Towards a Multi-Style Service-Oriented Architecture for Earth Observations
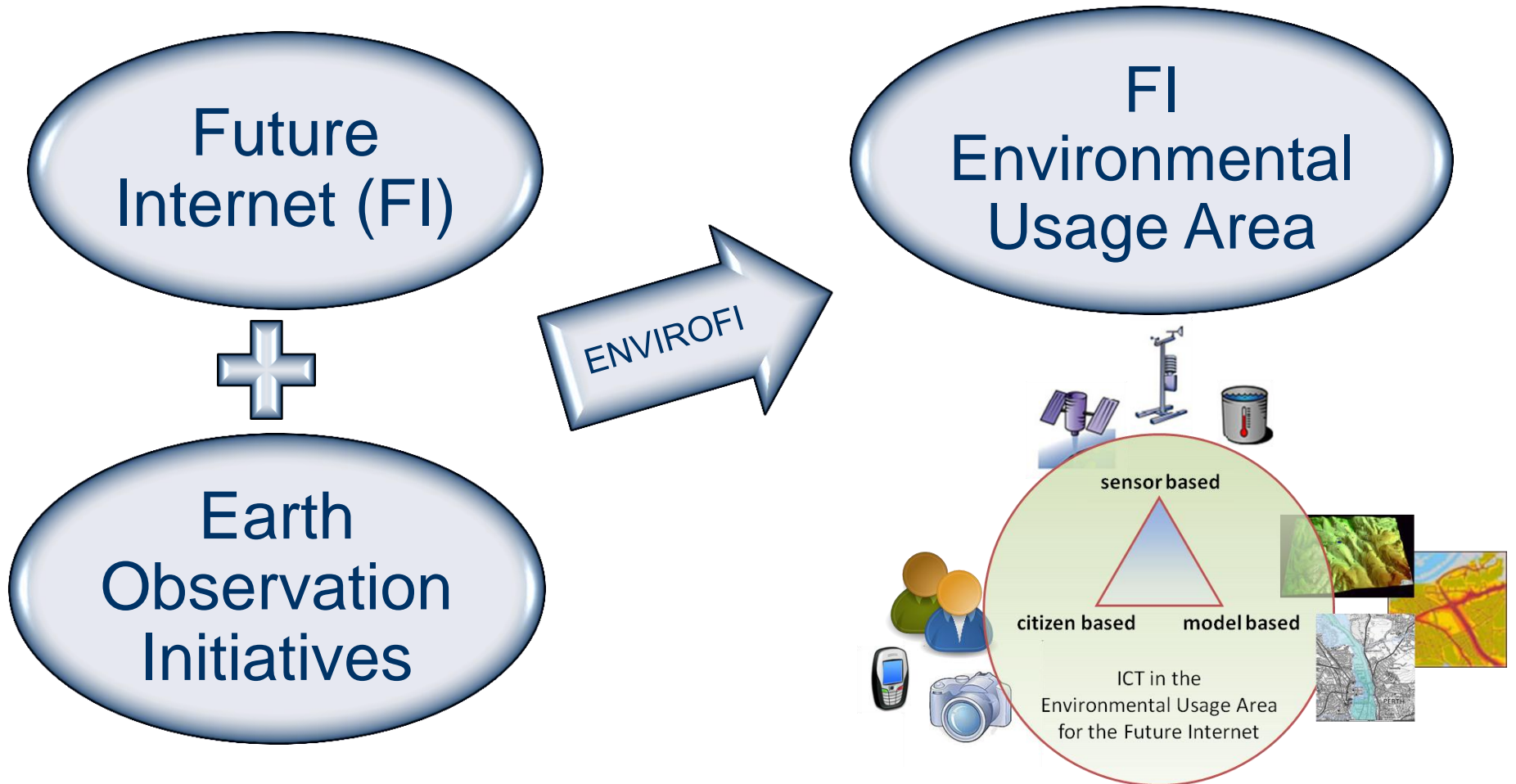

