

Medical Solutions

The Magazine for Healthcare Leadership

May 2011

SIEMENS

In It for the Long Run

Iqbal Survé on Health
and Happiness





How can I achieve high-quality outcomes at the lowest possible dose?

Combined Applications to Reduce Exposure (CARE) help you to reduce radiation dose with excellent diagnostic and interventional outcomes.

Life is precious. Protecting it from radiation is our concern. That's why, as an innovation leader in dose reduction, Siemens has long applied a comprehensive approach to all areas of diagnostic and interventional imaging. The Siemens CARE standard brings together a wide variety of advanced technologies and applications to meet the needs of patients and physicians. This allows for appropriate radiation dose while maintaining excellent outcomes for diagnosis and interventions. Life is precious – take CARE. For more information, visit www.siemens.com/low-dose

Answers for life.

SIEMENS

Providing Access

In September 2000, world leaders came together at the United Nations headquarters in New York to adopt the United Nations Millennium Declaration, thereby committing the represented nations to a new global partnership. The declaration identifies eight targets that today are known as the Millennium Development Goals. Three of these eight targets are closely related to healthcare: Combat HIV, malaria, and other diseases; reduce child mortality; and improve maternal health. And a deadline was set to achieve these targets by 2015.

With not even five years to go, where do we stand?

In some countries, the number of new HIV infections continues to rise, but access to antiretroviral treatment is rising as well – for every two patients that begin treatment each year, five people become newly infected. Despite a five-fold increase in the global production of malaria nets, the disease still kills a child every 45 seconds – mostly in Africa. The fight against tuberculosis seems to be a success story with the number of new patients declining considerably in all regions – except for Asia. The mortality rate for children under five has fallen between 1990 and 2008 – but only by 28 percent. This is still far from the Millennium Goal of reducing the rate by two-thirds. And though some countries achieve significant declines in maternal mortality, the rate remains un-

acceptably high with more than 350,000 women dying annually from complications during pregnancy and childbirth.¹ The article on the World Health Summit on page 12 gives some examples of how goals, such as those mentioned, are being achieved little by little – and of what remains to be done.

Only with the joint efforts of governments, non-governmental organizations, commercial enterprises, and private endeavors would there exist the potential to enable humanity to achieve those goals.

As a global provider of diagnostic imaging, therapy, and laboratory equipment as well as healthcare IT, Siemens feels a deep sense of responsibility to support national healthcare systems in enabling a nation's people to have access to basic, quality healthcare. The articles covering mobile clinics in India (page 18) and the SOMATOM® Spirit in China (page 30) illustrate how we are providing solutions for growing economies dealing with such challenges. In established economies, our offerings of refurbished systems not only help healthcare systems and healthcare providers deal with aging populations and the ensuing financial strain, but also with their aim of providing high-quality care in a sparsely populated region and with the least possible harm to the environment (page 24). And our article on the Ethianum hospital on page 34 shows



Hermann Requardt,
Member of the Managing Board of Siemens AG
and CEO of the Healthcare Sector

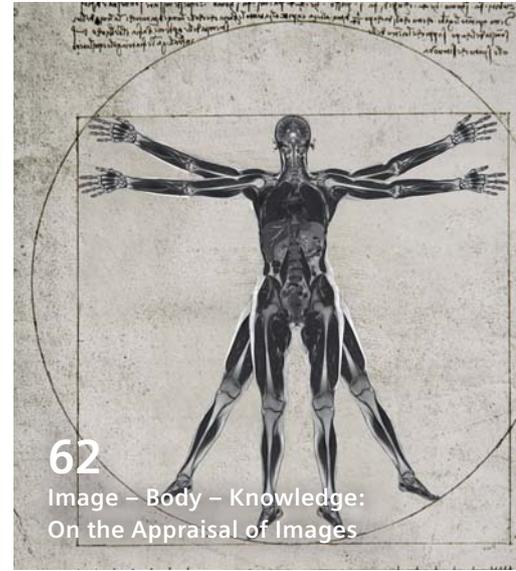
how top-notch hospitals can create a sustainable impact through our Green+ Hospitals concept. By implementing these solutions, healthcare providers also support the Millennium Goals – namely, “Environmental Sustainability.”

Finally, South-African medical-doctor-turned-entrepreneur Iqbal Survé reports on “the ultimate goal of life” – happiness – in his interview on page 40.

Survé reminds us that one of the basic goals of good healthcare is to give people a better quality of life. This is a great reminder for us all as we work to foster healthcare improvements and, thus, happiness.

Sincerely,

¹ Source for all data: <http://www.un.org/millenniumgoals>. Last accessed Feb. 10, 2011



Cover Story



10 Sustainable Healthcare

Sustainability in healthcare has several aspects. Economically priced, yet containing the latest technology, locally produced Siemens imaging systems help growing economies give their population access to healthcare. Innovative medical systems and high-tech building infrastructure reduce energy costs and help to improve patient care. Read more about the full spectrum of Siemens' approach to sustainable healthcare in our cover story.

03 Editorial

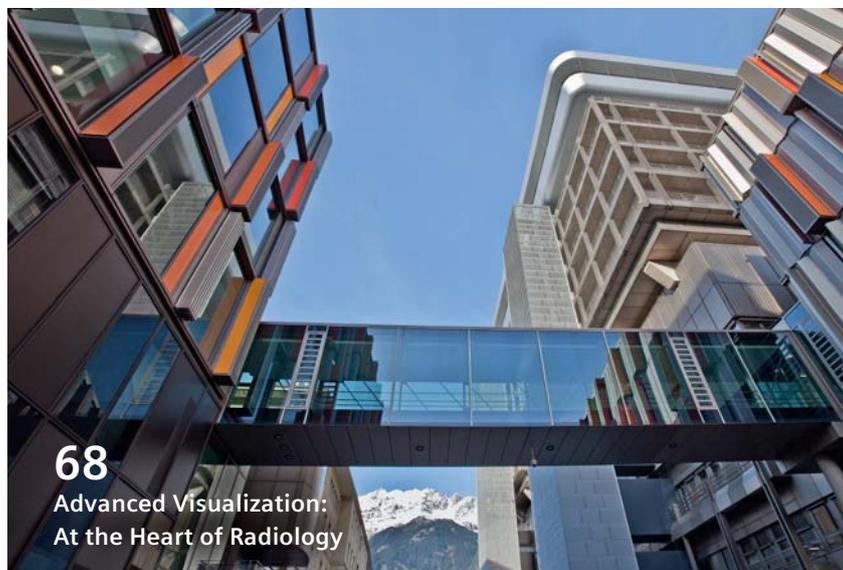
06 News

82 Essay Series:
The UK Healthcare
System

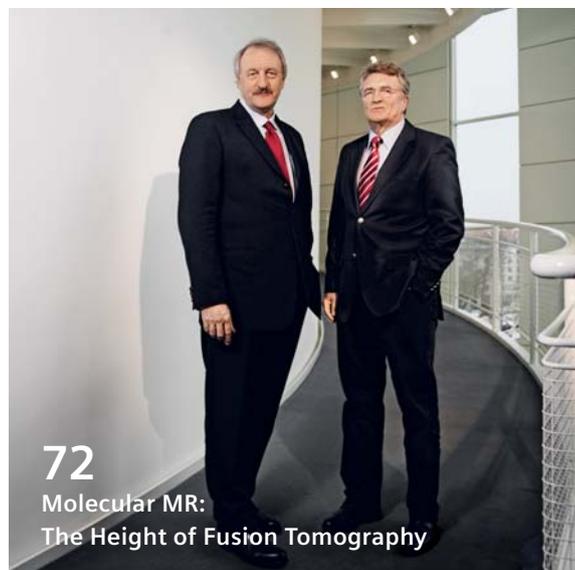
88 Further Reading

92 Imprint

93 Subscription



68
Advanced Visualization:
At the Heart of Radiology



72
Molecular MR:
The Height of Fusion Tomography

Features

- 44 Physicians and staff** of G. Fornaroli Hospital in Magenta, Italy, praise the VersaCell solution's efficiency, dependability, and flexibility, as it streamlines lab workflow and reduces risks from human error, all while saving time, space, and money.
- 48 In a consulting project** at Düren Hospital, Germany, Siemens Healthcare Consulting analyzed strategies, clinical processes, and infrastructures, relying on full-spectrum experience, an interdisciplinary team, and excellence in the process.
- 54 The new generation of Siemens MRI systems** serves the demands of modern hospital care by combining attractive features for patients with user-friendly technology for hospital staff.
- 58 The linchpin in the cardiac cath lab** is a precise, yet versatile imaging system that can be used to perform complex tasks quickly and dependably. Artis zee is the solution for cases that present diagnostic difficulties.
- 62 Today's high-definition medical images** can seem so real, so visually striking and distinct compared to what we were used to be looking at, we get the sense we are peering inside ourselves. But what are these images really showing us?
- 68 syngo.via is an excellent tool** to increase the productivity of radiologists working on cardiac images. It further offers ample opportunities to improve treatment, according to Professor Gudrun Feuchtner, MD, of Innsbruck University Hospital in Austria.
- 72 For a few months now**, Munich, Germany, has been home to the world's first fully integrated system, currently undergoing clinical use testing, that combines PET and MRI: Biograph mMR from Siemens.
- 78 syngo.plaza helps boost** radiologists' productivity. Siemens' new PACS can be adapted to customers' needs individually to serve them even better, as Professor Andreas Herneth, MD, in Vienna demonstrates.

Blood Volume Distribution Imaging



The neurology department of the Erlangen University Hospital, Germany, recently was the first neurological hospital in Europe to implement an Artis zeego® system that can perform whole blood volume distribution imaging of the entire brain.¹ The system features expanded diagnostic as well as therapeutic applications, especially in cases of stroke and

vascular diseases, that can be performed directly in the angiography suite. Nowadays, clearer images, knowledge of functions, steady progress in catheter technology, and the development of new microimplants, which, when inserted through the groin, allow for better, gentle treatment of vascular disease. Such vascular diseases include aneurysms and

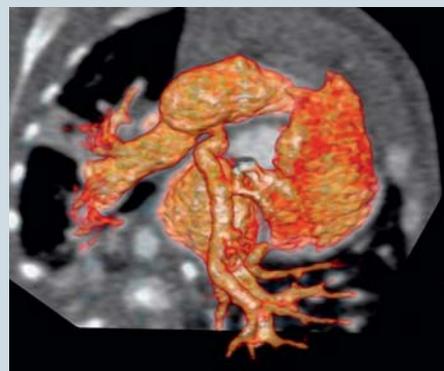
stenosis of the carotid and brain vessels. The images also help neurosurgeons in the treatment planning and monitoring of surgical cases. For instance, pathological changes of the brain's small vessels can be detected in 3D with the Artis zeego. With this system, patients can benefit from being treated with minimally invasive methods and avoid full-scale operations. The unique design of the system includes a flexible C-arm with a performance-oriented robot that circles the patient's body. "This allows our medical personnel to check their patient-sparing treatments more directly and accurately – and additionally makes interventions safer," explains Professor Arnd Doerfler, MD, Head of the Neuroradiology Department at the Erlangen University Hospital.

¹ Perfusion related to ml blood per Liter Volume (Parenchymal Blood Volume). The product might not be approved in some countries or for other reasons, not yet be commercially available. The information about this product is being provided for planning purposes. The product requires 510(k) review and is not commercially available in the U.S.

Dose Savings in Pediatric CT

Reducing radiation dose while maintaining excellent image quality has always been a top priority for Siemens. Innovative CARE (Combined Applications to Reduce Exposure) features are an integral part of all Siemens radiology systems. In computed tomography (CT), CARE kV and CARE Child are the most recent additions. CARE kV automatically selects the optimal tube voltage based on the individual patient and application. In combination with CARE Child, which for the first time in the industry provides a tube voltage as low as 70 kV, CARE kV leads to a dramatic reduction of dose, especially in pediatric patients.

The new features were developed and tested in close collaboration with Marilyn Siegel, MD, Professor of Radiology and Pediatrics at Washington University School of Medicine in St. Louis, Missouri, U.S., and Pediatric Radiologist at the affiliated St. Louis Children's Hospital. To address the special needs in pediatric CT, Siegel will also be heading the newly established pediatric sub-committee of SIERRA, the Siemens Radiation Reduction Alliance. The sub-committee will not only concentrate on new technologies but also – equally important – on education in this field. "For the first time, it becomes possible to optimize all relevant scan parameters in a way that can be used in clinical routine. This is exactly what we have in mind with SIERRA, transferring innovative dose reduction technologies into daily routine," says Siegel.



CT scan of a premature baby shows mild stenosis present at the ostium of the right pulmonary artery.

Courtesy of Centre Chirurgicale Marie Lannelongue Le Plessis-Robinson, France

SIERRA
Siemens Radiation Reduction Alliance

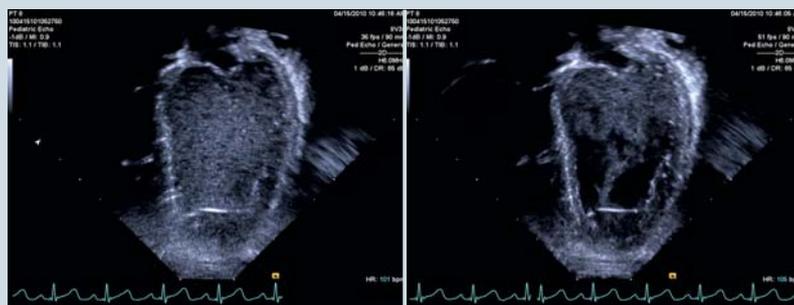
www.siemens.com/low-dose-CT

Consolidate Nucleic Acid Extractions

With new and enhanced technology, the VERSANT® kPCR Sample Prep system consolidates nucleic acid extractions to help laboratories increase productivity, efficiency, and better isolate and purify both DNA and RNA from diverse clinical samples on a single bench-top platform. The VERSANT kPCR Sample Prep system's single platform can handle various workloads and sample types and can perform 96 extractions per run in less than three hours. Extracted nucleic acids are compatible with a variety of molecular testing applications, including target amplification through sequencing, PCR and kinetic PCR, and line probe hybridization. DNA and RNA can be extracted with just a single process, thereby improving efficiency. Samples such as plasma, serum, urine, dried blood, stool, and breast milk are supported by the technology with primary-tube sampling. The features and technology of the VERSANT kPCR Sample Prep system not only help to increase lab efficiency and productivity, but also provide a tool for lab technicians to more effectively meet their molecular testing demands.



IN Focus Coherent Imaging Technology



Without IN Focus

With IN Focus

With IN Focus coherent imaging technology on the ACUSON SC2000™ volume imaging ultrasound system, users do not have to sacrifice a complete, in-focus image for a large field of view. Conventional focusing during traditional ultrasound imaging requires a user to predefine a depth at which the anatomy needs to be in focus. This narrow field of view compromises the resolution at all other depths, lowering diagnostic confidence everywhere else in the image.

With IN Focus, for the first time, no focal zone is required to capture a sharp, well-defined view of anatomy. A real-time technology, IN Focus provides dynamic transmit focus at all depths, delivering enhanced detail and contrast resolution of the heart and clear, crisp views at all depths in a single image.

With the image in sharp focus at every point, physicians can see more than ever before and be more confident in their diagnoses. IN Focus technology brings the ability to visualize blood cells as they flow through the chambers of the heart. This technology also increases image uniformity at all depths, from apex to base, dramatically reducing exam variation due to focal zone placement and eliminating the need to shift the focal zone throughout the exam.

IN Focus technology allows a look into the heart like never before. With a wide view of anatomy in full focus, physicians can quickly and easily see the structure and function of the heart in a single image in real-time, allowing them the peace of mind that they have seen it all.



Global Breast Cancer Survey Results: Information that Makes a Difference



As announced in our last edition of *Medical Solutions*, the market research institution Gesellschaft für Konsumforschung (GfK), on behalf of Siemens, conducted an international survey about breast cancer and awareness to determine what women around the world knew about disease and early detection, what aspects most interested women, and how women prefer information to be presented. The results are in and yield some very useful insights. More than 4,000 women, all of whom were between the ages of 25 and 65, from eight countries across the globe – Austria, Brazil, China, Germany, India, Russia, Sweden, and the U.S. – participated in the online survey. Five hundred women from each country provided statistical information regarding their feelings about the importance of breast cancer screening, personal experiences, and levels of trust with qualified doctors and channels of information, services, and official screening programs – all of which help to raise awareness and consciousness about this topic.



Women were asked to rate, on a scale from one to six, how important breast cancer screening is perceived. In particular, Brazilian women state that breast cancer screening is of high importance with a ninety-six percent response rate. In India, ten percent of women responded that breast cancer screening is of low importance. Among the eight countries, an average of eighty-two percent of women consider breast cancer screening to be of high importance.



When it comes to knowledge about breast cancer, the numbers differ considerably among the eight countries. Overall, forty percent of the women rate their knowledge as good or very good. Indian women seemed to be best informed since three out of four Indian women state that their knowledge is good or very good, whereas in China, Russia, and Sweden less than one-third of women said they were well or very well informed about breast cancer screening.

It was also important to understand how women felt about their breast cancer screen-

ings – were they a positive, neutral, or negative experience? On average, the majority of women perceived their experience as positive but China and Brazil stood out. Eighty-six percent of women in China reported positive experiences and seventy-nine percent in Brazil. In Germany and Austria, women tend to describe their experiences as mostly neutral. Women were asked who they trusted most as a source of information and could choose from options such as their mothers, friends, governmental agencies, and gynecologists. Overall, most women consider their gynecologist the most trustworthy source of information. In India, twenty percent indicated that family members or friends are a trusted source of information. In Russia and Sweden, about fifteen percent of women chose governmental agencies as the most trusted source of information. Sweden, in particular, stood out due to the fact that thirty-one percent of women answered that they “don’t know.”

The survey also intended to find out how much women knew about official screening programs that were available in their country. Overall, almost half of the women surveyed were unaware of whether an official screening program exists in their country. Especially in Russia and Austria, the awareness is quite low at sixty percent. The exception is India: Three quarters of the women state that they are aware of an official screening program. This survey has helped Siemens gain a better understanding about what women need and want when it comes to learning about breast cancer, and the results clearly show that the eight countries have differing approaches to the topic. Ultimately, the goal is to breed awareness that can turn into action and give women more control when dealing with this personal issue.

www.siemens.com/pink

Giving Hospital Networks More Options

Hospitals and clinics are faced with the increasing need to maneuver through their processes faster. Siemens offers two *syngo*®.via Web Options mobile solutions for image and report viewing to help: *syngo*.via WebViewer¹ and *syngo*.via WebReport². With *syngo*.via Web Options, physicians and referrers, within and outside the hospital, can securely access images and reports for viewing in a standard Web browser or on an Apple® mobile device.

syngo.via Web Options aim to improve communication and efficiency. With *syngo*.via WebViewer, physicians are able to access, view, and read images in interactive 2D and 3D with a Web browser, when in combination with a diagnostic grade screen. General images for non-diagnostic purposes can also be viewed on a selection of Apple devices and connection is possible anywhere within the reach of the hospital network through a secure VPN connection.

With *syngo*.via WebReport², physicians have secure and immediate access to reports and images – anywhere³. The application can be launched with a Web browser or on a selection of mobile devices for non-diagnostic purposes. Such flexibility gives physicians and referring physicians access to patient data immediately. Thanks to the thin-client architecture, minimal administration is needed – savings costs while also protecting an investment that is aligned with patients' needs.



¹ *syngo*.via WebViewer: The application is not for diagnostic viewing/reading on mobile devices. In the U.S., only CT images are approved. The information about this product is preliminary, as it does not have the necessary clearances in all countries. It is not available for sale, for example, China or Brazil. Diagnostic reading of images with a Web browser requires a medical grade monitor.

² *syngo*.via WebReport: The product is not for diagnostic use. The application does not have the necessary clearances in all countries. It is not available for sale in China.

³ Prerequisites include: Internet connection to clinical network, meeting of minimum hardware requirements, and adherence to local data security regulations. Apple®, the iPhone®, the iPad®, iPod Touch® are trademarks of Apple Inc., registered in the U.S. and other countries. For iPhone, iPad, iPod Touch country-specific laws may apply. Please refer to these laws before using for diagnostic reading/viewing.

Getting to the Heart of Things



Cardiologists and cardiac surgeons can now perform transcatheter aortic valve implantations with more ease and confidence thanks to the new *syngo*® Aortic ValveGuide¹ application. The application is designed to streamline workflow by simplifying minimally invasive heart valve implantation.

The new software is also designed to automatically reconstruct 3D representations of the aortic root from computed tomography-like cross-sectional images that are acquired from Siemens angiography systems. Software images automatically overlay the 3D representations with other 2D images that are acquired during live fluoroscopy, thereby providing real-time, three-dimensional guidance in the patient's body while the physician navigates the new valve to its intended location.

Exact perpendicular views of the aortic root are calculated with the aid of anatomical landmarks in the 3D representation of the vessel. To further simplify such complex processes, the C-arm can be adjusted to the corresponding angulations for the live fluoroscopy, which can help the physician place the new valve in the correct position. *syngo* Aortic Valve Guide was also awarded the prestigious Techno-College Innovation Award at the 2010 Annual Meeting of the European Association for Cardio-Thoracic Surgery (EACTS) in Geneva, Switzerland.

¹ The information about this product is preliminary. The product is under development and not commercially available in the U.S., and its future availability cannot be ensured.

“The most basic objective of good healthcare is not just to save people’s lives but to give them a better quality of life and indeed to make people happy.”

Dr. Iqbal Survé, Chairman, Sekunjalo Investment Holdings, Cape Town, South Africa

Overview:

- 12 **World Health Summit:** Where Are We Heading with Healthcare?
- 18 **India:** The Bus of Hope
- 24 **Refurbished Systems:** Choices for the Environment
- 30 **China:** Affordable Healthcare for Growing Economies
- 34 **Germany:** Green+ Hospitals
- 40 **Interview:** Iqbal Survé, medical doctor, philanthropist, and social entrepreneur





World Health Summit
2010

Where Are We Heading with Healthcare?

Medicine is heavily sub-specialized, and so is health policy. Rarely do healthcare experts from different faculties, developing countries, and industrialized nations come together to discuss the challenges involved. The World Health Summit is one of these rare occasions. *Medical Solutions* asked health journalist and medical doctor Philipp Grätzel von Grätz to report back.

By Philipp Grätzel von Grätz, MD

The World Health Summit conference series was launched in 2009 by the M8 Alliance, a group of eight academic centers of excellence around the world. The idea behind the summits is to try find global answers to questions such as how we can improve access to healthcare in times of austerity or deal with an ageing population. Charité University Hospital Berlin hosted the inaugural event in 2009, the year of its third centenary celebrations, and again in October 2010. Standing in the registration line, it occurs to me that Charité is the ideal venue for a conference like this; it is an academic medical center of global renown, it is well connected with medical institutions in the developing world, and it is chronically underfunded, since it is located in a city that is, according to its mayor Klaus Wowereit, proud of being “poor but sexy.”

Major Challenges Ahead

The challenges that healthcare is facing are not sexy at all. The changing demographics, combined with constantly improved but increasingly expensive therapies, have been putting pressure

on healthcare systems in the industrialized world for years. One of the first things I learn at the Berlin summit is a number. Peter Smith from Imperial College Business School in London, UK, has calculated that if total spending on healthcare in the U.S. continues to rise as it has in recent years, it will reach an astonishing 37 percent of Gross Domestic Product (GDP) by 2050, almost three times as much as today. Obviously, this is completely unsustainable. Healthcare budgets will never rise as much, no matter how massive the medical need might be.

But rise they will. Peter Heller, a healthcare economist from the School of Advanced International Studies (SAIS), Johns Hopkins University, Baltimore, Maryland, U.S., revealed recent calculations from the International Monetary Fund (IMF) that take into account budget pressures in healthcare. And even this relatively conservative estimate finds that healthcare budgets in relation to GDP are set to double both in the U.S. and Europe by 2050. It must be acknowledged, however, that these calculations were made



Journalist Philipp Grätzel von Grätz reports on the endeavors of representatives from academia and public, private, and nonprofit institutions to shape the future of healthcare and health policy.

prior to the global financial crisis – which does not make the situation any easier. “Any hope that we might be able to shield healthcare from cutbacks is unrealistic,” says Heller. And, one week after the World Health Summit, the British government promptly announced the biggest cuts to



The 2010 World Health Summit adopted the motto "Translation – Transition – Transformation."



Peter Heller revealed calculations from the IMF that healthcare budgets are set to double by 2050.

public spending in post-war history. In Spain, according to Heller, total health-care expenditure increased from 8.4 percent of GDP before the crisis to a current 9.0 percent because of the shrinking GDP.

Healthcare Access

Given this situation, it is obvious that providing widespread access to the best possible medical care will be the biggest challenge facing the healthcare systems of industrialized nations in the years to come. The problem will not be easy to solve. But from the perspective of the developing world, this is a "luxury" problem. In many parts of the developing world, the burning question is not how to access the best possible care, but how to access any care at all. The statistics keep on coming, this time from the World Health Organization (WHO). Mortality of children under five years of age in Africa has fallen from 182 per 1,000 live births in 1990 to 142 in 2008. What sounds like a success is, in fact, a disaster. The figure is two times higher than the global average and about 20 times higher than in high-income countries. This is due to several factors, including perinatal complications, low coverage of vaccination, high prevalence of malaria, and limited access to therapy for easy-to-treat illnesses. Only one out of three children



Bernhard Schwartländer is calling for innovations targeted to the needs of the communities in which they are used.

in sub-Saharan Africa receives oral rehydration therapy in the case of life-threatening diarrhea. And less than 50 percent receive any care whatsoever when having pneumonia.

Innovation is Key

So what needs to be done in terms of global healthcare? How do we improve access to care where it is needed? How do we deal with rising costs? One option worthy of discussion is innovation: Can we perhaps innovate our way out of the healthcare dilemma? In part we can, it seems. I listen to Matthew Berg and become more and more excited the longer he talks. Born in Cameroon in 1978, Matt grew up in Senegal and later went to the U.S. He was named one of the hundred most influential persons in 2010 by *Time Magazine*. He is neither a minister nor an NGO bureaucrat. He is the IT director of the Millennium Village Project, a grass-roots initiative of villages in sub-Saharan Africa. Berg introduced mobile phones as public health tools. He achieved an increase in measles vaccination rates and in the number of children that are diagnosed with malnutrition and properly treated.

