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10 years of hybrid operating rooms  
in Germany: Lessons learned

Giovanni Torsello, MD, Head of Vascular Surgery at St. Franziskus-Hospital,  
Münster, Germany

Illustrated Workflows in Hybrid Operating Rooms, No. 3

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## St. Franziskus- Hospital Münster

Located in Northwest Germany, the St. Franziskus-Hospital Münster serves nearly 3,000 inpatients and 5,000 outpatients per year. As part of the St. Franziskus Stiftung – a Catholic foundation comprised of over 15 medical facilities – the hospital has a strong tradition dating back to 1854. The hospital has grown into a large facility, consisting of 18 specialty clinics and two outpatient clinics. In order to provide the highest quality of medical care, St. Franziskus Hospital Münster relies not only on the clinical expertise of its highly qualified staff, but also the most advanced diagnostic imaging technologies.

In 2003, the first hybrid operating room in Germany was opened at the Clinic for Vascular Surgery, St. Franziskus-Hospital Münster, headed by Prof. Dr. Torsello (right). Since then, he has performed fenestrated endografting, iliac side branching, branched grafts for TAAA, hybrid procedures, as well as chimney techniques in this hybrid operating room.

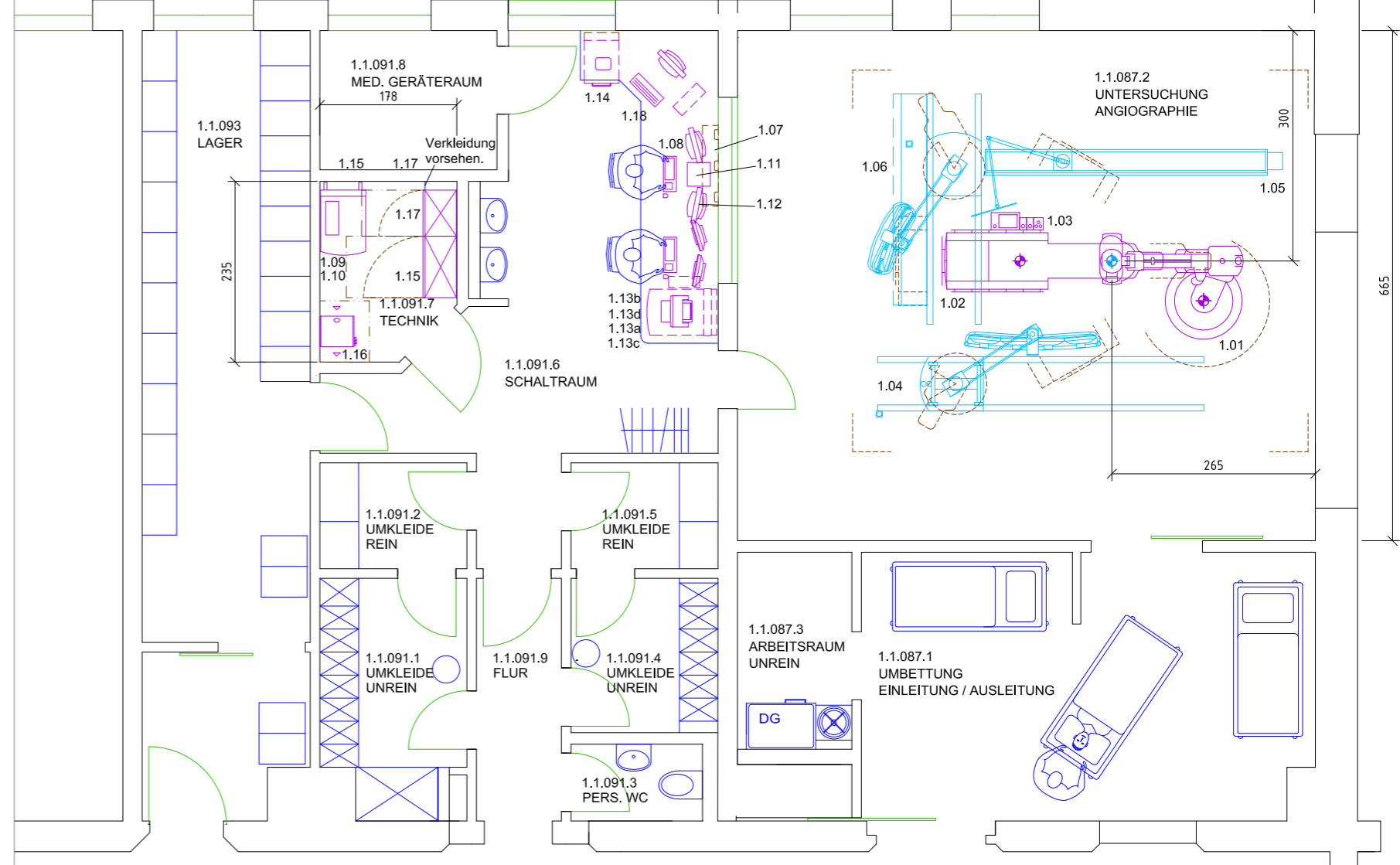
Only recently, Dr. Torsello's second hybrid room was set up in this hospital, which will soon be followed by a third hybrid room at the Center of Vascular and Endovascular Surgery at the University of Münster – one of the biggest and most innovative centers of vascular intervention in Europe.



