

## **Session 1 (PS5): General ideas of SISE**

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

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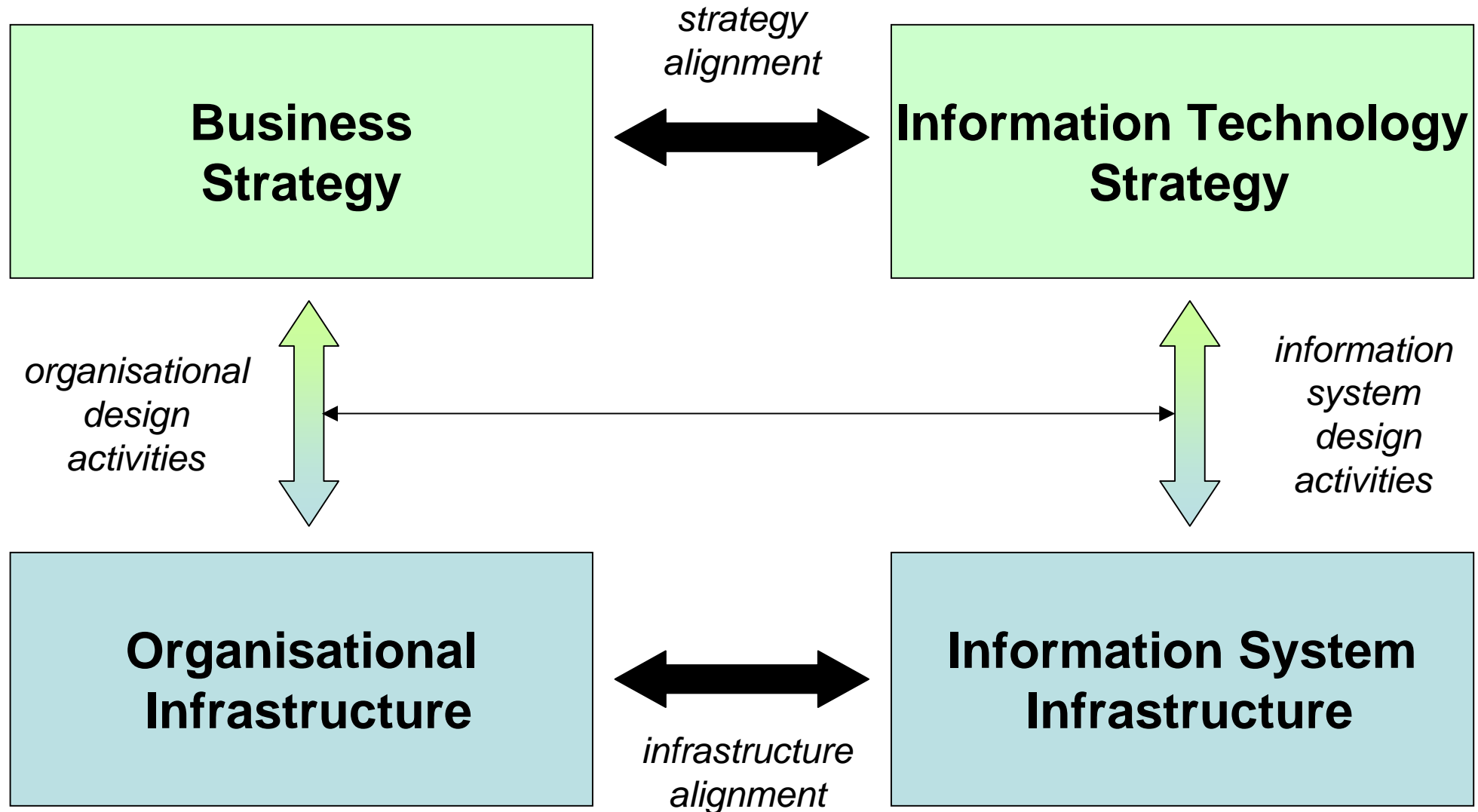
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# Outline

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- 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

