

Session 1 (PS5): General ideas of SISE

Architectural Viewpoints and Trends for the Implementation of the Environmental Information Space

Thomas Usländer

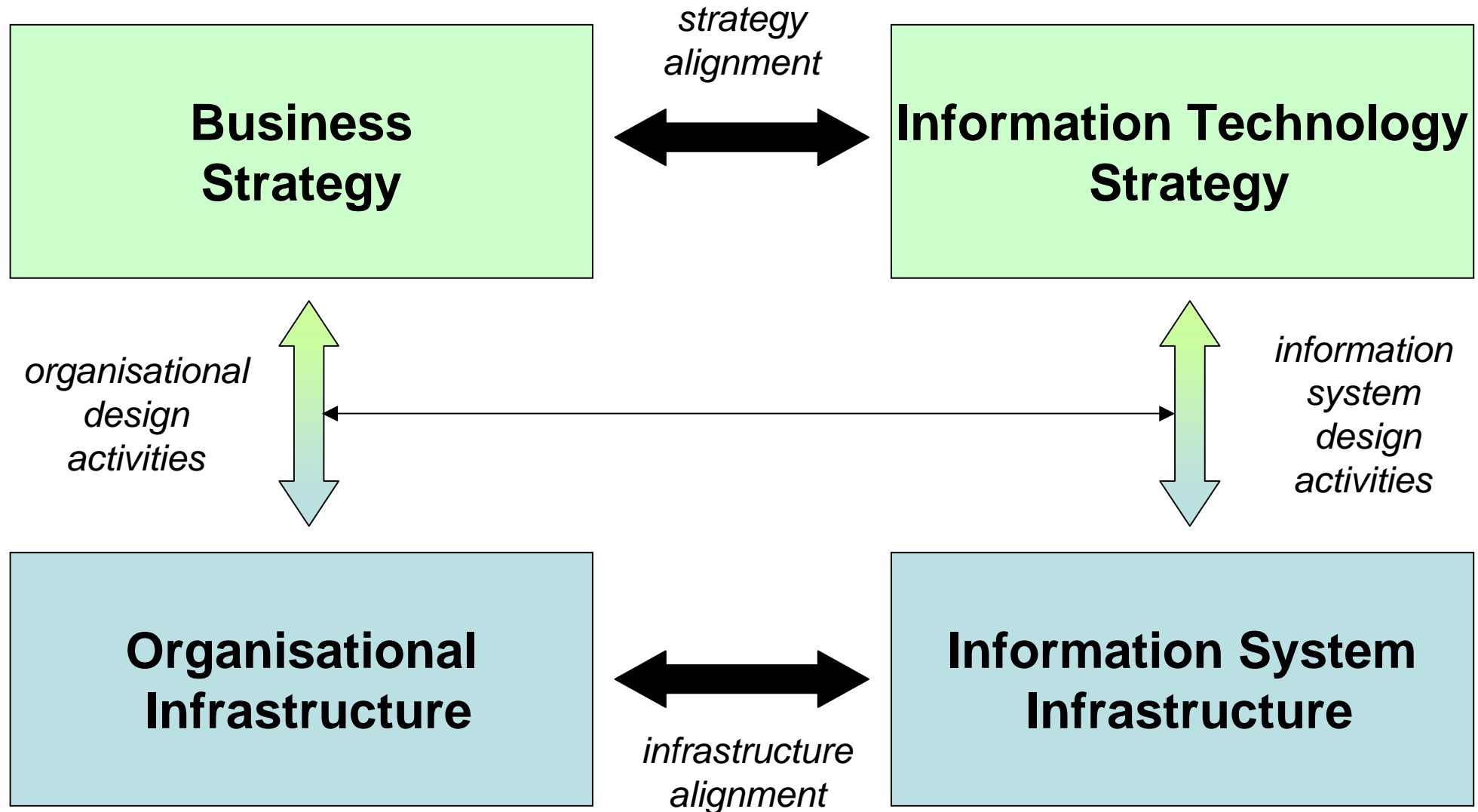
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Outline

- Implementation of an environmental information space (here: SISE) needs an **Architecture**
- An architecture of such a complexity is typically specified from several **Viewpoints**.
 - Selection of architectural concepts and structuring rules
 - Focus on particular concerns within a system
- SISE Architecture needs to be specified in iterations
 - Architectural **Trends** to be considered for each iteration

SISE
Research
Framework



SISE: Business Strategy

Business Strategy

policy directives
open access

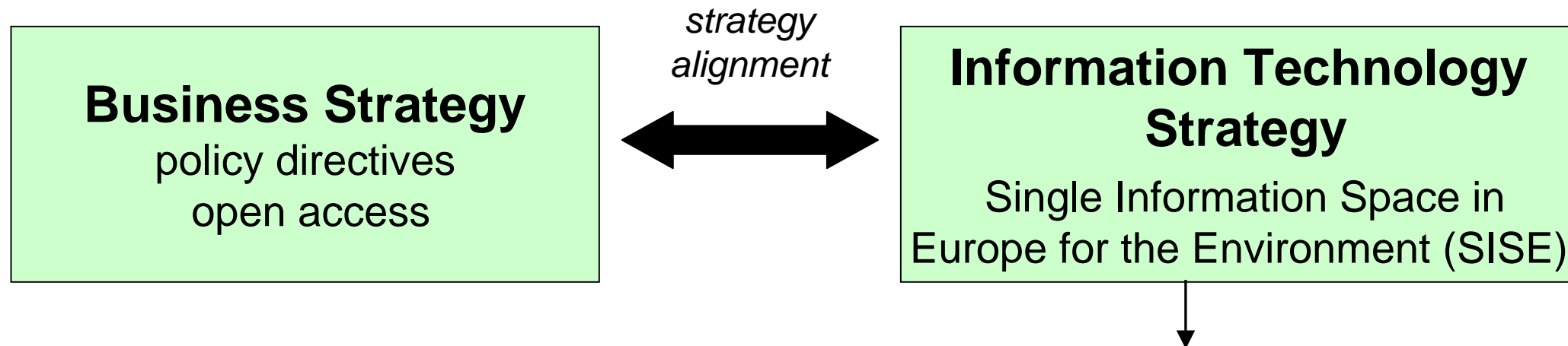
• Directives

- Public Access to Environmental Information (2003/4/EC)
- several environmental directives, e.g. Water Framework Directive (2003)
- INSPIRE - Infrastructure for Spatial Information in the European Community (2007/2/EC)
- SEIS – Shared Environmental Information System (announced for 2009)

• Business Context

- GMES – Global Monitoring for Environment and Security
- GEOSS - Global Earth Observation System of Systems

