

Hauptseminar Software for Digital Health



Faculty of Computer Science, Chair of Software Technology

13.11.2018



Agenda

- Organization
- Aspects of Digital Health
- Problem Space
- Example: Data Driven Point of View
- Example: Current Projects
- Strategic Research Area and Grand Challenges
- Topics
- Next Steps



Organization

- Inhalt:
 - Einarbeitung und Literaturrecherche zum ausgewähltn Thema
- Geforderte Leistungen:
 - Kolloquium (Vortrag 15 min, Diskussion 15 min)
 - Seminararbeit (mind. 5 Seiten, ACM SIGPLAN Format)
- Termine:
 - Einführung Literaturrecherche & Wissenschaftliches Schreiben: tba.
 - Einführung Wissenschaftliches Vortragen: tba.
 - Kolloquium: 08.01.2019
 - Seminararbeit: 01.02.2019



The term of Digital Health



The term of Digital Health

Digitalization

Data

Processes

Devices

Systems

Collaboration

...



The term of Digital Health

Digitalization

Systems

Devices

Processes

Data

Collaboration

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Scope

Telemedicine

System Integration

Electronic Medical Record

Smart Wearables & Implants

Data Integration & Processing

Personalized Medicine

Digital Medical Services

Robots & Medical IoT

...



The term of Digital Health

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Systems

Devices

Processes

Data

Collaboration

...

Scope

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Electronic Medical Record

Smart Wearables & Implants

Data Integration & Processing

Personalized Medicine

Digital Medical Services

Robots & Medical IoT

...

Aims

Quality

User Experience

Data Sovereignty

Availability

Knowledge

Decision Support

Interoperability / Portability

Medical Environments

...



The term of Digital Health

Digital Health Systems should meet ..

Interdisciplinarity

Medicine

Computer Science

Electro Engineering

Natural Science

Social Science

Health Industry

Legislator

...



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Challenges

Annotated Data

Integration

Interoperability

Customizability

Adaptivity

Applicability

Transparency

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Digital Health Systems should meet ..

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Applicability

Transparency

...

Restrictions

Privacy

Authorization

Certification

Security

Safety

Traceability

Useability

...