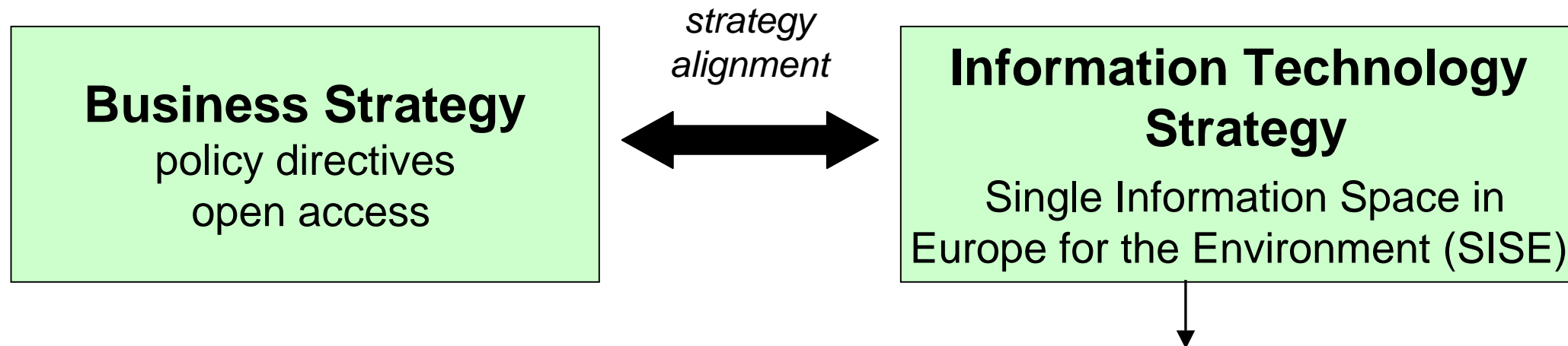
### • Directives

- 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

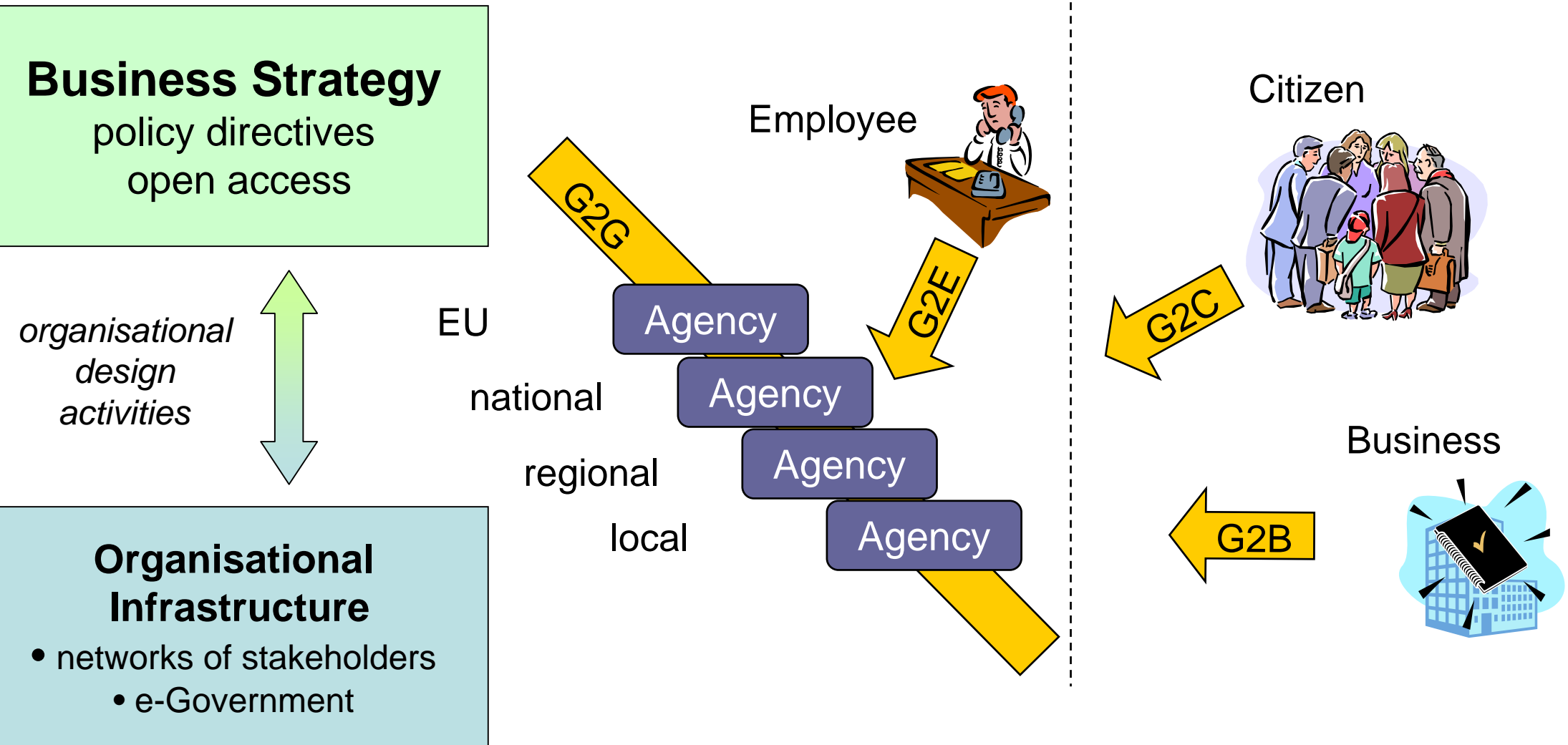
# SISE: IT Strategy



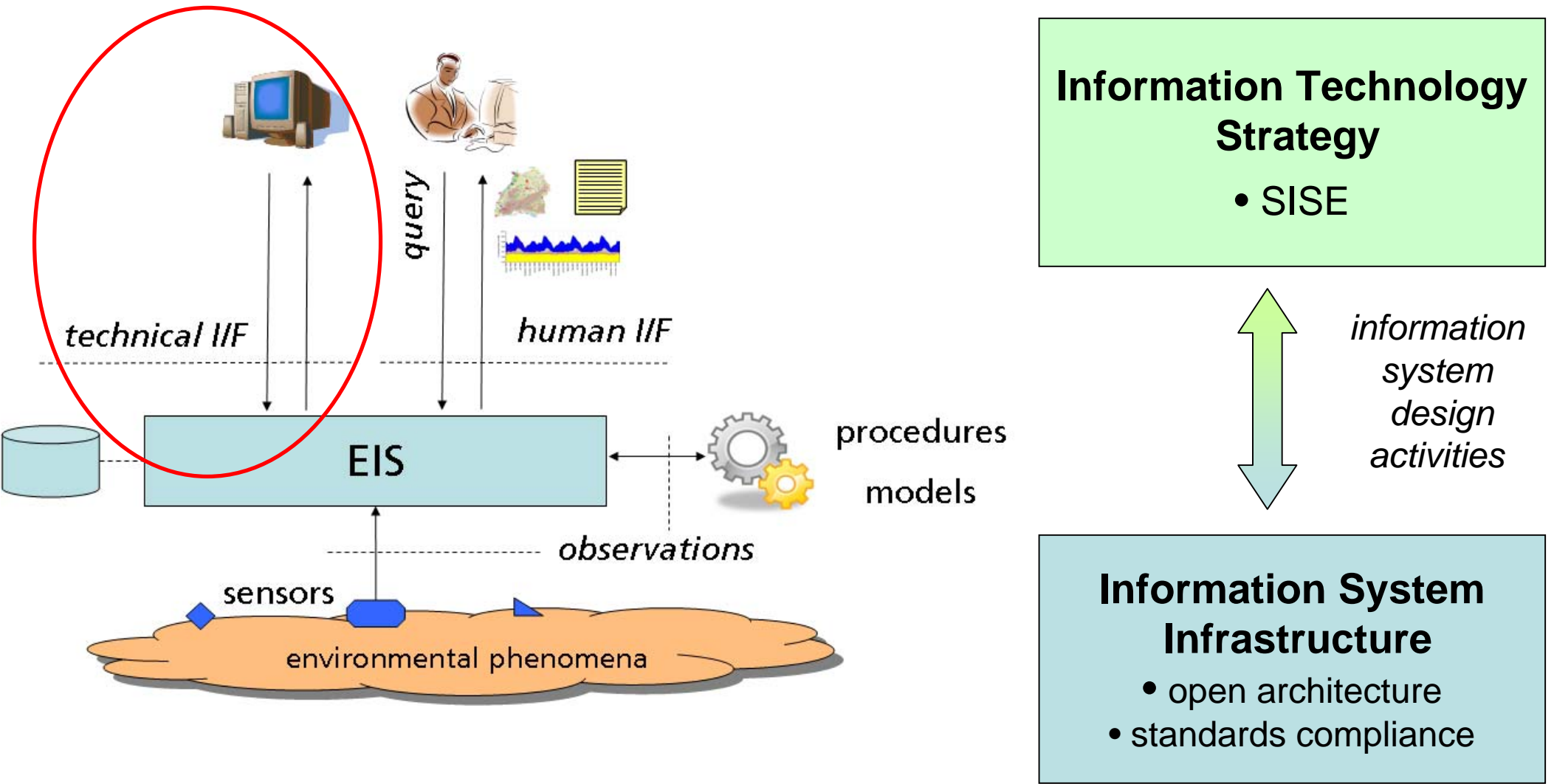
- Make environmental data available in a controlled and dependable fashion
  - collected in environmental monitoring and earth observation programs
  - at several organisational levels
  - for processing, information fusion, visualisation, reporting and decision support
- Consider also associated thematic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