Thomas Usländer, Fraunhofer IOSB
ENVIROFI Team

EGU 2011, Vienna
Session ESSI13/GI-17
6 April 2011

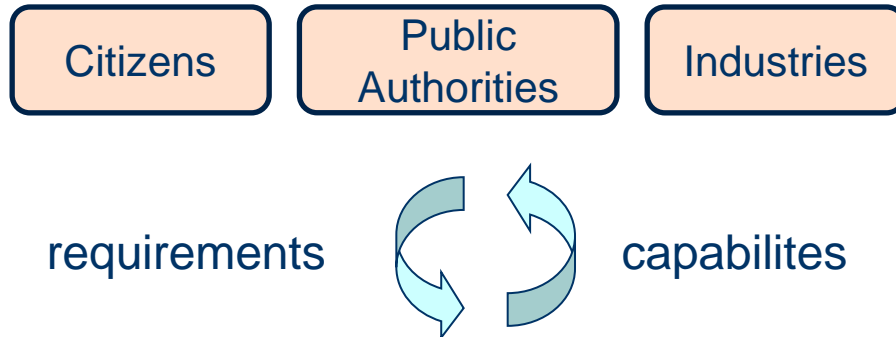# Why ENVIROFI?

ENVIROFI links the Future Internet and on-going initiatives

"ENVIROfying" the Future Internet: Requirements vs. Capabilities

Usage Examples

Citizens

Public Authorities

Industries

requirements ⇄ capabilites

Enablers

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Knowledge and Service Discovery

Sensor Enablement

Semantic Enrichment

Fusion & Modelling

Geospatial Processing

Future Internet Core Platform

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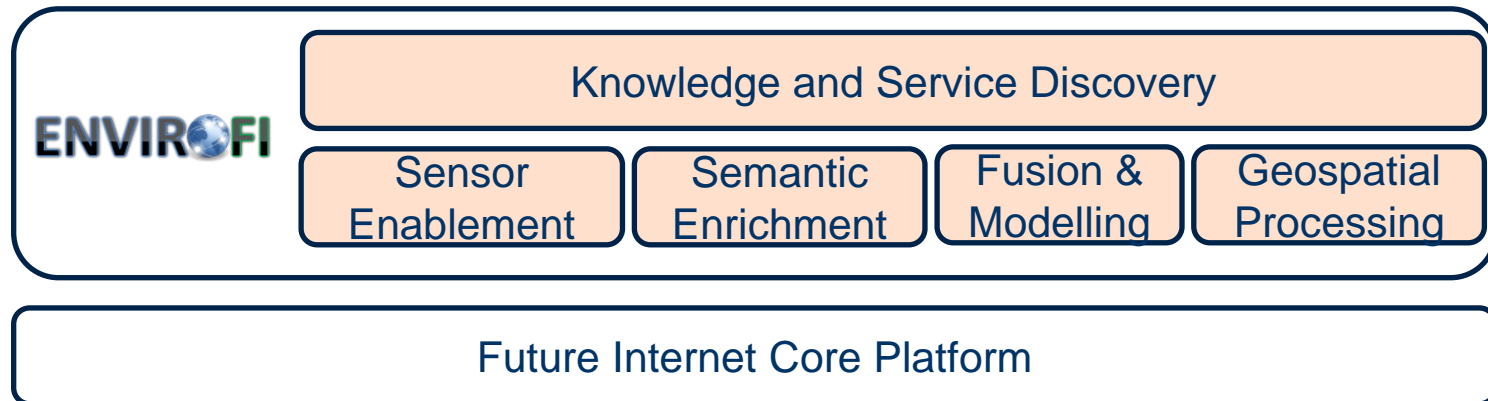
Which Architecture for the Enabling Platform ?

Users

(geospatial)
standards

requirements

reference models

capabilites

Enabling Platform

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Knowledge and Service Discovery

| Sensor Enablement | Semantic Enrichment | Fusion & Modelling | Geospatial Processing |

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Compliance with Standards ?

