



Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

Bernd Blobel, PhD, FACMI

eHealth Competence Center
University of Regensburg Medical Center

Head, eHealth Competence Center and International Center for Telemedicine
Head, German Health Informatics Standards Group
Head, German delegation to ISO and CEN
Chair, HL7 Germany. Chair CEN/ISSS eHealth Standardization Focus Group
Chair EFMI WGs "Electronic Health Records" and "Security, Safety and Ethics"



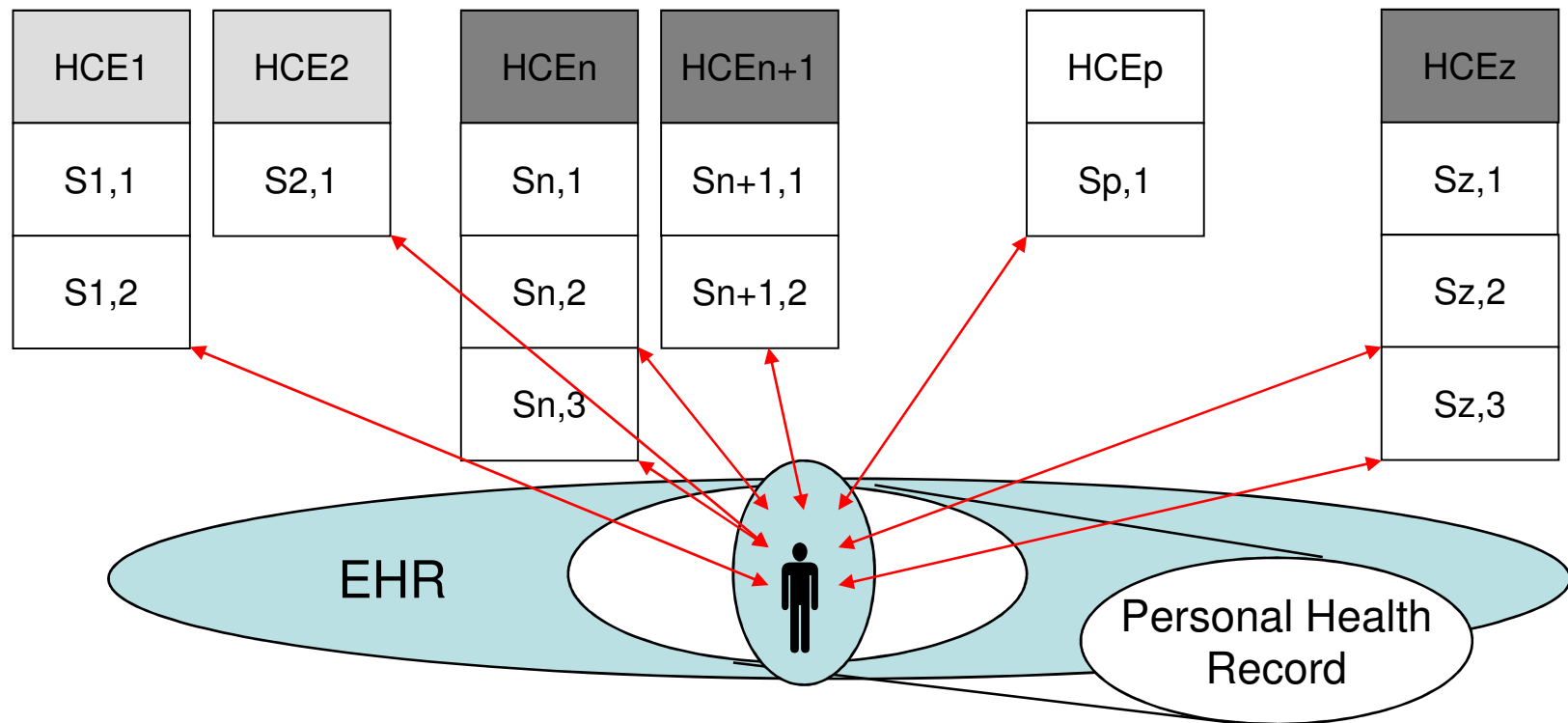
Bernd Blobel
eHealth Competence Center
University Hospital Regensburg

10th European Telepathology Congress
4th International Congress on Virtual Microscopy
1-3 July 2010, Vilnius, Lithuania

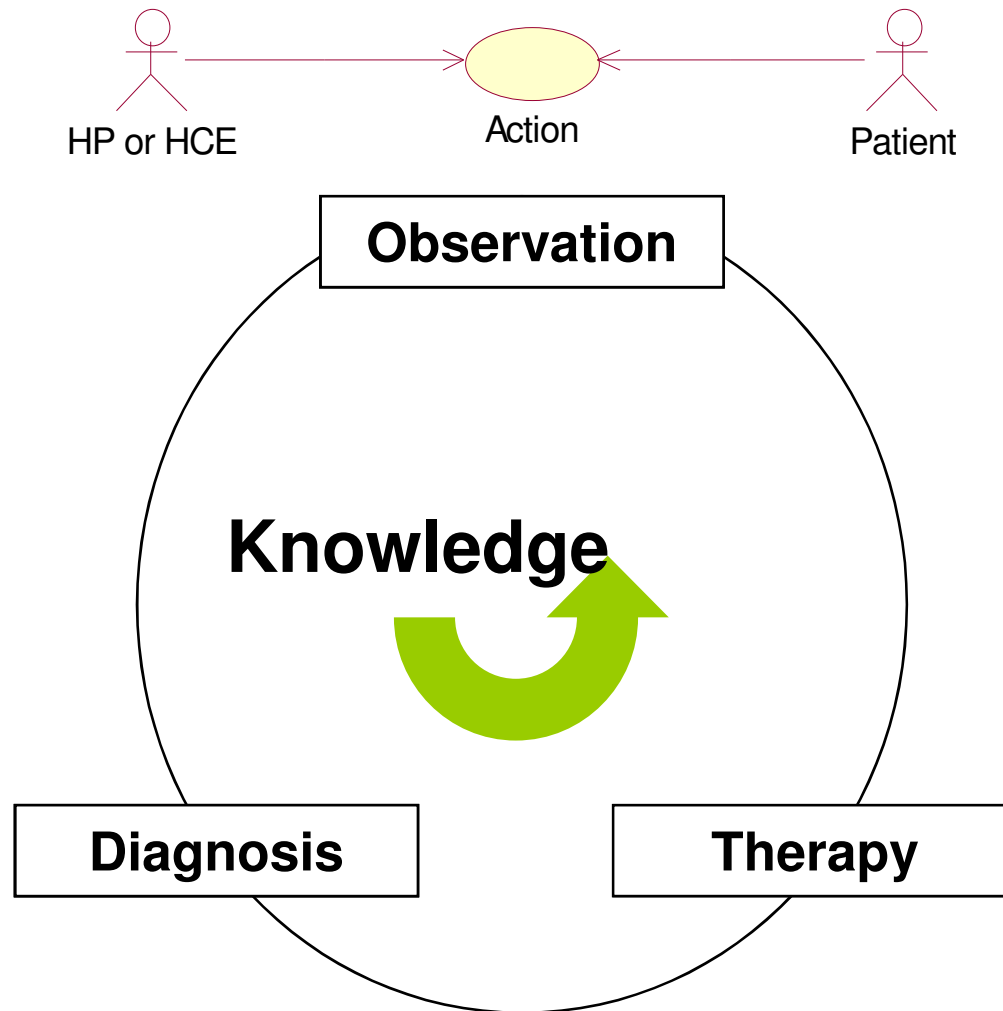


Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

Personal Health Paradigm



Intelligent Security and Privacy Solutions in Telemedicine/Telepathology



Bernd Blobel
eHealth Competence Center
University Hospital Regensburg

10th European Telepathology Congress
4th International Congress on Virtual Microscopy
1-3 July 2010, Vilnius, Lithuania



Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

Interoperability Levels

Interoperability Level	Instances
Technical interoperability	Technical plug&play, signal- & protocol compatibility
Structural interoperability	Simple EDI, envelopes
Syntactic interoperability	Messages, clinical documents, agreed vocabulary
Semantic interoperability	Advanced messaging, common information models and terminology
Organizations/Service interoperability	Common business process