# SISE: Organisational Design

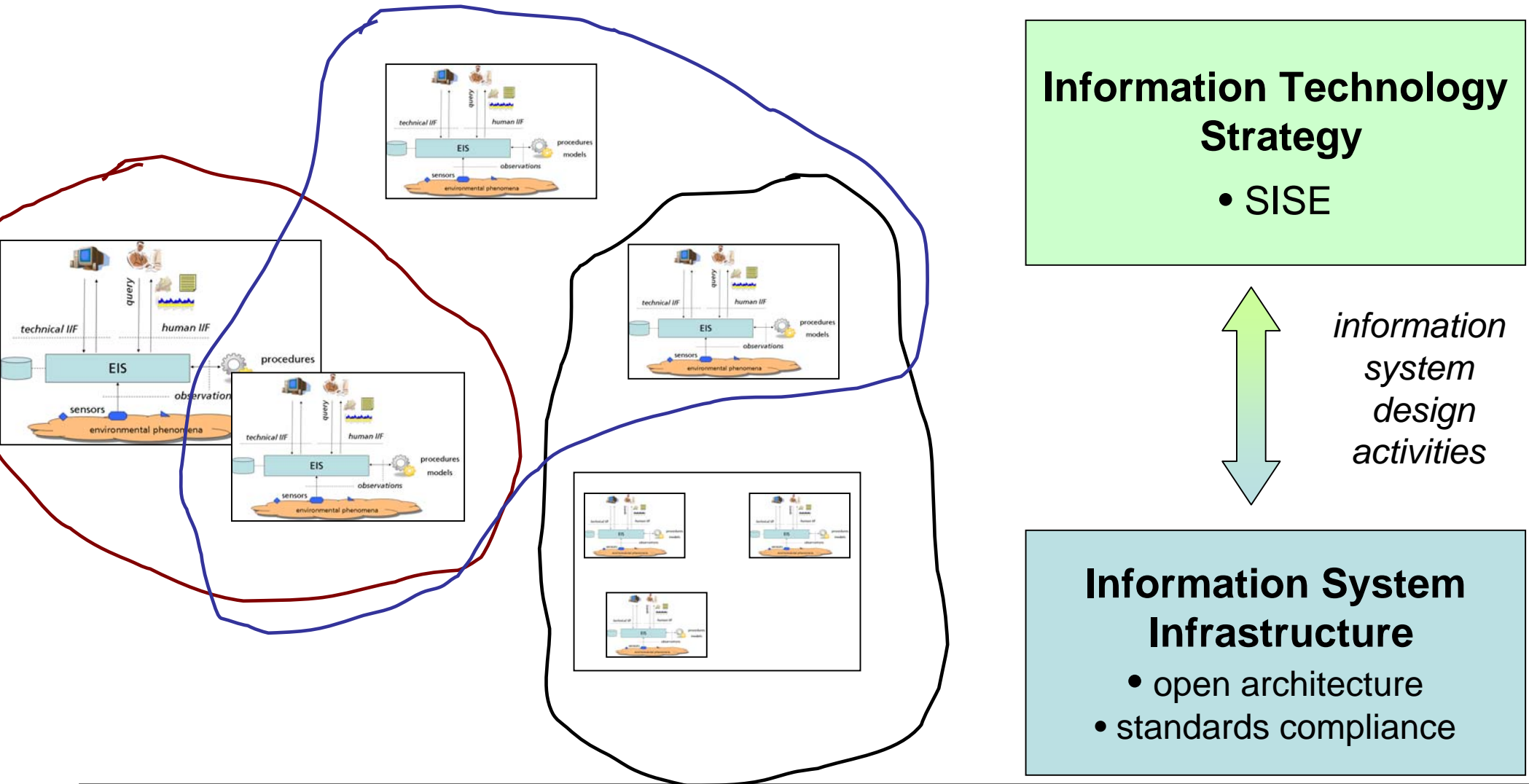
Government(G2G)  
Employee (G2E)  
Citizen (G2C)  
Business (G2B)



# SISE: Information System Design (1)



# SISE: System of Systems Engineering Design Challenge (2)



**Information Technology Strategy**

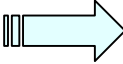
- SISE

information system design activities

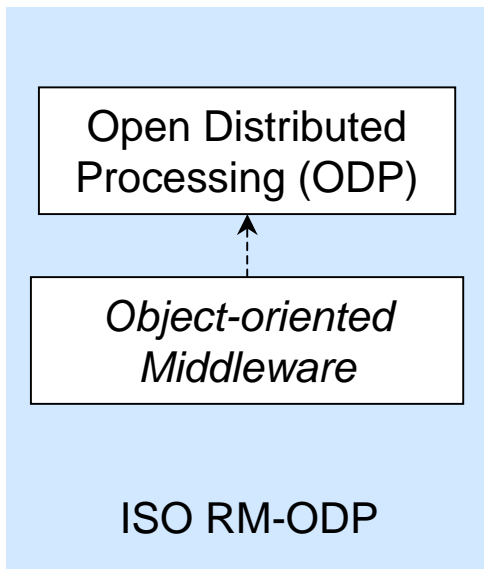
**Information System Infrastructure**

- open architecture
- standards compliance

# ISO Reference Model for Open Distributed Processing

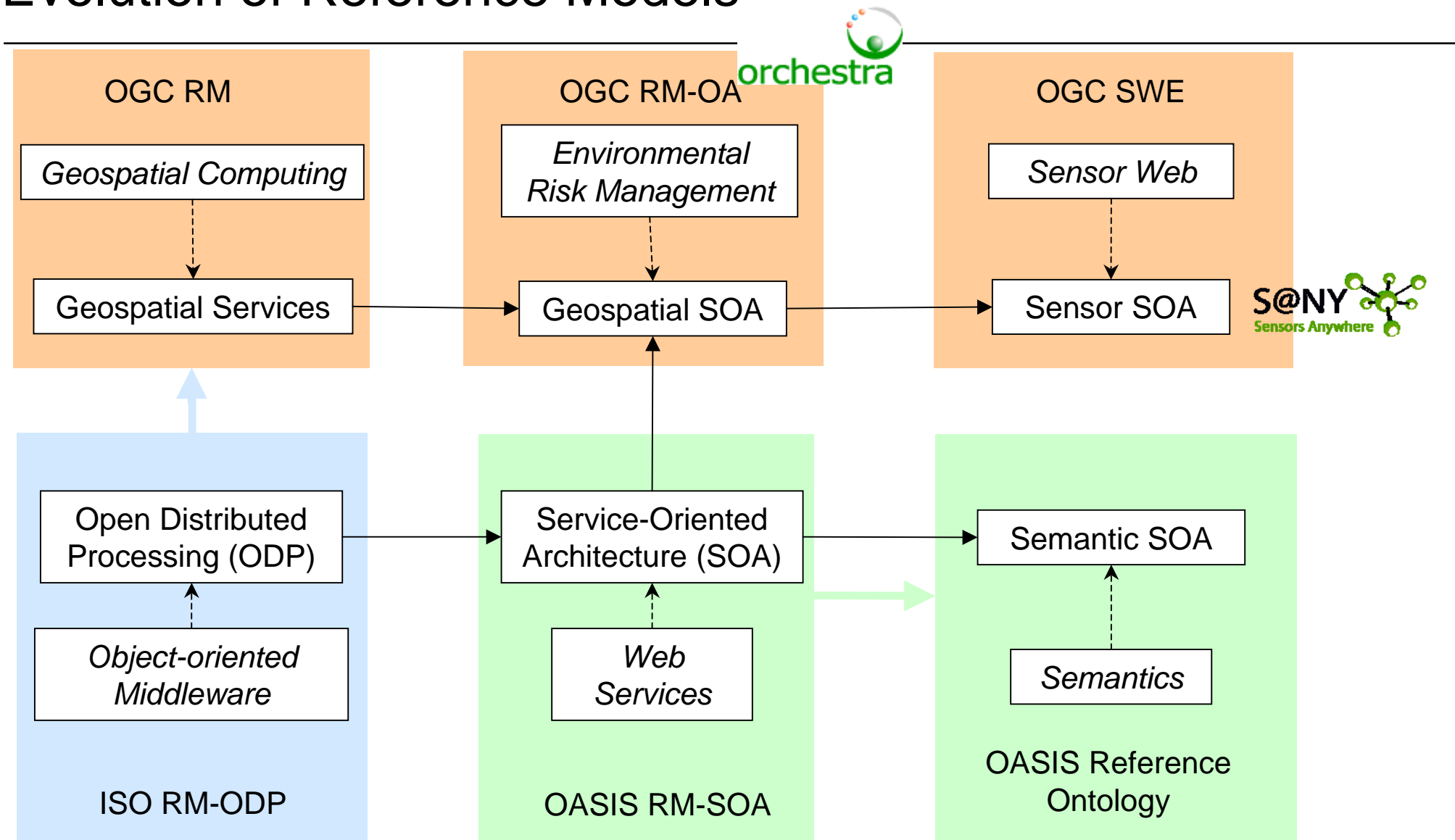
Viewpoints applied to "services" 