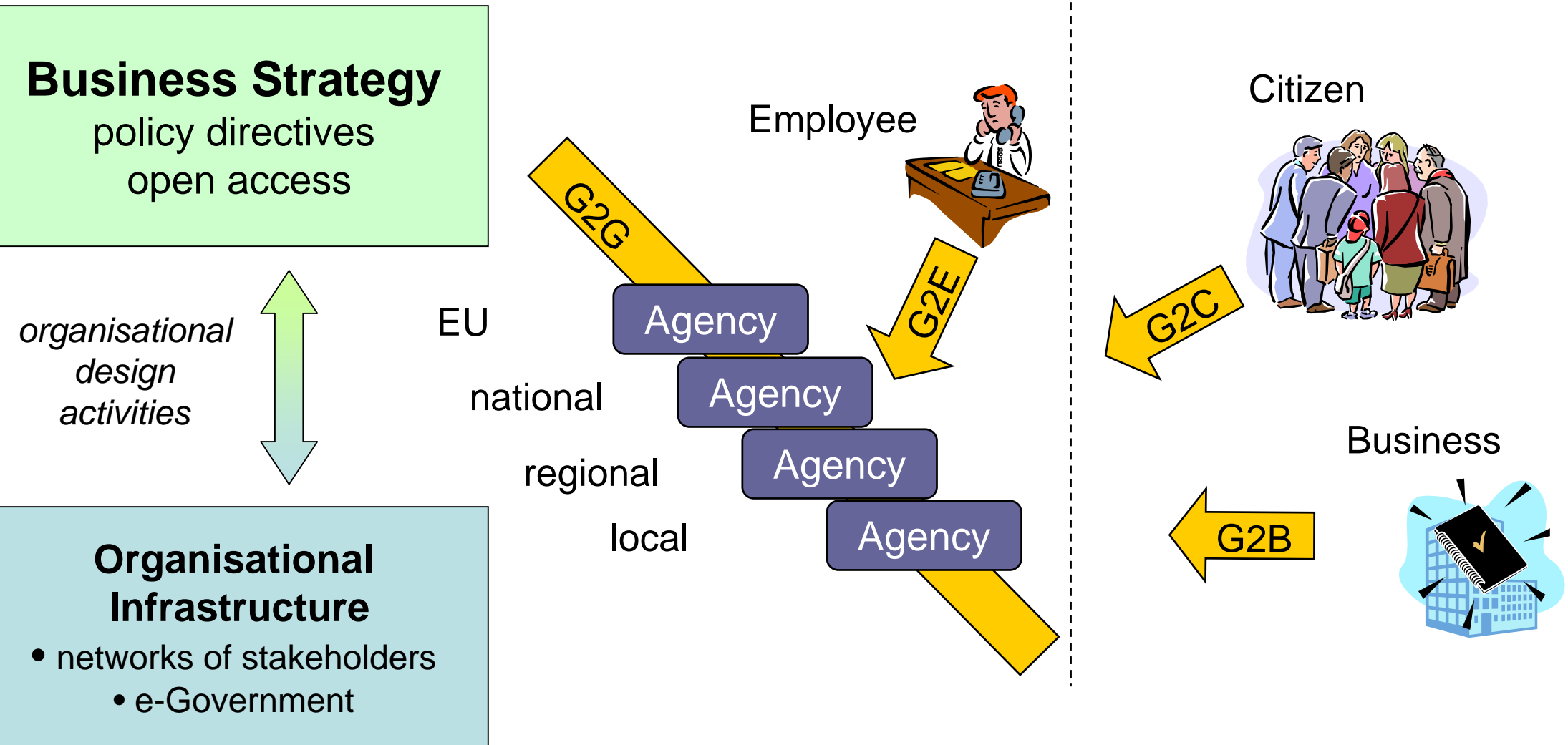
SISE: IT Strategy



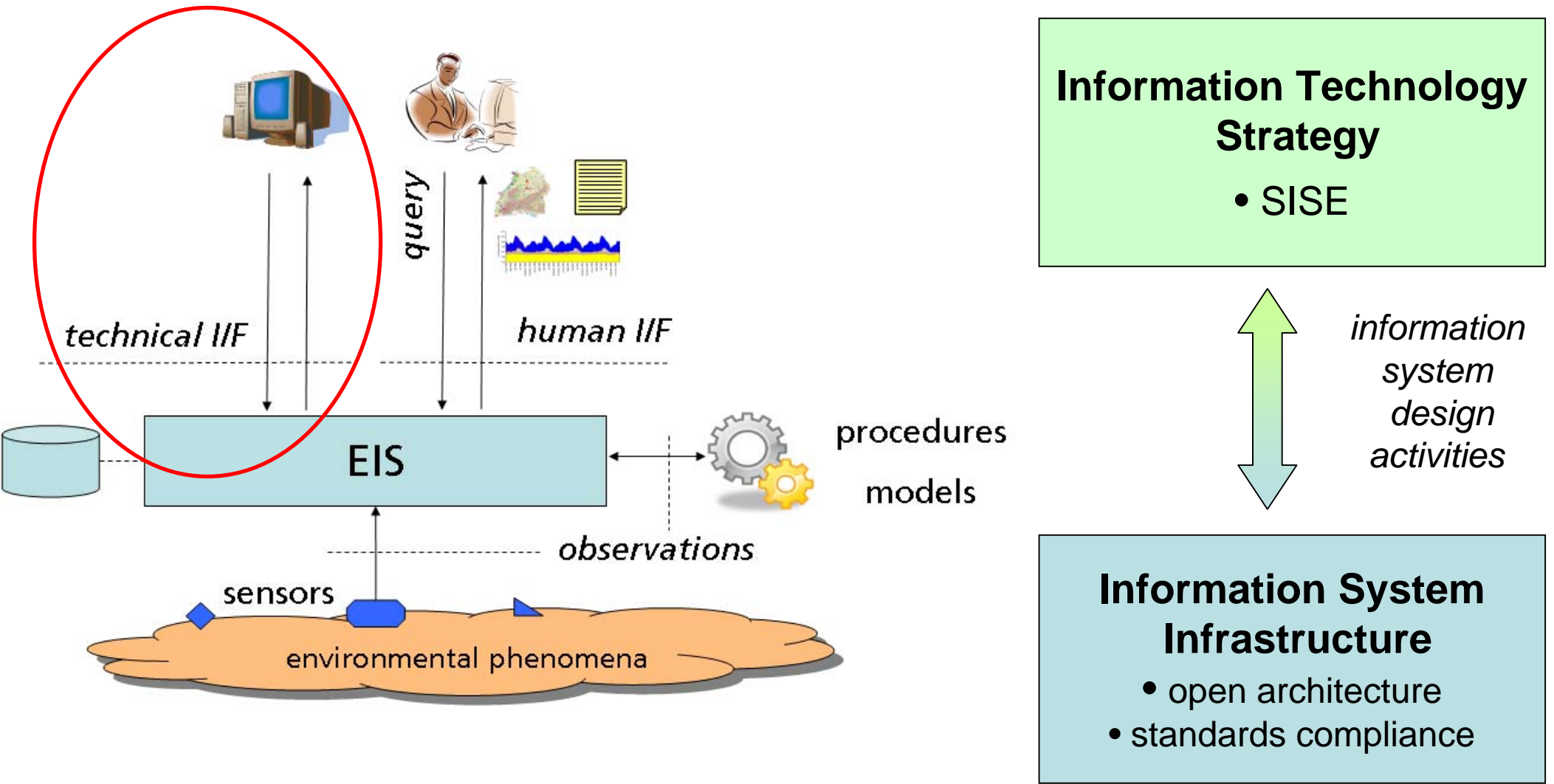
- Make environmental data available in a controlled and dependable fashion
 - collected in environmental monitoring and earth observation programs
 - at several organisational levels
 - for processing, information fusion, visualisation, reporting and decision support
- Consider also associated thematic domains such as health, security, commerce and transport

