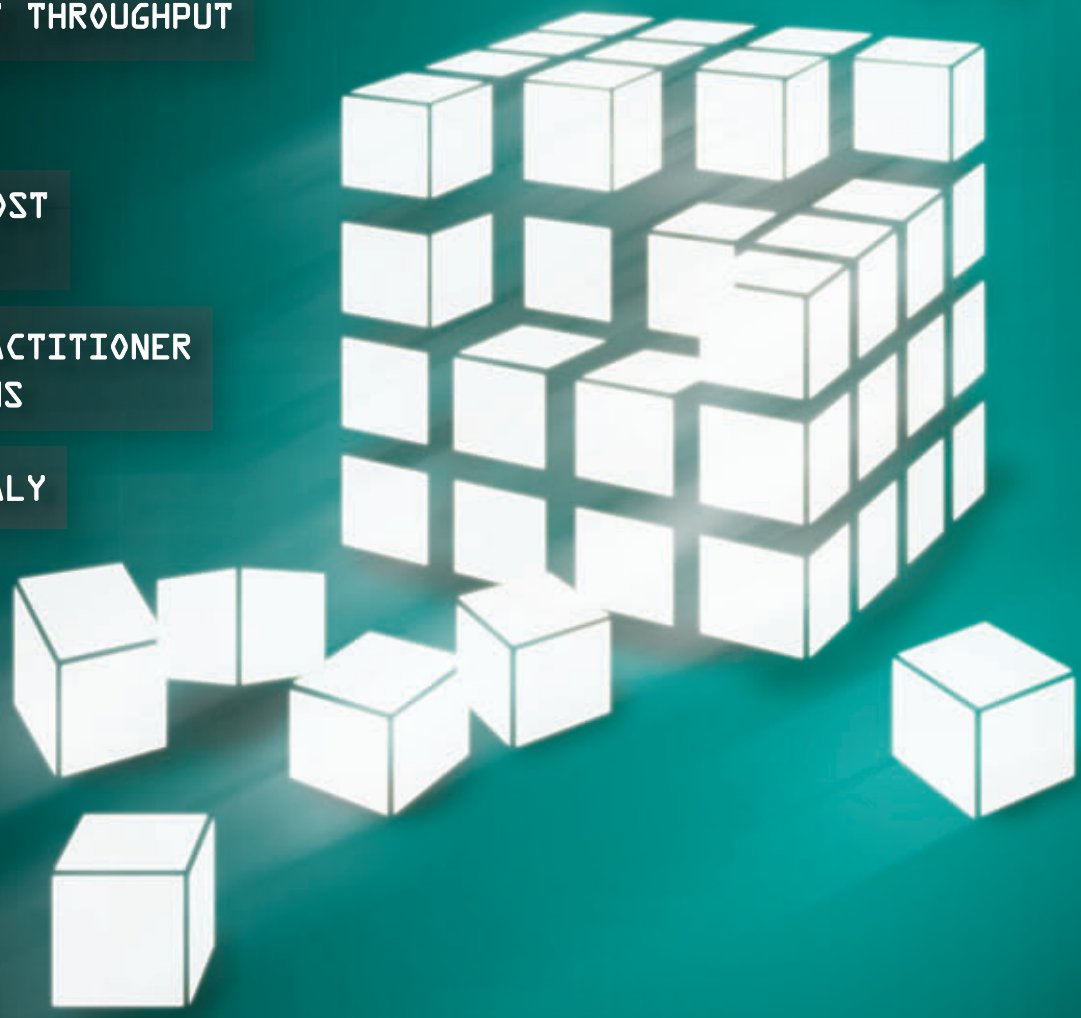
HEALTHCARE IT MANAGEMENT

ISSN: 1782-8406

THE OFFICIAL JOURNAL OF THE EUROPEAN ASSOCIATION OF HEALTHCARE IT MANAGERS

CUSTOMISING HEALTHCARE IT



Volume 4 / Issue 2 / 2009 / €15

Ask the Ultimate Power in Imaging.

Every year Siemens provides a spectrum of new imaging systems that enhance diagnostic precision. With *syngo*® the first unified software interface for all imaging modalities was delivered. Tim® technology revolutionized MRI, and Dual Source CT continues to drive new clinical possibilities. Talk to us to experience these innovations and new groundbreaking advancements in imaging excellence.
www.siemens.com/answersforlife +49 69 797 6420

Answers for life.

SIEMENS

A91CC-9016-A3-7600

Dear Reader,

On February 17, US President Barack Obama signed the American Recovery and Reinvestment Act. Known by its acronym ARRA, the legal measure is one of the most ambitious commitments to healthcare IT anywhere, anytime.

Mr. Obama plans to pump-prime the US economy through investments in healthcare (alongside energy and education) and to jumpstart healthcare by means of IT. The sums earmarked for healthcare IT are not insignificant - about 15 billion Euros. By our calculations, this is equal to about 100 dollars for every American aged over 20. If Mr. Obama's plans work out, they could very well do to healthcare IT what the Apollo program did for space exploration, or the Manhattan Project for nuclear technology.

Aside from the sums committed to ARRA, there is another crucial factor which differentiates the US initiative from those like the EU's RTD Framework Program. The Obama gameplan involves spawning, catalyzing and growing a user base which will both push and pull healthcare IT, and do so in the real world of here and now. It does not concern itself with technology for technology's sake.

In this respect, the US is headed towards launching what we, in our previous cover story, called the era of i-Health. Europe needs to be even more concerned now that it does not get stranded in an island of e-Health, of demonstrations and pilots, while the US develops masses of healthcare IT users, alongside protocols and standards (the Real, Real Thing).

Yet another recent development with major relevance for Europe's healthcare IT community is the acquisition in April of Sun Microsystems by Oracle. The approximately 6 billion Euro all-cash takeover highlights one of the enduring mantras about recessions – that recovery is marked by the absence of many old familiar faces.

The Sun-Oracle duo is now poised to take the battle of the Titans (or Microsoft-against-everyone-else, as one of our in-house wags put it) to the next phase.

One need not really be surprised. Oracle has been an acquisitive beast. It has, in the past seven years, bought and digested onetime rivals in the enterprise software space like PeopleSoft, Siebel and J.D Edwards, and at least 40 more in other areas. Its offering now encompasses everything from the back-office database through EAI to applications. In the world of healthcare at least, such omnipresence is hard to miss. About the only thing Oracle lacked was an operating system and a future-facing programming language. Via Sun, it has got both, namely Solaris and Java. On April 20, Oracle CEO Larry Ellison called Java "the single most important software asset we have ever acquired."

Against such a development, it will be interesting to see Microsoft's riposte.

But then, the behemoth from Redmond is not the only player left in town. In recent years, networking giant Cisco has been as acquisitive as Oracle. It too sits on tens of billions of dollars in cash reserves. Cisco's Net-centric concept of Unified Computing may juxtapose well into the offsite Data Center elements of Electronic Health Records – including those achieved in large-scale working deployments such as those of the US military. In the e-Health area, moreover, Cisco's still-novel Telepresence videoconferencing system seems set to revolutionise telemedicine (and much more).

The future of healthcare IT remains exciting. More is still to come.

Yours truly,

Christian Marolt

Healthcare IT Management is the official voice
of the European Association of Healthcare IT Managers

Publisher and Editor-in-Chief
Christian Marolt - c.m@hitm.eu

Managing Editor
Tosh Sheshabalaya - editor@hitm.eu

Publishing House
EMC Consulting BVBA
28, Rue de la Loi, B-1040 Brussels, Belgium
Tel: +32 2 286 8501, Fax: +32 2 286 8508
Email: office@hitm.eu, Website: www.hitm.eu

Subscription Rates

One year	Europe 80€	Overseas 120€
Two years	Europe 140€	Overseas 180€

Production and Printing
Nyomda
Print run: 12,000 – ISSN = 1782-8406

VERIFIED CIRCULATION
according to the standards of
International Business Press Audits

Healthcare IT Management
is independently audited by
Accountskantoor Closset on behalf
of the European Association
of Healthcare IT Managers

References
References cited in this journal are available upon request to: editor@hitm.eu.

HEALTHCARE IT MANAGEMENT

Page 15-20
CUSTOMISING HEALTHCARE IT

In spite of considerable progress in user-directed flexibility, many off-the-shelf software packages still lack key real-world features and fail to meet the requirements of users, especially smaller ones. The customisation challenge is especially vexing for healthcare IT. Hospitals were one of the first major adopters of large-scale IT systems, and continue to depend on older legacy platforms for some of their key operations. The only answer seems to be customisation.

Page 40-46
COUNTRY FOCUS: ITALY

The Italian National Health Service was established in 1978 to grant universal access to a uniform level of care throughout Italy, financed by general taxation. In spite of this, there are considerable variations in service quality between the richer and better-covered regions of the north and the poorer ones in the south. The Country Focus looks at the structure of the Italian healthcare system, and the new managerialism being implemented in its hospitals. It also analyses Italy's approach to healthcare IT, and more specifically e-Health.

Patient Classification Systems also face hurdles in Europe

Sir,

In the excellent overview on Patient Classification Systems (Issue 1, 2009), the author notes the challenges facing their use in Brazil.

Unfortunately, we also have similar issues here in the US, maybe less so at the senior management level, but not at the level of nurses. I have personally encountered a lot of resistance among nurses to changing the old way. Better training can be part of the answer, but good training courses are rare and sometimes there is an unwillingness to learn, especially on the part of older nurses.

I wonder whether inbuilt knowledge transfer from younger, more tech-savvy nurses to their older peers would be culturally acceptable in the US or Europe ?

Al Kennedy
Pittsburgh, US

Europe should be concerned about US

Sir,

You have done a good job explaining Barack Obama's healthcare IT plans (Issue 1, 2009). I agree that new American healthcare IT standards are likely to have an impact on Europe and the world beyond. But they have in fact been doing so for decades and more (think HIPAA, HL7), and not just in healthcare IT (think DOS, Windows …)

One fact which was missed, however, was about how realistic is the 5-year target to have comprehensive EHRs. I believe the Americans will still have to think about more basic things at first – for example, how to insure the tens of millions currently without any health coverage at all. Still, I believe Obama is determined, and when the US is determined, they manage to do things – and get their way.

Klaus Stehling
Wiesbaden, Germany

i-Health and beyond

Sir,

Congratulations on your impressive mapping of the iHealth megatrend, and pointing out that the EHR and personal medicine are two sides of the same coin.

Nevertheless, I believe it is still too early to assess how much of today's IT skills are going to be needed in the i-Health world. Think of some other Big New Trends – automated (goal-driven) programming and generic meta-programming. Then add this to ready-to-explode robotics technologies, especially highly miniaturised nano-robots (some of which have been experimented with already).

Would i-Health then mean invisible Health rather than individual Health – or both ?

Anders Ruben
London, UK

Thanks from a quiet Belgian

Sir,

While many people, especially those with strange names from abroad, like to poke fun at Belgium, I thank you for noting our country's often-unacknowledged role "as having developed and implemented some of the most dramatic mass-use IT projects in memory".

Few indeed know (like your author) that we had near-universal coverage by ATM and POS cards more than two decades ago. Good work also in noting the pioneering role of the Belgian Proton smartcard and our leadership in cable TV. Yes, we will be there first in e-Health too.

Thomas Koopman
Leuven, Belgium

*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 EDITORIAL BOARD
OF HEALTHCARE IT MANAGEMENT

Healthcare IT Management is pleased to present its newest Editorial Board members, Dr.med. Peter Gocke and Dr. Joseph M.Picas.

Our Editorial Board now consists of some of the most respected and prominent names in the European healthcare IT field, who would already be familiar to our readers:

Prof.Dr. George De Moor,
Belgium
University of Ghent

Dr.med. Peter Gocke,
Germany
University Hospital Hamburg Eppendorf

Prof. Eric Lepage,
France
Délégation à l'Information Médicale et Epidémiologie

Dr. Miroslav Madjaric,
Croatia
University Hospital Centre Zagreb

Dr. Joseph M. Picas,
Spain
Hospital St. Pau

Prof. Eric Poiseau,
France
IHE Europe

Dr. Karl Stroetmann,
Germany
Empirica

Ing Marius Stupu,
Romania
University Hospital of Bucharest

Diane Whitehouse,
United Kingdom
Castlegate Consultancy

Ing Martin Zeman,
Czech Republic
Regional Health Corporation

The members of the editorial board will use their invaluable expertise and repository of contacts to help define editorial policy and shape the content of the journal.

In turn, this will help the European Association of Healthcare IT Managers (HITM) and its Official Journal "Healthcare IT Management" to fulfill its mission in developing and defending a common European position in the fast-changing world of healthcare IT.
Our team welcomes the new editorial board members and hope that they will enjoy their experience with us!

For more information on HITM and information about membership, please contact:
Yana Konstantinova, Project Manager, at office@hitm.eu

IT@ NETWORKING

The IT @ Networking Awards 2009 will select outstanding European healthcare IT solutions in hospitals and healthcare facilities and bring them to the pan-European stage.

WINNING PROJECT GETS EXTENSIVE PRESS COVERAGE AND €5,000 CASH

WHERE AND WHEN

Brussels, the centre of European decision-making, will be the location for the IT @ Networking Awards 2009 *(IT @ 2009)*. It will be held from 29 - 30 October 2009 during the European Summit in October, ensuring international attention.

WHO

The attendee roster will include hospital CEOs, CIOs, hospital and healthcare IT managers, physicians with an interest in IT, members of the European Parliament, civil servants from the EU and individual European countries whose mandates cover healthcare IT, as well as members of the specialist healthcare and IT press.

WHY

Behind its fragmented façade, European healthcare IT includes a number of world-class jewels: cutting edge IT solutions that meet real-world challenges, efficiently and cost-effectively, and not rarely, in an elegant fashion.

Unfortunately, many such jewels remain unknown to the outside world – not just the general public, but ironically, to the healthcare IT community as well.

So too do their designers and architects, unsung heroes who have often invested their creative talents, and dedicated months and years of hard work – to create and build something good, something better, all the way through to the very best. But many such efforts extend beyond job definitions, stretch far above the call of duty.

These pioneers need recognition! Their stories will inspire others. The lessons they have learned can help both avoid mistakes and transform healthcare IT challenges into opportunities, into "Made-in-Europe" success stories. This is the goal of *IT @ 2009*.

HOW

Several national or European awards are often decided by "experts", thus not always familiar with real-world challenges. Sometimes, they even make decisions on political grounds.

The European Association of Healthcare IT Managers believes that peers will make the wisest decisions in respect to their own needs. As far as healthcare IT is concerned, the Association considers it to be self-evident that senior healthcare professionals will know what is the best solution for them.

To use familiar terminology for IT professionals, *IT @ 2009* is built on the principles of best-of-breed and peer-to-peer networking.

An on-the-spot, one-person = one-vote electronic system will be used to enable attending CEOs, CIOs and healthcare IT managers to make their choices.

ORGANISER:

European Association of HEALTHCARE IT MANAGERS

MEDIA PARTNERS:

HEALTHCARE IT MANAGEMENT

Hospital

G AWARDS 2009

ROLLOUT: FROM MINDBYTE TO WORKBENCH

FIRST DAY: MINDBYTE

All successful submissions for the *IT @ 2009* will be allocated 5 minutes for a short presentation (a Mindbyte) on what differentiates their solution and makes it special.

VOTING

Voting will immediately follow a synopsis of all presentations, and the finalists will be announced by the Chair of the Organising Committee.

SECOND DAY: WORKBENCH

Finalists of the *IT @ 2009* will be given 45 minutes to provide an in-depth presentation, followed by a 1/4 hour Q&A session with the audience.

FINAL VOTING

Final voting will commence immediately after the last presentation followed by the awards ceremony.

THE IT @ Networking Awards 2009 CEREMONY

Out of the finalists, the 3 top rated IT solutions will be awarded a prize.
The winning project will:
- receive the IT @ Networking Awards 2009 Trophy;
- have a detailed presentation of their solution in Europe's leading healthcare management media, and
- be awarded a cash prize of Euro 5,000.

WHO SHOULD PARTICIPATE

Developers of imaginative, innovative healthcare IT solutions. Solutions can be built on both COTS as well as bespoke designs. However, all entries have to demonstrate a considerable degree of customisation and show ingenuity. All entries must be already implemented in at least one site.

SUBMISSION DEADLINE

Submissions must be received by **25 September 2009.**

Candidates should send us a brief, 250 word synopsis of their solution – what makes it special and outstanding; what makes it a European answer to a European or global challenge.

*For further information or your project submission please visit our website **www.hitm.eu**, contact our Secretary General **Christian Marolt** via email **c.m@hitm.eu** or call **+32 / 2 / 286 8501**.*

CARDIOLOGY MANAGEMENT

IMAGING Management

ICU MANAGEMENT

IBM

3-D ELECTRONIC PATIENT RECORD

Researchers at IBM are testing a 3-D version of an electronic patient record at Thy-Mors Hospital, Northern Denmark.

The software creates a medical information hub and even includes an avatar (Sanskrit for incarnation), which was created by scientists at IBM's Zurich Research laboratory.

IBM scientists claim that by using a 3-D representation of the human body, the avatar helps medical staff navigate an electronic patient file. The avatar can be rotated and can zoom in and out in order to achieve the desired level of detail. Different views can be selected, for example to inspect organs or the circulatory, muscular and nervous systems. Arrows appear on the parts of the body to denote that medical data is available for that particular area. Clicking on the arrows results in the practitioner being provided with all information available.

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

SIEMENS

SIEMENS BUYS I.S.H.MED FROM T-SYSTEMS AUSTRIA

Siemens Medical Solutions will take over all use and exploitation rights to the software i.s.h.med held by T-Systems in Austria. i.s.h.med is a clinical information system that is fully integrated with the leading standard healthcare SAP software. It was jointly developed by the two companies and has become an important tool for planning, control and communication in more than 300 hospitals in 16 countries worldwide.

Siemens, SAP and T-Systems Austria also plan to intensify their existing cooperation with the objective to deliver comprehensive software solutions that cover a hospital's entire requirements spectrum to their joint customers.

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

iSOFT

ISOFT WINS SPANISH CONTRACTS WITH TWO REGIONAL HEALTHCARE SERVICES.

iSOFT will develop clinical and patient management systems for one of Spain's most important autonomous communities (regional governments). The company is part of a consortium providing an integrated healthcare system for 28 hospitals in a project totalling 12 million euros over two years. The consortium is upgrading current systems and infrastructure to provide a common platform for all administrative, clinical and patient management functions and so improve the quality of healthcare services for 8 million patients. The system is designed for up to 82,000 healthcare professionals.

iSOFT's contract, which includes patient administration, theatres, electronic prescriptions and data warehousing systems and integration services, covers the initial two years of the project. There is potential for ongoing development, maintenance and support.

The second contract is to develop an e-prescription solution for the Navarra Healthcare Service in northern Spain. iSOFT will provide an e-prescription solution to eliminate paper prescriptions and so save time and costs and avoid dispensing mistakes. It will also give doctors prescribing rules and lists of recommended drugs and automate invoicing and payments for pharmacists.

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

AEROTEL MEDICAL SYSTEMS

PATIENT GPS IN SWITZERLAND

Aerotel Medical Systems have teamed with GEBOA SA to launch Aerotel's GeoSKeeper™ personal safety and location system in Switzerland under the brand name AlarmTouch™ GPS.

AlarmTouch™ GPS is a GPS-based personal telecare safety device, intended for seniors, children and lone workers. The companies plan to introduce the products in France as well as in other markets in Europe. The system can activate a warning signal or initiate a voice call in case of need and then identify the location of the caller so immediate assistance can be provided.

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

GE HEALTHCARE

FDA CLEARANCE FOR PORTABLE ECG SOLUTION

The US Food and Drug Administration has authorised GE Healthcare's latest ECG solution, the portable MAC 800, which is based on cell phone technology. Originally produced in China in 2008, the portable device combines the keypad of a phone with a full-size colour display and diagnostic software.

MAC 800 has the features of a full size, 65-pound ECG device, engineered down to under seven pounds, battery included. The unit's integrated carrying handle enables clinicians to carry it like a briefcase, expanding access to care, regardless of patient location. Its lithium ion battery keeps it running for roughly two hours and a four-hour recharge ensures minimal downtime. Its multiple communication options include LAN, modem, SD card and serial port to store and send ECG data from any location.