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

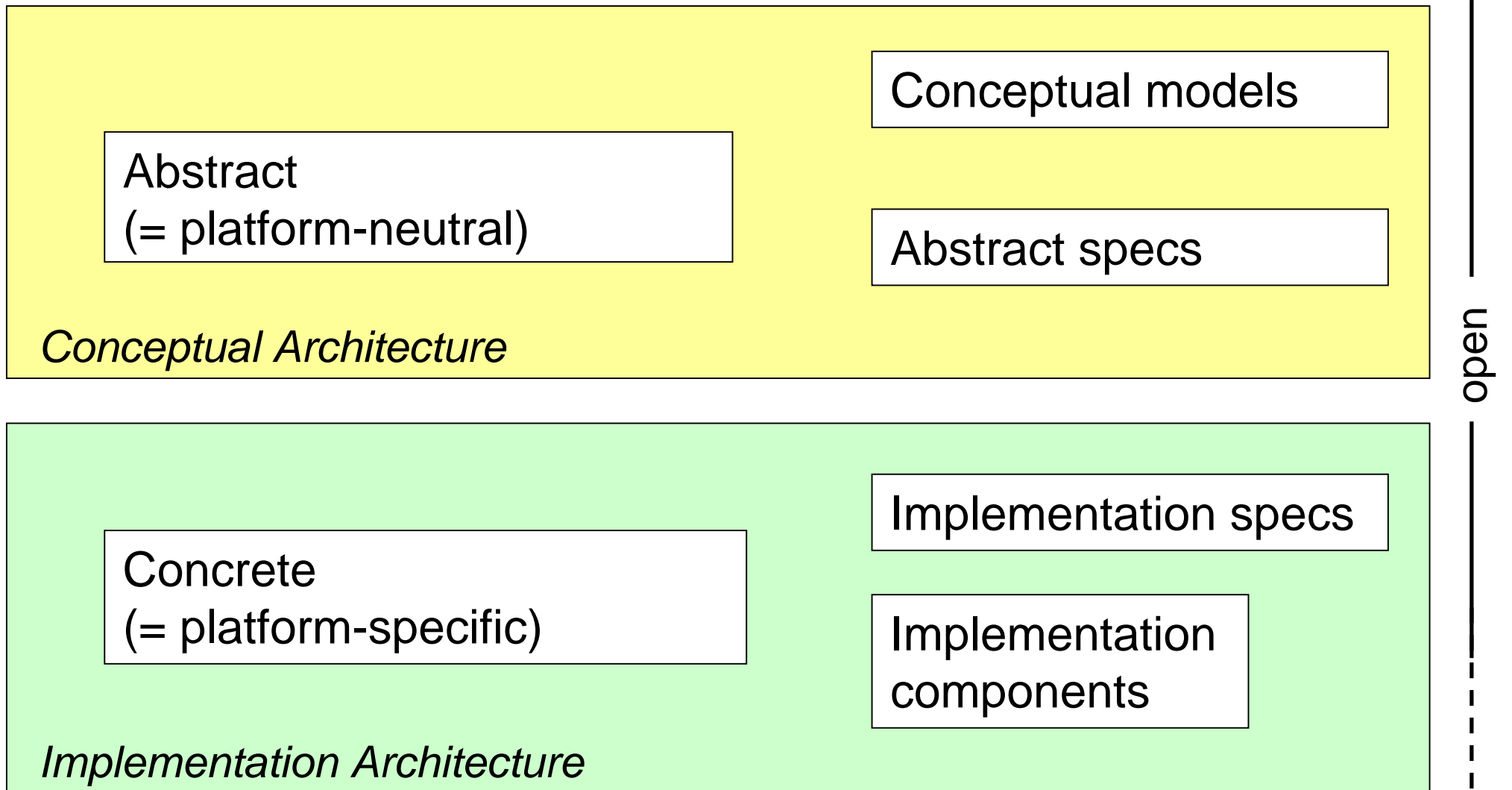


# Architectural Trends (personal non-exhaustive selection)

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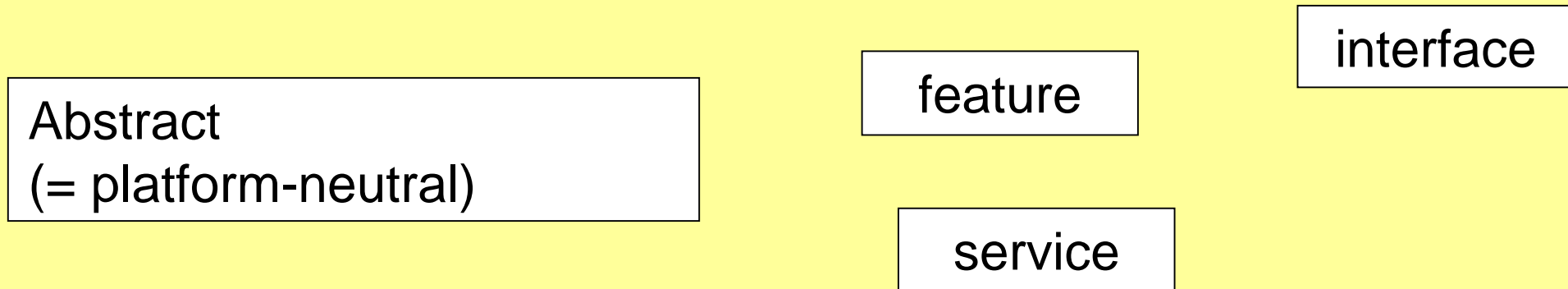
- Design of Open Geospatial SOAs
  - mapping of requirements to the service platform
  - multi-platform architecture including “lightweight” Web services (**RESTful services**)