ISO – International Organization for Standardization

TC/211
19119 NWIP

SensorWeb
Ref.arch

Air

Biodiv

**Various
Standardization
activities**

W3C – WORLD WIDE WEB consortium

OGC – Open Geospatial Consortium, Inc.
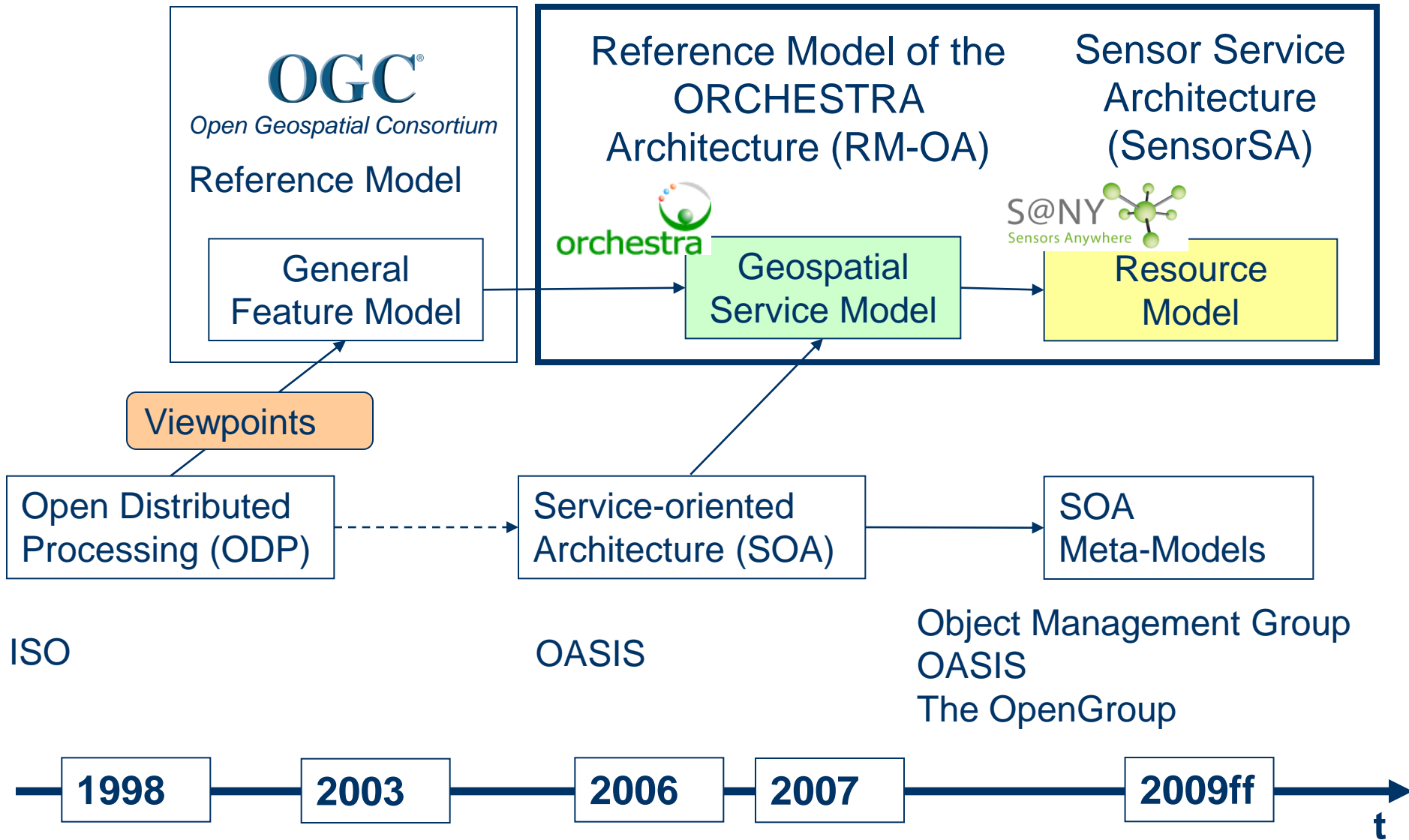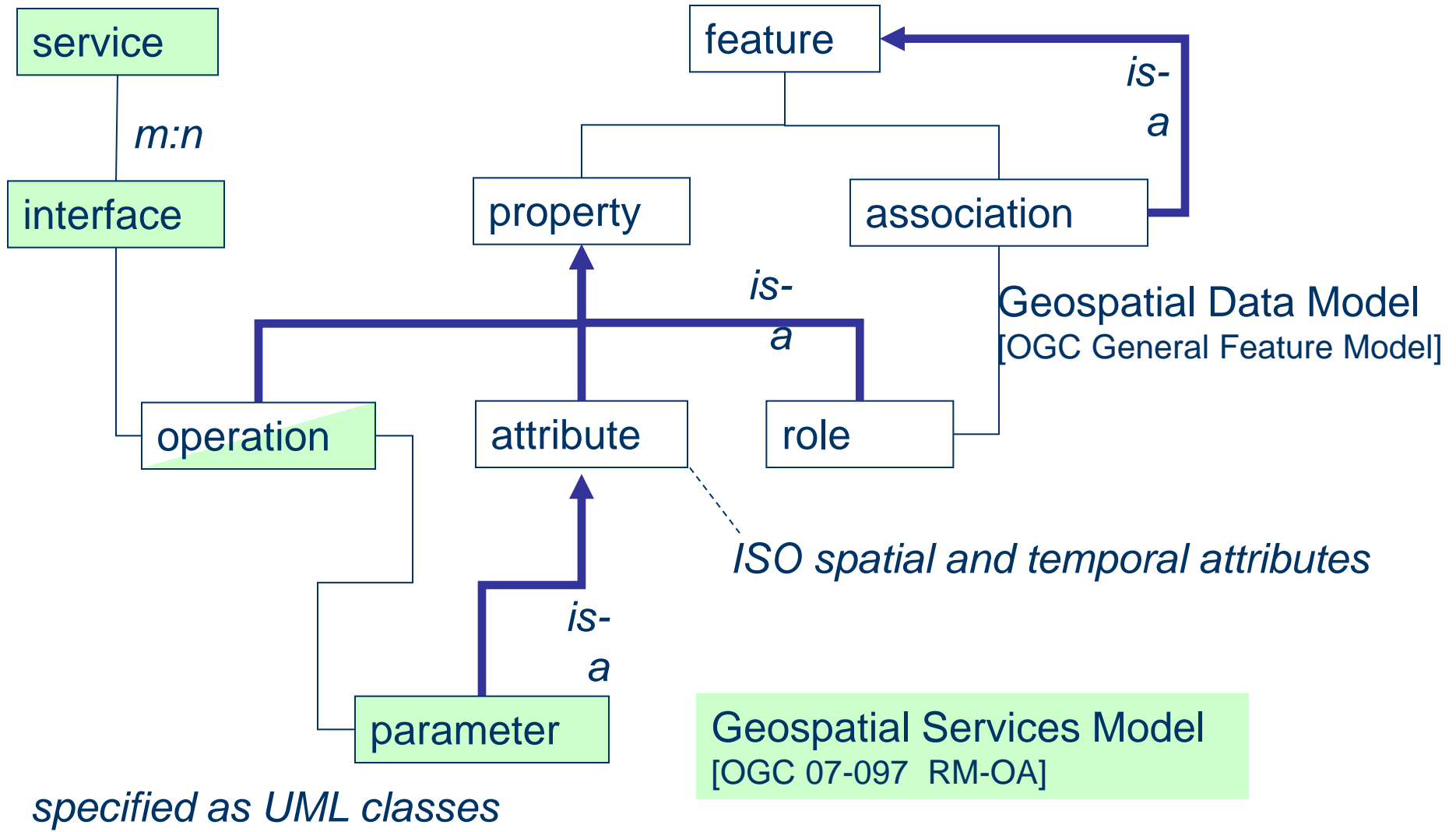
TC/287