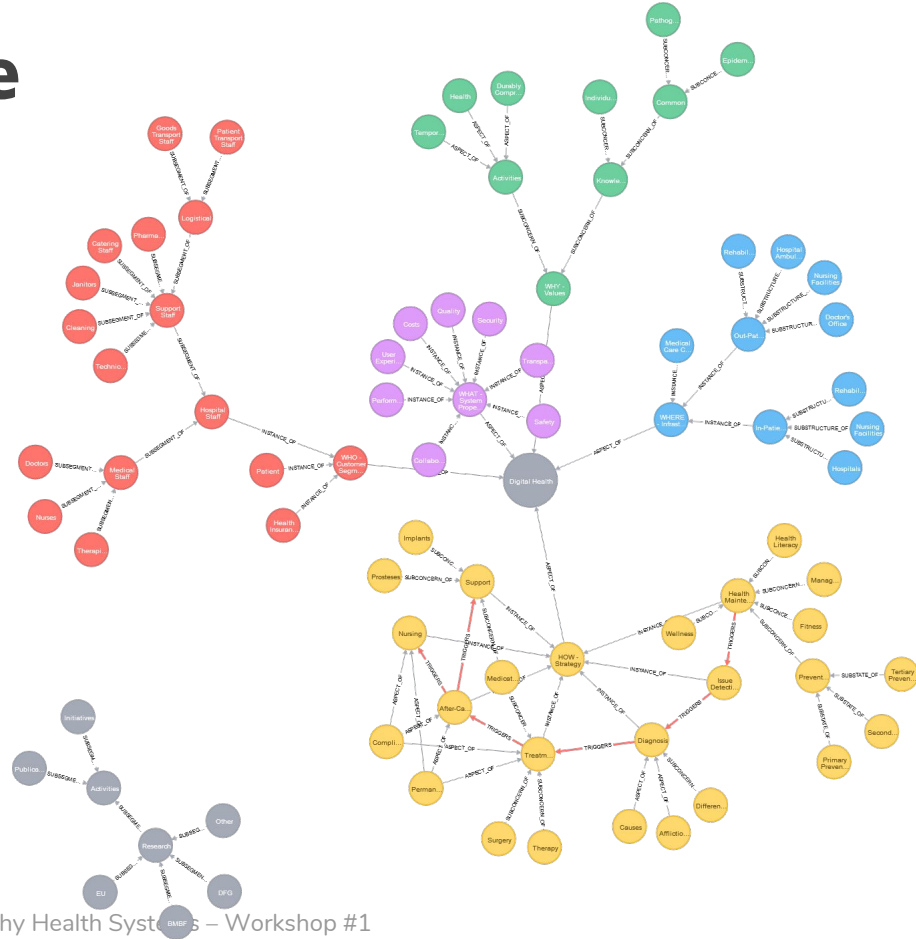


Problem Space



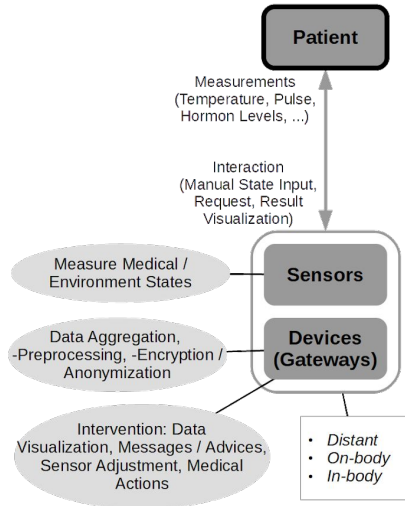
Problem Space

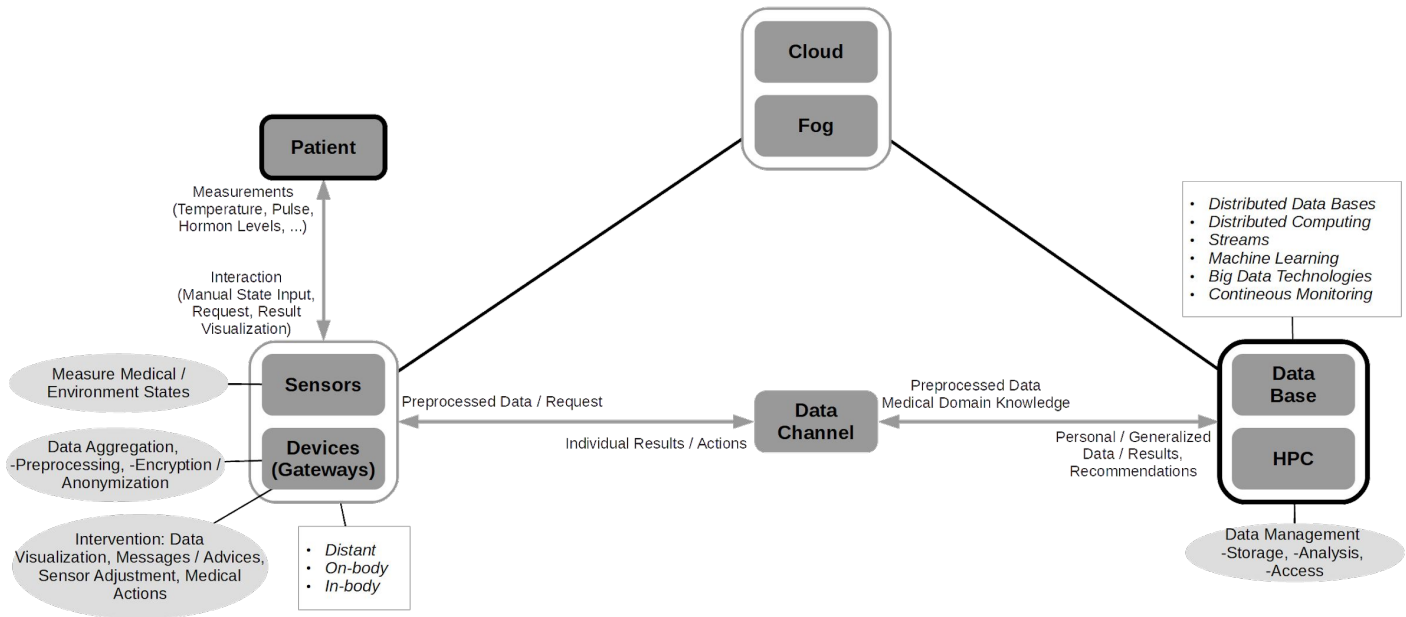
- Graph-Based Model
- Queries
- Organise & Relate Aspects
- Locate
 - Problems
 - Challenges
 - Approaches

