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Towards Automatic Electronic Health Record Dissemination in the Operating Room or Intensive Care

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Outline

1. Motivation
2. Existing Approaches
3. Alternative Approach
4. Conclusion

Motivation

- Today Medical Device Integration is basically not available
- Some approaches exist
  - Have not established yet
  - Use legacy communication techniques
  - Do not cover custom requirements
- Central case of application:
  → set up patient data on medical devices
- Nowadays manually typed in at every device
- Easing workload by automatically disseminating data to devices

Existing Approaches

- **DICOM Worklists**
- **IHE IT Infrastructure Documents**
- **IEEE/ISO 11073 Patient Demographics**

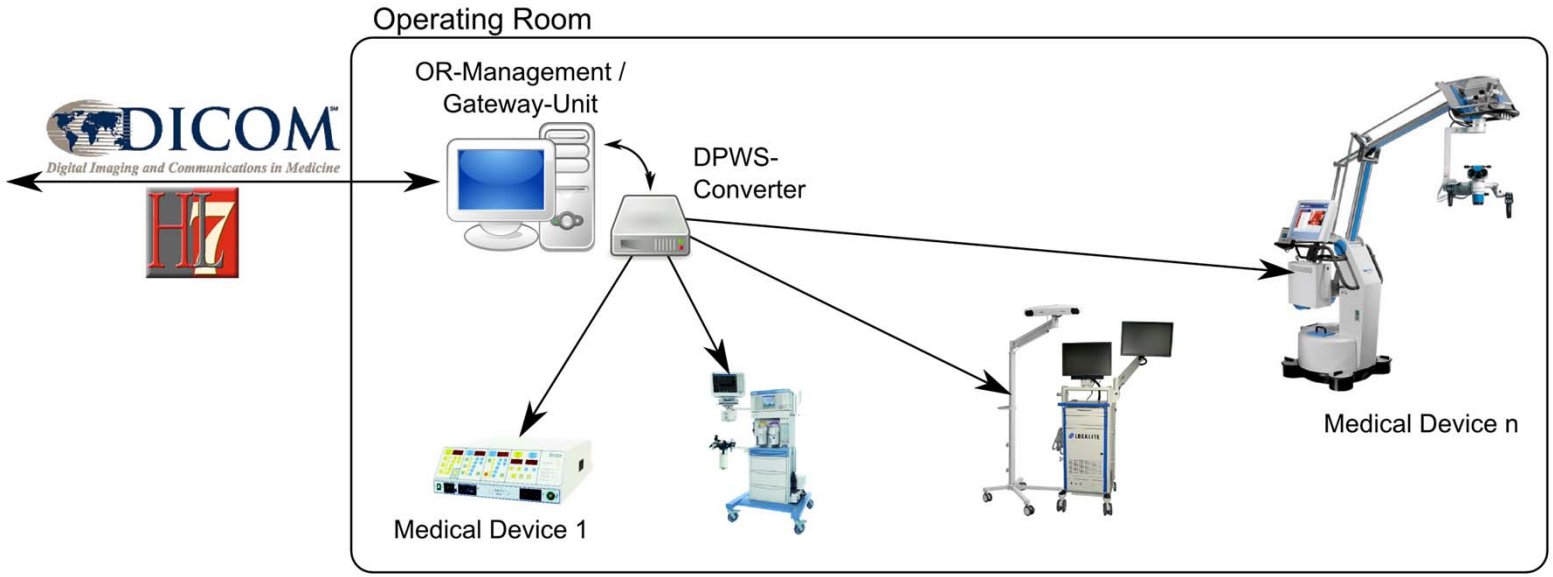
- Concrete specs missing regarding to
  - Data flow
  - Exception handling
  - (Semi-)automatic dissemination
  - Security/Safety issues and liability

IEEE/ISO 11073

Alternative Approach

- Utilizing DPWS
- *Advantages:*
  - \+ Standardized, device-suited specification
  - \+ Decentralized communication stack
  - \+ Dynamic binding
  - \+ Publish/Subscribe
- Confirm electronic health record (EHR) at *one* station
- Disseminate EHR to interested parties

Architecture



Assumptions

- Authentication mechanism is available
- Patient context is available
  - Devices can be grouped together automatically or manually
- Devices are speaking DPWS by default
  - Use wrapper boxes if not
- Serializing via XML
- Independency to EHR semantics
  - May be based on IHE ITI proposals
  - May be based on ISO/IEEE 11073 Patient Demographics#
  - …

Suggested Implementation

- Work in progress → improvements are welcome!
- Main idea:
  1. At some time, OR devices & converter will be activated
  2. OR devices subscribe as soon as converter is available
  3. EHR list is consumed at OR gateway
  4. Single EHR is confirmed by authenticated staff member
  5. EHR is transmitted to converter
  6. Converter notifies devices on confirmed EHR
- Converter provides his identity and identity of confirming person → liability guaranteed
- Data may be transmitted in a 2-channel way

Exception handling

- Devices are restarted → solved by:
  - Initially sending an EHR request
  - If no EHR available, wait for notification
- Legacy patient data → solved by:
  - EHR comes with Visit-ID and timestamp
  - „Last EHR“ is stored at device side
  - Compare params with current EHR to recognize legacy data
- More then one EHR supplier found → solved by:
  - Trust on SOA‘s service transparency; use any supplier
  - Compare several EHR from different suppliers for plausibility reasoning; break on differences

Conclusion & Future Work

- New protocol on EHR dissemination
- Liability by applying staff authentication and device signatures
- (Semi-)automatic EHR assignment
- Covers connection losses
- **Next steps:**
  - Implementation and evaluation of the system
  - Defining data requirements
  - Protocol on storing documentation data after intervention