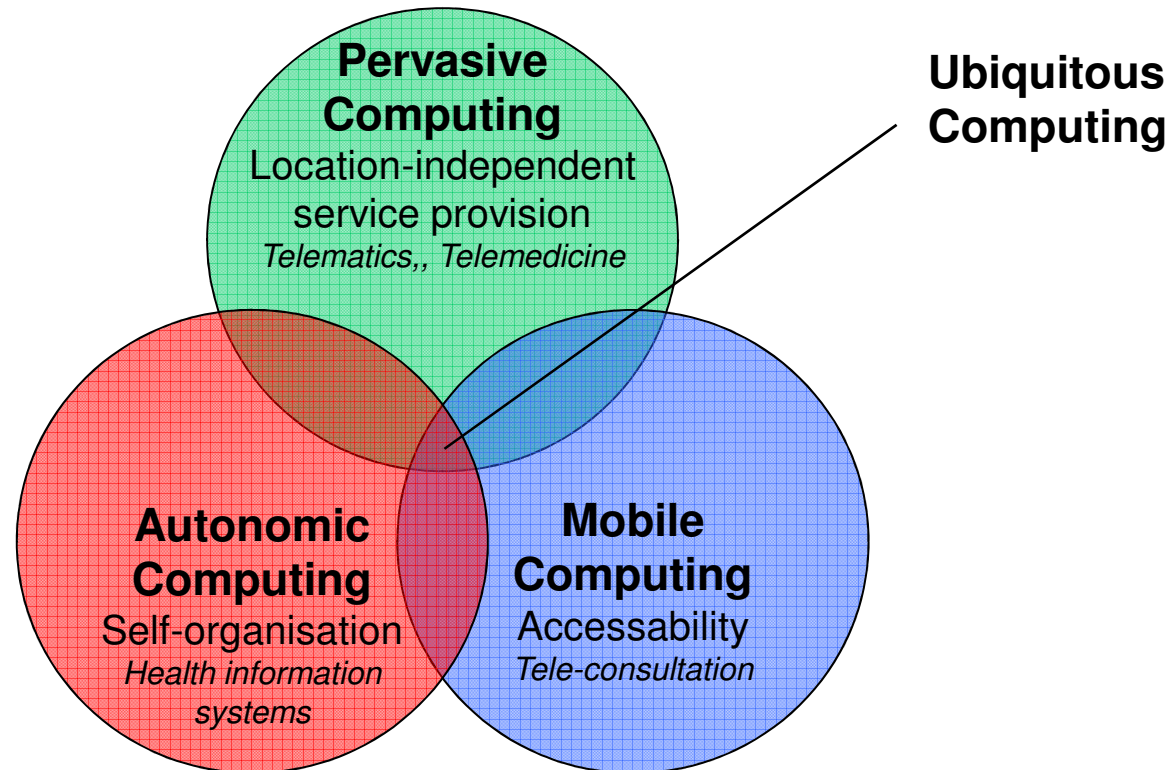
Bernd Blobel
eHealth Competence Center
University Hospital Regensburg

10th European Telepathology Congress
4th International Congress on Virtual Microscopy
1-3 July 2010, Vilnius, Lithuania



Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

Technical Paradigms for pHealth



Bernd Blobel
eHealth Competence Center
University Hospital Regensburg

10th European Telepathology Congress
4th International Congress on Virtual Microscopy
1-3 July 2010, Vilnius, Lithuania



System Architecture

- For consistently describing a system's behavior, the system's architectural model has to be developed describing the system's components, their functions and their relations.



Intelligent Security and Privacy Solutions in Telemedicine/Telepathology



What would Gyro Gearloose
like to do?



Bernd Blobel
eHealth Competence Center
University Hospital Regensburg

10th European Telepathology Congress
4th International Congress on Virtual Microscopy
1-3 July 2010, Vilnius, Lithuania



Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

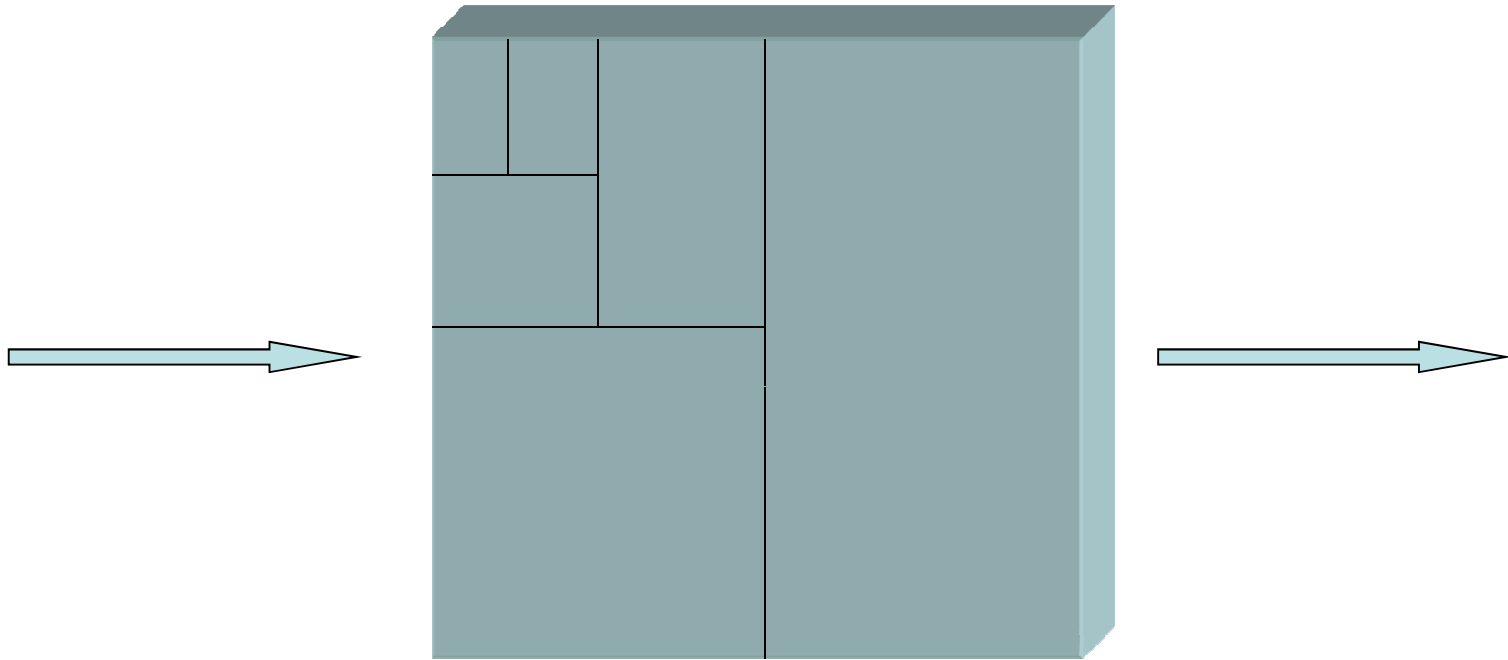


Bernd Blobel
eHealth Competence Center
University Hospital Regensburg

10th European Telepathology Congress
4th International Congress on Virtual Microscopy
1-3 July 2010, Vilnius, Lithuania



Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

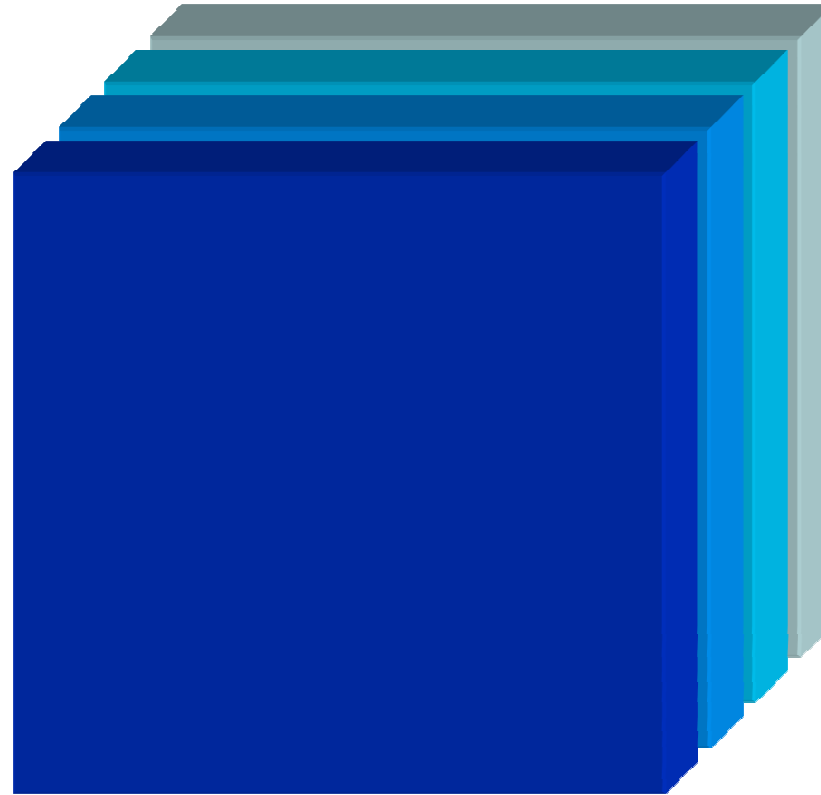


Bernd Blobel
eHealth Competence Center
University Hospital Regensburg

10th European Telepathology Congress
4th International Congress on Virtual Microscopy
1-3 July 2010, Vilnius, Lithuania



Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

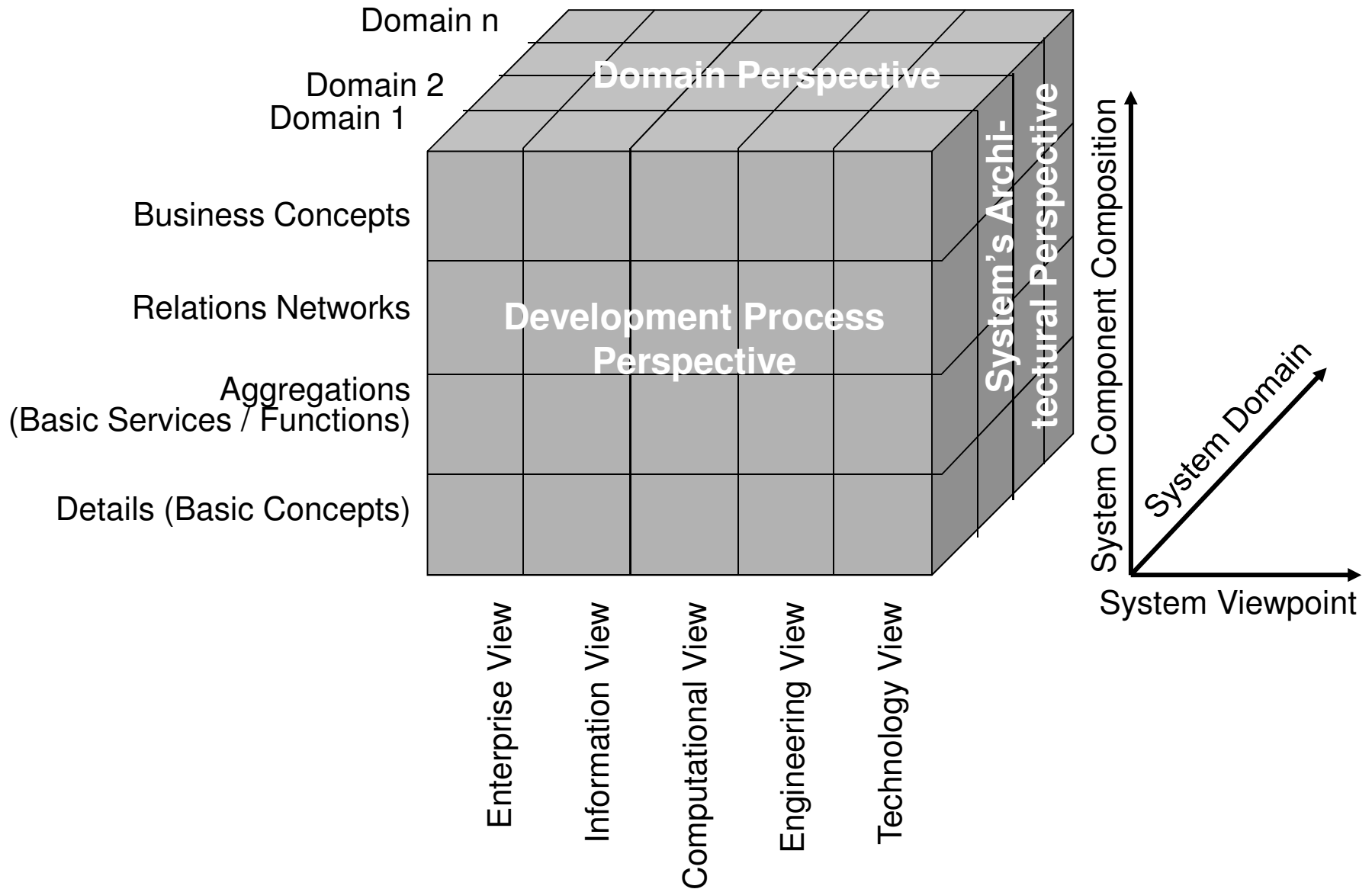


Bernd Blobel
eHealth Competence Center
University Hospital Regensburg

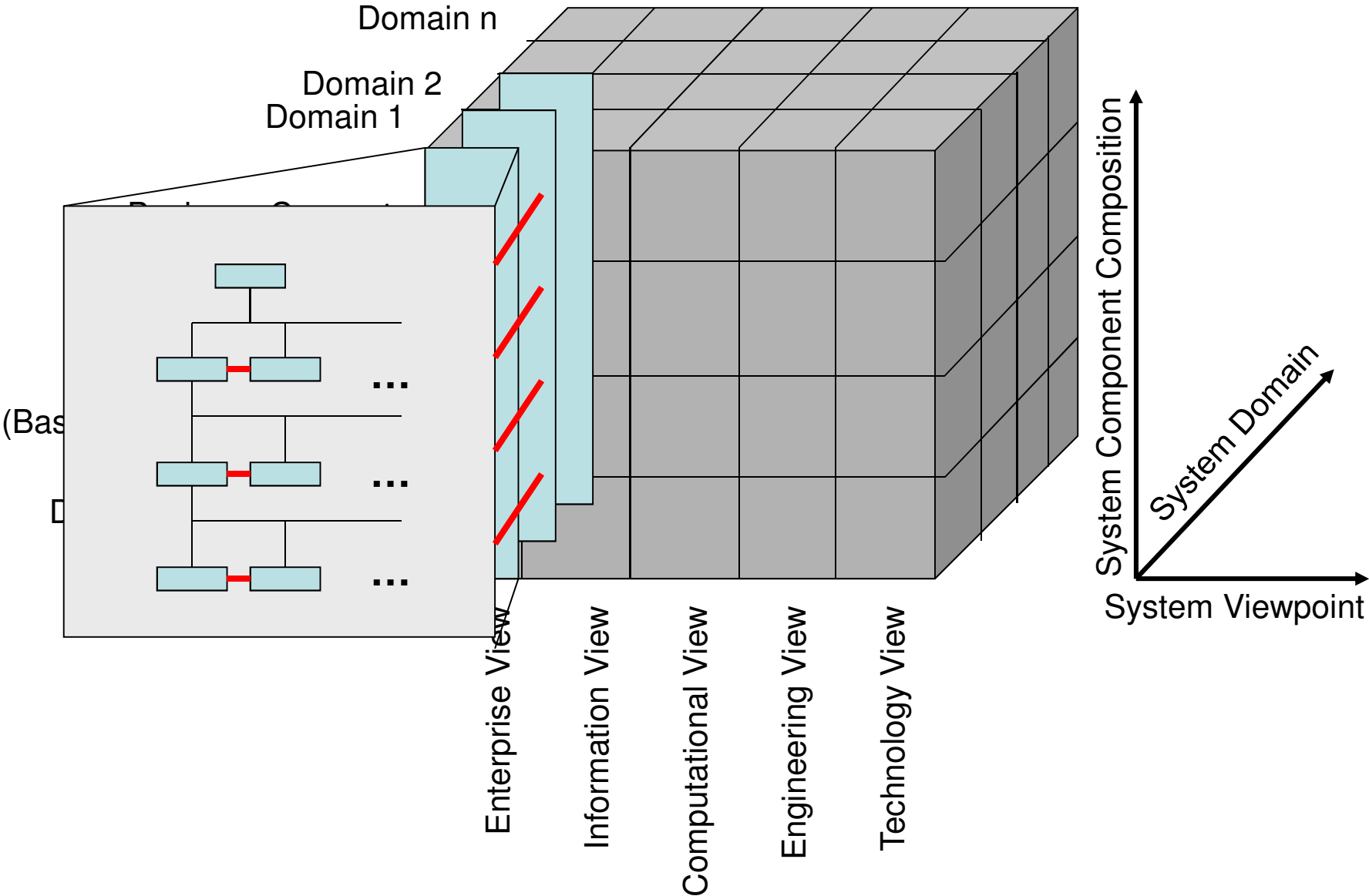
10th European Telepathology Congress
4th International Congress on Virtual Microscopy
1-3 July 2010, Vilnius, Lithuania