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


UltraGenda®
BEST IN CLASS
In matters of appointment scheduling, only one name stands out.
UltraGenda has a distinct and innovative vision when it comes to the problems facing the healthcare industry today. In turn,our approach to potential solutions is ground-breaking. We are not content to offer only what the market demands, but strive to offer solutions the sector truly needs.
Our best-in-class, robust software for referral and appointment management, integrated with innovative portal applications for the patient and the referring physician are the ingredients for a revolution in healthcare—a revolution in which everyone wins.
UltraGenda: accelerating healthcare enterprise
ultragenda.com

BULGARIA LAUNCHES ELECTRONIC HEALTH RECORDS

As the entry point for its first electronic health records, Bulgaria has launched a national health portal. The portal will provide state administration employees access to an electronic version of the paper-based Personal Ambulatory Book that is used to keep track of medical appointments.

The Electronic Personal Ambulatory book will give physicians access to information about diagnoses and medical documents such as reports, radiographies and scans. There is also an emergency data set that includes blood type, allergy and chronic illness information as well as the next of kin to contact in case of emergency.

Developed by InterComponentWare (ICW) with Bulgarian provider of medical practice management systems, Kontrax, medical information from the health record can be exchanged automatically with its practice management system, Hippocrates.

The portal will also give Bulgarians access to the latest health information and a registry of doctors, hospitals and pharmacies.

For more information, please visit:
www.zdravenportal.bg/site/index.jsf

CROATIAN SOCIETY FOR MEDICAL INFORMATICS CELEBRATES 20 YEARS OF ACTIVITY

The Croatian Society for Medical Informatics is celebrating 20 years of activity with a Medical Informatics Symposium 2009, which is due to be held on May 8-9 at the Faculty of Medicine in Osijek. Aimed at a wide range of experts in the field of healthcare and information technology, the symposium will be an opportunity to gather and exchange ideas and promote the use of new procedures and information-communication technologies.

There will be lectures and a new university textbook "Medical Informatics" will also be presented. This is the combined work of teachers from all four medical faculties, experts, teachers and scientists from other faculties, health clinics, institutes and businesses in the Republic of Croatia.

For more information, please visit: **www.hdmi.hr**

HEALTH2.0 SEMINAR IN THE NETHERLANDS

Nictiz, the National IT Institute for Healthcare in the Netherlands, organised a seminar on Health2.0 on February 12, 2009. The seminar promoted Health2.0 as a way to empower patients and emphasised the fact that the majority of patients research information on the Internet before visiting a physician.

Health2.0 applications allow cooperation between patients and caregivers and the sharing of information. There were four presentations at the seminar including speakers from Nexthealth.nl, who talked about the definition of Health2.0 and a representative from the Dutch Association for eHealth (NVEH) who assessed how far the concept has been developed. The seminar portrayed a clear-cut message about what Health2.0 implies for health consumers and highlighted the value of the concept regarding the doctor-patient relationship

For more information, please visit: **www.nictiz.nl, www.health20forum.nl**

RADIOLOGY 2009: MEDICAL INFORMATICS AND TELEMEDICINE

The Ukrainian Association for Computer Medicine is organising a satellite scientific and practical symposium, "Radiology 2009, Medical Informatics and Telemedicine" during the "Modern Information and Electronic Technology" conference on May 21-22, 2009 in Odessa.

The symposium is an opportunity for constructive dialogue, commercial contracts, building friendships and networking. The topics of the symposium will be announced at a later date. There will be a scientific and technical exhibition where leading Ukrainian and foreign producers of medical equipment will present the latest technological developments to physicians and heads of authorities.

For more information, please visit: **www.ukrmedtech.com.ua**

MIE 2009 CONFERENCE IN SARAJEVO

The 2009 MIE Conference is being organised by the Society of Medical Informatics of Bosnia and Herzegovina. The motto is "Medical Informatics in a United and Healthy Europe"

New medical, biomedical, and health informatics bridges must be built between the western and eastern parts of the European world. For this purpose, a panel of high-level scientists and healthcare managers will be invited to participate and give keynote speeches, tutorials, and organise in-depth workshop discussions.

The conference will take place in Sarajevo, Bosnia and Herzegovina, from 30 August until 2 September 2009. Its attendance is around 500–1000 participants and scientific presentations are from more than 40 countries and all continents.

For more information, please visit: **www.mie2009.org**

26-28 MAY 2009, PARIS, FRANCE

HIT PARIS

The European Association of Healthcare IT Managers invites you to take part in France's major European congress and trade show solely dedicated to Health Information Technologies. The event will take place in Paris Expo (Porte de Versailles, Hall 7.3) from the 26th until the 28th of May 2009.

Launched in 2007, HIT Paris is an initiative of the French Hospital Federation (FHF). It is supported by French and European Institutions and has as patron Ms. Viviane Reding, the Commissioner for Information Society and Media.

In 2008 a survey among the conference participants was conducted, from which it was concluded that 99% of the participants of HIT Paris 2008 were satisfied with the event. The majority of the public consisted of Healthcare and IT Managers, IT Project Managers, IT Engineers and Medical Information Managers. More than 100 specialised exhibitors, 2,500 speakers from within and outside France, 1,400 congress participants and 14,000 visitors are being expected. Next to the exhibitions, there will be a 3 days of professional training organized.

During the congress the main subject areas will be:

- Data processing system, networks, computer hardware and maintenance
- Telecommunication
- Telemedicine
- IT hardware and software for personal use
- IT health systems, solutions and applications
- Security systems and application
- Health establishment and medical database management (SGBDR)
- Management of support services information systems
- Consultancy and associated services

The aim of the congress is to bring together hospital information technology players, such as hospital decision-makers, management teams, network leaders and public authorities as well as general practitioners, health professionals, managers and engineers.

HIT Paris is an event associated with Geront Expo-Handicap Expo. During the exhibition the main focus will be on home maintenance, coordination of patient circuits and geronto-technology.

The third session of HIT Paris is a recommended event for all healthcare IT professionals, who are interested in the latest solution from data processing systems to management of support services and information systems. This event will bring together health professionals from Hospital Managers to doctors and pharmacists.

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

31 MAY -03 JUNE, 200, QUEBEC, CANADA

E-HEALTH CONFERENCE 2009: LEADERSHIP IN ACTION

Considered to be one of the largest e-Health tradeshows in Canada, the e-Health Conference 2009 has prepared an excellent Conference Program and an Exhibition filled with practical experiences, workshops and activities. Above all, it is the place to be for social events and networking opportunities.

The Conference is jointly hosted by the Canadian Institute for Health Information (CIHI) and the Canada's Health Informatics Association (COACH). Together they manage to organize a proactive top-quality learning and an opportunity to network with organizations and people that value quality health information as well as effective integrated system solutions. Since the beginning, the conference has attracted a steadily increasing attendance, which reaches more than 1,500 delegates.

This year the congress will address the following topics:

- Access and New Models of Care
  - > E-health and Information Management
  - > Remote Service Delivery Solutions
- Balancing Workforce and Technology
  - > Change Management
  - > Decision Support
- Innovation and Sustainability
  - > Leading Large Initiatives
  - > School of Hard Knocks

Showcased will be an impressive number of e-Health solutions, which deliver on the benefits of improved patient outcomes, improved patient safety and improved cost effectiveness in the delivery case. The main focus during the Conference will be on the latest health informatics developments through a combination of keynote plenary sessions, concurrent sessions, a leadership forum, facilitated workshops, panels, delivered by through leaders and innovators. Furthermore, several new sponsorship opportunities will be introduced. For the first time, an own product/session will be conducted, during which key sponsors will be able to engage directly with delegates.

The e-Health Conference will take place in the Québec City Convention Centre from May 31 until June 3rd 2009. This Conference is an excellent opportunity to have a direct access to members of the health informatics community, practical experience and information on the newest e-Health solutions and all in one place.

For more information, please visit:
www.e-healthconference.com

6-10 MARCH VIENNA, AUSTRIA

ECR 2009

The 21st European Congress of Radiology took place in Vienna, Austria, from March 6th until the 10th. Accepted as one of the largest radiological meetings worldwide, the Congress showcased the newest products and achievements in technical medicine, pharmacology and specialized media.

Since 1991, the congress is held annually in early March in the Austrian capital. The president of ECR this year was Professor Borut Marincek, Head of the Department of Radiology, University Hospital Zurich, Switzerland.

More than 18,000 delegates from 97 countries and 285 exhibitors from 36 countries were present at the ECR this year. The public consisted mainly of radiology professionals, radiographers, industry representatives and press reporters for medical and consumer press.

Furthermore, there were 25 industry-supported Satellite Symposia and Hands-on Workshops. For the sixth year the "Invest in the Youth" program had a great success. It was dedicated to young radiologists and radiographers between the age of 22 and 30. The special country focus was on Switzerland, New Zealand, Australia and Croatia. During the congress the participants shared the experience of the four countries in the field of radiology.

The most recent developments in science and research were presented with a special focus on the importance of radiology in early detection of breast cancer, the role of CT and MR in major trauma, radio frequency ablation (RAF) of the liver and lung tumours and strategies for radiation dose reduction.

ECR is the annual meeting of the European Society of Radiology (ESR). The next congress will take place in Vienna from March 4-8, 2010, under the presidency of Professor Ma_gorzata Szczerbo-Trojanowska from the Interventional Radiology Department at the Medical University of Lublin in Poland.

For more information, please visit:
www.myesr.org/cms/website.php?id=/en/congress.htm

04-08 APRIL 2009 CHICAGO, ILLINOIS, US

HIMSS09

The Healthcare Information and Management Systems Society's annual conference and Exhibition took place from April 4-8 at McCornick Place in Chicago.

The show enabled participants to make more than 1,000 connections with leaders, policy makers, vendors and peers, meet 900 companies demonstrating breakthrough solutions and receive 3,000 opportunities to learn from industry through leaders.

Via e-Networking, participants could connect online with attendees, vendors and members and the Customized Agenda tool was very helpful in searching the best activities that matched participant profiles from hundreds of educational and exhibit options on HIMSS09.

HIMSS09 was an excellent place to share best practices, find prospects, exchange ideas and explore options and discover healthcare IT solutions with some of the industry's top healthcare IT professionals. The public consisted mainly of physicians, nurses, pharmacists, vendors and of course healthcare IT professionals.

The place of the conference was not randomly chosen; Chicago is located in the Midwest of the US, which is the home of 2,000 CIOs and more than 10,300 healthcare organizations including integrated delivery systems, critical access hospitals, single hospital systems, large hospitals and more.

In the program there were Pre-Conference Workshops and Symposia, more than 300 Education Sessions about the latest and hottest healthcare IT topics and more than 900 exhibits representing 30 product categories.

For CHIME members, a CIO Forum was organized by CHIME and HIMSS. CIOs explored new ideas and trends with colleagues and experts. Alongside, a Microsoft HUG Tech Forum presented best practice sharing and knowledge exchange in a highly collaborative setting. User-driven presentations have shown new ideas and proved tactics the participants could use for their working solutions.

A demonstration of US federal agency projects, including health IT exchange for the Nationwide Health Information Network (NHIN), was a first-of-its-kind event this year.

HIMSS10 is planned from March 1-4, 2010 at the Georgia World Congress Center in Atlanta.

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

NATIONAL EHEALTH STRATEGIES: EC-FUNDED STUDY LOOKS AT PROGRESS AND BARRIERS

A new study funded by the European Commission is assessing the progress made to date towards the realisation of European eHealth Action Plan goals. Good practices and lessons learned constitute the study's key elements. The results will be fed into policy recommendations for further accelerating eHealth implementation.

The study has been assigned to a consortium consisting of empirica Communication and Tech-nology Research (Germany), The National Institute for Health and Welfare (Finland), Time.lex (Belgium), Prof. Denis Protti of the University of Victoria (Canada) and University College, London (UK), and EMC Consulting Group (Belgium).

The European Commission and EU Member States have long recognised the potential of ICT-enabled applications to improve citizens' health, healthcare delivery as well as public health services or medical research. In its 2004 eHealth Action Plan, the European Commission identi-fied distinct areas of initiatives required to build up national and pan-European eHealth infra-structures and to implement solutions in order to move swiftly towards an ICT enabled, collaborative, personalised and more efficient model of healthcare.

The eHealth Strategies study will take a closer look at policy documents, concrete eHealth im-plementations and national-level legal and regulatory as well as administrative support mecha-nisms. In addition, it will also deal with financial and reimbursement issues. The research effort draws upon earlier projects funded by the European Commission. In particular, these include the eHealth ERA study and the Legal framework of interoperable eHealth in Europe study. A network of National Correspondents will raise data on new developments and validate existing information for each country.

The compilation and comparative assessment of the results is informed by concepts from public policy science, notably the policy-cycle paradigm. This allows an assessment of the advances made, from agenda setting through implementation to full routine operation. In addition, national evaluation and assessment activities will be presented where applicable. This will be complemented by statistical analyses.

The final project report – based on individual country briefs - will provide a summary of eHealth progress on the European level and information regarding the spectrum of eHealth solutions available in each country, the degree of administrative and legal support and financial incentives for promoting the use of eHealth applications. In that perspective, the study will furnish strategic information not only for policy-makers but also healthcare service providers, healthcare industry executives and other stakeholders.

Link to the study website: **www.ehealth-strategies.eu**

THE PRAGUE DECLARATION ON E-HEALTH

The e-Health Conference 2009 in Prague (eHealth for Individuals, Society and Economy) has been followed by the release of The Prague Declaration. This emphasises the progress already made in e-Health by both Member States and the European Union. It also notes that the benefits of e-Health for a safe and efficient health sector have long been recognised by expert stakeholders.

Recent initiatives from both Member States and the European Commission have been providing additional support to launch new projects, in order to keep building the momentum of healthcare IT usage and to prevent further progress from becoming compromised by legal, technical or economic barriers.

The Prague Declaration states that the benefits of e-Health applications and services must be enhanced and evenly distributed among all stakeholders, as follows:

> e-Health for individuals
> e-Health for society
> e-Health for economy

Benefits for individuals, society and the economy

For individuals, e-Health can increase quality and effectiveness of services. It is of immense benefit to those with chronic illnesses, and can improve continuity of care and facilitate cross-border healthcare.

For society, e-Health is about interoperability, e-literacy and the accessibility of new technologies. It is also a great opportunity for research and development with high growth and innovation potential.

As far as the economy is concerned, e-Health can offer enormous savings by enhancing reach, access and effectiveness. With the potential to transform the healthcare sector, e-Health solutions can substantially change healthcare facility business models; this is extremely relevant taking into account today's fragile economic climate.

Call for building further on achievements

It is widely accepted that considerable progress has already been made since the last e-Health conference in ABCDEF but the general consensus is that progress must not stop there. Following the high-level conference it has been decided to move forward and concentrate on the areas important for the full utilisation of e-Health potential. Consequently, EU Member States have been encouraged to take actions concerning telemedicine, interoperability and European cooperation including exchange of best practices.

Telemedicine deployment

The November 2008 Communication from the Commission on telemedicine highlights the areas for improvement and provides an action plan for the full exploitation of opportunities offered by telemedicine. Both patients and healthcare professionals must build their confidence in telemedicine services.

In order to increase the level of confidence, technical issues needed to be resolved and legal clarity must be achieved. Another challenge facing telemedicine is market development. Once these challenges are overcome within Member States the market will become less fragmented and not limited to one-off and small-scale projects

Interoperability and the M403 Mandate

In order for e-Health to expand and reach its full potential a common set of standards for electronic health records, patient summaries, emergency data and other services must be developed. There is a clear lack of interoperability, which has already been highlighted in the existing EU action plan on e-Health.

An agreement on a consistent set of EU-level harmonised standards is therefore urgent and essential. Harmonised standards would facilitate access to healthcare to all EU citizens wherever they happen to work or travel. Key elements in interoperability are ontological and semantic standards as well as technological standards.

The Declaration states that the implementation of the eHealth Interoperabilty Standards Mandate M403 is an initiative that should be widely supported for enabling interoperability of e-Health systems and services in Europe.

European Cooperation and Exchange of Best Practices

e-Health high-level conferences are great opportunities to exchange best practices between Member States. Studies have shown that there is a large gap between Member States and between readiness and actual use of e-Health.

Although most healthcare professionals are now using IT, there is room for improvement concerning the interconnectivity of electronic networks of different health actors. Further development is therefore required.

Next Steps on the Agenda

In order to facilitate the development, implementation and usage of new e-Health services and solutions the declaration highlights three specific areas to focus on:

1. Fulfilling Existing Strategic Goals and Developing New Ones
The Member States declare their intent to fulfil the goals of the i2010 initiative, e-Health action plan and specific national strategies already in place to promote e-Health in the EU.

2. Patient Safety and Empowerment
IT usage in the health sector has already had a positive impact on patient safety. Future actions must include strengthening patient involvement through the communication of targeted patient safety policies and solving legal and ethical issues. Privacy and data protection must also be high priority, including developing a common approach to optimising existing directives on data protection and privacy.

3. Governance Structure for e-Health
Due to its increased importance and usage, arrangements for Europe-wide governance are needed. This will be discussed by all Member and partner European states in order to achieve interoperability and facilitate faster deployment so that patient safety and continuity of care is ensured within Member States as well as on a cross-border level.

Conclusion

The Prague Declaration serves as a call for action on building an e-Health area for European citizens.

Member States and the Commission must work together to build this area, which will enable all citizens access to healthcare.

National strategies must be adapted so that individuals, society and economy receive the benefits of e-Health and Member States must work together to create a European-wide governance structure to facilitate the implementation of new services as well as the removal of existing barriers.

For more information,
please visit:
www.ec.europa.eu/information_society/newsroom/cf/document.cfm?action=display &doc_id=590

CUSTOMISING HEALTHCARE IT

Choice or Compulsion

AUTHOR
Tosh Sheshabalaya,
HEALTHCARE IT MANAGEMENT
ANALYSIS

In spite of considerable progress in user-directed flexibility, many off-the-shelf software packages still lack key real-world features and fail to meet the requirements of users, especially smaller ones.
Unlike a new suit or television set, IT users can rarely afford to throw away an old system and start out wholly fresh. And in contrast to a GE or a Unilever, smaller firms do not really figure in the one-size-fits-all approach, which alas, happens to be the way most software products are designed.

And yet, most healthcare IT managers detest the word 'customisation', with all the unforeseeable extras that it entails – requirements management and analysis, development, interfacing, testing, quality assurance, re-testing, etc. – and then being blamed when things go wrong. And things do go wrong. Cases abound, for example, of a routine vendor upgrade, or even a patch, wiping out hundreds of person years of customisation, or rendering it meaningless (since many vendors offer to only support a patched release). At the other end of the spectrum is the challenge of previous rounds of customisation, which may not have been fully documented, and then pose massive challenges for future customisation.

Requirements still less science than art

One of the major stumbling points, at the outset of any customisation project, is that requirements management still largely remains an art rather than a science. It is principally textual and based on natural language. There have been considerable efforts, not least by Carnegie-Mellon University's Software Engineering Institute, to quantitatively define relationships among requirements and other software process specifications, but results so far have been mixed.

Certain subsets of requirements management have seen significant standardisation – for instance, in terms of traceability - to monitor the life of a requirement from origin/originator to implementation, and back. However, such steps (although welcome in terms of removing healthcare IT managers from the line of fire of CFOs or CEOs), are expensive extras, and have done little, at least so far, to enhance cost-benefit ratios in customisation projects.

A radical transformation

Few nonetheless argue that the software customisation process itself has undergone a radical transformation in the past 5-10 years. Source code modifications, for example, are hardly ever employed anymore, although they were traditionally one of the first choices in the past.

Although there has been some growth in healthcare industry-specific offerings, even the best of new-generation hospital information systems (HIS) continues to require a considerable amount of customisation.

As discussed in the next article in this issue, many are now turning to specialist firms to meet such challenges.

Complementing, not standardising

As in many other sectors, HIS software packages do not standardise business processes in hospitals but only complement them, and ideally make them more efficient. The only exception to this rule would be in Third World countries, where hospitals run on paper and do not have an IT system to begin with. In Europe, on the other hand, all HIS packages will require at least some major level of customising, and the best way to achieve this is by first understanding the business processes and operating procedures in place, and then to assess where customising could be most efficiently implemented.

