

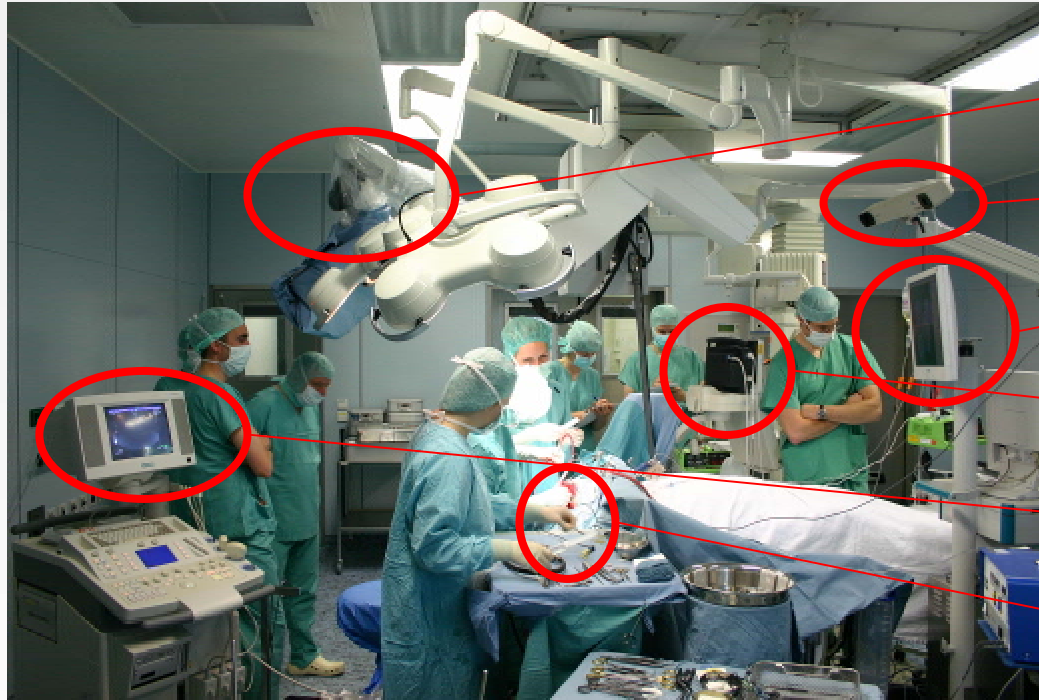
Integration of Mechatronic Components in an Open Surgical PACS Architecture

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Introduction



AR in microscope

Navigation data

Display of Models

System monitoring

US-Display

Tracked US-probe

Need for
commonly
accepted
interface

Modern, complex surgical interventions are strongly dependant on the availability of **information**.

- DICOM is a well established standard for image acquisition and communication in **radiology**.
- DICOM is about to be extended to support **surgical interventions** intraoperatively (→ DICOM WG24)

→ DICOM can be extended by adding specific SOP-classes for

- Data structures
- Commands

BUT:

- DICOM say nothing about the underlying implementation

→ S-PACS ≠ S-DICOM

- State of the Art:
 - One vendor cares about the characteristics of his system.
 - Future: Systems of different vendors must interact!
- Prediction of system behavior in a surgical workflow must be possible
- Systems Architecture
- Need for clearly defined interfaces
- Data structures
 - Commands
 - Hardware interfaces / networks