Mobile phones have proven successful in healthcare in the developing world. Berg says it is because they are cheap, easy to use, reasonably robust, and not

what a typical technological innovation in medicine is like. This is why Bernhard Schwartländer, Director for Evidence, Strategy, and Results at UNAIDS, is calling for a different paradigm of innovation under which innovations would not be developed once and for everyone, but targeted according to the needs of the communities in which they are used. "This means a shift in invention, a shift in technology, and a shift in product design," he says. I suddenly remember

a figure in a newspaper article I read a couple of days before the summit. It showed global market shares of mobile phones. Providers of sophisticated smart phones are clearly gaining market share in rich countries. Overall, though, the clear market leader still produces cheap, reliable, and robust mobile phones that are used in many parts of the world. There is a lesson to learn here: We should forget the idea that improving quality in healthcare always and inevitably means increasingly expensive therapies. We need cheap, reliable, and robust tuberculosis tests, imaging, and laboratories. Vidar Jorgensen, President of Grameen America, has a story to tell in this respect: "I know of a hospital in India that offers open heart surgery for as little as US\$2,000 in a hygienic environment and with better outcomes than a well-known U.S. hospital." I do not know whether he is right, but even a similar outcome would be impressive.

Later that day, I have a chance to discuss the issue of innovation with Detlev Ganten, the Summit President and former head of Charité. He is one of the greats in European biomedical research, having spearheaded molecular medicine at a time when this term did not even exist. I ask him how medicine will have to change in order to make healthcare sys-



"We have to make health a major topic in society, like climate change, like the future of energy, like clean water," says Detlev Ganten.

tems in industrialized countries sustainable. "Healthcare," he says, "must clearly reach a point where its primary focus is not solely to treat ill people. We must also try to detect medical problems as early as possible and, in particular, to prevent illness, not by diffuse propaganda for a healthy lifestyle but based on sound scientific grounds."

The Social Dimension of Healthcare

There is no question that innovative technology can help detect diseases earlier. And by developing methods for analyzing individual risk factors, technology can help make prevention more targeted as well. But technology is not the only answer to the challenges that healthcare is facing. There is a social dimension, too. In a summit session on the north-south health divide, Zulfiqar Ahmed Bhutta, Head of Women and Child Health at the Aga Khan University in Karachi, Pakistan, cites a study that suggests that maternal education has been the single most important factor in reducing child mortality in the developing world. Financial incentives can also help, as is demonstrated by the Safe Motherhood conditional cash transfer Scheme (JSY Scheme) in India. Under this program, mothers receive an incentive for delivering their babies in healthcare facilities rather than at home. The result is a reduction in

perinatal mortality of nearly 30 percent. "The program shows that it is possible to change behavior even within short periods of time," says Bhutta. Paying someone to behave sensibly sounds a little unorthodox to me. But there are, in fact, health insurance companies in the west that return a share of the health premiums if the person insured is a non-smoker or regularly goes to the gym. The problem with this approach is that you need to define health and to control healthy behavior. And this is neither easy nor cheap or, in my view, particularly desirable. Nevertheless, the general conclusion of the Berlin summit is that we need to increase healthcare awareness – in the developing and in the industrialized world. "We have to make health a major topic in society, like climate change, like the future of energy, like clean water," says Detlev Ganten. Michael Marmot, Professor of Epidemiology and Public Health at University College London, UK, said something similar only minutes earlier: "Every minister in a government should be a health minister."

Healthcare as an Investment

What is certainly debatable is whether a healthcare system that focuses more on the prevention and early recognition of diseases will reduce overall expenditure. When I listen to various health economists at the summit, I cannot help

but conclude that the jury is still out. I like what Pedro Garcia Aspillaga, Dean of the Faculty of Health at Saint Thomas University, Chile, says on this issue. Garcia was the Minister of Health in Chile from 2003 to 2006, a country that has put considerable effort into achieving a "healthier" healthcare system and a healthier society in recent years, even giving legal health guarantees to all the population: "We are not saving money with this. We are spending money. We have witnessed an annual increase of the health sector budget, which has doubled in the last decade. But it is worth it. We see healthcare as an investment and that is why this sector has to be very efficient and innovative. When our population is healthy and more educated in healthcare, we get something back. People are more satisfied. They work more. They act more responsibly."

The President of Grameen, Vidar Jorgensen, also touches on the issue of healthcare as an investment. Grameen, founded in 2006 by Nobel Peace Prize winner Mohammad Yunus, is an association that provides microfinancing to people in the developing world. Many of these people do not have bank accounts. They meet regularly with Grameen staff, and this relationship is strong enough to guarantee that the vast majority of microcredits are repaid. Apart from being a lender, Grameen also runs 52 primary



According to Matthew Berg, mobile phones have proven successful for healthcare in the developing world.



Grameen provides microfinancing and healthcare to its customers. Problems with repayments are healthcare-related in 50 percent of cases, says Vidar Jorgensen.



Zulfiqar Ahmed Bhutta cites a study that suggests that maternal education is the most important factor in reducing child mortality.

care clinics in Bangladesh. Why? “We realized that problems with repayments are healthcare-related in 50 percent of cases. So, we have an interest in the health of our customers,” explains Jorgensen. Grameen subsidizes its clinics with ten to 15 percent of the clinics’ overall budget. The rest is accounted for by a mixture of income-dependent service fees and small insurance fees. Jorgensen says that the investment pays for the bank.

It is already dark when I leave the World Health Summit that day. On my way to the train, I pass by the emergency room of Charité University Hospital. There is an ambulance waiting in front of it, and another one is coming around the corner at Robert Koch Place, lights flashing and siren blaring. I decide then and there to do some exercise the next morning – for the first time in months.

Philipp Grätzel von Grätz is a medical doctor turned freelance writer and book author based in Berlin, Germany. His focus is on biomedicine, medical technology, health IT, and health policy.

Further Information

www.siemens.com/healthcare
www.worldhealthsummit.org



Pedro Garcia Aspillaga sees healthcare as an investment in people.



Journalist Philipp Grätzel von Grätz during one of his rare breaks at the Summit: What’s next on the schedule?

Summary

Challenge:

- Healthcare systems increasingly function with limited budgets due to demographic changes and more sophisticated diagnostics and therapies
- The developing world is facing a double medical burden: Infectious diseases remain the most important killers, while chronic conditions are clearly on the rise

Solution:

- Industrialized countries must try to increase healthcare efficiency in order to deliver constant or increasing quality of care without skyrocketing costs
- Developing countries need to improve access to care by educating citizens, increasing the number of medical care providers, and using technology to bring expertise to remote places
- Both industrialized and developing nations need to increase healthcare awareness in order to avoid illness and to diagnose early to prevent complications

Result:

- Education and incentive programs have reduced childhood and maternal mortality in India
- Modern communication technologies help villages in sub-Saharan Africa improve their vaccination rates
- Healthcare economics help to compare costs and benefits of new diagnostic or therapeutic interventions and make healthcare efficiency more transparent





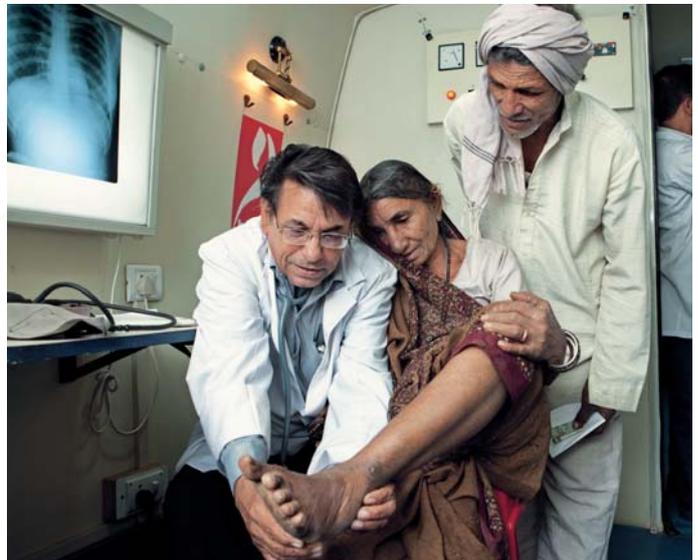
The Bus of Hope

In the Hindu epic *Ramayana*, Lord Hanuman saves the life of Lord Rama's brother Lakshman by carrying a mountain with a "magical" herb called *Sanjeevani booti* on his palm. In Sanskrit, Sanjeevani means "one that infuses life." Sanjeevan – a Siemens-built bus with state-of-the-art medical facilities – not only derives its name from the epic, but also lives up to it by taking healthcare services and health education to millions of people living in remote villages of India.

By Swati Prasad

Manju, the 15-year-old daughter of a landless laborer, had had a fever and an upset stomach for several days. She walked five kilometers with her father on a cold December morning to Barufatak village in the Barwani district of Madhya Pradesh, where the Sanjeevan Mobile Clinic was scheduled to arrive. The bus has been coming to the same spot every Wednesday for over a year now. On other days, the bus goes to other villages in the region. If it were not for

the bus, Manju would have had to be taken to a hospital in Dhamnod, 30 kilometers (18.6 miles) from Barufatak – also on foot. The other option would be to suffer in silence, since poverty, misery, and diseases are rampant in much of rural India, a country that is home to one-third of the world's poor. The Sanjeevan is a rather unique bus. It has a generator that runs air conditioners and diagnostic systems, a water tank that meets the requirements of the clinic,



The Sanjeevan Mobile Clinic provides medical attention, in various forms, to patients of remote villages in India as well as education to learn basic hygiene.

“Working in rural areas, we realized that a lot of work needs to be done in health and education.”

Ritu Baruah, President, The bioRe Association, Mhow, India



a refrigerator that stores injections and medicines, diagnostic facilities such as X-ray and electrocardiogram systems, a provision for ultrasound, and a pathological laboratory. It also has a public address system and a television for spreading awareness of healthcare issues. This particular mobile health unit (MHU) is being run by the bioRe Association, a society that works in the areas of health, environment, and education in the cotton belt of Madhya Pradesh. Over the last four years, Jaiv Sanjeevan has held nearly 950 camps in the region and has treated about 25,000 patients.

Almost immediately after stepping into bioRe Jaiv Sanjeevan, Govind Devda, MD, a retired government medical officer who now runs a private clinic and provides his services to the mobile clinic, instructs Chandrashekhar Sen, a pathology technician, to draw a blood sample from Manju for testing. Within 90 minutes, she is diagnosed with typhoid, a disease that breeds under unhygienic conditions. Since traveling is an issue, reports are provided to patients almost immediately.

Manju is among the 35 to 100 patients who come to the Jaiv Sanjeevan Mobile Clinic every day – Monday through Friday – in this region, which includes the Barwani and Khargone districts. These areas have very high poverty levels. The Khargone district, for instance, has more than 1.5 million inhabitants, with over 35 percent¹ of the population below the poverty line, earning less than US\$1.2 a day.² With high illiteracy rates – 50 percent³ of the population cannot even write their own name – comes poor hygiene and unawareness. That is why on weekends, the bus holds camps to educate people on personal hygiene, cleanliness, nutrition, and pre- and postmaternal care.

Says Ritu Baruah, President of the bioRe Association: “Working in rural areas, we realized that a lot of work needs to be done in health and education.”

¹ <http://www.slbc-mp.co.in/MPInfo.aspx>. Last accessed Jan 27, 2011

² UN Global poverty line

³ <http://www.mponline.in/Profile/districts/Khargone.asp>. Last accessed Jan 27, 2011

Remote villages of India do not even have pharmacies, let alone medical clinics. Though the government has set up more than 22,000 primary healthcare centers in villages across India, these often remain just structures, because doctors, radiographers, pathologists, and other medical personnel are not only in short supply, it is also hard to lure them to remote locations. In addition, many villages still do not have electricity, which is necessary for running medical equipment. Many of the best doctors in India prefer to work in the larger cities, where there are better facilities and jobs that are financially more rewarding.

The bioRe MHU is one of 18 that Siemens has supplied across India over the last ten years. Some of the other buses ply hilly and difficult terrain such as that found around villages in Bhimtal and Dehradun in Uttarakhand, Darjeeling of West Bengal, and in the state of Mizoram. Yet others serve villages around Jalandhar and Amritsar in Punjab, Jaipur (Rajasthan) and Hyderabad, Puttaparthi, and Vijaywada in Andhra

Summary

Challenge:

- Providing healthcare services to remote areas of emerging markets where there are no hospitals, pharmacies, qualified doctors, or medical personnel
- Largely illiterate populations that lack awareness of health and hygiene
- Areas with a high proportion of poor, with a low paying capacity
- Irregular supplies of electricity
- Qualified doctors, technicians, and other medical personnel not willing to work in these locations

Solution:

- Sanjeevan, a mobile health unit (MHU) that travels to various villages across rural India
- Unit is self-sufficient with a generator that runs air conditioners and diagnostic systems; a large water tank that meets all requirements of the clinic, and a refrigerator that stores injections and medicines
- MHU comes equipped with a pathological lab, X-ray, EKG, and ultrasound systems, and a wide array of medical equipment
- MHU has a public address system and television to spread awareness of healthcare issues
- Regular health education camps held, featuring specialists and doctors from nearby areas
- Medical services provided at nominal cost or free for the very poor

Result:

- Quality healthcare made accessible to disadvantaged people living in remote areas
- Thousands of patients in rural areas able to lead a healthier life
- Illiterate, poor people made aware of health- and hygiene-related issues through education
- Decrease in epidemics and chronic disease
- Concept of MHUs finding acceptance across India and in neighboring countries

“Sanjeevan gives us immense satisfaction as it is instrumental in taking healthcare to the remote areas of India.”

Shankar Haveri, Head of Special Projects,
Siemens Healthcare, Mumbai, India

Pradesh. In all, 13 Sanjeevans have been bought by NGOs, four by the government and one by a corporation.

The MHU is part of Siemens' sustainable health aspiration model, wherein it seeks to provide access to affordable healthcare in emerging economies. The bus clinics are planned, built, and executed by Siemens as a complete product – including training and mock camps. Siemens, in addition, is responsible for the performance of the clinic and manages its warranty; all of which is a part of Siemens' turn-key project. “Sanjeevan gives us immense satisfaction as it is instrumental in taking healthcare to the remote areas of India,” says Shankar Haveri, Head of Special Projects for Siemens Healthcare in India. He adds that this is a unique concept, which is likely to be picked up in other Asian countries as well.

Building Confidence

Despite the challenges of high running costs and finding doctors and other medical personnel to serve remote villages, bioRe reports that its Jaiv Sanjeevan has been an overall success. However, running it is no ordinary feat as it requires meticulous planning and dedication. Key features of this MHU are the support of the bioRe Foundation in funding the losses incurred by the unit, the regularity of the camps, and the dedication of the staff members, many of whom have been with the Mobile Clinic since day one. “When we got the bus, I feared that this may turn out to be a white elephant,” says bioRe's Baruah. “Initially, people thought the services offered by this fancy bus would be very expensive. It took us time to win the trust of the communities.”

Today, the bus has become an integral part of their lives. And thousands of villagers look forward to it every month. bioRe's Jaiv Sanjeevan operates in areas where most people have extremely limited capacity to pay for services. For instance, Manju's father borrowed INR 100 (US\$2.19) to come to the clinic. He earns INR 60-70 (US\$1.3-1.5) a day, while his wife – who cooks midday meals for schools – earns INR 1,000 (US\$22) a month. They have five children. This translates into an income of US\$0.40 per day per head, which is far below the international definition of poverty. The bioRe unit charges a lot less than the going market rate. The doctors' consultation fee is only INR 10 (US\$0.22). For the extremely poor, treatment is free. The MHU is able to perform more than 20 pathological tests on-site. More complex cases are sent to the district hospital in Khargone or to hospitals in Indore. The bioRe Association holds nearly 20 to 25 healthcare education camps each month. Going to the same location on the same day of each week helps with follow-ups. “It also helps us hold free specialized camps in pediatrics, orthopedics, gynecology, and ophthalmology,” says Baruah. For instance, when the MHU has ten to 12 patients for eye treatment, it calls an eye specialist to Jaiv Sanjeevan. The association also encourages alternative medicines like homoeopathy and Unani medicines. Sahina Ansari, BHMS, is the project leader and a homoeopathic physician; the women are quite comfortable approaching her with their health problems. Though bioRe's MHU has been lucky in finding dedicated staff, most other



The Sanjeevan's next goal is to continue standardizing its processes and financing in order to reach more patients in need.

Sanjeevans have faced difficulties in finding people who are willing to leave the comforts of their home and work under grueling conditions. Moreover, everyone – including the drivers – needs to multitask, since it is also difficult to find skilled labor in these areas. They often need to take over work as electricians, plumbers, air-conditioner mechanics, and other jobs, to address technical snags.

Another challenge was creating a product that could be standardized. Says Haveri, “Initially, we were not very confident about the MHU. It took a lot of time to build and standardize the product.” This was achieved by obtaining constant feedback from the clients. Though the concept dates back to 1999, when India’s veteran actor Late Sunil Dutt had approached Siemens Healthcare for a mobile unit for the Dharavi slum in Mumbai, the product has become more standardized since 2005. “In the last three to four years, we have sold 15 MHUs and four more are under construction,” says Haveri.

One example of customer feedback being explored for future options: Currently, the bus and its generator run on diesel. The fuel cost of the bus is as high

as 28 percent. Siemens is working on a solar option for the generator. “If we can switch to solar energy, it would save us huge running costs,” says Baruah. Besides, she would prefer an eco-friendly bus, since environment is a key area in which the bioRe Association is involved. “We are in an advanced stage of launching the solar option. It works like an inverter – solar energy would be saved in a local unit,” explains Haveri.

The Future of Sanjeevan

Due to the low paying capacity of people in rural India, Sanjeevan depends on NGOs, governments, and corporations for monetary support. For example, the total budget for the bioRe MHU is INR 1.8 million (US\$39,493.1) per annum. But the bus is only able to generate a third of that. The remaining amount is taken up by the bioRe Foundation of Rotkreuz, Switzerland, the umbrella organization that promotes social responsibility at the community level. It also sponsored the capital costs of the unit.

However, an increasing number of NGOs are realizing that Sanjeevan is a viable model for taking healthcare to remote areas of India. “Even corporate hospitals

are willing to explore the MHU,” says Haveri. Siemens is now also receiving inquiries about the Sanjeevan from neighboring countries like Pakistan and Sri Lanka.

India is growing at a fast pace, and it is possible that development will lead to an increase in good clinics and hospitals in villages like Barufatak. What would then happen to Sanjeevan? “The MHU will go to even more interior parts of Madhya Pradesh,” says Haveri. Because he knows that there will be another Manju there, waiting for the fancy bus to diagnose her ailment so that she can get well and back to school.

Swati Prasad is a freelance business journalist based in Delhi. She reports from India for several publications overseas and has worked as a correspondent and editor for the Economic Times, Business Standard, the Indian Express and Business Today.

Further Information

www.siemens.com/sustainability/en/sustainable/mobile_clinics.htm

Choices Made for the Environment

At the Medical Care Center RadCom GmbH in the rural area of Eastern Germany, only previously owned imaging systems from Siemens are used. With their latest purchase, the MAGNETOM Symphony, MCC benefits from the ability to choose options in the refurbishment process that are most suitable for their facility. The results: Reduced initial costs and enhanced clinical workflow.

By Tanja Berbalk





Klengel explains that with the new MAGNETOM Symphony MRI, the practice can relieve the existing MAGNETOM Avanto – a significant workflow improvement.

The road to Riesa, a small city between the metropolitan areas of Leipzig and Dresden, Germany, passes through idyllic landscapes, meadows, and fields, as far as the eye can see. Small villages with only a few houses are home to an area that offers peace and relaxation. The countryside and the steady wind are ideal for renewable energy. The sheer amount of wind turbines in the area suggests that the local people use the environment to their advantage – in a responsible and future-oriented way. This attitude is also apparent in radiology. In Riesa, Steffen Klengel, MD, founded the main site of the Medical Care Center (MCC) RadCom GmbH; other facilities are located in three small towns nearby. Since 1997, the radiological practice in Riesa has been cooperating with the resident clinic – a facility of maximum care

and an educational hospital for the University of Dresden. By integrating Klengel's radiological practice into the clinic, the much discussed interlocking of outpatient and inpatient care became an early reality. So far, the MCC has only used refurbished systems from Siemens. This means that Siemens takes back medical equipment from the initial customers and newly assembles them according to strict quality standards. Refurbishment is an important aspect to Klengel, because he appreciates the intent of lowering primary energy and material consumption by reusing certain parts of the system. Since 1997, the MCC installed nine refurbished magnetic resonance imaging (MRI) and computed tomography (CT) systems, thus avoiding approximately 923 tons of carbon dioxide (CO₂) emissions in the sys-

tems' manufacturing process. Besides the environmental aspect, this concept also boasts economic advantages. Klengel explains, "By purchasing used instead of new equipment, we save costs of almost 30 percent. Only because of this cost-effectiveness are we able to offer our patients a comprehensive range of high technical performance and diagnostic capabilities." It becomes clear that budget requirements and environmental consciousness do not conflict with one another – they go hand-in-hand. Klengel is convinced by the technical and service quality as well as the systems' stable performance. "Siemens covers the medical supply range and, at the same time, emphasizes the technological developments that support me in my daily work. I am also impressed by the local service staff from Siemens, particularly in its sophisticated purchase advice and logistical planning when it comes to on-site equipment installation." In the MCC Riesa and the cooperating practices, a total of 30 employees are responsible for examining about 60,000 patients annually. The practice network owns a MAGNETOM® Avanto 1.5 Tesla MRI system, two 1.5 Tesla MAGNETOM Symphony MRIs, and a MAGNETOM Impact Expert 1.0 Tesla MRI, as well as two SOMATOM® Sensation 4 and SOMATOM Sensation 16 scanners. The MAGNETOM Impact Expert system will soon be replaced by a MAGNETOM Symphony MRI. Klengel is the first Siemens customer worldwide to order a system that has been refurbished with a scalable process model.

What's Your Taste?

The scalable refurbishment process is similar to assembling a burger: Not everyone has a taste for onions, not everyone likes cheese, and some prefer different kinds of meat. Depending on individual preferences, a burger can be ordered and custom-made for the individual. Similarly, a Siemens customer can choose from a range of refurbishment options; in addition to the basic refurbishment that is done for all systems. The option "New" includes the replacement of X-ray tubes or coils. With the "Aesthetic Refurbish-

“Used instead of new equipment saves us costs of almost 30 percent. This enables us to offer our patients a comprehensive range of high technical performance and diagnostic capabilities.”

Steffen Klengel, MD,
Director, Medical Care Center (MCC)
RadCom GmbH, Riesa, Germany

ment”, all visible parts are repainted to look like new, and new accessories such as tabletop mattresses or arm supports are added. With the “Technical” and the “IT Refurbishment” options, the customer opts for the latest standard of hard- or software.

When Klengel made his decision for a new MAGNETOM Symphony scanner, he chose three of the available refurbishment options. In addition to new, powerful, and dedicated gradient coils (New Refurbishment) for joint and head examinations, he also considered it important to own the latest *syngo*[®] software (IT Refurbishment) for specific sequence protocols and advanced diffusion imaging. “A consistent user interface is one of the key advantages of the Siemens systems,” says Klengel. “We can easily solve the vacation and sickness substitute challenge due to a rotation principle for physicians and technologists. This can only work well when every employee uses the same system interface.”

In addition to the Aesthetic Refurbishment, the radiologist liked the zebra-coating, which helps alleviate patients’ fears. However, Klengel forwent the complete coil equipment since he already has them available for the high-end equipped MAGNETOM Avanto. Also, he decided against the Technical Refurbishment – the reworking of cabinets, tables, and



Klengel has good reasons to be happy: With refurbished systems from Siemens, his practice network could overcome the local challenge of providing reliable and high-quality medical care for a very sparsely populated area.

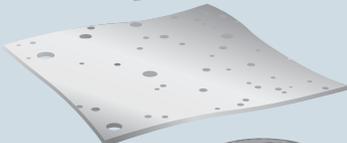


Customers Now Have Options to Pick and Choose...



Basic Refurbishment

- Touch-up painting
- Cleaned and disinfected
- Safety and performance updates
- Configuration based on RS price book



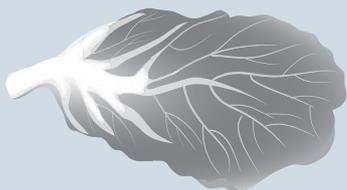
Option New Parts

- CT new X-ray tube
- MR new coils and cushions



Option Aesthetic Refurbishment

- Whole surface painting on visible parts



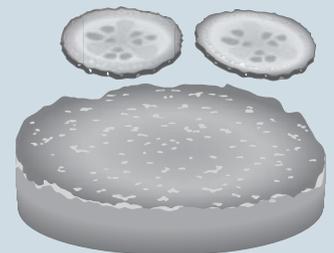
Option Technical Refurbishment

- Technical update and testing of system and components



Option IT Refurbishment

- New system IT hard- and software (Upgrade to last possible software/hardware)



good coil performance, is already proven and tested in two of our practices. Here in Riesa, it is an ideal secondary device for joints, spine, and skull examinations." Klengel further sees a gap between the potential accuracy of radiological diagnosis and its therapeutic relevance.

"Whether we run examinations with a routine or a high-end system depends on the diagnostic question. A heart scan, for example, requires a highly equipped system. For the imaging of joints, a sufficiently equipped routine system is truly satisfactory. So, significantly less energy consumption can be achieved in these cases. We also have to bear in mind how we consume energy. Over-consumption can be avoided, depending on the medical demand. So, we can manage more CO₂ reduction, work more economically, and spare the patient an unnecessarily strong magnetic field and high-frequency exposure, if it is diagnostically not required. Adapting the examination to the diagnostic need – for me this is one important aspect of sustainability."

What Will the Future Bring?

According to the customers' needs and their vision on sustainability, devices are manufactured with the goal of providing the most appropriate examination method for the patient. This is where the aspect of sustainability is a central theme through the complete diagnostic process. As the head of a practice that is exclusively equipped with environmentally-friendly pre-owned systems, Klengel has a clear view of what sustainability means for him. "To me, sustainability in radiology means to optimize the entire diagnostic process – not only in manufacturing medical technology, but also in the use of this technique. A meaningless waste of resources must be avoided."

Manufacturers and users of medical equipment should be aware of the costs as well as the benefits of their actions. "The medical technology industry needs to abandon the current trend to create a maximum, and rather move toward an optimum. Cerebral anatomical structures with 1024 matrix at three or seven Tesla MRI may look tempting. But to my knowledge, 95 percent of the diagnoses

the like was not as necessary for his practice.

Routine or High-end?

With the new acquisition, Klengel primarily aims to relieve the existing, high-end sophisticated MAGNETOM Avanto and deliberately decided on a well-established and adopted system: "MAGNETOM Symphony, a routine system with very

“An over-consumption of energy can be avoided, depending on the medical demand.”

Steffen Klengel, MD, Director, Medical Care Center (MCC) RadCom GmbH, Riesa, Germany

can be made accurately and sufficiently with considerably less technical effort, less energy consumption, fewer technical artifacts, and less patient exposure, but with an even higher image quality at 1.5 Tesla routine systems, compared to three or more Tesla systems. In the automotive sector, the discussion about ‘downsizing’ already reached a global level. In medicine, this thinking seems largely displaced.”

