Healthcare transformation, we’ll take you...

The future of radiology

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The role of the radiologist is evolving fast, with communication and teamwork at the heart of successful patient care.

Patient care is definitely a team effort, and every member’s contribution is crucial. But it is clear that the role of the radiologist is evolving fast within the team, supported by both healthcare IT and diagnostic imaging technologies and solutions.

Let’s take a look at the future of radiology, and what the radiologist can bring to the table. Communication, quality, collaboration, tools, efficiency... Individually each of these directly impacts patient care and outcomes; together they form a new paradigm for radiology and beyond.

We know, for example, that patients themselves are playing a bigger part in their own care. The more they understand, the larger their contribution to their own outcome. The radiologist has a unique “view” of the patient; sharing this perspective creates ever-greater value for patients and colleagues alike.

Hospital IT is giving the radiologist a platform for this intercommunication, and for acting as the heart of collaboration for the entire care continuum. Departmental and regional data management solutions are opening the way for radiologists to move beyond the traditional interpretive role, and into a more central, enabling role – one in which they deliver actionable insight.

The radiologist is also at the center of some of the most important issues in long-term patient health outcomes, such as the need to control and monitor imaging radiation dose. Starting from neonatal care, the radiologist has a responsibility to find ways to provide the best image quality at the lowest possible dose.

Finally, the radiologist is also facing the same need for cost efficiency and accountability as other healthcare team players. “Value over volume” is the new watchword, but care quality cannot suffer! In a patient-centric healthcare model, where “customized care” is being offered, the radiologist must and will find ways to keep costs down and care quality up.

We invite you to read the articles we have prepared for you here. Happy reading!
Not even a Ferrari will get you to your destination without a driver

Radiology is an interdisciplinary field influenced by virtually all medical innovations. This naturally applies to imaging and image-guided interventions just as much as to diagnostics and data management. We spoke to Prof. Winfried A. Willinek and asked him about present and future challenges.

Prof. Willinek, where do you see current developments in radiological imaging?

The trend is moving away from static individual images toward collated image data sets, for example data gained from multiparametric imaging with the option of quantifying the pathological processes, or from moving images (“4D”) that allow dynamic visualization of the kinetics of pathological changes. Today, in oncology, not only are statements about tumor size required, but also information gathered non-invasively, including that concerning a tumor’s metabolic activity or malignancy. For instance, surgeons would like to see in front of them in 3D not only the liver they are going to operate on – to help in planning the operation, including colored display of the liver segments, vessels and metastases – but also data about the size and volume of the remaining parenchyma, and about the function. This means evidence of liver damage or fat content/fibrosis. When treatment is being monitored, increasingly we need functional information about the residual tumor and its vitality. Based on these radiological data, it is possible to plan the best courses of treatment or treatment options. In this process, I see my colleagues and myself more and more in a pioneering position. Radiology should play a crucial role not only in reaching a diagnosis, but also in treatment management and the selection of patients. Ultimately this is based on standardized, structured findings that allow comparisons and can document the success of the treatment.

One major example of the growing requirements placed on radiology is the rising importance of genetic analysis of cancers with a view to immunological approaches to treatment. Previously the role of radiology was to provide image-guided histological diagnosis of a lesion. Today it is important to document the changes in tumor genetics during treatment.

This requires numerous sequential biopsies over time. And here we find the foundation for the paradigm shift with individualized therapies – for example, moving away from classical chemotherapy to a combination of chemotherapy and immunotherapy, possibly also alternating with locoregional and local ablative radiological treatments.

In what period of time will this paradigm shift take place?

I think we will see treatments with biologicals becoming more established within the next five years – in combination with new developments in device-based medicine.

Can you give us an example?

With high intensity focused ultrasound, HIFU for short, we do not yet know the areas where it will become a routine clinical procedure purely on ultrasound. Initial results are encouraging, especially in the treatment of acute cancers with a poor prognosis, such as pancreatic cancer. The possibility of using HIFU in loco and focal therapy opens up many more fields of application. Fibroids already constitute one established indication. In the future I can see additional applications, for example the prostate, but also soft tissue sarcomas or brain tumors.

Therefore, in tumor boards, radiology should promote all innovative treatment options for consideration alongside the others. Here functional information about the tumor is important for correctly categorizing the course of the disease under treatment. Radiology has the task of ensuring that findings are classified correctly and that decisions made on this basis serve the well-being of the patient (and especially to avoid overtreatment). It is not only the quality and standardization of the diagnostic process, but also the marking of crucial lesions over time, which make it possible to demonstrate the images and findings in an interdisciplinary conference.

Have these developments any impacts on the organization of radiological departments and institutes?

Sure. To improve our handling of the constantly increasing amount of data and complexity of the imaging, more than anything else we have to have the appropriate personnel, but we also have to work in networks. This may require bringing in several departments together in some cases. Furthermore, the number of interdisciplinary meetings in certification processes is rising all the time.

Radiology is an interdisciplinary field and is, therefore, in contact with other departments through its staff. For instance, in Bonn we have more than 60 meetings a week. This demands that radiology has very good time management and continuous research and image demonstration, so that clinically relevant findings from many patients can be presented within a short space of time.
Radiology must and will always find new ways to maintain its key role in diagnostics and treatment.

Prof. Winfried A. Willinek
The 1000 bed Mahatma Gandhi Mission Hospital (MGM) serves a local population of six million people drawn from the 12 districts of Maharashtra. When it was founded by the Mahatma Gandhi Mission Trust in 1990, it was with two key objectives: to provide the highest quality healthcare to the local population and to deliver advanced standards of teaching to its future generation of healthcare providers through its Bachelor of Medicine and Bachelor of Surgery and Postgraduate Courses (MD/MS/PG Diploma).

However, in an economically challenged region where money is scarce and 40% of the population is below the poverty line, the challenges posed by these two aims are ones not often seen in more developed regions.

**We chose the DR 400 because it offers a complete, scalable DR solution that is able to grow and develop as our requirements change.**

— Dr Pravin Suryawanshi

Deputy Dean, Chief Executive Officer, Professor and Head, Department of Surgery and Chief Endoscopist, Advanced Laparoscopic and Hepato Pancreatico Biliary Surgeon

Says Dr Suryawanshi, Deputy Dean, Chief Executive Officer, Professor and Head, Department of Surgery and Chief Endoscopist, Advanced Laparoscopic and Hepato Pancreatico Biliary Surgeon, “We serve a diverse range of patients. Many are drawn from local communities where healthcare has traditionally been scarce. These patients will often present with issues such as dysentery or other water-borne diseases, like hepatitis. In addition, because we are one of the fastest growing industrial areas in our region, there is also a transient labour force that is being drawn into the city to find work. This means we are also faced with industrial accidents, road traffic accidents, fractures, etc.

“As a result, our X-ray patient numbers have increased from around 100 people per day two years ago to around 160 a day now, and we expect the rate of increase to continue at a similar pace over the next few years.”

**Taking a creative approach to the financial challenges**

Dr Suryawanshi continues: “Because the local population is so poor, they can afford to pay only a fraction of what it costs to actually treat them, and we are charging just 10% of the costs that other facilities in the region are charging for the same care. However, although we are catering to the poorest class in the community, we still want to provide them with the very best quality healthcare. In addition, as a teaching facility, we remain committed to providing our students with exposure to the best technology and facilities and to offering them the best learning experiences.