# The Hybrid Operating Room

The new hybrid operating room at the St. Franziskus-Hospital Münster was built as an isolated tract starting from a radiology space, which brought additional challenges regarding workflow and storage of equipment to the project. The layout on the right side includes the actual OR with its control and equipment room as well as a changing room for staff and a surgery preparation room, specifically built for this OR.

The hybrid operating room is equipped with an Artis zee floor-mounted system and an Artis OR table. Two monitor stands with two 19" screens each are installed on Display Ceiling Suspensions (DCS) and provide optimal views from both sides of the table. Two CHROMOPHARE E558 OR lamps by Berchtold are mounted directly above the OR table and a Trumpf anesthesia boom is installed next to the Artis zee on the patient's right side (not shown in the plan).



## High quality imaging a must

Bringing excellent imaging into the sterile setting has been the major advance of the last ten years. This brought about qualitative improvements with regard to more complex interventions, research options, patient volume, performance, and patient satisfaction. Therefore, choosing the right angio system is key.

Dr. Torsello very much values the overlay function of fixed angiography systems, that is, the option to steplessly change between the native image and the summed-up image. Other important features for him are pulsed fluoroscopy to reduce dose for patient and staff, some preprogrammed working positions to simplify workflow, and mainly for aneurysm interventions, an automap function, which spares the



patient extra angiograms and therefore contrast agent. Fluoroscopy time is another important issue. Most C-arms do not fulfill the requirements for long continuous or pulsed fluoroscopy over several hours and need to be given time to cool down.

The pictures show Artis zee floor in a parked position. The pivot point of the C-arm stand is mounted far away from the table, giving ample space to the staff to prepare the patient.



## Autonomy a key issue

Handling is another key issue when performing angiography in the OR. Using a regular C-arm necessitates help from people to support the examiner. Therefore, a precise language to communicate about directions is needed. With employees changing jobs, this information is hard to convey with the required precision. Surgeons might lose their nerve in complex interventions. Therefore, Dr. Torsello favors a set-up where the examiner navigates the table himself.

From his ten years of experience Dr. Torsello recommends a free-floating table that can be tilted from all positions and has a rack for auxiliary equipment. For ergonomic reasons it shouldn't be too wide. While wide tables might not be an issue during catheterization, working bent down for hours to reach the middle line of the patient will lead to problems unless the table is narrow.

The picture on the left shows the Artis OR table tilted in a Trendelenburg position, which might be required during a procedure for hemodynamically unstable patients.





## Space matters

Preferably, a hybrid room should have a minimum size of 50 square meters (540 square feet), suggests Dr. Torsello. If hybrid interventions play a prominent role or the hybrid room is shared with a cardiac surgeon, an even bigger room might be needed for the team to move about without the risk of becoming non-sterile.