SISE: Organisational Design

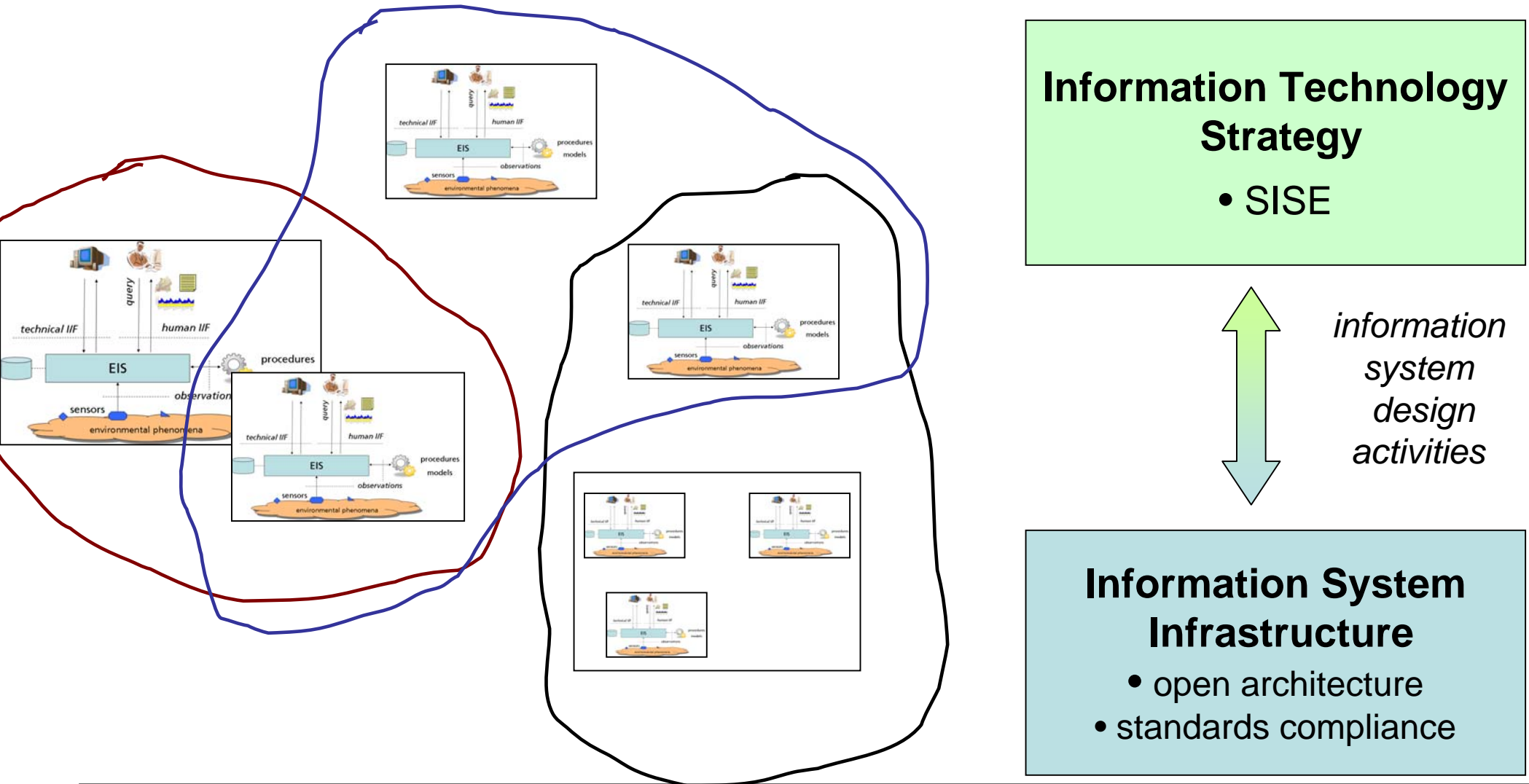
Government(G2G)
 Employee (G2E)
 Citizen (G2C)
 Business (G2B)



SISE: Information System Design (1)



SISE: System of Systems Engineering Design Challenge (2)



Information Technology Strategy

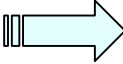
- SISE

information system design activities

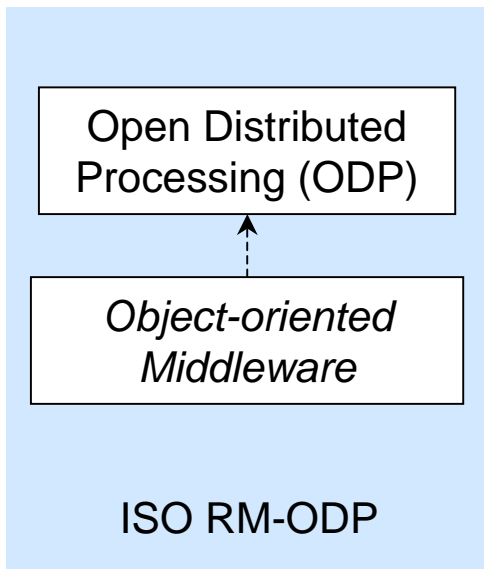
Information System Infrastructure

- open architecture
- standards compliance

ISO Reference Model for Open Distributed Processing

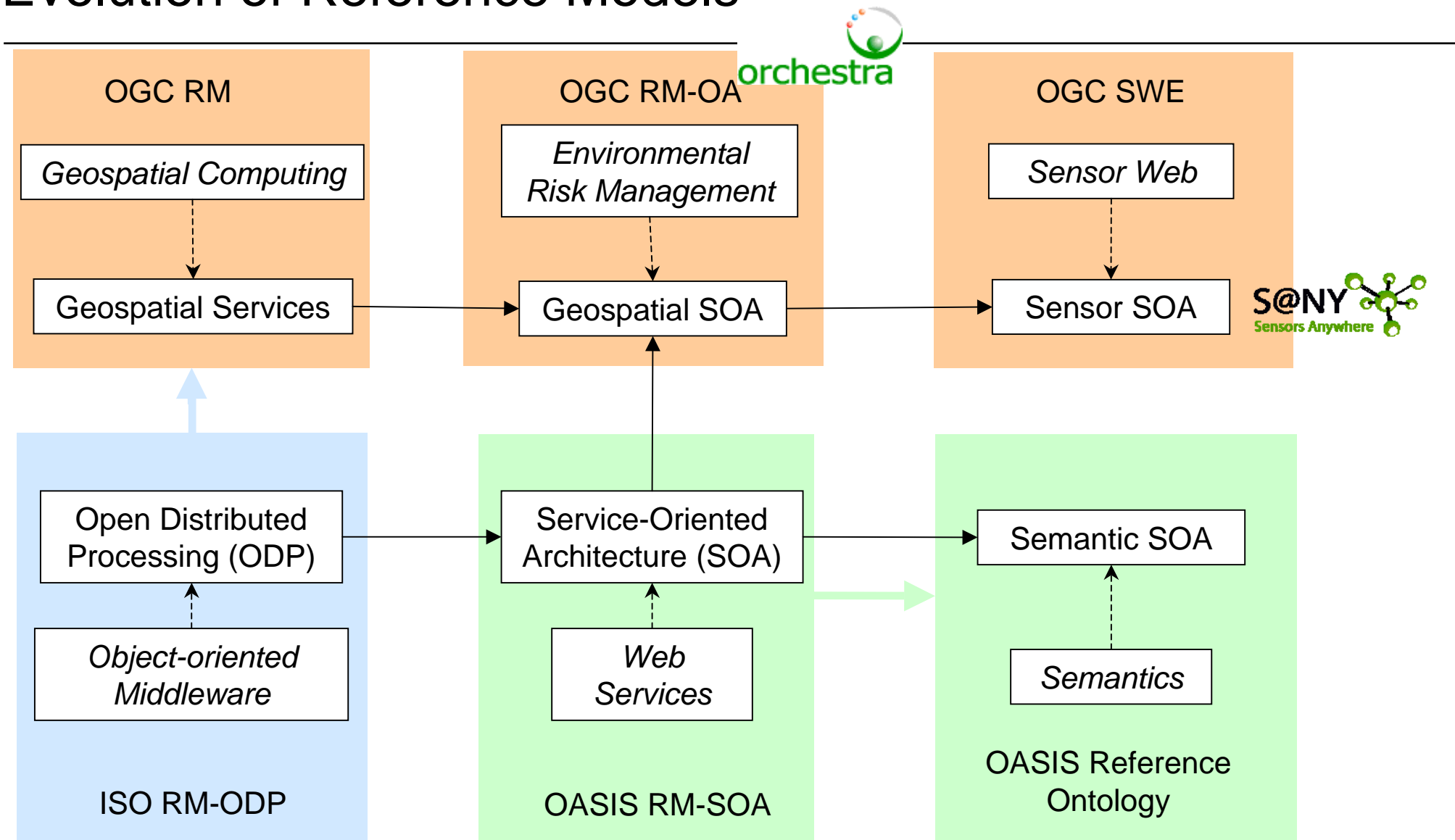
Viewpoints applied to "services" 

Enterprise	documentation of the business strategy → functional, informational and qualitative requirements
Information	modelling approach of categories of information including their thematic, spatial, temporal characteristics as well as their meta-data.
Service	modelling approach of Interface and Service Types including their syntax (signature) and semantics.
Technology	logical characteristics
Engineering	mapping to the characteristics of service networks including operational policies.