“Another challenge is that we wanted to shorten the time per X-ray; aiming to achieve around 120 X-rays out of the 160 we do each day in just four hours.”
many of the established healthcare providers, they have found it challenging to accept digital imaging. They are used to seeing, and in many cases still want to see, images on film, so there continues to be an educational process with some of our colleagues.”

Dr Suryawanshi recognizes that, for some, acceptance of digital imaging will take time, but he is passionate that the medical school graduates, which now number 150 graduates and 80 post graduate students a year, are experienced and comfortable with the very latest digital technologies. He says, “We are one of the very few medical colleges in our state to have super specialty courses like plastic surgery, cardiology, urology, pediatrics, radiology and nephrology and were recently given A+ Accreditation from the National Assessment and Accreditation council – a very prestigious accreditation. Providing students with access to leading technologies and capabilities, such as those offered by the DR 400, is pivotal to that achievement.”

By 2020, MGM Institute of Health Sciences, of which MGM is part, aims to be a top-ranking Centre of Excellence in Medical Education and Research. To achieve this, Dr Suryawanshi sees MGM’s continued association with Agfa HealthCare as a key element.

“We have enjoyed excellent advise and immense support from Agfa HealthCare over the last five years. As we move forward, and the gap between what our patients can afford to pay and what we need to recoup to finance ongoing technological developments continues to be difficult, being able to reduce running costs by maximizing efficiencies and having complete confidence in our choice of solutions will be critical.”

**DR 400**

- Flexible configurations and options for most needs
- Floor-mounted for cost-effective and easy installation and use
- Best-of-breed solid components, offering reliability and maximum uptime
- Can be equipped with CR and DR technology
- DR systems can be combined/integrated with Agfa HealthCare CR systems for even greater versatility

Innovations in healthcare IT and diagnostic imaging technologies and solutions fundamentally changing how we deliver the patient experience.
Roland Rhynus, CEA, Executive Director of Radiology

What made the DR upgrade a no-brainer for us was the marginal cost increase in monthly payments for the adoption of significantly superior DR technology as compared to what we were paying previously for ongoing maintenance of our CR technologies,” said Roland Rhynus, CEA, Executive Director of Radiology. “The main benefit of the Fast Forward DR Upgrade Program is to obtain the latest and most advanced DR X-ray technologies in a cost effective manner. The bonus is that the program also includes a service maintenance agreement (SMA) for ongoing maintenance service and a Damage Assistance Program (DAP), which provides insurance coverage for the costly DR plates as part of the monthly payment. Mike Haman, Enterprise Director Imaging Informatics commented: “These are expenses that a hospital would normally pay for on top of the purchase and installation costs of new equipment. Having them included in the cost of the program makes the upgrade especially cost effective.”

Upgrading existing CR technologies instead of replacing

Agfa HealthCare’s DX-D Retrofit is the heart of the upgrade program. The DX-D Retrofit provides healthcare facilities using analog or CR technology an efficient upgrade to the benefits of DR without replacing their existing X-ray equipment. By maximizing the use of existing equipment while simplifying installation, DX-D Retrofit provides an easy and affordable way to implement direct digital image capture in the X-ray room that can then be shared and accessed within the EHR. This vendor-neutral upgrade solution provides DR workflow and image quality for a fraction of the price of a complete system and handles many applications throughout multiple hospital departments.

Real benefits of DR upgrade at LLUMC

Streamlined workflow and time savings. Although typically it only takes a few minutes to develop a CR X-ray cassette, collective processing time becomes substantial when it is multiplied by the hundreds of X-rays LLUMC conducts every day. The automatic digital downloading of images with DR technology, combined with faster exams, has saved the radiology staff significant time, which also translates into cost savings at the hospital.

Better image quality and radiation dose reduction. Agfa HealthCare’s patented MUSICA image processing software is utilized with the entire DR product line and was automatically installed with all of LLUMC’s DR technologies. MUSICA brings multi-scaled image processing to a new level by showing exquisite detail in low noise images that allows radiologists at LLUMC to consistently capture high-quality images at lower radiation exposure. When the needle-based detector option is used, images processed with DR technologies using MUSICA show more detail. This allows radiologists to modify their techniques by increasing the kilovoltage (kVp) and decreasing the milliampere seconds (mAs), thus lowering the effective radiation dose. With Agfa HealthCare’s DR systems using the needle-based detector option, the radiation exposure to the patient can be reduced by at least one-third without any noticeable difference in image quality. DR technologies are able to produce quality images at a lower exposure index (EI) than is needed to achieve the same quality image with CR technologies. A quality image can be achieved even though the EI may indicate that the technique selected is “undesirable”. MUSICA allows the contrast and brightness of an image to be adjusted directly after it has been taken. This allows an image with a lower EI taken with DR to be as diagnostic as one with an EI within mid-range taken with CR.

Optimized patient comfort and care. Patient engagement, comfort, and satisfaction at LLUMC have greatly increased as a result of the upgrade to DR. Agfa HealthCare’s DR technologies allow the technologist to view the X-ray image seconds after the exposure is made while still with the patient. This allows the technologist to immediately verify that a high quality radiograph is obtained and any necessary adjustments can be made quickly if an additional image is required. If any additional views or modifications are needed, the patient is able to stay in their current position while the image is retaken, as the DR image plate does not have to be replaced after each exposure, as is required with CR plates. Furthermore, no matter where the body part of interest is placed on the DR detector, the image is automatically centered after the exposure is made. This is especially beneficial when imaging the small extremities of pediatric patients that are positioned on the edges or corners of the detector.

“For bed-ridden trauma patients and children in particular, the ability to immediately review an image and retake it right then and there, if necessary, is a huge benefit. To force a bed-ridden trauma patient in pain or an active child to redo the entire X-ray process can be very difficult.” We’re also able to take action immediately if the X-ray image indicates further medical procedures are needed,” said Aimé Gallegos, R.T., Interim Manager Children’s Hospital Radiology.

Unique cost structure makes DR upgrade possible

X-rays are one of the most frequently used technologies within the radiology department of any hospital. X-ray has become a staple technology for the diagnosis of many conditions due to its non-invasive ability to easily and quickly view internal injuries. Many hospitals have seen progresses in film developed with chemicals, to computed radiography (CR) using an imaging plate processed through a special laser scanner or image viewed on a computer, to direct radiography (DR), considered to be the most advanced radiography technology available today.

Today the benefits of DR are widely known; however, many hospitals are challenged to find cost effective ways to upgrade their legacy radiography technology. This was the situation at Loma Linda University Medical Center located in Loma Linda, CA. LLUMC is part of a non-profit health system of six hospitals with 1,076 licensed beds available for patient care. It is the only level one regional trauma center for Inyo, Mono, Riverside, and San Bernardino counties. In addition to providing renowned patient care, including neonatal care, LLUMC operates some of the largest clinical programs in the United States. Each year the institution discharges more than 43,500 inpatients and serves roughly 725,000 outpatients.

The diagnostic radiology department of LLUMC conducts an average of 500 diagnostic exams for roughly 1,600 images per day. It was clear that transitioning from CR to DR would have significant positive impact on patient care. However, without the availability of sufficient capital to fund this transition, moving to DR did not appear to be a current possibility, but instead it would need to be a future goal. The radiology department was left with the challenge of trying to find a way to implement a DR upgrade that they knew would save the hospital vast amounts of money in the long-run without the availability of a large up-front capital investment to purchase and install the new equipment.