The participation of a hygienist and medical engineer in setting up a hybrid room is of utmost importance. Both can give valuable input as to whether a floor- or ceiling-mounted angio system is preferred – issues that must be decided at an early stage.

The design of the C-arm provides valuable space for the anesthesiologist.



## Investment confidence

The fear of administrators ending up with a vacant hybrid room can easily be dissipated: between September 2003 and December 2011 Dr. Torsello's team performed 8,651 interventions in their hybrid room, 5,671 of them endovascular interventions and angiographies, 1,975 combined interventions, and 1,005 conventional operations. If the 300 aneurysm treatments he does per year alone were performed as open surgery, the size of the intensive care unit would have to be increased by another 30 beds – an impressive argument for administrators.

Ten years after getting started Dr. Torsello is more convinced than ever that the future lies in endovascular procedures and hybrid rooms. "For those 10 to 20 percent of patients in whom the anatomical situation is not suited for endovascular treatments, we will still need vascular surgeons trained in conventional operations. But we no longer need pure operating rooms – they can perform the intervention in the hybrid room." Hybrid procedures will become the standard operation of the future.



*"Combining a ceiling-mounted C-arm and a laminar air flow (LAF) ceiling is very complex and expensive. The efficacy of the LAF is reduced when the ceiling-mounted C-arm is in a working position. Therefore, we recommend floor-mounted C-arm systems that can be installed even under existing LAF ceilings."*

Blerim Pruthi (right), the responsible planner for hybrid rooms at Siemens

# Configuration of the Hybrid Operating Room

Clinic for Vascular Surgery,  
St. Franziskus-Hospital Münster

- Artis zee floor with MULTISPACE.F, road mapping, pulsed fluoroscopy, and auto mapping functionality
- Artis OR table including narrow tabletop, thin mattress, carbon-fiber arm rest, head-end holder, and hand grips with support
- Upper and lower body radiation shielding
- Wireless footswitch
- Vascular analysis software and fluoro loop
- MMWP with syngo InSpace3D, syngo DynaCT Cardiac, in-room control
- 2k acquisition with 30x40 detector, 3D/3D Card acquisition including DYNAVSION
- Two monitor stands each equipped with two 19" screens on Display Ceiling Suspensions (DCS)
- One anesthesia boom by Trumpf
- Two OR lamps by Berchtold



## Lessons learned

- Hybrid operating rooms are preferably installed in an existing surgical wing to minimize reconstruction and to reduce costs
- The surgical workflow is an important issue to consider when setting up a hybrid room
- Key to success is bringing excellent imaging to the sterile OR environment
- The surgeon should operate the table and the system by himself
- Space is extremely important. At least 50 m<sup>2</sup> (540 square feet) are recommended
- Involve hygienist and medical engineers early on in your hybrid OR project

## Benefits of Artis zee floor

- Cost-effective high-end angio system
- Ample space to prepare patient
- (Anti-) Trendelenburg up to 15 degrees
- Room for the anesthesiologist to access patient
- Free laminar air flow field
- Easy installation in existing ORs



Scan this code with your smartphone to explore more photos of this hybrid OR solution



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#### **Global Business Unit**

Siemens AG  
Medical Solutions  
Angiography & Interventional  
X-Ray Systems  
Siemensstr. 1  
DE-91301 Forchheim  
Germany  
Phone: +49 9191 18-0  
[www.siemens.com/healthcare](http://www.siemens.com/healthcare)

#### **Global Siemens Headquarters**

Siemens AG  
Wittelsbacherplatz 2  
80333 Muenchen  
Germany

#### **Global Siemens Healthcare Headquarters**

Siemens AG  
Healthcare Sector  
Henkestr. 127  
91052 Erlangen, Germany  
Telephone: +49 9131 84-0  
[www.siemens.com/healthcare](http://www.siemens.com/healthcare)

#### **Legal Manufacturer**

Siemens AG  
Wittelsbacherplatz 2  
DE-80333 Muenchen  
Germany

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