

# Listening and Learning

## Digital X-ray integrated with analog

*For PD Dr. Henri-Marcel Hoogewoud, Head of the Radiology Department at the Cantonal Hospital in Fribourg, flexibility is something to be uncompromising about, especially if the end result is an obvious advantage to everyone concerned. And when the advantage is in a technology with such a positive future ahead of it as digital X-ray, Dr. Hoogewoud can be justifiably proud about giving Philips a nudge in the right direction.*

### WHO/WHERE

Fribourg Cantonal Hospital,  
Switzerland, 450-bed regional hospital  
PD Dr. Henri-Marcel Hoogewoud,  
Head of the Radiology Department



### CHALLENGE

Integrating digital X-ray,  
effectively and efficiently, into  
the Radiology Department

### SOLUTION

Philips DigitalDiagnost as separate  
thorax and table Bucky solutions

The Radiology Department in Fribourg, with a staff of 60, offers diagnostic imaging, radiation oncology and nuclear medicine, on devices ranging from ultrasound, through fluoroscopy and X-ray, to MRI and CT. The patients cover the full range of in-patients, out-patients and referrals from local practitioners and specialists. And flexibility is more than necessary, within all of the budgetary restrictions faced by a regional hospital.

The long term plan in Fribourg is to integrate all of the modalities into a PACS. Many of the X-ray machines already use phosphor cassettes, for computed radiography, and along with the CT and MRI scanners and angiography, the department is already fully digital when it comes to image acquisition. In late 2000, when the time came to re-equip two of their diagnostic rooms, the strategy clearly indicated fully-integrated digital X-ray machines. By comparing a number of manufacturers on the resolution of the images, the size of the detectors, and the thought put into making the digital machine a real replacement for a con-

*“This way we get the best of both worlds.”*

ventional system, Dr. Hoogewoud quickly discovered that the Philips DigitalDiagnost was the only system suitable for their purposes.

### Adaptability

At the time, Philips only offered a Digital Diagnost unit that combined a wall and table Bucky. Though each examination room has both a table and a wall mounted unit, putting both of the digital detectors into one room was not the most effective way for the Cantonal Hospital to apply its budget. To get the most out of them, the DigitalDiagnost table needed to be available for pelvic, hip or urological examinations, which take more patient preparation and time, without affecting the throughput of the corresponding thorax unit. The detector is the most expensive part of such a digital system, and Dr. Hoogewoud was so convinced that this was the system he wanted, that he convinced Philips to adapt it so he

**PHILIPS**



Reception and registration area of the Radiology Department at the Fribourg Cantonal Hospital



Listening to Dr. Hoogewoud, Philips adapted DigitalDiagnost to ensure maximum utilisation of the two examination rooms



A patient prepares for a chest X-ray examination with Philips DigitalDiagnost



It's important that Mr. Guillet, Chief Radiographer, can manually prepare the images for printing from the exam room

could have one digital detector in the table of the first room (with a phosphor cassette in the wall stand) and the other digital detector in the wall stand of the second room (with a phosphor cassette in the table). This enabled maximum utilisation of the two rooms from the budget available.

For Philips, this meant re-working the controlling software to ensure the generator worked with the mix of digital detector and phosphor cassette in each of the two rooms. “This way we get the best of both worlds”, says Dr. Hoogewoud, and the flexibility to continue working as usual, without compromising on the quality improvement the DigitalDiagnost had to offer.

### Maturity

The original plan had been to change to the DigitalDiagnost in the Emergency Room too. Though Dr. Hoogewoud now regrets that they didn't do this, at the time the software and the operation of the DigitalDiagnost was too cumbersome and slow for the application. It has to be easy to transfer the digital images to film, he explains, particularly in the Emergency Room where time is of the essence. This wasn't the case with the DigitalDiagnost when the decision was being made. Though digital X-ray cannot cover all the eventualities in an Emergency Room (which still needs cassettes for lateral positions or for taking pictures of patients in beds), Dr. Hoogewoud comments that the DigitalDiagnost has matured since, and would be the obvious choice today. “It would help a lot to have it in an Emergency Room, instead of the phosphor cassette system we are using.”

### Efficiency

Even without an interface to a digital post-processing or archiving system, the Digital Diagnost has made an important contribution to the Radiology Department in the Cantonal Hospital. It has boosted productivity by making it possible to check the image immediately, and by making it “nearly impossible to make a bad picture”. The system comes with

a number of filters to preset the generator and adjust the display characteristics for particular types of examination. A few of the organ filters needed to be changed early on, but the majority of the filters produced good results as delivered. Today this means that the pictures very rarely require any correction, though if it is required you can manipulate the image – in an extreme case, you can even process a single captured image to see both the soft tissue and the bones.