For a sustainable future of radiology, Klengel encourages further efforts. “I could imagine that some day more efficient and environmentally-friendly cooling systems such as brine would be used, or that a reasonable concept for the re-use of heat resulting from the superconducting high-field MRI systems would be developed. Also, the further development of permanent magnets with highly sophisticated coil architecture, transformed from high-field experiences, should be given a chance.” Klengel and his team have set an ambitious goal in their network: Bringing the CO₂ amount close to zero by compensating the energy consumption of medical devices. Their way to achieve this goal is to support reforestation projects in the rain forest of Nicaragua as well as in the domestic forest nearby Riesa. Klengel would like to see his colleagues in radiology as well as manufacturers of medical equipment implementing such concepts of voluntary CO₂ compensation.

Closer to the Patient

By establishing cooperations with other neighboring sites, Klengel and his team are tackling a special challenge in the region: Providing medical care for a very sparsely populated area. In the past, there were some particularly small hospitals in the region; they saw too few patients

and investing financially in high-end diagnostic systems would not have been a proper economical decision. Due to this fact, Klengel expanded his cooperation with hospitals and medical practices little by little. The result was a network of outpatient and inpatient facilities: The MCC now offers a spatial concept ensuring patients a reliable, high-quality radiological service as close to home as possible. Bringing medical care closer to the patient, according to Klengel, is one step further down the road of sustainable actions.

In the MCC region, sustainability has come to life. While maintaining levels of energy consumption through the acquisition of refurbished systems, Klengel and his team were able to establish an intelligent spatial concept of medical care to reduce travel distance for their patients. Selecting individualized features and components assisted Klengel in streamlining his practice’s workflow – ultimately, saving him time and money. Several systems on hand give the practice team the freedom to strategize how to consume energy in line with the diagnostic need. Day in and day out, the wind turbines continue to spin and the region’s wind power is harnessed to maximize the resources of nature, and just the same, the MCC harnesses its holistic concept: sustainability.

Tanja Berbalk has a degree in sociology, marketing, and communications. She is an editor at Medical Solutions.

Summary

Challenge:

- Offering a comprehensive, high-end MRI while being environmentally conscious
- Bringing radiological excellence to a sparsely populated region
- Relieve an existing high-end system

Solution:

- Scalable Process by Siemens Refurbished Systems: The customer can configure the system according to his or her diagnostic needs
- To create a portfolio of differently equipped diagnostic systems

Result:

- Costs adapted to business model
- CO₂ reduction
- Improved workflow by relieving high-end systems from unnecessary diagnostic use
- Improved patient care

Further Information

www.siemens.com/proven-excellence



Affordable Healthcare for Growing Economies

Siemens Healthcare produces the SOMATOM Spirit computed tomography scanner in the Chinese megacity of Shanghai. It is an ideal system for the entry-level segment: Reliable, fast, and affordably priced. A visit to a customer site illustrates how rural regions of emerging economies can benefit from both the system and the overarching Siemens strategy.

By Kathrin Schmich

Right in the heart of China, far from the country's teeming cities and roads, lies the province of Shanxi. A sleepy village road leads to Jiang County People's Hospital, which serves roughly 300,000 people from the surrounding area. In addition to its administrative building, emergency room, and patient wing, the hospital has a radiology department which Li Ze Hai, the hospital director, refers to as his "pride and joy." The reason for his enthusiasm is the Siemens system that has been installed there: Two years ago, Jiang County People's Hospital became the first hospital in the area to introduce the SOMATOM® Spirit computed tomography (CT) scanner.

"A trustworthy brand"

Li has not regretted his decision: "Not only does our hospital have the most advanced CT scanner in our region; we've also nearly doubled our profits." From his perspective, the Siemens brand was also a deciding factor when selecting the system. "Siemens is a trustworthy





热烈欢迎市妇幼卫生工作督导组来我院检查指导

救 120 急

晋M 24829

红十字标志
山西大学

brand that stands for quality," he says. Every day, patients arrive at Jiang County People's Hospital to undergo scans – without an appointment. Just at this moment, a woman who has injured her head in an accident has been brought to the radiology department by her family – clearly an emergency. Everything moves fast from this moment: Zheng Jie Hua, MD, quickly positions the patient and sets the CT scanner in the control room. "This kind of head scan used to take ten minutes," Zheng recalls. "But with the SOMATOM Spirit system, the whole process – including patient positioning and removal – now takes no more than five minutes." A benefit for the patients as well, so they can return to their family as soon as possible.

10,000 Scans – And No Failure

At the same time, Zheng's colleague, radiologist Zhang Yi Qun, MD, evaluates

nicians visit the hospital regularly to check and service the system.

Growing Demand for High-quality, Affordable Care

Jiang County People's Hospital is an excellent example showing the demand for the SOMATOM Spirit scanner, especially in rural areas of China and the comparable emerging markets of Brazil and India. To stay competitive in these markets, Siemens has steadily reduced the cost of the SOMATOM Spirit system in recent years – all while maintaining the same high standard of quality. By taking this approach, Siemens is also providing a growing segment of the population access to proper, quality healthcare – which can be hard to obtain, especially in emerging markets. Outside of the major urban areas, the necessary medical infrastructure is often lacking: Many local hospitals are simply unable to afford

of training in Beijing, the capital of China, knowing that the newly purchased system awaited him.

Sustainable Solutions

Siemens is currently hard at work to increase access, since offering high-quality medical care to everyone is one of the core principles of the Siemens Healthcare sustainability concept. This concept is illustrated 1,000 kilometers (600 miles) away from the Jiang County People's Hospital, at the Shanghai Medical Park. There, at the headquarters of Siemens Healthcare, Kong Jun, PhD, general manager of the Siemens CT business in China and head of research and development (R&D), sits in his office and reviews the SOMATOM Spirit system's success story. In 2003, he was appointed head of R&D just as SOMATOM Spirit development started. "The Chinese market is developing very fast," Kong says.

“With the SOMATOM Spirit system, not only does our hospital have the most advanced CT scanner in our region, we have also nearly doubled our profits.”

Li Ze Hai, Director, Jiang County People's Hospital, Shanxi, China



the clinical images taken of another patient. What really impresses her about SOMATOM Spirit, aside from its ease of use, is its reliability. "We have not had a single failure throughout the years, and we have performed around 10,000 scans," Zhang says. Outstanding service is yet another element that contributes to a superior track record: Siemens tech-

systems or to provide some of the necessary functions. Another issue is often a scarcity of trained healthcare personnel in rural areas. The Jiang County People's Hospital does not have this problem, however – in part thanks to the SOMATOM Spirit scanner. Chief radiologist Zheng did not have second thoughts about returning to the facility after completing a year

"The time was right for a product like SOMATOM Spirit – a multislice scanner for the entry-level market segment."

S.M.A.R.T. Products for the Entry-level Segment

The tremendous success of the SOMATOM Spirit proves Kong right when he says the timing was perfect: About 600 systems

are now installed in China, primarily in rural areas. Boasting its major characteristics – reliability, speed, and cost effectiveness – SOMATOM Spirit is a perfect fit for the S.M.A.R.T. strategy of Siemens. S.M.A.R.T., which stands for Simple, Maintenance-friendly, Affordable, Reliable, and Timely to market, encompasses products that have been especially well received in emerging markets. Physical proximity to the customer is key in this approach. SOMATOM Spirit is not only produced in China – one-third of the total production volume is also sold directly in the country. About 21 percent of the approximately 300 systems produced annually are sent to Brazil, followed by Japan at 13 percent, and India at ten percent.

Local Training Units

At the customer’s location, Siemens goes beyond merely installing the system; customer relationship management expert

He knows what is important to them and how much they value the system’s user-friendliness. To continue adapting the system to customers’ needs, Shi conducts an annual survey of their satisfaction with SOMATOM Spirit. Here too, the responses hail praise for the system’s reliability.

Challenges and Opportunities

Of course, competitors are also aware of the opportunities in emerging markets. General Manager Kong is aware of the challenges facing “his” system in its base market of China. Although he is also sure about one thing: “With smart innovations, we will be able to hold our ground in the Chinese market.”

This should be possible as long as there are customers like hospital director Li who plans to rebuild the hospital in the next few years. As he proudly presents the plans, he tells us that he will be rely-

Summary

Challenge:

- To develop high-quality healthcare systems in emerging markets

Solution:

- S.M.A.R.T. (Simple, Maintenance-friendly, Affordable, Reliable, and Timely to market) products
- Local production that meets strict Siemens quality standards
- On-site customer training
- Integration of customer feedback into the further product development process

Result:

- Reliable, user-friendly, and cost effective systems
- Wider range of diagnosis and treatment options onsite



More than 300 SOMATOM Spirit systems are produced in Shanghai each year.



Every day, patients arrive at Jiang County People’s Hospital to undergo scans with SOMATOM Spirit.

Shi Yong Zhen also provides training to familiarize customers with its operation. In two units – one basic training session and one workshop for clinical applications – Shi trains hospital staff how to use SOMATOM Spirit. A former employee of the radiology department at a teaching hospital in Shanghai, Shi is intimately familiar with the customers’ perspective.

ing on proven quality for new equipment purchases. “We would like to invest in even more Siemens systems.”

Kathrin Schmich is an editor at Siemens Healthcare.

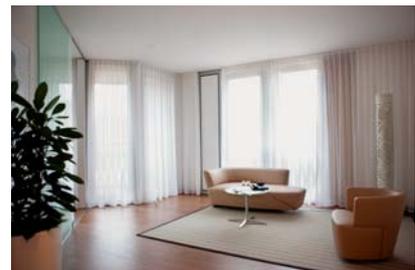
Further Information

www.siemens.com/somatom-spirit
www.siemens.com/annual/10/reportagen/reportage_02.html

The Future of Healthcare Is Green

Patients have come to expect the best possible care from medical institutions. A private hospital for plastic surgery and preventive medicine in Heidelberg, Germany, is proof that cutting-edge healthcare is more than that: The Ethianum's approach to sustainability brings together quality of care, efficiency, and environmental protection.

By Philipp Grätzel von Grätz, MD



From outside, the Ethianum looks, well, ... normal. Granted, there is some vegetation on the roof. The windows are somewhat larger than you would expect from a hospital. There are several nice balconies, some of them overlooking the Neckar Valley. And the lawn is very neatly trimmed.

But it's only when you are inside that the hospital truly makes its impression. This is not a conventional hospital entrance hall, but rather a dome resembling the Roman Pantheon with its circular window in the middle of a very high ceiling. Unlike the real Pantheon, the roof's window is covered with glass. Heidelberg is

Style and a certain grandeur are what strikes the visitor when first entering the Ethianum. But there is more behind the façade: With 40 beds and 75 full-time staff, the Ethianum is a reference site for Siemens' Green+ Hospitals program. Situated directly adjacent to Heidelberg University Medical School, it was designed from scratch not only to offer the best possible quality of care and a hotel-like atmosphere, but also to set new standards in terms of environmental protection and efficiency in healthcare and logistics.

"For me, a truly innovative hospital is not only about atmosphere, but also



“For me, a truly innovative hospital is not only about atmosphere, but also about sustainability.”

Peter Görlich, PhD, Managing Director, Ethianum, Heidelberg, Germany

not on the Mediterranean, after all. But this is pretty much the only compromise. As you would expect from a Pantheon, the upper walls are filled with the names of medicine's all-time heroes: Sauerbruch, Galenus, Hippocrates, Al-Razi, to name just a few. Closer to the floor, the walls are covered with what looks like copper plates. It is not actually copper, but a convincing imitation.

New Environmental and Efficiency Standards

"Creating a hotel-like ambience is not so much about money but about having an aesthetic vision and implementing it," says Peter Görlich, PhD, Ethianum's Managing Director. It is the details that impress the visitors: The floor is not blue or green, but dark brown with a parquet-like texture. The wardrobes and shelves are distinctly stylish. There are lifestyle magazines waiting for readers everywhere. "This isn't expensive, either. We employed a hotel specialist, and she knew how to get these subscriptions for a competitive price."

about sustainability. The whole care and logistics concept has to be rethought in terms of sustainability," says Görlich. Building a sustainable hospital is a reputation enhancer, of course, but it is also good for the balance sheet: "Healthcare costs continue to be an issue. But hospitals simply cannot reduce staff any further. So, it was clear to us that we needed to take a new approach. We started to think about reducing energy expenditure and streamlining processes." Once the idea of building a hospital in line with sustainability standards was mooted, the search for partners began. "We were extremely lucky to have aesthetic surgeon Professor Günter Germann with us who is very willing to discuss sustainability aspects. Both Professor Germann and myself had already been in contact with Siemens. So, the decision for Siemens and the Green+ Hospitals program was taken." In retrospect, Görlich considers this an ideal choice: "It was a big advantage to have someone with expertise not only in medicine but also



Modern medical technology, sustainable care processes, and a relaxing atmosphere go hand in hand.



in areas like building automation and digital infrastructure. It was crucial for the success of the Ethianum to have close cooperation among the architect, the planning staff, and the project coordinators. This worked extremely well.” To have the opportunity to build a new hospital from scratch rather than having to renovate an existing one was certainly an advantage. Take energy expenditure: The Ethianum was built with state-of-the-art insulation in order to reduce the

amount of energy required for heating. It features large windows, which reduce the need for artificial lighting. It has its own geothermal energy facility with no less than 40 individual bore holes. And in order to adjust energy consumption to actual needs, a sophisticated building automation system provided by Siemens Building Technologies allows a facility manager (and indeed the patients from their bedside terminals) to fine-tune energy consumption. “The energy con-

sultants told us that under ideal circumstances we will be able to reduce the amount of energy that is consumed per patient bed by 50 percent annually. We did not expect to achieve this quickly, but it remains our goal. And, there is a clear trend that we are heading in the right direction,” says Görlich. Energy was also an issue when it came to deciding on which medical technology to implement. “We went out and analyzed the market to see which equipment fit



Dr. Görlich and his dedicated team at the Ethianum focus on process-oriented improvements that are in the best interests of the clients.

Feel the Difference

Peter Görlich is the Managing Director of the Ethianum in Heidelberg, Germany. He is convinced that sustainability is more than a concept. It is tangible.

The Ethianum is the first German clinic developed with the Green+ Hospitals program. Let's assume that I am a patient in your hospital.

Would I actually feel the difference?
GÖRLICH: You would feel the difference. Sustainable healthcare as we understand it goes hand in hand with a different approach toward the client. The whole atmosphere will remind you of a hotel rather than a hospital. We don't have aquarium-like rooms for nurses, for example, but open, lobby-like areas that make it far easier to interact with the staff. Your medical records will be transparent to you as well: During ward rounds, your doctor will discuss your

problems using your bedside computer terminals. And, by the way, you won't be called a patient, but rather a client.

Saving energy is an important issue in terms of sustainability. How would I know that you're saving energy? Are the rooms darker? Will I have to freeze in winter?

GÖRLICH: For us, energy-efficiency means that energy is consumed according to actual needs. We have a building automation system that allows energy consumption to be fine-tuned down to the room level. As a client, you will be able to adjust the temperature and lighting with the help of your bedside termi-

nal. So, again, sustainability for us means higher comfort for you. No dark rooms. No freezing.

Does this also hold true for the actual medical care process?

GÖRLICH: It certainly does. In the radiology department, for example, we no longer use X-ray films or chemical developer. We are working with a digital X-ray system. This is good for us and good for the environment. But it is also good for the client, because you will be exposed to far less radiation compared with an analogue system. We are convinced that a larger outlay in the beginning pays off for everyone involved.

best with our hospital concept." Apart from current consumption, a proper recycling loop for the machines was also important. Görlich: "We wanted to be consistent in what we do. This includes caring about what happens at the end of the life cycle. It came to be that Siemens, again, had the most convincing concept, and so we procured much of our imaging technology from them."

Medical technology nicely illustrates that high-quality care, sustainability, patient comfort, and business economics can go hand in hand. For magnetic resonance imaging (MRI), for example, Ethianum chose MAGNETOM® Verio. The system provides excellent image quality for diagnostic confidence. It is environmentally friendly because 95 percent of the materials can be recycled. MAGNETOM Verio offers high patient comfort thanks to the 70-centimeter large diameter of its Open Bore. And it is a financial winner, since a closed helium cycle with "no" helium boil-off means a drastic reduction in expensive helium consumption.

A Revolutionary Logistics Concept

Efficient processes in material logistics are also part of the Ethianum's sustainability concept. For example, there is almost no stockpiling of medical materials. "We have an emergency repository, of course, but that's it. All other material is delivered on demand and paid for only after it has been used," explains Görlich. For a hospital, at least, this approach is revolutionary. It has resulted in a marked decrease of capital lockup from 350,000 euros per month to 50,000 euros per month for 40 beds. And again, patient comfort is increased, because fewer repositories allow for bigger rooms and more lavish floors. For a system like this, it is necessary to know exactly what kind of material is required for what kind of intervention. Which is why "Kit-Packs" are ordered separately for each patient, depending on the kind of treatment that is planned.

Obviously, processes like these will only work if an efficient digital infrastructure is available. At the Ethianum, patients can enter relevant medical data online

before admission. This saves time when the patient arrives at the hospital. But it also allows equipment to be ordered promptly. Not surprisingly, the hospital is largely free of paper. On the ward, in particular, all documentation is digital, including nursing charts. In order to make this possible, a modern communication infrastructure was installed. Siemens provided bedside terminals that can be used by both patients and staff. Doctors use smartcards to sign in before being granted access to patient data, and digital signatures have been implemented down to the document level. "Even a pain medication that's applied outside of the pain regimen needs to be signed," says Görlich.

Digital signatures also allow for proper electronic archiving. This is crucial, since – as in every hospital – the Ethianum's archive is set to grow rapidly, according to Görlich: "We expect to treat around

3,000 inpatients a year, and the number of outpatients who come to us for medical checkups and smaller aesthetic interventions will probably be even higher." But the Ethianum cannot and will not increase patient numbers infinitely, Görlich says. "We want to maintain our care standards, our service quality, and the personal atmosphere."

Philipp Grätzel von Grätz is a medical doctor turned freelance writer and book author based in Berlin, Germany. His focus is on biomedicine, medical technology, health IT, and health policy.

Further Information

www.siemens.com/green-hospitals
www.ethianum.de

Summary

Challenge:

- Build a hospital that features both high-quality care and environmental sustainability
- Generate savings by reducing the amount of energy per patient bed and by streamlining processes and logistics
- Increase patient comfort and place the patient at the center of care

Solution:

- Apply Green* Hospital standards
- Optimize energy consumption with geothermal generators, building automation, and innovative use of lighting and medical technology
- Switch to a just-in-time logistics concept
- Implement a secure communication infrastructure with bedside access to patient data and patient services

Result:

- A modern private hospital, specializing in aesthetic medicine and prevention, that meets hotel standards with 40 beds for 3,000 inpatients and even more outpatients annually
- Reduction of energy consumption per patient bed of up to 50 percent and decrease of capital lockup from 350,000 euros per month to 50,000 euros per month



On the same veranda where, in the early 20th century, tuberculosis patients spent years breathing away their disease, visitors like Iqbal Survé today can enjoy a cup of coffee – weather permitting.

Doing Good and Doing Well

Arriving in Davos, Switzerland, Iqbal Survé had to cope with a 45-degree Celcius drop in temperature within hours. But the South African business leader and former anti-Apartheid activist adapted quickly. Survé, a member of the Siemens Sustainability Advisory Board, jumped about in the snow. After all, life is about happiness.

By Philipp Grätzel von Grätz, MD

Where if not at the World Economic Forum in Davos could one meet and discuss sustainability? And where if not in the Schatzalp Hotel could one talk about what is and is not sustainable in healthcare and healthcare policy? The former tuberculosis clinic with its splendid view of Rinerhorn inspired Nobel Prize winner Thomas Mann to write his most famous novel "The Magic Mountain" in 1924. After World War II, the sanatorium closed permanently. But the Schatzalp building survived the European tuberculosis pandemic to reinvent itself as a hotel that deals playfully with its morbid past. Thomas Mann's favorite cigars, for example, can be ordered in the X-ray bar, which still features the massive light boxes that were used to show chest radiographs to early twentieth century patients. And on the Art Nouveau veranda, where these same patients spent literally years just lying around and breathing, guests can now enjoy a simple coffee. With temperatures of minus ten degrees Celcius, Iqbal Survé preferred to talk inside, though. And rather than contemplating illness, like the "Magic Mountain" protagonists, Survé preferred to envision a future when individual health and a sustainable lifestyle go very much hand in hand.

"The Magic Mountain" is the story of a young man who uses illness as an excuse for retreating from a world in transformation. Today, the world is transforming again. What role – if any – does healthcare play in the global sustainability debates?

SURVÉ: Let me start by saying that this is really a great setting. The fact that we are in a former tuberculosis clinic is interesting from a sustainability point of view, because the history of tuberculosis can teach us something about the link between healthcare and sustainability. Tuberculosis is a disease that was rampant in Europe during early industrialization. Today, it is a disease of developing countries and virtually absent from many parts of Western Europe. There is a clear message here: Industrialization brought advances in basic sanitation, in basic conditions of humanity. This was the main reason why Europe was able to eliminate tuberculosis, and it obviously was a very sustainable solution. Shipping tuberculosis patients up here, by contrast, was not too sustainable outside the realm of literature. To answer your question: Healthcare is certainly not at the heart of most sustainability debates, which tend to center on energy and climate. But

"Health is systemic, and because it is systemic it will always be linked to sustainability."

Iqbal Survé, MD, Chairman,
Sekunjalo Investment Holdings,
Cape Town, South Africa

since health depends on factors like drinkable water or clean air, we cannot ignore it. Health is systemic, and because it is systemic it will always be linked to sustainability.

How would you explain the concept of sustainability to a school boy?

SURVÉ: I like the simplest definition, which is leaving a future for our children. Once you start thinking about what kind of life your children are going to have in the future, you are already in the middle of the sustainability debate. Sustainability

is about actively creating an environment for the future without sacrificing values, cultural traditions, or the environment.

Before you became a business leader and sustainability expert, you worked as a medical doctor. How do these two worlds go together? Where is the sustainability in your own career?

SURVÉ: The common factor is values. No matter what I did, it was always about trying to create a better future, a pursuit of happiness, if you like. When I was a medical doctor, I was also a political activist under Apartheid. What drove my sense of involvement at that time was that I wanted to overcome injustice, to overcome poverty, to help create a better South Africa, a more sustainable future. When Apartheid ended in 1994, the Mandela government realized that to get the new South Africa going, we needed not only a political but also an economic transformation. The problem was that black people were excluded from big business during Apartheid. So Mandela said: Some of you will have to give up a career and go into business. That is how I became a business leader. The question then was in which direction to go. I started thinking about business in terms of poverty reduction, job creation, giving people dignity, and ended up as chair of a financial services company that funds sustainable business projects.

You said that values are at the heart of sustainability. What are the core values of the old healthcare world that should be kept in a sustainable future healthcare system?

SURVÉ: I have always been convinced that the most basic objective of good healthcare is not just to save people's lives or to heal people but to give them a better quality of life and indeed to make people happy. The ultimate objective of life is becoming happy. We are very fortunate today that we've got the technology to be able to deliver a much better quality of life to many people, and we should use it for everybody's sake. On the other hand, it is clear that healthcare needs to become far more efficient in order to become sustainable. Technology can help



Iqbal Survé, MD, is one of the leading experts on sustainability worldwide. As such, he is one of ten members of the Siemens Sustainability Advisory Board that was created in 2009 in order to help Siemens maintain a position as a global leader in the provision of sustainable technologies. Survé was a medical doctor in South Africa before he decided to become a social entrepreneur after the end of the Apartheid regime. He is Chairman of the Sekunjalo Group, a company that focuses on offering financial services and support to sustainable business projects with a focus on Sub-Saharan Africa. Dr. Survé is a member of various prestigious boards, such as the HRH the Prince of Wales's Business & the Environment Programme, and was a founding member of the Clinton Global Initiative of former US President Bill Clinton, where he served as an Advisory Board member on Governance.

enormously in reaching this goal. More energy-efficient medical technology, for example, will help hospitals free money that they can spend for the benefit of the people instead. Digitizing care processes will have similar benefits. And it is also sustainable, because it saves paper and trees and protects the environment. A company like Siemens, with its strengths in healthcare and in sustainable technology, is uniquely positioned to be at the forefront of this development. And they should push forward. It is good for the people, for healthcare, and for business. I like the saying: 'Do good and do well at the same time.' This is my prime advice to healthcare companies.

But switching to sustainable technology in healthcare is remarkably expensive in the beginning, isn't it? How will particularly low-income countries be able to cope with that?

SURVÉ: I don't think we have a choice. The economist Joseph Stiglitz makes the point that when people talk about a green economy, they tend to say it is too expensive to develop solar or wind energy, for example. But this is the wrong way to look at it. Yes, it is more costly today. But in the long run, a developing – I prefer the term fast-growing – economy will enjoy considerable benefits, in terms of energy as well as healthcare.

Sounds good in theory; but does it work in practice?

SURVÉ: I can give you a good example. One of the legacies of Apartheid in South Africa was that it had created a health-care system that was designed to care for the white community only. So when the new government came in, a big task was to implement a working healthcare system for 35 million instead of six million people within a very short time. We pumped a lot of money into these efforts, but we were not able to achieve the desired outcome. So we looked at Europe and realized that in big European hospitals, more or less all processes are assisted by IT solutions that increase efficiency. We then approached the regional government and said: Look, are you prepared to spend a billion Rand in order to equip a big tertiary hospital in Cape Town with a modern IT infrastructure? They were. Today, it is a more or less paperless hospital that communicates digitally, not only within the institution but also with community clinics and mid-sized hospitals. And I tell you: It is a thousand times more efficient than any other South African hospital.

Did other regions jump on the bandwagon?

SURVÉ: We are busy implementing a similar solution in Gauteng. And we are in discussions in other provinces as well. But you really have to convince every minister in every regional government. It's hard work.

Would it help if companies tried to develop different products with different price levels for different countries? Or should they just try to make their products sufficiently cheap?

SURVÉ: I prefer the alternative you suggested: Let us try to develop the best technology for everyone, while also making it more affordable. This makes more sense from a business point of view as well, because you sell your technology to a much greater target group. We should also not forget that the economic world atlas has changed forever. The one thing that prevented the world economy from suffering a complete

collapse in the recent crisis was the fact that China and India were still buying. If this had not been the case, it would have been the end of the market economy as you and I know it. What we can learn from the field of telecommunications is that economies like Africa, China, India, and Brazil can make the technological quantum leaps pretty quickly. This represents a major opportunity for large western companies. My message is: When it comes to creating a sustainable future in healthcare, there is a golden opportunity to be an early mover in fast-growing economies these days. Grabbing this opportunity makes business sense. It makes environmental sense. And it makes sense for humanity.

