of stay is higher and the number of admissions is lower than European averages.

Hospital financing system before reforms

Financing of hospital care in Belgium can be broken down into two parts.
The first—medical services and medication, are included under the heading of healthcare, paid mostly on a fee-per-service basis and retrospectively (according to the rates negotiated between the national health insurance companies and professional bodies).

The second segment includes days of care, covering nursing services and accommodations. Until 1995, every day was reimbursed up to a certain quota based on the number of beds and a standard occupancy rate. This type of financing system did not take into account the usefulness of the days or that of the services provided, nor did it encourage service providers or hospitals to find the most effective way to treat their patients.

In order to ensure that resources were used more efficiently, the development of need and performance indicators concerning both the use of resources and the quality of care had become critical. Financing-related incentives based on these indicators then had to be introduced. In other words, the general tendency was to introduce prospective elements into a reimbursement system, which until then was operating almost completely on a fee-for-service and retrospective basis. Advantages associated with a prospective financing system include better management of expenses and motivation to be efficient, but risks include decreasing quality of care and the selection of higher-yielding patients based on the expected financial structure.

Principal reforms in the hospital sector

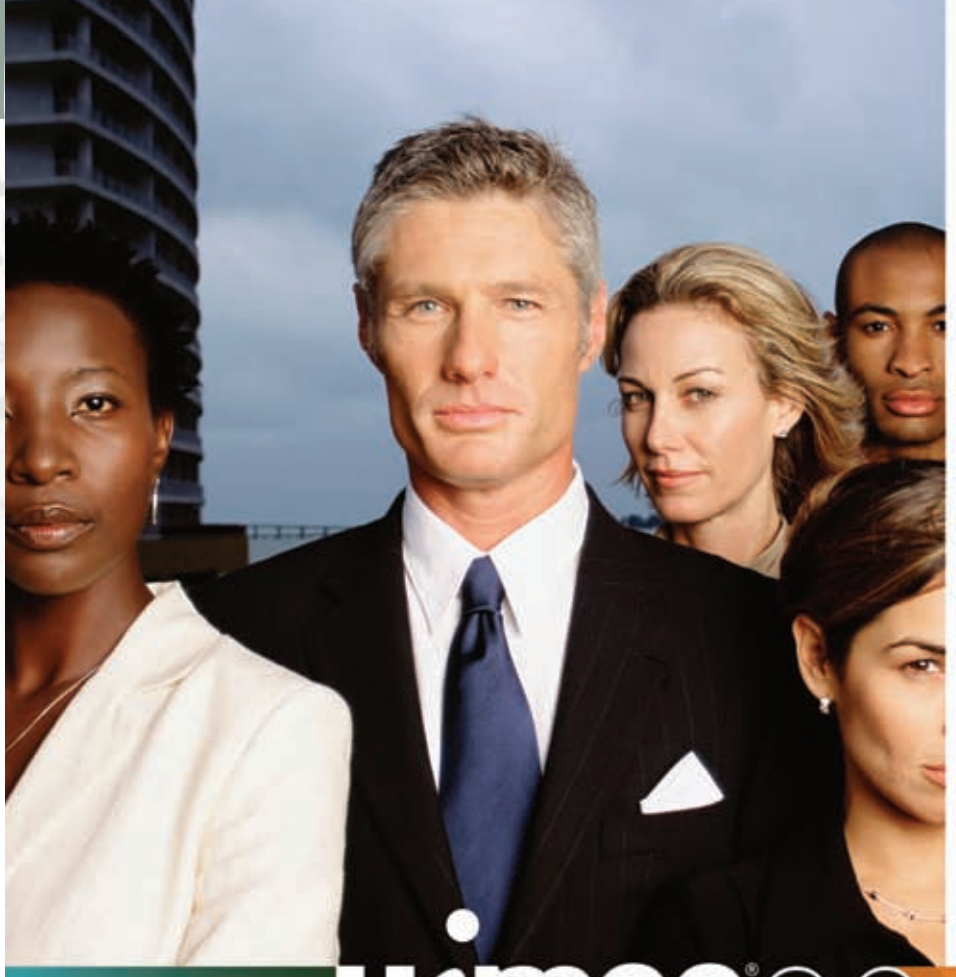
Prospective financing for in-patient hospital care