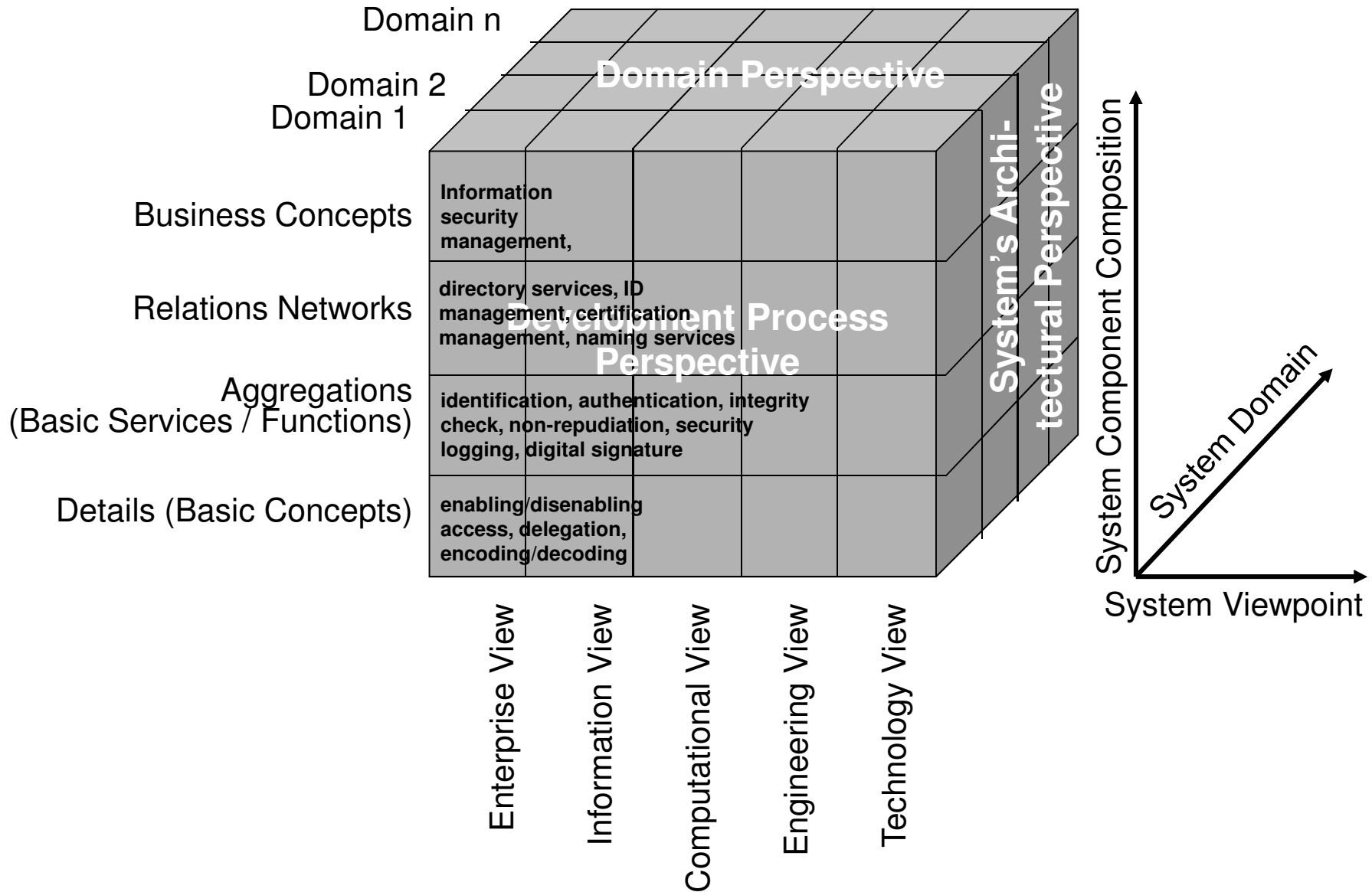
Generic Component Model (GCM)

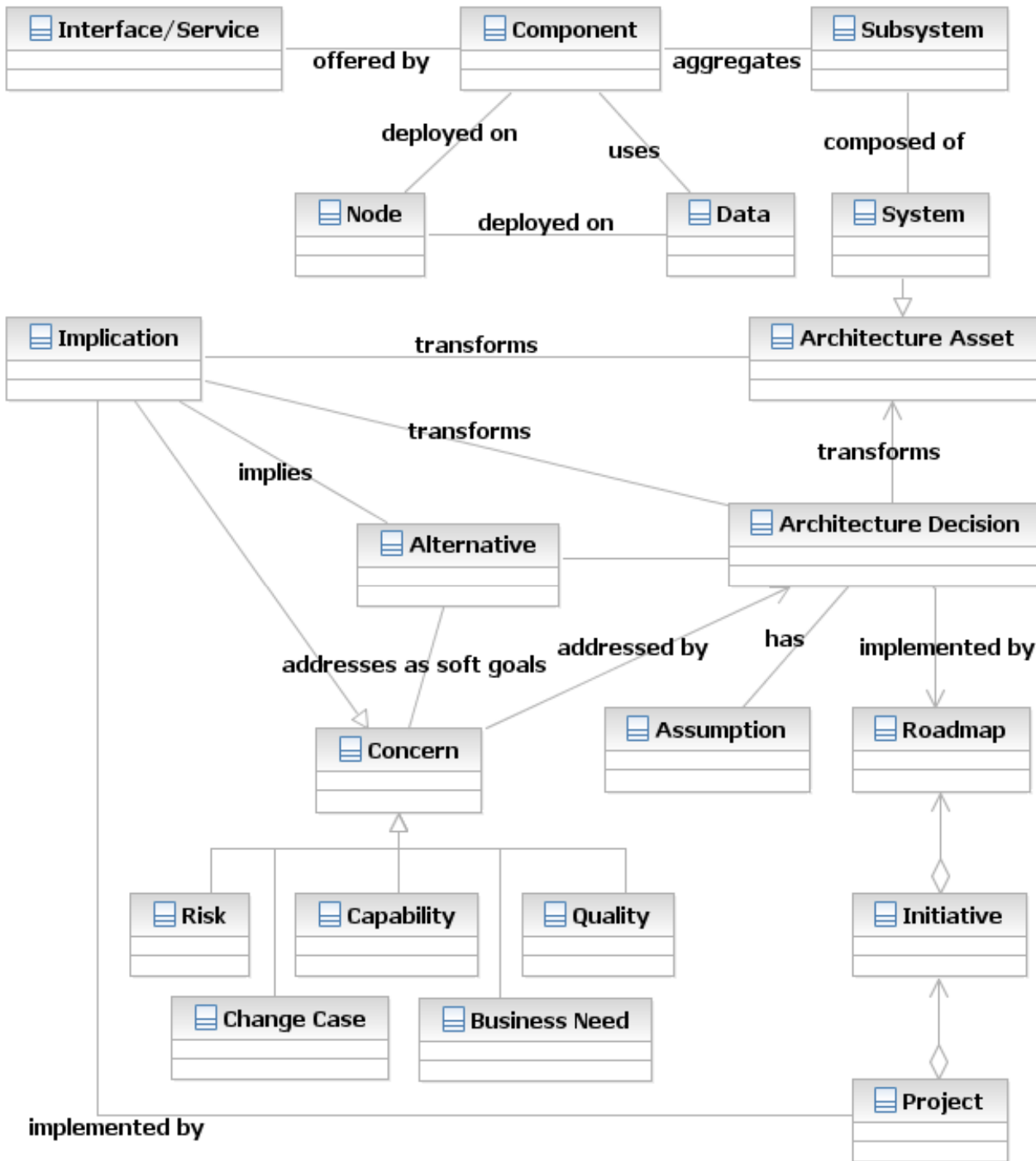


Generic Component Model (GCM)