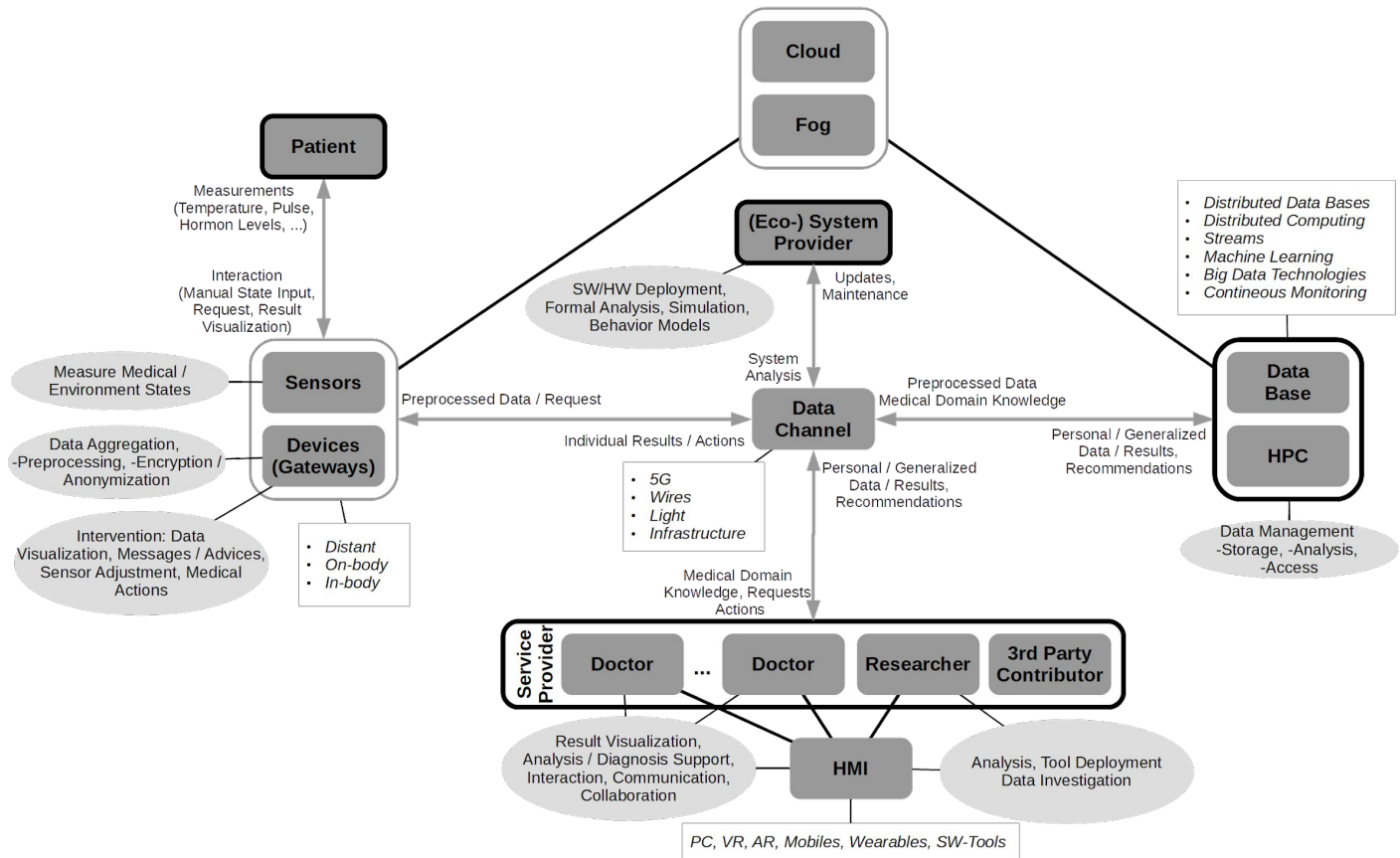


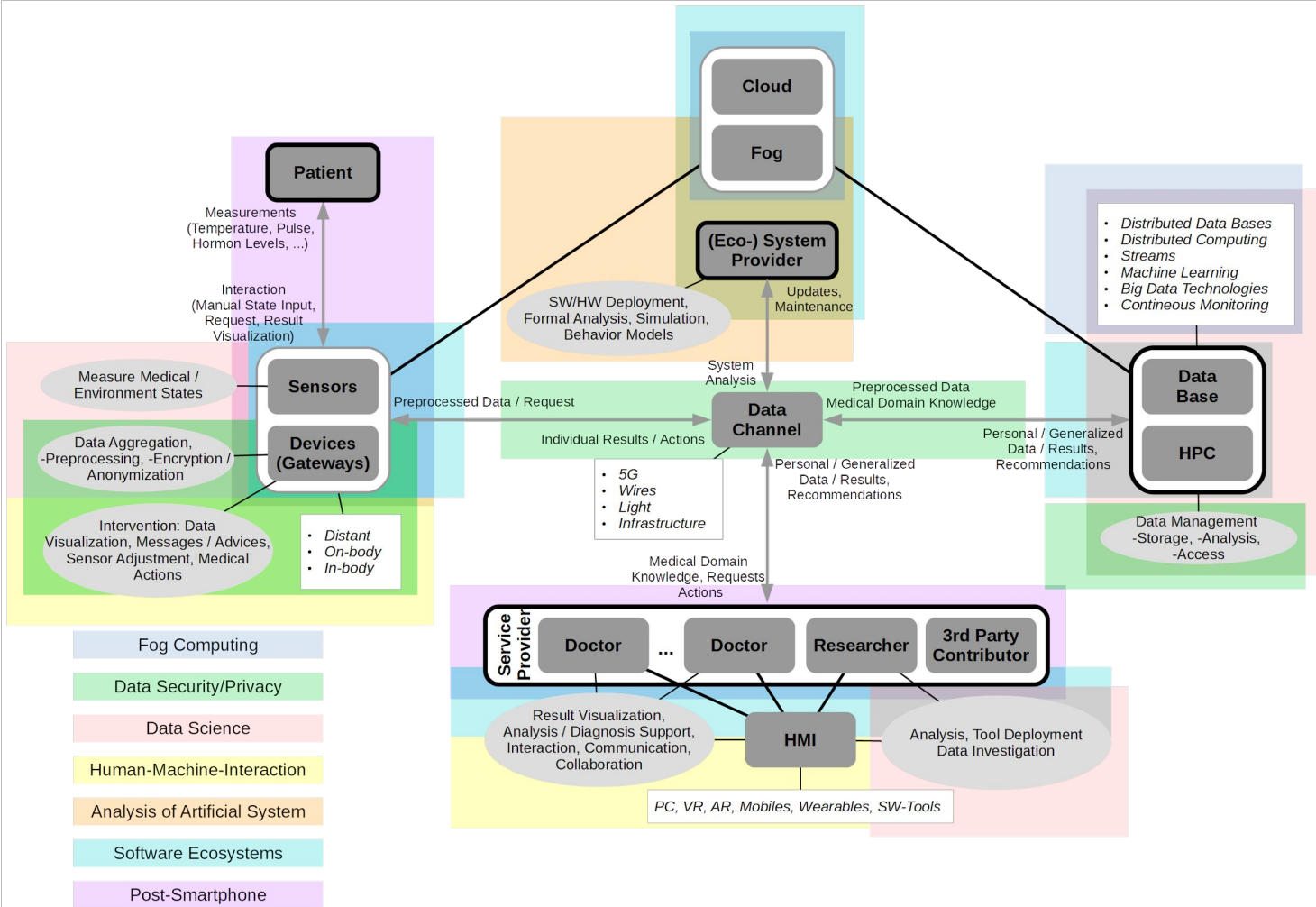


Example: Data Driven Point of View