# Two-level Architectural Approach (1)

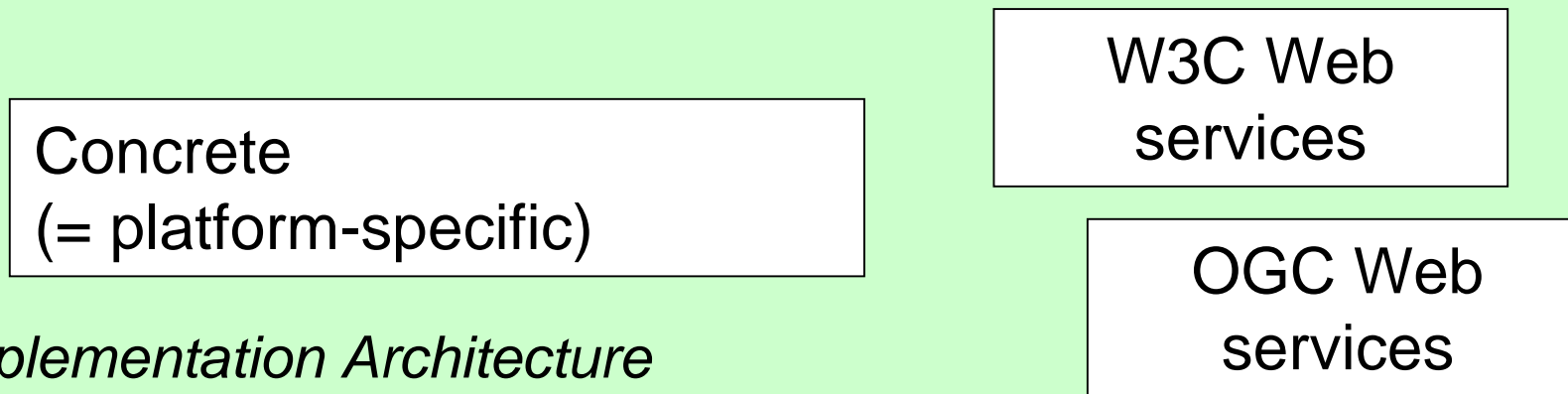


# Two-level Architectural Approach (2)

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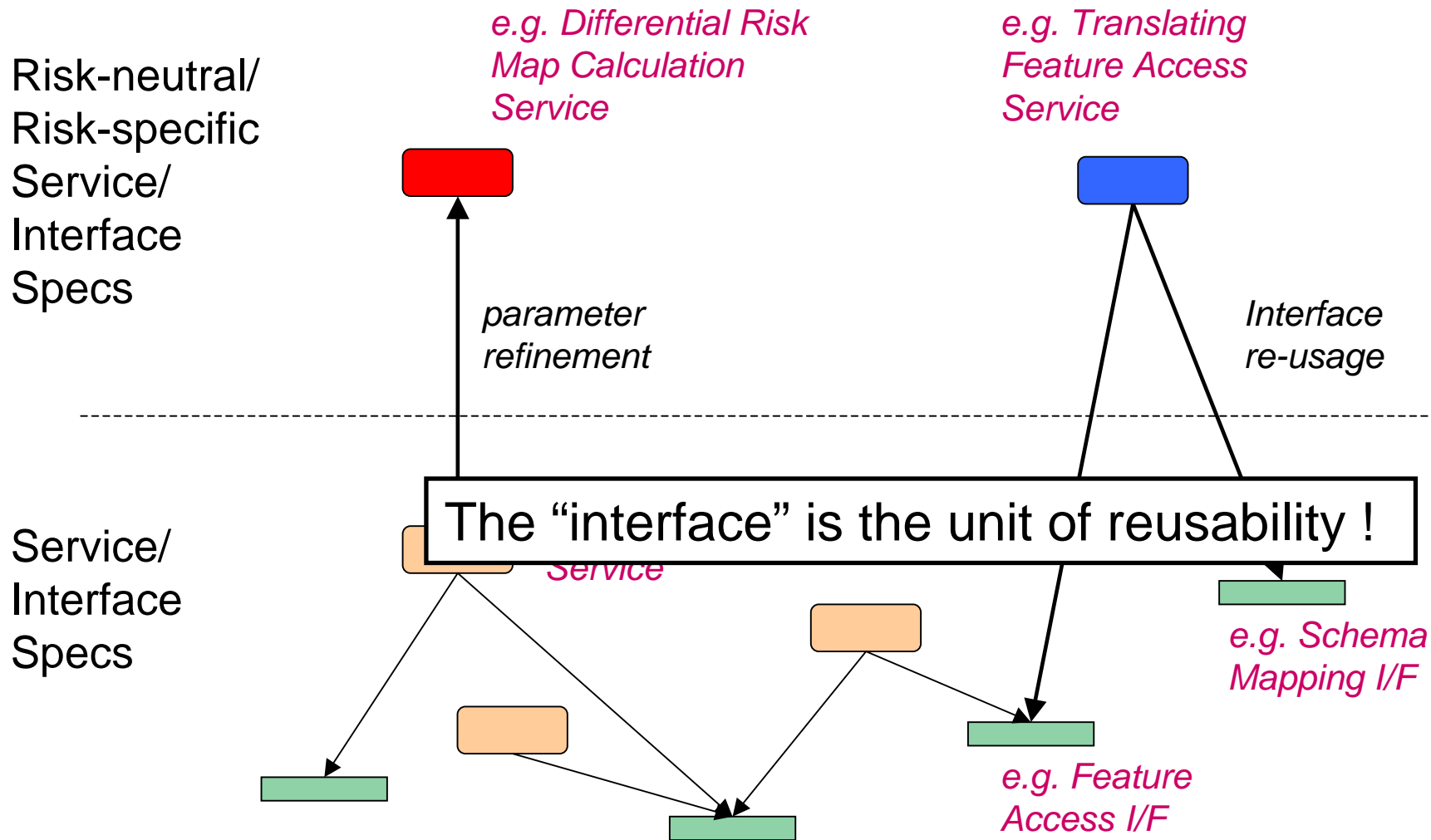