Architectural Constraints
→ Requirements

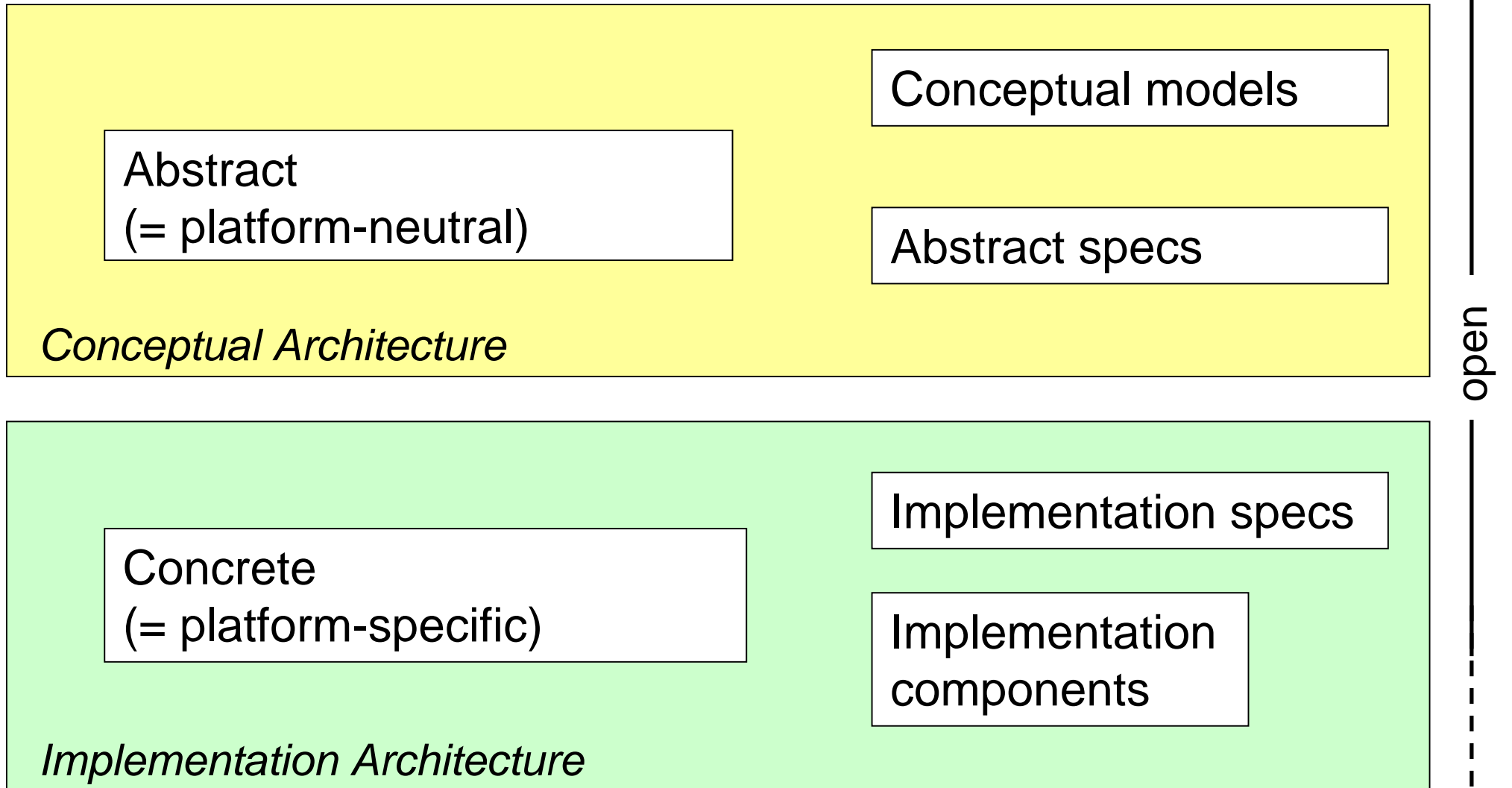
Evolution of Reference Models



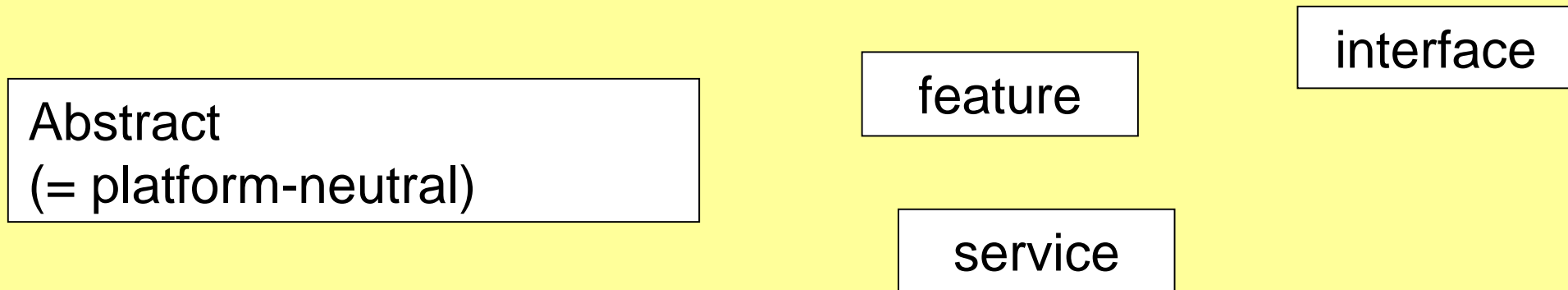
Architectural Trends (personal non-exhaustive selection)

- Design of Open Geospatial SOAs
 - mapping of requirements to the service platform
 - multi-platform architecture including “lightweight” Web services (**RESTful services**)

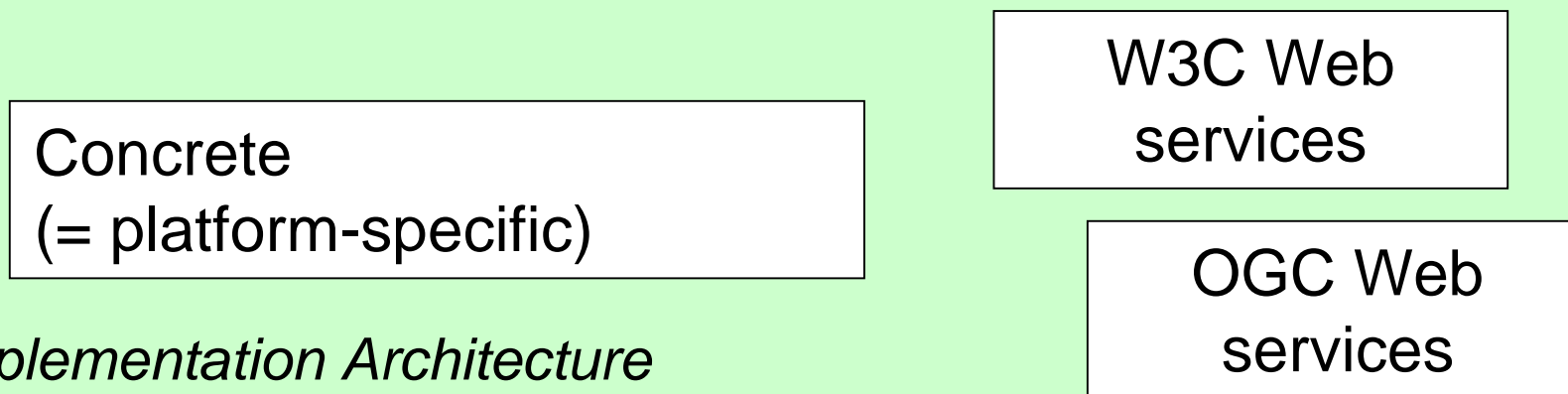
Two-level Architectural Approach (1)