In "The Magic Mountain," psychoanalyst Dr. Krokowski contemplates health, and he says: "I, for one, have never in my life come across a perfectly healthy human being." The WHO took up this extremely broad concept of health 30 years later when it defined health as a state of total physical, mental, and social wellbeing. Don't we need a less ambitious concept of health for a truly sustainable future of healthcare?

SURVÉ: We do need a new concept of health, but we do not need a less ambitious one. A healthcare system can only be sustainable in the long run if it takes prevention seriously. And this implies having a broad concept of health. But it does not necessarily mean that it is all about doctors and institutions. Again: It's all systemic. The ultimate goal of life is happiness. One of the things you need in order to be happy is health. And in order to be healthy, you not only need a working healthcare system that provides good care to everyone, you also need drinkable water, an intact social environment, clean air. And these are all sustainability topics. Sustainability is about future generations, their health, and their happiness.

Philipp Grätzel von Grätz is a medical doctor turned freelance writer and book author based in Berlin, Germany. His focus is on biomedicine, medical technology, health IT, and health policy.

Further Information

www.siemens.com/sustainability



The sanatorium turned hotel Schatzalp (www.schatzalp.ch) features beautiful Art Nouveau architecture and furnishings – and room for thought about sustainable healthcare.



The Lab of the Future – Today

G. Fornaroli Hospital in Magenta was one of the first hospitals in Italy to install the VersaCell solution. Both physicians and staff praise its efficiency, dependability, and flexibility, as it streamlines workflow and reduces risks from human error, all while saving time, space, and money.

By Claudia Flisi, MA

“VersaCell provides total management of the blood sample.”

Giulio Vignati, MD, Director,
Center for Endocrinology and Metabolic Diseases,
G. Fornaroli Hospital, Magenta, Italy



The VersaCell system at CMEM is running 50 different tests. It connects the IMMULITE 2000 XPi and one of CMEM's ADVIA Centaur units, significantly reducing operator time.

Although Italy has one of the best health-care systems in the world (second only to France in the World Health Organization's ranking¹), it confronts problems common to many such systems globally: rising costs, increased demands from an aging population, limited room for expansion in older facilities, and political pressure for greater productivity. Magenta is in the Lombardy region of Northern Italy, about 25 kilometers (15.5 miles) from Milan. While Magenta's population is only about 24,000, Lombardy is the most heavily populated region in the country, and the hospital's Center for Endocrinology and Metabolic Diseases (CMEM) handles more than 1.4 million analyses annually. More than half of these – 55 percent – are outpatient tests. CMEM also handles another 400,000 tests from the neighboring town of Abbiategrasso. So when the head of CMEM, Giulio Vignati, MD, first heard about a new Siemens laboratory system that would help him address his workload challenges, he was eager to learn more. Vignati is

both a member of the Italian board of ELAS, the European Ligand Assay Society, and the scientific director of *Ligandassay*, the magazine published by ELAS Italy. And he is very familiar with Siemens: His laboratory has one IMMULITE® 2000 XPi and two ADVIA Centaur® immunoassay systems. “We have been using Siemens equipment for close to two decades,” he notes. So when the VersaCell™ system was launched in Italy in 2009, Siemens invited Vignati to try out the technology first-hand.

The VersaCell solution supports a wide range of two-instrument connections and combines unique sample management capabilities that improve a laboratory's workflow. It has four drawers holding up to 50 samples each for loading both routine and short turnaround time (STAT) samples, and a robotic arm that moves the samples from one analyzer to another.

Vignati visited Siemens' systems and software research and development center in Flanders, New Jersey, for five days, and then spent another two weeks discussing the productivity implications of the new technology before it was installed in September 2009. “We were handling

300 tubes a day before VersaCell,” he recalls. “That took time and required the manual transfer of tubes from one machine to another, plus the risk of human error in labeling, sorting, and consolidating results.”

Track-based automation was not an option at G. Fornaroli. There simply was not enough room. However, the VersaCell system's small footprint of 130 x 178 x 104 centimeters could fit, and it was configured to connect the IMMULITE 2000 XPi system with one of CMEM's ADVIA Centaur units.

A Multifunctional Lab Tool

Compared to total lab automation (TLA), the VersaCell solution is less expensive, takes up significantly less space, and has notable flexibility, according to Vignati. “You can connect two ADVIA Centaur or two IMMULITE systems, you can do clinical chemistry and immunochemistry, and you can run a large number of tests on the system. At present, VersaCell is running 50 immunoassay tests, and it works like a single instrument,” he emphasizes. The doctor's enthusiasm is detailed and documented: “VersaCell provides total management of the blood sample, maps

¹ http://www.who.int/whr/2000/en/whr00_en.pdf.
Last accessed Jan. 26, 2011



Apollo Hospital in New Delhi belongs to one of the largest healthcare groups in Asia with more than 8,500 beds across 53 hospitals within and outside India.

Improving Performance in a High-Volume Lab

The telephone used to ring incessantly every morning in the biochemistry laboratory of Apollo Hospital in New Delhi, India. Doctors who had requested blood tests for their patients in intensive care would expect to see the results when they began their rounds at 8 a.m. If the results weren't ready, the doctors called the lab.

"I would sit at my desk and the phone would be ringing constantly from doctors who wanted to know when their results would be arriving," reports Abha Gupta, MD, a senior consultant for the hospital and member of the ethical committee for Apollo's clinical research trial program, who has been leading the lab for more than 15 years.

Dr. Gupta explains that blood samples for the intensive care unit (ICU) are taken between 4 a.m. and 6 a.m., when the lab is less than fully staffed, so technicians would struggle to complete the reports by 8 a.m. That changed completely when the lab installed a Siemens VersaCell™ system in January 2010 and linked it to a newly purchased ADVIA Centaur® instrument and a then one-year-old ADVIA®



Lab head Abha Gupta is proud of the fact that more than 95 percent of ICU reports arrive on time.

1800 instrument. "Today, my phone almost never rings with requests for ICU reports," she says. "More than 95 percent of ICU reports arrive on time, as they should."

Serving more than 19 million patients from 55 countries, the Apollo Hospitals Group is one of the largest healthcare groups in Asia. It is recognized as a leader in bringing medical innovation to the region.

Among the group's 53 hospitals, Apollo Delhi is the first in India to have been accredited

by the U.S.-based Joint Commission International (JCI) in 2005 and has since been re-accredited.

The laboratory handles between 5,000 and 6,000 tests per day, about 60 percent of them generated by the hospital's 600 inpatients, and the remainder by outpatient requests. Another 150 beds will be added in 2011. Gupta has been looking at track-based, full automation systems for more than a decade, but has been limited by the physical space available. She says the VersaCell system seemed like a compact way to achieve consolidation, and has since proven its worth.

The multiple benefits are both direct and indirect, says Dr. Gupta, noting that turnaround time has improved by 30 to 40 percent since the VersaCell system was installed. "We can produce the results of special immunoassays the same day now because of the integration of chemistry and immunoassay platforms through VersaCell. No sample segregation is required," she explains. In addition, short turnaround time (STAT) has improved by 50 percent – and even more in the case of the ICU. And last but not least, cost savings also result from the fact that blood does not have to be collected in two separate tubes. Only one tube needs to be labeled and handled. Needless to say, patients are happier because they have to give less blood, and doctors are happier because test results arrive faster and are consolidated.

The operation of the VersaCell system is so simple that only one technician is needed to operate the two analyzers, whereas previously two technicians were required. Human error is also reduced, as the technician does not have to program the tests to be completed. This information is already contained in a bar code on the tubes when they arrive at the lab. Apollo Delhi's satisfaction is evident in its plans for purchasing another ADVIA 1800 instrument to be linked to the VersaCell system.



Due to the lack of space, line automation was not an option at CMEM.

the results, and provides a seven-day history of its movement," he reports. "It integrates the information from the two machines so that their results are visible in one place, on one report, as well as separately. It has reduced operator time by 43.7 percent, reduced the need for blood tubes by more than ten percent, improved speed by almost 25 percent compared to separate machine analysis, and improved our laboratory's relative productivity index (RPI) by 35.4 percent." The improved turnaround time has made doctors in and outside the hospital very happy. Patients are also happy because they don't have to give as much blood – a benefit for both the squeamish and the time-sensitive.

Neither Vignati nor his staff was nervous about being one of the first hospitals in Italy to install the VersaCell system. Not only was the laboratory well acquainted with Siemens equipment, but Vignati had also studied the potential impact of the new device in detail with Siemens before installation. "Our preparation was minimal, because our technicians were already familiar with the two Siemens machines we linked," he explains. "We 'saved' three-quarters of a person, and that time is being used for other applications such as work in the microbiology lab. This

improves the lab's workflow and productivity, and is more stimulating for the employees, so it benefits everyone."

Doing More Without More Space

Vignati and his team are so pleased that they have made another request to Siemens. Vignati has asked Siemens to extend the automatic seven-day histories kept by the VersaCell system to 15 days, a change that Siemens is currently implementing. This modification will further enhance the VersaCell system's contributions to workflow improvement and laboratory management in a cost-effective way. Its performance has been so convincing that Italy has become one of the largest customer bases for the VersaCell system in Europe, with 30 installations – and more scheduled for 2011.

Claudia Flisi, MA, is a US-Italian freelance writer based in Milan, Italy. She covers a wide range of topics for her clients and has previously written about hybrid operating rooms and heart surgery for Medical Solutions. She has a BA with distinction from Mount Holyoke College in South Hadley, Massachusetts, and an MA from Johns Hopkins University in Baltimore, Maryland, USA.

Summary

Challenge:

- Growing – and aging – populations in countries around the world result in an increasing demand for routine blood tests
- Decreasing number of lab technicians in the workforce to perform tests
- Lack of space in many hospitals to install high-productivity line, or track-based, testing equipment

Solution:

- The VersaCell system drives versatile analytics with unique sample management by connecting two freestanding Siemens laboratory systems used for routine blood analyses, such as those in the IMMULITE and ADVIA immunoassay and chemistry series
- Connectivity in a space-saving unit delivers efficiencies usually found with larger and more expensive line automation systems
- Total management of blood samples, mapping of results, and integration of the information from the two connected machines

Result:

- Improvements in workflow, manpower productivity, and turnaround time
- Efficiency – operator time at G. Fornaroli Hospital's CMEM laboratory reduced by 43.7 percent, and relative productivity index (RPI) improved by 35.4 percent
- Flexibility – easy adaptation of the VersaCell system configuration to a variety of space requirements
- Versatility – ability to reallocate human resources to tests that are more complex and labor intensive
- Simplicity – easy adaptation to new systems by laboratory operators

Further Information

www.siemens.com/versacell



“A Lot of Findings Surprised Us”

Siemens Healthcare Consulting analyzes strategies, clinical processes, and infrastructures in healthcare, relying on full spectrum experience, an interdisciplinary team, and excellence in the process. A conversation about the consulting project at Düren Hospital, Germany.

By Hildegard Kaulen, PhD



Uwe Stelling, Gereon Blum, and the stakeholders at Düren Hospital worked closely with the Siemens Healthcare Consulting team led by Jens Schneider (from left).

Düren is a medium-sized city in the west of Germany, where the German border meets those of the Netherlands and Belgium. For two years now, the municipal hospital has been posting double-digit growth in all areas: business volume, staff numbers, and treatment figures. And the hospital management hopes to continue to grow in the future as well. To accomplish that, the hospital aims to boost the efficiency and profitability of its processes while maintaining high-quality of treatment. Following a consulting process, Siemens Healthcare presented a number of important action recommendations. Science journalist Hildegard Kaulen, PhD, spoke about the ambitious hospital with Uwe Stelling, Chief Executive Officer (CEO) of the hospital, Gereon Blum, MD, the hospital's Chief Medical Officer (CMO),

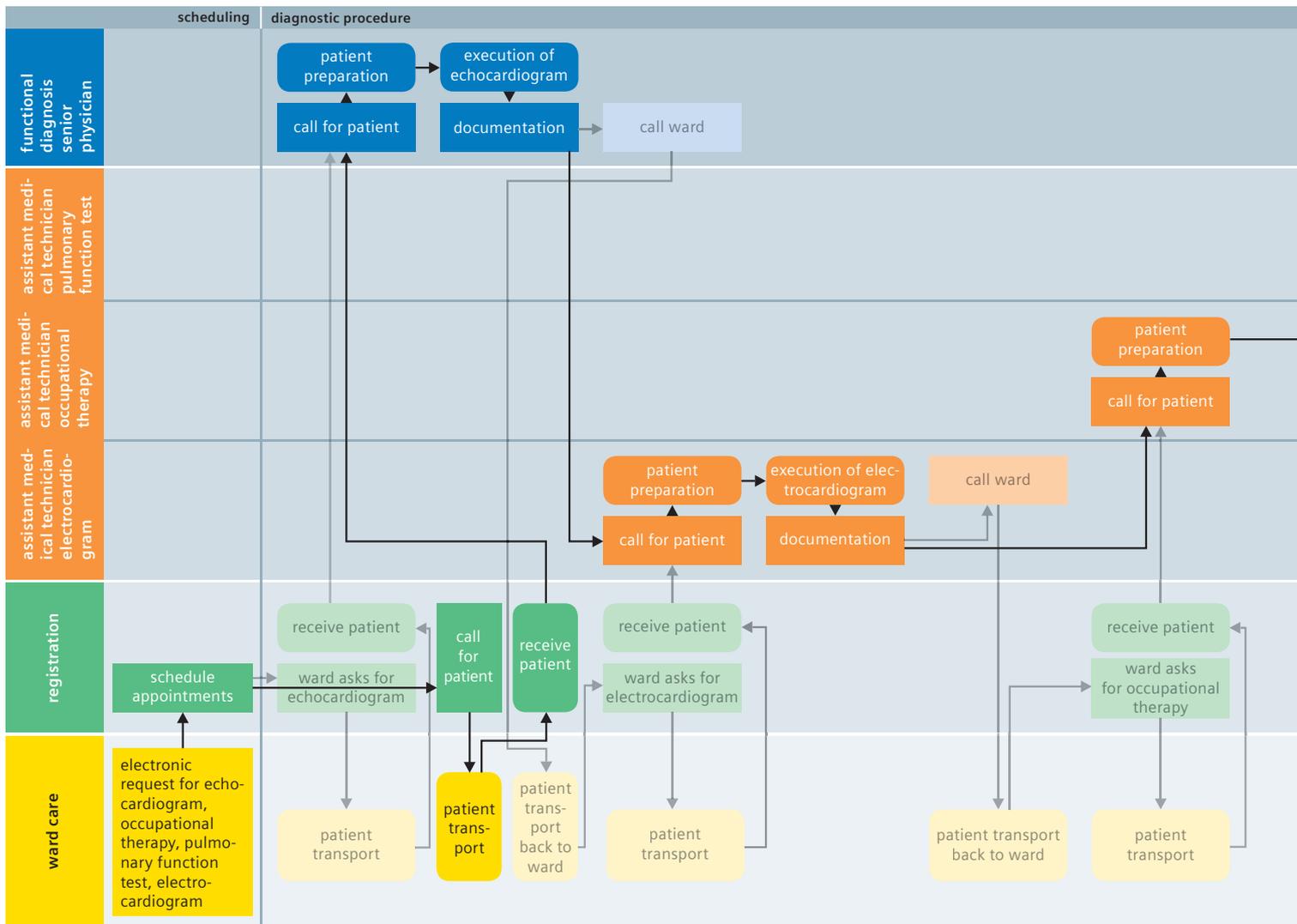
and Jens Schneider, Senior Management Consultant at Siemens Healthcare.

Mr. Stelling, you are responsible for operations and strategy. There are three other hospitals, funded by different bodies, in the city. That means that Düren has one hospital bed for every one-hundred residents. There are also four well-known university hospitals nearby, in Aachen, Cologne, Düsseldorf, and Bonn. Under these circumstances, where do you see still untapped potential for further growth?

STELLING: Despite the high density of healthcare options here, we are very optimistic about our situation. We are a specialized hospital with a position just below maximum care. We have sixty

beds in urology alone, and one hundred in cardiology. Viewed in terms of the quantity of cardiology services we provide, we do 75 percent of what University Hospital Aachen also does. But we do refrain from providing highly sophisticated services such as heart transplants or the correction of congenital heart defects – for strategic reasons. We also do not have a stroke unit. On the other hand, we are very strong in interventional cardiology, which has replaced heart surgery in many cases. We also provide round-the-clock emergency service to restore blood flow in patients with an acute heart attack and do a lot of catheter ablation procedures for treating atrial fibrillation. And, we have a Coronary Care Unit for monitoring heart problems. Because patients

Functional Diagnosis (Inpatients): Actual vs. Target Process



prefer to seek treatment locally, they first come to us – provided the services we offer and the quality of our treatment are excellent. That means we have every reason to expect that we will continue to grow.

So you don't compete with the other three hospitals in the city?

STELLING: No, our competitors are the four university hospitals. The other hospitals in Düren have different areas of focus. They occupy a strong position in geriatrics, neurology, and psychiatry.

So where do you hope to become more efficient and more profitable?

Dr. Blum, have you made specific suggestions in your position as CMO?

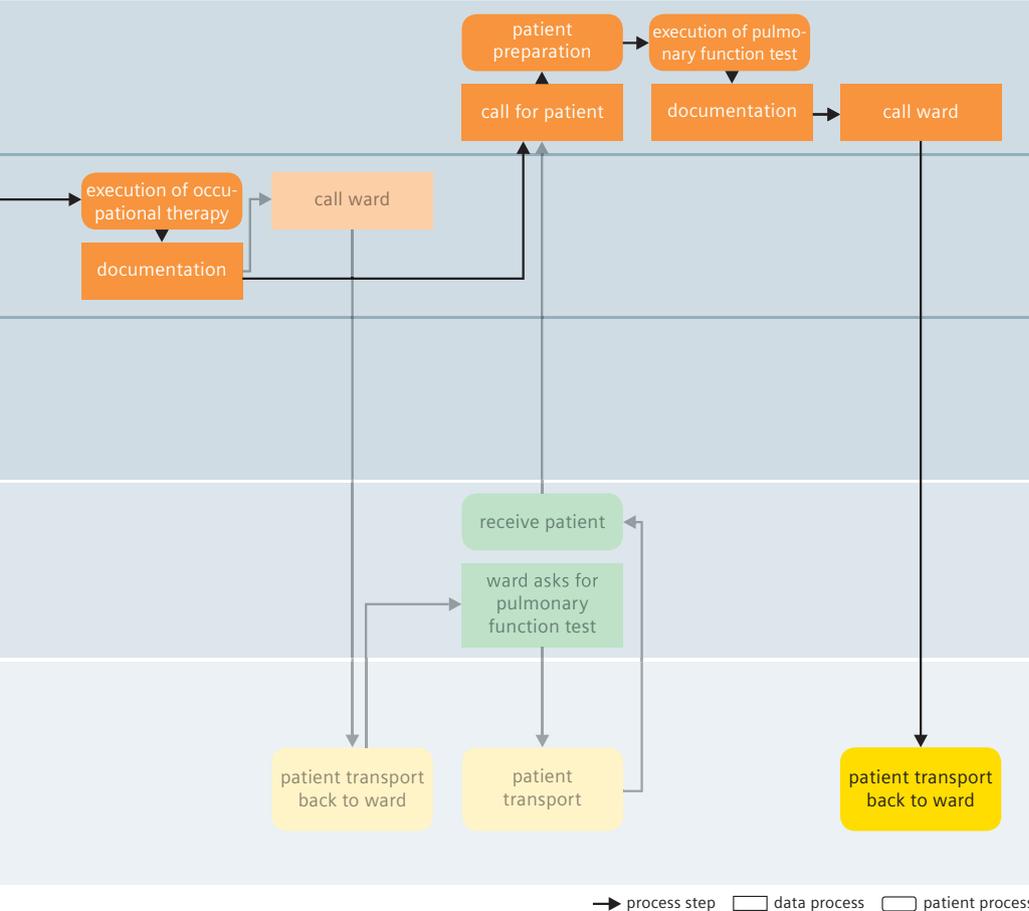
BLUM: We looked at cardiology for two reasons. First, cardiology patients occupy nearly one-third of our beds, which means that we are considering a relevant segment of our inpatient care operations. And beyond that, Mr. Stelling and I have repeatedly been informed that the cardiology clinic is hopelessly overloaded and urgently needs additional staff. We wanted to have tangible figures to help

us make decisions in that regard. That's why we asked Siemens Healthcare to monitor our ongoing work in cardiology and let us know what the relevant process barriers are. We wanted to arrive at a precise, independent analysis.

Mr. Schneider, you were responsible for the consulting project. Who did you start out with, and what did you do?

SCHNEIDER: In principle, we provide consulting on strategy, process optimization, and technology and infrastructure. The

The flowchart compares the actual processes (light colored) with the recommendations from Siemens Healthcare Consulting (dark colored).



“The precise analysis we received shows that we made the right choice.”

Uwe Stelling, CEO, Düren Hospital, Germany

team is assembled to fit the individual customer requirements. In most cases, we have physicians, business experts, technicians, management specialists, and representatives of health economics on board. We operate worldwide, and we have completed more than 400 consulting assignments in the past few years, so we have a broad range of experience. We start out by talking to the executive management. At that time, targets are set and questions are narrowed down. What we did at Düren Hospital was observe processes in detail and speak to physicians,

patients, medical staff, and administrative employees. We evaluated staff schedules, scrutinized appointment scheduling, reviewed bed occupancy information, and analyzed the duration of patient stays in the hospital. We also looked into admission diagnoses, case management, billing methods, central data capture, IT equipment, and much more. All of that helped give us a detailed picture of the specific process barriers. Then our specialists developed appropriate recommendations and solutions. At the same time, we always look for intersections between

The Interviewees



Uwe Stelling has a degree in business and has been CEO of Düren Hospital since October 2008. Before this appointment, he held various positions with the Humaine Kliniken group of hospitals, in which Helios Kliniken GmbH now holds a majority share.

Gereon Blum, MD, CMO, is an anesthesiologist and has worked at Düren Hospital for 21 years. He has been looking closely at capturing service data since the mid-1990s. He studied medicine at the University of Aachen.



Jens Schneider has a degree in business and has been a Senior Management Consultant at Siemens Healthcare Consulting for three years. Before that, he was head of business planning at the University Hospital Aachen. He obtained his degree from the University of Marburg.

the individual interest groups so that we can arrive at a broad consensus in favor of the solutions we propose.

So you take a very holistic approach?

SCHNEIDER: Yes, that's precisely where our strength is. We work with an interdisciplinary team and closely scrutinize every aspect, not just technology or the IT infrastructure.

STELLING: We specifically chose Siemens for that holistic approach. We wanted a single-source concept. The precise analysis we received shows that we made the right choice.

Did the result of the consulting assignment surprise you, or were you aware of many of the problems?

STELLING: A lot of findings surprised us. We knew that we were well positioned in terms of infrastructure and that we had issues with our processes. But a couple of very specific process barriers did come as a surprise to us.

Can you give an example?

STELLING: The process monitoring stage showed that we had given our patients simultaneous appointments for cardiac catheter exams. The result was a huge peak in capacity utilization in the morning, which staff perceived as highly stressful and led to a request for more staff.

We are now aligning the whole workflow by distributing our appointments better throughout the day. That means that there is no longer a peak in terms of

“We wanted to have tangible figures to help us make decisions.”

Gereon Blum, MD,
CMO, Düren Hospital, Germany

capacity utilization in the morning, which eases strain on staff, plus waiting time for patients could be reduced.

Another result of the process monitoring was that we need an additional echocardiography system to handle the high demand.

BLUM: I'd like to point out another example. It has to do with managing the duration of patient stays and with inter-departmental coordination of diagnostic chains. The process analysis made it clear that we often admit patients on an inpatient basis only because the necessary examinations are not performed promptly one after the other. Take a suspected heart attack, for instance. Lab values might suggest that no infarction is present, but an electrocardiogram should also be performed just to be safe. If that doesn't take place promptly enough, the patient is admitted as an inpatient to be on the safe side. This means that a bed is assigned and no longer available to relieve

the intensive care department. As a result, we may very well have to turn away an emergency patient that urgently needs to be seen because we don't have a bed free in

intensive care. When we do this, we're turning away a patient for which the hospital would receive 13,000 euro in reimbursement in favor of one that brings 1,100 euro. That's a tangible error in decision-making, and one for which we now have specific data for the first time ever.

You received the final report five months ago. Have the changes that were initiated already yielded measurable results?

Düren Hospital

Year founded:	1417, first documented reference as St. Agatha Hospital
Funding bodies:	City and District of Düren in equal amounts, clinic organized as a nonprofit limited liability company (<i>gemeinnützige GmbH</i>)
Facilities:	13 clinics, 3 institutes, on-site child care
Employees:	1,040 employees (2007: 865) Full-time employees: 750 (2008: 650)
Number of beds:	491
Inpatients:	20,000 per year (2007: 16,500)
Outpatients:	40,000 per year
Business volume:	75 million euro per year (2007: 55 million euro)

Summary

Challenge:

- Mounting cost pressure, increasingly stringent quality requirements, investment backlog, and staff bottlenecks in the healthcare sector
- Individual, site-related challenges
- Market and competition situation, strategic positioning, and processes require ongoing re-analysis

Solution:

- Siemens Healthcare Consulting examined the processes in cardiology
- Eighty percent of the problems described had to do with processes and process barriers
- Barriers in terms of managing the duration of patient stays, case management, appointment scheduling, bed management, IT equipment, and staff IT skills have a significant impact on the efficiency and profitability of processes
- Further analyses are planned, also in regard to the future portfolio and treatment quality

Result:

- Siemens Healthcare Consulting has performed more than 400 consulting assignments worldwide to date
- Like other customers, Düren Hospital was highly satisfied with the consultants' precise analysis
- It is still too early for measurable results, but the hospital management expects savings in the millions

STELLING: It is still too early to say. We won't see measurable results until one to two years from now. But we do expect savings in the millions. We made a lot of changes right away. The observation of our processes also showed us, for example, that many of our physicians lacked the skills to handle the hospital's software effectively, which meant that they felt inhibited by it. Entries were made slowly or put off until later. As a result, admission diagnoses were in the system too late. You can't implement IT-supported diagnostic chains or treatment paths unless the system also recognizes the patient.

BLUM: Naturally, we responded to that right away. Every new hire is trained in how to use the hospital's software on the very first day. We no longer let anyone work in the departments who cannot use the program confidently.

What is next for Düren Hospital?

STELLING: We plan to analyze other departments as well, such as our emergency room. We will also take a closer look at key indicators of treatment quality. Siemens did excellent preparatory work in this regard. We also plan to review our

strategic positioning and medical portfolio in greater depth and make adjustments where necessary. This fall, we will also put our new private unit into operation. It is being built right now, on the roof of the hospital building. If visibility is good, you'll be able to see all the way to the famous cathedral in Cologne.