Belgian hospitals are financed for the number of justified days according to the activity measured and type of illnesses treated (taken into account by APRDRGs), age and the geriatric characteristic of the stay. Since 2007, the impact of social factors is also being taken into account. The number of justified days is determined by national averages in terms of the relevant characteristics. In addition, the number of days covered is reduced if the hospital has a lower percentage of hospital outpatient treatment than the national average, taking into account the treatment performed.

The initial studies conducted after this reform indicate that it has been somewhat effective in reducing lengths of stay and increasing the percentage of outpatient treatment.

Prospective funding for medication expenses

Prospective funding for medication in terms of APRDRGs and four severity levels has been established since 2006. This



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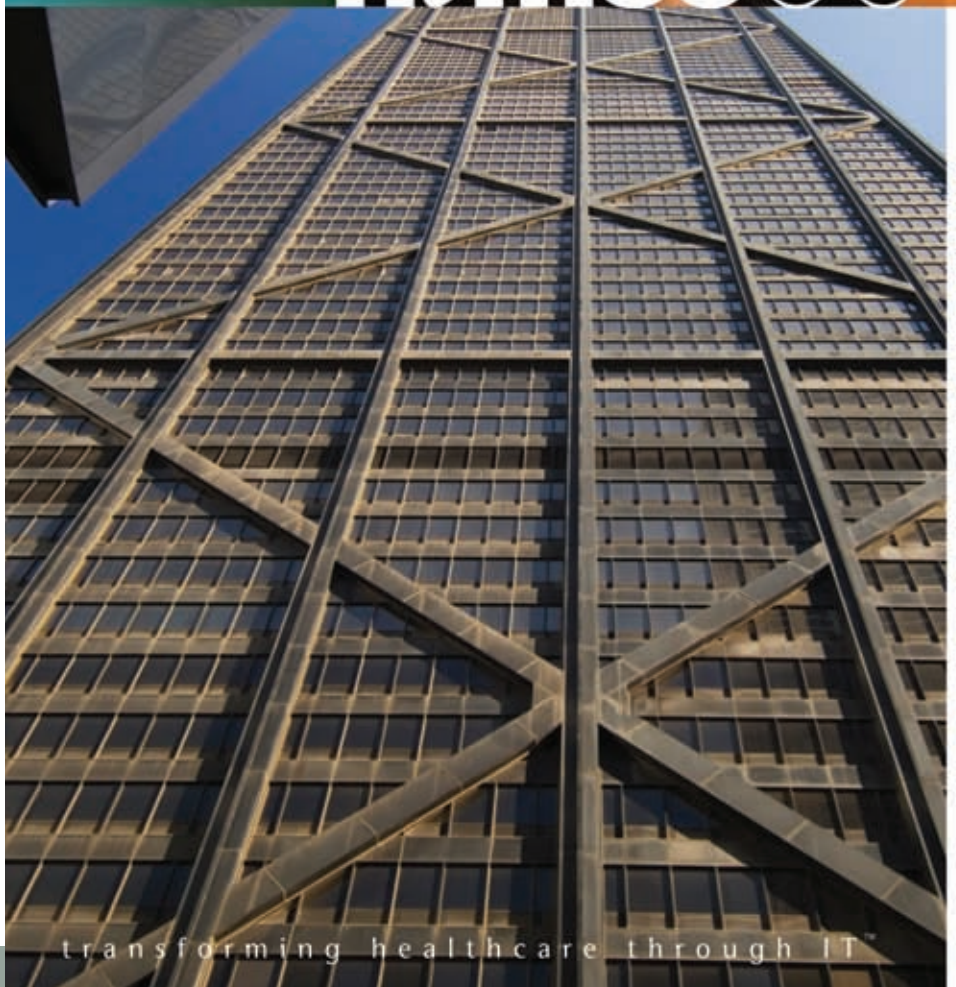