Examples of customisation

One of the biggest requirements in the healthcare sector is to adapt formats in reporting and bring them into line with local practices and traditions. Many of the latter have their roots not only in custom but in laws and legal practices too; these are not necessarily IT friendly.

Such adapting may sound simple to a lawyer but could be a nightmare for an IT manager drilling deep into a database to access the requisite bit of information, and thereby heavily taxing system resources. Other tools allow data to be validated as it is entered into the system, force entry of data in fields where it is legally required (and do so in a preset order) as well as run checks on data based on entries elsewhere

Some of the most common customisations in such a situation are to host datawarehouses on a dedicated thin-client server, thereby removing the load from the main HIS-linked

system. Other workarounds involve 'standardising the customisation process', as one IT manager told HIT (only partly tongue in cheek). Examples of this include third-party or even vendor-provided add-ons, as well as integration with common front-end applications such as Microsoft Office which have themselves evolved to permit such integration, more easily and seamlessly. Current spreadsheet programs, for example, can be tailored to provide complex what-if scenario analysis, and these can be tweaked (standardised ?) to automatically trigger under pre-determined scenarios, and then run behind the scenes, thereby reducing demand on system resources.

Assessing complexity and impact

For healthcare IT managers, a twin challenge in customisation is to not only assess the level of complexity in the process but also conduct an impact assessment on other IT-related aspects of the hospital operation – both immediate and in terms of evolving requirements for the future.

Another issue involves quality assurance and testing – across the entire chain, from developer to end-user, as well as in terms of change control.

In this respect too, there have been several positive changes in recent years – such as dedicated test facilities to which the customised product can be outsourced for testing, alongside pre-modified code to revert to for 'safe mode' operation in case of failure.

Overall, the mission is to strike a Golden Mean between standardised HIS systems and customised versions tailored intelligently to real needs.

CASE STUDY: CUSTOMIZING MEDICAL DATA INTERCHANGE

Challenges – and the lessons learned

AUTHOR
Kirill Basikhin,
is Vice President of Softage LLC, Novosibirsk, Russia.

A leading Netherlands-based hardware and software vendor required customized interfacing software to support data interchange between their own proprietary software, medical imaging devices and a Hospital Information System. They sought an external partner to develop customised software that would connect these different systems and fully support data interchange in DICOM (Digital Imaging and Communications in Medicine) and XML formats. Softage, a Russian firm finally selected for the job, won the order due to a proven technological track record in complex software development projects, quick responsiveness/turnaround times and attractive pricing. Along the way, there were lessons for everyone, as explained by the Vice President of Softage.

Project overview

The interfacing software we were tasked with developing was meant to support five connections with external systems. All these connections, moreover, had to be compliant with industry standards.

In the first phase of the project, our customer needed to process only data transferred to and from X-ray devices, based on DICOM - which covers handling, storage, printing and transmitting of information in medical imaging and includes a file format definition as well as a network communications protocol (see box).

C#.NET, MS SQL Server and DICOM

Our engineers, in cooperation with the customer, designed and implemented the first version of the interfacing software. We used C#.NET and MS SQL Server as the best technology choice for the Windows platform, which is common at hospitals in Europe. The interfacing software transforms procedure information data into DICOM standard and transfers it to the X-ray device. X-ray device information, on its part, is sent back to the interfacing software for further processing.

At the end of this process, complete patient information including demographic data and X-ray information can be easily obtained from the database. The software has been found to work well according to customer expectations. Further system development is likely to consist of adding HL7 compatibility and connection to HL7 data feeds.

Challenges of customisation = Niche opportunities

Why was there a need for such software?
The reality is that giant hardware manufacturers and healthcare software vendors such as Philips produce heavy large-scale systems which address only the major needs of hospitals, doctors and dentists for data storage, transmission and process-

ing. This opens up opportunities for smaller players with state-of-the-art software/hardware offerings in a panoply of niche application areas.

Our customer's existing product (combining hardware and software) was a Hemodynamic Monitor designed specially for Cardiologists. But the software originally could only output and process data in XML format. That's why there was a need for DICOM-to-XML and backward conversion capability, in order to connect it to other medical devices such as X-rays as well as Hospital Information System.

Potential options, advantages of DICOM

Why was DICOM necessary for our project's purposes?
DICOM is a wonderful technology that allows addressing technical interoperability issues in medical imaging. It connects different hardware systems produced by diverse vendors and heterogeneous software platforms. The fact that DICOM has been widely adopted by hospitals in Europe will significantly facilitate a market for the software. This is why DICOM compliance was an obvious requirement in our case.

In our project, we used a third party library which helped in transmitting DICOM data to the X-Ray device and backward. However, it did not provide all of the required functions, which had to be developed and implemented by our experts.

Specific challenges and technology issues

The main project challenge consisted in remote development of a complex data processing software without having access to the customer's original medical equipment. Our company's development centre is located in Novosibirsk, Russia, while the customer premises were located in the Netherlands, with a 5 hour difference in time zones.

So from the beginning we set up an efficient collaboration environment including bug tracking and version control software systems and set up regular daily communication with the customer's project manager using instant messenger to overcome the distance.

For the same reason we actively used special programs - emulators that helped us to work without direct access to the expensive and bulky medical hardware. Usage of emulators allows significant savings in development time and project budget. Another obvious advantage is that our project schedule was not dependent on

> *Continues on page 20*

DICOM: Healthcare's Must-Have IT Standard

HEALTHCARE IT MANAGEMENT
ANALYSIS

Though the history of digitised medical images dates back to the 1970s, it was only in the early 1990s that standardised formats for their transmission came into being. The trailblazers for these efforts were the American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA), which sought to replace previous, proprietary formats for image storage and transmission.

The earliest versions of the ACR-NEMA initiative created a common terminology and information structures. However, a standard method of communicating the information was the ACR-NEMA version 3.0 Standard released in 1993. This soon saw its name changed, to Digital Imaging and Communications in Medicine (DICOM 3.0).

DICOM 3.0 not only allows for the transfer of medical images in a multi-vendor environment, but also interfaces with picture archiving and communication systems (PACS) and other medical information systems. It is considered as the standard for communication across the boundaries and margins of disparate applications and devices.

DICOM addresses multiple levels of the ISO OSI network model and provides support for information exchange on interchange media. It specifies a TCP/IP network protocol, defines service classes beyond simple image data transfer and has established a mechanism to uniquely identify Information Objects (images as well as patients, records, reports etc.), as they are acted upon across the network.

DICOM currently defines an upper layer protocol (ULP) that is used over TCP/IP (independent of the physical network), messages, services, information objects and an association negotiation mechanism. These ensure that any two implementations of a compatible set of services and information objects can effectively communicate. In turn, independence from the underlying network allows DICOM to be deployed in many functional areas of application, such as single-site communication (e.g. through Ethernet), between sites over leased lines or virtual private networks (VPNs), and within wider regions – via DSL, Asynchronous Transfer Mode or satellite.

At the baseline, DICOM does not define architectures for an entire system or provide specifications for functional requirements, beyond their service-related behaviour. The storage of images (objects), for example, is defined in terms of what information must be stored or transmitted, not how they must be displayed.

In the application layer, the Information Objects address five main functionalities:

- Transmission and persistence of complete objects (such as images, waveforms and documents),
- Query and retrieval of such objects,
- Performance of specific actions (such as printing images on film),
- Workflow management (support of work lists and status information) and
- Quality and consistency of image appearance (both for display and print).

In a healthcare setting, DICOM's scope is universal and encompasses every specialty that uses imaging, from cardiology and ophthalmology to pathology, radiology and surgery. DICOM also addresses integration of information (the DICOM Information Objects) from different specialty applications into a patient's Electronic Health Record (EHR).

Organisationally, DICOM is an independent, international standards development organization. It is administered by NEMA's Medical Imaging and Technology Alliance. Working groups perform the bulk of work on the extension of the standard and (when required) implement corrections and modifications. DICOM also has a strong relationship with IHE, the Integrating the Healthcare Enterprise initiative, which was profiled in the previous issue of Healthcare IT Management.

Physician Practice Information Systems

Identifies the most important specifications to consider when comparing models

ECRI Institute
The Discipline of Science. The Integrity of Independence.

ECRI Institute Europe
Weltech Centre Ridgeway
Welwyn Garden City
Herts AL7 2AA
United Kingdom

Tel: +44 (0)1707 871511
Fax: +44 (0)1707 393138

info@ecri.org.uk
www.ecri.org.uk

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**

Supplier Footnotes	
<1>These recommendations are the opinions of ECRI Institute's technology experts. ECRI Institute assumes no liability for decisions made based on this data.	<2> Supplier declined to update product specifications. Model listed is currently marketed.

	ECRI RECOMMENDED SPECIFICATIONS<1>	AXIS CLINICAL SOFTWARE
MODEL	**Physician Practice Information Systems**	**Patient Analysis and Tracking System-PATS**
SYSTEM CONFIGURATION		
Hardware platform		Intel processor computers, many UNIX platforms
Operating systems		Windows NT, UNIX
Program languages		Visual Basic, Cache, M
Capacity, number patients per MB		250-1,000
NETWORKING		
Architecture		Client/server, distributed
Communication protocols		Ethernet, TCP/IP, Token Ring
Cable type		Twisted pair, fiberoptic, 10BaseT, coaxial
STANDARDS SUPPORTED	HL7 (required)	HL7, ODBC
CLINICAL FEATURES		
Patient profile	Required	Yes
Display diagnoses	Required	Yes
Print prescriptions	Preferred	No
Ad hoc reporting	Preferred	Yes
Clinical summaries	Preferred	Yes
Print referrals	Preferred	No
Vital statistics	Required	Yes
Nursing/physician assessment	Preferred	Yes/yes
Drug profiles	Preferred	Yes
View multiple encounters	Preferred	Yes
Other features		Clinical outcomes analysis; predictive/risk stratification capability; actuarial and trends analysis; national database participation; PDA, HIS, lab interfaces; graphical presentation; clinical report generation
MANAGEMENT FEATURES		
Appointment scheduling	Preferred	No
Scheduling pool	Preferred	No
Hospital rounds scheduling	Preferred	No
Insurance claims	Required	No
Insurance authorization	Required	No
Benefit coordination	Preferred	No
Automatic billing	Required	No
Daily physician activity summary	Preferred	No
Patient/account histories	Preferred	Yes
Inventory control	Optional	No
Patient chart log	Preferred	Yes
CPT code payments	Required	No
ICD9 classification	Required	Yes
Word processing	Optional	Interface
Custom reports	Preferred	Yes
Ad hoc reports	Preferred	Yes
Other features		Outcomes analysis and reporting, generation of clinical reports
NUMBER OF PHYSICIANS SUPPORTED		Unlimited
PLANNING & PURCHASE		
Time required from receipt of PO		45-90 days
Year first sold		1981
Total number of installations		350
Installation costs	≥1 year hardware, ≥90 days software	Varies by configuration
Training program		On-site or classroom
Training costs		$900/day, plus expenses
Warranty		90 days
Typical price		$5,000-150,000 for software
Cost of annual software upgrade		Averages 15% of license cost; software and maintenance agreements include updates and line support
Fiscal year		January to December
OTHER SPECIFICATIONS		None specified.
LAST UPDATED		Apr-04<2>
UMDNS CODE(S)	18101	18101

CERNER	CLINIC PRO SOFTWARE	HEALTHCARE DATA	NUMEDICS
PowerChart Office	**Clinic Pro Medical Software**	**Health Probe Professional**	**CliniPro**
IBM P Series and RS/6000 under AIX	Windows	Windows 95/98/NT/ME/2000/XP	IBM compatible
Win XP, 2000	Windows	Windows 95/98/NT/ME/2000/XP	Microsoft Windows
Visual C++, Visual Basic, Oracle, C, C++	VFP9, SQL	Visual Basic, ASM, Microsoft SQL	Object Pascal, Java, C#, C++
Varies	2,500	1,000	Limited to size of storage media
Client/server	Client/server	Client/server	Client/server, application service
TCP/IP	TCP/IP	TCP/IP	Ethernet, TCP/IP, Internet
Not specified	Twisted pair	10/100 on wireless, LAN, all	Customer-defined
ASTM, HL7, SNOMED, ANSI x12, EDI	ANSI	HL7, QSL, X12	HL7, HIPAA, XML
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes/yes	Yes/yes	Yes/yes	Yes/yes
Yes	Yes	Yes	Yes
Yes	No	Yes	Yes
None specified	None specified	Progress notes, patient instructions, voice recognition, preventive maintenance list, touch screen adaptable, drug-drug, allergy-drug interactions	Clinical outcomes analysis, actuarial and trends analysis, lab interfaces, clinical report generation, automated encounter/progress notes, clinical, nutrition, and education management
Yes	Yes	Yes	Yes
Yes	No	Yes	Yes
Yes	No	Yes	Yes
Yes	Yes	Yes	No
Yes	Yes	Yes	No
Yes	Yes	Yes	No
Yes	Yes	Yes	No
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
With optional software	No	Optional	No
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes
No	Yes	Any application	Yes
Yes	Yes	Yes	Yes
Yes	No	Yes	Yes
None specified	None specified	Order tracking, order/diagnosis-diagnosis/order relations, CMS-compliance coding, accounts-receivable reports, integrated EMR/CPOE, accounts-receivable, electronic scripts, and e-mail	ADA, NCQA, provider recognition, reporting
≥3,500	200	Totally expandable	Unlimited
Client specific, varies	2 days	1 week	8 weeks
1996	1994	1985, current version 2007	1995
338 sites	≥975	>1,000	110
Client specific, varies	None	$0	Varies
Train-the-Trainer in Kansas City or on-site	3 months	2 days on-site optional	On-site, online, designated location
Client specific, varies	None	$1,500 per day optional	Varies
Perpetual license, annual support fee	Not specified	Replacement of program	Perpetual license, continuous support
Client specific, varies	$9,995	$3,600 for 5 users subscription	Varies
Included in support and maintenance	$1,200	Included	Varies
January to December	January to December	January to December	January to December
Expert systems; drug-drug interactions; integrated health plan data; online formularies; online referral network; structured documentation (coded entry); integrated billing; GUI and IntelliStrip chart navigation; electronic eligibility.	None specified.	Import/export capabilities; additional user cost dependent on number needed; optional turnkey setup; practice management data conversions; external orders tracking; drawing capabilities; script writer; search module.	Online eligibility and treatment authorizations; patient alerts; storing patient communications; integrated EMR; patient follow-up and tracking; education scheduling and tracking; diabetes and chronic disease management.
Sep-05	Aug-07	Aug-07	Aug-07
18101	18101	18101	18101

> *Continued from page 17*
hardware resources availability. The final tests were, however, completed on real equipment at a hospital.

Multiple languages

Another challenge was the need to support multi-language processing of patient data. The system was aimed at recognition and processing of most European languages, beginning with English and Dutch given that the primary target for the software were Netherlands-based hospitals. We took this requirement into consideration and designed the system to fully support Unicode, allowing for the processing of data in any European language. While we worked on the project we faced several technology issues.

Tweaking tools

The first of the issues was integration of a third party tool. We used Offis DICOM DCMTK tool to process queries from the X-ray device to our software. In the early phase of the project, the tool did not manage to correctly process some important data. We investigated all available documentation for this tool, but there was lack of detailed documentation about its usage so these documents didn't help us much. To solve the problem, we investigated the source files of the tool, read the internal source code comments, and tried to trace the execution of this tool. After in-depth research of the problem, and with the help of the vendor's team, we managed to successfully fix problems in the third-party code.

Testing: mixing and matching, harmonising

The second issue was the test environment mix on the development and customer side. Since we didn't have a real X-ray device at our lab, we decided to use Phillips DVT (DICOM Validation Tool) to 'emulate' DICOM requests from the X-Ray device. Meanwhile, the customer had been using the Witt Biomedical application to emulate such requests. As a result, at the customer end the software did not properly process the DICOM data coming from the emulator. Once we convinced the customer to use an identical testing environment, the problem was solved. The final acceptance testing with a real X-ray device at a hospital was successfully completed by the customer's team.

Field mapping

Another issue concerned a Field Mapping problem. This was related to the conversion of XML data field values coming from the customer's software into DICOM-compliant data. The original customer's equipment data output contained fields without direct equivalents in the DICOM standard. We intensively worked with the customer's team to resolve this issue and to create a working field mapping schema. At the end, we achieved full data compliance to DICOM standard.

Protection

The final problem was related to usage of hardware protection for the software. The customer decided to use a hardware HASP key to protect their application from improper usage. [HIT Note: HASP is a rights management solution to enable the use of either software- or hardware-based protection keys to enforce software protection and licensing].

The HASP key vendor released a master key for the customer's team and we got a supplemental test key for development purposes. At the late phase of the project the customer found that the program could not be started with their master HASP key. As our company did not have any previous experience with HASP technology, we contracted a third party professional familiar with this technology so that the team was able to get consultations when needed. After investigation, we found that both the customer and the contractor must have identical "vendor code" for both HASP keys that is supplied along within software package. This allows both a customer and his remote development team to stay on the same page.

Lessons learned

Interoperability and third-party tools

Most of issues we faced and resolved were related to interoperability and third party technology usage. To resolve these issues, we investigated the third party components, available documentation and sometimes contacted manufacturer/vendor teams. Strong analytical skills and the creativity of our experts were key contributors to the success of the project.

Assigning right specialists to perform specific tasks is a critical success factor in outsourced projects. The usage of collaboration tools such as bug tracking and version control systems helps aligning the efforts of customers with a remote development team.

Appropriate test environment

Setting up a proper testing environment can have a strong impact on a project, especially in complex projects with specific hardware involved. Usage of software emulators significantly saves project time and budget and allows working independently from hardware resources availability.

During this project our specialists acquired valuable experience in such specific areas as DICOM and HL7 standards and interoperability solutions development for the Healthcare industry. Today, we are capable of delivering enterprise-scale Healthcare solutions which fully comply to the most stringent standards.

A personal touch – and the long-term

Open, honest and regular communication with customer, the discussion of all problems (including those just emerging) was also a critical factor to help in resolving issues.

Upon successful completion of the project, our top management was invited to the customer's premises to discuss further long-term cooperation. The next project will consist in development of powerful DICOM data processing software for the Hospital Information System. The software will work as a service that processes visual information in DICOM format coming from different hospital appliances and stores the information in the central database.

MANAGING COMPLEXITY THROUGH VALUE MODELLING

AUTHOR
Paul Johannesson is Professor of Information Systems at the Royal Institute of Technology, Stockholm. Erik Perjons is a research engineer at the Institute.

Politicians, healthcare managers, and systems designers need new instruments for managing the complexity of today's healthcare systems. One of the most promising instruments is a recent enterprise modelling technique called value models. A value model is a graphical representation of a network of cooperating actors that together create value through resource exchanges and transformations. Value models have their origin in commercial contexts, where they have been used for analysing the economic viability of networks and their participants. Value models can be extended to cater for the special requirements of healthcare networks, thereby facilitating the design of new forms of collaboration in healthcare as well as innovative healthcare services.

A main reason for these problems is the complexity of the healthcare sector; many healthcare providers, with different responsibilities, terminologies and IT systems, need to collaborate in order to provide high-quality care for their patients. At the same time, politicians, patient organisations, insurance companies and other stakeholders attempt to influence the structure of the healthcare sector resulting in ever more complex relationships, incentives, organisational forms and regulations.

In order to manage the complexity of today's healthcare systems, every healthcare organisation needs to acquire effective instruments for managing knowledge about itself and its environment. Towards this, many organisations have turned to enterprise models as an instrument for improved communication between healthcare professionals, decision makers, systems designers and other stakeholders. An enterprise model is a representation of the structure, processes, information, resources, people, and constraints of an organisation. As enterprise models are usually shown as graphical diagrams, they become easy to understand and manipulate for any stakeholder, thereby facilitating shared understanding. At the same time, enterprise models are so precise that they can be used as a basis for designing healthcare systems and services.

From enterprise models …

Some of the most well known enterprise models in healthcare are Health Level 7's Reference Information Model (RIM) and CONTSYS – which are healthcare information models, Health Informatics Service Architecture (HISA) – which describes core healthcare services and their relationships, and SAMBA – which specifies core healthcare processes.

Though enterprise modelling has seen widespread application in the healthcare area, it still suffers from limitations in its scope. It has often taken an internal perspective focusing on business processes, information flows and communication within an organisation. Furthermore, the use of enterprise modelling has in many cases addressed low level issues, like data and terminology analysis, which are primarily of interest for the design and construction of IT supported systems.