Two-level Architectural Approach (2)

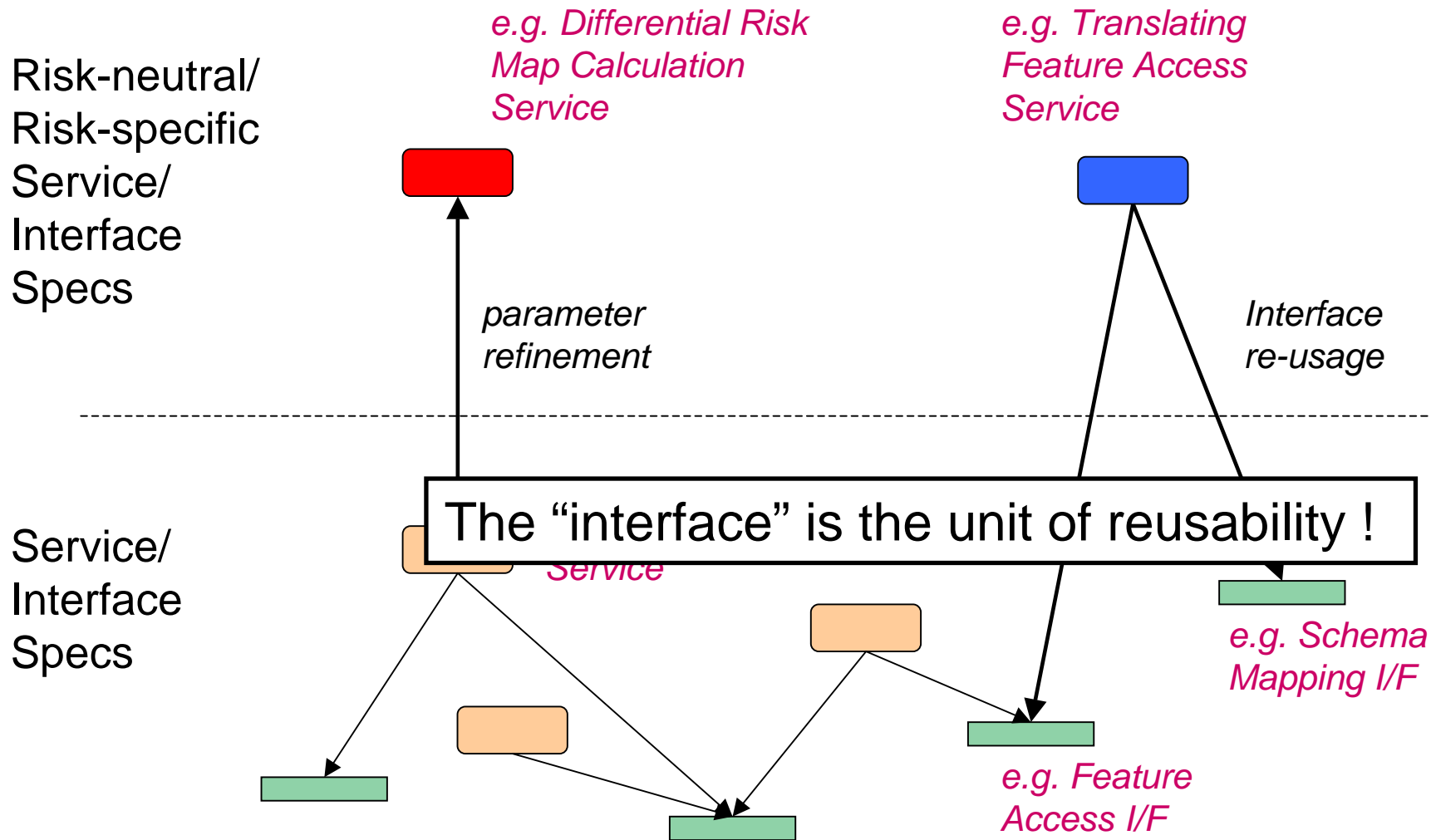


Conceptual Architecture

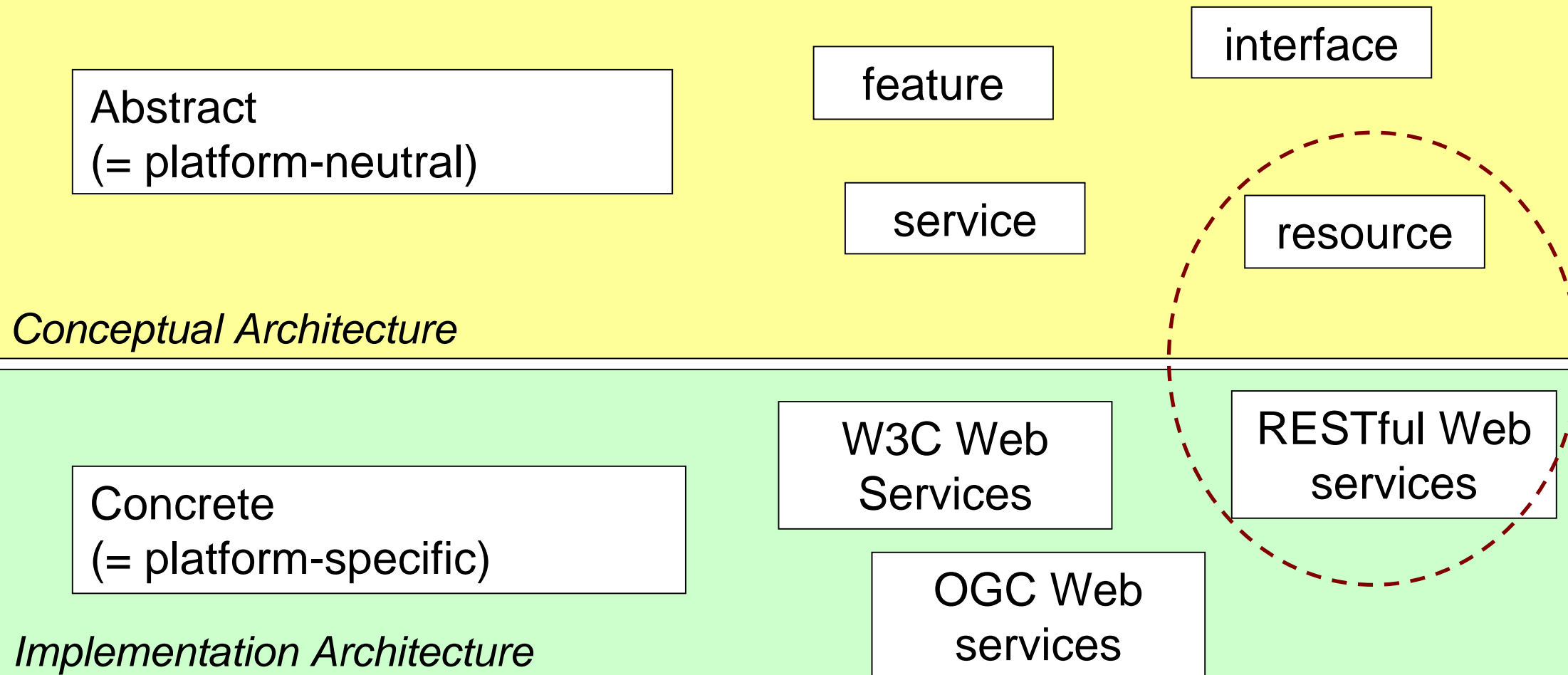


Implementation Architecture

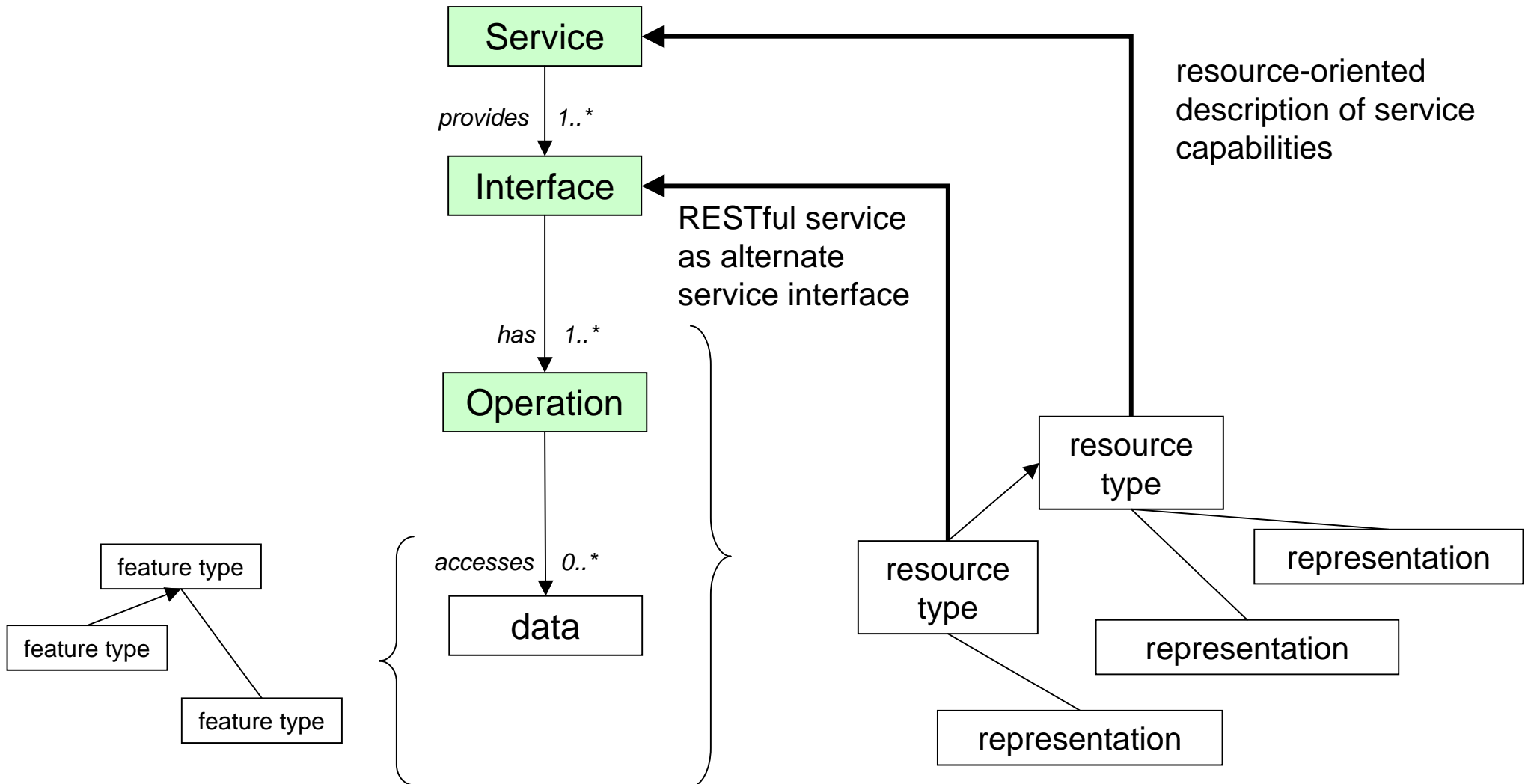
“Toolbox” for Thematic Services