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affects approximately 50% of medications used in hospitals. Exclusions apply to vital medications from the treatment and social point of view and continue to be paid per medication. For medications included in the budget, each hospital receives a sum that theoretically covers 75% of its medication expenses based on the structure of the illnesses it treats. The remaining 25% continues to be financed on a fee-per-service basis.

Flat-sum billing of certain categories of fees based on "reference amounts"

Since physicians have always been paid on a fee-per-service basis in Belgium, the flat-sum billing of medical fees encounters significant resistance in medical circles. However, an initial attempt has been made: more flat-sum financing was decided upon for 28 frequently occurring illnesses which are uniform in terms of expenses, simple in terms of procedures (cataract, tonsillectomy, appendicitis, etc.), and for which patterns of consumption that deviate significantly from the national average can be easily identified. For each group of illnesses, a reference amount has been determined by severity class (1 and 2) and by expense item (clinical biology, medical imaging and internal medicine). This amount corresponds to the national consumption average per patient increased by 20%. The hospital must reimburse expenses exceeding this amount. These 28 groups account for 22.7% of stays. However, this reform excludes many stays, sanctioned by type of expense and by APRDRG, without allowing compensation between APRDRGs and expenses. In addition, it does not include positive incentives for hospitals.

Conclusion

In order to limit expenses and encourage efficiency, spending limits must be established for hospitals. However, it is unrealistic to think that it will be possible to take all clinical situations into account.

Clinical situations are rarely specific and standardised enough to make it possible to precisely determine which services need to be provided for each patient based on guidelines. In order to take this inherent variability of medical practice into account, it must be possible distribute risk. Efficient practices greatly reduce the probability of having expenses that exceed the expected budget, taking into account all patients, their illnesses and their severity. Compensating for risks can at that time come into play completely. In conclusion, while it is useful to put a limit on expenses based on measurable needs (severity APRDRG, etc.), it is extremely important that physicians and managers realise that this limit only has meaning for an overall budget, and not per patient or group of illnesses, where the level of accuracy is too low.The budget is a financial framework and not an indication of quality. The imposition of a budgetary framework must be accompanied by the development of quality care promotional programmes (develop and evaluate quality indicators, develop guidelines making more efficient practices possible).

To increase efficiency in the field of patient care in Belgium, it will also be crucial to increase coordination between the various levels of care (outpatient, specialised medicine, institutional, hospital), all the more so since the aging population and increase in chronic illnesses will require more and more integrated medical services.

Controls on supply of healthcare professionals runs into controversy

HEALTHCARE IT MANAGEMENT

Analysis

In 1996, the Belgian government introduced a system to set intake quotas for physicians and dentists under a so-called Committee for Medical Supply Planning. The mandate of the Committee was subsequently extended to cover nurses, physiotherapists and some other healthcare professionals.

The committee formulates proposals to the Health Minister on the annual number of candidates required over a rolling period of years, in order to match demand forecasts – but avoid an oversupply of physicians.

The committee's work led to a quota system. The maximum number of medical graduates accepted for accreditation is 700 for the years 2004–2011, 833 for 2012 and 975 for 2013 – a reduction from about 1200 accreditations in 1999.

In recent months, the system has come in for considerable criticism. In mid-2008, Didier Giet, a respected professor of medicine from the University of Liege warned of work overloads on physicians due to shortages and pointed out that in 2007, Belgium was compelled to import foreign physicians to practice in the country. Though the quotas have been revised upwards (to 757 in 2008) and to a ceiling of 1,230 in 2015-2018, a new challenge has struck the country in the shape of local physicians leaving Belgium to practice overseas.