BLUM: I'd like to stress that the entire assessment was very helpful to us. If you want to make far-reaching changes in a clinic, you will need an ally who provides you with an independent view on structures and processes. Siemens Healthcare Consulting was such an ally for us. We got quite some food for thought on further challenges.

Hildegard Kaulen, PhD, is a molecular biologist. After positions at Rockefeller University in New York and the Harvard Medical School in Boston, she has worked since the mid-1990s as a freelance science journalist for leading newspapers and scientific journals.

Further Information

www.siemens.com/healthcare-consulting



Combining Efficiency, Research, and Patient Care

The new generation of Siemens magnetic resonance systems serves the demands of modern hospital care by combining attractive features for patients with user-friendly technology for hospital staff. The University Medical Center Mannheim, Medical Faculty Mannheim, Germany, was the first hospital in the world to test the advantages of MAGNETOM Skyra.

By Annette Tuffs, PhD

Today, successful academic medicine is about achieving the highest efficiency, quality, and cutting-edge innovation – all while striving for maximum patient comfort and satisfaction. To fulfill such diverse requirements demands both technological advancement and clinical expertise. The first installation of MAGNETOM® Skyra, Siemens' latest 3 Tesla magnetic resonance imaging (MRI) system, at the University Medical Center Mannheim went a long way toward reaching these ambitious goals. The facility was the first in the world to be granted access to this groundbreaking top equipment. "We are honored to have been chosen as a partner," says Professor Stefan Schönberg, MD, Director of the hospital's Institute for Clinical Radiology and Nuclear Medicine.

The Medical Faculty Mannheim, part of Heidelberg University, has an excellent reputation for oncology and medical technology. It is also home to the Institute for Clinical Radiology and Nuclear Medicine, where state-of-the-art equipment provides the highest diagnostic standards to several thousand patients each year.

Increasingly Competitive Hospital Market

With mounting economic pressure on hospitals, fixed budgets for medical care in Germany, and the higher demands

of an increasingly competitive hospital market, modern diagnostic equipment is one of the cornerstones needed to ensure a hospital's high-standard patient services and reputation while maintaining top notch access to translational MRI research. The new Siemens MAGNETOM Skyra and MAGNETOM Aera (1.5 Tesla) systems combine visible high-standard patient care with efficiency and technical innovations. The introduction of Tim® 4G (Total imaging matrix) technology and Dot™ (Day optimizing throughput) engine with MAGNETOM Skyra and MAGNETOM Aera makes important contributions to enhancing the productivity of imaging procedures, not only improving quality, but also increasing patient throughput and therefore, the overall economy of an imaging department.

At the same time, Tim's 4th generation (Tim 4G), with up to 204 coil elements and up to 128 receive channels, allows further scientific developments for higher temporal and spatial resolution as well as anatomic coverage. The DirectConnect cableless or SlideConnect coils are easy and fast to handle and allow flexible combinations of multiple coils, offering parallel imaging in all directions and therefore, major advantages in orthopedic, neurologic, oncologic, and angiographic imaging. Additionally, the Tim coils allow the complete anatomy to be

Through the integration of Tim and Dot, MAGNETOM Skyra sets a new standard of efficiency and top-notch research. The open space and the friendly design is enhanced by the option of a pleasant "Illumination MoodLight" atmosphere.



“Our initial experience opens the horizon for further integration of cutting-edge scientific developments into clinical routine.”

Stefan Schönberg, MD, Director, Institute for Clinical Radiology and Nuclear Medicine, University Medical Center Mannheim, Medical Faculty Mannheim, Heidelberg University, Mannheim, Germany

examined in fine detail without coil or patient repositioning. Tim 4G also provides higher signal intensity and homogeneity than previous systems. “The light weight as well as the flexibility of the larger body coil is appreciated by both the patient and the technician,” says Henrik Michaely, MD.

Modern Radiology Focuses on the Individual Patient

In order to help radiologists and technicians combine clinical accuracy with efficiency, Siemens has developed Dot. “Modern radiology is all about looking at the individual patient and his or her individual problem rather than the organ,” says Schönberg. For example, it is not good enough to simply order a diagnostic knee MRI scan – the radiologist has to bear in mind the underlying diseases such as a rheumatic condition, trauma, or tumor. Radiology protocols have to be

developed according to patient history and medical data, which are obtained directly from the hospital’s electronic clinical information system. The MRI scanning procedures are set on a screen, and the radiologist or technician is visually guided through the system.

Before the introduction of Dot, a great number of parameters had to be set before the examination. This meant extra time and effort for readjustment and possibly poorer quality of images. With Dot, there are just ten to 30 flexible parameters, and they are stable during the examination, helping ensure a swift examination and high quality. In the extra time saved by Dot, doctors and MR technicians can attend to their patients, integrate cutting-edge developments into clinical routine protocols, and interact more closely on a professional level. “Workflow and image quality have been greatly improved,” says Michaely.

Imaging greatly profits from Dot’s special automation and guidance workflow features. Measuring processes are automated and, through complex control mechanisms, presented in small portions, making interruptions of the imaging process unnecessary and therefore, saving time. “It has the advantages of an automatic gear box,” says Michaely. “Changing gears is unnecessary, but we stay at the wheel and decide where to drive and which scientific and clinical studies to perform.”

At the same time, Dot interacts with the examiner by asking specific questions at critical stages of the examination. “There is a complete overview over all parameters, and useful advice is given for arranging the imaging process.”

The University Medical Center Mannheim is currently using Brain Dot Engine and Abdomen Dot Engine with their own protocols. Michaely compares Dot to the autopilot system of an airplane: “The pilot can rely on it, but at the same time, has to be aware of complex situations, such as in high-end clinical and research applications. These situations demand his or her attention.”

MAGNETOM Skyra was tested in a scientific study: 100 patients who underwent MRI examinations at University Medical Center Mannheim had volunteered for an extra scan with the new device, with and without applying the Dot engine, giving radiologists the opportunity to test the new equipment and compare results. “Our initial experience shows that the images are exceptional, and the handling of the system and the patient will make MRI diagnostics much more efficient in the future. Thus, this opens the horizon for further integration of cutting-edge scientific developments into clinical routine,” says Schönberg. One of the next steps will be to make the system comparable between different academic hospitals, which will then put radiological imaging on another level.

Open Bore Offers Breathing Room

Another advantage of the new generation of MRI scanners is the reduced room space needed for hardware and the device

itself. Fewer space requirements allow easier integration of MAGNETOM Skyra and Aera into the surrounding scientific and clinical MRI landscape at the institute. Whereas former generations of scanners needed an extra room for the entire equipment, the new generation MRI scanners is more compact, and the hardware is contained in the same room. The names of the two new MRI systems, MAGNETOM Skyra and MAGNETOM Aera, signal one of their most prominent features, the 70-centimeter Open Bore design, which not only accommodates patients with very large frames, but also provides additional space and breathing room compared to previous MRI systems. This, in turn, means the patient is more likely able to remain still and easily follow physician or MR technologist instructions.



“Workflow and image quality have been greatly improved.”

Henrik Michaely, MD,
Associate Professor of Radiology,
Section Chief Vascular and Abdominal
Radiology, Institute for Clinical
Radiology and Nuclear Medicine,
University Medical Center Mannheim,
Medical Faculty Mannheim, Heidelberg
University, Mannheim, Germany

Therefore, less time is needed to complete imaging, and image quality is considerably improved.

Even claustrophobic patients who, out of sheer anxiety, previously declined to participate in the MR examination are now overcoming their fears, according to Michaely. He quotes the example of a patient who previously would only agree to have his knee scanned, but was now ready to undergo an MRI of the spine with the new system. The open space and the generally friendly design, enhanced by the pleasant “Illumination MoodLight” option, should also help children¹ and parents overcome their fear of high-tech medicine.

The extra-wide bore also allows extra space for the anesthesiologist and his or her equipment. The new generation of MRI devices uses dockable mobile tables, which are ideal for patients who need special accommodations or set-ups for clinical or scientific exams. Better care can be provided to children who have to be sedated, severely ill patients under intensive care treatment conditions, immobile patients who need to be placed with special care, as well as extremely obese patients weighing up to 250 kilograms (550 pounds) using the mobile table. These features also contribute to higher efficiency: While the patient is being prepared for his or her examination outside the MRI room, the MR technologist has time to prepare for scanning.

How the patient feels during MRI scanning and how he or she cooperates is an important factor for the quality of the images in clinical and research studies. But taking the patient and his or her needs more seriously is also a prerequisite for adequate planning and execution of MRI scanning procedures, something that Tim and Dot facilitate.

Annette Tuffs, PhD, is a German medical journalist based in Heidelberg. The former medical editor of the daily newspaper Die Welt has contributed to the Lancet and the British Medical Journal since 1990.

¹ The safety of imaging fetuses/infants has not been established.

Summary

Challenge:

- Improve quality of MRI images
- Plan MRI scanning as part of an individual treatment
- Make MRI scanning a more patient-friendly procedure
- Test and establish the latest and most efficient MRI technology
- Take efficiency and patient processing into consideration
- Integrate cutting-edge scientific developments into clinical routine more easily

Solution:

- Utilize the Dot (Day optimizing throughput) engine
- Implement Tim (Total imaging matrix) technology
- Use MRI devices with Open Bore and soothing Illumination MoodLight
- Connect MRI technology with hospital data systems
- Make scanning easier and less stressful with mobile tables and light coils
- Establish a scientific study with patients undergoing extra scans voluntarily

Result:

- Shorter MRI scanning times and higher patient throughput
- Patients more likely to undergo MRI scans
- Consistently high image quality with Tim and Dot because of improved patient cooperation and improved coil technology
- Higher number of patients with previously limited access to MRI technology (children, obese patients, ICU patients) can be scanned
- More comprehensive morphologic and functional information

Further Information

www.siemens.com/mri-productivity

High-Performance Imaging in the Cardiac Cath Lab

More and more diseases can be diagnosed and treated in a cardiac cath lab. The linchpin is a precise, yet versatile imaging system that can be used to perform complex tasks quickly and dependably. Thanks to its high-resolution images and innovative postprocessing options, Artis zee is the solution for cases that present diagnostic difficulties and the tool of choice for innovative, minimally invasive intervention goals at Schwabing Hospital in Munich, Germany.

By Matthias Manych

Looking back, she can think of January 14, 2011 as her lucky day. The patient had been admitted through the emergency room. All that Professor Stefan Sack, MD, the head physician at the Cardiology, Pulmonology, and Intensive Internal Medicine Clinic of Schwabing Hospital, and his colleagues initially had known was that the woman in her early seventies had been suffering from an increasing sensation of pressure in her chest during physical exertion for about a year. The exact cause, however, remained unclear. Now, an examination in the cardiac cath lab is scheduled to see whether the heart is involved. When Sack's catheter reaches the outlet from the aorta to the right coronary artery, he and his colleague Jochen Menne, MD, study the real-time images displayed on the Artis zee® monitors with particular concentration. On the one hand, contrast is still flowing into the vitally necessary coronary blood vessel, but on the other, he is unable to push the catheter in any further. With

standard projections, the reason is initially not identifiable. It is not until the cardiologist selects a special 90-degree angling option that they discover something that looks like a narrow bridge – an area of severe narrowing that requires immediate treatment.

Right at that moment, the doctors – and ultimately, the patient – already benefit from the special features of the new C-arm system. Essential vascular structures are significantly easier to recognize thanks to images with high contrast and minimal disruptive noise. The same is also true of especially tiny tools, such as, guide wires and special catheters measuring less than one millimeter. With freely selectable X-ray angles, an experienced examiner can discover findings that are, while rare, certainly dangerous, like the stenosis in this case. Before Sack begins the stent implantation this patient so urgently needs, he makes use of another important optional feature of the high-tech system: full

integration of various additional technologies, in this case, intravascular ultrasound (IVUS). The physician can use the touch screen of the Artis zee examination table to start an IVUS measurement directly, and then view the results on the monitors while the X-ray is in progress. This feature helps physicians assess and measure areas of narrowing in detail so that they can choose the correct stent, among other things. Then, during the stent implantation that follows, the focus is once again on taking extremely detailed images of the target structure and the stent itself. After all, the tiny wire tube has to be positioned in this challenging location to extend into the aorta a few millimeters from the outlet of the right

Professor Stefan Sack heads the Clinic for Cardiology, Pulmonology, and Intensive Internal Medicine at Schwabing Hospital.



coronary artery, to prevent it from slipping. Once this is accomplished and the stent is perfectly in place, the dangerous stenosis is resolved. "The patient was really lucky that we saw the stenosis now," says Sack, who is relieved after the procedure. "She would not have survived a blockage."

Improved Workflow, Better Cost-Effectiveness

The cardiologist and his team have been working with Artis zee since August 2010. During this time, the system has already proven its value with excellent results. The team also values the way it makes things easier even aside from the actual imaging process. Professor Sack mentions reporting as an example: "We can implement the crucial images right in the catheter report. We can enter online which catheter and which balloon was used, so that it is possible to finalize the report quickly afterward." On the whole, this advanced X-ray system improves workflow so much that examination times are found to be shorter. Professor Sack has 22 years of experience working with X-ray units, which puts him in an ideal position to judge the changes in workflow. Plus, this modern imaging system means that it is no longer necessary to run two or three

extra pieces of equipment for applications that are important, but have, thus far, not been integrated into the cardiac cath lab, thereby eliminating the time needed to set up and remove these units. And if, on top of the savings already realized, the overall process is organized well both before and after the examination, the system can be used much more extensively. As a result, the new X-ray system has already significantly increased patient throughput in Sack's department. And the potential for further gains is considerable: The two cardiac cath labs at Schwabing Hospital serve about 1,600 patients each year.

High Image Quality for Any Situation

The hospital decided in favor of Artis zee to bring superb image quality into the cardiac cath lab. Built as a hybrid room, meaning that it also meets surgical standards, the new lab's space was limited. The only possible option was a floor-mounted C-arm that offers optimum range of movement around the patient. At the same time, the hospital also had to consider the needs of the ten to 15 patients with acute infarction treated each week at the hospital, where staff is on duty 24 hours a day. Professor Sack

describes the requirements in vivid detail: "When we are performing acute care and we have a LUCAS – a device used for automatic mechanical resuscitation – placed on the patient's rib cage, we have no room for a big X-ray detector." Since Artis zee offers excellent image quality even with a flat detector measuring just 20 by 20 centimeters, the choice was not difficult. This also means that serving even obese patients is possible; up to 30 percent of all patients seen at the cardiac cath lab are considered obese. Being able to offer such patients optimum diagnostic and interventional options is an important factor from an economic standpoint as well.

Obesity and severely calcified blood vessels are among the particular challenges in a cardiac cath lab. While pronounced deposits of fatty tissue can blur vessel contours or fine guide wires in less powerful X-ray systems, coronary calcification presents a different problem for examiners. "If calcification is severe, it is difficult to assess the residual lumen and see what the situation behind the calcification is like," Sack explains. Help is offered by the freedom to adjust the angle with Artis zee, by IVUS, as mentioned above, and by the fact that this C-arm family is based on a very powerful X-ray tube that provides quality images even under more strenuous conditions.

Designed for High Definition and Low Doses

Mathematical processes are a critical supplement to the system's mechanical and physical advantages. Under the name CLEAR, various applications improve the results of X-ray scanning. Filter algorithms, for instance, further reduce image noise, and there is compensation for errors caused by movement. The head of the cardiology department at Schwabing Hospital is also impressed by the way the edges of vessels are visualized. Like IVUS, Artis zee can also be used to gauge a coronary vessel's size, for example through quantitative coronary analysis (QCA). "The question then is how precisely the system performs this analysis, and in this case it is an excellent fit for what we see via IVUS. It is one factor

Cardiac interventions require excellent image quality and easy handling.



“We can implement the crucial images right in the catheter report.”

Professor Stefan Sack, MD, Head Physician, Cardiology, Pulmonology, and Intensive Internal Medicine Clinic, Schwabing Hospital, Munich, Germany



arguing for excellent contour definition on the edges of the vessels,” Sack reports. Another package of programs, called CARE, maintains image quality even at low X-ray doses. For example, the dose of radiation can be reduced with a lower number of X-ray pulses. This option is programmed into the Artis zee system, a great match for the specific requirements of the team in Munich. The physicians can use the touch screen to access further low-dose programs depending on the situation, such as when a slender patient is being examined.

Tool for New Projects

According to Sack’s experience, Artis zee offers three core elements that crucially enhance the quality of work at the cardiac cath lab: first, superb image quality; second, simple, precise, and variable controls for the C-arm and examination table; and third, configuration options that meet physicians’ individual requirements. All of this helps make Artis zee a tool for state-of-the-art interventions as well, which at Schwabing Hospital not only includes mitral valve reconstruction and aortic valve replacement, but also 3D imaging of the vessels of the neck using syngo® DynaCT technology. This function, which enables CT-like image reconstructions in the Artis zee system, will soon also be used for a completely new project aimed at providing lasting help to patients with severe chronic obstructive pulmonary disease (COPD)

via a minimally invasive intervention. The head of the clinic has no doubt that the new X-ray system – and thus the investment made – is ready for the future, and he considers Siemens a highly capable partner. What is especially important to him is joint further development of existing and new interventional techniques. For mitral valve reconstruction, for instance, Siemens’ engineers would like to learn what kind of requirements the technique generates for imaging with Artis zee so that the company can work together with physicians to meet those requirements. Professor Sack expects to see very strong developments, especially in the area of interventions. Interdisciplinary cooperation with vascular and cardiac surgeons will certainly also be intensified. He is certain that imaging will become increasingly important in the future: “The major goal will be to improve image quality even more and reduce radiation exposure.”

Matthias Manych, a biologist, is a freelance scientific journalist and editor specializing in medicine. He regularly writes about imaging methods, among other topics.

Further Information

www.siemens.com/Artis-zee

Summary

Challenge:

- Optimum image quality and technological flexibility for the cardiac cath lab
- Individually configurable system
- Options to integrate important additional applications
- Requirements to tackle new clinical issues

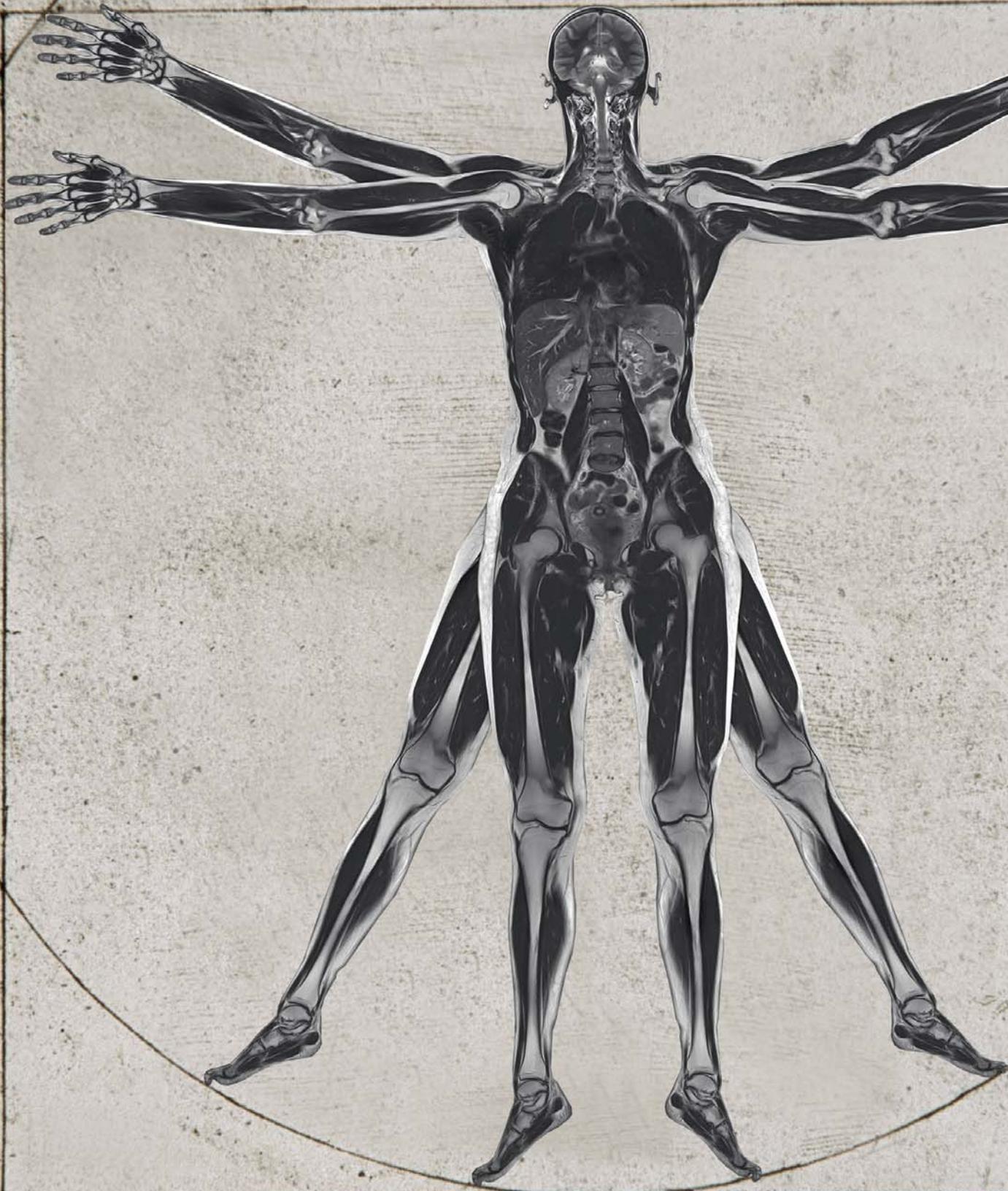
Solution:

- Flat detectors in various sizes
- More powerful X-ray tube, program packages for image optimization, and low-dose applications
- Highly ergonomic, with excellent technological flexibility
- Full integration of functions such as IVUS
- 3D reconstructions with DynaCT
- Close cooperation for medical/technical innovations

Result:

- State-of-the-art C-arm X-ray imaging, even in limited space
- Reliable diagnosis and intervention, even with rare and difficult situations
- Improved workflow over the entire process chain
- Higher patient numbers, better economic benefit
- Development of modern interventions, initiation of new projects, and definition of future imaging requirements

Handwritten text in a historical script, likely Latin or Greek, located at the top of the page, partially obscured by the circular frame.





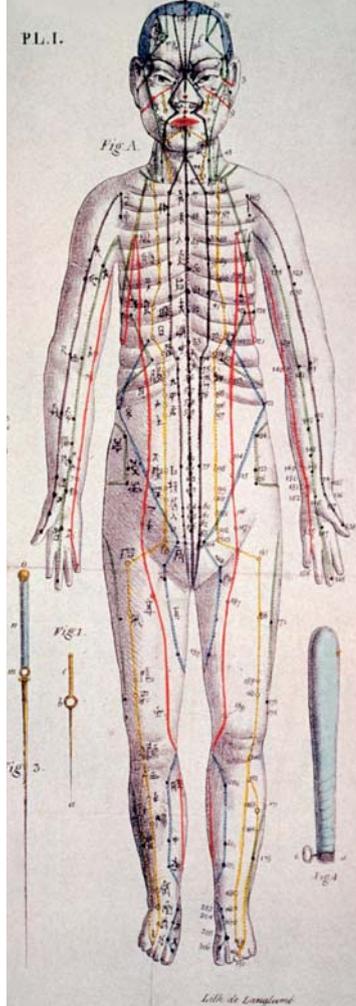
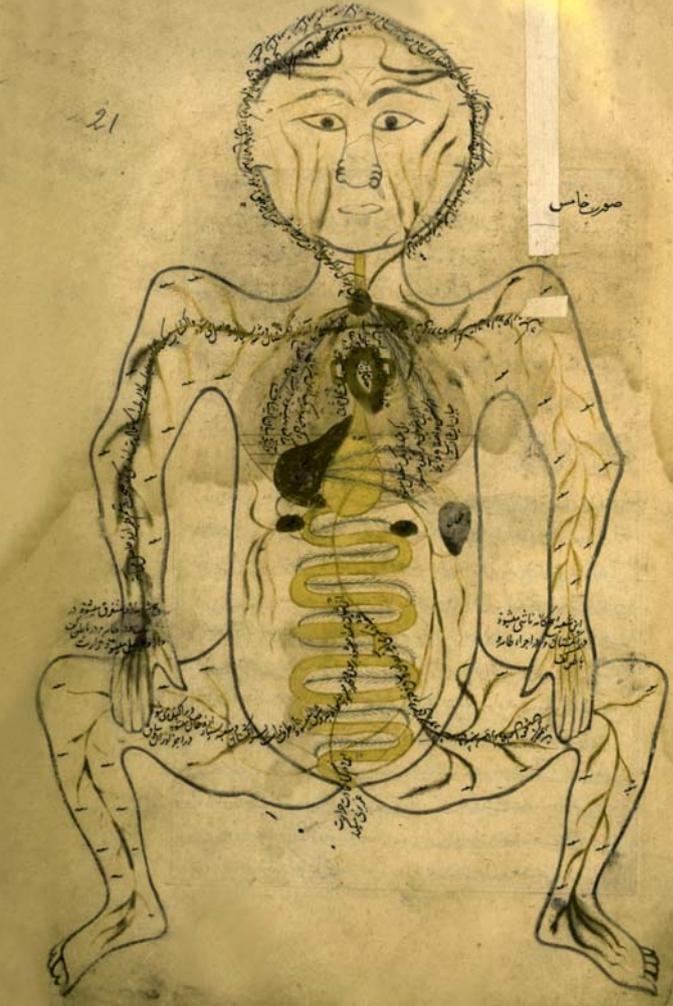
Your Body: In the Focus

Today's high-definition medical images can seem so real, so visually striking and distinct compared to previous images, pictures, and drawings we have seen of the human body, we get the sense we are peering inside ourselves. But what are these images really showing us? How do they affect the doctor-patient relationship? And most importantly, how can we make the best use of them?

By Peter Allegretti

The history of images is nearly as old as the hills. Not too long after starting to inhabit those hills, we humans decided to represent them pictorially – from cave paintings and carvings in stone, through to framed landscapes brushed with oils and acrylics, and now via photography and digital satellite imaging. The technology has changed throughout the millennia, but the question still remains: Which medium best expresses the landscape of the hills? Which is more faithful, more accurate, and which gives us a better sense of the spirit of that landscape?

These are also the kinds of questions doctors, scientists, and researchers are asking today about the human body as portrayed by a new generation of medical imaging. As so often in this day and age, technology presents us with extraordinary possibilities. In the case of medical imaging, new scanners now deliver high-definition, technologically advanced pictures of the body, yet we are only just beginning to really understand them. "If you look at these latest images, they are so precise and so exact that you have the impression that you are seeing a sculp-



The anatomical drawing from Persia (left) dates from the second half of the 15th century. Arabic medical works had a significant influence on the development of modern medicine. The lithograph by Langlume (2nd from left) was published in Paris in 1835. It depicts a diagram of the acupuncture channels of a human body as used in traditional Chinese medicine. The alchemy symbols on the bloodletting chart (right) were drawn by Paracelsus (1493–1541), who believed that the alchemic principle, “everything tends towards perfection,” could be used to find a universal medicine.

