

# Interoperability – a Key Requirement for Personal Health Care

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# Interoperability - a Key Requirement for Personalised Health Services

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## Agenda

- **Which Interoperability ? (“Functional” vs. “Semantic”)**
- **History: from “Interoperability Islands“ to “e-Health“**
- **Interoperability for the “Electronic Health Record”**
- **Future: Personal / Mobile Systems Interoperability**
  - **Towards Ubiquitous Personal Health Services**
  - **Body Area Network Interoperability Scenario**
  - **Micro-System Level Interoperability (IMEX)**
- **Conclusions**

## Interoperability

### Definition:

ability of two or more systems or components

- to exchange information

(“**functional interoperability**”:

*Shared Communication Architectures, Methods, Frameworks* )

and

- to use the information that has been exchanged

(“**semantic interoperability**”

*Shared Data types, Terminologies, Coding Schemes* )

*(without further need for user interaction)*

source: IEEE Standard Computer Dictionary -

A Compilation of IEEE Standard Computer Glossaries, IEEE, 1990

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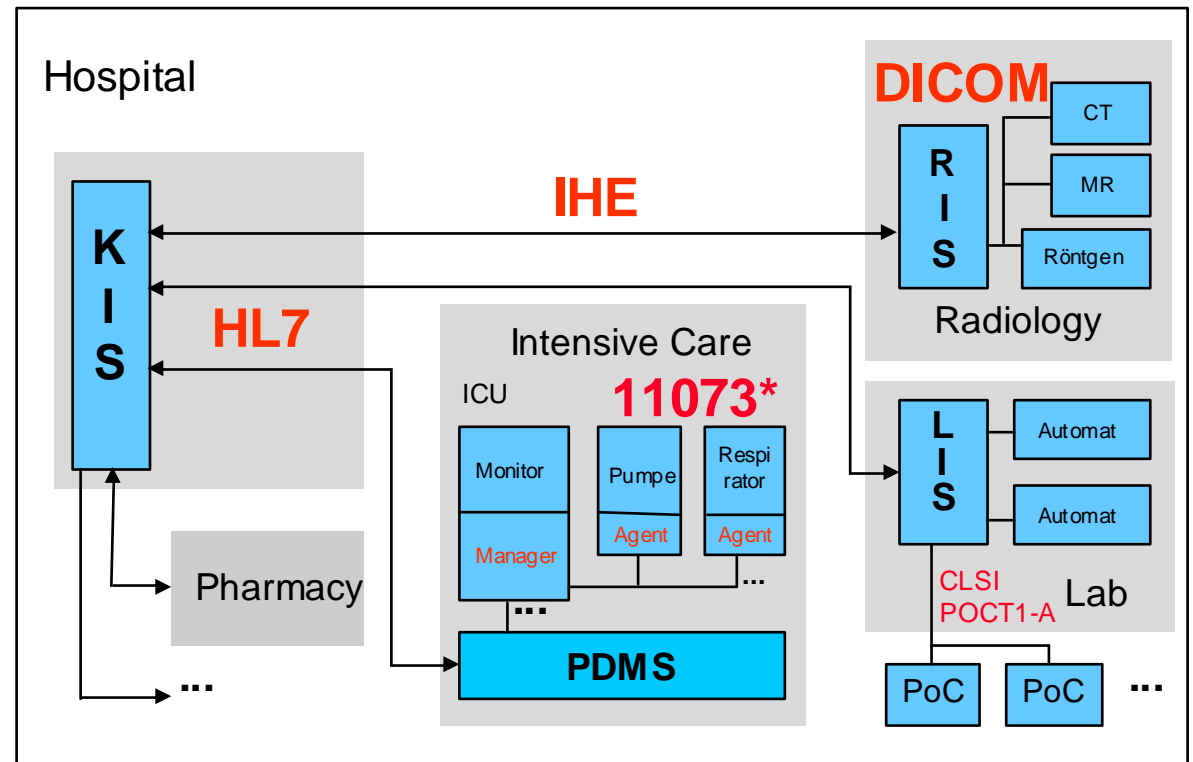
## Where it started: Interoperability in Hospitals

*in the past:*

- mostly historically grown “interoperability islands” (departmental / clinical information systems with inconsistent patient-related / medical information)
- systems linked using proprietary data conversion