In January 2009, the professional trade magazine Journal du Medecin reported that 2,111 Belgian physicians had left Belgium in the previous four years, Underlining the gravity of the situation, it noted that this corresponded to three-fourths the quota, and was higher than the number of incoming foreign physicians into the country. In 2007 alone, it noted while 537 Belgian physicians left the country, only 184 foreign physicians obtained authorisations to practice in the country.

HEALTHCARE IT IN BELGIUM

The legislative framework for e-Health in Belgium overlaps several existing laws and rules, ranging from privacy and data protection to certification of medical software and liability for devices. The key bodies officially developing the e-Health programme are the federal Health Ministry and the State Secretariat for Informatics.

Federal system entails incrementalism in technology adoption

The competitively federal nature of the Belgian State has led to e-Health policy being under the purview of several ministries and departments. This has resulted in overlaps and lack of clarity in authority and responsibility. A range of health related issues, such as preventive health and infrastructure, are dealt with at the regional level.

Given this federalist political culture, Belgium has so far taken a step-by-step approach to implementation of e-Health. Nevertheless, since e-Health itself continues to witness an accelerating pace of evolution in recent years – alongside moves to draw up new EU and global standards – Belgium has striven to frame an official national-level e-Health roadmap so as not to be left behind.

One factor strongly favouring e-Health in Belgium is that part of the funding for the country's hospitals requires delivering anonymised electronic data sets relating to hospitalisation, including diagnosis, procedures and length of stay. Such a requirement translates into an incentive for an electronic health record, and provides fuel for the solid takeoff of e-Health.

Official e-Health roadmap – key initiatives

The principal Ministry of Health initiatives in the e-Health field so far include:

- Establishment of the Be-HEALTH national e-Health backbone to provide a patient master index as well as authentication services.
- Development of reference databases and codification systems for healthcare products and medical treatment.
- Appointment of a Health Telematics Commission of national experts to set up technical standards on the transfer and sharing of health data.
- Funding for follow-up research on issues such as patient identification, electronic signature implementation, certification of hospital information systems and telemedicine.

A look back in time at a world pioneer

At the current moment, a brief note on the history of consumer-focused high technology is crucial to understand the current state of e-Health in Belgium, and its prospects.

The first is the country's often-unacknowledged role (even by Belgians themselves) as having developed and implemented some of the most dramatic mass-use IT projects in memory.

Years before the rest of Europe or the US, Belgium pioneered the use of ATM and POS cards in the 1980s. In the field of smart cards, the Belgian Proton system served as a model for similar initiatives across many other countries, and at one point Belgium accounted for a larger number of such cards in use than the rest of the world, combined. Belgium was also a leader in the area of household cable television, a foundation for today's broadband highway.

This quiet leadership role has not been lacking in the area of e-Health. Indeed, as far back as 1998, all beneficiaries of the Belgian social security system (practically its entire population) began using the so-called SIS smart card to access healthcare.

> "Being structured as a collaborative framework, Be-HEALTH is compatible with all types of healthcare data – most crucially genomic data. As a result, personal medicine is likely to be fully integrated into BeHealth services."

From SIS to eID

The SIS Card is currently being replaced by the Belgian eID card, a citizen electronic identification card launched in 2004 which is due to cover the entire population by 2009. [Belgium requires all inhabitants to carry identification.] eID is a smart card equipped with two certificates, one for authentication and another forgenerating digital signatures. It contains identification data which is also visible in print on the card. The cardholder's address, however, is stored exclusively in electronic form.

The eID card, which will steadily replace other cards for identification and authentication purposes, is therefore designed at its foundations to be a key to access centrally stored information. Such a principle

will be applied when functionalities of the SIS card become integrated into the eID.

The emerging e-Health infrastructure

Apart from its rich experience with similar projects, a high penetration of broadband telecoms and cable TV network provides a ready infrastructure for e-Health services. In 2005, an EU study found Belgium leading Europe in terms of broadband as a share of Internet access.