Two-level Architectural Approach (3)



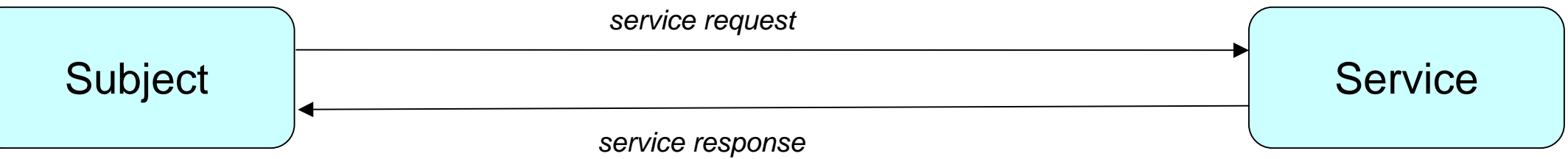
Resource-oriented Architectural Style: possible integration



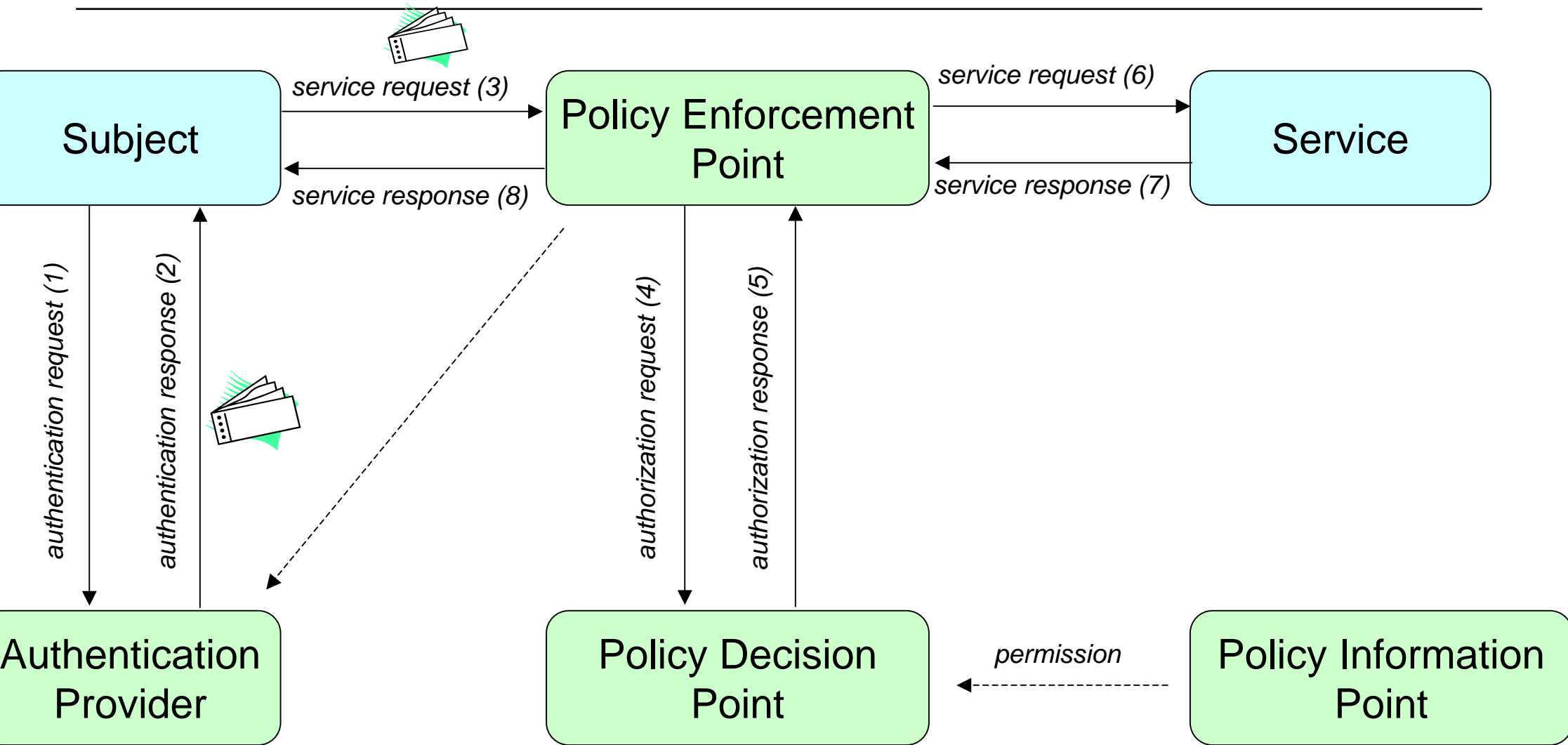
Architectural Trends (personal non-exhaustive selection)