*today: phase of transition*

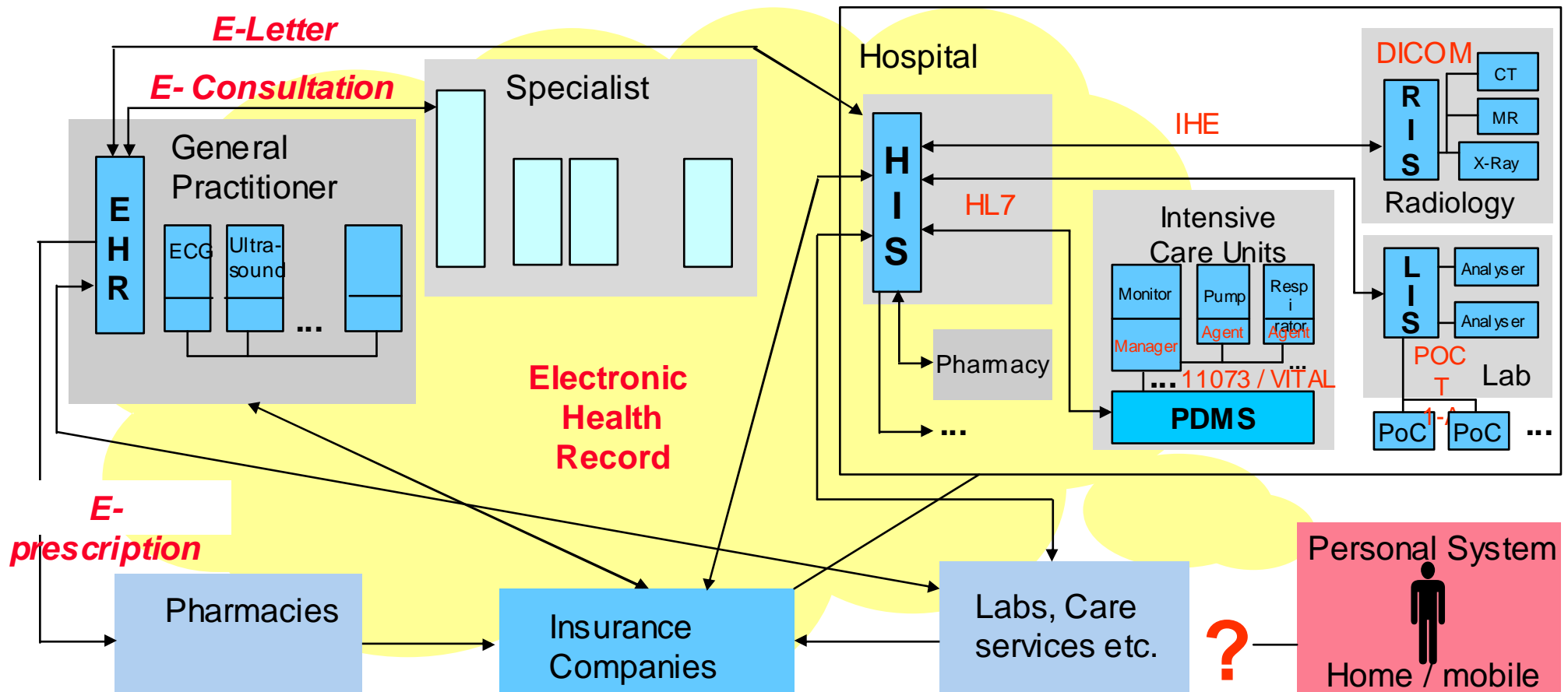
- interoperability standards
- their use is a driver and a prerequisite for **e-health**