The national e-Health network Be-HEALTH mentioned previously is designed to provide an umbrella backbone for e-Health services.

Since the 1990s, a host of dedicated private networks have also been set up to target e-Health, at both national and regional levels. The best examples of the former are the sick funds-run Carenet (used to transfer billing data between hospitals and pharmacies) and MediBRIDGE, while regional networks include Mediring and Mexxi.

The core aim of Carenet, which was launched in 2004, is to verify insurance entitlements for patients and allow third-party payment between insurance funds and all Belgian hospitals.

Be-HEALTH: Future-proofed for the Genomic Age

The key philosophy behind the Be-HEALTH backbone is to avoid centralising information and restrict operation to data exchange between authorised parties, with anonymisation ensured where required. This is seen as a wise approach, given the permanent undercurrent of concerns about privacy – and the dampening effect this has on the wider takeup of e-Health across the world.

Being structured as a collaborative framework, Be-HEALTH is compatible with all types of healthcare data – most crucially genomic data. As a result, personal medicine is likely to be fully integrated into the Be-HEALTH service provision framework.

The future – intelligent applications, e-Prescription …

2007 saw the pilot phase launch of two major regional networks for sharing patient records.

For its part, the Be-HEALTH platform is designed to ensure interconnection of independent networks and also be extended to support areas such as a register of health professionals.

Basic interoperability is now already possible at the ambulatory care level (see below), and the government has made it a priority to develop 'intelligent' applications for general practitioners (including decision support), establish codification schema of patient files for specialists, and make reference databanks available for the industry.

ePrescription has also been studied, and implementation tests are under way.

The question of standards …

In spite of such impressive headway, there is also as yet no universal and comprehensive technical syntax standard which is accepted and used by all parties concerned with e-Health in Belgium. Instead, de facto standards are the rule so far as the exchange of clinical data is concerned. There are also important differences in the field of data security standards.

Delimited text-based reporting is defined by the national social security Institute INAMI/RIZIV and used for third party payment (at hospitals – especially chronic care facilities, elderly homes and pharmacies).

The Belgian Health Telematics Commission has endorsed a set of XML syntax standards, based on HL7 version 2.3 – the so called Kmehr standard (Kind Messages for the Electronic Healthcare Record).

The transfer of Kmehr-compatible messages for EHRs is being developed further in order to integrate major EHR structuring elements and codification in what has been billed Kmehr 2.

… and the challenge of interoperability

As a major step towards country-wide interoperability, Belgium is introducing a Summarised Electronic Health Record or Sumehr. Production, export and import of Sumehr messages is, since 2005, mandatory for the labelling of EHR systems.

At the moment, it is already feasible to deploy Sumehr at the ambulatory care level. The government plans to set up certification schemes for minimum quality and interoperability levels of authorised ambulatory care software systems.

Nevertheless, the ongoing development of national health networks is expected to spur wider demand for Sumehr and quickly take it to a viable user level.

A phased approach to EHR

Such incrementalism and phasing of steps is also seen in the field of EHR.

EHR applications with meaningful clinical content are almost wholly used in a primary care setting.

In hospitals, EHR applications are either at the level of departmental systems with specific medical speciality content (for example, imaging, ophthalmology) or focused on managing paper (recording of orders and billable interventions); the latter also applies to at-home care.

A look ahead

The strategic goals of e-Health in Belgium have evolved with time. Their locus standi was at first simply to attain cost efficiencies in the social security administration. However, in recent years, the e-Health agenda has also been seen as a way to kickstart quality improvements across the entire healthcare delivery spectrum. Both these factors, along with concerns about an aging population (which will put further strains on the country's generous healthcare system) now constitute the principal drivers of e-Health.

On its part, the government also foresees a public campaign aiming at a national roll-out to get users ready for the new era of e-Health.

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