Security Services Granularity Levels at GCM

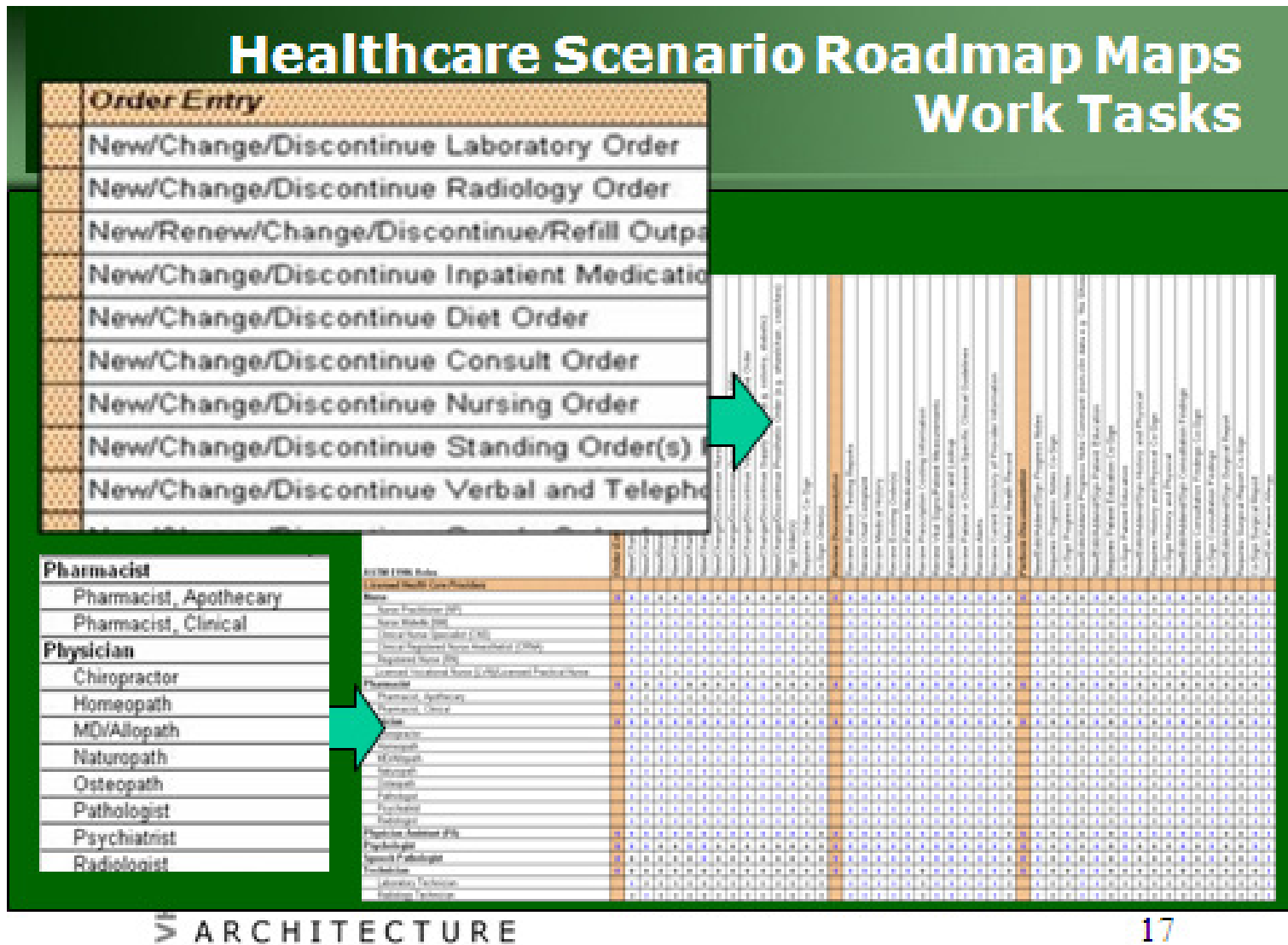




ICT Ontology

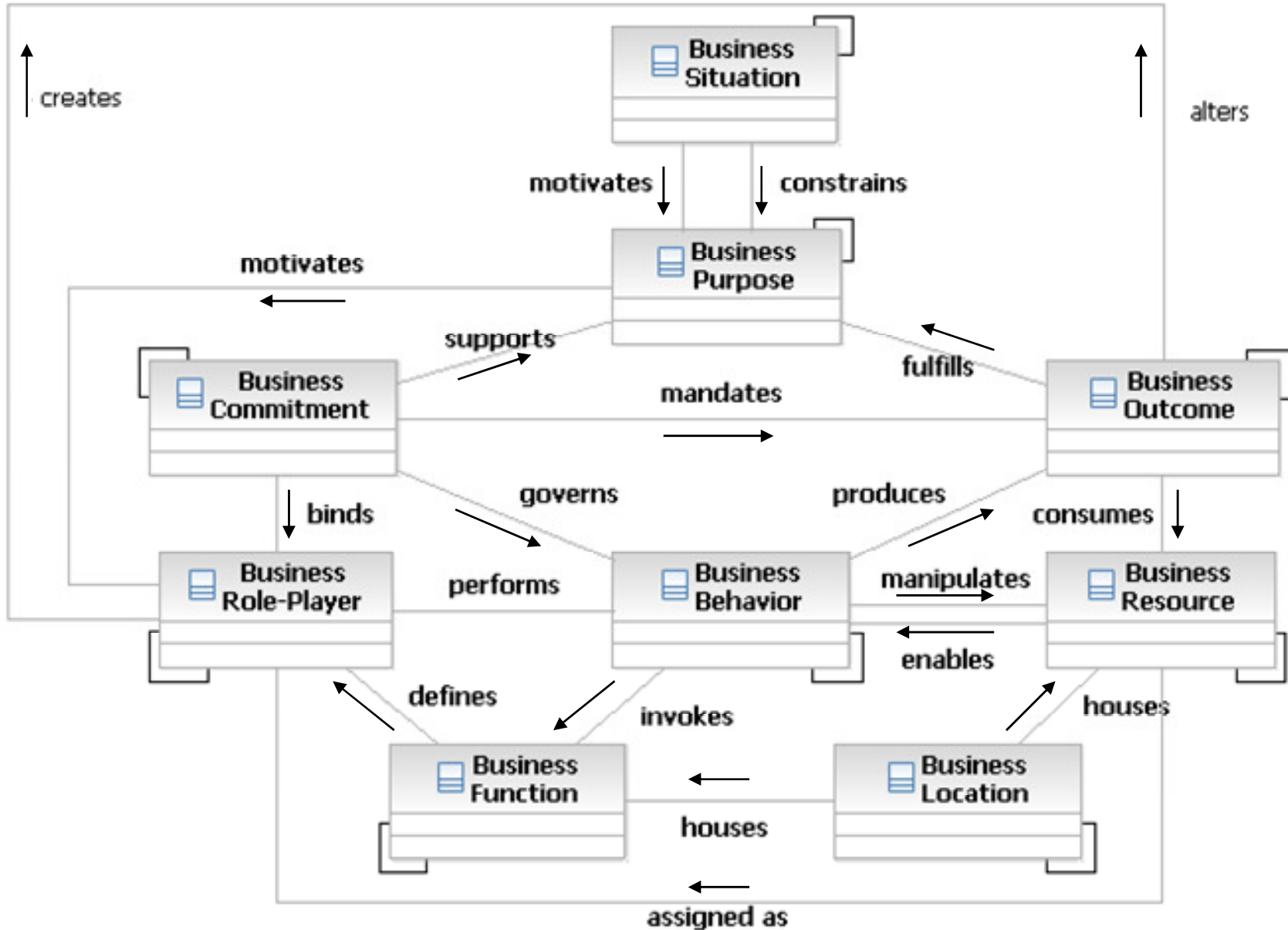
(after Akerman)

Intelligent Security and Privacy Solutions in Telemedicine/Telepathology



Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

Modeling Business Concepts after McDavid



Ontology Hierarchy

- Using a computation-independent approach, the domain knowledge for performing a specific business has to be represented defining Business Domain, Business Process, Location, Business Organization, Event, and Business Motivation regarding meta-models, concepts and relationships.

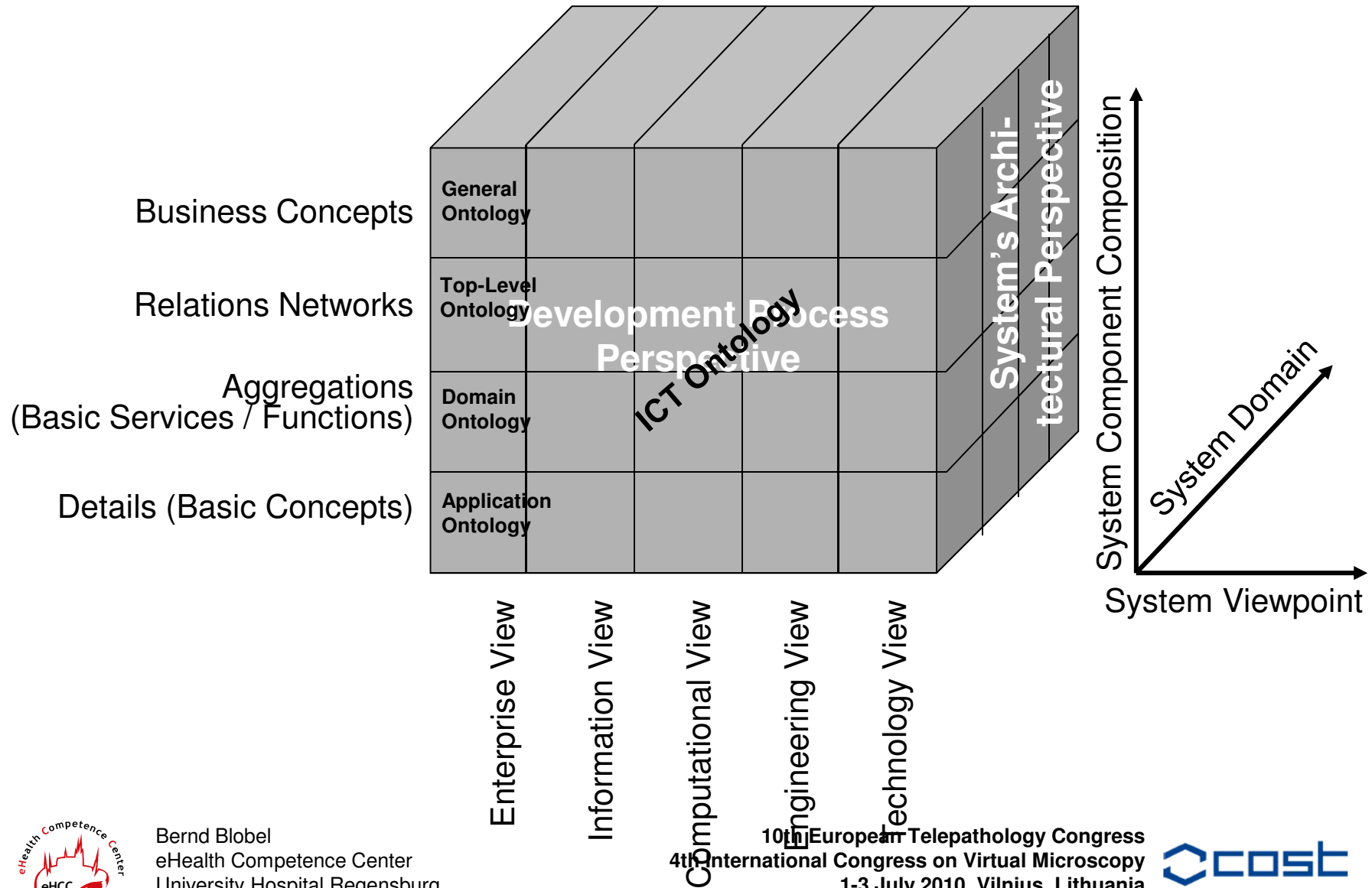


Ontology Hierarchy

- general ontologies
- upper level ontologies
- domain ontologies
- application ontologies
- ICT ontology

Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

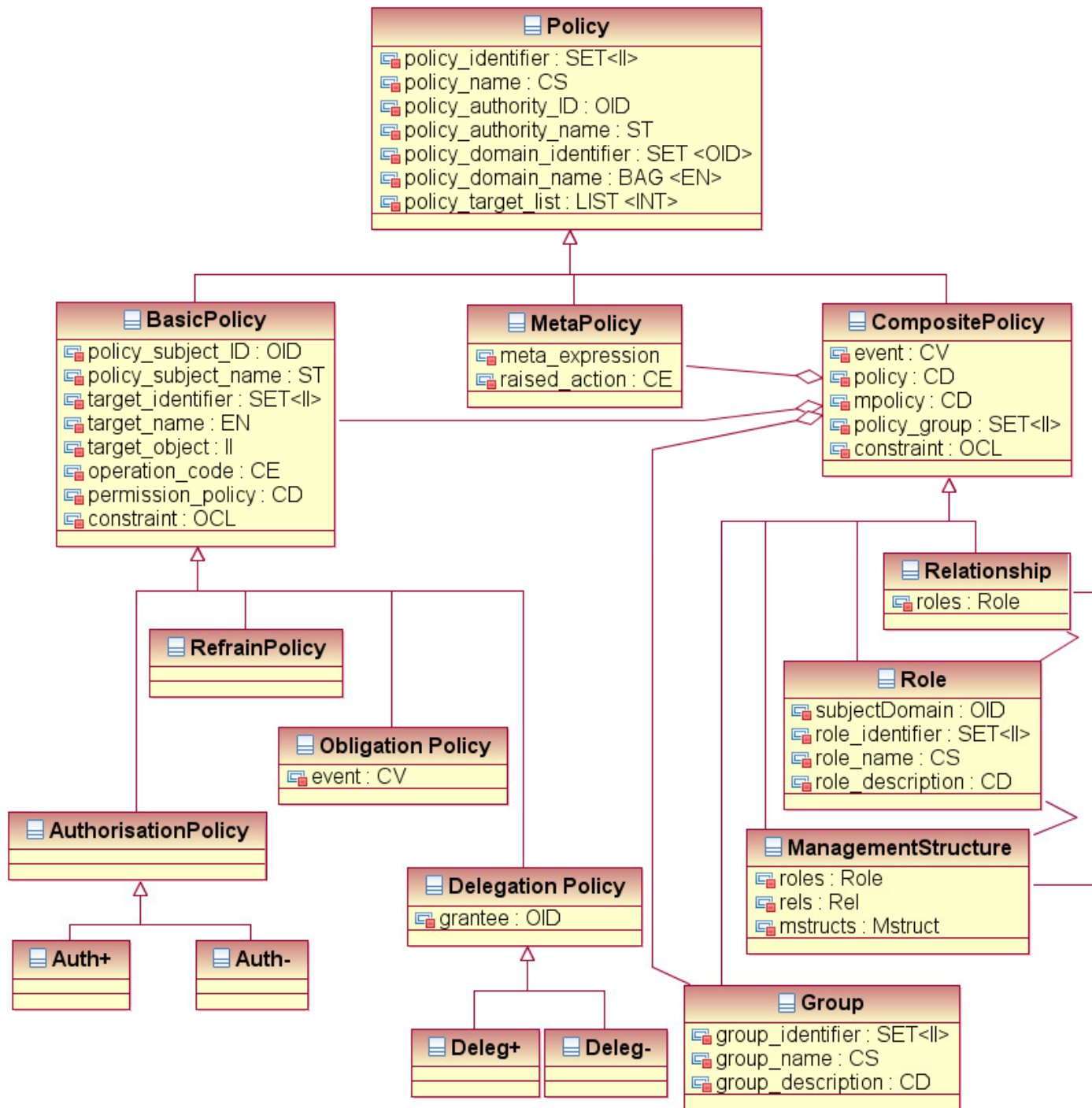
Designing Ontology Systems with the GCM



Bernd Blobel
eHealth Competence Center
University Hospital Regensburg

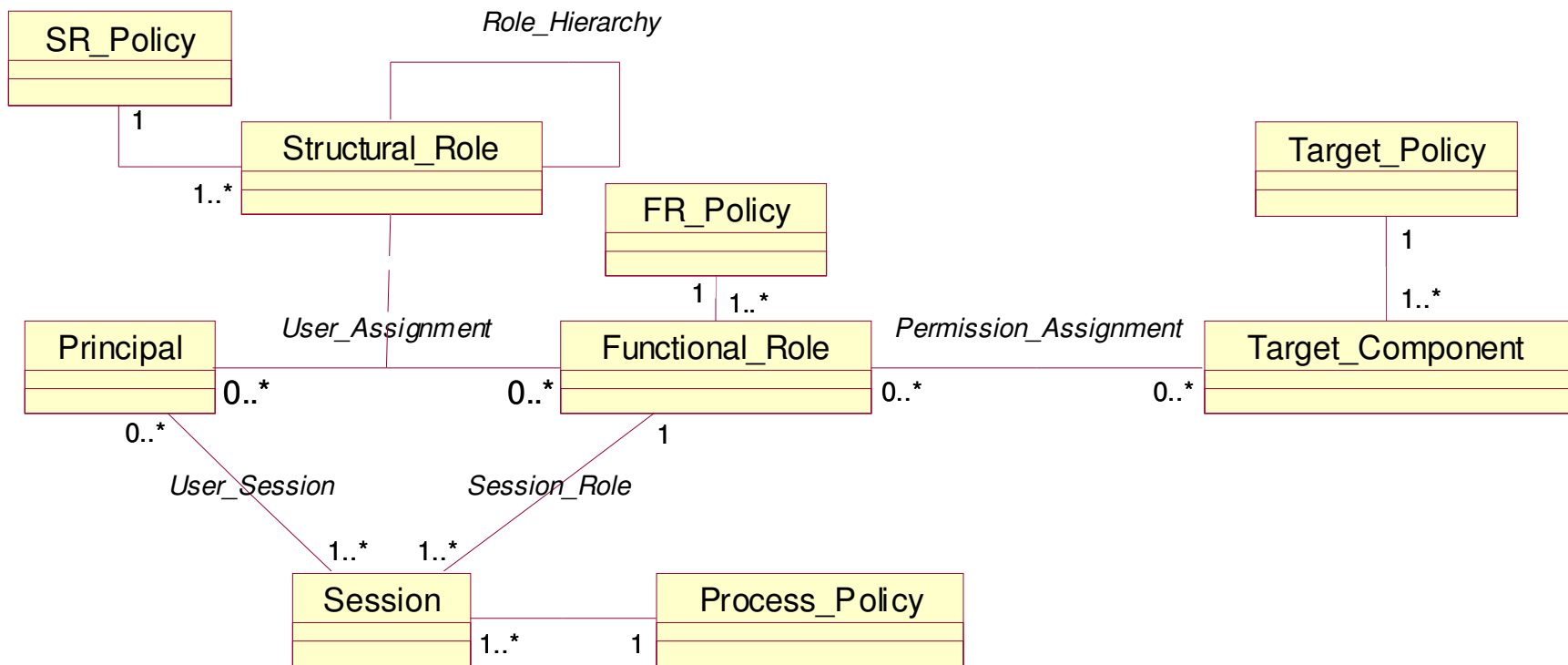
10th European Telepathology Congress
4th International Congress on Virtual Microscopy
1-3 July 2010, Vilnius, Lithuania