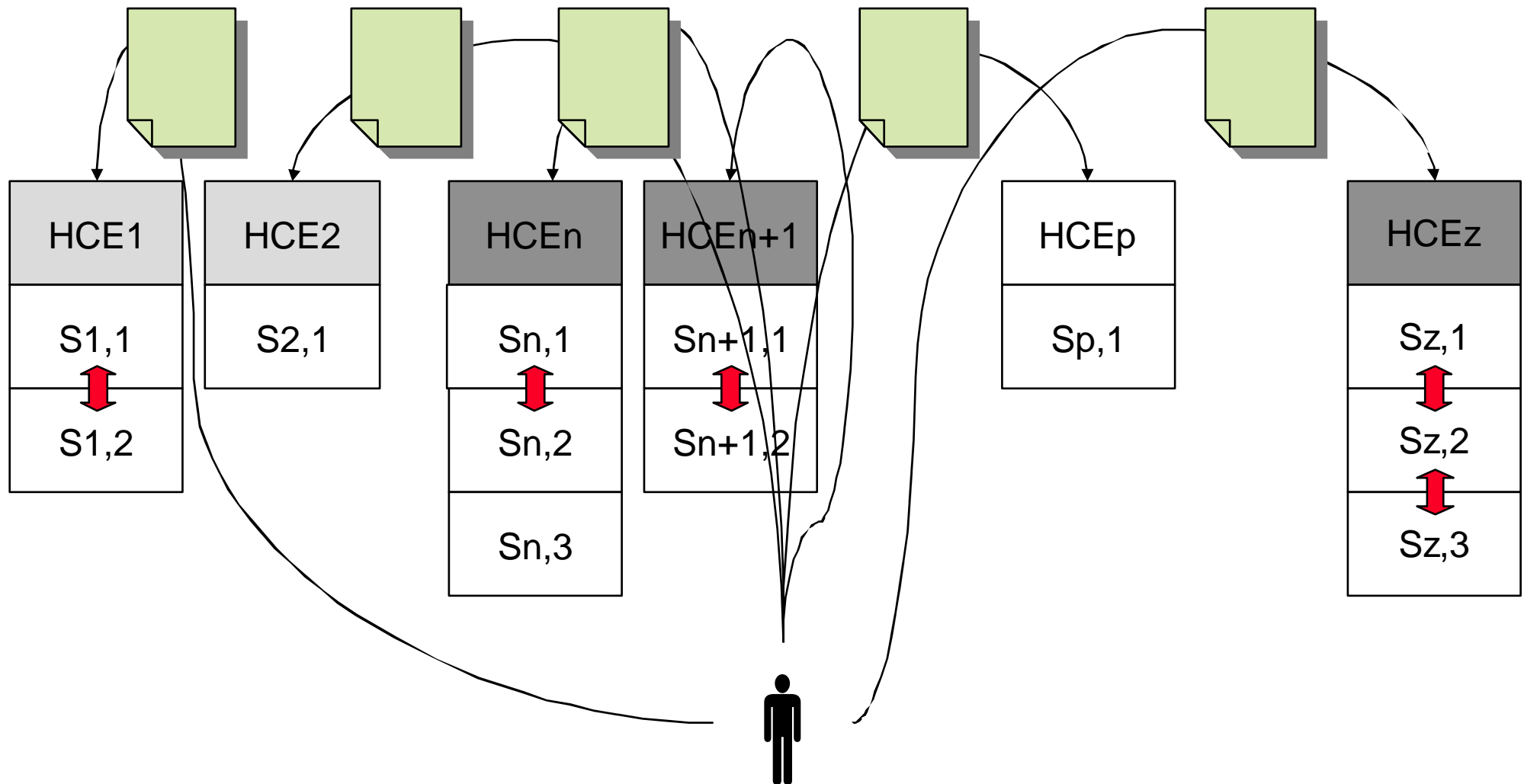
\* CEN ISO / IEEE 11073 (“VITAL“)

