Towards Communication Requirements in the Operating Room and Clinic IT

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Agenda

• Motivation
• The OR.NET Project
• Methods
• Results and Discussion
Today’s situation

- Mainly stand alone devices (e.g. due to legal requirements)
- Heterogeneous group of devices/systems: Medical Devices and hospital IT Systems
- Integration capabilities of devices (none, partial)
- Some vendor specific closed system solutions (OR1, Core, …)
The OR.NET Project

- BMBF funded project (15 million Euros)
- 46 Project Partners and 23 Associate Partners

Main goals:
- Interconnection of medical devices
- Integration of medical devices with IT-Systems (HIS, PACS)
- Standardized (HL7, DICOM)
- ...

www.ornet.org
Methods

1. Collect clinical and technical use cases
2. Develop a communication matrix
3. Cluster the communication requirements
4. Questionnaire survey on identified communication requirements
Methods

Use Cases

Communication Matrix

Communication Requirements

Informative requirements cluster

Manipulative requirements cluster

Documentation requirements cluster

Additional clinical requirements cluster

Questionnaire survey

16 communication requirements

6 German University Hospitals sorted the 16 com. req.:
1 = less important
16 = very important
Results

1. Informative requirements cluster
2. Manipulative requirements cluster
3. Documentation requirements cluster
4. Additional clinical requirements cluster
Results

1. Informative requirements cluster
   • Accessing patient data, findings and documents emerging from clinical IT systems in the OR
   • Visualization of device data (centralized)
   • Transfer of alerts and warnings
   • Image and Video transfer within the OR
   • Accessing images and videos from the OR network, coming from the hospital IT systems
   • Telemedicine
1. Informative requirements cluster
Accessing patient data, findings, documents

Hospital IT-Network

Accessing:
Patient data
Findings
Documents
...

OR-Network
1. Informative requirements cluster
Visualisation of device data (centralized)
1. Informative requirements cluster
Transfer of alerts and warnings
1. Informative requirements cluster
Image and Video transfer within the OR

OR-Network

Low Latency

Low latency
1. Informative requirements cluster
   Accessing images and videos
1. Informative requirements cluster
Telemedicine

Switch views and mark structures

external-Network

OR-Network
Results

2. Manipulative requirements cluster
   - Manual control
   - Automatic control (real-time, no user interaction)
   - Manual remote control (telemedicine)
   - Remote maintenance
2. Manipulative requirements cluster
Manual control

OR-Network

US Power Up/Down

Up/down

Pedal
2. Manipulative requirements cluster
Automatic control

Danger area

Tracking data
2. Manipulative requirements cluster

Manual remote control

External Network

OR-Network

Change device data
2. Manipulative requirements cluster
Remote maintenance

Safety
Security
Privacy

Tunneled access

External service technician

HIS/PACS

Hospital IT-Network

PC/Clients

OR-Network

Service technician
3. Documentation requirements cluster
   • Clinical documentation
   • Image documentation
   • Video documentation
3. Documentation requirements cluster
Clinical, image, video documentation

Hospital IT-Network

OR-Network

Images/Videos, findings, documents

Device data

Documents

Video/Image

Image/Video

findings
Results

4. Additional clinical requirements cluster
   - Protocol transfer
   - Data, image and video fusion
   - Workflow control
4. Additional clinical requirements cluster
Protocol transfer

- Surgery Start
  - C-Arm
  - Use Microscope
  - US-Power up
  - Surgical incision

- ... Surgery End

OR-Network
4. Additional clinical requirements cluster
Data, image and video fusion
4. Additional clinical requirements cluster
Workflow control
Results

- Physicians and operators from 6 German University Hospitals prioritized the communication requirements (1=less important, 16=very important):
  - University Hospital Aachen (UHA)
  - University Hospital Leipzig (UHL)
  - University Hospital Tübingen (UHT)
  - Rhön Hospital (RH)
  - University Hospital Heidelberg (UHH)
  - University Hospital Schleswig-Holstein (UHSH)

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## Results and Discussion

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