- Design of Open Geospatial SOAs
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 - multi-platform architecture including “lightweight” Web services (RESTful services)
- Governance of Open Service Platforms
 - IT level: policy support for **access control**, discovery and service management
 - Organisational level: service level agreements

Security: Abstract Access Control Pattern [OASIS]



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Architectural Trends (personal non-exhaustive selection)

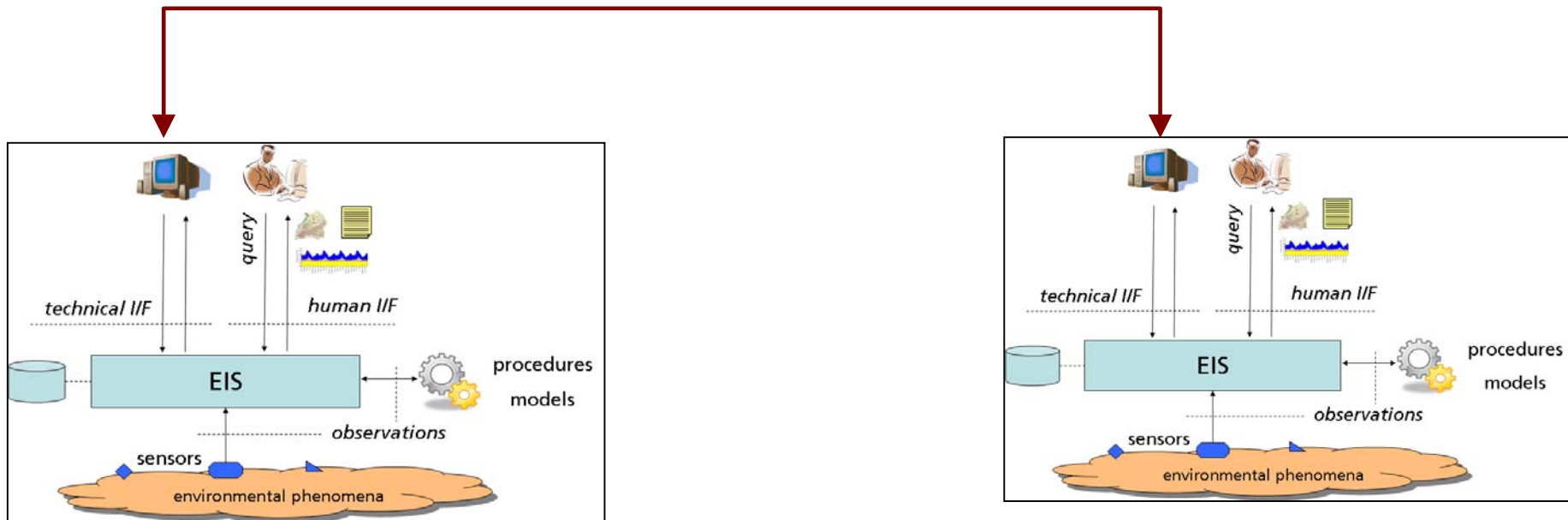
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 - Organisational level: service level agreements
- Semantic Interoperability
 - Exploitation of Semantic Web technologies
 - Role of complex Semantic Web Service frameworks (OWL-S, WSMO) ?
 - W3C recommendation for Semantic Annotation of Web service descriptions (WSDL) and XML schemas (**SAWSDL**)

Semantic Interoperability Challenge (1)

Syntactical Interoperability

→ information access and exchange

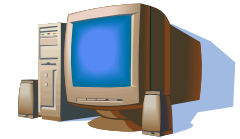
→ discovery, analysis and fusion of information by humans



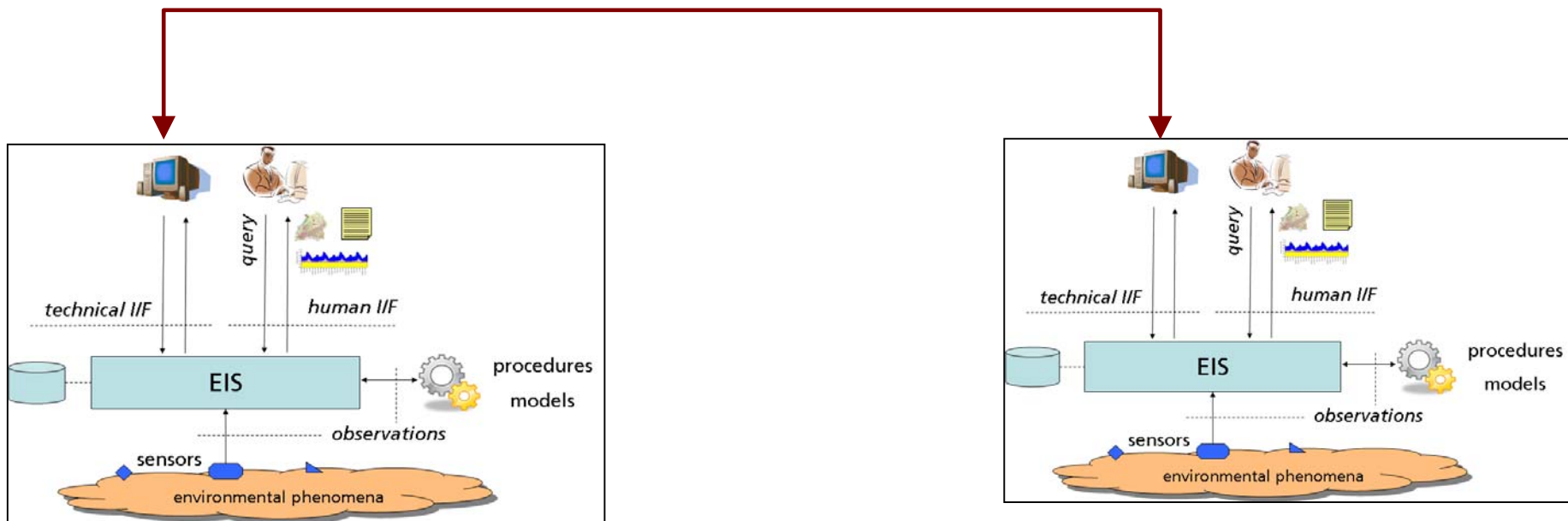
Semantic Interoperability Challenge (2)