However, to manage the increasing complexity of healthcare, enterprise models need to move outwards, i.e. towards the environment in which the organisation is embedded. Enterprise models also need to move upwards, i.e. from IT systems design and implementation towards organisational analysis and design. For handling these needs, a novel type of enterprise model has recently been proposed, so called value models (or business models).

… to value models

A value model gives a high level view of the actions taking place in and between organisations by identifying actors, resources and the exchanges of resources between the actors, i.e. a value model focuses on the what in business. Thereby, a value model can be used to describe a network of cooperating actors that together create value through resource exchanges and transformations.

For illustration, we introduce three different value models describing alternative ways of organising healthcare in a society.

Figure 1 shows the simplest possible value model for a healthcare network, consisting of two actors, a citizen and a care

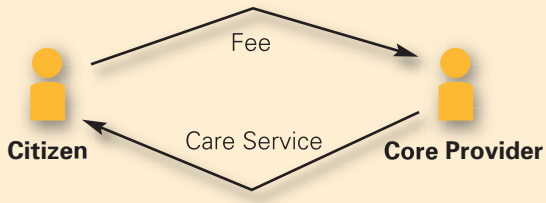


Figure 1. *Simplest value exchange*

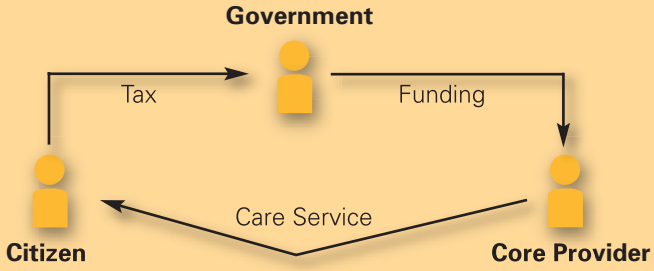


Figure 2. *Value exchange with fixed governmental funding*

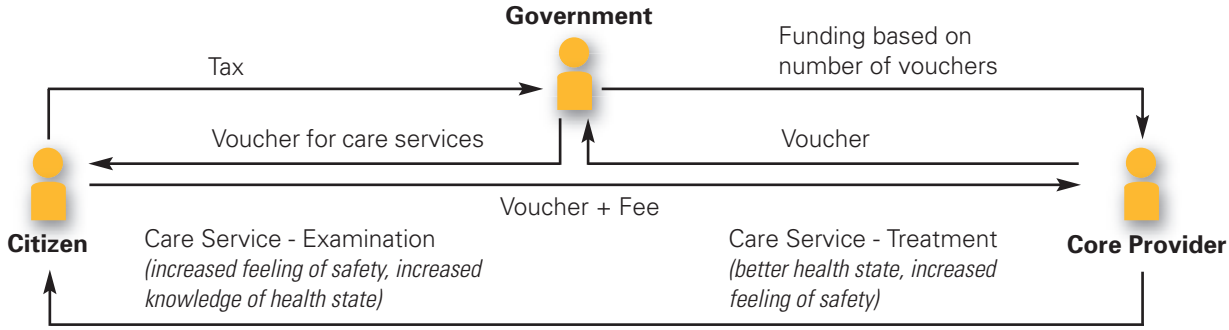


Figure 3. *Value exchange with vouchers and patient fee*

provider, where the care provider offers care to the citizen in return for a monetary fee. Obviously, this model is not acceptable in a European welfare society as some citizens would not be able to carry their healthcare costs.

A more realistic value model is shown in Figure 2, where the government redistributes costs for healthcare - citizens pay taxes to the government, which offers a budget for care providers, who provide care to the citizens. In other words, citizens do not pay directly for their healthcare but indirectly via taxes to the government. In this model, funding of the care provider is not linked to the number of care services offered. Instead, a fixed yearly budget is set. A problem in this model is that care providers do not have any incentives to satisfy citizen demands for healthcare as their funding is not dependent on actual services provided. Furthermore, citizens may be inclined to overuse healthcare services, as they do not need to pay any fee for them.

Such concerns are addressed in the value model of Figure 3, where care providers are reimbursed by the government only for services they have actually carried out. This reimbursement is realised through vouchers issued by the government to citizens, who can use these for acquiring care (in the form of examinations or treatments) from care providers. These can in turn exchange the vouchers for money from the government. Furthermore, the model includes a fee that is paid by the citizens directly to the care providers in order to discourage overuse of care services. It should be noted that this model is oversimplified in the sense that it does not specify why and how a citizen receives vouchers for care; typically a citizen gets unconditional access to primary care, which acts as a gatekeeper to specialist care through issuing referrals, which is a kind of voucher.

Advantages of value modelling in healthcare

Value models offer a number of advantages over other types of enterprise models when it comes to understanding the context of a healthcare organisation. They provide a compact view of the environment of an organisation by focusing on its value aspects and disregarding procedural ones. Value models can therefore be easily understood by healthcare professionals, providing an effective instrument for communication and shared understanding. Furthermore, they are expressed in notions that are directly relevant for healthcare professionals, thereby making them more accessible for domain experts and top management.

Though value models bring many benefits to representing and understanding healthcare systems, they often have a somewhat restricted scope due to their origin in commercial and business applications. In particular, value models typically focus on economic resources, i.e. resources that can be traded between actors, such as goods and services. In a healthcare scenario, this would mean that a value model could include resources like medicine, examinations, treatments, and other services. However, a value model restricted to economic resources is only able to provide a partial picture of the values offered in a healthcare network.

The role of 'soft' values in the model

For healthcare networks, it is also important to include softer values such as knowledge and experiences internal to an actor, or relationships shared between two or more actors. A value model for a healthcare scenario should, therefore, be able also to include resources like feeling of safety, trust between care takers and care givers, and knowledge about health conditions. Being able to capture these kinds of softer values illustrates one of the main challenges of modelling in healthcare, the fact that we need to represent vague and fuzzy concepts and situations. This is reflected also in other kinds of enterprise models, e.g. process models that in healthcare cannot be as rigid and procedural as is common for industrial applications. In figure 3, we have included (within parentheses) a number of softer values that are acquired as a result of receiving and using resources. For example, a citizen receiving an examination service will thereby acquire an increased feeling of safety as well as an increased knowledge of her health state.

To conclude, value models offer several benefits compared to other enterprise models. They enable healthcare stakeholders to easily get an overview of their complex systems. They can be used to describe the rationale of a network and analyse its sustainability. They can support the analysis and design of different types of network architectures. Finally, value models can be used as a starting point for identifying business processes and services needed for realising the interactions of a healthcare network. We envisage that value modelling will become an even more important instrument in the future, as citizens are no longer only passive consumers but active co-producers of value in a healthcare network. In such networks, a flexible cooperation between multiple healthcare providers and other stakeholders is needed in order to provide tailored solutions for each individual citizen. The role of healthcare organizations will be to continuously reconfigure networks of healthcare providers, citizens, and other stakeholders.

In a follow-up article in the next issue of Healthcare IT Management, we will show how value models can be used as a starting point for designing healthcare services, in particular e-services, that take into account the needs and wants of citizens as well as the goals and constraints of healthcare providers.

SHOULD WE BUY AN ONCOLOGY MANAGEMENT SYSTEM?

A mini HIS for oncology

AUTHORS
Andrew Hoole,
Addenbrooke's Hospital, Cambridge University, UK.
Edwin Claridge,
University Hospital, Birmingham, UK.

The selection and integration of appropriate information systems is one of the challenges facing hospital managers in their quest to achieve organisations offering a high level of clinical care, coupled with efficiency, and good financial and clinical governance.
The issues become particularly difficult when 'top down' systems, such as EHR, HIS and PACS come into contention with established departmental systems. This article considers Oncology Management Systems (OMS), where issues of integration between departmental systems and corporate systems currently engender debate.

OMS offerings have developed from the real-time computer systems used in radiotherapy (RT) departments, mainly with linear accelerators, to control treatment delivery. Complex daily treatment fractionation is tracked through Record and Verify (R&V) modules that maintain a complete record of each radiation beam's contribution to the overall dose.

OMS components

R&V modules and the machine verification aspects are specialist and unique RT features, now incorporated into OMS systems. These encompass other modules covering medical history, to record tumour diagnosis and staging, scheduling, not only for patient preparation and therapy attendances, but also for activities in treatment preparation that do not involve patient attendance.

Additionally, with modules for the organisation and delivery of Chemotherapy (Chemo) regimes and RT protocols, concurrent treatments can be tracked. Clearly this OMS functionality now overlaps with some features found in 'top-down' Hospital Information Systems (HIS).

OMS structural options

OMS suppliers serve the international market and can offer independent systems or can create hybrid systems by linking OMS with DICOM to related RT systems and to PACS, and with HL7 to HIS systems dealing with demographics and more.

One can also envisage systems in which almost all oncology records are maintained on the main HIS system. The departmental system would then receive treatment machines requests for work-lists and treatment parameters from the HIS and in turn submit treatment delivery records back to the HIS.

The growing maturity of the RT extensions to the DICOM standards and their adoption across the community makes moves towards this model potentially possible although the many unresolved integration issues suggest that the hybrid system model is the pragmatic choice for now. Whatever model is adopted, within the sphere of oncology the appropriate use of OMS technology can considerably aid the process of achieving the necessary clinical, efficiency, financial and governance objectives.

Benefits to RT processes

Patient pathways through oncology are complex, involving input from various professionals. Developments within OMS introduce the possibility of actively tracking 'back-office' tasks such as tumour delineation on planning images and the subsequent RT planning processes.

Careful mapping of preparation processes and available staff skills makes it possible to devise ways in which the scheduling capabilities of an OMS can be used to more clearly define and allocate the associated tasks within the processes. This precise definition and allocation of tasks can also improve the sense of ownership, accountability and control that staff feels. Such techniques also enable the audit of pathways. This kind of audit highlights areas of resource bottlenecks, enabling managers at all levels to address such issues by training or physical resource provision. The need to meet stringent waiting time targets requires the overall process to be intelligently controlled.

Over the past decade or so the technology behind RT and chemo has increased in complexity. The ability to safely utilize new technologies has been due largely to the parallel development of OMS, handling information on patient configurations, image guided RT, or the complex regimes associated with chemo.
As treatment complexity increases, it is important that treat-

ment management does not become fragmented across too many information systems. This would increase the difficulty of maintaining an overall picture of a patient's treatment. Potential conflicts arise in that context, such as whether it is best to have a chemo prescribing system that serves clinics distant from a cancer centre and is part of an OMS, or whether it is better to prescribe chemo from individual hospital pharmacy systems?

Other advantages

Integration:
To achieve good integration, OMS providers should be encouraged to provide solutions that both embrace the newly developing technologies and that integrate with HIS and other corporate systems. This is most likely to be achieved by ensuring that systems support developing standards, for example, HL7 for general message passing, and the maturing RT components of the DICOM standard, for PACS integration, both encouraged by the Integrating the Healthcare Enterprise (IHE) initiatives for exchanging data between systems using agreed definitions.

Time and space management:
Oncology management falls at the complex end of the spectrum of hospital activities. Work is largely out-patient oriented and both RT and chemo are likely to involve many treatment sessions. The scheduling is complex because slots in treatment bays and rooms are used so intensively. The treatment pathways are many; their modification as treatments regimes and protocols progress is quite common.

When using an OMS database a distinction between activities concerned with the provision of patient treatment and those intended to provide management statistics needs to be appreciated. For costing/billing and process/revenue allocation managers must choose between collecting large volumes of daily data from incomplete prescriptions, or lower volumes of summary data, which has been through more quality screening and deals with finished prescriptions. For monitoring the use of treatment rooms, the various waiting times and the techniques in use, the OMS is also a rich resource.

Dissemination of information:
A challenge for the oncology community is to make local data appropriately available across a broader spectrum in a manner that is not open to misinterpretation; uses could include audit and resource planning.

Unfortunately the terminology used in oncology and OMS is not standardised and comparisons between centres are therefore difficult. The wide availability of PACS systems, themselves based on the DICOM standard and in some countries becoming integrated across the nation, make them a potential platform for achieving this wider dissemination of information. The operational differences between radiology and oncology departments make it difficult to envisage a real-time integration with OMS, but the retrospective uploading of a completed RT episode summary DICOM data object into PACS is a potential way in which this data may be "protected" for the benefit of the patient across a broader geographical spectrum.

Data security:
Data protection is often viewed as ensuring that data does not fall into the wrong hands. Another important aspect is to ensure that the data held remains available for continued use, in the context of both current and future treatments. The centralized storage of data in local OMS facilitates this process. Note that statutory Oncology data storage periods are usually greater than many OMS software life cycles, implying that evolutionary planning must include archive data.

Conclusion

In conclusion an OMS is now a critical component in the day-to-day operation of Oncology facilities and a potentially rich data resource for management to meet larger goals. Currently the level of integration, for example for the assimilation of OMS elements beyond R&V into HIS and/or PACS, is not completely developed. The standards for the definitions required for national and international data exchange have also not yet been agreed. It is necessary to consider these issues when purchasing an OMS solution and essential to engage in an active debate about future relationships between OMS, HIS and PACS.

Imaging Technologies and HIS Convergence

HEALTHCARE IT MANAGEMENT
ANALYSIS

As observed in this article, Oncology Management System (OMS) suppliers offer both independent systems as well as hybrids linking OMS with DICOM and to related RT systems and PACS, and with HL7 to HIS systems dealing with demographics and more.

Some of the most dramatic technology advancements in recent years have indeed concerned imaging systems, from acquisition and display to storage, retrieval and transmission. Imaging technologies, in turn, are acting as the fundamental push-side drivers to convergent hospital information systems. Digital images from cardiology, pathology, radiology, or for that matter oncology and other specialties, are being linked to each other's databases, and accessed seamlessly. This has begun improving workflow, cut costs and enhanced patient safety, the Holy Grail for any healthcare IT manager.

A key challenge facing imaging data integration with HIS systems was messaging standards between DICOM and Health Level-7 (HL7). This has been addressed by so-called 'brokers' – which accept HL7 messages from the RIS and then translate them to produce DICOM messages which are then transmitted to the PACS. Further developments in RIS/PACS to HIS connectivity are being addressed at Integrating the Health Care Enterprise (IHE) initiative, which has been covered in the previous issue of Healthcare IT Management.

RUNNING TO CATCH UP, RACING TO LEAD

THE AMERICAN RECOVERY AND REINVESTMENT ACT AND HEALTHCARE IT

AUTHOR
Tosh Sheshabalaya,
HIT

In spite of its acknowledged status as the hub of innovation and technology, the US has lagged many other industrialised countries in the area of healthcare IT. The new US President, Barack Obama, has made it a political priority to change this state of affairs, as we discussed in the previous issue of Healthcare IT Management ('Obama's Healthcare IT Vision).
Obama's new administration, supported by a clear majority in the US Congress, have endorsed his vision with an ambitious program to spend billions of dollars in galvanizing the American healthcare IT. This is seen as nothing less than a way to inject new life and kick-start the flagging US economy.
Meanwhile, the new interventionist nature of the US government is not only highlighted by the 20 billion dollar spend earmarked for healthcare IT, but by the leadership role it intends to take in setting new technology standards. As we have long argued, this is bound to have major implications for Europe.

Very low stage': EHRs in the US

Fewer than one in ten US hospitals (9%) have electronic health records (EHRs), according to a major survey published by the 'New England Journal of Medicine' on March 25. Moreover, only 1.5% of hospitals have adopted a comprehensive, hospital-wide system. The US position in EHRs, as a result, is at "a very low stage compared to other countries," said the survey's author, Harvard Professor David Blumenthal. Prof. Blumenthal was recently named National Coordinator for Health Information Technology (a new position created by the previous Bush Administration which some label as a 'healthcare IT czar').

Addressing the cost barrier, generously

The biggest barrier to EHR adoption is cost, a reason cited by three out of four hospitals. As a result, it is almost certain that the US healthcare system will eagerly embrace the funds in the economic-stimulus package passed by the US Congress and signed into law by President Obama on February 17.
The sums involved in what is called the American Recovery and Reinvestment Act (ARRA) are not insignificant. About 20 billion dollars in federal outlays are earmarked for healthcare IT, according to non-partisan Congressional Budget Office (CBO). In return, the CBO estimates that ARRA will reduce federal health spending by over 12 billion dollars in the next 10 years, with additional savings rippling throughout the health sector as a result of improvements in the quality of health care as well as reductions in medical errors and inefficiencies.

The role of healthcare IT – from economic growth to jobs

The movers behind the Obama healthcare reforms do not mince words. Nor are they coy about their underlying vision. Affordable and quality health care is seen as the key to strong American economic growth, and healthcare IT is seen as the means to the former – cost-effective and high quality health services. House Speaker Nancy Pelosi strongly endorses these links on her own Website. For her, ARRA "invests in bringing our health care system into the 21st century with information technology – that is proven to reduce costs, increase quality, and save lives." Modernizing the health care system, she continues "will create hundreds of thousands of jobs."

ARRA: Healthcare IT technology, finances and standards

The healthcare IT elements of ARRA are analysed below:

Healthcare IT seen to reduce medical errors
19 billion dollars is explicitly dedicated to accelerate the adoption of Health Information Technology (HIT) systems by hospitals and physicians, in order to modernize the health care system, save billions of dollars, as well as reduce medical errors.

Financial incentives for hospitals and doctors to adopt EHRs
As part of moves to accelerate healthcare IT take-up, both hospitals and physicians are to be provided with significant financial incentives through the Medicare and Medicaid welfare programs to adopt and use electronic health records. The Congressional Budget Office estimates that, due to ARRA, 90 percent of doctors and 70 percent of hospitals are likely to be using electronic health records within the next 10 years.

Decision-makers are being clearly urged to immediately procure and implement healthcare IT systems and structures to obtain short-term personal gains and feed these into long-term benefits for the wider healthcare system.

A matrix of incentives to reward early adopters and penalise those delaying implementation until 2015 has been established. Medicare incentive payments will have a ceiling of up to 15,000 dollars for the first payment year, with a progressive scaling thereafter. Early adopters would benefit up to 18,000 dollars, while those not doing so before 2015 will be ineligible for sub-

sidies. Indeed, physicians who fail to adopt a certified HIT system will face a progressive reduction in their Medicare fee schedules after 2015.

Incentives under the Medicaid program are also available for physicians and hospitals, although physicians cannot take benefit from incentive payments under both Medicare and Medicaid programs. Here again the numbers are impressive. Physicians practising outside a hospital setting (and a minimum 30% Medicaid patients) can receive up to 63,750 dollars in benefits over a six-year period. ·

HIT standards – led by US government, target date 2010
ARRA directs the federal government to take a leadership role in developing healthcare IT standards, and do this by 2010. These standards will in turn catalyse EHRs by permitting the nationwide electronic exchange and use of health information. Towards this, new HIT Policy and Standards Committees, consisting of both public and private stakeholders, are due to provide recommendations on healthcare IT standards and certification, implementation specifications, as well as criteria for electronic exchange and use of health information. The Department of Health and Human Services is due to adopt an initial set of standards, implementation specifications, and certification criteria by December 31, 2009.

Security and privacy

The healthcare IT standards are to be developed within a framework of enhanced security and privacy. ARRA seeks to strengthen federal laws to protect personal/identifiable health information from misuse and abuse as the health care sector increases the use of HIT.

This is one area with considerable potential for trouble. As one critic dubbed it, "Obama seems willing to take on drug companies, physicians and lobbyists, but lawyers are quite another thing."

The Obama reforms classify "inadvertent" disclosures to also be a breach of patient health information and requires notification to patients in all cases. Such notification is also required to made by vendors of personal health records.

Given the still-emerging technical landscape of EHRs (and data exchange), this is clearly an area of potential concern for vendors, given the litigious nature of the US system. Indeed, the new rules specify that existing HIPAA privacy and security laws will also apply directly to business associates of covered entities and authorizes increased civil monetary penalties for HIPAA violations.

The role of ONCHIT

ARRAS officially establishes the Office of the National Coordinator for Health Information Technology (ONCHIT), as an entity within the Department of Health. Its mandate will be to develop a nationwide interoperable HIT infrastructure. ONCHIT is headed by Harvard Professor David Blumenthal, who as we have seen previously was the author of a survey finding the US lagging in the area of electronic health records. ONCHIT is authorised supply HIT systems to providers for a nominal fee, alongside competitive grants to States for loans to providers.