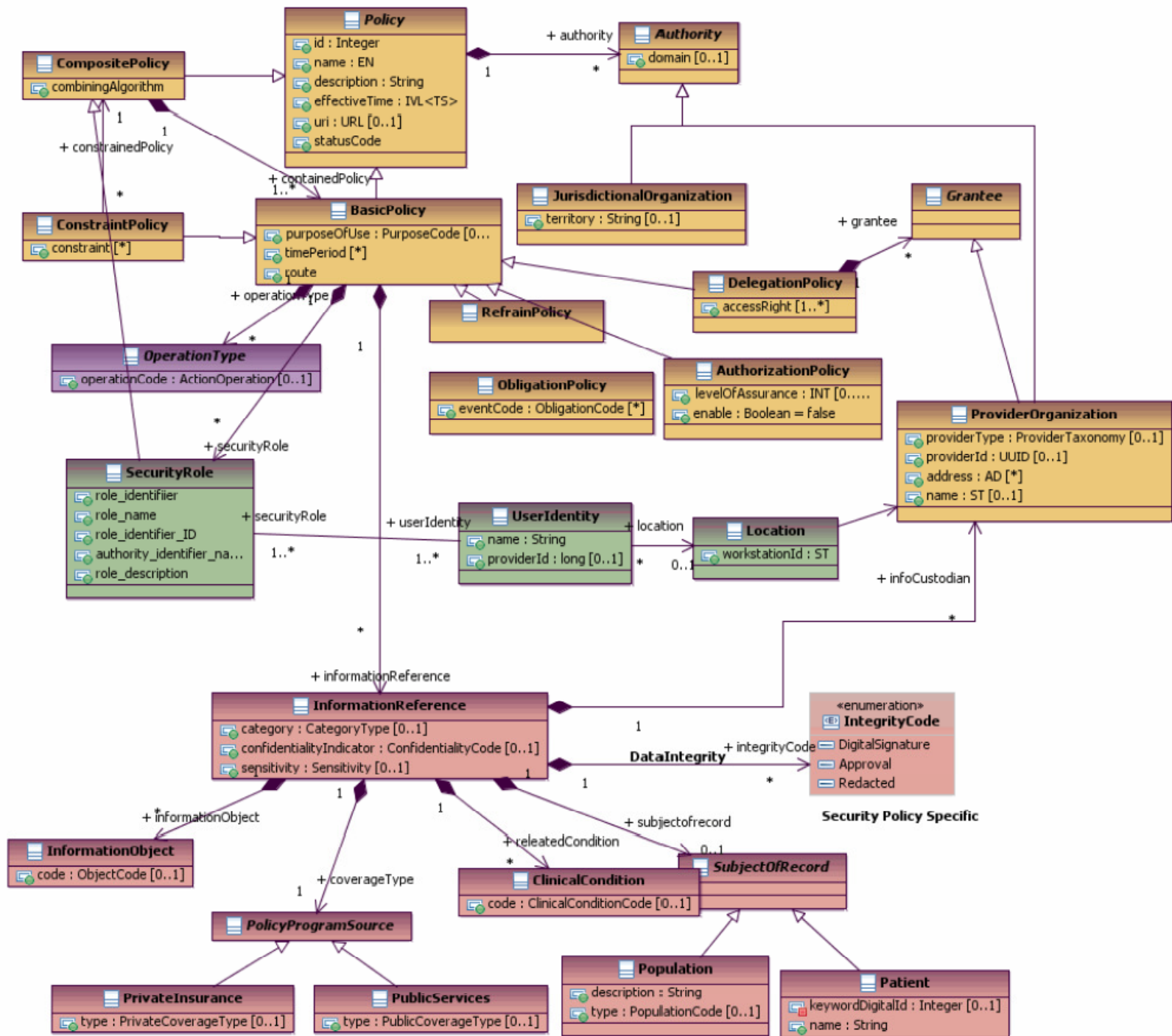




Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

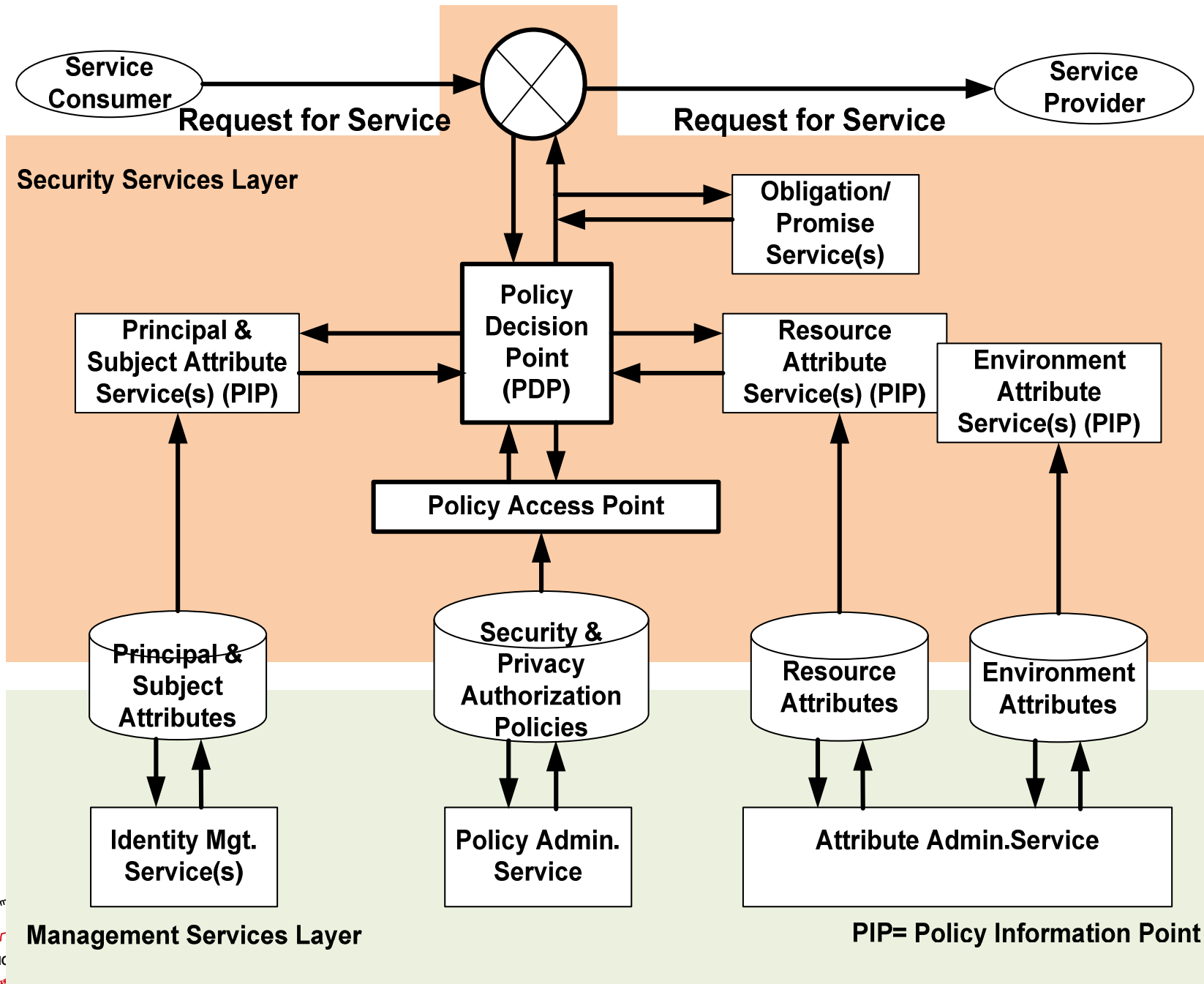
Policy-Driven, Role-Based Access Control



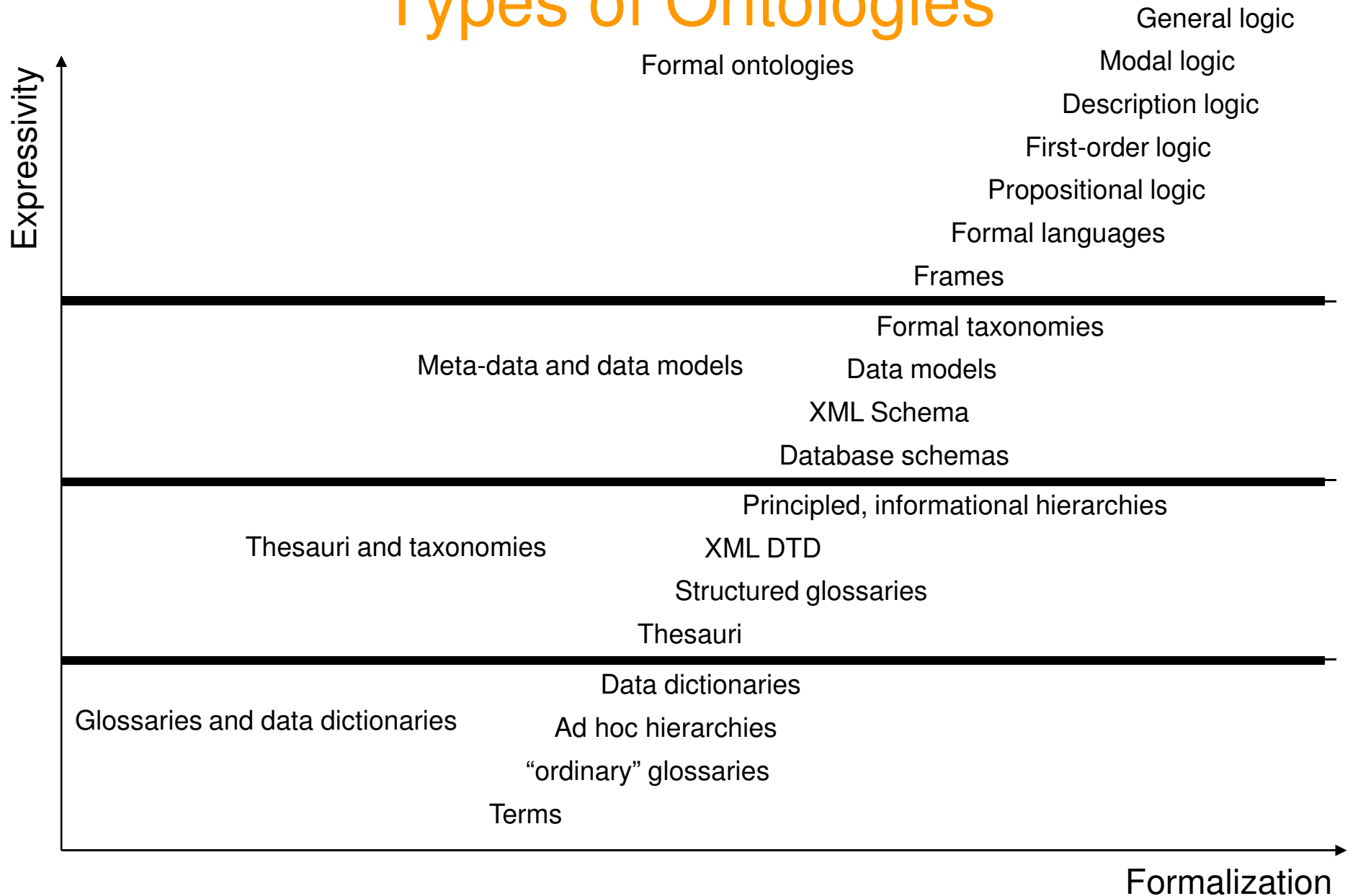


I

Policy Enforcement Point (PEP)