“These latest images are as precise and exact as a sculpture.”

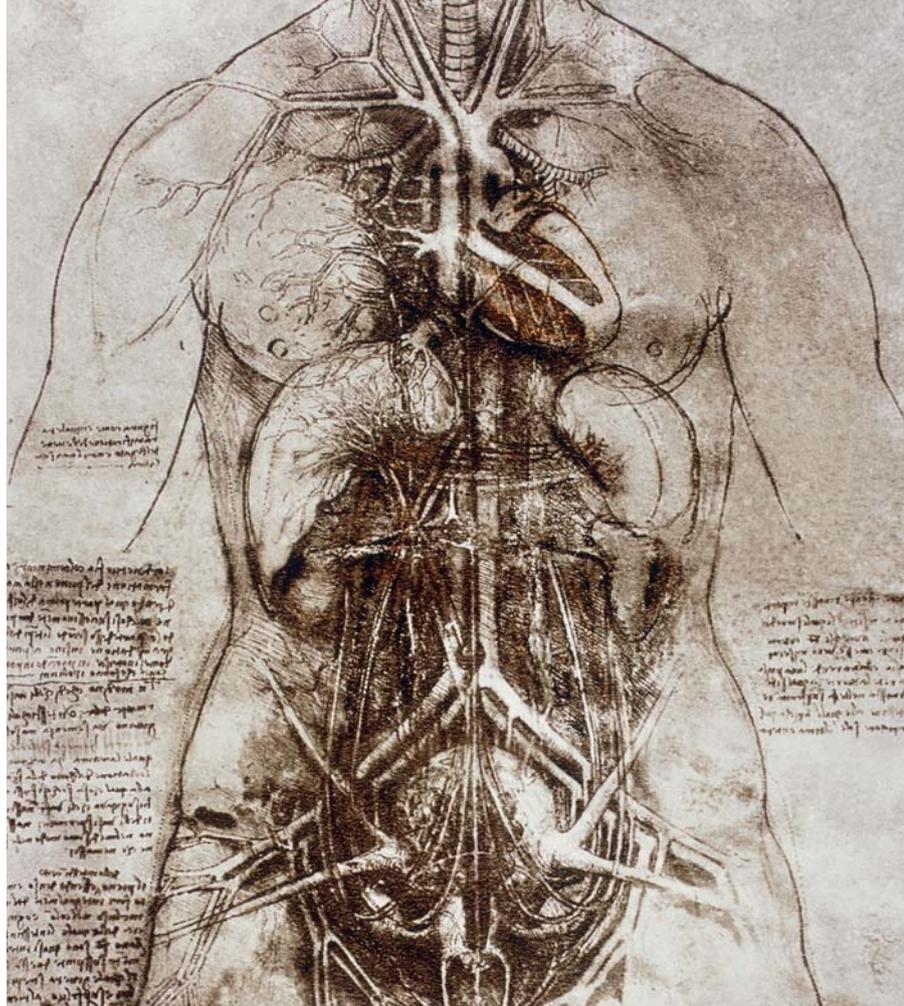
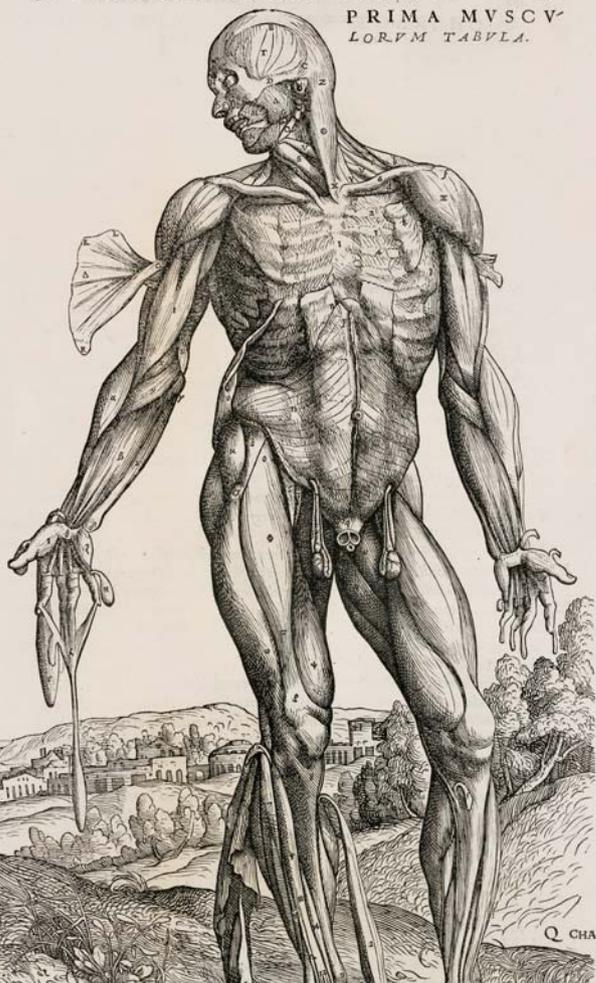
Professor Richard Hoppe-Sailer, Art History Institute, Ruhr University, Bochum, Germany

ture,” says Professor Richard Hoppe-Sailer of the Art History Institute at Ruhr University in Bochum, Germany. “But there are still many things that physicians do not know about interpreting these new images.”

High Expectations

On the one hand, structural deformities in the body are shown in startling clarity. The power of these images can help a physician reach a diagnosis and better explain a condition to the patient. On the other hand, less “visible” conditions, such as pain or psychosomatic conditions, are harder to “show” to patients. Nevertheless, there is an increasing desire from the patient to “see” what’s going on inside. Marcus Schiltewolf, Professor of Orthopedic Surgery and Psychosomatic Medicine at the University of Heidelberg, Germany, believes that high-quality

medical imaging is actually altering the relationship between the doctor and patient. “Physicians now routinely order scans to be carried out when a patient comes to the doctor with certain complaints, such as pain,” says Schiltewolf. “The scan will show the patient a clear image. And now there is an expectation that what you can see on the image is going to show exactly where the pain is coming from.” In this sense, a patient may believe that the picture has the power to reveal all. But it may not. This is one of the key challenges in the changing doctor-patient relationship – managing the patient’s expectation that the picture will provide the evidence he can understand. Schiltewolf thinks these kinds of advances in technology are partly responsible for what he calls a subtle shift from patient to customer – a relationship that



Andreas Vesalius' (1514–1564) front view of the deeper muscles of the male human body (left) was published in 1543 in his greatest work *De Humanis Corporis Fabrica*. Vesalius and Leonardo Da Vinci (1452–1519) dissected human bodies – most of them criminals, as the church did not permit them to dissect righteous people – and made the first anatomical drawings. Da Vinci's female anatomy (right) shows the heart, liver, spleen, kidneys, and bladder, as well as major vessels and the trachea.

is quite literally changing the way patients view their own conditions, perhaps leading to a more autonomous or consultative approach to their own physician's advice and recommendations for treatment. Peter Henningsen, MD, Head of the Psychosomatic Medicine Department at the University Hospital of the Technical University in Munich, Germany, uses the phrase "parallel running" to describe the two main protagonists – the patient and the picture. As a psychologist, he is interested in the relationship between these two when investigating psychosomatic conditions. But trying to match the picture to the condition is still elusive. "Medical images explain on a general level that something is going on in the brain parallel to psychological functions – possibly perception, possibly emotion – but the pictures do not explain the whole story," says Henningsen. "There is still much to

learn, still much we do not know." How the images actually relate to a condition and what information can be gained from them is fertile ground for medical researchers. Yet the power of the picture is undeniable. "These kinds of pictures have an almost hypnotic quality to them," says Henningsen.

Images Stronger than Explanations

Hoppe-Sailer agrees. "It's a general trend in our society. People believe in images sometimes without any critical position. Now, there is a great advance in medical images – they are more attractive, more exact." But in what way? Hoppe-Sailer points to a long-standing debate about the differences between a person and the portrait of a person. What can any portrait show exactly? Given that a portrait – or a medical scan – is simply one

"These kinds of pictures have an almost hypnotic quality to them."

Peter Henningsen, MD, Head, Psychosomatic Medicine Department, University Hospital, Technical University Munich, Germany



The information produced from modern clinical images is throwing up new questions: Are variations from the “norm” indications that something is wrong, or are they simply – variations? (Middle: Courtesy of *Diagnóstico por Imagem*, João Carlos Costa, MD, Lda/Viana do Castelo, Portugal; Right: Courtesy of CMIV Linköping University, Petter Quick, Linköping, Sweden)

“The physician offers an explanation, but what is most convincing are images.”

Professor Marcus Schiltewolf,
Orthopedic Surgery and Psychosomatic
Medicine, University of Heidelberg,
Germany

representation of a person, what information does it include and what does it leave out? Indeed, is a scanner artistically interpreting the body in the same way that landscapes have been interpreted by the artists, film, or canvases that portray them?

Here, one enters a more philosophical debate, particularly from the point of view of a suffering patient who is hoping for concrete answers and relief from the presenting condition – and who is increasingly expecting answers and explanations from medical imaging. “The first step for a patient is to ask his or her doctor, ‘Please, show me why I am suffering,’” says Schiltewolf. “So the physician offers an explanation, but what is most convincing are images, because in everyday life we have learned that what we see is what we can best rely on.” Doctors agree that patients tend to feel more satisfied

if they see a good image that reinforces the physician’s explanation. Even the information produced from these images that we can identify and measure is throwing up new questions. One of the most interesting for both physician and patient is: “What is normal?” Back in a time when a doctor had only books and medical drawings, there was little expectation that the sketch would precisely match the organ it depicted. As we moved into an analog age of medical imaging with X-rays, we began to get greater detail and see greater variance. Now, with digital imaging, we can see even wider variety and ever greater detail. It is more evident than ever that people come in all shapes and sizes, both inside and out. So, in the age of well-defined representations, physicians say that there is a desire for patients to know how their picture compares to a “normal” picture.



Are variations from the “norm” indications that something is wrong, or are they simply – variations?

Hoppe-Sailer reminds us that images have historically been a starting point in life sciences. He feels that with digital medical images, we have arrived at a new starting point – one which is generating questions and debates and conundrums as quickly as answers. While many doctors agree that we are at an early stage in understanding the full impact of imaging, they also see huge potential in using these new techniques and continuing research to further our never-ending quest for a greater understanding of ourselves.

Peter Allegretti has reported for NBC in Europe and the USA, and has produced news and current affairs stories from more than 30 countries for the BBC, World Monitor, and Frontline News. He is also a qualified therapist and coach with a keen interest in health issues. He is based in Barcelona.

“Image-Body-Knowledge: An Interdisciplinary Project on the Appraisal of Images”

A Joint Project of the Institute for Advanced Study in the Humanities (Kulturwissenschaftliches Institut, KWI), Essen, Germany, and Siemens

The preparation of the “Image-Body-Knowledge” project began in August 2007 under the leadership of Rainer-M.E. Jacobi (Institute for History of Medicine at University of Bonn, Germany) with the intent to focus on better understanding all aspects of medical images and imaging techniques. Given the crucial importance of modern medical imaging in diagnosis and therapy, the project examines the complexities of imaging from a number of different perspectives. It brings together a wide range of experts – from doctors and medical researchers to image science and cultural anthropologists – to examine the myriad issues surrounding modern computer-generated

medical imaging and interpretation of those images. Key among these issues are deepening our understanding of the relationship between the human body and the medical image of the human body, critically appraising the images and considering their value to medical professionals and the doctor-patient relationship, and contextualizing computed tomography and magnetic resonance imaging in anthropological terms. The project also examines the methods of image generation and the way in which these images are described and interpreted by those who use them. The results of the research, workshops, and seminars will be collated and coordinated by the KWI.

At the Heart of Radiology

syngo.via is an excellent tool to increase the productivity of radiologists working on cardiac images. It further offers ample opportunities to improve treatment, says Professor Gudrun Feuchtner, MD, of Innsbruck University Hospital in Austria.

By Oliver Klaffke



High-tech medicine and beautiful mountainous surroundings merge at Innsbruck University Hospital.

“Take a patient with acute chest pain, for example,” says Gudrun Feuchtner, MD, Professor of Radiology at Innsbruck University Hospital in Austria. A fast diagnosis of cardiac emergency patients is often vital. The pain might be an indicator of a cardiac attack, in other cases the cause might be less clear and by no means life threatening. Using Siemens’ advanced visualization solution, *syngo*[®].via,¹ helps cardiologists readily separate the severe cases from the lesser ones. Saving time and streamlining workflow is what *syngo*.via is all about. It helps radiologists concentrate on what counts the most: reading scans and diagnosing patients quickly. They no longer need to bother with finding a free workstation, storing data, searching for and retrieving files, or spending time on preparing the images for reading. Instead, these tasks are taken over by *syngo*.via.

Automatic Case Preparation

Feuchtner is one of Austria’s youngest professors in radiology – and is already an internationally recognized scientist. She divides her time between mountain-

ous Innsbruck and Miami. In Austria, she works mainly as a clinical radiologist, whereas in the U.S. she holds a research position and is involved in a research project on acute chest pain. She is especially interested in ways radiologists can contribute to improving the treatment for these patients. *syngo*.via plays a very important role in that. The solution integrates images from different modalities, such as magnetic resonance imaging (MRI), computed tomography (CT), and positron emission tomography-computed tomography (PET-CT), with radiology information systems (RIS) and picture archiving and communication systems (PACS) from leading vendors, including Siemens’ newest PACS solution, *syngo*.plaza. One of *syngo*.via’s distinct advantages is its Automated Case Preparation function, which automatically loads images into the appropriate application and displays them with the corresponding disease-specific layout, thereby eliminating the need to manually choose the application, load data, and select corresponding layouts. Also unique to *syngo*.via is the Case Navigator function, which supports structured workflow by categorizing various workflow steps and aligning the proper images to each correspond-

ing step. Furthermore, during the reading process, findings and measurements can be automatically tracked and listed with the one-of-a-kind Findings Navigator, which allows users to effectively navigate between various findings with just one click.

What Feuchtner likes most in *syngo*.via is the easy handling of images. The corner menu, the automatic scrolling function through all planes, and the Findings Navigator are her favorite features. Using the corner menu is handy working on the images. The scrolling function is useful when following a vessel. “A major benefit is that *syngo*.via automatically generates findings and reports²,” she says.

Speeding up the Reading

The most striking feature of *syngo*.via is the speed of processing CT images in cardiology. When the scans are done, the images are readily available for reading by the radiologists. No time is lost, as the images do not have to be transferred to a PACS and then to a workstation. That was the procedure radiologists

¹ *syngo*.via can be used as a stand-alone device or together with a variety of *syngo*.via-based software options, which are medical devices in their own rights.

² The disease-specific report created in *syngo*.via is not the final diagnostic report. The final diagnostic report is generated and signed off within the RIS. Archiving of diagnostic reports is the responsibility of the RIS.

had to apply before Siemens developed its new imaging IT solution. Now, the scans can be viewed even while the patient is still on the CT table.

Getting Cases Ready

It is the speed of processing that is also a direct benefit for patients. This is especially important when their condition might be life threatening. "Time makes a difference in emergency medicine," says Feuchtner. From her U.S. research, she knows that patients with acute chest pain benefit from being routinely screened

get acquainted with the system. A basic training session and instructions by Siemens' staff was all that was needed to introduce the team to *syngo.via*. "The training was efficient and the instructions were excellent," says Feuchtner. Siemens' staff was available in the background for some time in case assistance was needed. The system ran without difficulties, so the Siemens customer care team never received a phone call from Innsbruck. "*syngo.via* turned out to be extremely easy to understand and learn," Feuchtner recalls. The radiologists knew the basics

for the treatment; for example, his or her vessels have to be wide enough. Using CT and the *syngo.via* analysis tool is a very reliable way determine vessel width and define vascular planes for intervention. "Surgeons not only get information, but they can also see the actual images on their computer monitors," Feuchtner says. In Innsbruck, *syngo.via* is mainly used for coronary and aortic valve operations.

Time Savings of up to 70 Percent

Siemens integrated functions into *syngo.via* so the software could take over some tedious tasks from the medical experts. The result is cardiologists get better information in less time. In the cardiac workflow, for example, *syngo.via* automatically removes the rib cage from the images, clearing the view to the heart. In the past, radiologists had to manually remove the bones on the monitor with the mouse. This took time away from the actual diagnostic work. *syngo.via* also recognizes vessels automatically, like the coronary arteries, and offers easy ways to measure their diameter and rotate the CT images around one point of interest. This improves orientation and contributes to increased diagnostic quality. In some internal studies, the radiologists found time savings of up to 70 percent³ when reading cardiac images. "While *syngo.via* is taking over tasks that can be done automatically, the radiologists can concentrate on reading the CT scan instead of wasting time preparing the data," Feuchtner explains. As a result, she gets her cases ready in less time.

New Ways of Intervention

A fascinating field of *syngo.via* use is with robotic surgery. This is a new and promising technique to craft a bypass without opening the chest, and was implemented by Professor Johannes Bonatti, MD, who is working at the University of Maryland, Baltimore, U.S. The procedure is difficult and technically complicated, but has a major advantage for the patient: The operation is less severe than in the past

"*syngo.via* is the future of radiology."

Professor Gudrun Feuchtner, MD, Innsbruck University Hospital, Austria

when rushed into the hospital. Some emergency departments in the U.S. have a dedicated algorithm that helps considerably reduce the time from admission to diagnosis, such as Baptist Hospital in Miami, Florida, with which Dr. Feuchtner is currently collaborating. "Dr. Ricardo C. Cury, the Director of Cardiac Imaging, has set up a successful clinical workflow and an excellent research study that I am honored to be part of," says Feuchtner. "Within one hour after the patient is brought to the emergency room, the report for the clinician is ready," she says. In no time, it is established whether or not the patient suffered a cardiac attack and needs further treatment or can be discharged. Getting a diagnosis fast is also important from an economic point of view. "It helps to save money," Feuchtner says. "The sooner you can discharge a patient, the better." When in doubt, the CT scan and analysis of the images with *syngo.via* will help in diagnosis.

The Cornerstone of Radiology

syngo.via plays a vital role in cardiology at Innsbruck University Hospital today. It was installed more than six months ago, giving Feuchtner's team the chance to

of the user interface from other established Siemens imaging solutions and so they did not have to start learning from scratch. So far, only the radiologists have been trained. The next step will be to train the technical staff. "We want them to be more involved in working with *syngo.via* so that they can benefit from its advantages in the future," says Feuchtner.

New Methods Thanks to *syngo.via*

Feuchtner expects much from *syngo.via* in radiology in the years to come. It will not only help accelerate diagnosis but will also advance patient treatment. One of the most interesting outlooks is using it when preparing non-invasive interventions, which play an important role in cardiology today. These methods were developed during the past decade and helped achieve treatment success that was not considered possible only a couple of years ago. Take transcatheter aortic valve implantation (TAVI) for example, which is the replacement of aortic valves using a minimally invasive method. To prepare the intervention, the surgeon has to be sure that the patient is eligible

³ Results may vary. Data on File.

and the patient is discharged from the hospital after only five days. Extremely precise information about the anatomy of the patient's coronary vessels is required to precisely craft the bypass. The technique is now used in dedicated centers in the U.S. and Europe. "We wouldn't be able to apply robotic surgery without CT and the image processing as provided by *syngo.via*," Feuchtner says. Siemens' new imaging IT solution also makes urology interventions easier, like in gynecology and urology (prostatectomy).

Images Available Everywhere

With *syngo.via*, however, it is not only what can be seen that makes a difference but also where it can be seen. The images can be viewed at every computer in the hospital.⁴ *syngo.via* is a server-based system and users can log in from

anywhere. According to Feuchtner, the time is over when the images were stored on one workstation only and radiologists queued up to work on their cases. Thanks to *syngo.via*, they can work on them whenever and wherever they want. Surgeons can access the images from the computer in their offices to prepare operations.

"*syngo.via* is the future of radiology," Feuchtner says. It is not only hospital radiologists who will benefit. Think about the opportunity it offers teleradiology: Specialists can be asked to have a look at a case or cases can be discussed in a forum of radiologists. *syngo.via* enhances communication and knowledge-sharing. Workstations were expensive, so their number was limited in most hospitals. With *syngo.via*, access to one's cases is no longer limited.

Oliver Klaffke is a science and business writer based in Switzerland. Among other publications, he has written for New Scientist and Nature in the past.

Summary

Challenge:

- Increase diagnosis speed of cardiac patients
- Help radiologists support new methods of treating cardiac diseases

Solution:

- Siemens' new imaging system *syngo.via*, which can be used for angiography and minimally invasive intervention planning

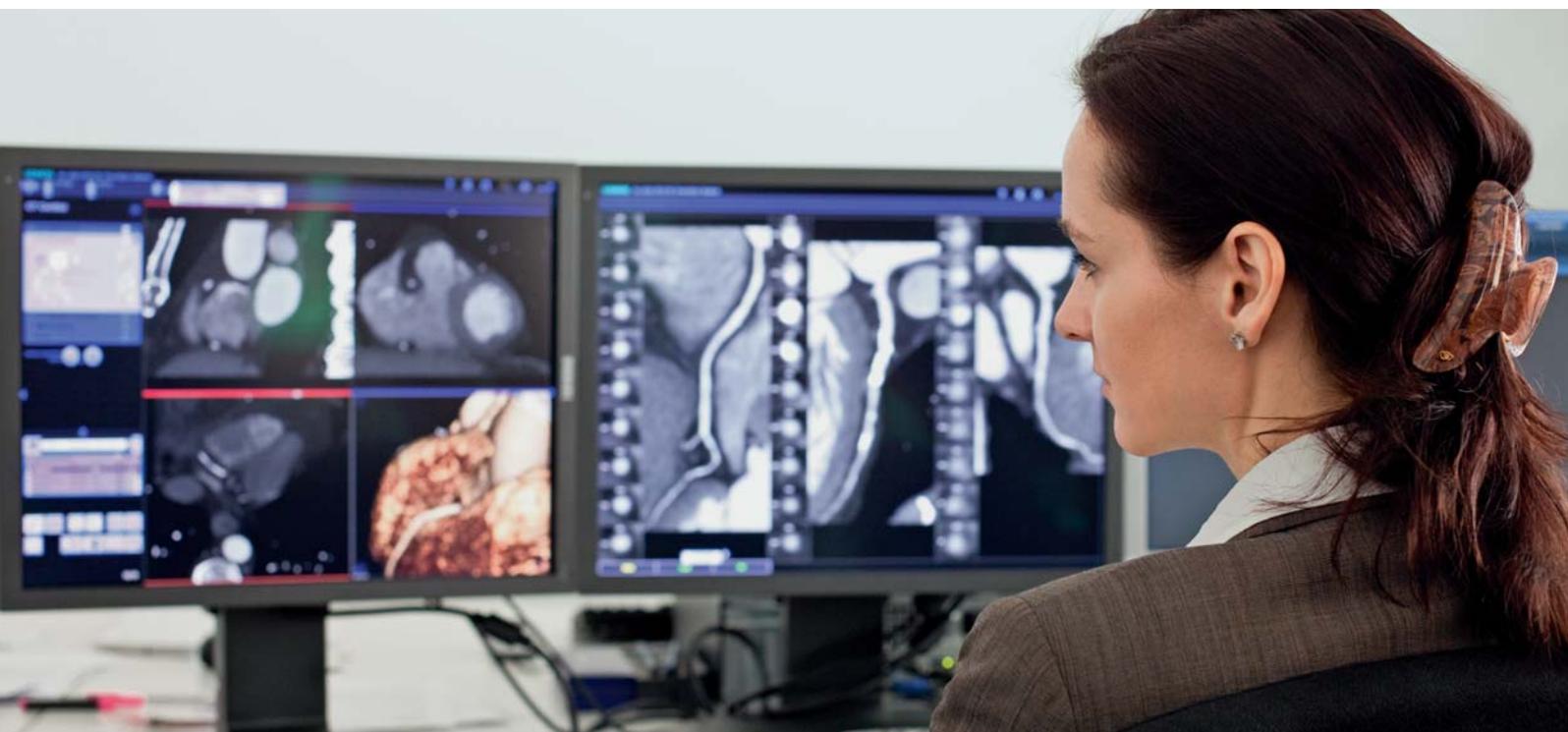
Result:

- For TAVI, surgeons benefit from improved patient selection and from receiving better information about the anatomical details important for a successful placement

Further Information

www.siemens.com/syngo.via

⁴ Prerequisites include: Internet connection to clinical network, meeting of minimum hardware requirements, and adherence to local data security regulations.



In the cardiac workflow, *syngo.via* automatically removes the rib cage and recognizes vessels, such as coronary arteries.

The Height of Fusion Tomography

For a few months now, Munich, Germany, has been home to the world's first fully integrated system, currently undergoing clinical use testing, that combines PET and MRI: Biograph mMR from Siemens. A second system has been installed in Tübingen, Germany. *Medical Solutions* spoke with Professor Markus Schwaiger, MD, and Professor Claus D. Claussen, MD, on their view of the new technology's potential.

By Martina Lenzen-Schulte, MD

Hybrid systems are among the most exciting – and, recently, the most frequently discussed – developments in radiology and nuclear medicine. For a long time, though, combining magnetic resonance imaging (MRI) and positron emission tomography (PET) was a distant vision of the future. But it is no longer a distant vision: We are closer than ever for hospitals to have a way of acquiring whole-body MR images and performing PET scans on a patient simultaneously. The world's first fully integrated whole-body hybrid MR-PET system, Biograph™ mMR¹, is in use at the Nuclear Medicine Clinic at University Hospital Klinikum rechts der Isar, affiliated with the Technische Universität München, Munich, Germany. A second system has been installed at the Department of Diagnostic and Interventional Radiology at the University Hospital of Tübingen, and the university hospitals in Essen and Leipzig will soon also be among the first few locations in

the world to have the new systems. The German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) is supporting the installation of the new units as an overall project; a step that also acknowledges the academic and scientific importance of the technology.

Professor Schwaiger, you have already had some experience with the new hybrid system in Munich. What do you, as a clinician, think of Biograph mMR?

SCHWAIGER: There are many aspects, but let's start with the most practical one – everyone involved is able to save a huge amount of time. With the large field of view and rapid acquisition, we can finish an examination in about 20 minutes. That's almost exactly the same amount of time it takes for just one MRI exam and even faster than most PET exams. But the main savings have come during preparation time, which is considerably longer than the exam itself and which we have been able to cut in half. We should also bear in mind how much the patient additionally benefits from only having to organize one visit to the hospital instead

¹ The Biograph mMR system is pending 510(k) review by the U.S. FDA and requires a Declaration of Conformity according to MDD. It is not commercially available in all countries.