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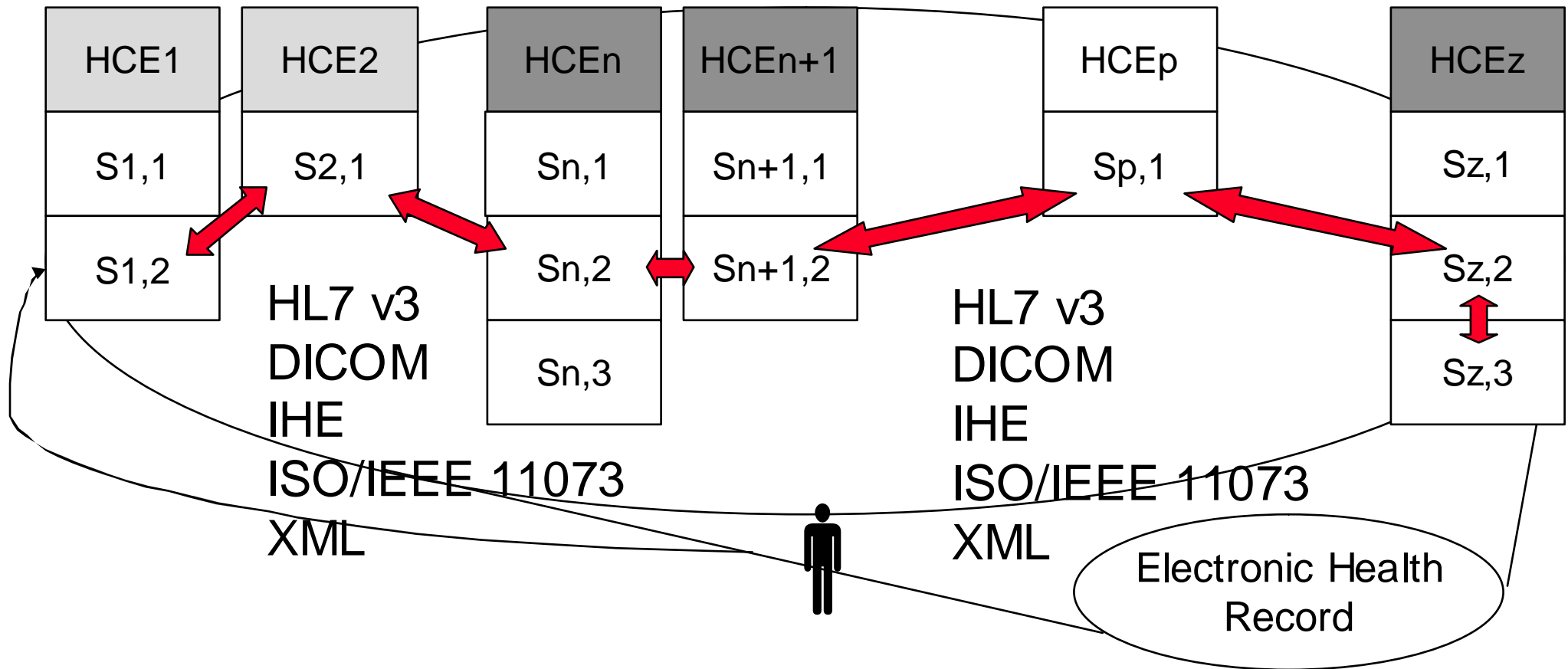
## “e-Health” - Interactions and Integration Paths



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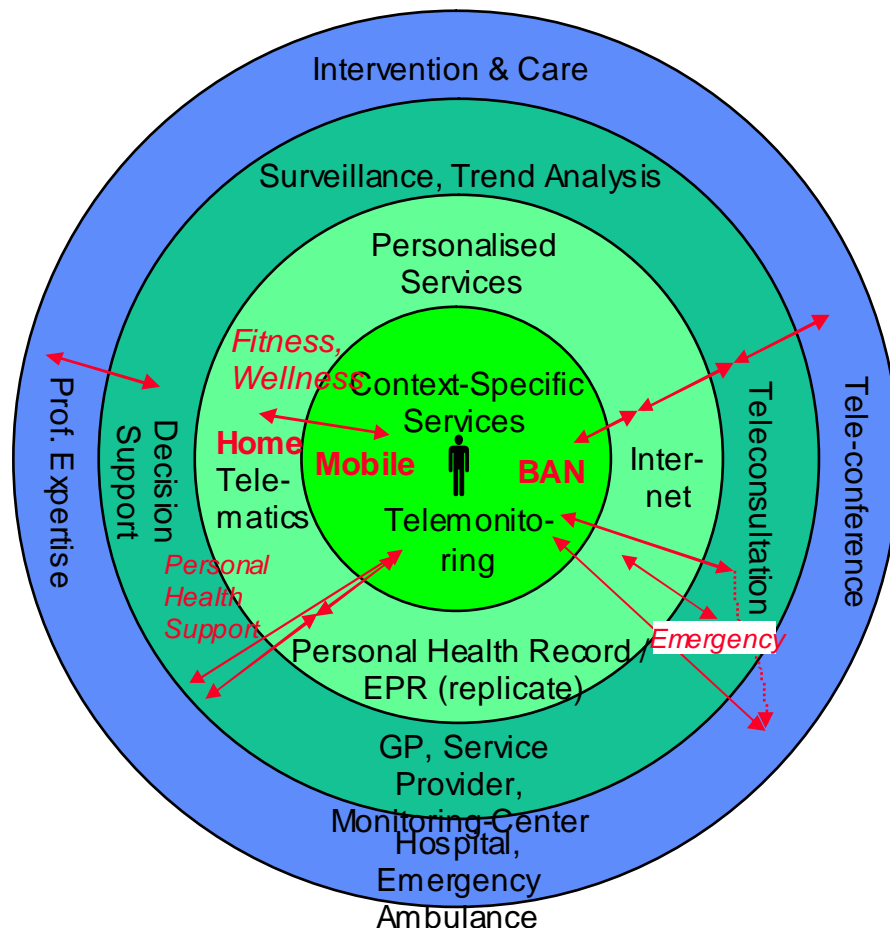