Comparative Effectiveness Research

The Obama reforms also actively acknowledge the ever-'ongoing' nature of healthcare information technology – as a work in progress. Like evidence-based medicine, the criterion of comparative effectiveness is applied to make technologies supporting healthcare consistent with the settings in which care is delivered. Funding for comparative effectiveness research (CER) has been boosted, alongside establishment of a Federal Coordinating Council (FCC-CER), a 15-strong advisory board with at least eight physicians or clinical healthcare professionals. The Agency for Healthcare Research and Quality (AHRQ) will receive 700 million dollars for CER, of which 400 million dollars will be earmarked for the National Institutes of Health. The Secretary of Health has another 400 million dollars as a discretionary spending item.

The Czar of Healthcare IT

The Office of the National Coordinator for Health Information Technology (ONCHIT) has clearly become an elemental one in the field of healthcare IT.

Given the longstanding tradition of turf battles in Washington, however, the question of how effective ONCHIT is will depend on the personality of its incumbent, and his equations with other power brokers, including the Secretary of Health and Human Services, as well as the heads of the National eHealth Collaborative (which makes health IT recommendations to ONCHIT), the Nationwide Health Information Network (billed as the 'network of networks') and the Certification Commission for Healthcare Information Technology (the public-private entity created to set standards for data transmission). Also involved in the field are the Federal Coordinating Council for Comparative Effectiveness Research (FCC-CER and the Agency for Healthcare Research and Quality (AHRQ).

The new US President has clearly been savvy in appointing a high-profile personality like Dr. David Blumenthal to this role. Holder of a professorial chair at Harvard Medical School (alongside being the Director of the Institute for Health Policy at Massachusetts General Hospital), Dr. Blumenthal was previously senior vice president at Boston's Brigham and Women's Hospital and executive director of the Center for Health Policy and Management at Harvard's John F. Kennedy School of Government. During the late 1970s, he was an adviser to Senator Edward Kennedy's Senate Subcommittee on Health and Scientific Research. Dr. Blumenthal is the founding chairman of AcademyHealth, the national organization of health services researchers and a trustee of the University of Pennsylvania Health System.

e-HEALTH INVESTMENT

HIGH POTENTIAL OPPORTUNITY AND MANAGERIAL CHALLENGE

AUTHOR
Alexander Dobrev,
empirica
Tom Jones,
TanJent Consulting
Karl A. Stroetmann,
empirica

The increase in demand for health services tends more and more often to outstrip the increase in supply. Ageing populations, increasing incidence of chronic diseases, and improvements in medical knowledge and technological equipment are the main demand drivers across the EU. The financial and real resources available for meeting this increase in demand are limited. As a result of this worsening mismatch, the generic investment challenge is to improve the performance and capacity of the supply side in order to meet some of the growth in demand.

The European e-Health IMPACT (2006, www.e-Health-impact.eu) and EHR IMPACT studies (2008, www.ehr-impact.eu) showed that effective e-Health solutions can substantially contribute to improvements in quality, access and efficiency of healthcare, thus increasing the capacity of the supply side.

How to invest in e-Health?

The recently completed Financing e-Health Study (2008, www.financing-e-Health.eu) provided a generic guide for potential e-Health investors to support them in the decision making process. The guide, addressing decision makers and managers, sheds light on, and draws the connection to, the overall decision taking and change management processes that are part of e-Health investment.

The main lesson regarding the models to adopt is to integrate the e-Health investment decisions into the healthcare strategy of the organisation. e-Health can deliver, but it has to become part of the general resource mix considered in addressing healthcare needs. Then, e-Health investments are considered alongside more conventional investments and the ones with the best value for money can be selected. The financing model for the investment should only be considered after the economic analysis is being performed. The approach is illustrated in the figure below. Too often, investments are driven by affordability considerations and not by a comparison between investment and the economic value of its impact.

The process of economic and financing decisions

Common difficulties in e-Health investments reflect the differences between e-Health and conventional ICT investment. e-Health focuses on changes in the way healthcare is delivered, which is a demanding endeavour. In e-Health investment, ICT serves only as an enabler, not as an end. In this context, the main obstacles to success include

- unrealistic timescales,
- underestimated risks,
- inherent procurement difficulties, and
- a common misperception of the nature of most valuable benefits from e-Health.

Timescales for e-Health

Project management for some e-Health projects focuses mainly on deploying and managing the resources during the design, development and implementation stages, and possibly the initial stages of operation. This timescale can be too short for sustainable e-Health investment, as shown in the chart below. It may fit an ICT project, but seldom provides the time required for the activities needed to realise net benefits: typically, about four years on average and at least eight years for EHRs. The appropriate timescales extend well beyond the business and financial planning of most healthcare provider organisations and can present financing challenges for e-Health.

Instead, the e-Health investment lifecycle should be set by the time needed to realise the required net benefit, the ultimate objective. This will enable the management and productive utilisation of all the reallocated resources, as part of change lifecycle.

Risks

Like all investments, as complexity and scale increase, so do the scope, probabilities and costs of risk. Plans for e-Health investment seldom evaluate the potential of risk realistically. The result is no recognition of risks as costs, no mitigation and no respective financial provision. This in turn leads to understated costs and overstated benefits, which is not a good foundation for e-Health investment.

For example, engagement with users and other stakeholders is a high risk activity. Where it is not successful, the effect can inhibit e-Health activities for many years. Where it is successful, e-Health investors tend to apologise for the extended timescales, understating the significant reduction in risk by pursuing effective collaboration and engagement, especially with healthcare professionals.

Procurement

Another concern is that there is still a mismatch between supply and demand for e-Health systems and tools. Experts con-

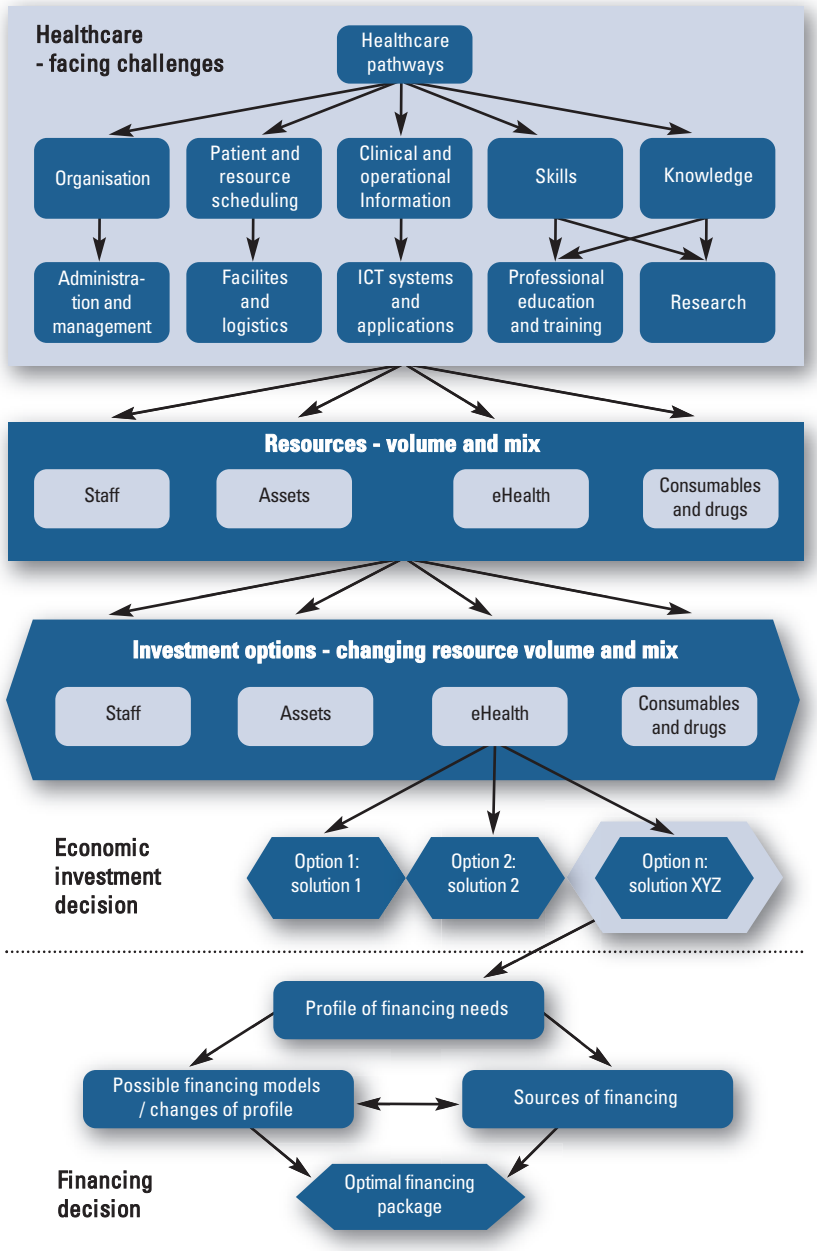
sulted in the Financing e-Health Study reported of repeated occasions in which ICT suppliers were not in the position to supply the solutions needed for benefit realisation, leaving investors with the task to develop rather than procure. At the same time, requirements are not always set effectively by procurers, making the lives of ICT vendors more difficult.

The value of non-financial benefits from e-Health

The challenge is to ensure that the total investment matches an appropriate total economic benefit. It is important to treat e-Health investment in the same way as other new investments in healthcare, such as new drugs and surgical techniques. It should not be a means of saving money and improving overall cash flow, but an investment in better healthcare.

Large proportions of economic benefits from e-Health are from quality, including patient safety, and time improvements. e-Health is usually a net investment, with a negative financial return, so financial benefits must be realistic in their value and their timing. Sustainable e-Health investment requires that all decision takers and financial stakeholders are clear about the distinction between economic benefits and financial savings.

The task is to identify, define and describe all the benefits needed from better information for each strategic initiative. There are several examples, such as inform patients better, improve patient safety, improve timeliness, streamline healthcare, improve clinical effectiveness by sharing patient information with other healthcare professionals that form the multidisciplinary team providing patient care, and modernise healthcare: all quality goals. Some citizens, such as those in remote locations, may need improved access to hospital and other specialist health services. Improving efficiency by saving time and cutting waste may be a priority.



Source: © TanJent/empirica 2006

The impact of e-Health on hospital management

The critical requirement for leaders, executives and e-Health stakeholders is to be able to deal with e-Health investment as an integrated part of all healthcare investment. Finance executives and managers have a more specific role. First, they need to understand the value and impact of e-Health, so they can extend and develop financial planning to deal with e-Health investment timescales. Second, they need to extend their financial management skills to be able to develop ways to invest in better value.

This expands the principle of organisational change from healthcare professionals who use the e-Health investment directly, to the whole organisation. It is just as uncomfortable for executives as it is for healthcare professionals. As healthcare professionals use new information to improve quality, access and efficiency, executives are confronted with new clinical, working, and information exchange practices: they have a different organisation to run.

Conclusion

e-Health is slowly becoming a must have in modern healthcare. Expectations and resource constraints call for a high potential response, and e-Health seems to be part of it. This seems to be common wisdom, but begs the question why e-Health investments are not always successful in proving their potential. The answer is to some extent conveyed in this article, which is based on extensive research for the European Commission in the Financing e-Health Study. More needs to be invested in acquiring appropriate knowledge and experience with e-Health in order to master the managerial challenges associated with realising its potential.

PAPT
– PATIENT ADMISSIONS PREDICTION TOOL

AUTHOR
Justin Boyle,
is a Research Scientist
with CSIRO Australia

Evidence-based research demonstrates that overcrowding in emergency departments causes ambulance diversion, increased hospital lengths of stay, medical errors, increased patient mortality, financial losses to hospital and physician, and medical negligence claims.
Many hospitals still do not anticipate and prepare for the next day's volume and admission through the emergency department. And yet, contrary to the conventional wisdom that emergency patient volume is highly unpredictable, the number of admissions per day can be predicted with remarkable accuracy.
Forecasting presentations and admissions is a relatively easy solution. When implemented, it can protect everyone's access to emergency care.

In April 2008, the American College of Emergency Physicians (ACEP) published a report identifying solutions to the practice of 'boarding', or holding, patients admitted to the hospital in the emergency department, which is the primary cause of overcrowding. A boarded patient was defined as a patient who remains in the emergency department after the decision to admit him or her to the hospital has been made. Most emergency departments in the world are critically overcrowded and unable to respond to day-to-day emergencies, and the proposed solutions address the growing global crisis that is harming public access to lifesaving emergency care.

Solutions with the highest impact in reducing boarding and improving the flow of patients through emergency departments are:
- move emergency patients who have been admitted to the hospital out of the emergency department to inpatient areas, such as hallways, conference rooms;
- coordinate the discharge of hospital patients before noon;
- coordinate the scheduling of elective patients and surgical patients.

Research Study: A Clinically Usable Software Package

The main aim of our study was to develop and validate a clinically usable software package that accurately predicts the number of admissions sourced from emergency department cases on any given day of the year, taking into account peak periods such as public holidays. The primary outcome measure was the accuracy of forecasts when validated against historical data from two differing hospitals. The resultant Patient Admissions Prediction Tool can assist with the allocation of inpatient beds to alleviate overcrowding.

The modelled data consisted of five years of ED presentations and admissions (1/7/02 – 30/6/07) from two hospitals chosen for their different demographic characteristics. Hospital A is a 280-bed regional facility, located 120km away from a major tertiary referral centre and services an area of approximately 410,000 km2 with a resident population of about 280,000. Hospital B is a 750-bed busy urban facility and services a rather itinerant population of around 500,000. It is host to several annual events that

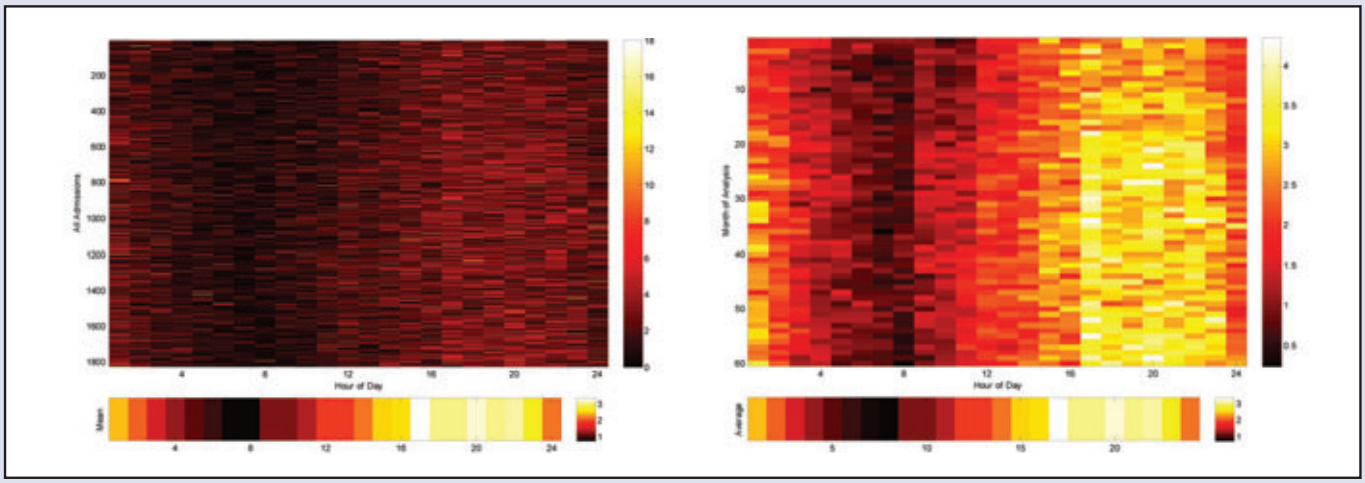


Figure 1. Peak admission times for patients leaving the ED; Left: Admissions across every day in study period; Right: Monthly averages across study period.

attract large amounts of tourists. Despite their differences, presentations numbers for both hospitals across the five years were similar (218,000 – regional Hospital A, 278,000 – urban Hospital B). The urban hospital has a higher rate of admissions (33%) than the regional hospital (20%).

Many useful characteristics which can help shape health management practices have been identified from the data. For example, the date and time when admitted patients leave the ED, indicating the times of highest demand on hospital beds; patient arrival time in the ED, which represents a staffing impact with workload; and the days of the week which represent higher ED workloads and hospital bed demand. The data also enables the analysis of 'frequent-flyers' – those patients who presented multiple times during the analysis period.

From the analysis of this data, we have been generating forecast estimates and associated confidence intervals based on several forecasting approaches and validating the forecasts against actual data. The project also included packaging the most accurate technique into a standalone software application.

Data Analysis

The data includes date and time of admissions which provides useful information on peak admission times experienced within the EDs. Figure 1 indicates the times of highest demand on hospital beds (admitted patients leaving the ED), indicated by a brighter colour. The vertical columns of the plots indicate the hour of day, and admission numbers are indicated by the colour bar. It is apparent that the highest demand for hospital beds occurs in the afternoon and into the evening. Every row on the left-hand plot represents a day from 1/7/02 – 30/6/07, while the rows on the right-hand plot indicate monthly averages throughout the study period. Similar assessment has been done for discharge times of all presentations (not just those admitted) and also for arrival times within the ED. The skew of the data to the end of the day is apparent.

Another point of interest is the time of arrival in the ED, as this represents a staffing impact with workload. Figure 2 shows the ED discharge time for the admissions that are shown in Figure 1. This discharge time refers to the time patients leave the ED and require a bed, as opposed to discharges leaving hospital. It also indicates the arrival time for this group, which peaks around 11:00hrs. However, admitted patients make up only a small subset of all the patients seen in the ED, and the two curves in the upper portion of the plot represent all presentations. We can see that the mean peak discharge time lags behind the peak arrival time by around 8 hours and again see the skew of the data to the end of the day.

The hourly fluctuations of the data has also been studied using box-plots as shown in Figure 3, which show, for example, the quietest time (8am) and the busiest time (5pm) for admissions. Median, upper and lower quartiles and outliers are represented in the plots.

It is also of interest to determine the days of the week that represent higher ED workloads and hospital bed demands. For example, Figure 4 shows the mean and 95% Confidence Interval band for the daily and monthly trends in the arrival time of all presentations (Left) and for admitted patients (Right) at the urban hospital. The busiest days for presentations are over the weekend and Mondays. Considering the arrival time for just those patients that are admitted, it can be seen that Mondays and Tuesdays are the busiest days. There has also been an overall increase (approximately 40%) in the number of patients presenting over the five years. Interestingly the trend over all the months-of-analysis for admitted patients shows a plateau effect, which could be attributed to bed capacity being reached, or the adoption of hospital avoidance strategies.

Results

Presentations to the ED and subsequent admissions to hospital beds are not random and can be predicted. Forecast accuracy worsened as the forecast time intervals became smaller: when forecasting monthly admissions, the best MAPE was approximately 2%, whilst for daily admissions this was 11%, for four-hourly admissions: 41%, and for hourly admissions: 51%. Presentations were more easily forecast than admissions (daily MAPE ~7%). Subgroups within the data with more than 10 admissions or presentations per day had forecast errors statistically similar to the entire dataset.