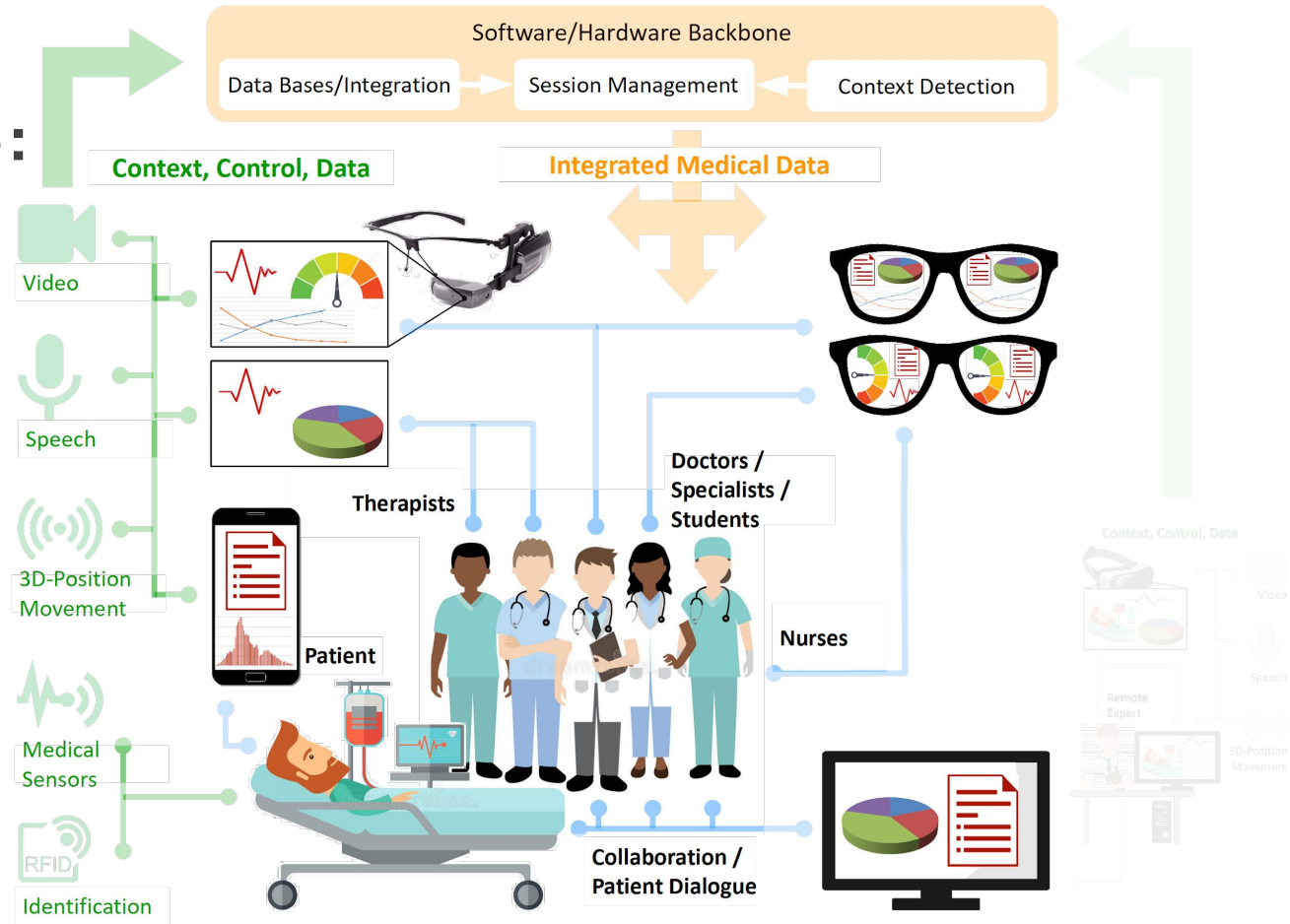






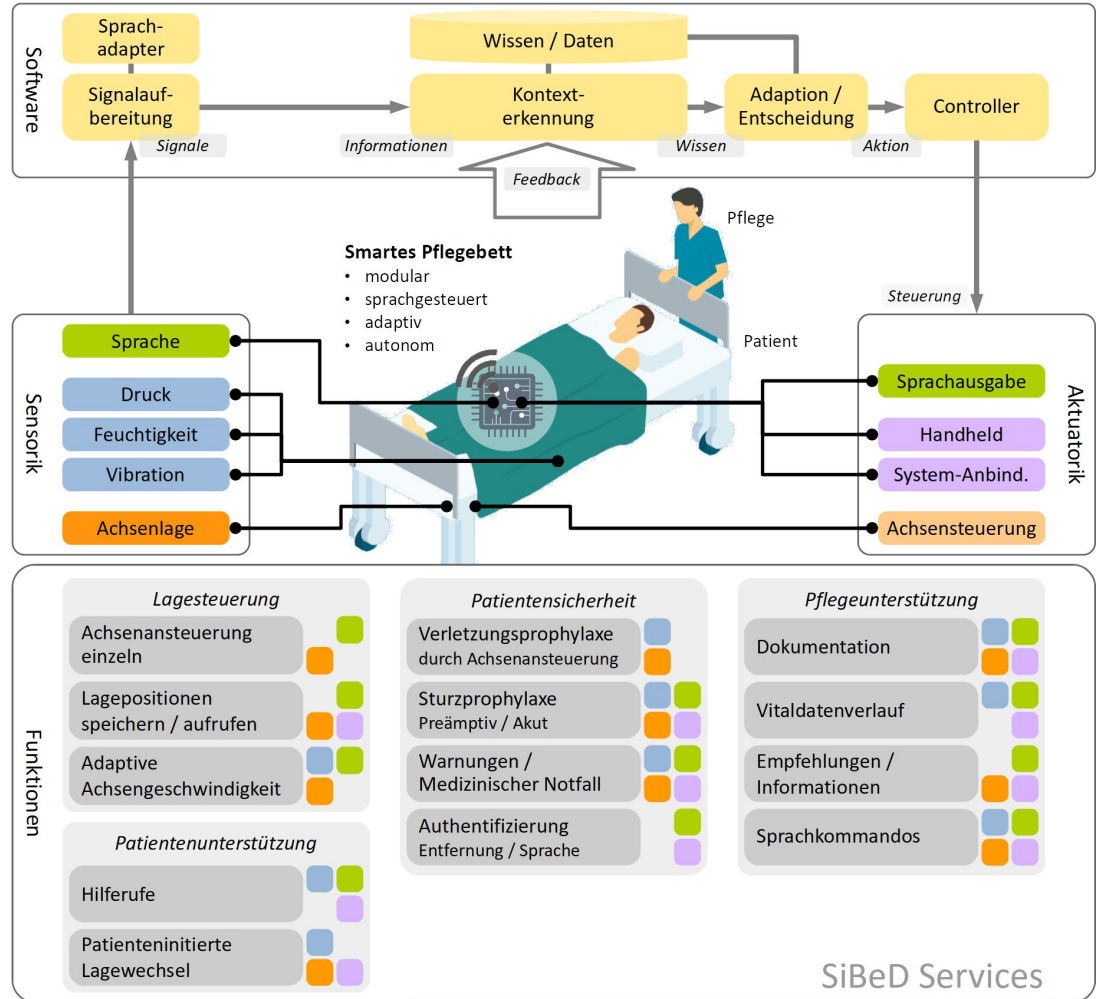
Example: Current Projects

Visite Mobil



Example: Current Projects

