



The Hybrid Experience

One Room, Many Possibilities

Managing the modern OR room is a complex, logistical challenge. It is a busy environment, loaded with surgical and anesthesiology equipment and a plethora of auxiliary devices, where sterility is key. The current growing trend is to install high-end imaging systems in these rooms.

This is only one example of a typical OR room with an integrated high-end imaging system.

Picture taken at Emory University School of Medicine, Atlanta, GA, USA

Hybrid rooms are becoming more popular with customers in search of synergies and they offer multiple benefits. They allow “one-stop shopping” by eliminating the need for preoperative angiography in the radiology suite. They enable the surgeon to perform image-guided surgery with high image quality and imaging capabilities. Physicians can immediately monitor the quality of surgical procedures. When performing interventions they can, if required, proceed directly to open surgery.

The Hybrid Experience One Room, Many Possibilities

The intervention is well underway. The patient, Karin, lies sedated on the table and the radiologist is completely focused on guiding the catheter into her brain. Just three days ago, the 35-year-old woman was diagnosed with an aneurysm in a brain artery. Now she lays on the intervention table and a coiling procedure is planned to treat the aneurysm. The procedure is a routine one for the experienced neuroradiologist, who has already successfully closed over 200 aneurysms in this way. Today, however, there is a problem. The aneurysm was perforated during the procedure and Karin’s blood pressure drops rapidly as she bleeds into her brain tissue. Fortunately, Karin’s intervention is being performed in an OR. The sterile environment allows immediate surgical intervention. There is no need to transfer her to a special OR table; all the OR systems are accessible and the OR team stands ready. Shortly after reversing the anticoagulant to prevent blood clotting, Karin’s aneurysm is clipped. She tolerated everything well and was able to leave the hospital a few days later – health restored. This scenario is not a futuristic vision. On the contrary, hybrid treatment rooms providing both surgical and high-end imaging have become the trend over the last five to six years. They are suitable for min-

imally invasive procedures and surgical interventions, or a combination of both.

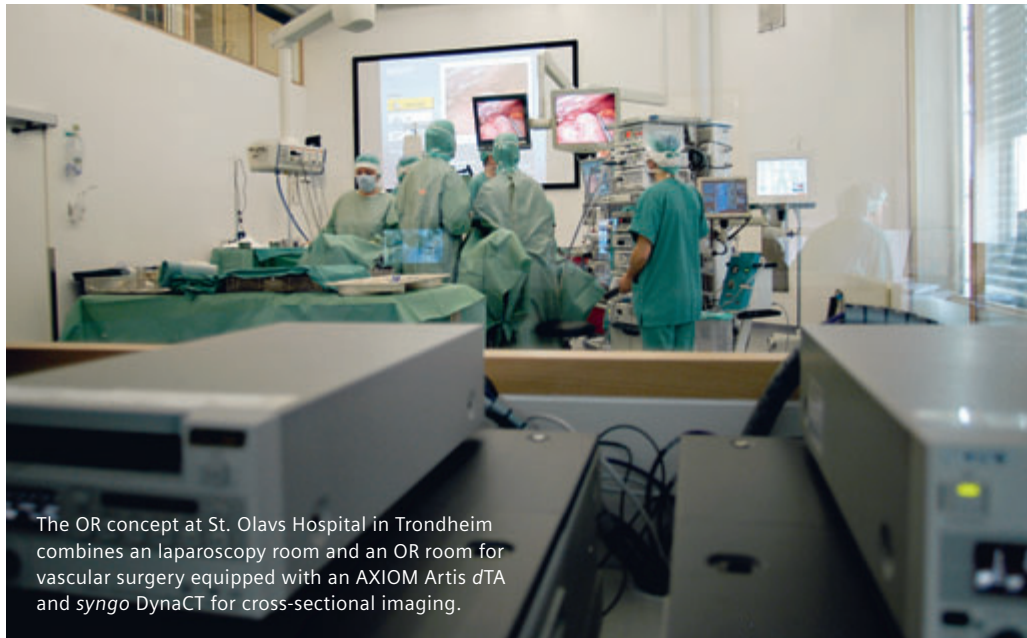
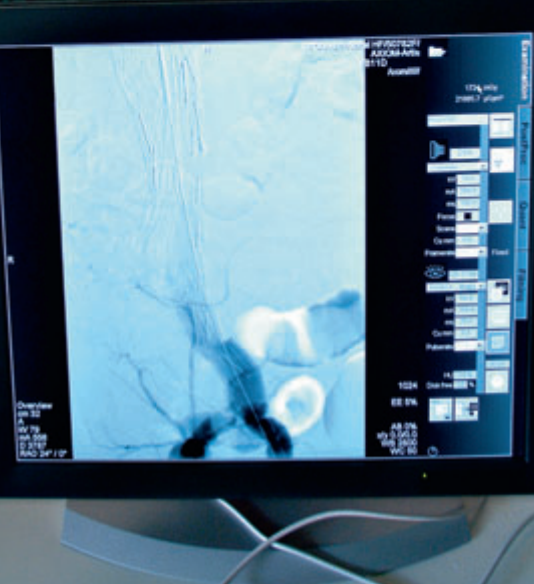
Understanding customer needs