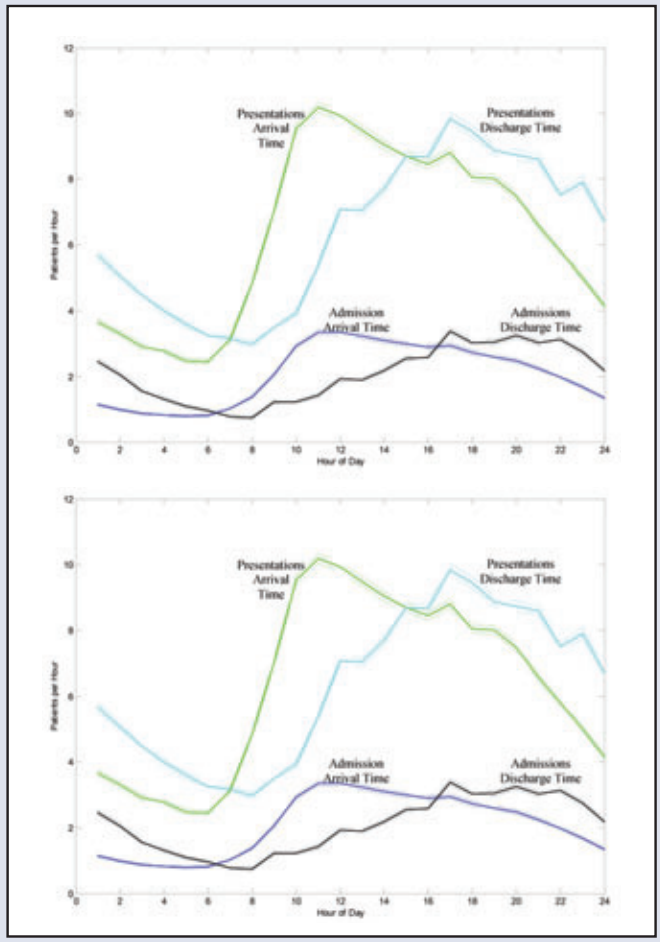


Figure 2. Patient Arrival/Discharge in the ED

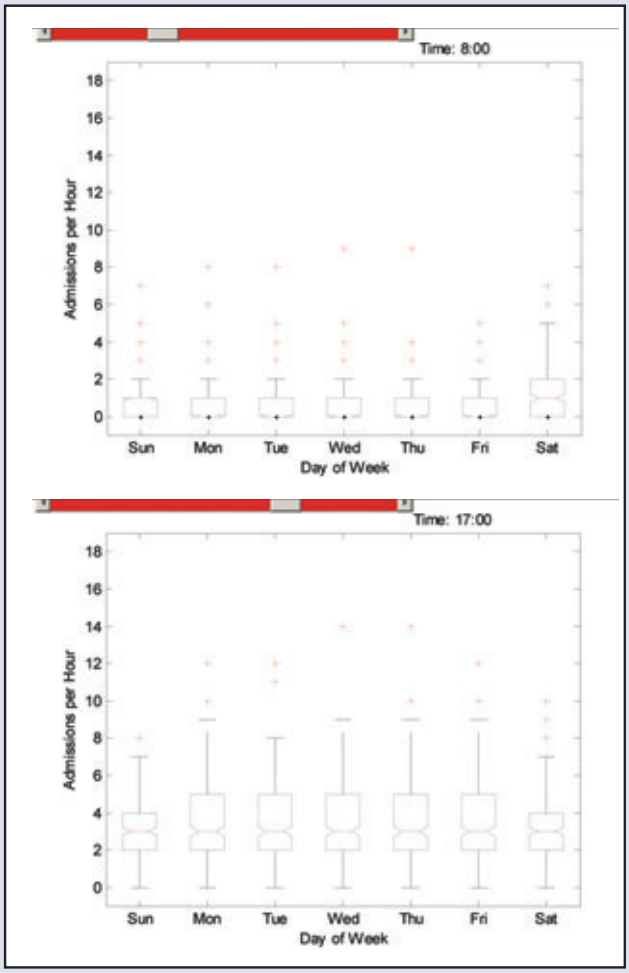


Figure 3. Box-plots of hourly admissions;
Top: 08:00hrs, Bottom: 17:00hrs

The best method for forecasting data used in our study was averaging (smoothing) using a four-year training period, and potential exists for the model to be implemented in other facilities. Sensitivity analysis showed that smoothing techniques worked best with as much historical data as possible, but regression was best with the most recent data.

When compared to existing prediction models at one of the hospitals, the new techniques shave Mean Absolute Percentage Error of daily admission predictions from 20% to 11%. Based on a mean admission rate of 50 admissions per day, this improvement in forecasting performance corresponds to ±5 beds. When a new ED wing opened in the catchment area, the error from existing predictions worsened to 30%, whilst error from the new models was 11.8%. This improvement in forecasting performance corresponds to ±9 beds.

The admissions and presentations predictive modelling has been implemented as a standalone software application. The program has been designed to run in an unsupervised manner, where forecasts for admissions and presentations are refreshed every hour. It is also possible to run the program once or repeatedly for a specific date. Initially this choice is determined from the welcome screen, along with the confidence limits to adopt for prediction intervals. The project has also resulted in the development of a User Experience Base via detailed consultation with ED and bed management planning staff to identify user expectations and functional requirements for a prediction tool.

Conclusion

As a result of this study, it can be concluded that accurate forecasting tools are important aids to many areas of hospital management, including elective surgery scheduling, bed management, and staff resourcing. We have produced a tool that can predict ED admissions and thus allow appropriate allocation of in-patient beds and operating theatres. With regular feed of site specific retrospective data, this tool should have considerable utility for acute facility bed management and health service planning.

The project team have identified an extension of this project to formally evaluate the impact of the prediction tool in these areas. Such evaluation is essential to quantify the potential benefits of the model such as reduced ambulance bypass occurrences and elective surgery cancellations. Future research into this aspect has recently commenced.

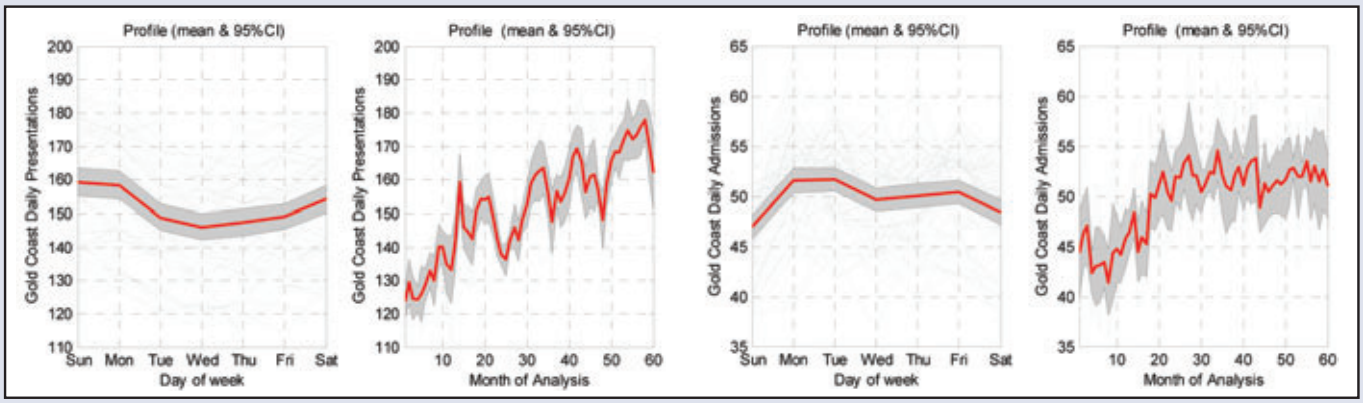


Figure 4. Daily and Monthly Trends in Presentations (Left) and Admissions (Right) at the urban hospital emergency department: July 2002 – June 2007

NANOTECHNOLOGIES AND HEALTHCARE

AUTHOR
Paul J.A. Borm, is with Magnamedics Diagnostics BV at Geleen and Centre of Expertise in Life Sciences, Zuyd University, Heerlen, Netherlands

Recent years have witnessed unprecedented growth of research and applications in the area of Nanoscience and Nanotechnology. There is increasing optimism that nanotechnology, as applied to medicine, will bring significant advances in the diagnosis and treatment of disease. Anticipated applications in medicine include drug delivery, diagnostics, cell therapy and production of biocompatible materials. Examples and visions make up of front pages of scientific top journals. But when will we be able to master its potential and the risks involved, so that the patient can start to profit?

Nanotechnology concentrates on the manipulation and fabrication of materials in a bottom-up approach. Using principles often mimicking the processes of nature, we are gradually becoming capable of building highly organised molecules, that have very specific properties. The fascinating side of nanotechnology is that it integrates physics, biology and chemistry and needs open minds by researchers and technology developers in this field. Using the principle of DNA copying in a cell to develop quick calculations is not a straightforward application, but is proving to be very efficient for IT.

Since nanotechnology involves bottom-up fabrication, hopes are also there that sustainable and clean production processes can finally be developed without producing waste.

Market expectations

Analysts estimate that the European market for nano-based products is currently around €2.5 billion but could rise to hundreds of billions of Euros by 2015 and one trillion in a few years thereafter. Lux Research reports that corporations spent 3.8 billion dollars globally on nanotechnology research and development in 2004. Approximately 900 million dollars in venture capital has gone to nanotechnology companies since 1999, with 386 million dollars invested in 2003. Furthermore, Lux predicts that by 2014, nanotechnology will be associated with 15 % of all manufactured goods, roughly worth 2.6 trillion dollars. Products incorporating emerging nanotechnologies would constitute 920 billion dollars in value added, accounting for 2% of global gross domestic product. Manufacturing, incorporating nanotechnology, will be responsible for 10 million jobs worldwide, comprising 11% of total manufacturing jobs.

However there is also considerable debate about nanotechnology, as is (and should be) the case occur for every new technology. The complicating fact is that nanotechnology is not a single technology such as biotech, or silencing RNA. Nanotechnology is a foundational technology which in turn enables developments in many sectors and industries. When are we to expect effects or breakthroughs on Health Care?

Nanotechnology and healthcare: opportunities

Personalized medicine is key to all perspectives about the future of health care and many developments in science and industry are seeking to make this happen. The vision here is that a personal diagnosis can be complemented with a personalised treatment using customised minimal invasive surgery or medication

Healthcare IT and nanotechnology

HEALTHCARE IT MANAGEMENT
ANALYSIS

Given the huge volumes of data that will be generated by nanomedicine, and require real-time capture, access, management and interpretation, it is inevitable that healthcare IT will be closely involved in the making of such a vision real.

In healthcare IT, the first significant impact of nanotechnology is likely to be in the area of medical diagnostics and Laboratory Information Management Systems.

Diagnosis is today still a lengthy and complicated business, with tests having to be scheduled and conducted, and samples then having to be sent for analysis, after which results can take days or even weeks to reach. Nanotechnology is accelerating the entire process, and enabling more precise diagnosis, via what has come to be known as a 'lab-on-a-chip' – a small, handheld device which not only requires tiny sample but permits near-immediate processing and analysis.

Nano-sized probes and biosensors will continue to enhance the speed of in vitro diagnostic testing. Nanoparticle formulations of iron oxides and specialty polymers will, on their part, broaden in vivo imaging capabilities by enabling the far-earlier detection of genetic anomalies, tumours and a whole spectrum of disease states, using lower and more effective doses of diagnostic compounds.

targeted and tailored to the specific needs of a particular patient. This vision will clearly have a considerably impact on the development of health care, its costs and on insurance models.

"Nanotechnology is a foundational technology which in turn enables developments in many sectors and industries. When are we to expect effects or breakthroughs on Health Care?"

Nanomedicine is the term that is being used to describe the field that is generated by interaction of nanotechnologies and a vast range of medical and diagnostic fields (see Table 1).

Regenerative medicine

Regenerative medicine involves smart biomaterials on the one hand, and on the other nanotechnology enabling cell-based therapies and tissue growth. The imminent growth of this field is explained by the need for "repair and enhancement" of cells and tissue in a rapidly aging population. With the emergence of stem cell therapy a decade ago, this field is expected to grow into a more mature phase where rapid and customized production is likely to be commonplace within a decade from now.

Biosensors

Biosensors is another field that is rapidly changing due to inputs from nanotechnology sensors and has relevance for several other major areas such as in vivo and in vitro diagnostics. At the moment nanotechnology has an enormous effect on the speed and specificity of determinations of biomarkers in body fluids.

Although initial progress has been made in the genomics area using PCR and microarray-technology, it is expected that in the years to come, the analysis of proteins (proteomics) will receive an enormous boost. Proteomics and genomics will then be equal and complimentary tools to detect the risk for and status of biological adverse effects, which lead to diseases.

Drug delivery

Drug delivery using smart materials and nanoparticles is a research area that may help to restore the continuously decreasing output of new drugs by pharmaceutical companies, and help to improve the efficacy of existing drugs and revitalize drop-out drugs since local delivery may eliminate earlier systemic side effects.

Smart drugs, that consist of assemblies of carrying agents (nanoparticles), imaging devices and drugs are being developed to target affected tissues and at the same time monitor the process.

Magnetic nanoparticles: iron oxide becoming a useful tool.

To date, most interest in the clinical use of magnetic nanoparticles has focused on iron oxide. This is because of the chemical stability, biological compatibility, and relative ease of manufacture of magnetite (Fe3O4) and maghemite (_-Fe2O3) nanoparticles.

The in vivo use of magnetic nanoparticles is attracting considerable interest as a means of delivering personalized medicine. Biocompatible nanoparticles that can be drawn toward a magnet are being investigated as site-specific drug delivery agents. Polymers or silica-shells filled with iron oxide and a drug have been made by and tested in animal tumour models to show increased efficacy and less side-effects (review: Borm & Muller-Schulte, 2006). In addition, paramagnetic iron oxide nanoparticles can be heated in an alternating magnetic field, and in this way be used to create local hyperthermia. This is being applied to treat brain tumours that are not operable, and this application is ongoing in clinical trails (Maier-Hauff, 2007).

Combinations of iron-oxides have already been approved for clinical use as MRI contrast agents. MRI agents work by altering the relaxation rates of water protons that are trying to realign with a static magnetic field following the application of radio frequency (RF) pulses. Iron oxide-based contrast agents affect transverse relaxation times, or what is known as T2 decay.

This leads to 'negative contrast', or dark spots, on T2-weighted MR images. The

Interval	Expected developments	Application
now-2015	Lowering detection limits for biomarkers in proteomics. Biocompatible coatings and implants Improvements of instruments, devices and sensors	In vitro diagnostics Point of Care systems Implants (hip) Sensors, minimal invasive surgery
2015-2020	Combination with cell therapy: Nanostructures as basis for in situ cell growth. Miniaturisation of biomarker detection. Drug delivery with nanocarriers	Regenerative medicine (heart, bone marrow) Non-invasive in-vivo diagnostics Point of Care diagnose (Cancer, HIV, diabetes)
2020-2030	Nanostructures for cell growth and implant prototyping. Assemblies of multifunctional structures with imaging, targeting and drug-release . Intelligent Biomaterials	Continuous monitoring and repair of biological function. Smart medicines

Table 1. *Future perspectives on impact of nanotechnology on Health care by the convergence of nanotechnologies and life sciences.*

agents tend to be termed super-paramagnetic iron oxides (SPIO) if individual particles are larger than 50 nm and called ultra-small (USPIO) when particles are smaller then 50 nm. This application is mainly used to enhance contrast in inflammatory regions or regions characterized by leaky vessels, such as in tumours. A new application is passive imaging of medical devices in MRI by marking devices on the surface with a coating containing iron oxide nanoparticles.

"Analysts estimate that the European market for nano-based products is currently around €2.5 billion but could rise to hundreds of billions of Euros by 2015 and one trillion in a few years thereafter...

"Manufacturing, incorporating nanotechnology, will be responsible for 10 million jobs worldwide, comprising 11% of total manufacturing jobs."

However, its clear that one size does not necessarily fit all. Realizing the clinical potential of these novel nanocarriers means finding the correct magnetic nanoparticle and its properties for each particular application. This means that the exact functional demands needs to be disentangled into the needed physicochemical properties and coupled to a biological behaviour that allows these things to happen.

Despite the tremendous amount of work the only registered applications of iron oxide particles are (U)SPIO as contrast agents. Of course there is also the ex-vivo application of iron oxide in magnetic beads that are used in diagnostic platforms for rapid and automated determination of biomarkers.

A classical dilemma

The flood of consumer nano products tells us that nanoproducts are already on the market without a life cycle analysis or sufficient toxicity testing. What emerges is that for implementation for engineered nanoparticles in healthcare, a risk-benefit evaluation is needed per individual material and application. At the moment there is incomplete information on the risk side and we may discover the same occurs on the benefit side of the equation as well. This is typically the dilemma for many applications of nanoparticles. It appears that we do not have a full understanding or appreciation of the longer term implications or toxic effects of free, as opposed to fixed or biodegradable, nanoparticles.

Nanotechnologies therefore pose a classical dilemma for modern society: use its potential and go full speed ahead or perform the necessary risk assessment and technology assessments before stepping into this. Application in the field of health care is the ultimate challenge but has already started and will move from carefully controlled conditions such as contrast agents to more day to day products and applications.

Concerns about nanomedicine

HEALTHCARE IT MANAGEMENT
ANALYSIS

Like biotechnology, there have been concerns about nanomedicine in some quarters, especially with regard to safety and privacy. So far, most such concerns have been raised by NGOs and technology watchdogs rather than the general public, which remains sanguine about its prospects. An exception is the Netherlands, where the Health Council has highlighted the need for rules and laws on privacy, the doctor-patient relationship and the possibility of a widening gap between diagnostics and access to therapy (Betekenis van Nanotechnologies voor de Gezondheid. No. 2006/06, Health Council of the Netherlands).

And yet, nanomedicine is hardly an everyday word. Nor, it seems, is nanotechnology. Various surveys (e.g. by the EU's Eurobarometer) show about half of the general public had not heard about nanotechnology.

The European Commission has published a Recommendation for a Code of Conduct on responsible nano-research [C(2008) 424 final, dated February 7, 2008]. This urges research labs, companies, government bodies and NGOs to make a 'public consultation on nanosciences'. One of its key planks is that "researchers and research organisations should remain accountable for the social, environmental and human health impacts" which their research "may impose on present and future generations."

Some of the other points urged by the Recommendation for nanotechnology research include the following:

- Comprehensibility to the public.
- Safe, ethical and contributing to sustainable development.
- Anticipating potential environmental, health and safety impacts.
- Conforming to best scientific standards, including Good Laboratory Practices (GLP).
- Encouraging creativity, innovation and growth.

Led by Britain's Royal Society, Europe's private sector has also been developing a Responsible Nanocode of good practices, which would establish guiding principles rather than strict rules.

In the United States, chemicals giant DuPont and the Environmental Defense Fund (EDF) have jointly published a Nano Risk Framework in 2007, which seeks to identify and evaluate potential risks of nanomaterials throughout the product cycle.

HEALTHCARE IT IN INDIA

AUTHOR
Tosh Sheshabalaya,
HIT

The Indian healthcare system, like India itself, straddles the 19th and 21st centuries. But while the country's 19th century face of slums and poverty is better known, the 21st century end is quietly readying itself to gain a major presence on the global healthcare IT scene.

HIPAA and IBM's Health Superhighways

Large Indian hospital groups such as Apollo are playing a key role in terms of bringing HIPAA-compliant EMRs and interoperability to India.

Apollo, whose 45-strong hospital network is soon set to grow to 60 (beyond India, in the Middle East and Africa), is a testbed for pilot projects by IBM for a globally-directed 'Healthcare Superhighway'. The Apollo group's IT spend, at 4.5% of the operational budget, is higher than many hospitals in Europe.

The importance of such a phenomenon is clear. As the US Health Information and Technology Policy Lab notes: "With a maturing private healthcare sector (driven to no small extent by the new middle class and medical tourism – see box), the private hospital chains have become the primary consumers and financiers" of healthcare IT in India. "The aggressive IT sector in India is slowly managing to move large government hospitals", too, towards this, the Lab concludes. Given India's size, when this happens, the knock-on effects on healthcare IT will be significant – and global.

International health technology firms in India

International firms have been locked into Indian healthcare IT for several years. After the recent downturn, the sleight-of-hand previously used to befuddle opponents of outsourcing has also been dropped. In March, IBM (seeking federal government stimulus funds) was criticised for shifting 5,000 jobs to India – not to 'India and China' – a source of much confusion in the past, given that any of the larger Indian IT companies had bigger revenues than China's entire offshore IT industry.

Indeed, as far back as March 2006, Matt Porta, head of the Global Business Solution Program at IBM named its Bangalore, India, center as the "global hub" for the "management and creation of replicable components" for its SOA service-oriented architecture across 17 industries, including healthcare.

Philips: Every product has a Bangalore flavoring

Dr. Bob Hoekstra, the CEO of Philips Innovation Campus until 2006, says that every product having software in it "has a contribution from the Bangalore campus". Indeed, one of Philips' first contributions from India was a series of healthcare products launched in 1997, including a radiology information system and software-based diagnostic radiology equipment.

Philips has since partnered with Apollo Hospitals (mentioned above) as well as the Indian Space Research Organisation to establish its first telemedicine project in the State of Tamil Nadu. In a now-familiar pattern, Philips is transferring the methodology from the Indian project to China, according to K. Ramachandran, Managing Director of Philips India.