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## Tomorrow: Ubiquitous Personal Health Services



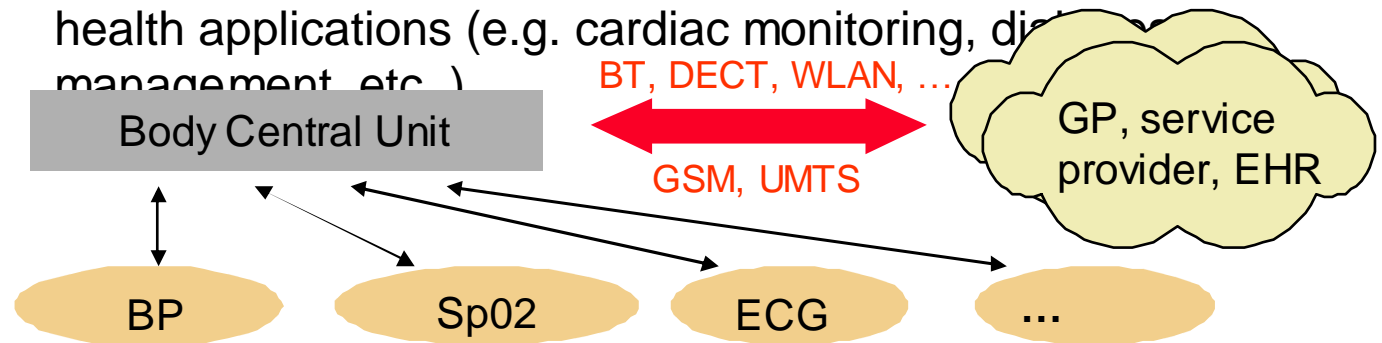
- Continuous location-independent access to personalised health-related
  - information,
  - assistance,
  - support and
  - intervention
- Continuous monitoring of personal health status
- Situation- and health-status-related stepwise activation of additional, hierarchically cooperating services and functions („rings“): *escalation strategy*

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## Body Area Network Interoperability Scenario



- simultaneous operation of multiple sensor or actor elements
- ultra-low power wireless net-work among these body-worn units and a body central unit -> Body Area Network
- ad-hoc **interoperability with external health telematics infrastructure** (GP, service provider, EHR...) via wired or wireless link
- minimal communication overhead for (multi-)signal-based event detection -> smart sensors, multi-level data storage and processing
- enabling a new class of personal mobile (public and private) health applications (e.g. cardiac monitoring, diet management etc.)



# Interoperability - a Key Requirement for Personalised Health Services

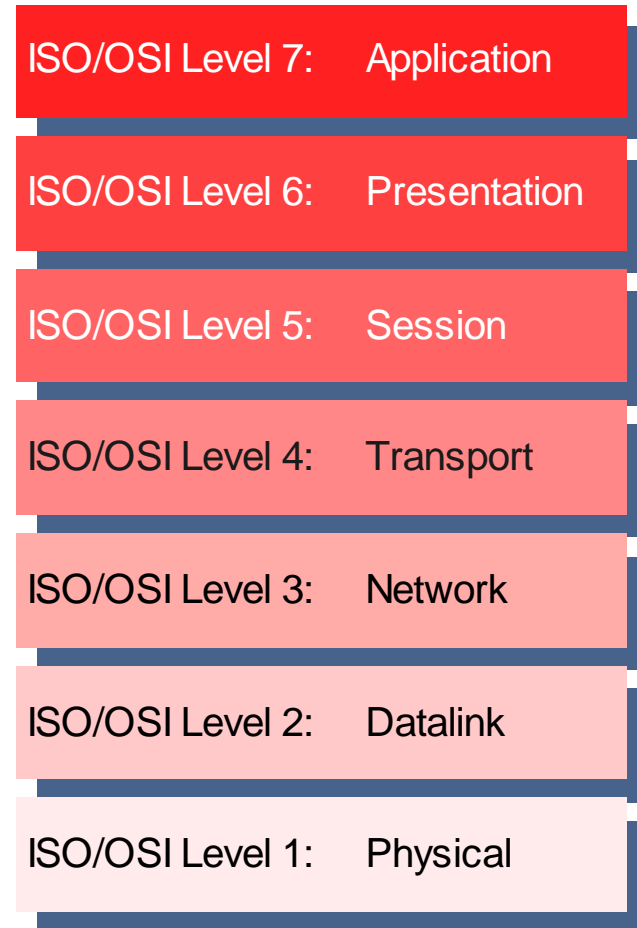
## Interoperability Standards and ISO/OSI Context