The answer came in the form of Agfa HealthCare’s Fast Forward DR Upgrade Program.
At the Jacques Lacarin hospital in Vichy, a long-term IT strategy supports quality information and quality care

Agfa HealthCare’s IT solutions come together to help the hospital meet its development program and regulatory requirements

“Our relationship with Agfa HealthCare allows us to take advantage of the opportunities from technical evolutions, to anticipate things, and ultimately to expand our vision of the future of healthcare IT.”

Patrice James, Director of Information Systems

For many years, the Centre Hospitalier Jacques Lacarin de Vichy (CH Vichy) and Agfa HealthCare have collaborated in creating an IT infrastructure that will support the hospital’s development program. Agfa HealthCare IT solutions – from the HEXAGONE* hospital information system (HIS), to the ORBIS* clinical information system (CIS), through the IMPAX radiology information system/picture archiving and communication system (RIS/PACS) and now the upcoming adoption of the HYDMEDIA** enterprise content management solution – are helping it to achieve its long-term goals for patient care and management.

“My vision for our hospital IT infrastructure is to have a solution that covers almost all the major, computerized functions at the enterprise level – from administration (especially everything regarding the patient), to managing our financial and economic resources, through to human resources,” says Patrice James, Director of Information Systems for CH Vichy. “And of course we need a strong medical IT part – including all medical AND nursing information.”

Partnering to solve the real needs of real hospitals

For fifteen years, CH Vichy has been a pilot site for the HEXAGONE HIS, working in close partnership with Agfa HealthCare and its development team. With the HIS up and running, the hospital turned towards eliminating the information silos that existed throughout the enterprise. “We were already implementing our clinical information in the 1990s,” explains Patrice James.

“But computerizing the patient files was done individually by department or service. That’s the problem ORBIS has been solving for us, decompartmentalizing each activity within our hospital, and bringing everything together to create a true medicalized information system.” CH Vichy now has a number of ORBIS functionalities and modules, including the patient record (diagnoses and procedures), medical information, PMSI (the French medicalized information system program), prescriptions, medication workflow and supply management, canteen management, office/administration and business intelligence.

Rolling out ORBIS, step by step

The first ORBIS modules to be implemented were the patient record (diagnoses and procedures) and the office/administration module. During these initial installations, the Agfa HealthCare team supported the CH Vichy implementation team. But for the rest of the modules the Vichy team was able to act autonomously, explains Patrice James. “We set up an internal ORBIS implementation team consisting of three IT professionals and a nursing manager, who knows the functioning of the services much better than the IT staff!” Including a ‘field expert’ in the implementation team has been a big factor in our success. For example, when we implemented the administration/office functionalities, we brought in a secretary to provide that insight.

We continue to do this for each new module, such as the operating theater and emergency department.” Patrice James highlights that one of the most important success factors has been bringing together into a single activity the IT services and the department of medical information, finance and patient management. “This collaboration allows us to optimize the interface with the healthcare professionals and to focus the discussions on the real optimization issues for our HIS.” The roll-out process for each ORBIS functionality or module is essentially the same. First, the team selects a ‘pilot site’ within the hospital. “We have found that a unit with around 15 beds is generally a good size for the pilot,” comments Patrice James. Once the pilot site is going well, the module is launched department by department. However, the length of time it takes to implement a module can vary a lot, explains Patrice James.

“The functionality for inputting diagnoses and procedures was implemented across the hospital in 15 days. The administration/office module was completed in two months. On the other hand, the medication circuit is very complex: we are talking about the prescription by the doctor, then the verification by the pharmacist and finally the administration of the medication by the nurse. So that module took over a year to fully implement. You have to be a bit flexible with the timing, ensuring a good quality of implementation is the most important thing.”

HYDMEDIA integrates with both ORBIS and HEXAGONE. Plus, the flexibility of the parameterization and the powerful search engine were critical decision factors.

Patrice James
Solutions that help improve patient care CH Vichy has now been using ORBIS for five years, and the biggest changes for Patrice James are in the traceability and the quality of information. "It’s not just about productivity, although we do see gains in terms of administration and secretarial work. For example, structured documents, such as release letters that automatically include the patient’s history, obviously save time and effort, and reduce the risk of error. "But the big benefits are more qualitative: better patient management and security, which lead to better care. Take the medication circuit, which completely secures the management of the patient’s medication. That’s key! Having access to all the relevant information about the patient in real time also improves patient care. Finally, being able to see the entire history when a patient comes to the hospital, for example to the emergency department, allows the physicians to make informed decisions about e.g. which exams need to be performed, potentially allowing us to eliminate repeated exams."

CH Vichy will be putting the ‘final ORBIS brick’ in place later this year, comments Patrice James: the module for the nursing record will be piloted in September, with the full implementation expected in October/November.

* HEXAGONE and ORBIS are not available in Canada and the U.S.
** HYDMEDIA is not available in the U.S.
Agfa HealthCare awarded 7 year IMPAX contract

**Picture Archiving and Communication Systems (PACS)** are installed in over 160 National Health Service acute trusts in England. Most of these NHS hospitals received systems to enable them to capture and store digital diagnostic images as part of the health service IT modernisation program, called the National Programme for IT (NPfIT). The NPfIT, which originated a decade ago, sought to develop the NHS national IT infrastructure for delivering electronic patient record services across NHS England. As part of the NPfIT, PACS was to be deployed to enable the digital storage and retrieval of patient related images. Five different regions were established throughout England and contracts were awarded to Local Service Providers (LSPs) to deliver the solutions. With Accenture as the LSP, Agfa HealthCare won contracts to deliver IMPAX, its fully integrated digital information and management PACS solution, to 30 Trusts across two LSP regions – the North East and East Midlands. The roll out of PACS is often considered to be one of the few big successes of the NPfIT.
Departmental and regional data management solutions are opening the way for radiologists to move beyond the traditional interpretive role, into one in which they deliver actionable insight.

**SUCCESS FACTORS**

As part of the original National Programme for IT (NPfIT), Agfa HealthCare delivered IMPAX to 20% of NHS England through:

- **Clear program parameters.** Ensured no “program scope creep” throughout the upgrade program, although the project team’s success did ultimately result in its scope being expanded.

- **Utilization of technical expertise.** Ensured replacement of live clinical systems minimized impact to patients.

- **Technological knowledge.** Enabled the creation of a solution suitable for all sizes of hospitals.

- **Technical expertise.** Facilitated problem solving without impact on live service.

- **Strong relationship management,** as well as its understanding and empathy of each Trust’s desire for an individual solution, was key to convincing customers of the value of the IMPAX solution.

- **Comprehensive training program,** incorporating a training center to train the PACS users, provided understanding of the advanced functionality provided by the new version of IMPAX.

- **Added value to customers** by upgrading all customer Trusts to IMPAX 6.5.2 within the allocated budget.

- **Delivered a complex project on time and on budget.** A cross functional project board meant strong financial control, key decisions taken effectively/ quickly, a clear line of escalation management and a strong team spirit through the challenges.

- **Strong financial management** controlled costs and provided effective governance of all aspects of the program.

- **Resource management.** Agfa HealthCare was responsible for both its own team of professional as well as external teams.

- **Effective logistical management.** Despite unanticipated supply challenges, Agfa HealthCare effectively managed large volumes of equipment from source to supply.

- **Team commitment:** delivered most aggressive upgrade program ever. The success of the project team resulted in the program scope being expanded into running other projects.