“The only bad pictures are the ones where the position is not correct”, says Dr. Hoogewoud. The success rate has been helped in particular by the reduction in the X-ray dosage. This is not only good for the patient but, because it

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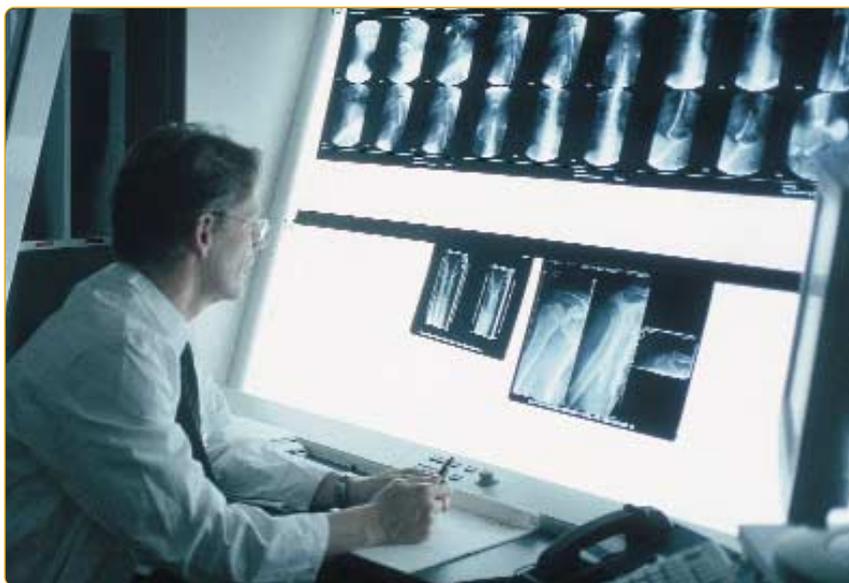
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means shorter exposures, movement artefacts are almost completely eliminated.

### Savings

Once a picture is checked, it is queued for printing from the workstation. Though the transfer to film is not significantly faster than the old development process, being able to trust the quality of the images makes all the difference. “Where we win time is that the picture is correct from the beginning and there are very few retakes”, says Dr. Hoogewoud. As if proof were needed, the department has even thrown out its bin for dumping bad X-rays.

Apart from eliminating waste, savings are made by putting related images (such as both pictures from a thorax exam) on a single film – which is helped by being able to resize pictures. This reduces material costs, and also ensures that images that belong together are kept together, and are more easily viewed as a unit.



PD Dr. Hoogewoud, Head of Radiology, values good images for accurate diagnoses.

*“Where we win time is that the picture is correct from the beginning and there are very few retakes.”*

### Effectiveness

Digital X-ray is unbeatable when it can be used in conjunction with PACS for archiving and retrieval, and for teleconsultation. But, as Dr. Hoogewoud puts it, “Philips was thinking too far ahead”, and originally developed the DigitalDiagnost primarily with PACS in mind. “Film isn’t dead yet”. Even in hospitals that have a PACS, a large proportion of patients are referred from outside, and this means that film is necessary to communicate the results.



Hand X-ray with DigitalDiagnost



Chest X-ray with DigitalDiagnost

Dr. Hoogewoud tried distributing images on CD to referring specialists outside the hospital, but the time taken to load the pictures put them off. He also points out the advantages of film as a physical medium for discussing with the patient, the ease with which it can be transported, and the fact that it can be viewed universally, whether you are in a doctor’s practice or an orthopaedic operating theatre.

By thinking in terms of PACS for the Digital Diagnost, Philips had conceived of printing to film as either a fully automated process or as a separate task, to be carried out at another time and place than the examination. Working in

*“Film isn’t dead yet.”*

an environment that has yet to implement a PACS, Dr. Hoogewoud made clear the importance of the radiographer being able to manually prepare the images for printing from the examination room. The DigitalDiagnost workplaces are now equipped with a Philips EasyVision workstation, so the radiographer can send the images to the printer (a wet-laser film printer) without having to leave the patient. Though Dr. Hoogewoud remarks that this is “not as ideal as it could be”, Fribourg is soon to be a site for the beta-test of a new version of the radiographer’s acquisition station that will address these issues. With or without this new acquisition station, Dr. Hoogewoud admits that it is still a vast improvement over the traditional way of working. The radiographers in Fribourg are all very enthusiastic about using the DigitalDiagnost.

### Willing to Listen

Philips Medical Systems prides itself on developing products adapted to customer’s needs. Among other innovations, Philips record in X-ray includes being the first to launch a computed radiography system, the first to offer a fully integrated digital chest X-ray, and the first to prove that images from different modalities could be handled and processed on a single screen and printed on a single film. The experience gained from working with Dr. Hoogewoud gave the developers further food for thought. They reacted by reengineering the DigitalDiagnost to make it available, not just in the combined table and wall configuration, but also as a combination that integrates digital detectors with conventional cassettes, reflecting the real-world constraints faced by many hospitals striving to improve the quality of their services on a tight budget.

As Dr. Hoogewoud points out, it is difficult to put a figure on the real benefit of such a DigitalDiagnost system once it has gone into use. What is clear is that digital X-ray essentially means improved image quality with reduced X-ray dosage. The availability – through digital distribution, if a PACS is implemented, or just because images no longer get irretrievably lost – is not to be underestimated as a secondary benefit – it helps to avoid the 15 % of cases where images are not



PD Dr. Hoogewoud, Fribourg Cantonal Hospital

*Even in a department working with film, the Digital Diagnost is “the very best way to do conventional pictures.”*

available when and where they are needed. By providing these flexibilities Dr. Hoogewoud is convinced that, even in a department working with film, the DigitalDiagnost is “the very best way to do conventional pictures”.



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