*Smart Sick
Beds*

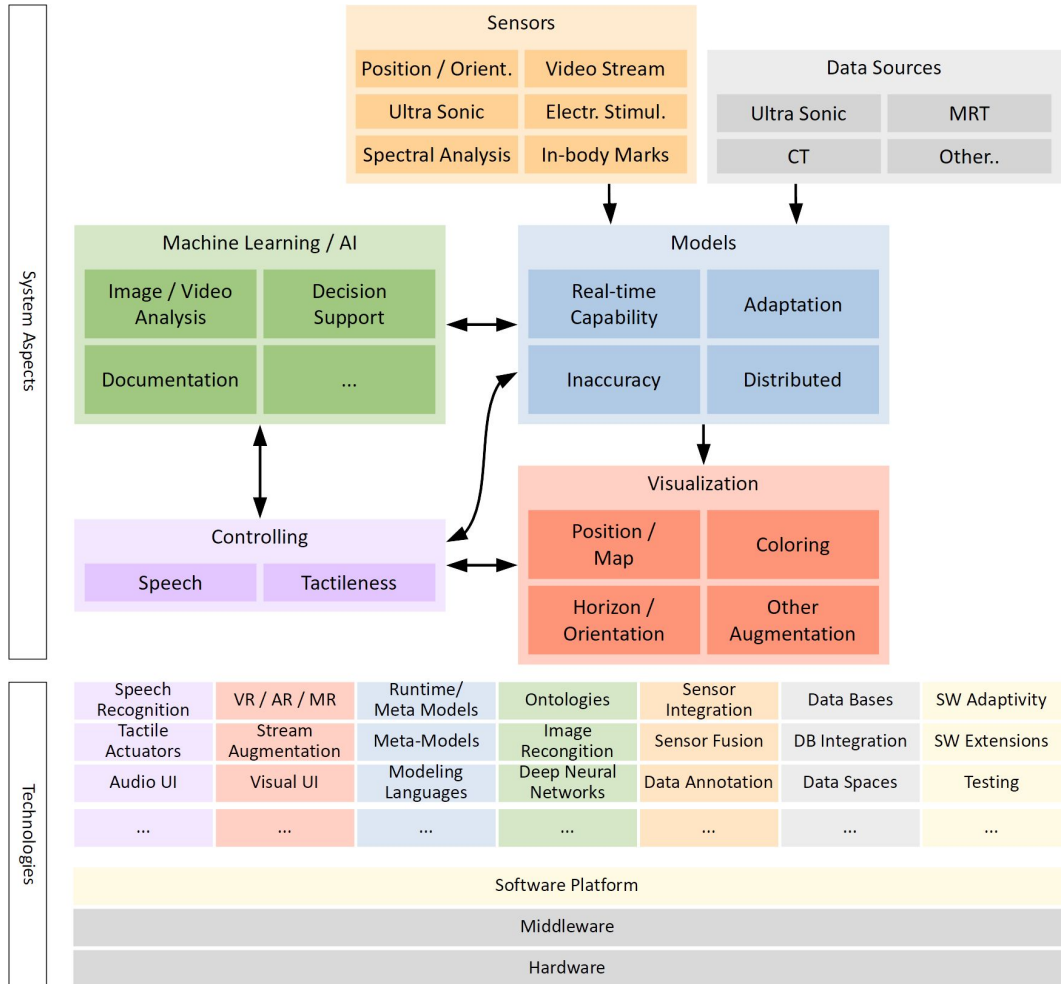




Example: Current Projects

AI OP Support

From Platform...