Pioneers in hybrid imaging: Markus Schwaiger and Claus D. Claussen (from left). Their departments are the first to install completely integrated whole-body MR-PET systems.





“I am highly optimistic that we will soon look at diseases in a whole new light.”

Professor Markus Schwaiger, MD, Director,
Nuclear Medicine Clinic and Polyclinic,
University Hospital Klinikum rechts der Isar,
Technische Universität München, Munich, Germany

“The new unit combines the two most advanced imaging methods currently available.”

Professor Claus D. Claussen, MD, Director,
Department of Radiology,
University Hospital Tübingen, Germany



of two. Within the foreseeable future, we believe that we may also need only half the staff, which may also apply to physicians after they are trained accordingly in both nuclear medicine and radiology aspects. Another thing that is a visible advantage, despite the technological challenges involved, is the system's dimensions, which are very favorable. The reactions of the medical professionals who have come to the clinic to take a look at it have been euphoric.

Professor Claussen, in your imaging department in Tübingen you have already tried out the possibilities offered by this hybrid technology with preliminary work on the development and testing of an integrated MR-PET research system dedicated to the head area. What do you expect as a result?

CLAUSSEN: Greater precision compared to sequential MRI and PET exams, both in diagnostics and treatment planning.

The new unit combines the two most advanced imaging methods currently available. Especially when it comes to visualizing areas with a high soft tissue percentage, like the brain, MRI is already a very good technology. Now, in conjunction with PET, we are better able to discover very tiny changes, such as metastases. We were able to show with a brain tumor, a meningioma, that the tumor's spread is registered more precisely than with conventional methods, a fact that also influenced radiation therapy. Neurosurgeons in Tübingen have also already confirmed to us in individual cases that they would have taken tissue samples from the wrong spot without this higher-quality localization option. Beyond that, we have performed highly promising initial trials aimed at determining the aggression potential of brain tumors. So far, it has only been possible to do so by performing a biopsy on the tissue and examining it in the lab. Although the

people who were involved in this development from the start are already convinced that molecular MR adds value, this now has to be proven scientifically, without any doubt, in larger multi-center studies in coordination with other centers.

In what fields do you hope to first take advantage of the possibilities offered by the new system?

SCHWAIGER: The focus will initially be on diagnosing and characterizing tumors. Of the 115 patients we have examined thus far, 88 are tumor patients; 15 of those have prostate cancer. As a university medical center, we have to scientifically prove the advantages of the new method over established conventional methods. That requirement is also included in the assignment from the DFG, which has provided such generous support for the investment. In terms of tumor diagnosis, we can take advantage of the benefits of molecular MR. In many instances of tumor localization, MRI supplies very detailed images. It is also dynamic and permits repeated examinations; we are not limited to a single acquisition. In combination with PET, we then also capture metabolic variables in malignant tissue. This is a quantum leap in oncological diagnosis.

How do patients benefit from that?

CLAUSSEN: Take prostate cancer, for instance, the second most common type of malignant tumor in older men. A biopsy is standard procedure for clearing up a suspicion of this type of cancer. But we know from other examinations that when tissue samples are taken more or less blindly according to the book, tumor material is found in other locations as well in about 50 percent of cases. The new technology, however, would not only let us enhance biopsy accuracy in soft tissue of this kind; it can also be assumed that simultaneous molecular MR will give us additional information to base our treatment recommendations on because we will be able to characterize malignant tissue very precisely. Another thing that is important here is the extent of lymph node involvement, which can only be

The Interviewees

Professor Claus D. Claussen, MD, studied medicine at the universities of Erlangen and Heidelberg from 1966 to 1971. After practicing in Heidelberg and Berlin, he became the Director of the Department of Radiology at University Hospital Tübingen in 1988. Since then, Claussen has been involved in the scientific and technical development of a large number of innovations in the field of radiology. Most recently, the German Council of Science and the Humanities (Deutscher Wissenschaftsrat) recognized the department's years of preparatory work in this field by providing funding for hybrid MRI and PET. In addition to his activities as a publisher, expert, and dean of his faculty at the university, Claussen is actively involved in implementing quality standards for clinical research.

Professor Markus Schwaiger, MD, studied medicine in Berlin and Freiburg from 1969 to 1972. After working for a time at the German Heart Centre in Munich and the UCLA School of Medicine, he became the director of the Nuclear Medicine Clinic and Polyclinic at University Hospital Klinikum rechts der Isar, affiliated with Technische Universität München, in 1993. Alongside his many other activities, Schwaiger has been active for many years as dean of his faculty at TU München. Two years ago, the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) began supporting a collaborative research center on the use of imaging in the selection, monitoring, and individualization of cancer treatment; Schwaiger was selected to be the spokesman for this group.



Markus Schwaiger and Claus D. Claussen shared their high expectations and first results with *Medical Solutions* at the Siemens Forum in Munich.

seen via PET. All of this additional information enables us to better characterize the aggressiveness of this specific prostate carcinoma. That would give us a firmer basis than is currently the case, so that we can advise the patient in good conscience either to have surgery or wait and see.

What influence will the new technology have on topics explored in medical research?

SCHWAIGER: We can take breast cancer as an example. Within the foreseeable future, molecular MR will play a major role in mamma diagnostics, and not just here at our site, which has always been highly involved in this field. We aim to use PET to show, at the molecular level, receptors for growth factors, which play a crucial role in selecting the right treatment. This method combines in vitro findings in the lab and in vivo diagnosis on the living patient. I believe it represents the future of medicine. It also lets us check to see whether the patient is responding to the treatment or when changes occur in the course of the disease. That is another milestone toward achieving personalized medicine. And, thanks to the low radiation exposure, monitoring the course of

Summary

Challenge:

- Combine the two most advanced imaging methods currently available
- Simultaneous process with equal precision and resolution in order to ease clinic workflow and save time for patients
- Scan the whole human body instead of only individual regions
- Create dimensions and handling suitable for clinical operations
- Understand diseases more comprehensively

Solution:

- Avalanche photodiodes detectors for highest precision within the magnetic field
- One scan instead of two
- Simultaneous scanning
- Uncompromised MR and PET image quality

Result:

- Efficient workflow: savings in exam time, prep time, and staffing
- For the first time ever, completely synchronous information on detailed anatomical structures and detection of functional and molecular metabolic processes within tissue
- Potential to better understand e.g., neurodegenerative diseases (such as Alzheimer’s), depression, and addictive diseases, as well as oncological and cardiac conditions

the disease represents less of a problem than in PET-CT, for example.

If we can now use simultaneous PET to unlock information right up to the cellularity of a tumor, meaning that we can characterize its tissue and metabolic properties, that will open up new possibilities for completely new disease categories. I am highly optimistic that we will soon look at diseases in a whole new light.

Whenever a large new unit is being introduced, costs also come up as part of the discussion. Are they a limiting factor?

CLAUSSEN: Those kinds of worries often start with false assumptions – large-scale high-tech devices generate only about one percent of a clinic's total medical expenditures. Besides that, it's easy to

overlook that there is even the potential for savings. Many modern chemotherapy drugs cost tens of thousands of euro annually. They are complex, expensive, and put a great deal of strain on patients. But if MR-PET can be used, for instance, to clearly show that a certain course of treatment will be useless because the specific patient will not, or no longer, respond to it, the costs of that treatment can be saved. Quite aside from the fact that it is much easier to communicate to the patient why he or she is not receiving a certain medication, and the fact that he or she does not have to contend with the side effects of treatment. Furthermore, we can also envision flexible solutions, as we see from models from abroad. In Tübingen, we have signed agreements with certain health insurers that allow us to provide services that

would otherwise not be eligible for reimbursement. As a result, having patients pay a portion of the diagnostic costs is definitely not the right solution in the long run. High-tech imaging should absolutely not become a luxury that is excluded from normal patient care.

Martina Lenzen-Schulte, MD, is a physician, medical journalist, author, and presenter. Her work appears in highly regarded medical journals and in general-interest media.

Further Information

[www.siemens.com/
Biograph-mMR](http://www.siemens.com/Biograph-mMR)

Biograph mMR – For a Perfect Pas de Deux

Extensive efforts have been made to find a way to combine positron emission tomography (PET) and magnetic resonance imaging (MRI) since the 1990s. Combining molecular information and precise anatomical visualization seemed to be only a pipe dream. Now, what was initially successful only for scanning small animals in preclinical research has also been extended to whole-body scans on human patients, with Biograph mMR¹.

The two technologies are actually mutually exclusive: The photomultipliers normally used in PET scanners interfere with an MRI unit's magnetic field. To circumvent this problem, the new hybrid device uses "avalanche photodiodes," which are highly sensitive to scintillator light. While PET uses radio-nuclides to show characteristic metabolic processes – such as those that indicate a primary tumor or dementia – MRI supplies a precise image of the organ tissue as the background. MRI is like a high-resolution aerial view of a three-dimensional landscape, while PET is the signal rocket that draws the eye precisely to the critical action.



Now, for the first time ever, Biograph mMR, which is based on a state-of-the-art 3-tesla MRI system, makes it possible to acquire real simultaneous whole-body images using both techniques. That means that it can be used for more than just relatively small areas of the body, like the head. The benefit of performing both scans truly simultaneously also offers great precision during dynamic studies. If physicians wish to correlate the flow of blood into and out of the tissue with metabolic markers, for instance, both exams must be absolutely simultaneous.



A dream come true: Biograph mMR, first simultaneous whole-body MR-PET imaging.

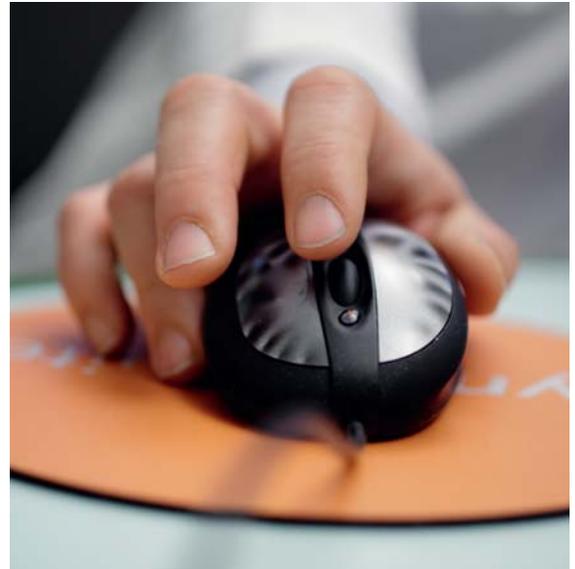
¹ The Biograph mMR system is pending 510(k) review by the U.S. FDA and requires a Declaration of Conformity according to MDD. It is not commercially available in all countries.

Making Mammography Reading More Efficient



syngo.plaza helps boost radiologists' productivity. Siemens' new picture archiving and communication system can be adapted to customers' needs individually to serve them even better, as Professor Andreas Herneth, MD, in Vienna demonstrates.

By Oliver Klaffke



Per Professor Herneth's request, each frequently used function is attributed to one out of eight "buttons" on a multifunctional, personalized mouse.

"In my daily work I'd like to achieve the highest efficiency possible," says Professor Andreas Herneth, MD, Chief of Radiology at Sanatorium Hera in Vienna, Austria. Herneth returned to Austria with his family from the U.S. recently after working at Stanford University, California, for some years and helping build a hospital in Malaysia. The monitors on his desk display mammography images. On the wall are some old light boxes, essential for reading X-ray images of the past. However, their time is over. "Radiology is going to be digital in the future," he says. "And we will see a streamlined workflow, higher productivity, increased diagnostic accuracy, and better service for our patients." Herneth wants a diagnosis as fast and efficient as possible and would like to see tasks eliminated that are not essential for his diagnostic work.

Less Distraction

Siemens' new picture archiving and communication system (PACS), *syngo*®.plaza, helps him to achieve exactly that in mammography. Since Herneth believes that the quality of work declines the more time is spent on it, he is not prepared to sit on his cases until 11 o'clock at night. "It was the tennis player Boris Becker who once remarked, 'Why should I play five

rounds of tennis when I can win in three and get the same amount of money?'," Herneth says.

Until Herneth had *syngo.plaza* installed at Sanatorium Hera, he and his colleagues were busy with significant amounts of work that did not really call for the competence of high-profile radiologists. Analyzing the mammography images involved a lot of work: tedious mouse clicks, saving images, searching for them, and finally retrieving and skimming through them. Instead of concentrating on the images, numerous other tasks required attention. Everyone who knows about workflows will tell you that any distraction from your intended task is a burden and your concentration will suffer – requiring a lot of time to get back on track again. "At the end of the day you work better, faster, and with higher quality if you're able to stay concentrated on what you do best," the radiologist says.

Herneth is very certain in what he expects from a modern PACS like *syngo.plaza*. He simply wants to stay focused and does not want to look at anything else but the clinical images on his screen. "I don't even want to look at the mouse, the pull-down menu, or the keyboard when working with the clinical images," he says. The more the eyes travel, the more tired they

become. The "eye kilometers" – as Herneth calls them – are what matters. Herneth wanted to take the benefits of the new *syngo.plaza* even further and asked Siemens whether it was possible to use a multifunctional personalized mouse to navigate through the workflow instead of using the menus. Each frequently used function is now attributed to one out of eight "buttons" on his mouse. Using this, the professor can go through his case without taking his eyes away from the images. The multifunctional mouse is readily available for a nominal price at every electronics store and is frequently used for computer games. No longer is there any need to navigate either the pull-down or corner menus. Herneth runs the reading using the mouse. This advantage seems to be small for those not familiar with the daily work of a radiologist but Herneth warns to not underestimate such benefits. It is all about avoiding "eye kilometers" and remaining concentrated when working with mammography images. Staying focused is vital as Herneth and his colleagues look for tiny spots on the images. Any untrained eye will overlook such microcalcifications easily, which are significant markers for developing cancer. However, any trained eye that becomes

tired might miss them as well. So, every advance that helps radiologists work in a more concentrated manner is beneficial to patients. "This multifunctional mouse really makes a huge difference," Herneth says.

Siemens was happy to equip the radiologist's *syngo.plaza* with the mouse. It was not a great feat technically and took engineers only a couple of hours to deploy. Now, the system is so flexible that everybody using *syngo.plaza* and the mouse can easily change the functions attributed to the different buttons of the mouse in no time. So, every mouse is personalized and adjusted to the needs and preferences of the user. "The mouse is just another added value of *syngo.plaza*," Herneth says.

More Comfort for the Patient

Currently, Sanatorium Hera is using *syngo.plaza* in mammography. The hospital, which draws most of its patients from Vienna's public servants, started to

"The digital way of doing radiology has had a tremendous effect on the way we collaborate today."

Professor Andreas Herneth, MD, Chief,
Radiology Department, Sanatorium Hera, Vienna, Austria

invest in new mammography equipment in the Summer of 2010. It replaced an analog mammography device with the Siemens MAMMOMAT® Inspiration. This system helps reduce the amount of time needed for an examination and provides a more comfortable environment for the patient. With the new full-field digital Siemens MAMMOMAT Inspiration system, even biopsies are easy to perform. Biopsies can be performed either in the upright position or horizontally lying in a bed.

The availability of older images from former examinations is a great advantage of

syngo.plaza. They can be accessed easily and compared with recent findings. This offers a better service for patients, and in some cases might even help save their lives. At the end of December, Herneth detected a small spot on the breast scan of a patient in a routine screening. As older images were readily available in *syngo.plaza*, it became clear that the suspicious lesion developed and grew quickly. An operation was scheduled quickly and it turned out that the patient had a malignant tumor in her breast. Without the easy image comparison offered by *syngo.plaza*, Herneth's team would have had to ask her to return in a couple of months in order to check whether they would see any change in the spot's size. "Evidently, in this case, the survival chances of the patient would have been severely hampered," he says.

The Digital Way of Doing Radiology

The quality of diagnosis is enhanced by using such sophisticated systems. By making image handling easier and helping radiologists fully concentrate on their tasks, intelligent software solutions pay off for patients: Their images get the experts' full attention. *syngo.plaza* can even automatically retrieve the most relevant older images within seconds when the patient is in for screening again. If Herneth has measured a spot on an image in the past, the next time he opens the case this very image will be displayed immediately. He is not going to lose any time looking for them. *syngo.plaza* takes over this task and offers valuable assistance to the radiologist: Within seconds, he knows what was measured previously. It is also convenient to have the digital data readily available to be sent directly to a specialist with *syngo.plaza*. In Aus-

CAD in Mammography

Using Siemens' latest mammography systems help reduce the time needed for an individual examination. It used to take 15 to 20 minutes to have the X-rays done. Today, it takes five to six minutes to get the relevant images in most cases. The workflow is efficient. It runs smoothly from patient registration via image acquisition, processing, and quality check, to reading and reporting.

Siemens has also developed tools that assist the radiologist in detecting relevant findings. Diagnostic success in mammography includes detecting breast cancer in its earliest and most treatable stage. Computer-aided detection (CAD) is becoming an integral part of the mammography workflow, helping radiologists detect cancer as early as possible.

Siemens' *syngo*® CAD Manager¹ is a platform that supports multiple algorithms, including *syngo* MammoCAD.² *syngo* CAD Manager automatically recognizes the examination type and correctly applies the appropriate algorithm. Once the algorithm has been applied and the images are processed, *syngo* CAD Manager routes the resulting images to the correct destination for review and interpretation. *syngo* MammoCAD analyzes images from Siemens' full-field digital mammography systems and generates CAD marks to highlight suspicious areas, such as masses and microcalcifications. The application was developed using typical structures of clinical cases worldwide and is continually being updated.

¹ *syngo* CAD Manager is not a medical device.

² *syngo* MammoCAD is not approved for use in the U.S. It is an investigational device and its future availability cannot be ensured.



Sanatorium Hera invested in new mammography equipment in 2010, replacing an analog mammography device with the Siemens MAMMOMAT Inspiration.

tria, as in most other countries, radiologists work closely together. If Herneth does not feel comfortable with an aspect of a case, he simply sends off the images electronically to a second specialist and asks for his or her opinion. In return, he helps his colleagues when they are in need of assistance. "The digital way of doing radiology has had a tremendous effect on the way we collaborate today," Herneth says. In addition, Herneth has installed the *syngo* CAD manager¹, so he can display the CAD findings via *syngo.plaza* for a second opinion.

Easy Installation, Easy Learning

The Siemens PACS was easily installed at the Sanatorium Hera, and even senior colleagues who were not so keen on using computers readily learned how to work with the system. Handling it is easy, the stability of the system a necessity. This is what Herneth considers one of the most important advantages of the Siemens system: "It runs smoothly and we haven't had any problem using it since *syngo.plaza* was implemented last year,"

he says. The number of films used for mammography X-rays decreased by 15 percent in the first few months *syngo.plaza* was running, Herneth reports. This meant less money spent and fewer toxic chemicals deposited.

What Herneth wishes for is an even more advanced streamlining of the whole process of radiology in the future. He dreams of sitting in front of the screens without being distracted by anything and of not having his eyes wandering elsewhere. He wants to focus on the clinical images and simultaneously dictate his findings into a microphone connected to a speech recognition system. This, he says, would make life even easier, work more efficient, and serve the patient better. This, he says, is the promise of digital radiology.

Oliver Klaffke is a science and business writer based in Switzerland. Among other publications, he has written for New Scientist and Nature in the past.

Further Information

www.siemens.com/syngo.plaza

Summary

Challenge:

- Diagnosis as fast and efficiently as possible
- Eliminate tasks that are not essential for diagnostic work
- Avoid distractions from the screen when reading clinical images

Solution:

- Digital image acquisition and digital image reading on PACS workplace
- Multifunctional computer mouse allowing the most frequently accessed functions of *syngo.plaza* to be used without a keyboard

Result:

- Fast image availability and possibility to share images with colleagues
- Easy access to older images and possibility to compare findings
- Eye strain through movement is reduced so that radiologists can fully concentrate on their tasks

¹ *syngo* CAD Manager is not a medical device.

The UK Healthcare System: Public and Private Collaboration

By Chris Ham, Chief Executive of the King's Fund; Professor of Health Policy and Management at the University of Birmingham, England; Honorary Fellow of the Royal College of Physicians of London and the Royal College of General Practitioners

The United Kingdom has had a national health service (NHS) since 1948. The NHS provides comprehensive services to all citizens, funded through taxation. With the exception of dental care, prescription drugs and optical care, which are subject to various levels of co-payments, all of these services are free at the point of use.

Most hospital services are publicly owned, while primary care is delivered by general practitioners (GPs) who are private practitioners paid for by the government. GPs usually work as part of a primary healthcare team comprising nurses, healthcare assistants, receptionists, and administrators. Primary healthcare teams work closely with community nurses, health visitors, physiotherapists, and other staff who are employed to provide care in people's homes and in community clinics. Ambulance services are also provided within the NHS.

Mental health services are provided in hospitals and the community. There has been a long-term trend to reduce reliance on psychiatric hospitals and to provide acute inpatient services within general hospitals. Community mental health teams work with primary healthcare teams to care for people living at home or in community settings, including people with dementia and other long-term conditions.

Private Healthcare

A small private sector exists alongside the NHS. The costs of private healthcare are met partly through private medical insurance (PMI) and partly through patients paying directly when this form of care is used. Most PMIs take the form of an employment benefit offered to white-collar staff, and it enables those who are insured to use private hospitals or seek the advice of doctors working privately.

Private expenditure comprises 17 percent of total health expenditure, a lower proportion than the average in Organization for Economic Cooperation and Development (OECD) countries.

Private healthcare does not provide a comprehensive alternative to the NHS because the range of services delivered in this way is restricted. People primarily choose to access private healthcare for non-urgent appointments with medical specialists, diagnostic tests, elective procedures, and some forms of cancer and cardiac care. Emergency care in hospitals and specialized services such as organ transplants are provided almost entirely by the NHS, as is most primary healthcare and maternity care.

An issue of ongoing debate is the boundary between healthcare and social care. The traditional role played by the NHS in providing long-term care to older people and others with complex needs has



public

private

Facts & Figures

The essay is based on the organization of the NHS in England, where the population of around 50 million comprises the bulk of the 60 million people who live in the United Kingdom (UK). The devolved governments in Northern Ireland, Scotland, and Wales have adopted different arrangements, based on planning rather than competition. The principles of a universal, comprehensive, tax-funded NHS are the same throughout the UK.

Total health spending per capita was US\$ 3,129 in 2008, close to the OECD average. Total health spending accounted for 8.7 percent of gross domestic product in 2008, compared with an average of 9 percent across OECD countries. Spending grew faster in the UK between 2000 and 2008 because of a political commitment to increase health spending to bring it into line with that of the European Union. Government spending comprises 83 percent of the total, well above the OECD average of 73 percent.¹

There have been long-term improvements in health outcomes, and in 2007 life expectancy at birth was 79.7 years, just above the OECD average. Female life expectancy was 81.4 years, and male life expectancy was 77.3 years. The infant mortality rate in 2008 was 4.7 deaths per 1,000 live births, which was the same as the OECD average. Rates of cigarette smoking are below the OECD average (22 percent compared with 23.3 percent in 2008), and obesity rates are higher than the OECD average (24.5 percent compared with 21 percent in 2008).¹ The leading causes of death in the UK today are circulatory diseases (accounting for 34 percent of deaths), cancers (27 percent), and respiratory diseases (14 percent). Although premature deaths from these diseases are falling and people are living longer, the prevalence of chronic conditions that affect people's quality of life has been increasing. More than 15 million people in England have one or more chronic conditions, and the number is expected to rise in line with increases in obesity rates and other risk factors like the misuse of alcohol.²

The UK has fewer practicing physicians than the OECD average (26 per 10,000 population compared with 32 in 2008) but more nurses (95 per 10,000 population compared with 90 in 2008). The number of acute hospital beds was 27 per 10,000 population in 2008 compared with the OECD average of 36. Reflecting long-term underfunding, the UK has less than half the number of magnetic resonance imaging (MRI) scanners and only one-third of the number of computed tomography (CT) scanners found in the OECD as a whole.¹

Most hospitals are publicly owned and are managed as semi-autonomous NHS Trusts. Medical specialists work as salaried employees in public hospitals, and some of these specialists also undertake private work during part of the working week. Private work enables medical specialists to increase their incomes, and the rewards are particularly high in surgical specialties such as orthopaedics and cardiac care.

Most private work takes place in private hospitals that work alongside public hospitals. In recent years, the NHS in England has paid for some patients to be treated in private hospitals to help reduce waiting times for diagnostic tests and non-urgent surgical procedures. Many public hospitals also have facilities used by private patients, as a way of supplementing the income they receive from the NHS. The result is a mixed healthcare economy in which the traditionally dominant role of public hospitals is increasingly supplemented by private providers.

Private medical insurance covers around 12 percent of the population. People with insurance are able to obtain faster appointments with medical specialists than is usually the case in the NHS, and they may also benefit from a higher level of convenience and amenity than is provided in public hospitals. Some people pay for the costs of private healthcare out of their own pockets if they feel that the NHS is unable to offer a timely response to their needs.

Sources:

¹ OECD, *Health at a Glance Europe 2010*, OECD Publishing, 2010; *OECD Health Data 2010: How Does the United Kingdom Compare*. <http://www.oecd.org/dataoecd/46/4/38980557>. Last accessed January 23, 2011

² Department of Health, *Our Health and Wellbeing Today*, Department of Health, London, 2010



77.3

Male Life Expectancy at Birth (2007):



Female Life Expectancy at Birth (2007):

81.4

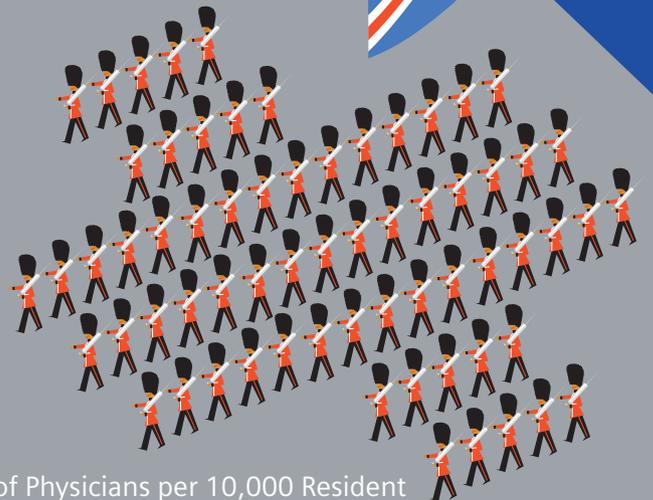
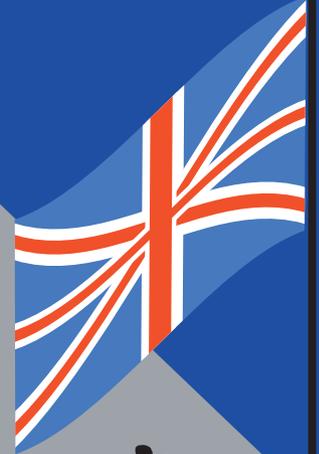
Population in Thousands (2008): 61,792



Government Expenditure on Health as % of Total Expenditure on Health (2008): 83%

Total Expenditure on Health per Capita (2008): US\$ 3,129

\$ \$ \$ \$

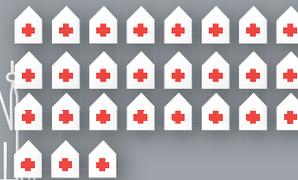


Total Expenditure on Health as % of GDP (2008): 8.7%

Number of Physicians per 10,000 Resident Population (2008): 26

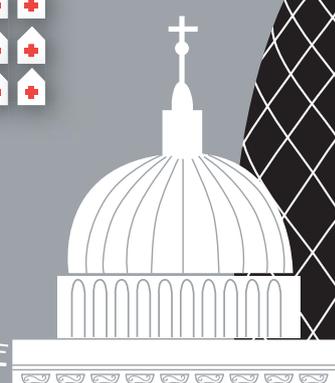


Number of Hospital Beds per 10,000 Resident Population (2008): 27



Number of Nurses per 10,000 Resident Population (2008)

95





declined as responsibility for much of this care has been transferred from public to private funding. Only people with low income and with limited assets have their long-term care fully funded by the state, leaving many others to ultimately pay for the costs of such care.

