IT Security of Cloud Services and IoT Devices in Healthcare
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About the Author(s)

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- Fields of research
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  - 5G SA / NSA campus networks and hardware

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Introduction & Motivation
Medical IoT and Cloud Services
Consequences for IT Security
Conclusions & Future Work
Introduction & Motivation

1. Medical IoT and Cloud Services
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3. Conclusions & Future Work
1. Introduction and Motivation

**Homecare**
Def.: Form of care for the sick and elderly in which patients are cared for in their familiar home environment.

![Homecare Image]

https://www.presseportal.de/pm/19954/4323883

**Integrated Care**
Def.: Is an approach to strengthen people-centred health systems through the promotion of the comprehensive delivery of quality services across the life course mostly not in their familiar home environment.

![Integrated Care Image]


These different environments lead to different IT security challenges in the domain of the upcoming medical internet of things.
1. Introduction and Motivation

Amount of Registered Healthcare Data Leaks in the US
(Years 2005 to 2019)

1. Introduction and Motivation
IT Security – Frameworks / Working Groups

ISO/IEC 27xxx
BSI
COBIT
NIST Cybersecurity Framework
NERC
ISO 15408

Cloud Security Alliance
ETSI TC CYBER
IASME
ISACA
ANSI/ISA 62443
IEC 62443
ISO 15408

Plan
Do
Act
Check
IT Security of Cloud Services and IoT Devices in Healthcare

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2. Medical IoT and Cloud Services
Different Settings and Environments

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**IoT-Devices**

<table>
<thead>
<tr>
<th>Risk Class</th>
<th>Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV very high risk</td>
<td>hip prosthesis, cardiac catheter …</td>
</tr>
<tr>
<td>III high risk</td>
<td>x ray, infusion pumps</td>
</tr>
<tr>
<td>II medium risk</td>
<td>x ray data, ultrasound</td>
</tr>
<tr>
<td>I low risk</td>
<td>wheelchair, fever thermometer</td>
</tr>
</tbody>
</table>

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**Integrated Care**

- Safe and controllable environment
- Levels of certain IT skills expected

**Homecare**

- Unprotected area
- No IT skills expected
2. Medical IoT and Cloud Services
Connection between IoT and Cloud
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3. Consequences for IT Security

• Current situation
  • IoT manufacturers often neglect the PDCA process
  • Sensitive patient data is being processed
  • Old medical equipment is being repurposed for IoT applications

• Consequences
  • IT security needs to be higher than in other industries
  • Best practices must be enforced
  • A unified process must be defined
Introduction & Motivation

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4. Conclusions & Future Work
Approach of the 5G4Healthcare Research Project

- **C** (Conception): Conception, modeling and selection of the scenarios to be investigated in the use cases, including status quo analysis and modeling of the anticipated target scenarios using 5G.

- **I** (Implementation): Implementation and execution of the scenarios in the Campus Testbed at the university and in Living Labs on site.

- **E** (Evaluation): Implementation of the evaluation concept and derivation of recommendations for scalability and transfer to standard care.
4. Conclusions & Future Work

Final Goal

- evaluation of current situation
- skill assessment
- product / service selection
- integration

Conclusions & Future Work

Final Goal

- guidance
- skill assessment
- product / service selection
- integration

Evaluation of current situation

Skill assessment

Product / service selection

Integration
Conclusion & Outlook

1. Guidelines & recommendations need to be applied by lawmakers
2. Structured verification/auditing process from independent institutes to validate medical IoT Products
3. Regulations for medical IoT product manufacturers to provide a minimum time of support to ensure a proper medical device live cycle (patches etc.)
Thank you, Questions?

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Sources

Icons from https://www.flaticon.com/

other images: openclipart.org