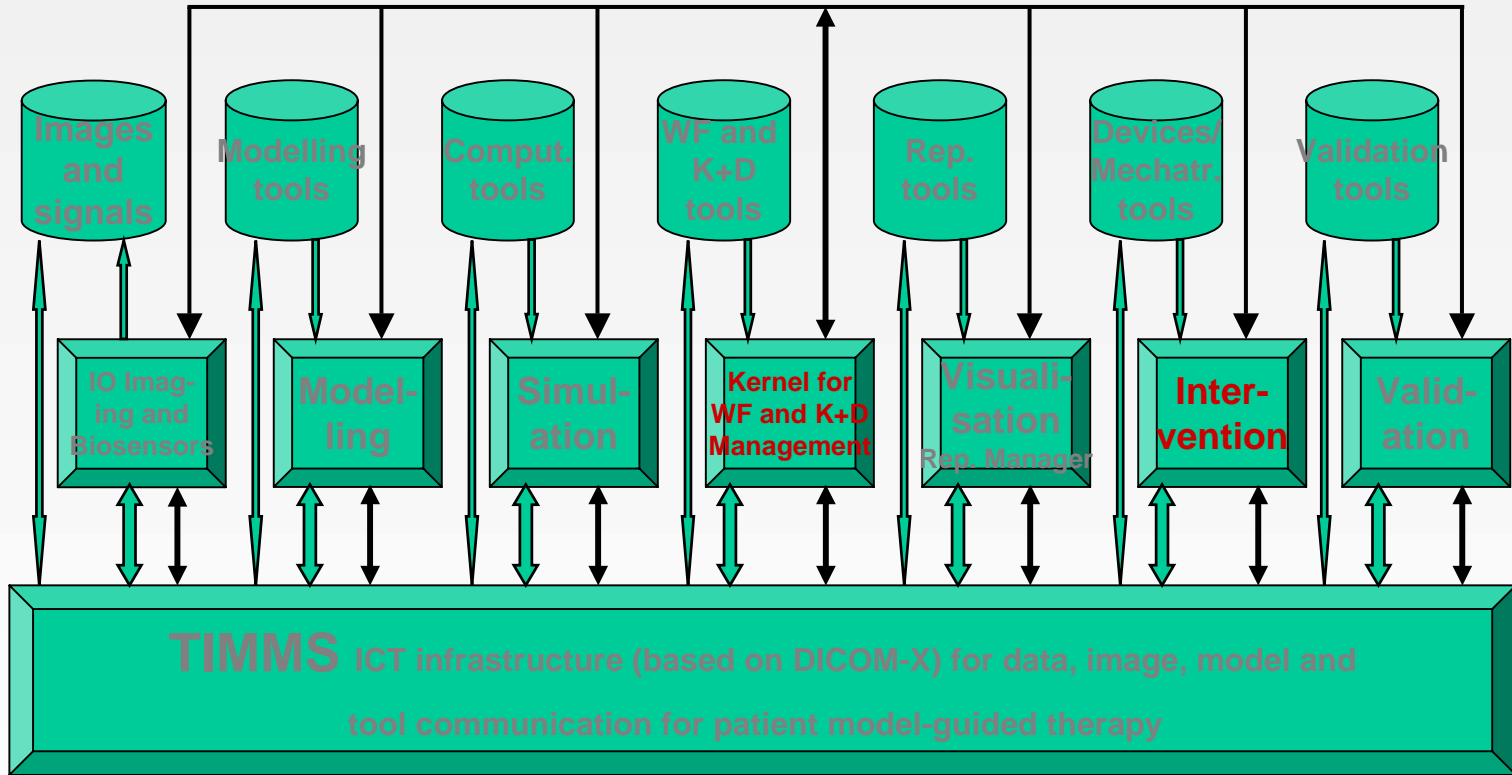
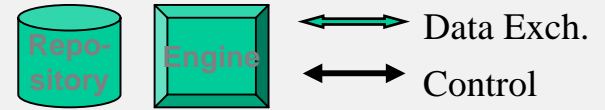
ICT infrastructure to support information- or model-guided surgeries

- Transport of Patient Model
 - Images
 - Bio-signals
 - Geometric Models
 - ...
- Support for data acquisition → Update of patient model
 - Ultrasound
 - Digital Radiography
 - ...
- Planning and Simulation
 - Pre- and intraoperative planning
- Intervention
 - Navigation
- ...

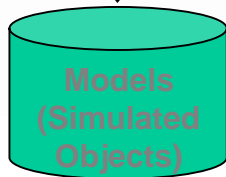
Therapy Imaging and Model Management System (TIMMS)