## *Conceptual Architecture*

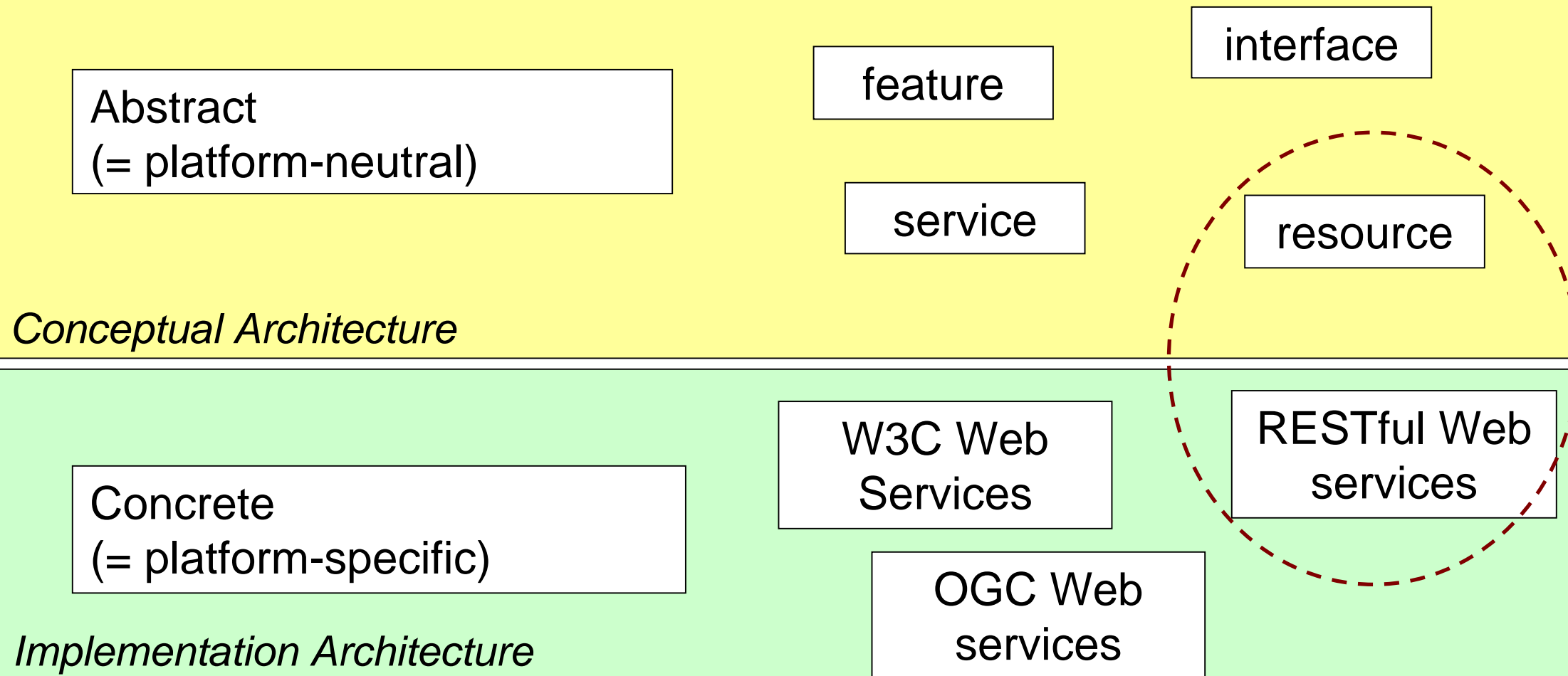


## *Implementation Architecture*

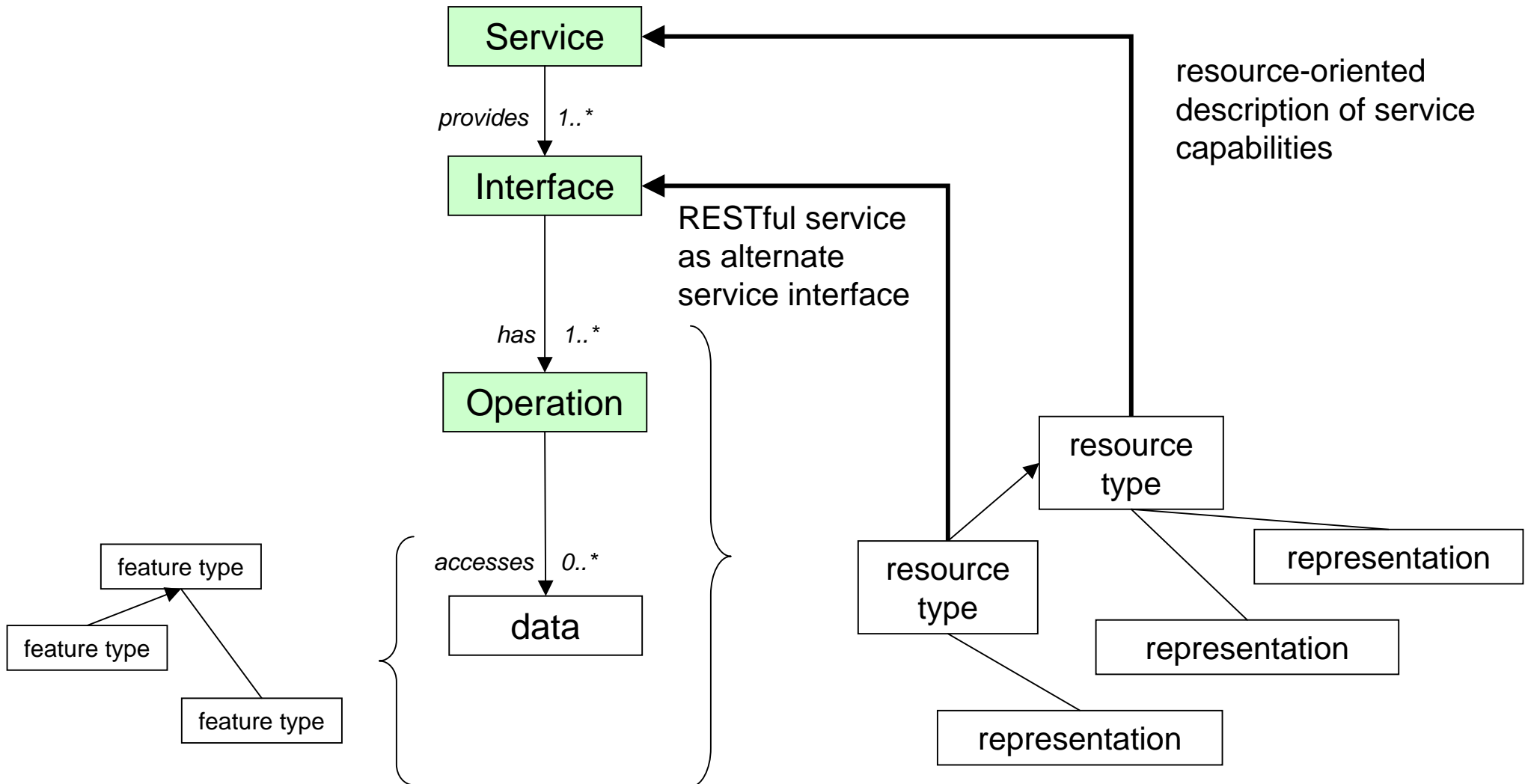
# “Toolbox” for Thematic Services



# Two-level Architectural Approach (3)



# Resource-oriented Architectural Style: possible integration



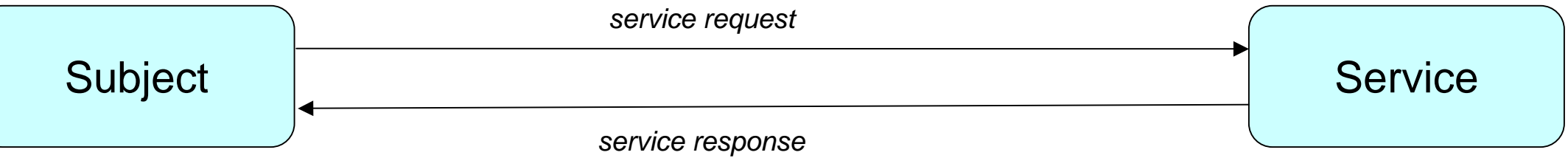
# Architectural Trends (personal non-exhaustive selection)