**The future**

Under the UK National Health Service Supply Chain framework customers benefit from a more flexible and bespoke imaging IT solution. New components such as image exchange, integration of clinical applications, 3D and support for digital tomosynthesis can be added to existing services to ensure unique imaging requirements are met. Having upgraded both the IMPAX software solution and the PACS hardware of all its program clients, Agfa HealthCare believes its Trusts are now well placed for the next wave of Agfa HealthCare technology. Full details of the project and its outcomes can be found at www.agfahealthcare.com

**Key Statistics**

- **A change success of 98.5% during 2013**

- **Less than 9 minutes’ unplanned downtime per Trust per month in 2013**

- **75% reduction in overall service failures since 2009**

- **8 years’ experience serving NHS customers with our fully managed service, delivered to stringent and high performing service levels**

- **Less than 9 minutes’ unplanned downtime per Trust per month**

- **Agfa HealthCare’s Involvement**
Under the microscope

Study of image quality and dose values for thorax images with the DX-D 300 and MUSICA 3
by PD Dr Karina Hofmann-Preiss, Institute of Imaging Diagnostics and Therapy (BDT), Erlangen

Scope of study

A total of 354 patients participated in the study, with an age range of 17 to 94 (Fig. 1). Examinations were carried out on 190 male patients and 164 female patients. In 74 cases only PA images were taken and in 280 cases two-plane images. The exposure parameters were 117 kV for PA, 125 kV for lateral X-rays with automatic exposure, anti-scatter grid r = 8.1, 10 = 160 cm, 52 L/cm.

The dose area products of all examinations were calculated in cGy x cm² and the effective dose for the individual X-ray was estimated from this using the conversion factor (0.002). The BMI was calculated for 275 patients from this collective and was between 18 and 44 (Fig. 2).

Initial results

For both the PA and lateral images, the dose area products for all BMI values were clearly below the current German dose reference value of 16 cGy x cm² or 55 cGy x cm² for lateral images. The average dose area product for PA images in this collective was 6.44 cGy x cm² and for lateral images was 16.01 cGy x cm² (Figs. 3 and 4). The average effective dose for a PA thorax X-ray in the collective was 0.013 mSv and for a two-plane X-ray was 0.046 mSv.

The lowest dose area product with a BMI of 18 was 3.1 for PA and 5.02 cGy x cm² for lateral. In this case the effective dose for the complete examination was 0.016 mSv. The maximum dose area product for a PA image was 14.7 cGy x cm², and correspondingly the dose area product for a lateral image in this case was 36.3 cGy x cm². Here the effective dose was 0.1 mSv for the complete examination.

Image quality was assessed in line with the quality requirements of the guidelines published by the Bundesärztekammer on quality assurance in diagnostic radiology.

Conclusion

Even at a very high BMI there were no limitations on the representation of characteristic features, important details or critical structures.

Both the retrocardiac lung and the mediastinal structures can be well assessed even with very overweight patients (Fig. 5 and 6).

In particular, the retrocardiac lung and the mediastinal structures were easier to assess in an intra-individual comparison between MUSICA² and MUSICA 3.

Sources:

- German Federal Office for Radiation Protection; Announcement of updated diagnostic reference values for diagnostic and interventional X-ray examinations, 07.22.2010
- Bundesärztekammer; Guidelines on quality assurance in diagnostic radiology – Quality criteria for diagnostic X-ray examinations, 11.23.2007

Agfa HealthCare’s DX-D 300 digital U-arm system has been in use at the Waldkrankenhaus St. Marien healthcare center since May 2013. Radiologist Dr Karina Hofmann-Preiss and her team attach great importance to patient comfort and high image quality as well as the minimization of radiation exposure. For Dr Hofmann-Preiss, the DX-D 300 kills two birds with one stone. “We get higher-quality and more diagnostically meaningful images with a lower radiation dose.” The high image quality of the DX-D 300 was achieved primarily by the cesium iodide detector and the MUSICA image processing software. In fall 2013 it was still unclear what dose reduction the radiologists at the Institute of Imaging Diagnostics and Therapy (BDT) would ultimately be able to achieve during individual examinations, as some assessments of the individual examinations still remained to be carried out. At that time it was estimated that the dose could be reduced by at least 15% compared with the previously used imaging plate systems.

In May 2014, the DX-D 300 was equipped with MUSICA 3, the next, further optimized generation of the image processing software. To collect reliable information about the dose and image quality with MUSICA 3, thorax X-rays were evaluated for a period of five weeks after the software was installed.

The image quality was assessed in line with the quality requirements of the guidelines published by the Bundesärztekammer on quality assurance in diagnostic radiology.

Conclusion

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In particular, the retrocardiac lung and the mediastinal structures were easier to assess in an intra-individual comparison between MUSICA² and MUSICA 3.
As one of the longest-standing departments of the University Hospital San Ignacio in Colombia, the radiology and diagnostic imaging department is committed to offering patients fast and top-quality imaging. But with its high patient throughput, the department faced regular backlog for carrying out exams, and patient wait times were growing too long.

The University Hospital San Ignacio was founded in 1942 in Bogotá, Colombia as a hospital and a research center for doctors and students. It is one of the most important hospital centers in Colombia, and one of the most respected in Latin America.

In 2013 the hospital decided to update its imaging equipment, in order to speed up its diagnostic imaging services. With Agfa HealthCare’s DX-D Retrofit solutions, as well as a DX-M computed radiography (CR) system for mammography and more, the department was able to achieve its goals, while maximizing the value of its existing imaging investment and enhancing image quality.

Competitive testing reveals advantages

The radiology and diagnostic imaging department provides a wide range of services, from conventional radiology, through ultrasound and scanning, to nuclear medicine, and MRI. Two years ago, the department carried out a competitive evaluation of the digital radiography offers of multiple vendors. The objective was to find a solution that would support it in achieving its overall goal of offering faster diagnostic service to patients and doctors alike.

Over several weeks, systems from different manufacturers were tested for speed of image acquisition. Based on the results, the radiology department chose to implement two DX-D Retrofit solutions with DX-D 10G digital detectors and the DX-M CR system with needle detectors.

With DX-D Retrofit, healthcare facilities using either analog or computed radiography (CR) can upgrade to the benefits of direct radiography (DR), without replacing their existing equipment. The non-invasive, connection-only installation is quick and easy.

The DX-M, for mammography and general radiography, combines excellent image quality with high throughput, delivered by a unique five cassette drop-and-go buffer, and a very fast preview.

Faster emergency unit workflow

Two DX-D Retrofit systems were installed in the hospital’s emergency department. According to Dr Luis Felipe Uriza Carrasco, Head Director of Radiology, “The emergency unit handles a large number of patients, carrying out around 200 exams each day. Before, we would get patient queues for imaging, which affects care quality. We added another person to register data, but the backlogs continued.

“With our previous equipment, each exam took five minutes; now, with the DX-D Retrofit, an exam is complete in just one minute. When you multiply that time saving by 200 daily exams, the improvement is considerable.”

Dr Luis Felipe Uriza Carrasco, Head Director of Radiology
High-quality mammograms, quickly

The hospital also installed a DX-M with needle detectors, which is used for mammograms and other radiography exams. “The tests carried out with the DX-M show that it provides notable advantages in terms of time, productivity and image quality, and again has allowed us to optimize patient care,” Dr. Uriza notes. Furthermore, the DX-M fulfilled a fundamental requirement by easily integrating with the radiology department’s existing systems. “We absolutely needed a solution that was compatible with our existing systems from different manufacturers, and the DX-M delivered,” continues Dr. Uriza.

Smooth implementation

“The installation of the Agfa HealthCare solutions was simple and took little time. The integration with our existing equipment went fine,” says Dr. Uriza. “One difficulty with temperature was handled quickly by the Agfa HealthCare services team,” he says. “Given the complexity of the systems used in radiology, incidents sometimes occur and must be resolved as soon as possible.”