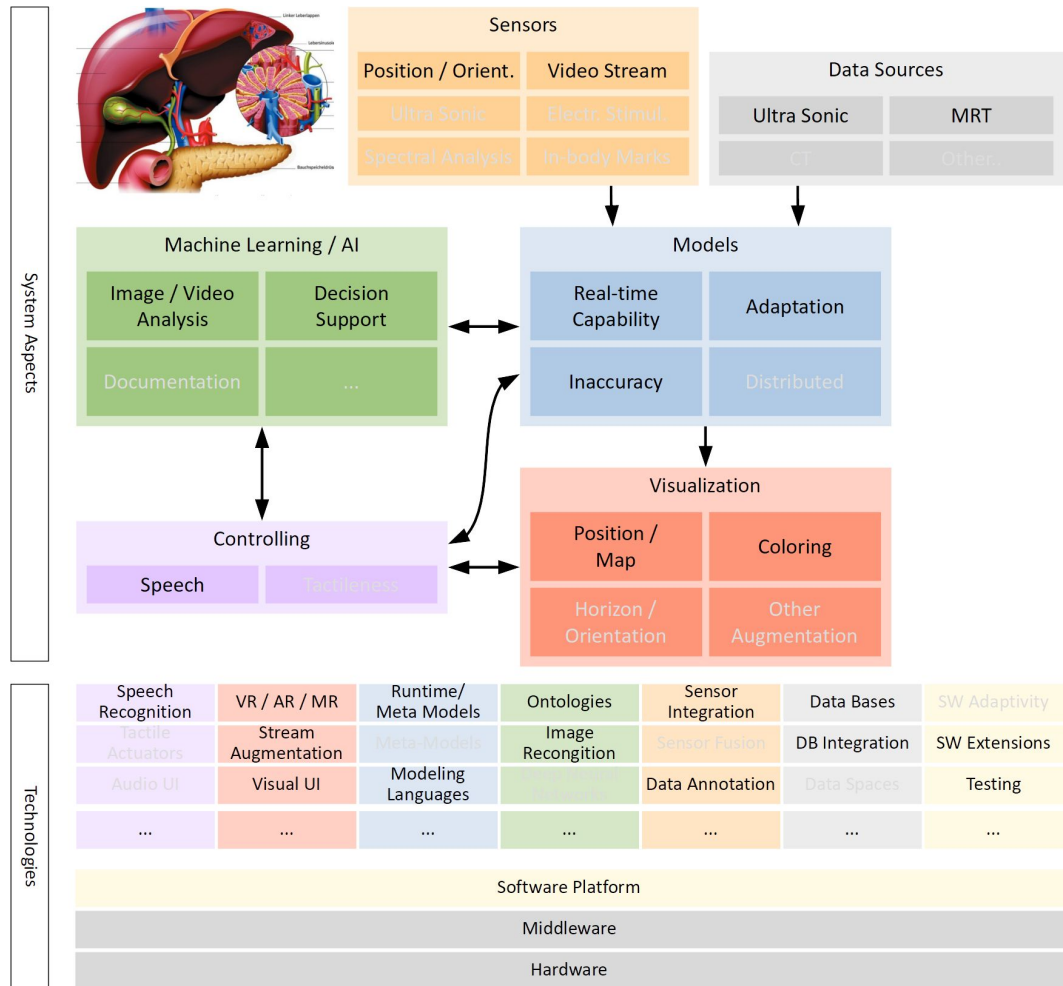




Example: Current Projects

AI OP Support

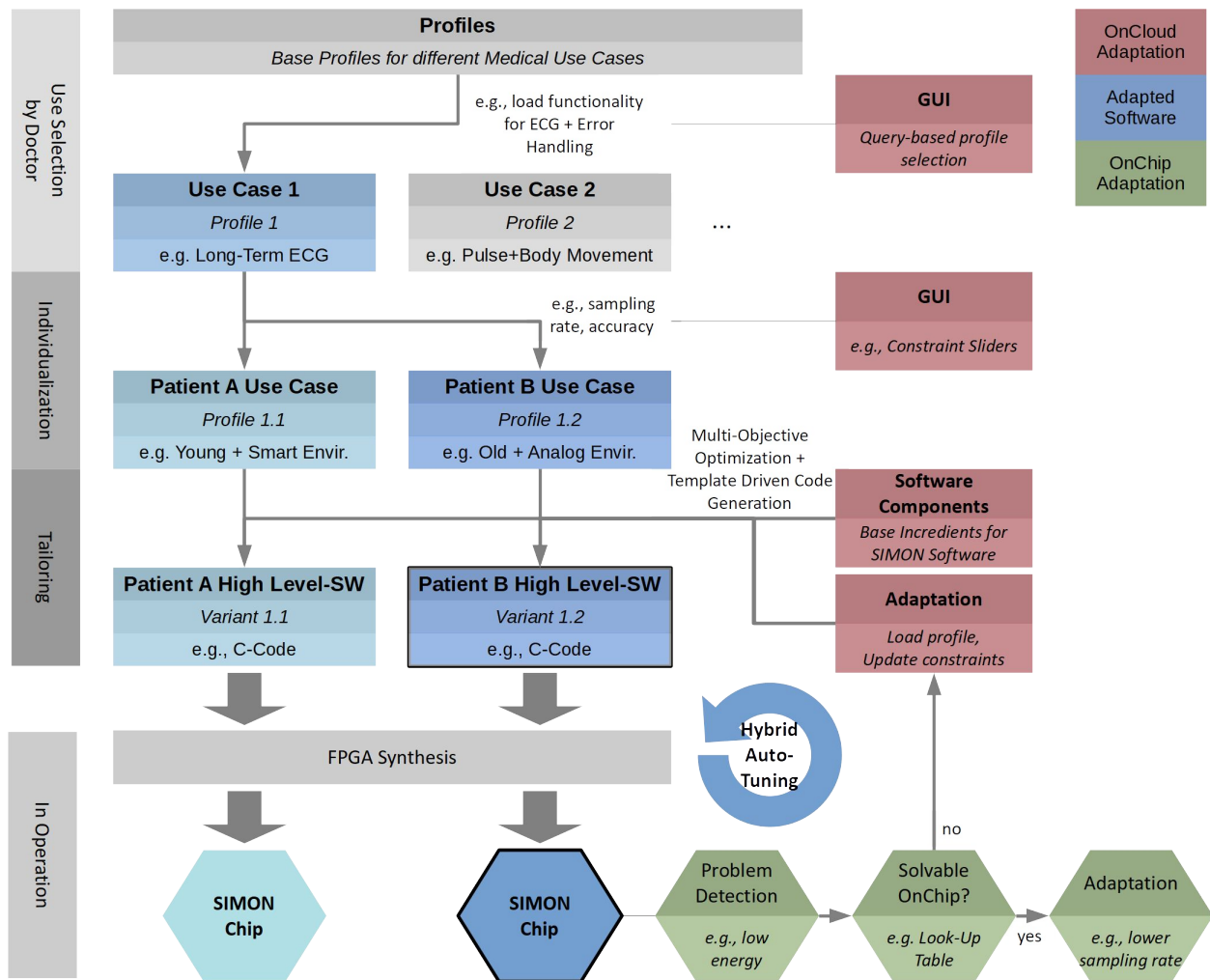
.. to Instance





Example: Current Projects

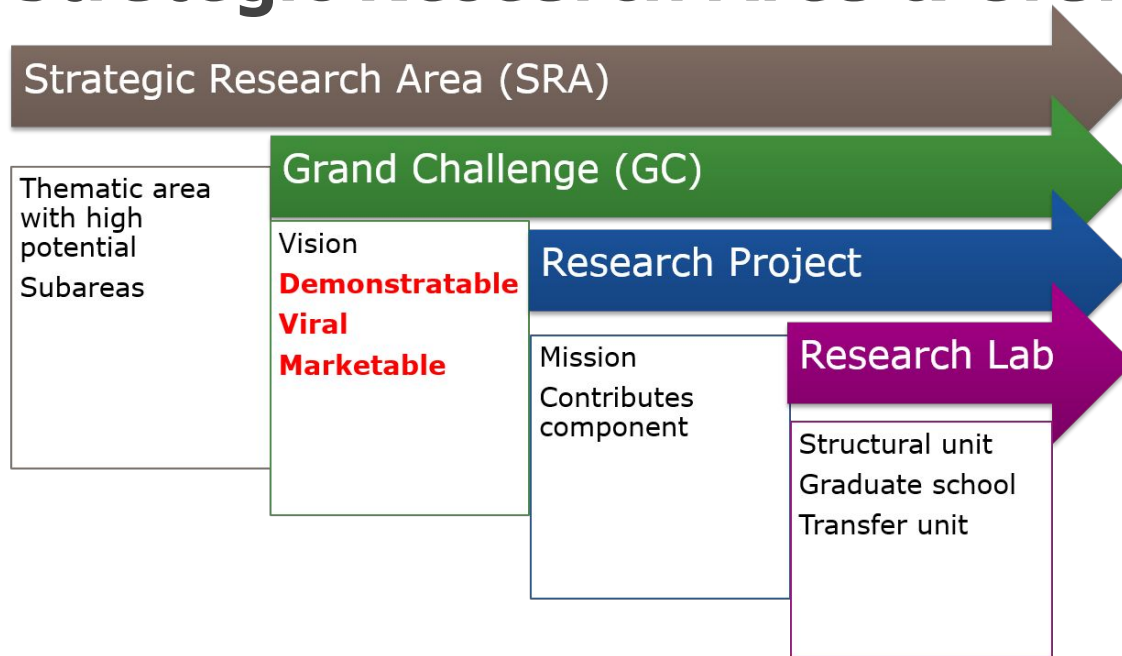
SIMON



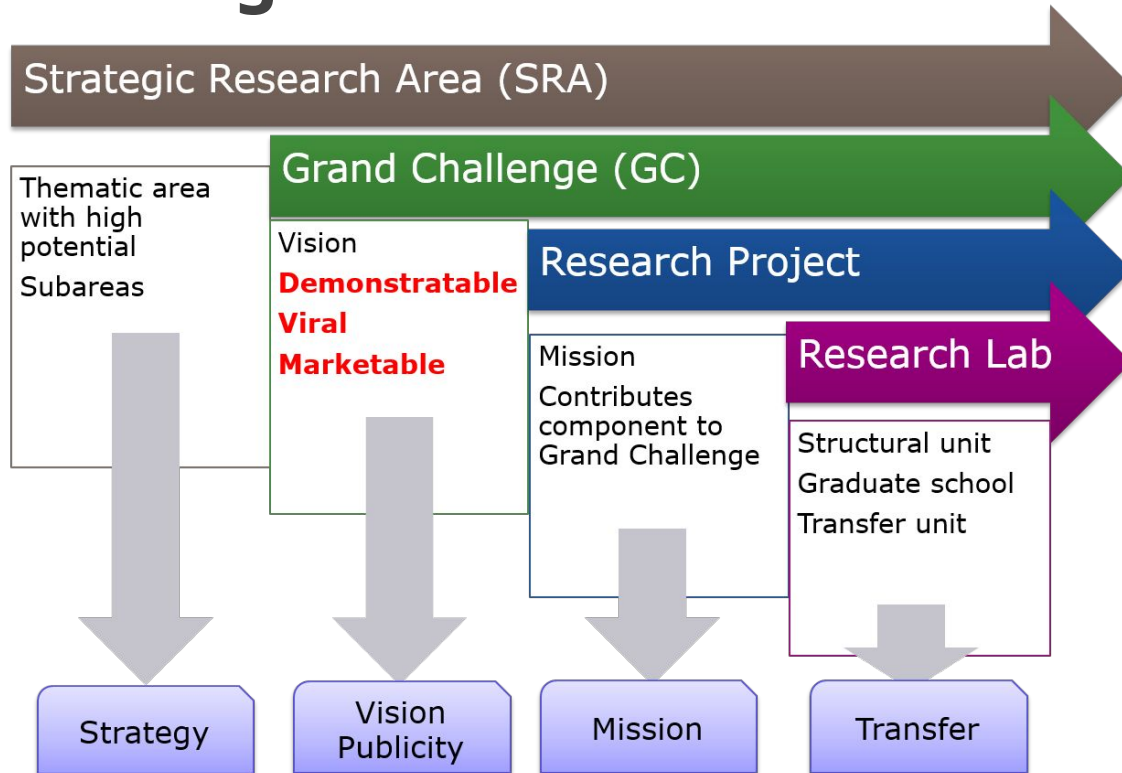


Strategic Research Area & Grand Challenges

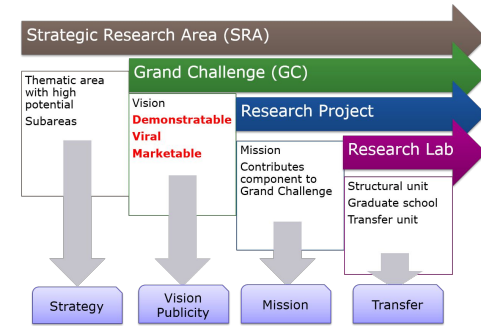
Strategic Research Area & Grand Challenges



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Strategic Research Area & Grand Challenges



Kartierung der Großprojekt-Landkarten für interdisziplinäre Forschungsprojekte

- Interessierte Kollegen einbinden
- Relevante Calls adressieren
- DFG-Projekte + Gruppen
- EU-Projekte (Horizon 2020)
- Roadshow-Trails
- Publikationen

Strukturmaßnahmen

- Inter-Projekt Koordination / Kommunikation
- Tooling / Dokumenten & Daten Management
- Public Relation, z.B. Trailer
- Training, z.B. Workshops