SoaML

MetOcean

GMES – Observing our planet for a safer world

cen – European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

OASIS

GEO – GROUP ON EARTH OBSERVATIONS

OMG – OBJECT MANAGEMENT GROUP

SEIS – Shared environmental information system

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Towards a Multi-Style SOA for Earth Observations

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Evolution of SOA Reference Models

OGC®
Open Geospatial Consortium
Reference Model

General Feature Model

Reference Model of the ORCHESTRA Architecture (RM-OA)

orchestra

Geospatial Service Model

Sensor Service Architecture (SensorSA)

S@NY
Sensors Anywhere

Resource Model

Viewpoints

Open Distributed Processing (ODP)

Service-oriented Architecture (SOA)

SOA Meta-Models

ISO

OASIS

Object Management Group
OASIS
The OpenGroup

1998	2003	2006	2007	2009ff

t

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OGC Geospatial Data and Service Models

specified as UML classes

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SANY Resource Model [Usländer, 2009]

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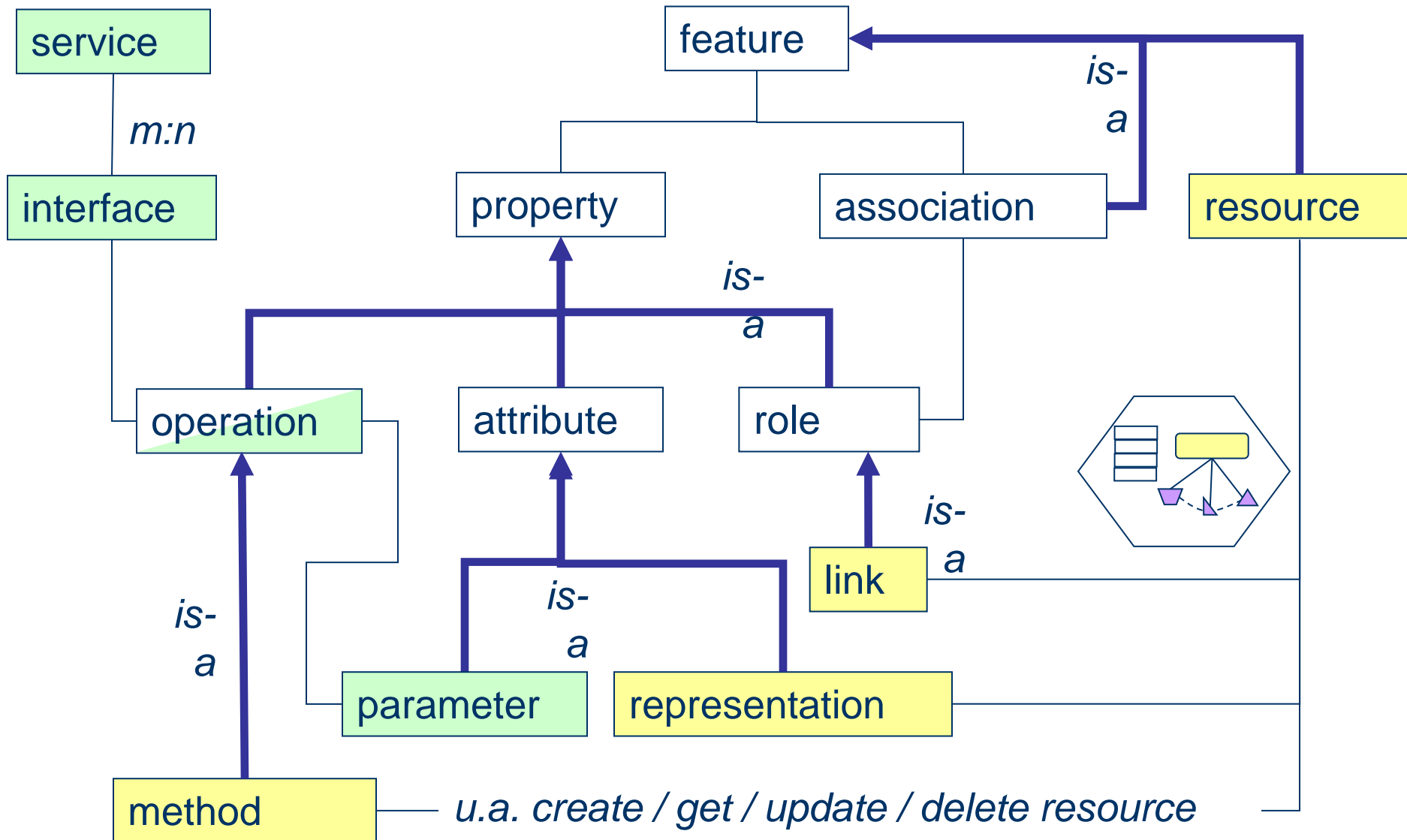
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Challenge (1)

How to characterize an enabling platform architecture ?