Since the implementation, the hospital carried out a time and movement study of the Agfa HealthCare solutions. “Our study showed that they are cost-effective and reduced our patient wait times. Image quality also improved significantly.”

Constant technical innovation

Dr. Uriza has experienced the evolution of diagnostic images first-hand. With the arrival of digital systems, radiology and diagnostic imaging departments have experienced a host of advantages, he says: “Image acquisition time is shortened, the workflow is better controlled, and productivity, security and delivery of patient care are improved.”

The implementation of the DX-D Retrofit and DX-M systems is only the start for the University Hospital San Ignacio. In fact, the radiology unit is planning to update its mammography equipment soon and to implement a new RIS/PACS. “We are in a process of constant technological innovation, which fits with the motto of the founders of the hospital: ‘Science and technology with social projection’.” A process that Agfa HealthCare looks forward to supporting.

“Our time and movement study showed that the Agfa HealthCare solutions are cost-effective and reduced our patient wait times. Image quality also improved significantly.”
In small doses

Reducing dose to improve the long-term health and safety of premature babies and neonatal patients with Prof. Dr Maria-Helena Smet, Pediatric Radiologist in the Department of Radiology at University Hospitals Leuven (UZ Leuven) and Associate Professor at the Faculty of Medicine, University of Leuven (KU Leuven), Belgium

To visit UZ Leuven’s new, state-of-the-art Neonatal Intensive Care Unit (NICU), you have to go through special measures, from careful hand and arm washing, to wearing gloves and removing rings, to wearing a gown over your clothes. But these are just a few of the precautions to protect the delicate patients, who face elevated health risks in several areas.

Other actions taken for patient safety are not so visible, yet are just as important, including the ongoing efforts of UZ Leuven’s pediatric radiology department to reduce to the minimum the amount of radiation neonates (as well as other pediatric patients) receive. Prof. Dr Maria-Helena Smet, a Pediatric Radiologist at UZ Leuven, and her colleagues are spearheading efforts and research into dose reduction and image quality optimization. Along with a multidisciplinary team, including Agfa HealthCare, she is carrying out the testing of CR and DR modalities to determine which allows the greatest dose reduction while still offering the image quality needed for the specialty. She sat down to explain the research, and why dose reduction is so important in pediatric radiology.

How is neonatal and pediatric radiology different from imaging for adults?

Imaging is absolutely crucial for many of our NICU patients, who can have a broad range of pathologies, including the positioning and checking of catheters. One baby can require multiple images during a stay here, and may need additional images in the future.

But the imaging can be quite challenging. Between premature babies and other neonates you can have a huge size and weight difference: anything from an extremely premature baby weighing only 500 grams, to a full-term baby that can weigh from 2500 to 4000 grams. And each individual patient will change and evolve over time, rapidly and significantly. The chest of a grown man, for instance, will be essentially the same at 20 years, 30 years, 40 years… and the radiation dose will remain the same. This is not at all the case in pediatric imaging! And the smaller the patient, the more significant the changes.

With this smaller size, the structures being imaged are also smaller, as are the catheters. Some of the structures have a high contrast and some have very low contrast. And here in the NICU, we are often dealing with a broad range of pathologies that can be visible in the images. It’s a very mixed population.

What’s more, their cells are still developing and dividing. DNA repair after radiation is difficult and hence these patients are more susceptible than adults to stochastic effects, such as radiation induced cancers. Radiation effects are known to appear a long time after the imaging process. The probability of a stochastic effect is proportionate to the dose, but the severity is independent of absorbed dose. And it may occur without a threshold level of dose.

Finally, we must remember that radiation risks are cumulative throughout the patient’s life. And while we are very pleased that our NICU and other pediatric patients have ever-greater life expectancies, there is also thus more time for carcinogenic effects to appear. So we must find ways to lower radiation dose without impacting the quality of the imaging. We have achieved a lot in this area over the 30 years I have been practicing medicine, and I believe there are still dose reductions to be found. In this neonatal environment, our Agfa HealthCare DX-D 100 has been ideal. We got this mobile wireless DR solution in early 2014. It has proven very convenient, very smooth in operation, with a short turning circle that is ideal for the individual patient rooms in the new department. The detector fits into the incubator, and we can switch off the batteries when not in use, so battery life is longer. And of course the image quality is very good. In all, it fits right in.

In this context, what does image quality mean to you?

In neonatal and pediatric imaging, the term image quality relates to whether an image allows me, in a clinical situation, to answer the clinician’s question. If I can, then the image quality is good or good enough. So image quality isn’t really something tangible but certainly has important consequences. And as we follow the ALARA (As Low As Reasonably Achievable) principle for dose, image quality can even vary for a specific image, depending on what we need it for. An image that is not the ‘highest’ quality can in a certain case be perfectly suitable for our needs, allowing us to use a lower dose. On the other hand, there are radiologists who prefer to always have ‘very high quality’ for every image. This attitude does not fit the ALARA principle.

Image quality thus has two aspects: physical quality and clinical image quality. Physical quality is easier to measure. The clinical image quality is more personal, based on the viewer’s preferences and needs.

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Image quality thus has two aspects: physical quality and clinical image quality. Physical quality is easier to measure. But the clinical image quality is more personal, based on the viewer’s preferences and needs. So, despite the physical quality parameters, the radiologist may say: “No, I don’t like it, the image quality is not what I want or need.” How should we measure that perceived quality? One can make a visual grading analysis, look at statistics, etc., but it’s difficult to test on very young patients. We have tested whether we can
use the physical quality parameters to predict the clinical perception of image quality. In other words, is there a definable, measurable relationship between them? We found that in the present case, the physical measurements largely predicted the perceived clinical image quality. There is an additional complication with digital imaging because the clinician is aware when dose is too low, but not when dose is too high. Low dose results in image noise but high dose just gives you very nice images, which can lead to something called ‘dose creep’ – slowly increasing dose to have ever ‘better’ images, when in fact images acquired at a lower dose would be sufficient to perform the clinical task. We need to eliminate this.

Of course, you can’t push dose reduction too far either. Sometimes it is a question of trial and error.

What tools help you to control and reduce dose?

First of all, we try to take only images that are necessary. For example, we might do an en face spine image but not a profile image, which increases lumbar dose, because we often have enough information from the first image.

Post processing is very important. I worked with Agfa Healthcare to adapt the second-generation MUSICa image processing software for neonatal use, and now I am working with them on the next generation, MUSICa 3. As I said, with these very small children you can have small structures with high or low contrast. MUSICa offers a proper balance between the contrasts, with a better preservation of low contrast details next to high contrast structures. You also need a very stable image processing to ensure standardized images.

Collimation is key, too. Consider an adult chest versus an infant chest. If the technician increases the field by 1 cm on top and bottom, this makes little difference for the adult. But for the infant, the proportional increase is huge! This can account for as much as 70% of the radiation dose.

We have to keep track of the dose each patient has received. For our fixed imaging modalities, we have integrated software that automatically records the technician, the dose, the parameters and the patient. So that information becomes part of the patient’s file. For our DX-D 100, we do the calculations ourselves, but we will add the software soon.

How are you carrying out the modality testing?

We have been testing three Agfa HealthCare detector systems: a CR system using powder phosphor, a CR needlebased phosphor system and a DR needlebased phosphor system. Our goal is to find the optimal parameter settings – the right mAs, the right kV, the right filtration – to allow us to use the lowest acceptable dose for diagnosis.