Health Informatics:

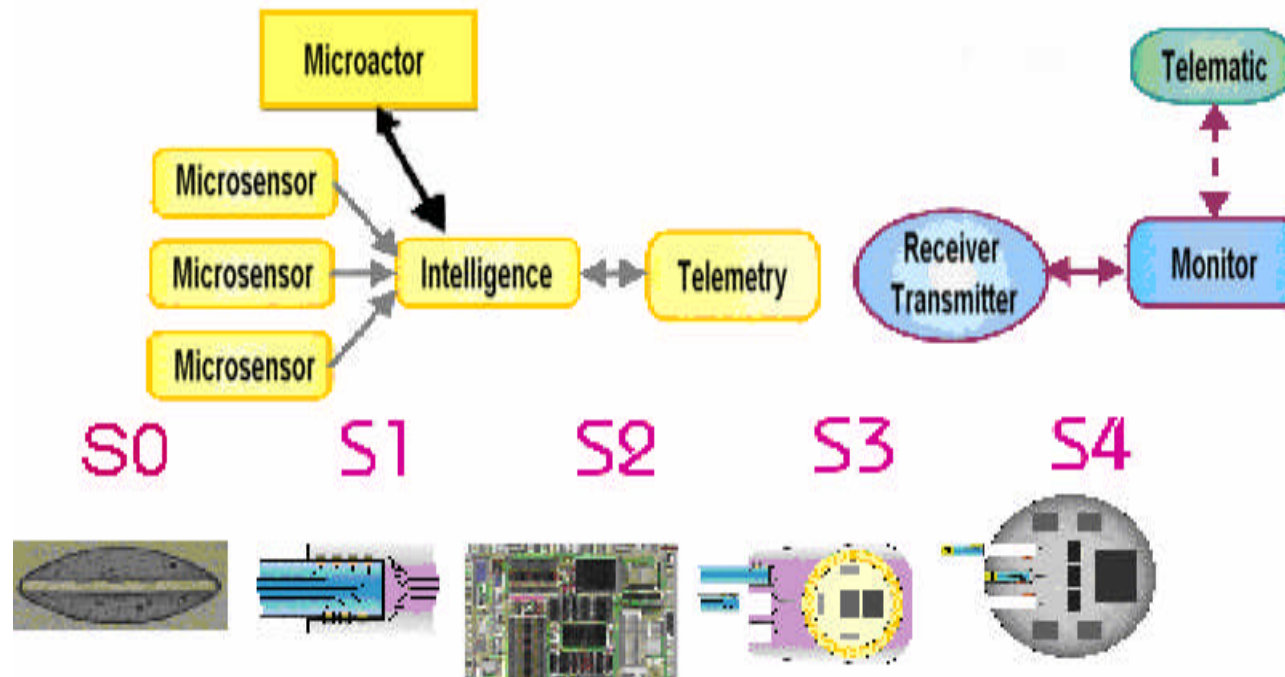
- generally interpreted as relating to ISO/OSI Level 7 (**HL7!**)

(Mobile) Personal Systems (& Medical Device) Interoperability:

- implies all ISO/OSI Levels,
- defines/ modifies standards in ISO/OSI levels 7 – 5
- in levels 1 – 4 chiefly references to other standards (such as 802.x, BT, ...)



# Smart Microsystems: The Other End of the Chain



⇒ **IMEX\* IEC standard draft for cross-vendor micro-system interoperability**

\*German VDE / BMBF IMEX Project: „Implantierbare und extrakorporale modulare Mikrosystemtechnikplattform“

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## Conclusions:

- Health information integration (“e-Health” / EHR) established a demand for semantic interoperability between clinical and healthcare-related processes and stakeholders.
- Domain-specific international communication / interoperability standards are available.
- The paradigm of “Personalised Care” motivates the inclusion of personal / body-worn / mobile systems into “e-Health” infrastructures.
- Personal (mobile) systems / device interoperability involves all 7 ISO / OSI reference model layers and particularly includes terminology / coding aspects.
- Micro-systems are essential components of future personal systems with interoperability requirements that further extend existing / emerging interoperability chains.