→ Semantic Interoperability

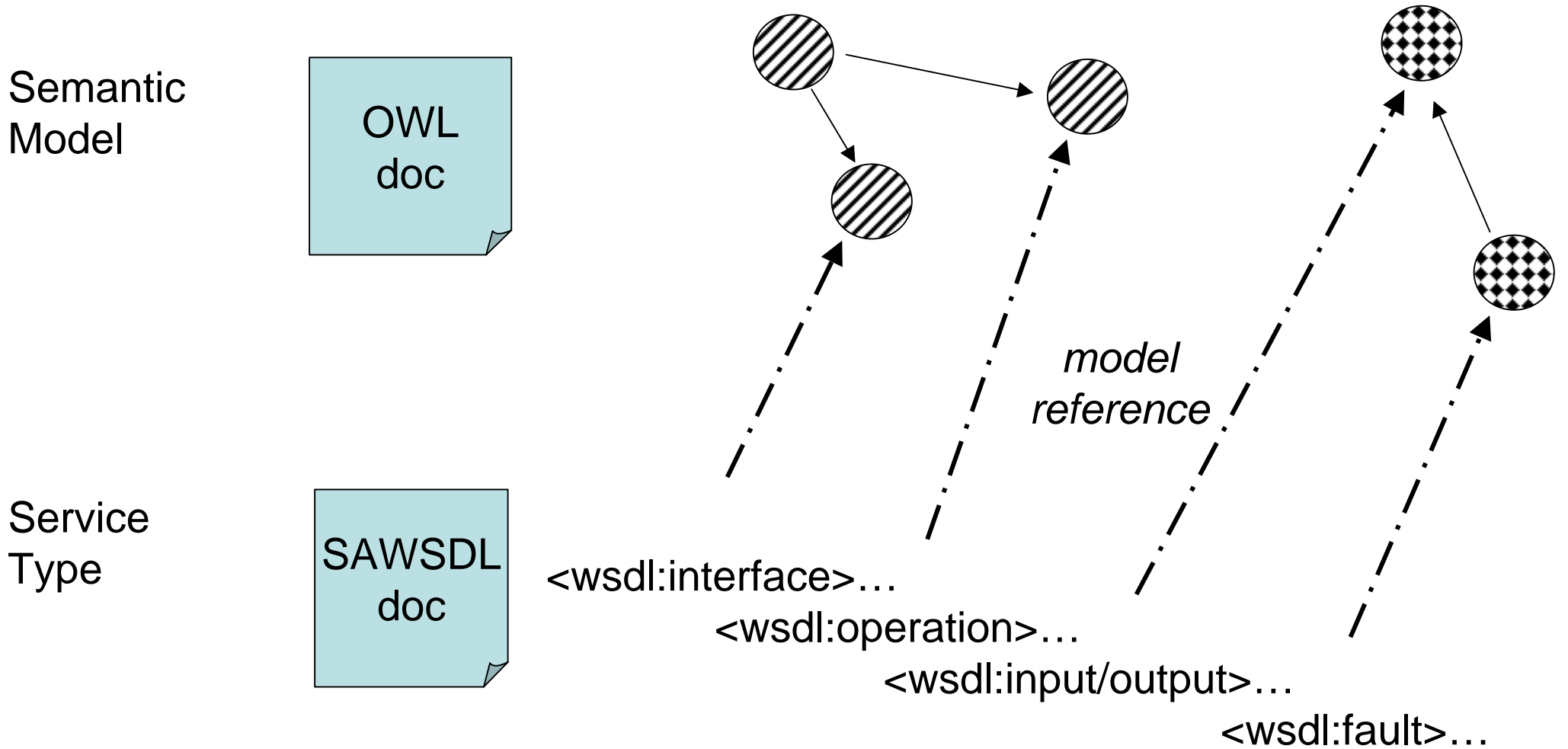
→ information access and exchange



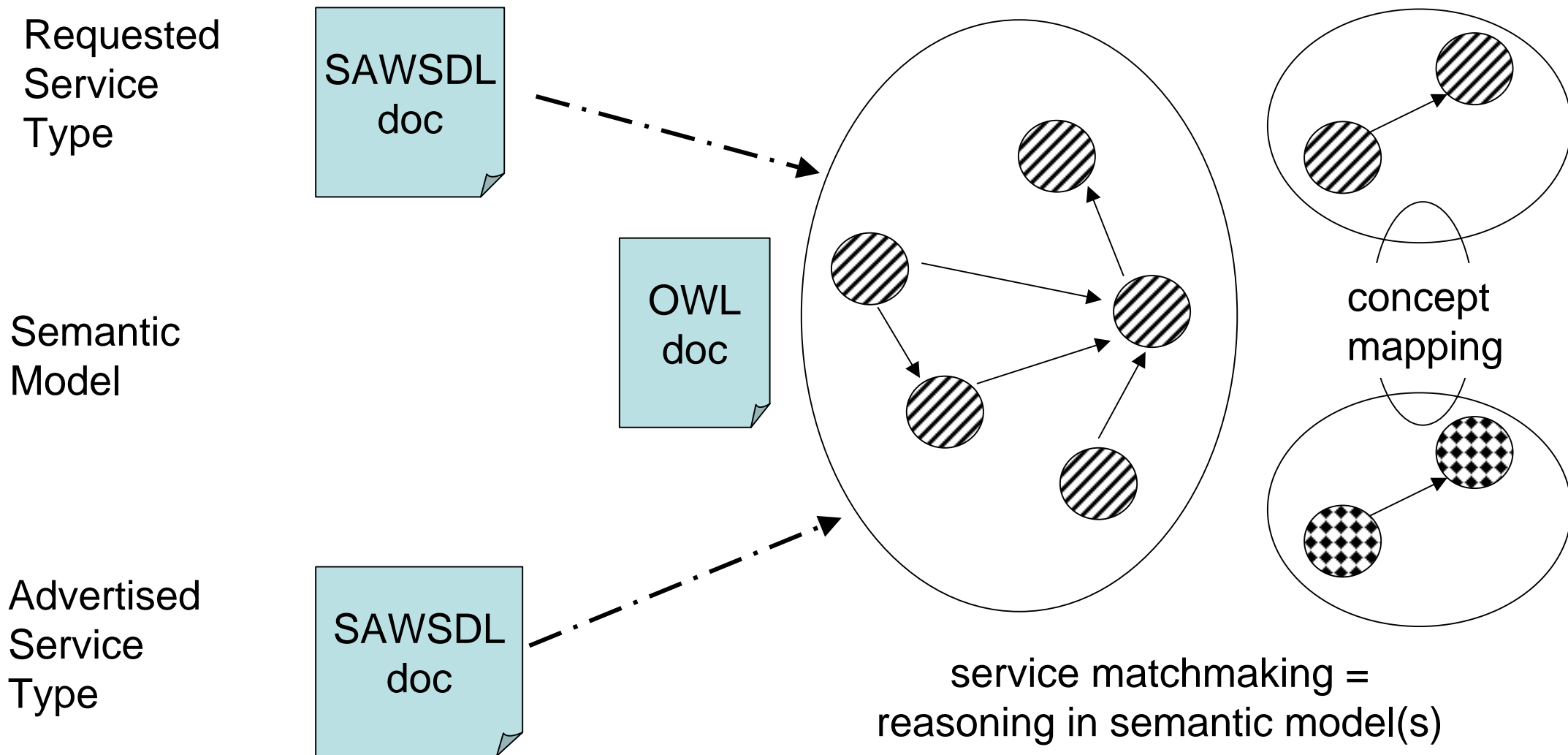
→ discovery, analysis and fusion of information by machines



Semantic Annotation based upon SAWSDL



Use of SAWSDL in Resource Discovery



Conclusion of the Architectural Tour

- Implementation of the SISE needs an Architecture
- Typically to be specified from several **viewpoints**
- RM-ODP good candidate as a basis for a Reference Model of an SISE Architecture as used in
 - Open Geospatial Consortium (OGC) Reference Model
 - Environmental risk management (ORCHESTRA → RM-OA, SANY → SensorSA)
 - Earth observation (GEOSS, ESA Heterogeneous Mission Accessibility - HMA)
 - Support action GIGAS (about harmonisation of initiatives)
- Co-development of SISE Architecture and Requirements required
 - Architectural **trends** to be considered when designing an SISE architecture
- Design of an SISE Architecture needs an iterative System of Systems Engineering approach

Thank you for your attention !

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