The testing is quite complex, and we have already acquired a total of 66 phantom images. These images were scored with image quality criteria during three sessions, with every session taking about an hour. As a next step, we performed a comparative scoring test. I work on this in between my clinical responsibilities, and I see it as a necessary and logical part of my job. This makes my job very busy, yet rewarding in terms of scientific insights and quality improvement.

We do have some preliminary results. For example, our results indicate that we may be able to reduce dose with the fine needle phosphor detector compared to the general powder phosphor detector, while still generating acceptable image quality. But we still have a lot of testing to do. For example, we need to subdivide the effect of filtration on image quality.

What’s key here is that, like in so much of patient care today, a multi-disciplinary approach will get the best results. To find ways to reduce dose, we can’t work in isolation, nor can manufacturers. So our team includes radiologists, clinicians, technicians, engineers, physicists, the manufacturer of the system – even statisticians! We need them all, and we keep in regular contact – that’s the best framework for this type of testing.

While the awareness of the importance of dose reduction has increased in the past years, it has always been an issue. In fact, it was one of the reasons I was attracted to the specialty of pediatric radiology 30 years ago. And we have made a lot of progress, thanks to better parameter settings, digital detectors, better training... Here at UZ Leuven, we already use a quite low dose. The high image quality we get from the needlebased CR and DR indicates that there is still further room to reduce dose. In other types of imaging, we see for example that the speed of CT is increasing, allowing less sedation or anesthesia, and greater throughput. I would also like to see greater availability and increased speed in MBIs – with small children, speed is key!

We have to always remember – the smallest patients are also the most sensitive. We must find the balance between quality and dose.

Ultimately, quality communication, images and technology will deliver the balance of image quality versus controlled costs that healthcare demands in the 21st century.
The Spółdzielnia Pracy Specjalistów Rentgenologów im. prof Witolda Zawadowskiego w Warszawie (Witold Zawadowski Cooperative of Radiology Specialists in Warsaw) is the oldest diagnostic cooperative in Warsaw. Over its 50+ year history, it has undergone many ‘facelifts’ to stay up-to-date and to continue to provide top radiology services to its community. In fact, for many years the clinic has been ranked among the top three medical facilities in Warsaw.

Its medical team consists of 390 staff, including 17 professors, seven associate professors and 75 doctors of medical science. All in all, the cooperative performs about 37,800 radiology examinations annually.

Over the years, the Cooperative has relied on Agfa HealthCare’s radiography solutions and software. Implementing several generations of solutions, has supported the Cooperative in its continuous journey to provide top radiology services to its community. In fact, for many years the clinic has been ranked among the top three medical facilities in Warsaw.

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Jacek Wińiewski, a member of the Board and radiological protection inspector of the Cooperative, explains how Agfa HealthCare’s solutions have supported the Cooperative in its continuous journey to “modernization”: “The shift from analog to digital has been the most fundamental change the cooperative has undergone in recent years, and included streamlining image processing and archiving, says Mr. Wińiewski.

The Cooperative of Radiology Specialists in Warsaw began in 1955 as a purely diagnostic clinic that over time expanded its range of services to adapt to the needs of patients. In the 1990s, the clinic became widely known for its specialist consultations and medical advice, as well as care for minor procedures. It expanded to two locations then added a third in 2001, in a modern facility in the south of the city.

“Services include the full range of diagnostic X-rays, analysis and ultrasounds,” explains Jacek Wińiewski. “We specialize in general radiology, mammography with tomosynthesis, tomography, dental radiology and cone beam computed tomography (CBCT).”

In 2006, the cooperative celebrated its 50th anniversary. While this was a landmark in its history, it was also an indicator that the Cooperative needed to modernize to remain a top-ranked facility. So in 2007, the Cooperative acquired several CR 30-X systems, followed the next year by a CR 75-X, enabling time savings and easy archiving.

High-quality images in seconds and state-of-the-art image processing

The Cooperative of Radiology Specialists gets thoroughly modern with Agfa HealthCare’s newest line of digital radiography solutions and software.

A DX-X CR system with needle imaging plates (NIP) replaced the CR 75-X CR system, while a DX-G CR system with NIP and a DX-D 300 DR system replaced the CR 30-X systems. The DX-X is a high-throughput, decentralized digitizer with state-of-the-art image quality; the DX-G next-generation system unites excellent image quality with a drop-and-go baffled workflow and enables a potential reduction in patient dose; and the DX-D 300 DR room offers top-of-the-line technology, a single detector and a fully-monitored positioner, yet requires limited space. The major benefit of DR is that it is even faster than CR. If necessary, retakes can be performed immediately; there is no need to replace the cassette.

The clinic also upgraded the gold-standard second-generation MUSICA image processing software to the next-generation MUSICA3. Fully automatic and exam-independent, MUSICA provides consistently high image quality across CR and DR solutions. The next-generation MUSICA3 includes new technology improvements such as no window level adjustment requirement, high level of details in the mediastinum and true representation of implants with clear bone interfaces, allowing confident and comfortable reading. “We decided to upgrade our software systems to improve diagnostic capabilities. The MUSICA3 software is exceptional in recognizing soft lung tissue, while we still prefer MUSICA2 for viewing bone tissue,” says Mr. Wińiewski.

A smooth introduction of advanced DR room

According to Mr. Wińiewski, the introduction of the new direct radiography technology took place without difficulty at the Cooperative of Radiology Specialists. “Implementation was carried out fairly smoothly. It was quite easy to get acquainted with the system’s operation, as well as to its everyday use.”

The only major hiccup came in implementing the new MUSICA software, due to a fault in the dominant operating system at the time. This caused problems when opening the image CDs given to patients. “Agfa HealthCare continued to provide us support, for both hardware and software, throughout this process, and most issues have been resolved,” Mr. Wińiewski comments.

The benefits of next-generation digital radiography

Upgrading to advanced digital radiography solutions proved a significant change for the clinic, and offered some specific benefits. “The new systems improve comfort and quality of work,” describes Mr. Wińiewski. “Importantly, we also see improved differentiation of tissue-organ systems – between the chest, ribs and lungs, the joints and bones, tendons and muscles.”

In addition, digital radiography has increased the clinic’s overall efficiency and workflow speed, in part due to the simplified image storage and archiving system. “It is obvious – faster imaging, with no chemicals and associated costs, means a faster workflow, plus greater efficiency, easier quality control and enhanced image analysis.”

The potential patient radiation dose reduction is another important factor, and a great benefit for patients. “Using Cesium Bromide needle-based imaging plates with our CR solutions, and Cesium Iodide detectors with our DX-D 300 equipment, along with MUSICA image processing in the DX-X system, helps us reduce radiation dose for the patient without impacting the quality of the images,” Mr. Wińiewski explains. Greater clarity also means fewer rejected images and thus fewer retakes, again resulting in smaller doses of radiation for patients.

He also praises Agfa HealthCare’s excellent support for both technical and user issues.
An archiving lifeline for CH Emile Durkheim, in Epinal, France

HYDMEDIA offers a lifeline to hospital ‘drowning in paper’, with a robust digital archive that centralizes electronic information storage, saving time, space and resources.

“...The nurses no longer have to track down the paper files; instead, they go directly to HYDMEDIA. And the doctors can immediately access the patient’s old files, which will have a big impact on how they deliver patient care.”