These types of rooms present challenges. Challenges to the technology, the imaging system and of course, the users. Yet they also offer new opportunities for physicians, patients, treatment methods and the hospital. Siemens Medical Solutions took on these challenges and has developed, together with our customers, an individual, tailor-made solution. The success of the solution requires user expertise as well as close cooperation with the healthcare provider and third-party equipment vendors of OR peripheral devices. The ceiling becomes prized real-estate as accessories, lights, gas pendants, scope equipment, navigation equipment, laminar flow ducts and displays all vie for space.

St. Olavs Hospital, Trondheim, Norway

“We’re a team. Only a well-rehearsed team can work together in this kind of





The OR concept at St. Olavs Hospital in Trondheim combines an laparoscopy room and an OR room for vascular surgery equipped with an AXIOM Artis dTA and syngo DynaCT for cross-sectional imaging.

“The ‘operating room of the future’ has contributed much toward improving clinical research in several disciplines at our hospital. It improves the quality of patient treatment.”

Prof. Hans Myhre, Director of Surgery, St. Olavs Hospital, Trondheim, Norway



Prof. Cao uses the ceiling-mounted AXIOM Artis dTA in the OR, mainly for vascular interventions combined with open surgery.

“The image quality is fantastic.”

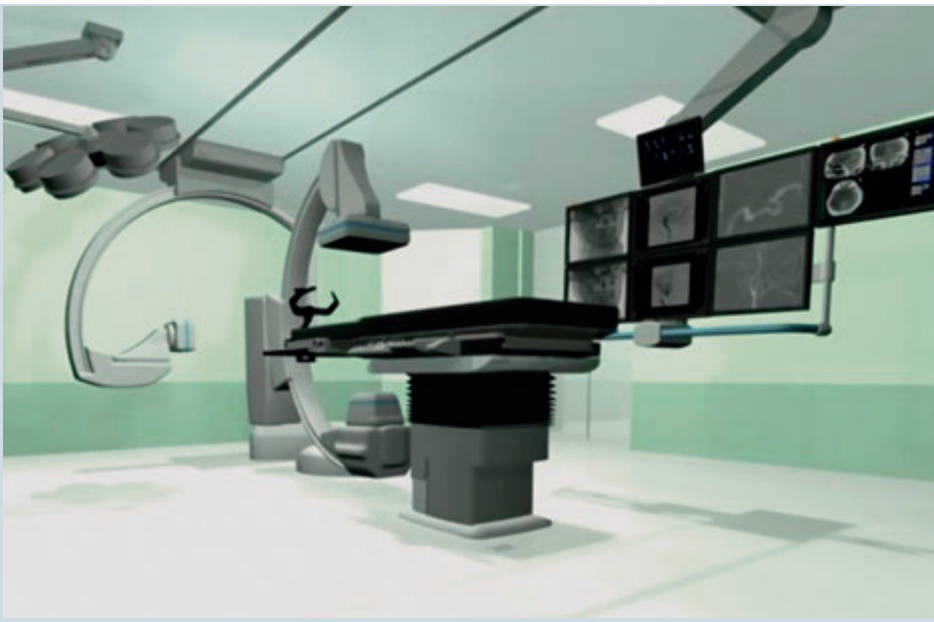
Prof. Piergiorgio Cao, FRCS
Professor and Chief of Vascular
and Endovascular Surgery
University of Perugia, Italy

“With our OR room, a separate session for diagnostic angiography is no longer necessary. This saves time and resources.”

Prof. Dr. Yuichi Murayama, Department of Neurosurgery, Jikei University School of Medicine, Tokyo, Japan



At the Department of Neurosurgery at Jikei University School of Medicine in Tokyo, a biplane AXIOM Artis BA was installed in 2003 (above). The OR room has recently been upgraded to an AXIOM Artis dBA with flat detector, syngo DynaCT and a Mayfield clamp.



3D simulation of an OR room for neuroradiology and neurosurgery. A Mayfield clamp is attached to the patient table.

room.", explains Prof. Hans Myhre, director of surgery at St. Olavs Hospital in Trondheim, Norway. It is clear to him that this environment strictly demands teamwork.