Types of Ontologies



SAML Decision Type

```
<simpleType name="DecisionType">  
  <restriction base="string">  
    <enumeration value="Permit"/>  
    <enumeration value="Deny"/>  
    <enumeration value="Indeterminate"/>  
  </restriction>  
</simpleType>
```

Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

XACML Assertion Example after OASIS

- <S12:Envelope>
- <S12:Header>
- <wsse:Security>
- <saml:Assertion
- AssertionID="_adf55-01d7-40cc-929f-dbd8372ebdfc"
- IssueInstant="2003-04-17T00:46:02Z"
- Issuer=www.opensaml.org
- MajorVersion="1"
- MinorVersion="1"
- ...
- </saml:Assertion>
- <wsse:SecurityTokenReference wsu:Id="STR1">
- <wsse:KeyIdentifier wsu:Id="..."
- ValueType=<http://docs.oasis-open/wss/oasis-wss-saml-token-profile-1.0#SAMLAssertionID>
- -a75adf55-01d7-40cc-929f-dbd8372ebdfc
- </wsse:SecurityTokenReference>
- </wsse:Security>
- </S12:Header>
- <S12:Body>
- ...
- </S12:Body>
- </S12:Envelope>



Bernd Blobel
eHealth Competence Center
University Hospital Regensburg

10th European Telepathology Congress
4th International Congress on Virtual Microscopy
1-3 July 2010, Vilnius, Lithuania

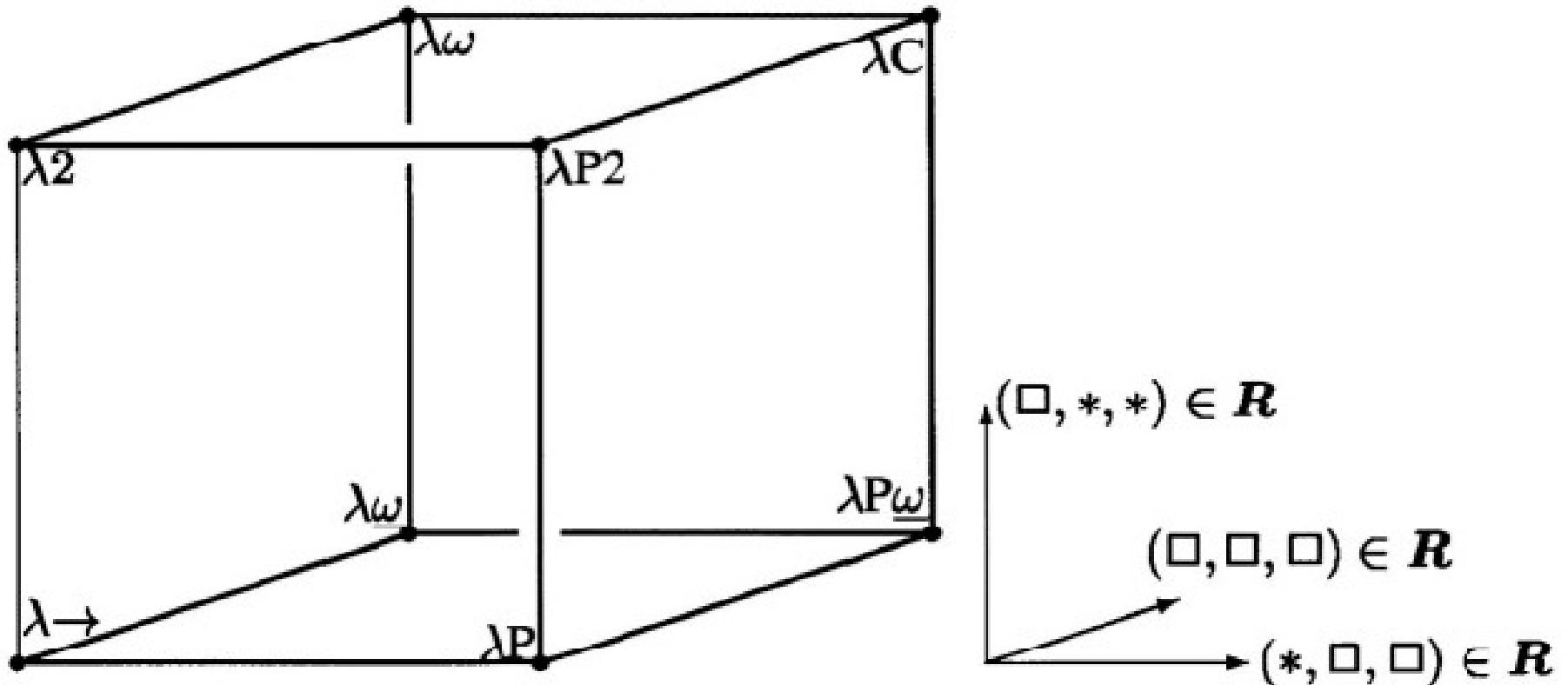


Privilege Assignments

canActivate(cli , Clinician(org, area))
ra.is-certified-NHS-clinician-cert(cli , org, area, start , end),
is-registration-authority(ra, org),
no-main-role-active(cli),
Current-time() 2 [start , end]

$\forall u:\text{user}, r_i:r_j, i \neq j$
 $u \in \text{role-memberships}(r_i) \wedge u \in \text{role-memberships}(r_j)$
 $\rightarrow r_j \notin \text{mutually-exclusive-authorisation}(r_j)$

Pure Type System



After Kamareddine et al.

Conclusions 1

- Interoperability is not first a matter of the ICT domain, but a user domains' one.
- Interoperability is a challenge to meeting business objectives. It requires sharing of knowledge, which should be built on a hierarchical system of ontologies.
- Multi-disciplinary interoperability solutions require a system-theoretical, architecture-centric approach, enabling the formalization of systems representation including ontology mapping.
- Regarding the level of complexity of the system in consideration as well as for the level of formalization the ontologies, just the absolutely needed level should be selected.

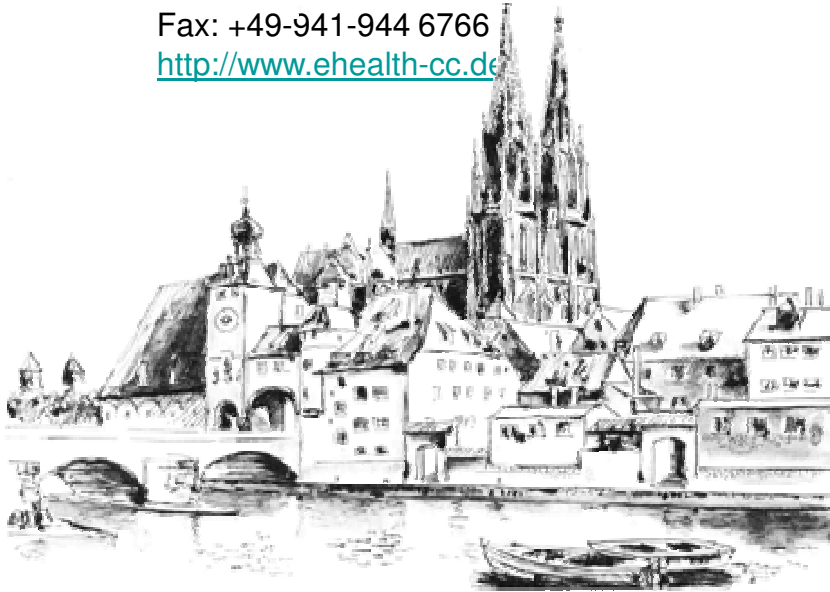
Conclusions 2

- In pHealth environments, security and privacy solutions have to be an embedded part of the system architecture.
- The solutions have to tackle all technical paradigms needed for implementing pHealth such as security and privacy for mobile, pervasive and autonomous systems.
- The solutions have to be policy driven, thereby enabling semantic interoperability between all principals by mapping their different ontologies.
- This also includes the different ontologies the different stakeholder groups are using.

Intelligent Security and Privacy Solutions in Telemedicine/Telepathology

Thank you very much for your attention!

Bernd Blobel, PhD, Associate Professor
eHealth Competence Center
University of Regensburg Medical Center
Franz-Josef-Strauss-Allee 11
D-93042 Regensburg, Germany
Email: bernd.blobel@klinik.uni-regensburg.de
Phone: +49-941-944 6769
Fax: +49-941-944 6766
<http://www.ehealth-cc.de>



Bernd Blobel
eHealth Competence Center
University Hospital Regensburg

10th European Telepathology Congress
4th International Congress on Virtual Microscopy
1-3 July 2010, Vilnius, Lithuania