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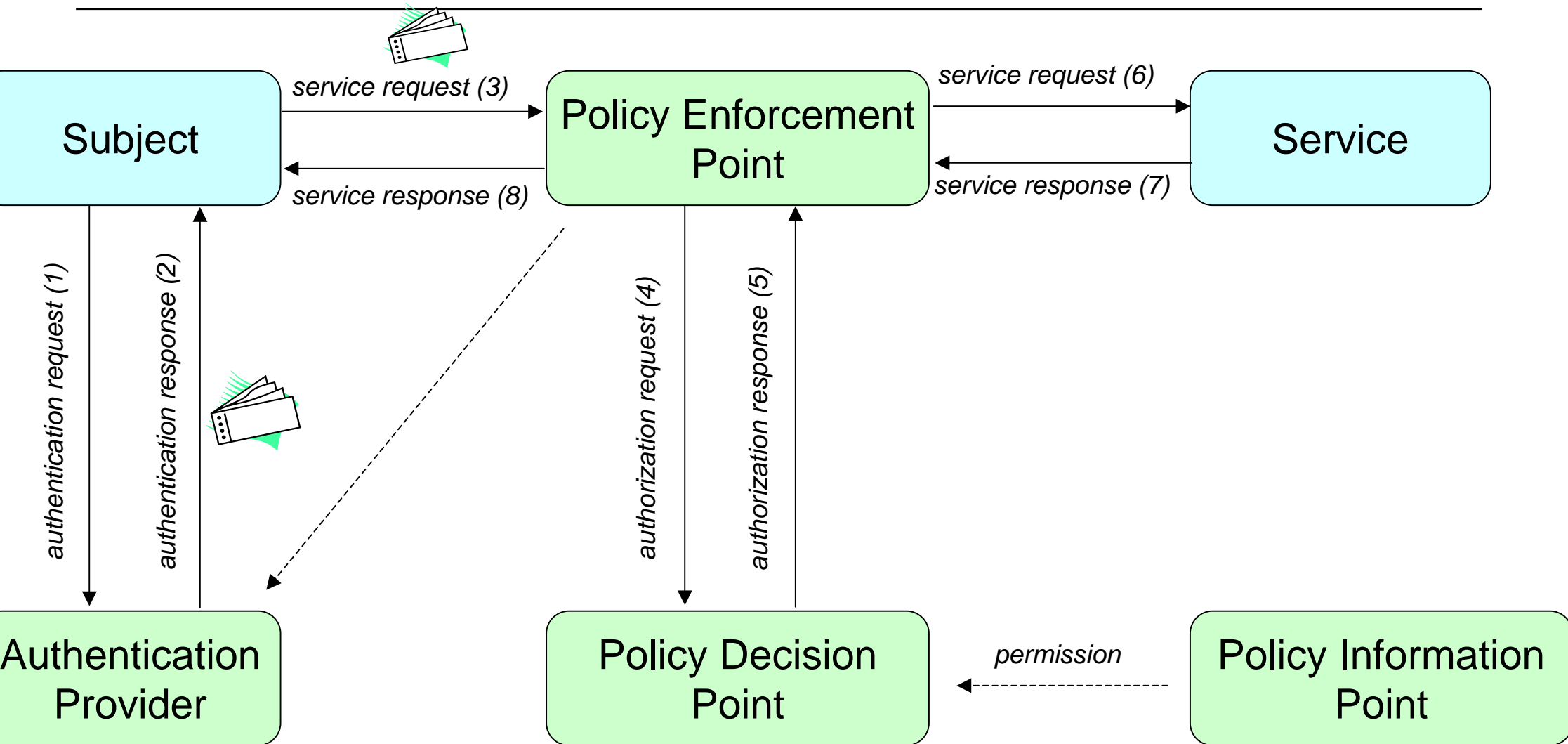
- Design of Open Geospatial SOAs
  - mapping of requirements to the service platform
  - multi-platform architecture including “lightweight” Web services (RESTful services)
- Governance of Open Service Platforms
  - IT level: policy support for **access control**, discovery and service management
  -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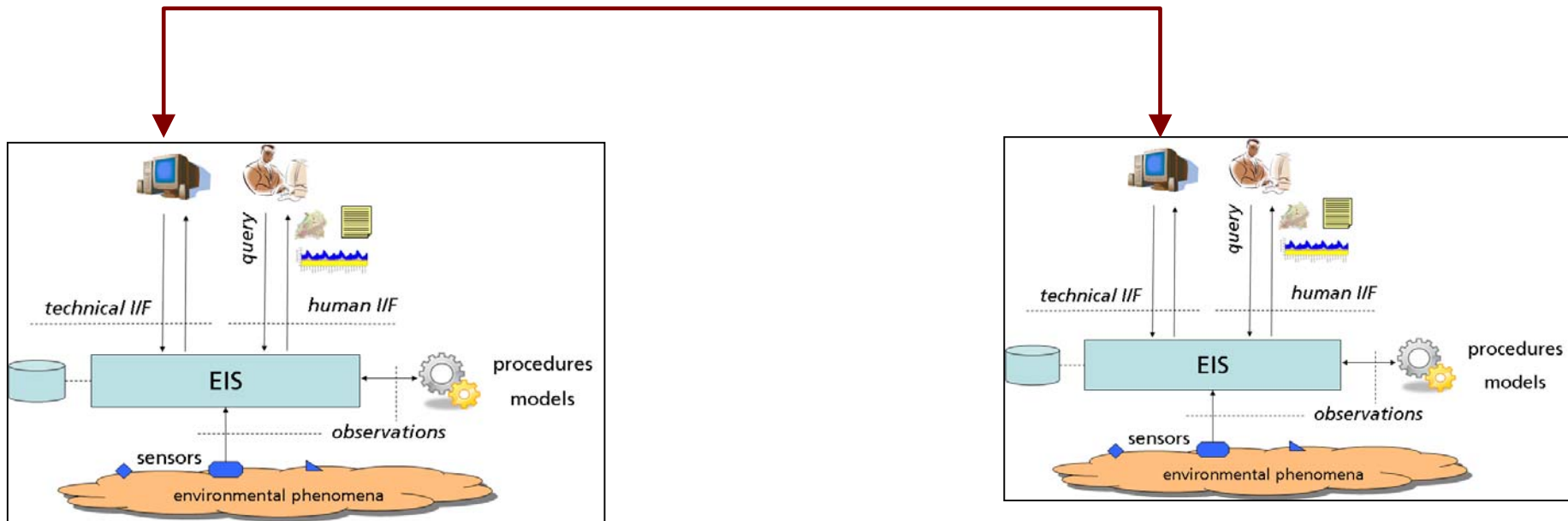
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  - mapping of requirements to the service platform
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  - IT level: policy support for access control, discovery and service management
  - Organisational level: service level agreements
- Semantic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

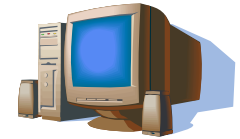
→ discovery, analysis and fusion of information by humans



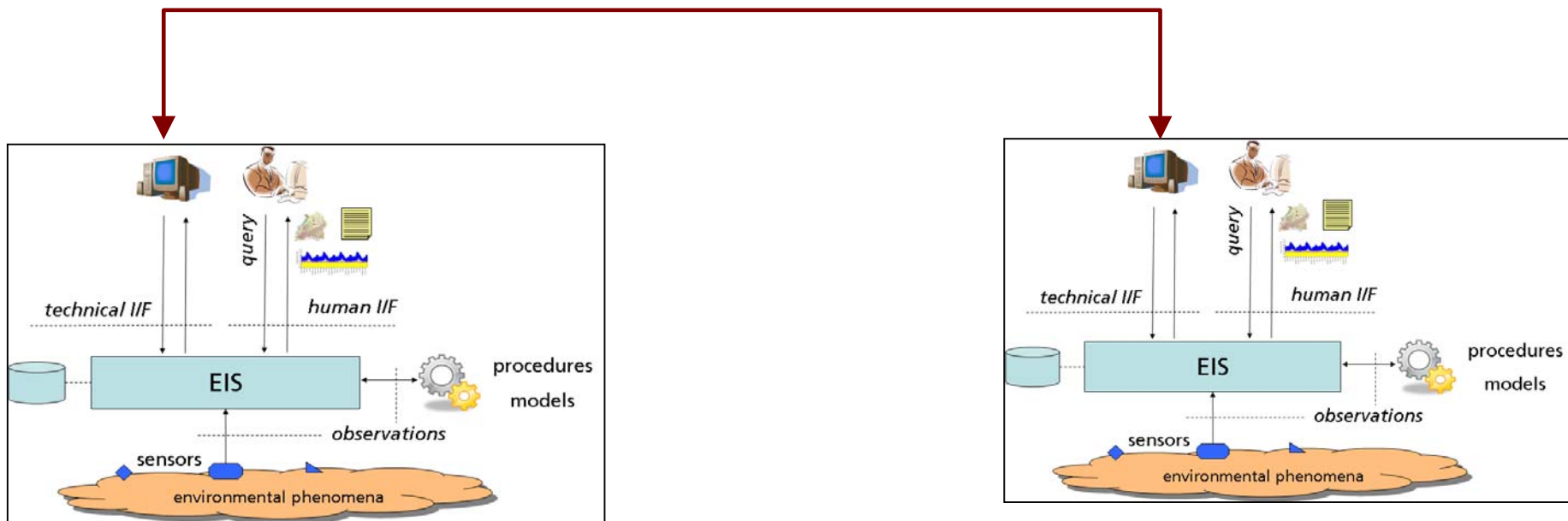
# Semantic Interoperability Challenge (2)