"The 'operating room of the future' has contributed much toward improving clinical research in several disciplines at our hospital. It improves the quality of patient treatment," he continues. The OR in the Trondheim St. Olavs Hospital is equipped with a Siemens AXIOM Artis *dTA*, used primarily for vascular surgery. The attached laparoscopy room is used for minimally invasive surgical procedures. In the digital angiography system,

Siemens designed an excellent imaging system for the hospital's OR. It can be used for diagnostics and interventions, and thanks to *syngo* DynaCT, it provides surgeons soft-tissue display (cross-sectional imaging) during the procedure itself. The main objectives of the "operating room of the future" project include improved quality as well as more effective logistics and infrastructure in the hospital. Through collaboration with medical companies such as Siemens, the project became a reality, allowing the development of prototypes that can be tested by clinicians, technologists and scientists in a safer way. The operating

room of the future offers the most up-to-date equipment available.

University of Perugia, Italy

This opinion is shared by Dr. Piergiorgio Cao, vascular surgeon at the University of Perugia in Italy. Especially when emergency cases have to be treated, it is vital to have versatile equipment. He is a big supporter of the hybrid room concept and as such was one of first in Italy to realize such a room combination. In March 2006, the AXIOM Artis *dTA* with the new flat detector technology was installed in the OR. "The image quality is fantastic", says Dr. Cao, "it is far better than on the mobile C-arm I previously had". In his OR, about 80% of the procedures are endovascular and 20% involve open surgery so image quality is a vital point. In the next step, the system will be equipped with *syngo* DynaCT. "It is a very useful application to control operations and check the success of the procedure. As it is directly available on the angiography system, emergency cases can be treated immediately and there are no waiting times for a CT scan. This saves time and sometimes the life of the patient.

Jikei University, Tokyo, Japan

Another such OR installation can be found on the other side of world, in Tokyo, Japan, in neurosurgery at the Jikei

University School of Medicine. Since 2003, Prof. Murayama has been performing embolizations of aneurysms, arteriovenous malformations and tumors as well as angioplasties. Now the entire OR has been updated. A state-of-the-art biplane angiography system, the AXIOM Artis *dBA*, was installed to accommodate the expansion of neurosurgery from conventional surgery to the more widely used minimally invasive endovascular neurosurgery. The advantages are clear for Prof. Murayama. When complications arose, patients would have to be brought from the angiography lab to the OR. Now patient transfer is no longer necessary. "This delay of emergency procedures may result in the risk of poor clinical outcomes. To achieve a safe and effective endovascular and surgical environment, we set up an OR that can integrate neurosurgical and radiological capabilities," explained Murayama. Another advantage the new biplane installation in the OR offers is that preoperative angiographies can be performed in the OR before the operation. A separate session for diagnostic angiography is no longer necessary. This saves time and resources.

Meeting the challenges in an OR environment

Custom-designed installations are needed because the requirements of the OR environment can vary greatly. Surgeons must have unobstructed access to the patient and the surgical site.

Appropriate lighting and ventilation are standard OR requirements. The requirements for an angiographic imaging system in the OR are many. The surgeon would like to see more to be able to do more. Excellent image quality is crucial and requires a fixed C-arm with high power output that enables high-resolution digital subtracted angiography, continual and pulsed fluoroscopy and road-mapping.

The AXIOM Artis systems meet these requirements. The built-in flat detector (FD) technology offers excellent greyscale visualization, 2K resolution and high frame rates with up to 60 frames per second. Additionally, FD technology makes possible advanced imaging applications, such as cross-sectional imaging with *syngo DynaCT*. These high-quality soft tissue and high-contrast 3D images are ideal for surgical planning and preparation for vascular and neurosurgery.

Another very important detail in the operating room is the table. Siemens angiography systems offer OR tables with lateral and longitudinal tilting capabilities and a floating tabletop.

Sterility is key in the OR. Surgical procedures require a sterile environment; features like the wireless footswitch are ideal since they are much easier to clean than footswitches with cables. During surgery the physician needs unobstructed access to the patient from all sides. It is very important to be able to move the C-arm out of the way. The C-arm of the AXIOM Artis can be parked 5 m away from the table, thereby meeting this requirement.

Economical Benefits for the Hospital

This type of installation and investment pays off rapidly. The OR concept offers many advantages. First, the room can be used for interventional radiology and surgery or a combination of both. The high-end imaging equipment and the high image quality enable image-guided therapy at a very high level, a level not achievable with other solutions. Pre- and postoperative examinations can also be done in the same room. Modalities such as CT or the other angio labs are freed up. Space is always at a premium and it is more than understandable that hospitals are constantly looking for ways to improve patient care, boost revenue, and position themselves in the community. This concept brings medical disciplines together in one room, for the benefit of the doctors, the hospital and ultimately the patients.

Contact

vera.juennemann@siemens.com