Strategic Research Area & Grand Challenges

Research Field

Data Driven Decision Support

Medical Eco-Systems

Mixed Reality Hospitals

Smart Powerless Health Wearables & Implants

Grand Challenge

AI Diagnosis Guide

Smart Sickroom

Wireless Powerless ECG

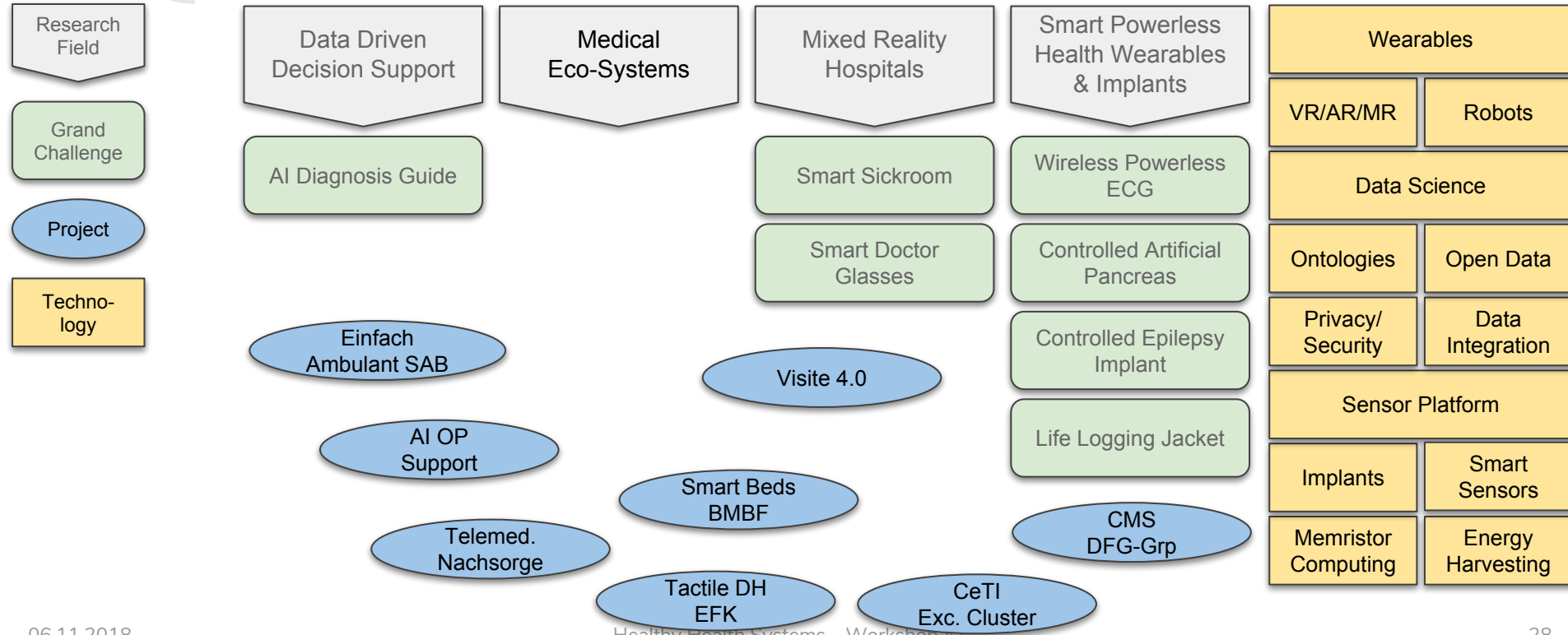
Smart Doctor Glasses

Controlled Artificial Pancreas

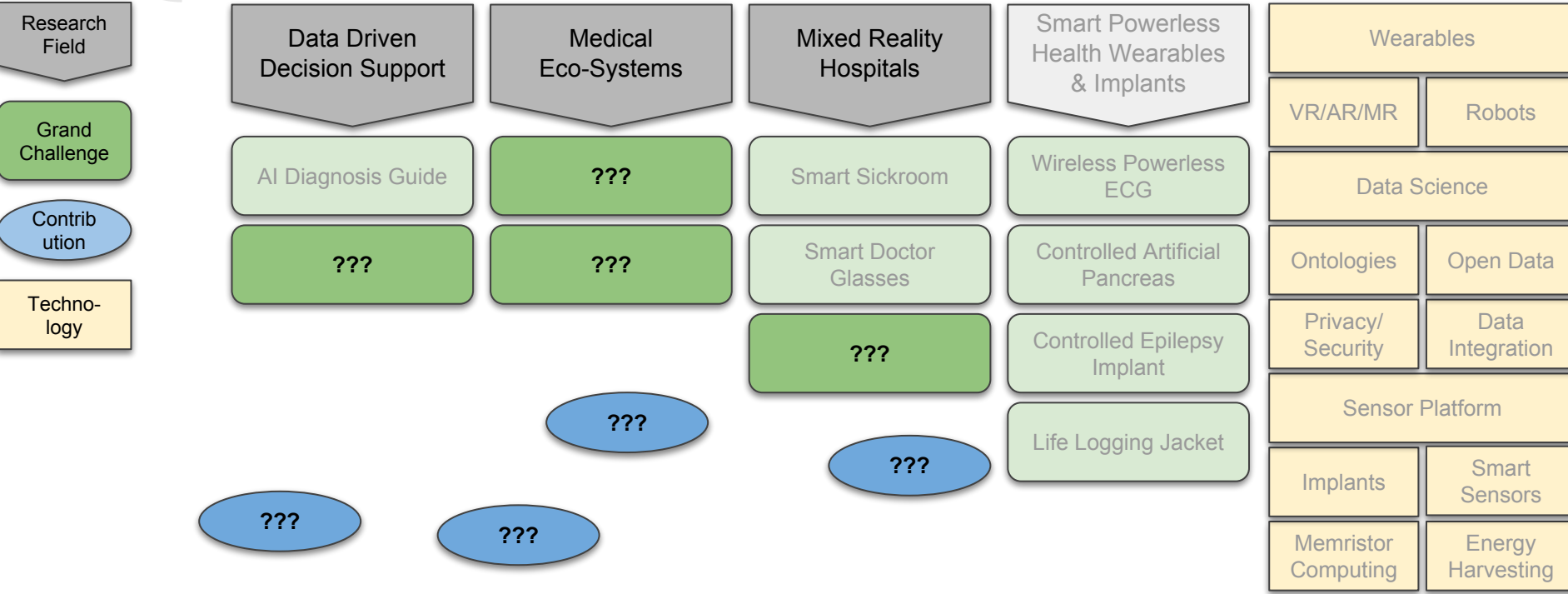
Controlled Epilepsy Implant

Life Logging Jacket

Strategic Research Area & Grand Challenges



Strategic Research Area & Grand Challenges





Topics

- **Usability & Privacy** - Wie können Privatsphäre und sensible Daten nutzerfreundlich geschützt werden?
- **Data Sovereignty** - Wie behält man die Souveränität über seine eigenen Gesundheitsdaten?
- **Interoperability** - Wie können aktuelle Technologien wie HAL7/FHIR, SnowMed CT & Co zur Integration von medizinischer Software eingesetzt werden?
- **Medical Fogs** - Wie können lokale, robuste, sichere und adaptive Clouds für med. Zwecke umgesetzt werden?
- **Smart Medical Environments** - Wie erzeugt man aus smarten Geräten und Umgebungen ein medizinisches System?
- **From Data to Knowledge** - Wie können Daten zur späteren ML-Verwendung annotiert werden?



Topics

- **Data Integration** - Data Lakes vs. Data Spaces
- Anonymization, Models & Transformation - Wie können die Daten für ML / KI aufbereitet und bereit gestellt werden?
- **Decision Support Systems & Concepts** - Welche ML-Technologien und -Framework sind für den Echtzeit-Einsatz geeignet und können verstanden werden?
- **Medical Wearables / Smart Textiles** - Welche Technologien sind für mobiles Monitoring und Behandlung in Zukunft nötig?
- **Medical UI/HMI** - Existieren einheitliche Frameworks, Portale oder Plattformen für med. Versorger und Verbraucher?
- **New DH Services** - Welche neuen (Software-) Dienstleistungen und Technologien sind denkbar?



Next Steps

- Topic Selection
- Review Survey Paper (supervised)
- Discover other Publications
- Explore Software Frameworks / Concepts
- Aggregate & Summarize Insights
- Consultations if required
- Attend HS Events
- Prepare Presentation & Essay