Dr GERARD MOUGENOT,
Medical Information Department

Immediate, easy access to archived files

The Centre Hospitalier Intercommunal Emile Durkheim is a departmental hospital serving a region with a population of around 265,000. Born out of the merging of the Centre Hospitalier Jean Mouenot d’Epinal and the Centre Hospitalier Intercommunal de Golbey, it now has three sites. The main site in Epinal counts around 330 beds for hospitalized patients, while the site in Golbey focuses on long-term and follow-up care, and the Maison de Santé Saint Jean offers external consultations in a broad range of services.

It was the Maison de Santé Saint Jean that was selected by the hospital to be the site of the ‘internal pool’ for implementing HYDMEDIA. “We chose the allergology department at Saint Jean because it is a rather specialized service, meaning that its patient files generally aren’t needed by most other departments. So a pilot involving those files wouldn’t impact the rest of the hospital,” says Dr Mougenot.

The hospital decided to digitize the files of all new and returning patients to the allergology department. “There isn’t much point in digitizing the files of patients who don’t return. We have now digitized the files of all patients who have been to the department in the last year. We are already seeing a big difference for the secretarial staff, who were drowning in papers and paper files before!”

For other users, including doctors and nurses, the differences are also striking. “For all these patients, the nurses no longer have to track down the paper files; instead, they go directly to HYDMEDIA or ORBIS. And the doctors can immediately access the patient’s old files, too, for example during a consultation, which impacts how they deliver patient care.”

With the pilot so well implemented, the hospital has begun the process of launching HYDMEDIA in other services. Dermatology, which like allergology is a rather small service, was next, and will be followed by the blood transfusion files. “Blood transfusion archives are maintained separately, as they are liable to different regulations: for example, they need to be kept for 30 years instead of 10,” comments Dr Mougenot.

“Being able to access them immediately when a patient returns for a transfusion is critical. This is a step that will impact the entire hospital, and require all the doctors and nurses to learn to use HYDMEDIA; this will be completed by the end of the year.” Currently, around 30 people – doctors, nurses and secretarial staff – are working with HYDMEDIA. When it has been fully implemented in the hospital, around 1,000 staff will use it.

Integration with ORBIS: see everything with just a click

An important advantage of the HYDMEDIA solution for CH Emile Durkheim is its close and easy integration with other Agfa HealthCare solutions, especially ORBIS. “We’ve been working with Agfa HealthCare for a long time, we are a ‘good customer’, smiles Dr Mougenot. “Their solutions are helping us to achieve our goal of maximizing our digitization. Beyond ORBIS, all of the medical software programs will directly send medical information to HYDMEDIA. This has already been implemented for the emergency module and the blood transfusion module; in the short-term, we will be adding reports from ophthalmology and radiology, for example.”

“ORBIS and HYDMEDIA are complementary,” he continues. “From HYDMEDIA, users can see everything in a click: including images in the picture archiving and communication system (PACS) and archived documents in HYDMEDIA.”

“We have to be able to work like that, to see everything in one domain and one way. With ORBIS and HYDMEDIA, a doctor in service B who needs to see what happened to a patient 3 months ago in service A will not only find the information immediately, but will see it presented in the same, familiar way his own service uses. So communication and transparency are enhanced.”

Dr Mougenot concludes: “Introducing information systems is of course quite complicated, but you very quickly appreciate the advantages! Integrating the HYDMEDIA enterprise content management solution with our ORBIS will not only help us solve the issue of space and resources for storing documentation, but it will save time and effort for everyone – doctors, nurses and secretarial staff – and make their jobs easier. And that means they can give more time to their core responsibility: patient care.”

HYDMEDIA enterprise content management solution

• Facilitates information sharing through integration with ORBIS and the HIS
• Negates the need for paper and film-based documentation
• Reduces physical archiving space
• Speeds information retrieval times
• Reduces costs and increases productivity
• Improves disaster recovery capabilities

ORBIS HIS/CIS system

• Provides access to shared patient record and administrative data anywhere, anytime
• Allows better patient management and security
• Improves collaboration between healthcare professionals
• Reduces the risk of administrative errors, and increases administrative productivity

If you would like to find out more about HYDMEDIA, please contact

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Email: contact@hydmedia.net

Hydmedia Healthcare Solutions is not available in the U.S.

* Please note, HYDMEDIA and ORBIS are only available in Canada and the U.S.
We are in a very competitive market. To remain relevant, we must maintain the most advanced technology and deliver the highest quality service.

Bill Lucas, Senior PACS Administrator

As to the benefits so far, Bill says that, “having PACS moved to a virtual platform allows us to do hardware maintenance without bringing the system down and we can move the virtual machines around from one solution to the other. The additional functionality that comes with the 6.5 client means that the radiologists are very happy and the RIS system is delivering faster running on new hardware so workflow has benefited.”

Know your objective and stick to your plan

And the advice Teresa would give to other hospitals considering upgradings? “It’s very important to know what you want and what the benefits are that you are trying to deliver. Having a clear plan for the next four years, understanding all of the projects rather than simply focusing on what you need right now means that you won’t have to keep amending the managed services agreement. You will enjoy detailed knowledge of your costs and always have the most current version of your applications means that you can be confident of remaining at the forefront of your competitive market.”

Teresa Simmons, System Director of Medical Imaging

Agfa HealthCare advice provided inside knowledge of future solutions

Bill continues, “However, as with any solution, there does come a time when hardware becomes outdated and solutions need to be upgraded, and that is a process we have been through extensively over the past few months. We knew that our hardware was getting to the end of its life and, while the Agfa HealthCare solution – IMPAX 6.3 – was very stable, we recognized that the later version, IMPAX 6.5, offered additional functionality, so we started to investigate the upgrade. We had long and detailed discussions with Agfa HealthCare about where we wanted to go as a hospital and they were able to provide guidance as to what our options were – not simply now, but also with regard to technology that was going to be coming through in the future.

“They came up with a road map that allowed us to bring up the elements we wanted in the time frame we needed but to do it in an economical way that fit the hospital’s overall plan. It was a cooperative effort but Agfa HealthCare had a tremendous amount of input into it.

Four year Managed Services Agreement manages costs and mitigates the risk of technology obsolescence

“Ultimately, we chose to make all the upgrades through a four year Managed Services Agreement. It enables us to know our costs over the next four years and as part of the agreement, it also means that Agfa HealthCare guarantees to leave us with the most up-to-date versions of their applications at end of the life of the agreement.”

In deciding to upgrade its solutions, Thomas Health System was clear that it was not just its own radiologists that it needed to service, but referring physicians who also have access to the hospital’s data, as Teresa Simmons, System Director of Medical Imaging, explains. “At least 60% of our imaging is outpatient based. Part of the managed services agreement was the purchase of the Agfa HealthCare XERO® Viewer which is the zero footprint viewer capable of working with IMPAX. It provides us with a scaled down version of the client to offer our referring physicians.”

Bill adds, “Before, a lot of physicians who have gone out and purchased Apple (iPad®) mobile digital devices or similar solutions other than Microsoft products found that their new purchase was not compatible with what they were trying to access. Now, with XERO Viewer that has all changed, and the new version of IMPAX will also run on Microsoft Windows 7 and 8 operating systems.” That increased compatibility will become increasing important if, as Bill believes, “our outpatient volume will continue to grow because everyone is trying to limit the hospitalization of patients to control their costs.”

Cohesive teamwork essential to successful upgrade

And the test of a successful upgrade? Well that, Teresa says, is not simply specifying the solution but ensuring that when it goes live it is as seamless as possible. “With a busy emergency room, doctors’ offices and our own radiology team needing consistent access to images, we really couldn’t afford to have the system down. As a backup, we ensured that while the upgrade was taking place, they could access images up to two months old via a temporary system.”