©. H. U. Lemke, August 2006

Interventional Cockpit/SAS modules
IT Model-Centric World View



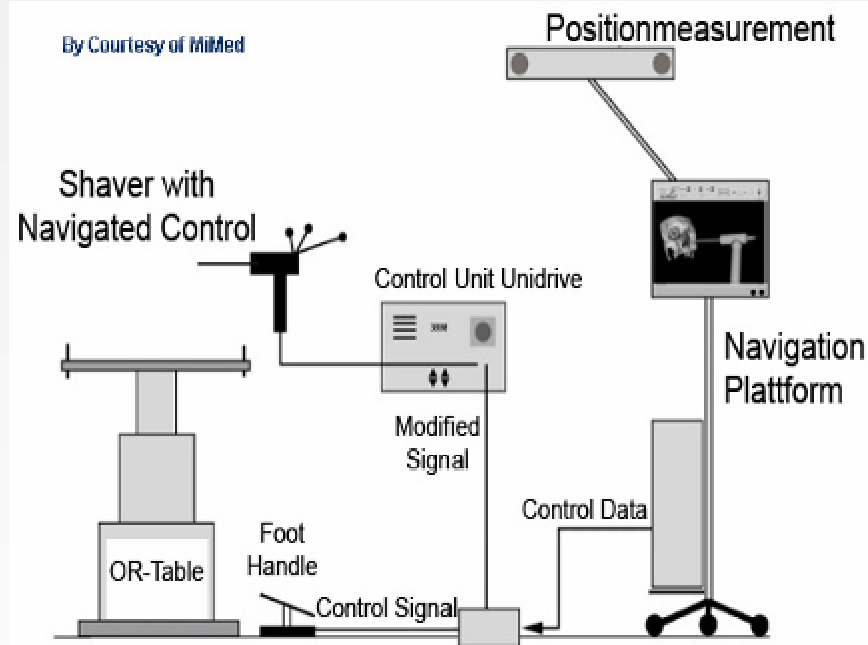
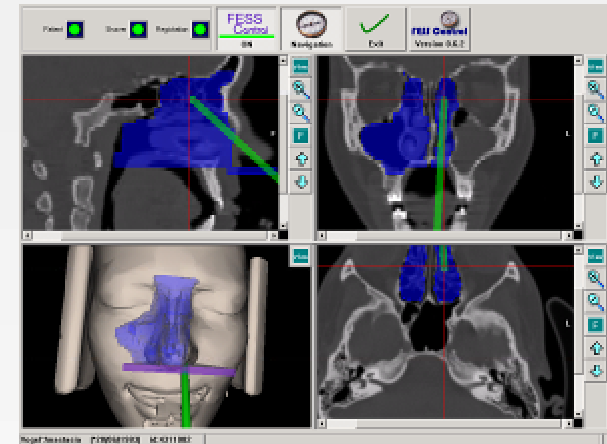
Data and information



Models and intervention protocols

- Navigated Control
- Augmented Reality using a Telemanipulator
- Navigation with Multimodal Images and 3D-Ultrasound

Navigated Control for FESS



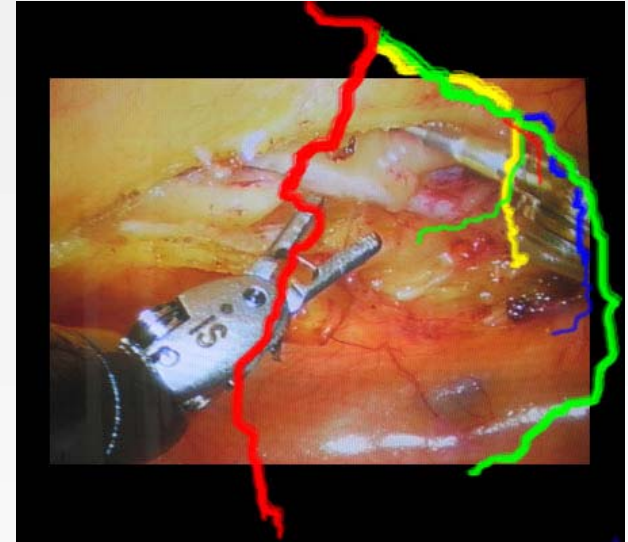
Navigated Control (NC) has been developed by MiMed, Prof. Lüth, Munich

Current aim at ICCAS:

Interface to arbitrary planning software



Augmented Reality using a Telemanipulator



AR goal:

Superimposition of 4D data set of coronary artery vessel tree
in endoscope image

→ Poster MI 7



- Calibration System for intraoperative 3D Ultrasound (3D-iUS)
- Zero-Configuration plug-and-play mechanism for optical tracking system
- Client doesn't need to know anything about implementation details of tracking system
- Enables integration of optical tracking cameras in S-PACS

Acknowledgement

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