Siemens: From MagicView to biometrics

Siemens is also an old India hand. In 1998, the MagicView telemedicine system was launched out of India. More recently, one of the thrust areas of its secretive Pune campus is on biometrics.

GE Healthcare: India hosts its biggest engineering lab

GE Healthcare has had a long-running joint venture with Indian IT giant Wipro. However, in 2002, the Indian firm took 100% control – most notably of all intellectual property in their HIRepS Hospital Information System package.

Meanwhile, GE's Indian activities have turned towards design, and more. In February 2009, GE Healthcare reported it was considering acquisitions of Indian companies to add technologies to its portfolio, and a month later announced a trebling of its Indian R&D facilities at Bangalore. Included here is a $25-million 'simulated hospital' to testbed medical innovations for both local and global markets. During a visit to Bangalore, John Dineen, President and CEO of GE Healthcare said that the Indian lab was "the biggest engineering lab for GE Healthcare, and the first of its kind in the world today."

TietoEnator and iSoft

In Europe, the best evidence of the scale of India's looming healthcare IT presence is illustrated by two cases.

Nordic IT major TietoEnator's flagship hospital information system, iMedOne, was developed in India. The 5th generation, EPR-ready product has already been implemented at over 200 hospitals in Europe (especially Germany, Scandinavia and the

ECR 2010

European Congress of Radiology

March 4–8, Vienna / Austria

Virtuosity in Radiology

ABSTRACT SUBMISSION

July 4 – September 18, 2009

The annual meeting of ESR myESR.org

18,200 Participants
97 Countries
270 Scientific and Educational Sessions
1,684 Accepted Papers and Exhibits:
rejection rate: 68%
Fully Electronic Scientific Exhibition
Industrial Exhibition on 26,000 m²
285 exhibitors

ESR
European Society of Radiology

Netherlands) and offers full mobile device interfacing and functionalities.

More strikingly, the troubled British NHS modernization program (centered on the iSoft Lorenzo e-Health solution) is also turning to India – as we have predicted at Healthcare IT Management two years ago. In September 2008, the Managing Director of iSoft announced: "The entire (Lorenzo) solution … is being developed and rolled out from the India development centre." The announcement followed a 50% ramp-up in iSoft's India headcount to almost 2,000, in less than one year.

Indian IT and the healthcare value chain: new niches

The US Health Information and Technology Policy Lab (see above) notes that India's key asset in terms of healthcare technology is its ambitious IT industry. With revenues of over 150 billion Euros in just the past three years, its size is now hard to ignore. According to some estimates, Indian BPO services in healthcare alone will bring in revenues of about 5 billion Euros this year.

Knowledge process outsourcing in healthcare

Players in the Indian IT industry range from behemoths like Infosys, Wipro and Tata Consultancy (a key player in the multi-billion pound revamp of Britain's National Health Service) to small, specialized and highly-competitive Indian start-ups –at the top of the value chain. One good example of the latter is marketRx, which employs just 25 people, a majority with degrees from India's elite Indian Institutes of Technology and Indian Institutes of Management. Funded by US venture capital firm Westbridge, marketRx focuses on KPO (or knowledge process outsourcing) for pharmaceutical firms in the US. Its clients include Johnson & Johnson, Bristol Myers Squibb, GlaxoSmithKline and Eli Lilly.

Another example is Strand Lifesciences, a designer of scientific software for the mining of biological data and literature, whose client roster includes Agilent and numerous other biotechnology majors.

India's 19th century challenges and 21st century solutions

In spite of its impressive pace of development, the bulk of the Indian healthcare system consists of poorly-equipped general hospitals, owned by the government, and concentrated in cities and larger towns.

Rural India – home to over 70% of its 1 billion population – has even more rudimentary healthcare facilities, with many areas devoid of even basic primary care or doctors. None of this is a surprise. According to the Human Development Report, public health expenditure as a percentage of GDP is 1.3% in India (compared to overall health spending at 5.3% GDP).

Supercomputers and satellites

The Indian government sees the only way to leapfrog such massive challenges by harnessing IT and leading-edge communications technologies. Within the next year, India will launch the world's first satellite dedicated exclusively to e-Health. The two-plus tonne HealthSat satellite, with more than 20 transponders, has a precedent in EDUSAT, a similar Indian satellite which now links over 50,000 schools across India for distance education.

For mass-scale use, the Indian government has developed two integrated telemedicine systems: Sanjeevani and Mercury, the latter rolled out at the Centre for Development of Advanced Computing (known in the IT world for its PARAM Padma teraflop-class supercomputers). Indeed, the PARAM provides the hub of one of the oldest and most promising e-Health projects (by the government of the Indian State of Andhra Pradesh), through about 6,000 kiosks across the State.

A variety of other rural e-Health projects have already taken off. Some are government-inspired (such as e-Swasthya, a smartcard-based project in one of India's poorest States, Bihar). There also are some pioneering joint State-private sector e-Health projects.

However, the majority of e-Health projects are in the private sector (Apollo Hospitals alone has over 50 across several States). It is on these that the government counts to address the huge challenges of delivering basic services for the hundreds of millions in rural areas. Many such initiatives go back almost a decade.

An e-opthalmology outreach project at the LV Prasad Eye Institute was hailed as far back as 2001 by a group of scholars from Harvard Medical School and Dana Farber Cancer Institute as a model of "excellence, efficiency and equity". It bills at a ratio of 1:1 non-paying to paying patients.

These efforts have continued to grow (as the US Health Information and Technology Policy Lab notes), but there is a long way to go in addressing India's healthcare problems.

In spite of the hundreds of thousands of patients treated at the Prasad Institute (and some pioneering efforts in stem-cell applications against blindness), India has more than 37 million blind people, equal to the population of Spain.

India to Africa

While much of the world's attention is focused on the Chinese presence in Africa, India's billion dollar PanAfrica E-network project has been described by Infoworld as "Africa's biggest ICT project ever." Much of this is centered on e-Health, with hundreds of thousands of teleconsultations already implemented. Some transponders in HealthSat, the Indian e-Health satellite, are to be dedicated exclusively to Africa.

Clinical trials

Like marketRx, the high-value (and in the West, increasingly cost-sensitive) healthcare business is seen as a priority opportunity for Indian business process outsourcing (BPO) firms.

Other areas include clinical trials, where a good example is Siro Clinpharm, India's largest fully integrated clinical trials organization. Siro has made a string of acquisitions in Europe, with its ambitions part-funded by Europe's largest VC firm, 3i. Even after the downturn, 3i has identified India and tech-intensive areas of Indian healthcare, among its highest priorities.

Medical device design

The BPO arms of the bigger Indian IT corporations, too, have begun targeting healthcare explicitly. India's HCL Technologies is the first Indian company to have an ISO 13485 certification for design and development of Class I, II and III medical devices, alongside an FDA-standard QMS, compliant to ISO 14971 for risk management. One of its most ambitious projects, however, is CrosSView, a framework based Computer Systems Validation (CSV) methodology for the development of robust healthcare IT applications.

Made in India, implemented in the US, may shake-up e-Health world

Several Indian firms have focused on niche technologies, especially those which adapt Western state-of-the-art technologies to rural India and to the challenges of the wider developing world (see attached boxes).

Of more concern to Europe would be the choice by some Indian firms to test-bed health sector applications in India and sell them to the US (an early case here was the WebMD portal, via its Indian-developed predecessor Healtheon). Michael Nerlich, President of the International Society for Telemedicine and eHealth, noted in March 2007 that low-cost, Indian-designed e-Health products could transform the future of the industry.

One example here is TeleVital, which claims to be the only one offering "integrated Electronic Patient/Medical Records and real-time telemedicine software modules with unique auto-recognition and configuration architecture that enables plug-n-play for a wide variety of medical devices from different manufacturers." Televital's founders include some major Indian-American names from Silicon Valley. The company's clients range from a remote NASA-sponsored anesthesia monitoring program at the University of Virginia, through mobile vital signs monitoring in ambulances in Japan to a host of customers in India, most notably the Indian Army. Recently, the company has begun a major rollout at Indian village e-Health centers.

Such an Indo-US business model also appears elsewhere, for example Voxiva, whose flagship US products include the mHealth solution for hospitals, payers and pharmacies, as well as HealthNet, for managing large health delivery programs via a scalable and secure real-time Health Management Information System (HMIS).

Medical Tourism in India

In today's India, hundreds of gleaming private hospitals, equipped with state-of-the art technologies and manned by top physicians, cater to affluent Indians and tens of thousands of so-called 'medical tourists', many of them British and Americans - faced with growing waiting lists back home. Consultants McKinsey & Co. estimate medical tourism in India as a 2 billion dollar business by 2012.

The first serious awareness of India's medical tourism phenomenon dates back to 2003. In July that year, Britain's 'Financial Times' reported that an Indian hospital in Chennai "successfully conducted a complex heart operation on an 87-year-old American at a reported cost of $8,000," inclusive of airfare and a month's stay in hospital; the patient claimed that a less complex operation in America had earlier cost him $40,000. More publicity was given to a double knee-replacement operation in October the same year, on a Scotsman who sought to avoid a prolonged (two-year) wait for treatment on the NHS, and instead went to a hospital in another Indian city Ahmedabad.

The wave has not abated. In March 2009, CNN's Medical Producer Danielle Dellorto covered the case of Sandra Giustina, an American whose heart condition made her a "walking time bomb". She chose to get treatment at Max, one of the smaller Indian hospital groups. As the report described:

"Walk through a patient wing at Max Hospital in New Delhi on any given day and you're likely to see people from around the world. In one visit, CNN met patients from the United Kingdom, Nigeria, Jordan, Afghanistan and the United States." While the quality of Indian physicians is well-known, especially to Americans, what is being increasingly recognized is the quality of equipment. As CNN described it: "the operating rooms (at Max are) similar to those in many U.S. hospitals. If fact, Max's neurosurgery room had an inter-operative MRI scanner, which is technology hardly seen at hospitals in the United States."

US health insurers Blue Cross and Blue Shield insure patients treated at leading Indian hospitals, as does Britain's BUPA.

Costs:

	US	India
Bone-marrow transplant	$200,000	$20,000
Liver transplant	$200,000	$60,000
Orthopedic surgery	$20,000	$5,000
Cardiac surgery	$20,000	$6,000

Source: Patient outsourcing - No stopping this one, Asia Times, March 17, 2004.

ITALY'S HEALTHCARE SYSTEM IN TRANSITION

HEALTHCARE IT MANAGEMENT

ANALYSIS

The Italian National Health Service (INHS) was established in 1978 to grant universal access to a uniform level of care throughout Italy, financed by general taxation.

The INHS provides universal coverage and free health care at point of delivery to all Italian and European Union citizens. In spite of this, there are considerable variations in coverage and service quality between the richer and better covered regions of the north and the poorer ones in the south.

Key actors

The key operational actors consist of 21 Regional Health Authorities (RHAs) and approximately 200 Local Health Authorities (LHAs) which serve geographical zones with mean populations of about 300,000. Together, they are responsible for ensuring the delivery of healthcare services by means of public and private accredited hospitals and other facilities.

Reforms shake up roles and responsibilities

In Italy, a major reform of the Constitution (Constitutional Law number 3 of October 18th, 2001) radically modified the roles and responsibilities of the State and the Regions.

At the national level, authorities are responsible for ensuring that the general objectives and principles of the health care system are met, including definition of the basic benefits package ('livelli essenziali di assistenza' or LEA, which must be uniformly provided throughout the country). The traditional welfare state maxims of universal coverage, dignity and equity have in recent decades been joined by principles of effectiveness and cost-effectiveness.

The Regions now have law making powers on health protection, within the framework of fundamental principles defined by the State. All Regional Authorities have a considerable degree of powers to legislate on a regional basis and freely allocate funds received from the central government, in particular for healthcare delivery. Major policy decisions are however agreed by an inter-institutional 'State-Regions Conference', which is constituted by representatives of national Ministries and the Regional Authorities.

Full spectrum coverage

Healthcare services cover the whole spectrum of, from visits to family doctors and specialists to in-patient treatment (tests, medication and surgery) and post-operative rehabilitation as well as ambulatory care and outpatient treatment.

The INHS also pays for part or all, of the cost of drugs and medicines. Emergency health provision is available to all residents (as well as visitors).

Tariffs, reimbursement and insurance

Hospitals are reimbursed by the INHS according to a national diagnosis-related group (DRG)-like system. National-level tariffs cover the cost of public hospital admissions throughout the country. The RHAs can add further tariffs for specific activities (such as psychiatric services) which are not covered by national tariffs.

Private hospitals are reimbursed to the same DRG-specified level, and additional costs borne by patients – through private insurance schemes.

Many Italians and foreigners opt to take out private health insurance in addition to the basic State cover. Among other benefits, private insurance provides freedom in choice of family doctors and/or specialists and the right to be treated in private hospitals. In many cases, private facilities reduce the waiting time for a specialist appointment or a surgical intervention. They also offer more freedom in visitation rights and standards of accommodation. However, the quality of medical care in State and private hospitals are roughly similar (surgeons typically work for both the State and private sectors).

Mixed private-public models – a beginning ?

Certain Regional Health Authorities have reached agreements with private hospitals allowing patients to be treated under the INHS. This has shortened waiting lists at public hospitals, but lengthened them at private facilities. In addition, a court decision sometime ago ruled that patients whose life was endangered because of

waiting lists could seek treatment at a private hospital without having to obtain advance permission from the Regional Health Authority, and still be covered for costs by the INHS.

> "The traditional welfare state maxims of universal coverage, dignity and equity have in recent decades been joined by principles of effectiveness and cost-effectiveness."

Sources and composition of healthcare financing

The financing of healthcare in Italy is mixed. The country has one of Europe's highest rates of private, out-of-pocket healthcare spending (about 25% of total). According to some estimates, almost 35% of Italians access private care in one form or another. Although one of the principal goals behind the establishment of the INHS in 1978 was to quickly move toward a national tax-based system, social health insurance contributions still represented more than 50% of total public financing for another two and a half decades. In 1998, social contributions were replaced by a regional business tax; this is supplemented with a national grant financed by revenues from value-added tax (VAT) collections to ensure sufficient resources for each region.

Co-payments

Out-of-pocket/private payments include co-payments for diagnostic procedures, medicines and ambulatory specialist consultations. Users have to pay costs of outpatient care up to a 36 Euro ceiling since 2000. Co-payments for drugs and ambulatory services have a restricted role, accounting for a 4.8% peak of total INHS revenues in 1996, and then declining to below 3% in 2002 after co-payments for prescription drugs were abolished.

Patients however continue to need to make out-of-pocket payments for non-prescription medicines and directly purchase private health care. An estimated 15% of the population has complementary private health insurance. This is either individually subscribed or offered by employers. About two out of three health insurance companies are for-profit while one third are non-profit organisations.

Private insurance still loosely coupled

In contrast to EU countries, such as Belgium, Germany and France, Italy's private insurance sector is very loosely integrated to the public sector. As a result, private insurers tend to mainly substitute for INHS services rather than complement them.

The most frequently used private health services covered by for-profit health insurance are diagnostic and outpatient visits, but their share in reimbursed monies is small. By contrast, in-patient surgical care accounts for only a fifth of demand but over two-thirds of total reimbursement.

The second best healthcare system in the world: WHO

Overall, the Italian healthcare system is one of continuing transition. In spite of occasionally severe criticism, not least from within the country, the World Health Organisation ranked the country as having the world's second best healthcare system, after France. (The World Health Report 2000). Organisation ranked the country as having the world's second best healthcare system, after France. (The World Health Report 2000).

COUNTRY FOCUS: ITALY

		DATE
Population (million)	58.78	2006
Live births/1,000 pop	9.2	2003
Deaths/1,000 pop.	9.8	2000
Male Life expectancy (years)	78	2006
Female Life expectancy (years)	84	2006
GDP (billion EUR)	1,572.2	2008
Total healthcare expenditure (% GDP)	9.0%	2006
Total healthcare expenditure per capita (PPP USD)	2,623	2006
% of healthcare system financed by public funds	76.4%	2004
Number of CT scanners (per million inhabitants)	24	2004
Number of MRIs (per million inhabitants)	11.6	2004
Number of acute care hospital beds (per 1,000 inhabitants)	3.4	2005
Length of stay (average in days)	6.7	2006
Number of physicians (per 1,000 inhabitants)	6.2	2005
Number of nurses (per 1,000 inhabitants)	5.4	2004
Number of Internet users	28.26 million (48.6% of population)	Dec. 2008
Percentage of households with broadband access	10.87 million (18.7% of population)	June 2008
Percentage of individuals using the Internet for interacting with public authorities	NA	NA

Source: OECD, Eurobarometer, WHO, Istituto Superiore di Sanita (Rome), Nielsen and International Telecommunications Union (for Internet statistics).

ITALIAN HOSPITALS AND THE NEW MANAGERIALISM

AUTHOR
Elena Cantu,
is with Bocconi University, Milan, Italy

From 1978, the Italian healthcare system has been organised according to the National Health Service model (Italian National Health Service, or INHS). Coverage is universal and, theoretically, uniform throughout the country. In 2003, public healthcare expenditure accounted for 75.1% of total healthcare expenditure.

The Italian healthcare system is tax-funded and most care is provided free of charge at the point of service.

Care is provided by government entities - Local Health Units or LHUs and Independent NHS Hospitals as well as private hospitals and professionals that are eligible for reimbursement when "accredited" by the relevant Region. The INHS has three tiers: the central government at the top; 21 regional governments in between; and 180 LHUs and 95 IHs at the bottom.

INHS staff (about 660,000 people, 1.1% of the Italian population) are under national contracts; wages and salaries are based on position and age. General practitioners (about 55,000) are not INHS employees, but provide primary care and refer patients to higher levels of care.

From 1978 to 1992, the INHS was characterised by centralised funding based on past expenditures.

In the 1990s, the INHS underwent major reform introducing managerialism, decentralisation to regions and quasi-markets.

Under managerialism, many hospitals were taken out of LHU control and established as independent entities (IHs); general managers replaced highly politicised boards of trustees; LHUs and IHs were given greater decision-making autonomy, but were also required to meet higher performance standards.

Under decentralisation, regional governments achieved greater control over LHUs and IHs, appointed their general managers, provided them with guidelines, and were expected to cover the deficits.

Under this new arrangement, each region became a parent company with LHUs and IHs as its subsidiaries. So much so, that some claim Italy no longer has one National Health Service but rather 21 regional ones.

At present, a further decentralisation process is under discussion, giving more power to regions on health and requiring that funding be collected at regional level, with an interregional/equalisation fund to guarantee national equity on per capita funding.

Quasi-market mechanisms were expected to induce better performance by requiring money to "follow patients". As a general rule, each LHU will reimburse other LHUs, IHs and accredited private providers for care given to its residents. Reimbursements are DRG based for hospital discharges and fee-for-service for outpatient services.

Under this general framework, each region is free to design its own funding arrangements. Italy's regions have consequently been experimenting with different organisational and funding models to achieve an acceptable combination of equity, efficiency, freedom of choice and cost containment.

The Italian hospital system

Hospitals have always played a central role in the INHS. Table 1 shows the different types of hospitals operating in Italy in terms of number, ownership and size.

In the last few years, health policy has pursued a shift from hospital to ambulatory care, resulting in a sharp decrease in the number of public hospitals (from 1,068 in 1995 to 732 in 2003) and public acute beds (from about 300,000 in 1995 to 200,000 in 2003). In contrast, accredited hospitals have remained stable (about 530 hospitals and 50,000 beds), probably because they focused on rehabilitation, long-stay and chronic disease care traditionally.

The current density of NHS beds is 4.8 for 1000 inhabitants (4.2 beds for acute care and 0.6 for non-acute care).

Internal organisation

The head of each public healthcare organisation (LHUs and IHs) is a General Manager (GM) appointed by the region. He is accountable for his performance and could be dismissed, if deemed inadequate.

The replacement of highly politicised Boards of Trustees with a GM was one of the most significant INHS reforms in the 1990s, marking a sharp departure from the traditional bureaucratic paradigm.