→ Semantic Interoperability

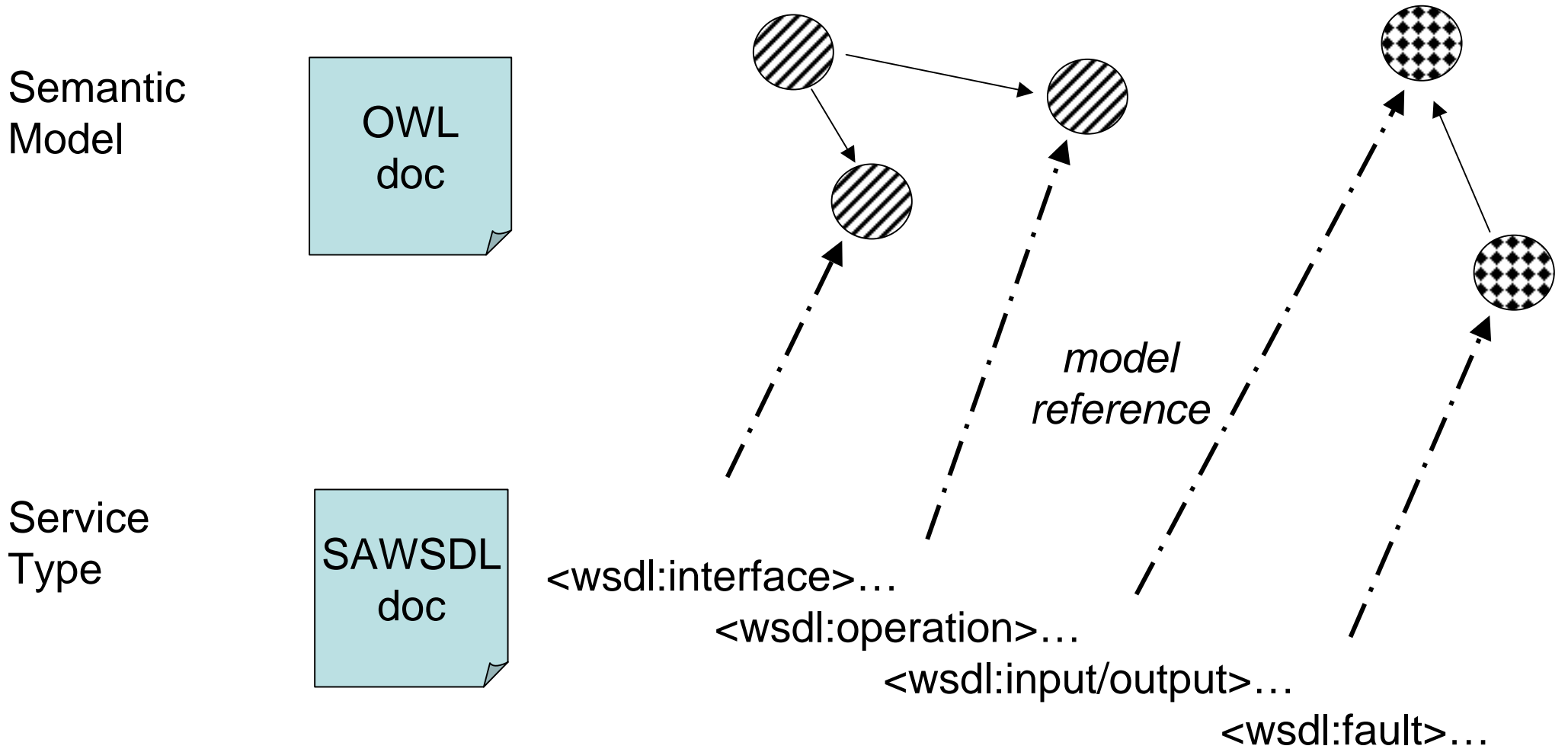
→ information access and exchange



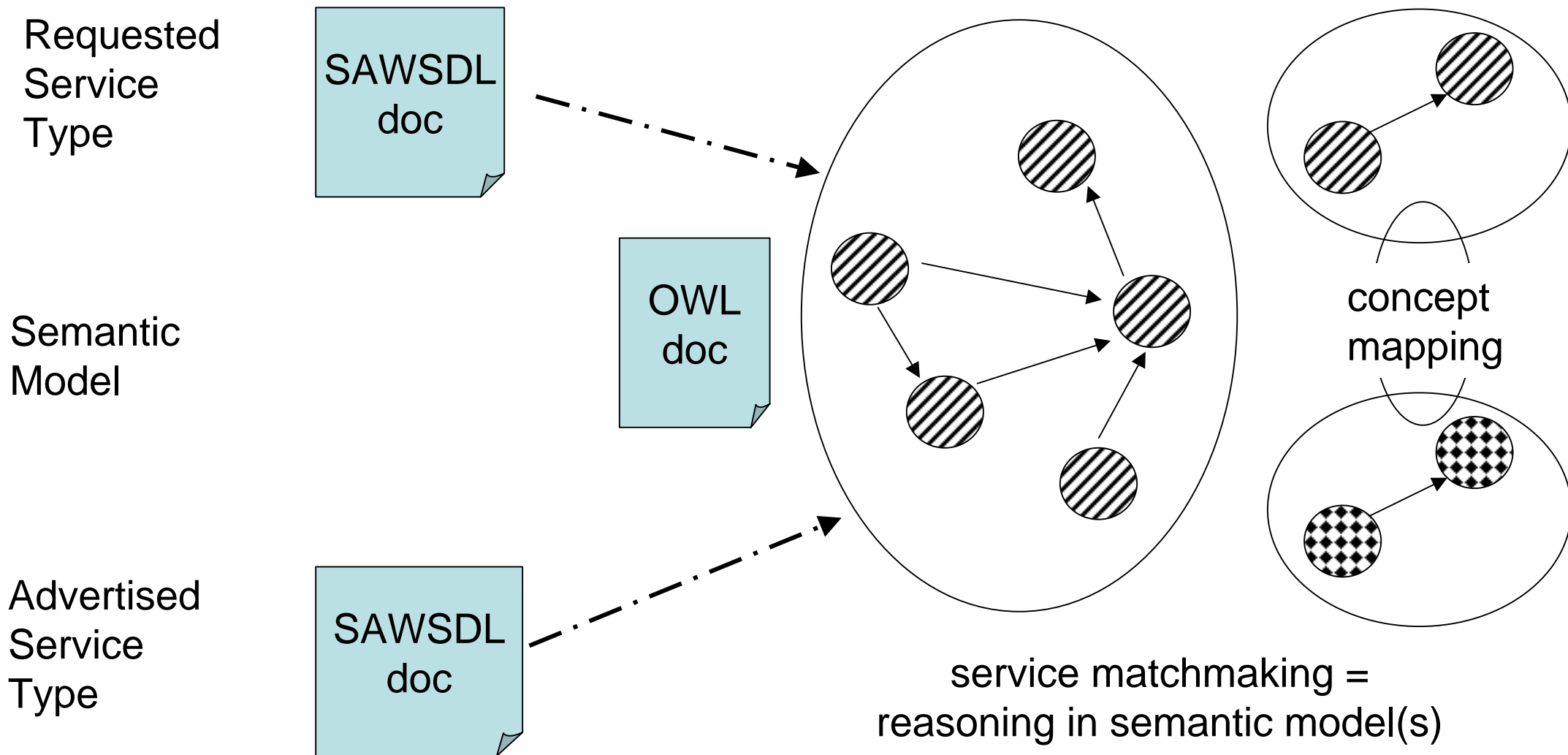
→ discovery, analysis and fusion of information by machines



# Semantic Annotation based upon SAWSDL



# Use of SAWSDL in Resource Discovery



# Conclusion of the Architectural Tour

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- 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

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# Thank you for your attention !

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