Says Bill, “For the RIS, we upgraded our tests system and spent a large amount of time testing and validating the function of the system. When we did the upgrade, we did it in the middle of the night, and Agfa HealthCare brought in resources both for that night and for the next couple of days to ensure any issues were dealt with quickly. For the PACS upgrade, we brought the servers up after Agfa HealthCare had done a lot of the configuration remotely and again the team was onsite both during and after go live.”

In situations such as this, Bill says, having a good working relationship is a key element to success. “I have seen plenty of situations where installs or upgrades have spiraled out of control because of lack of understanding by one party of what the other party is seeking to achieve, or a lack of understanding about what is possible. Having Agfa HealthCare involved from the beginning gave us the confidence that everyone knew what was expected. We also knew from past experience that should anything require addressing, that Agfa HealthCare’s support teams are responsive and resolve issues quickly.”
The city of Cologne is blessed with a large number of hospitals, and there are many more hospitals in nearby places such as Aachen, Düsseldorf and Bonn. This creates some challenges for the institutions. “And they do not get any smaller if you are located on the wrong bank in the city of Cologne,” notesSigurd Claus, Managing Director of Porz Hospital, referring to the eastern side of the River Rhine. His general hospital is therefore concentrating on certain specific fields. “Over recent years we have been quite successful at focusing on our cardiology and rheumatology,” Claus says. In Cologne the treatment available for rheumatology patients is somewhat sparse – a situation that is different in the rest of Germany. To position itself appropriately in this field, the hospital needs a proficient radiology department that serves as a provider to the other departments. “We have built this up over time,” explains Chief Radiologist Dr Paul Martin Bansmann.

One key area is non-invasive cardiac diagnostics. The institute has the most advanced modalities, such as currently the fastest computed tomography (CT) scanner and two powerful magnetic resonance imaging (MRI) scanners. “So you can see that the investments have flowed into imaging. But as a result, although we have made quantum leaps in technology, we have loaded ourselves up with a huge volume of data that we have to archive properly according to the law,” says Dr Bansmann, describing the consequences of this development. “In the end this could no longer be done on CDs or DVDs.” Now help is at hand from a digital information system for radiology.

Managing Director Claus realized the right time had come when a new senior physician arrived, ringing in a new generation to head the institute. “Dr Bansmann and I put our heads together and considered what form future progress should take to make sure that the infrastructure would ultimately be suitable for the equipment,” Claus says. The chief radiologist adds, “Right from the outset it was clear we could no longer be done on CDs or DVDs.” Now help is at hand from a digital information system for radiology.

New generation, new technology

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“Both systems should come from the same provider, to enable us to take full advantage of an integrated solution,” says Bock.

However, it was not a requirement that a monolithic HIS/RIS/PACS solution should come from one vendor. “The decision in favor of IMPAX and ORBIS® RIS from Agfa HealthCare was made independently of the established ORBIS HIS (hospital information system) that had been in use in the hospital,” Claus explains. “We are convinced that the solutions installed in April 2014 provide the ideal support for our workflows.”

Enhanced hospital performance

“The new systems, especially PACS, really do represent a huge step forward for us,” says Dr Bansmann, also satisfied with the choice. He illustrates the hospital’s performance with an example: “This morning, after a long weekend, there were 500 X-ray examinations waiting to be assessed. Things that used to take days are now completed in a matter of hours.” The benefits of the new RIS/ PACS are particularly noticeable during weekends and shifts in emergency: “At present an MTRA (medical technical radiology assistant) is responsible for the pathways in the institute. Before we had the digitalized system, she had the job of receiving the requests and passing them on manually, sticking labels on the X-ray sleeves, loading the films, entering patient data once again at the modality, and then carrying out the examination.

Today it is much simpler. The request arrives at the modality electronically via the RIS, with all the necessary parameters. The patient can go as soon as the pictures have been taken. For us this really amounts to a revolution.”

Porz Hospital clocks up around 45,000 X-ray images every year, along with 6,000 CT scans, 6,000 MRI scans, and 15,000 ultrasound examinations. This is pretty impressive for a hospital with 443 beds. Nonetheless, the managing director and the chief radiologist would like to increase the proportion of outpatient examinations. “However, to do this we will have to position ourselves as a powerful, competent health service provider,” says Sigurd Claus. Radiology stands out because it involves complex specialized exams requiring high levels of investment. “We made these investments during recent years, but at the same time we neglected the infrastructure,” says Dr Bansmann self-critically. “We have to catch up here so that we can match the other high-performing departments in the hospital.”

External communication via PACS

The installation of RIS/PACS proves its value in the hospital on a daily basis, for instance during the interdisciplinary case discusions. “The figure has increased continually over recent years, just as their significance in everyday clinical work has done. We have 15 X ray discussions per week. Before digitalization we had to spend more than 40 hours on preparing and holding them, but today we only need about half that because the preparation time alone has definitively come down by a good ten hours,” Dr Bansmann calculates. But the chief radiologist is not only concerned with providing services within the hospital. His institute is also a provider of consulting services to other facilities. “PACS makes it much easier to manage prior images or those from other organizations; the large number of CDs and DVDs we had before used to massively slow down our processes.”

In the future all communication with the referring doctors and partner hospitals will be via IMPAX/web.Access. “This means that we can dispense with DICOM studies quickly with SSL encryption via a secure connection to the referring clinic, without having to install anything or spend a lot of time on it. They will only need an individually created access code, and will authenticate themselves via a security prompt using the patient’s date of birth,” is how Dr Bansmann explains the procedure: “That is simple and saves a huge amount of time.”

“We are convinced that the solutions installed provide the ideal support for our workflows.”

Sigurd Claus, Porz Hospital

PACS supports training for specialists

But Porz Hospital is carving out a new position in more than patient care – again with the aid of ORBIS. “We are founding an academy for cardiology for offering training for specialists. This will not be possible without an electronic educational archive, in our case the Teaching File Archive. It holds records of examinations that have been anonymized and indexed with keywords, and we can link them with the diagnoses and make them available for visiting physicians to study. That is a fantastic possibility for us,” the chief radiologist says with delight.

But even with the large number of projects, he does not lose sight of his original task, that is, managing the Institute for Diagnostic and Interventional Radiology. This is no easy job in times of scarcer resources, shorter hospital stays and a generally difficult financial framework. “I always have to work out our performance on the basis of reliable figures. With RIS I can now compile a range of up-to-date statistics. I look at separate monthly performance figures for each modality, referring physician and so on, and if necessary I can take remedial action,” is Dr Bansmann’s description of the advantages of the information system.

Oriented to solutions and success

What ultimately appears so simple – the successful introduction of an integrated RIS/PACS – demanded a vast amount of commitment and discipline from all those involved. “This kind of project is not something you can realize just as a sideline,” Dieter Bock points out. “Here I need a strong team with the necessary freedoms, and a flexible industry partner. Despite nine change requests in the course of the project, Agfa HealthCare has consistently kept to the deadlines and always worked in a spirit that was oriented to solutions. You could feel that the company was doing everything it could to bring this project also to a successful conclusion.”
Radiologists around the world rely on digital image processing for their diagnoses. This is the scale on which MUSICA, the Agfa HealthCare image processing software, is used: daily, globally.

- **50,000** total MUSICA installations on CR and DR units
- **+5TB** bytes of MUSICA diagnostic information processed per day
- **+4,000** hours diagnostic reading per day with MUSICA
- **+1,000,000** MUSICA images read per day