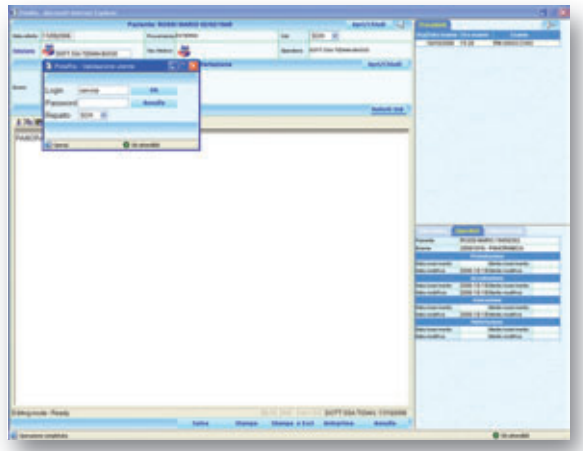
This spoil system showed some strengths but also weaknesses. In particular, regions were replacing their GMs too frequently. Nationwide, the average GM tenure was 3.2 years between 1996 and 2003. This seemed too short a period for effective management, especially in view of the complexity of healthcare organisations; the marked discontinuities brought about by GM turnover in the absence of strong managerial systems and market discipline; and the destabilising effects of turnover expectations.

Traditionally, the organisational structure of public hospitals was fragmented into numerous small, independent departments (e.g. general medicine, nephrology, gastroenterology). Numerous publications had recommended that these

Italian manufactured RIS for Carestream Health

PolaRis

In Italy, Carestream Health markets a third-party RIS product named PolaRis, now in its 4th generation. Pierguido Conti, Business Development Manager for Healthcare Information Systems at Carestream Health explains more.



Digital Signature Request.

1 Can you tell us something about PolaRis?

PolaRis is in its 4th generation, but its origins date back to the 1980s. Then, this kind of tool was basically just a DOS application for managing the procedures of a single Radiology ward. In the middle of the 1990s, PolaRis evolved to its 2nd generation, when it became capable of handling an entire Radiology Department.

In the 3rd generation stage, PolaRis was already able to manage multi-site hospitals and today, as I mentioned in its 4th generation, it can manage wide area installations and regional projects.

2 Who developed PolaRis?

An Italian company named EL.CO. located in the Liguria Region (Savona). EL.CO was a typical technical startup company, co-founded by Marco Dotta and Guido Bagnasco, and powered by a group of IT high fliers.

The company started as a consultancy team in the mid-1980s but had the lucky chance to enter the radiology business, thanks to contacts with media contrast giant Bracco, whose roots date back to Milan in the 1920s. Over the years since then, EL.CO. have developed a deep knowledge of this very specific hospital service.

3 What have been the principle drivers of the PolaRis lifecycle?

Over the years, EL.CO has been actively listening to and collecting hints, comments and suggestions from the doctors using PolaRis. In this way, all new releases of the product were built upon the solid foundation of real-life experiences.

Since the first release, the major revisions have involved the database, which has been entirely reviewed to optimize performance. Today, it is based on Oracle for new installations.

A further important innovation has been platform independence, in order to be free to work on several operating systems such as Windows, Linux, and Solaris. A consequence of this choice is the scalability of the system, a "must" in wide-area or regional scenarios.

4 Can you explain some of the features in PolaRis today which are original?

Tangible features include user-oriented work lists (each user can wholly configure his own work list), the tracking of all user actions and operations, the capability of defining cost centers (which is mainly used in a multi-hospital scenario).

PolaRis is wholly compliant with local privacy and security rules about data management, including encryption of all data communication and audit level and user policy.

The PolaRis GUI has been designed to improve and simplify the user's work; it is compliant with IHE framework and its communication is based on HL7 and DICOM protocols. It is fully integrated with Carestream PACS, both as back- and front-end. Moreover, it also offers the ability to include key images in the report (multimedia structured report) and has specific modules for Nuclear Medicine, Obstetrician US, Radiotherapy and Cardio NM.

5 Which of your users would provide the best case study for PolaRis?

Actually, each installation is a story on its own, since our system has been adapted to specific, local needs.

Among the most interesting installations would be:

Policlinico Gemelli (the Pope's hospital in Rome), where there is a profound level of integration between the RIS and the Hospital Information System (HIS).

Lagosanto Hospital (where the RIS has been integrated with the Regional Mammography screening system) was the pilot site for the multimedia structured report project.

Bergamo Hospital, where PolaRis is installed with a hardware architecture composed of 2 load balancing servers plus a 3-node database cluster (one at a distance of several kilometers to provide disaster recovery)

L'Aquila Hospital, where PolaRis is integrated with all GPs and pharmacies, and allows examination requests to be made to the hospital Radiology Department, with results returned directly to the PCs of the referring GPs.

Marco Dotta, co-founder of El.CO. notes: *"When I consider the future evolution of PolaRis, I imagine that RIS systems will increasingly step out of the X-ray ward and become a core component of the most significant Electronic Patient Record (EPR) projects".*

For more information contact:
pieguido.conti@carestreamhealth.com

Carestream HEALTH

departments merge into larger "divisions" or "clinical directorates" to reach an effective compromise between specialisation and integration, and create a team of clinical managers interfacing the professionals with the GM.

Managerialism reforms encouraged public providers to follow this recommendation. According to a survey in 2003, clinical directorates had been introduced by 92% of public providers and extended to all in-patient medical and surgical units by 77%. Despite the introduction of clinical directorates, the most important level of responsibility centres still corresponded to the traditional, fragmented departments.

Financing

As mentioned, the reforms of the 1990s significantly changed the funding system for public and accredited providers, from the traditional model based on past expenditures to a model where LHUs were financed on an adjusted capitation basis and money followed patients when they chose to receive care not from their own LHU of residence but from IHs, accredited private providers or other LHUs.

The purpose is to place healthcare organisations under further pressure to improve efficiency and quality of care and reduce waiting lists. The undesirable effect may lead to an excessive increase in the volume of services provided to LHU residents by other LHUs, IHs and private providers, where "excessive" means "unnecessary".

Consequently, all the regions try to limit this potential distortion by means of:

- differentiated fee schedules (according to the private or public nature of healthcare organisations and to their organisational complexity and case-mix);
- lump sum funding for activities where DRG based or fee for service funding is deemed unfeasible or inappropriate (e. g. funding emergency departments);
- expenditure ceilings and targets defined by the region for each single provider or negotiation of bilateral contracts between LHUs and providers; and
- introduction of utilisation reviews to deny payment for services that do not meet specified appropriateness criteria and development of appropriateness guidelines especially for out-patient services.

[A notable exception to the above model is the Lombardy region, which had formally opted for a radical purchaser-provider split: all hospitals were taken out of LHU control, grouped where necessary and established as IHs. As a consequence, LHUs do not provide in-patient care and out-patient specialist care. This model implies a more extensive use of activity-based funding.]

Type	Ownership	Number 2005	Avarage size (number of beds, 2003)
Hospitals directly managed by LHUs	Region	529	182
Independent NHS Hospitals	Region	95	673
Public scientific institutions for diagnosis, cure and research	Region/State	21	220
Private scientific institutions for diagnosis, cure and research	Private	37	220
University hospitals	Region/State	12	540
*Classified hospitals**	Private/Region	53	188
Accredited hospitals	Private	540	89**
Not accredited hospitals	Private	86	n/a

* including those classified by the Ministry for Health as "Presidio qualificato ASL"

** number of accredited beds

Table 1. *Types of hospitals operating in Italy*

A Long-Running Story

HEALTHCARE IT MANAGEMENT

ANALYSIS

The question of introducing a specific, healthcare management-oriented culture in hospitals has been the subject of a decades-long debate. An impetus was provided by the availability of IT systems and tools to enhance the efficiency of decision making by hospital administrators. The latest such systems take the form of management information system (MIS) 'dashboards' - the topic of a previous Healthcare IT Management feature by an Australian expert.

More recently, there has been a change in thinking about the very definition and role of a management-oriented culture, as far as enhancing healthcare quality is concerned. Several studies in the US and Britain have followed in-depth investigation into the subject earlier this decade, respectively at the Institute of Medicine in Washington and the British Government's NHS Quality Strategy.

In general, there is an emerging consensus that IT and sophisticated data management techniques do not automatically translate into a better healthcare culture. Instead, broader and deeper systemic change, and even 'cultural transformation' is required. Critics, however, insist that there is no such thing as a healthcare organisational 'culture', and even were one to be conjured up, it need not have any bearing on healthcare performance and quality. Indeed, some warn that hasty efforts at change could end up doing more harm than good.

Healthcare IT Management believes that one interesting exercise may be to map and benchmark healthcare against the management cultures of other economic sectors (which have been studied more extensively). In spite of the distinctiveness of healthcare, there are some areas – for example, public education – where experiences (both positive and negative) may have some major commonalities.

HEALTHCARE IT AND E-HEALTH IN ITALY

AUTHOR
Tosh Sheshabalaya, HIT

Italy's approach to healthcare IT, and more specifically e-Health, has three facets. These are based on:

- National-scale techno-infrastructural requirements (the New National Healthcare Information System).
- e-Health Board, to harmonise regional and national policies and implementation, and ascertain that these are in line with the European Union.
- Semantic considerations.

The overall goal of the e-Health programme is to improve the efficiency and effectiveness of the Italian healthcare system as a whole, and ensure adequate levels of healthcare services. In addition, the e-Health programme also aims to accelerate technological innovations and take-up of patient-centred healthcare services.

Responsibility for the programme is entrusted to a body called the Cabina di Regia. It is comprised of representatives of both the national government and the regions, and coordinated by the Ministry of Health. Key IT projects within Italy's e-Health programme are discussed below:

New National Healthcare Information System

The New National Healthcare Information System (NSIS) was proposed in early 2001 by the Permanent Committee, which coordinates political issues between the central and regional authorities. On the policy level, the NSIS is intended to govern (support, oversee and monitor) the Fundamental Levels of Healthcare Services (Livelli Essenziali di Assistenza or LEA) required by law and guaranteed by the Italian National Healthcare Service for various clinical and care conditions.

At the technical level, the NSIS seeks to define a minimum dataset for analytical data to be used for health governance needs by the Italian authorities. Towards this, it has two primary goals:

- To build an integrated system of individual health records, where patient information and the healthcare delivery structure are the central entities, but provide information on all levels of operating healthcare facilities, services delivered, as well as human and financial resources used by the patient(s).
- To contribute to good governance principles of the health authorities by ensuring that all required data on individual healthcare is available (to the authorities, physicians and healthcare facilities) and usefully grouped, with adequate levels of anonymisation of patient identifiers to preserve privacy.

Broadly speaking, the NSIS faces and meets the needs of both patients (in terms of increasing the efficiency of healthcare access and delivery) as well as the authorities (who obtain a valuable tool for comparatively assessing hospitals and monitoring the overall healthcare infrastructure). The latter is an especially strong need, given the growing trend to decentralise hospitals and provide new, flexible care settings – such as revolving-door treatments for the growing number of elderly patients with chronic diseases.

e-Health Board (TSE)

The permanent e-Health Board (in Italian, Tavolo di lavoro permanente per la Sanità Elettronica or TSE) was established in 2004. It was a joint initiative by the Health Ministry as well as the Ministry of Reforms and Innovations in Public Administration.

The TSE provides the forum and setting for technical consultations to harmonise national and regional e-Health policies in Italy, and to coordinate the implementation of e-Health action plans.

One of TSE's first major deliverables was a position document called 'Politica condivisa per la Sanità Elettronica' (Shared policy for e-Health). This adapts the strategic policy and implementation objectives in the European Union's 2004 e-Health Action Plan to an Italian context.

In Spring 2006, TSE released another major document 'Strategia architetturale per la Sanità Elettronica' (Architectural strategy for e-Health), which contains the first high-level guideline and technical building blocks for designing a national e-Health architecture.

Technical issues of direct concern are standards to represent collaborative healthcare delivery processes, data formats for electronic documents exchanged in the healthcare system.

In consonance with trends across the EU, the architectural approach recommended by the TSE considers the following requirements to be over-arching:

- Clinical information of the patient is available anytime, anywhere.
- The system respects the federated architecture of the Italian Healthcare System and Italian laws on privacy.
- The system has a high level of security reliability and availability.
- The system is based on the use of open standards.
- The system has a modular structure which enables a progressive implementation nationwide, and safeguards existing investments by being capable of interacting with existing legacy systems.

The full version of the Strategia architetturale is available from the website: www.innovazione.gov.it.

TSE has also launched a series of key e-Health pilots: General practitioners e-Health services network (covering 13,500 GPs in nine Southern Regions)

- e-Booking (five regions)
- e-Signature for operators (200,000 smart cards in 16 regions)
- Oncology Excellence Centres Network,
- Proactive prevention, telemedicine and tele-education

Semantic considerations

Interoperability
The Cabina di Regia mentioned previously coordinates development and implementation of a program to develop semantic interoperability between different regional health information systems and the new National Healthcare Information System. One specific aspect of this program (known as the Patient File project) has two goals:

- Re-engineering certain processes with a direct impact on digitally enhancing workflow (for example, patient registries, death certificates etc.).
- Defining a framework for EHR development at regional and national levels (which has been closely coordinated with the Veneto EHR project (described below).

Brick by brick
The so-called Bricks programme, representing common elements and building blocks of the healthcare system, was launched in 2004. It establishes the semantic toolkit necessary to ensure a common language for:

- the classification and codification of concepts such as healthcare services, facilities etc.
- the sharing of methodologies to measure and compare quality and efficiency of the Regional Healthcare Services such as waiting times
- achieving a uniform approach in the generation of data and information for the Fundamental Levels of Healthcare Services.

The Bricks toolkit also helps to ensure interoperability in the information systems developed by the Regions, and by the local healthcare administrations, will all interoperate. It has been organised into 15 thematic projects (bricks), with each Region responsible for managing one specific project.

Overall, the key e-Health projects under the auspices of the Bricks programme, has been run by the Veneto Region and the Lombardia Region.

The Veneto Project: Authentication, signoffs, EHRs and interoperability
Veneto has been responsible for IESS - Integrazione per l'erogazione di Servizi in Sanità (Integration for Health Services delivery). This project, beginning with demonstrations and scaling up of pilots, has gone to the heart of the entire e-Health chain. It facilitates a direct online approach by citizens to healthcare services and professionals (hospitals, GPs, pharmacies).

The Veneto region has also been mandated to set up a functional Electronic Health Record (in Italian, Fascicolo Sanitario Personale or FSP) alongside online authentication of 105,000 smartcards with digital signoffs at two local health units as well as the setting up of an interoperability network for all local health units of the region involved with electronic booking and the Electronic Health Record.

The Lombardia Project: Healthcare Extranet
The Lombardia Bricks project (due to end in 2009) involves a Healthcare Extranet to securely link all actors in the wider healthcare delivery chain, that is beyond patient and provider to also include social services organizations, aftercare paramedic professionals etc. The Extranet, known by its Italian acronym SISS, tracks and records all events in the patient treatment cycle. The project is based on smartcards to provide access to the SISS Network.

The first phase involved prototyping, and ran from the end of 1999 until 2002. Between 2003 and 2005, it was extended across the Lombardia region.

The second phase, which started in March 2002, is to be completed by September 2009 by when it is due to cover the entire country.

Healthcare IT and Quality

Decisions on investing in healthcare technologies have become increasingly important across the world. A key reason for this is the acceleration in technology lifecycles, alongside strategically vital questions of not being locked out by making one particular choice from an alternative (but still maturing) spectrum of other choices.

In 2001, Italy established a Health Technology Assessment (HTA) unit at the Gemelli University Hospital to support hospital CEOs in financial, quality and strategic-organisational decisions involving a full range of areas - from medical devices and pharmaceuticals drugs to biomedical instrumentation and IT systems. The Gemelli HTA Unit catalysed the first triennial Technological Investment Plan for the period 2004-2006. Other units have since followed suit.

Part of the inspiration for the HTA actually date back to the Italian National Health Plan 1998–2000, which set up a procedure for accreditation of healthcare providers (both public and private), based on an assessment of their infrastructure and human resources. The National Health Plan also called for developing a Programme on Health Care Quality to steer the Italian NHS to strive for a Six Sigma-style continuous improvement of all dimensions of quality.

HEALTHCARE IT MANAGEMENT

Subscription form

Ways to subscribe:

❑ Send an email with your name and address to: office@hitm.eu

❑ Transfer the correct amount to the following bank account:
Healthcare IT Management - 28, Rue de la Loi - B-1040 Brussels - Belgium
IBAN BE29 7350 1603 2064 - Swift: KREDBEBB
(in Belgium: 735-01603 20-64) Note: Charges to the principal

❑ Complete this form and post it to:
Healthcare IT Management - 28, Rue de la Loi - B-1040 Brussels - Belgium

❑ Complete this form and fax it to: +32 2 286 85 08

Subscription form:

Name: _____
Institution: _____
Address: _____
Postal Code & Town: _____
Country: _____
Telephone: _____
Email: _____

❑ Two-year subscription ❑ One-year subscription

Subscription rates:

One year:	Europe:	80€
	Overseas:	120€
Two years:	Europe:	140€
	Overseas:	180€

AGENDA **2009**

May

THE 5TH ANNUAL HEALTH CARE CONGRESS EUROPE
13-14 May 2009
Brussels, Belgium
www.worldcongress.com/events/HR09015/index.cfm?confCode=HR09015

HIT PARIS
26-28 May 2009
Paris, France
www.health-it.fr

June

E-HEALTH 2009
31 May -03 June 2009
Québec City, Canada
www.e-healthconference.com

14TH CONGRESS OF THE UNION OF ICT SOCIETIES OF SERBIA (JISA) AND THE INFORMATICS ASSOCIATION OF MONTENEGRO (DICG)
07-13 June 2009
Herceg Novi, Montenegro
www.jisa.rs

8TH SEFICT (SOUTH EAST EUROPE FORUM OF INFORMATION COMMUNICATION TECHNOLOGIES) CONFERENCE
09-11 June 2009
Dubrovnik, Croatia
www.sefict.org

IADIS INTERNATIONAL CONFERENCE E-HEALTH 2009
21-23 June 2009
Algarve, Portugal
www.ehealth-conf.org

EUROPACS 2009
23-27 June 2009
Berlin, Germany
www.europacs.org

CARS 2009
23-27 June 2009
Berlin, Germany
www.cars-int.org

July

DISASTER PREPAREDNESS SUMMIT
16 July 2009
Houston, Texas, USA
www.nationaldisastersummit.org

August

22ND MIE INTERNATIONAL CONGRESS - 2009 "MEDICAL INFORMATICS IN UNITED AND HEALTHIER EUROPE"
30 August -2 September 2009
Sarajevo, Bosnia and Herzegovina
www.mie2009.org/

September

BALTIC CONFERENCE ON EHEALTH
15-16 September 2009
Hamburg, Germany
www.baltic-conference-on-ehealth.com

October

IT @ NETWORKING AWARDS 2009
28-30 October 2009
Brussels, Belgium

November

TELEHEALTH AND ASSISTIVE TECHNOLOGY 2009
4-6 November 2009
Cambridge, Massachusetts, USA
www.iasted.org/conferences/home-663.html

MEDICA
18-21 November 2009
Düsseldorf, Germany
www.medica.de

RSNA 2009
29-04 December 2009
Chicago, US
www.rsna2009.rsna.org

HEALTHCARE IT MANAGEMENT **ISSUE 3, 2009**

European Association of HEALTHCARE IT MANAGERS

The European Association of Healthcare IT Managers is a non-profit pan-European umbrella organisation for all relevant national healthcare IT associations in Europe.

OUR MISSION:

- *The European Association of Healthcare IT Managers supports and encourages the emergence of common healthcare IT standards at both EU and international levels.*

- *The European Association of Healthcare IT Managers believes that the European Healthcare IT sector needs a common voice - especially in the face of rapid technological change and growing socioeconomic pressures.*

- *The European Association of Healthcare IT Managers invites you to be involved in a community to exchange opinions and experiences with like-minded colleagues. We defend your interests and make your voice heard, effectively.*

If you are a CIO, CMIO or IT Manager in the healthcare area

JOIN US !

Visit our website at www.hitm.eu to apply for membership today!

European Association of
HEALTHCARE IT MANAGERS
28, Rue de la Loi
B-1040 Brussel, Belgium

Tel.: +32/2/286 85 01
Fax: +32/2/286 85 08
Email: office@hitm.eu
Website: www.hitm.eu

European Association of HEALTHCARE IT MANAGERS

More information on the IT @ Networking Awards 2009 on page 6 and 7.