While responsibility for long-term care for those with medical needs falls within the NHS, various options have been proposed for paying for those needs deemed to be social rather than medical. The Coalition Government elected in 2010 has appointed a commission to examine these options and to report in the summer of 2011 with a promise of introducing legislation to establish a fair funding system in the future. It is expected that the commission will favor a partnership funding model in which the costs of care are met by a combination of public and private sources.

A Decade of Investment

One of the strengths of the NHS is the role of GPs as the first point of contact for patients when they are unwell. Almost

were not performing as well as in many comparable countries. As a result, access to hospital services has improved considerably with waiting times to see a medical specialist, undergo a diagnostic test, or have a surgical procedure much lower than used to be the case. Cardiovascular and cancer services have benefited from spending increases with the appointment of extra staff, the acquisition of new equipment for the diagnosis and treatment of patients, and funding of new drugs.

A major challenge will be to ensure that the improvements in care that have resulted from increased spending are maintained in the much tighter financial context that now exists. The NHS budget is not expected to increase more than is needed to cover the costs of inflation in the period until 2014. It is therefore faced with the unprecedented challenge of finding substantial efficiency savings over this period in order to meet the needs of an aging population and to pay for advances in diagnosis and treatment. Early indications are that waiting times for treatment are starting to creep up, and in some areas of the country non-urgent treatments are being delayed to avoid budgets being overspent.

The Next Stage of Reform

Looking to the future, the NHS in England is embarking on another major program of reform designed to increase the choices available to patients, stimulate greater competition between hospitals and other healthcare providers, and further strengthen the role of GPs. Networks of general practices are being formed to take control of budgets, with which they will purchase most forms of healthcare for the populations they serve. These networks, known as “commissioning consortia,” will take over full responsibility in 2013 and will provide a stronger link between the clinical decisions of GPs and the financial consequences of those decisions.

Commissioning consortia will purchase care from a mix of public and private providers, both in hospitals and in the community. The Coalition Government

“One of the strengths of the NHS is the role of GPs as the first point of contact for patients when they are unwell.”

Chris Ham, Chief Executive, King's Fund, London, UK

all patients are registered with a general practice, and GPs have come to work in small groups instead of practicing single-handedly. The range of services provided by GPs has expanded to include not just the diagnosis and treatment of minor medical conditions, but also the prevention of illness – for example, through vaccination and immunization – and chronic disease management.

In the last decade, there has been a substantial increase in spending on the NHS in response to concerns that hospital services and some forms of specialist care

has made a commitment to maintain the NHS as a public health insurer but is actively encouraging much greater diversity in service provision, in the belief that this will drive the improvements in performance that are needed in a resource-constrained environment. Accordingly, public hospitals will be given greater autonomy, and the intention is that any willing provider should be able to deliver care to patients as long as it does so within the prices paid by the NHS and to the standards set by the quality regulator.

The reform program is an attempt to shift away from a centralized healthcare system, in which targets set by the government provided the main impetus for improvement, to a much more decentralized service, in which the choices of patients and the decisions of GPs and other frontline clinicians have a much bigger influence. An attempt is also being made to reorient the NHS from the treatment of people when they become ill to the prevention of sickness. The renewed interest in prevention and public health reflects recognition that many of the health problems in the United Kingdom result from a combination of lifestyle choices and broader social and economic determinants of health.

The Coalition Government is also seeking to improve the performance of the NHS in areas where the United Kingdom does not do as well as other countries. Although premature deaths from cardiovascular diseases and cancer have fallen substantially, there is room for improvement in reducing deaths amenable to medical intervention and in increasing

“There is more to do to bring health and healthcare up to the level found in the highest-performing healthcare systems.”

Chris Ham, Chief Executive, King's Fund, London, UK

cancer survival rates. Some of the differences in health between the United Kingdom and other countries result from wide and persistent inequalities between socioeconomic groups, and these inequalities are being addressed through the focus on prevention and public health.

Summary

Survey evidence suggests that public satisfaction with the NHS is at a high level and has risen in line with recent improvements in performance. The international surveys conducted by the Commonwealth Fund show that on many measures, the United Kingdom performs well in comparison with countries like Australia, Canada, New Zealand, and the United States. The main areas in which the United Kingdom has room to do better relate to delivering patient-centered services and improving health outcomes in areas such as cancer survival rates. Increased public spending on healthcare in the last decade has brought expenditures in line with the average in European Union countries, thereby fulfilling the pledge made by Prime Minister Tony

Blair in 2000. While this has gone some way toward dealing with decades of relative underinvestment, there is more to do to bring health and healthcare up to the level found in the highest-performing healthcare systems. The major uncertainty is whether funding constraints from 2011 onward will stand in the way of the government's ambition of delivering truly world-class standards of performance.

On an optimistic note, the reforms being put in place will empower patients and GPs to build on recent progress and deliver further improvements in care. More pessimistically, some of the gains made since 2000 will be lost as a consequence of the mismatch between increasing demands and finite resources. The affection in which the NHS is held by the public makes one thing certain: The performance of the NHS will be closely scrutinized and will have an important bearing on the popularity of the government and its prospects at the next election.

The opinions reflected in this article are those of the author and do not necessarily reflect those of Siemens Healthcare.



Chris Ham is Chief Executive of the King's Fund, an independent foundation involved in policy analysis, leadership development, and healthcare improvement in England. He is also Professor of Health Policy and Management at the University of Birmingham in England and an Honorary Fellow of the Royal College of Physicians of London and the Royal College of General Practitioners. Ham served as Director of the Strategy Unit in the Department of Health between 2000 and 2004, when he worked with health ministers on the reform of the NHS. He has served as a consultant for governments in a number of countries and for the World Bank and the WHO. In addition, he is the author or co-author of 20 books and numerous articles in scientific journals. Ham was awarded a CBE for his services to the NHS in the Queen's Birthday Honours in 2004.

Further Reading

Siemens offers a variety of customer magazines and information channels. "Further Reading" introduces a selection of articles and topics featured that may be of interest to you. To learn more, follow the link below each article. To subscribe to any of the magazines, see page 93.

Seeing More: Aminoscopic Rendering

A recent case study¹ illustrates the success and implies the future potential of amnioskopic rendering with 3D imaging. A 32-year-old woman was correctly diagnosed with suspected partial perforation resulting from pathological changes in her uterus using 3D imaging versus a 2D ultrasound examination.

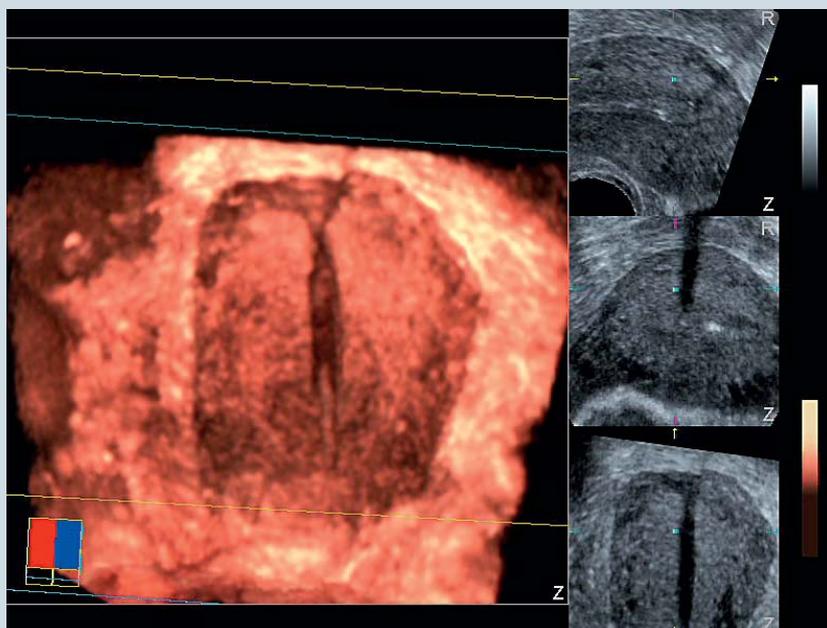
The patient complained of severe pains that began hours after the insertion of a levonorgestrel intrauterine device (IUD). She was referred for an examination using a 2D ultrasound imaging system. The 2D examination was unsuccessful in determining diagnosis due to inconclusive imaging. Aminoscopic rendering on

the ACUSON S2000™ ultrasound system, which provides improved resolution through a user-directed light source, was able to provide information for the physician to determine the exact position of the IUD and diagnose the patient with partial perforation of the uterus.

To visualize and determine the position of an IUD, 3D ultrasound using amnioskopic rendering is becoming a method of choice. The method is also useful for the physician when identifying pathological processes, such as damage of the uterus, by imaging the edema or the myometrium and transudation within the cavity.

3D ultrasound provides a clear visualization of IUD position over conventional 2D ultrasound. Amnioskopic rendering may prove to be of additional value especially in cases of suspected partial perforation and subtle signs of surrounding structures due to extravasations and local edema of the uterine wall.

¹ Volume Sonography using Amnioskopic Rendering in determination of partial uterine perforation with an intrauterine device. Darija Strah, MD, Diagnostic Centre Strah, Domzale, Slovenia; Ksenija Gersak, MD, University Medical Centre; Ljubljana, Slovenia



Differentiation of the local edema of the myometrium in the uterine fundus and transudate in uterine cavum, demonstrating the pathological changes of the uterus due to improper insertion of LNG-IUD.

[www.siemens.com/
ultrasoundlibrary](http://www.siemens.com/ultrasoundlibrary)

Clinical Relevancy of Automated Breast Volume Ultrasound

The shortage of experienced sonographers to perform complex breast ultrasound examinations as well as the time required to scan the entire breast are among the reasons why ultrasound's role in breast imaging has traditionally been that of a secondary imaging modality,



Large coronal view of the right lateral aspect revealing two small benign cysts as well as the surrounding breast tissue.

looking at palpable masses or findings identified on a mammogram. A new method for acquiring and analyzing ultrasound images has the potential to change that. Siemens' ACUSON S2000™ Automated Breast Volume Scanner (ABVS) is the world's first multi-use volume breast ultrasound system that acquires full sonographic volumes of the breast for comprehensive review and diagnosis. In less than ten minutes, the automated system acquires volumes that provide efficient and comprehensive analysis of 3D data and easy, semi-automated reporting.

Built on next-generation acoustic technologies, the ACUSON S2000 ABVS enables excellent, detail resolution and the acquisition of the unique anatomical coronal view not available using conventional ultrasound techniques. In addition, the system supports hand-held imaging for biopsy guidance, color Doppler imaging,

and the latest applications, including eSie Touch™ elasticity and custom tissue imaging.

At the St. Radboud University Nijmegen Medical Centre and the Jeroen Bosch Hospital, The Netherlands, physicians are about to begin further clinical research using the ACUSON S2000 ABVS¹. The entire study is expected to take approximately two years and will ultimately assess the potential role of automated breast volume scanning in the early detection of breast cancer.

¹ Automated Breast Volume Scanning: 3D Ultrasound of the Breast. Roel Mus, MD, Radboud University Nijmegen Medical Centre (RUNMC), Nijmegen, The Netherlands
Matthieu Rutten, MD, PhD, Jeroen Bosch Ziekenhuis, 's-Hertogenbosch, The Netherlands

[www.siemens.com/
ultrasoundlibrary](http://www.siemens.com/ultrasoundlibrary)

Shaping the Digital Revolution

For hospitals that are looking to digitize their imaging processes in the radiography or fluoroscopy suite, Siemens offers efficient solutions. An upgrade with a flat detector can help hospitals and practices pave the way to achieve their goals of reducing costs while still boosting patient throughput. The upgrade enables direct digital radiography because it eliminates the need for film or computed radiography cassettes – an advantage that can reduce operational costs. Such an upgrade comes with the confidence and convenience of a single contact partner for the entire system, protecting investment and overseeing the system so it remains up-to-date.

Examination times are significantly reduced with digital flat detector systems – by as much as 50 percent when com-

pared to analog systems.¹ The comfort of patients is not sacrificed to this end. In fact, patient comfort is increased thanks to the flexibility of the detector. Patients in wheelchairs or on stretchers can comfortably be examined, which improves workflow and helps to increase throughput. Preview images are available within seconds, reducing examination times, and postprocessing provides greater contrast detail and soft tissue visibility. Owners of a MULTIX radiography system or an AXIOM® Luminos TF fluoroscopy system can invest with confidence and experience the benefits of digital equipment with digital solutions from Siemens. Additionally, if the system is already a fully digital solution like the AXIOM Luminos dRF, customers can improve efficiency with a suitable upgrade: The



Ysio option – the wireless detector wi-D, the Ysio ceiling-suspended tube, and/or a bucky wall stand – offers virtually unlimited projection flexibility.

¹ Results may vary. Data on file.

[www.siemens.com/
AXIOM-Innovations-mFD](http://www.siemens.com/AXIOM-Innovations-mFD)

Improving Vitamin D Results

The demand for vitamin D testing will continue to rise as more people are made aware of their vitamin D deficiency and studies continue to support vitamin D levels as a general health indicator.

Recent studies link vitamin D deficiency to several other disease states, including cancer, cardiovascular, diabetes, and autoimmune diseases.¹ At the same time, deficiency rates are increasing with more

than one billion people being vitamin D deficient worldwide² as people limit their sun exposure due to the risk of skin cancer.

In the world of vitamin D testing, the ADVIA Centaur® Immunoassay systems from Siemens are the only systems to offer a fully automated total 25(OH) vitamin D (~100% D₂ and D₃) assay³ that employs proprietary antibodies and has traceability to liquid chromatography-mass spectrometry (LC-MS/MS).

The Vitamin D Total immunoassay test measures the two major forms of vitamin D – 25(OH) vitamin D₂ and 25 vitamin(OH) D₃ – and brings together a wide range of assays on a single analyzer – quickly, accurately, and with full automation. Precise and consistent vitamin D total results are made available in as little as 18 minutes, which results in fast turnaround times to help ensure that patients are correctly evaluated for deficiency, sufficiency, or toxicity. Hospitals can decrease overall turnaround time and make the most of the limited space and resources they have with a fast, convenient system. Now laboratories can easily manage a growing test volume and maximize productivity, which can lead to improved patient outcomes.

¹ Dietary Supplemental Fact Sheet: Vitamin D Office of Dietary Supplements. National Institutes of Health, updated 11/13/2009

² Holick MF. *N. Engl. J. Med.* 2007; 266-81

³ The ADVIA Centaur Vitamin D Total assay is not available for sale in the U.S.



www.siemens.com/vitamindtotal

State-of-the-art Device Management

Lawrence and Memorial Hospital – a 320-bed facility serving the community in New London, Connecticut, U.S., – performs more than 80,000 routine and specialty laboratory tests annually. At its main campus, two Siemens BCS® XP Systems have been selected for hemostasis analyses out of offerings from three vendors.

The lab's evaluation criteria included: system functionality, suitability of the test menu for the facility, anticipated maintenance requirements, minimal downtime, and the level and quality of service provided by the vendor. In 2009, the hospital implemented Siemens' RealTime Solutions™ (RTS) feature to further enhance the reliability and availability of its BCS XP Systems.

RTS is a secure, Internet-based technology that allows Siemens technicians to remotely monitor the performance and

operating status of the BCS XP Systems in order to identify, diagnose, and correct potential problems. Issues can often be resolved remotely with no system downtime or lapses in analyzer availability. Due to the hospital's constant, high-volume demand for hemostasis testing, analyzers must be reliable, available, and accurate.

The HIPAA requirements for utilizing this type of remote monitoring and support technology are very strict in the U.S. Therefore, maintaining the security of patient data is critical. RTS is designed to prevent unauthorized personnel from viewing patient data. Hematology Manager Pedro Ugarelli leads the hospital's coagulation testing operation and reports that his choice to deploy the new systems was influenced by his extensive prior experience with Siemens and the quality of service that he had received.



www.siemens.com/bcsxp

Siemens CLINITEST hCG Qualitative Pregnancy Test Demonstrates Better Analytical Sensitivity

According to an independent research study¹ the Siemens CLINITEST® hCG (human chorionic gonadotropin) pregnancy test, when performed on the CLINITEK Status® family of analyzers, had the highest detectability factor and analytical sensitivity when compared to Quidel QUICKVUE and four other point-of-care devices. The study documents the importance of detecting hCG beta core fragments (β cf) in early pregnancy samples, since this is one of the most common hCG variants in urine, following intact hCG.

Twelve different brands of hCG devices were tested for their ability to detect a number of different forms of hCG variants. Of the six professional point-of-care devices tested², Siemens' CLINITEST hCG was shown to detect the lowest levels of hCG. According to the results, Siemens CLINITEST hCG test had the highest detect-

ability factor and the greatest analytical sensitivity of the devices tested. The article summarizing the study was published by *Clinica Chimica Acta*: "Qualitative point-of-care and over-the-counter urine hCG devices differently detect the hCG variants of early pregnancy." In addition to its demonstrated analytical sensitivity, the CLINITEST hCG pregnancy test provides fast, easy instrument-read-and-reported test results taking the questions out of results interpretation.

¹ Cervinski, M.A., Lockwood, C.M., Ferguson, A.M., Odem, R.R., Stenman, U.H. Alftan, H., Grenache, D.G., and A.M. Gronowski, "Qualitative point-of-care and over-the-counter urine hCG devices differentially detect the hCG variants of early pregnancy", *Clinica Chimica Acta*, 406,81-85 (2009)

² The six professional point-of-care devices evaluated include SureVue® Serum/Urine hCG-STAT (Fisher Scientific), CLINITEST hCG (Siemens), Quick-Vue® + One-Step hCG Combo (Quidel Corp.), Osom® Card Pregnancy Test (Genzyme Diagnostics), hCG Combo SP® (Cardinal Health), and ICON® II HCG (Beckman Coulter).



www.siemens.com/clinitesthcg

© 2011 by Siemens AG, Berlin and Munich,
All Rights Reserved

Publisher:

Siemens AG

Healthcare Sector

Henkestrasse 127, 91052 Erlangen, Germany

Responsible for Contents: Michael Sigmund

Director of Customer Communications: Silke Schumann

Chief Editor: Doris Pischitz

Editorial Team: Tanja Berbalk, Emily Smith

Production: Norbert Moser

All at: Henkestrasse 127, 91052 Erlangen, Germany

Phone: +49 9131 84-7529, Fax: +49 9131 84-4411

email: editor.medicalsolutions.healthcare@siemens.com

Design and Editorial Consulting:

independent Medien-Design, Munich, Germany

in cooperation with Primafila AG, Zurich, Switzerland

Art Direction: Horst Moser

Layout: Claudia Diem, Mathias Frisch, Irina Paschenko

Editorial Coordination: Christa Löberbauer

Photo Editor: Anja Kellner, Susanne Nips

All at: Widenmayerstrasse 16, 80538 Munich,
Germany

PrePress: Reinhold Weigert, Typographie und mehr ...
Schornbaumstrasse 7, 91052 Erlangen, Germany

Printer: Mediahaus Biering GmbH,
Freisinger Landstrasse 21, 80939 Munich, Germany

Photo Credits:

Cover: Lothar Schmid

Cover Story: Stefan Boness, Atul Loke/Panos, Sven Döring/
Agentur Focus, Sabine Zander/Infografik-Hamburg, Siemens,
Harald Hoffmann, Lothar Schmid

Laboratory Automation: Simone Casetta/Agentur
Anzenberger, Siemens

Consulting: Harald Hoffmann, independent Medien-Design

Magnetic Resonance Imaging: Gaby Gerster, Siemens

Cardiology: Christoph Seeberger

Philosophy: Terry/SPL/Agentur Focus, Siemens, akg-images,
INTERFOTO/Science & Society

Advanced Visualization: Thorsten Rother

molecular MR: Dieter Mayr, Siemens

PACS: Peter Rigaud/Shotview

Essay Series: Orlando Illustration, Private

Note in accordance with § 33 Para.1 of the German Federal
Data Protection Law: Dispatch is made using an address
file which is maintained with the aid of an automated data
processing system.

We remind our readers that when printed, X-ray films never
disclose all the information content of the original. Artifacts in
CT, MR, ultrasound, and DSA images are recognizable by their
typical features and are generally distinguishable from existing
pathology. As referenced below, healthcare practitioners are
expected to utilize their own learning, training, and expertise
in evaluating images.

Partial reproduction in printed form of individual contribu-
tions is permitted, provided the customary bibliographical
data, such as author's name and title of the contribution as
well as date and pages of *Medical Solutions*, are named.
The editors request that two copies be sent to their attention.
The consent of the authors and editors is required for the
complete reprint of an article. Manuscripts submitted without
prior agreement as well as suggestions, proposals, and infor-
mation are always welcome; they will be carefully assessed
and submitted to the editorial conference for attention.

Medical Solutions on the Internet:

www.siemens.com/healthcare-magazine

DISCLAIMERS: Practice of Medicine: "The information presented in this magazine is for illustration only and is not intended to be relied upon by the reader for instruction as to the practice of medicine. Healthcare practitioners reading this information are reminded that they must use their own learning, training, and expertise in dealing with their individual patients. This material does not substitute for that duty and is not intended by Siemens Healthcare to be used for any purpose in that regard." Contrast Agents: "The drugs and doses mentioned herein are consistent with the approved labeling for uses and/or indications of the drug. The treating physician bears the sole responsibility for the diagnosis and treatment of patients, including drugs and doses prescribed in connection with such use. The Operating Instructions must always be strictly followed when operating your Siemens system. The source for the technical data are the corresponding data sheets." Trademarks: "All trademarks mentioned in this document are property of their respective owners." Results: "The outcomes achieved by the Siemens customers described herein were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that others will achieve the same results."

Siemens Healthcare Publications

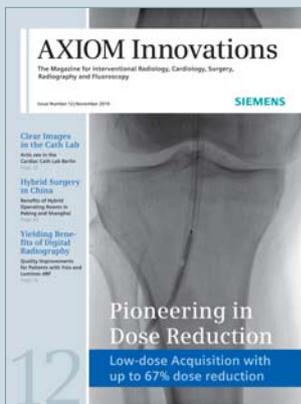
Our publications offer the latest information and background for every healthcare field. From the hospital director to the radiological assistant – here, you can quickly find information relevant to your needs.



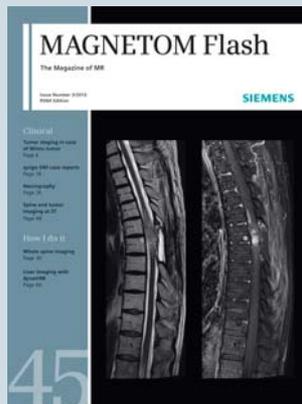
Medical Solutions
Innovations and trends in healthcare. The magazine is designed especially for members of hospital management, administration personnel, and heads of medical departments.



eNews
Register for the global Siemens Healthcare News-letter at www.siemens.com/healthcare-eNews to receive monthly updates on topics that interest you.



AXIOM Innovations
Everything from the worlds of interventional radiology, cardiology, fluoroscopy, and radiography. This semi-annual magazine is primarily designed for physicians, physicists, researchers, and medical technical personnel.



MAGNETOM Flash
Everything from the world of magnetic resonance imaging. The magazine presents case reports, technology, product news, and how-to articles. It is primarily designed for physicians, physicists, and medical technical personnel.



SOMATOM Sessions
Everything from the world of computed tomography. With its innovations, clinical applications, and visions, this semiannual magazine is primarily designed for physicians, physicists, researchers, and medical technical personnel.

For current and past issues and to order the magazines, please visit www.siemens.com/healthcare-magazine.

Global Siemens Headquarters

Siemens AG
Wittelsbacherplatz 2
D-80333 Munich
Germany

Global Siemens Healthcare Headquarters

Siemens AG
Healthcare Sector
Henkestrasse 127
D-91052 Erlangen
Germany
Telephone: +49 9131 84-0
www.siemens.com/healthcare

www.siemens.com/healthcare-magazine

Order No. A91CC-00041-M1-7600 | Printed in Germany |
CC 00041 ZS 051126. | ISSN 1614-2535 | © 05.11, Siemens AG

On account of certain regional limitations of sales rights and service availability, we cannot guarantee that all products included in this brochure are available through the Siemens sales organization worldwide. Availability and packaging may vary by country and is subject to change without prior notice. Some/All of the features and products described herein may not be available in the United States.

The information in this document contains general technical descriptions of specifications and options as well as standard and optional features which do not always have to be present in individual cases.

Siemens reserves the right to modify the design, packaging, specifications, and options described herein without prior notice.

Please contact your local Siemens sales representative for the most current information.

Note: Any technical data contained in this document may vary within defined tolerances. Original images always lose a certain amount of detail when reproduced.

Local Contact Information

Asia/Pacific:

Siemens Medical Solutions
Asia Pacific Headquarters
The Siemens Center
60 MacPherson Road
Singapore 348615
Telephone: +65 9622-2026

Canada:

Siemens Canada Limited
Healthcare Sector
6865 Century Avenue, Suite 3001
Mississauga, ON L5N 2E2
Canada
Telephone + 1 905 819 5800

Europe/Africa/Middle East:

Siemens AG, Healthcare Sector
Henkestr. 127,
91052 Erlangen
Germany
Telephone: +49 9131 84-0

Latin America:

Siemens S.A., Medical Solutions
Avenida de Pte. Julio A. Roca No 516, Piso 7
C1067ABN Buenos Aires
Argentina
Telephone: +54 11 4340-8400

USA:

Siemens Medical Solutions USA, Inc.
51 Valley Stream Parkway
Malvern, PA 19355-1406
USA
Telephone: +1 888 826-9702