



## Smart Surgery Lab 2030



Technological innovations are becoming increasingly important in surgical disciplines. Technological progress—eg. in medical imaging, preoperative surgical planning tools, advanced instrumentation, and intraoperative navigation systems—providing more accurate, more reliable and safer surgical procedures. These developments can be used for the treatment of a wide variety of congenital, oncological and traumatic conditions, both simple and complex. Erasmus MC currently uses surgical navigation (Brainlab, Germany) for head and neck surgery, orthopedic surgery, trauma/congenital surgery and neurosurgery. This has led to improved surgical treatment of complex congenital maxillofacial abnormalities, brain tumors, malunions through correction osteotomies, conditions requiring prostheses and (maxillofacial) traumas.

Moreover, surgical procedures are increasingly being planned preoperatively using techniques such as virtual reality (MedicalVR, Netherlands), 3D modeling and 3D printing (e.g. patient-specific surgical guides from Materialize, Belgium). In addition, the use of innovative technologies such as Virtual and Augmented Reality (VR and AR) show promise in terms of the optimizing communication and patient experience around the operation.

This Convergence Flagship has as goal to deliver personalized surgical tools and implants, within 24 hours, at low cost using streamlined automated scheduling and 3D printing facilities.

AR and VR will be used for the planning of procedures and the communication and experience of patients. The ultimate goal here is to improve the accuracy, security, predictability and improve outcomes of surgical procedures. We strive to enhance the cooperation and continue and expand initiatives of the Smart Surgery Lab (Erasmus MC/TU Delft), and we want to ensure that this development is also given a prominent place within the Convergence.

Within this Flagship we want to focus on developments and applications in the following areas:

1. Advanced image processing and automation of surgical planning
2. Extended reality: VR and AR
3. 3D printing of advanced patient-specific surgical instruments, molds and implants
4. Usability, effectiveness and cost-effectiveness

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