Response:

By means of Architectural Styles.

Architectural Styles

Design Patterns

defines

Architectural Style

characterizes
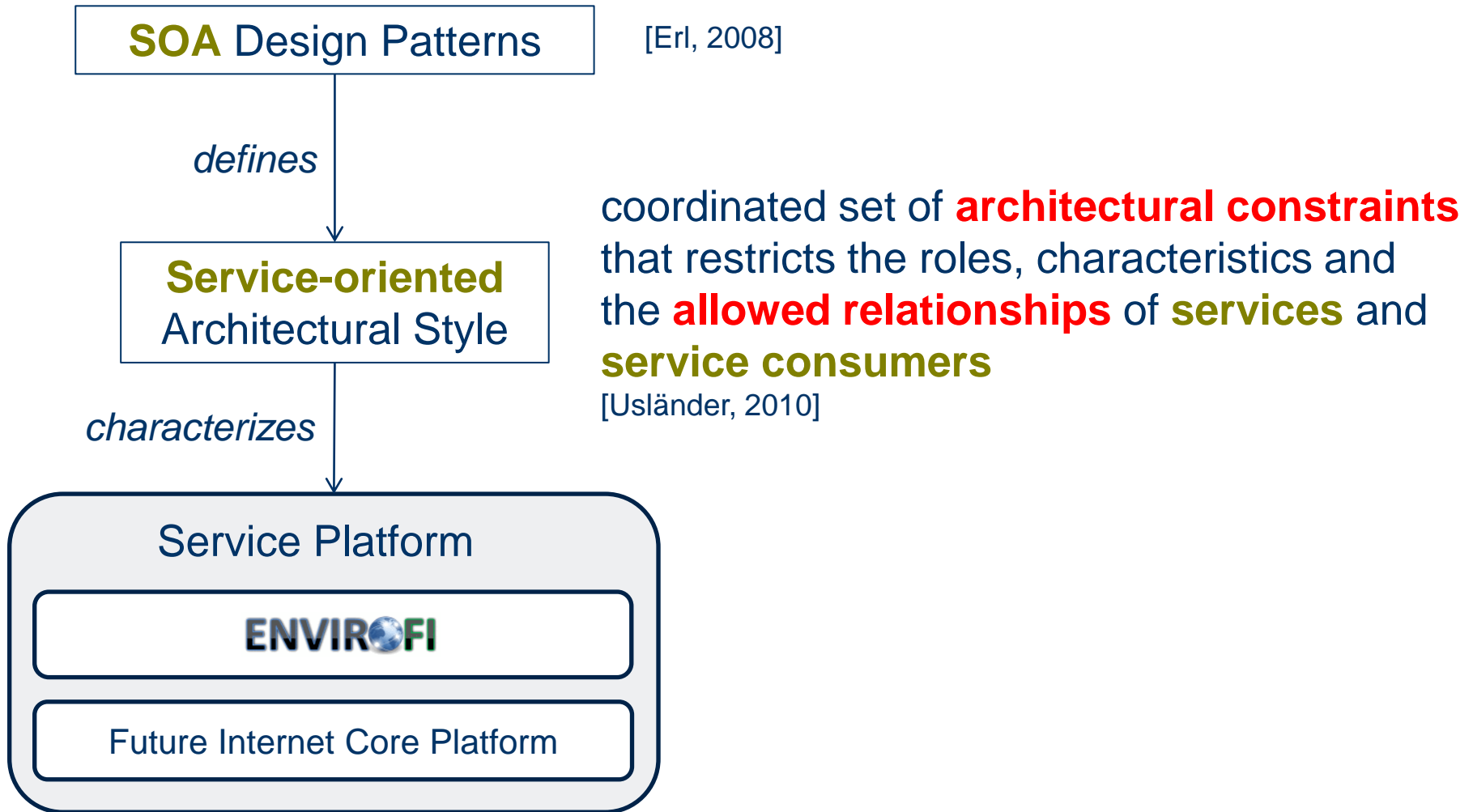
Enabling Platform

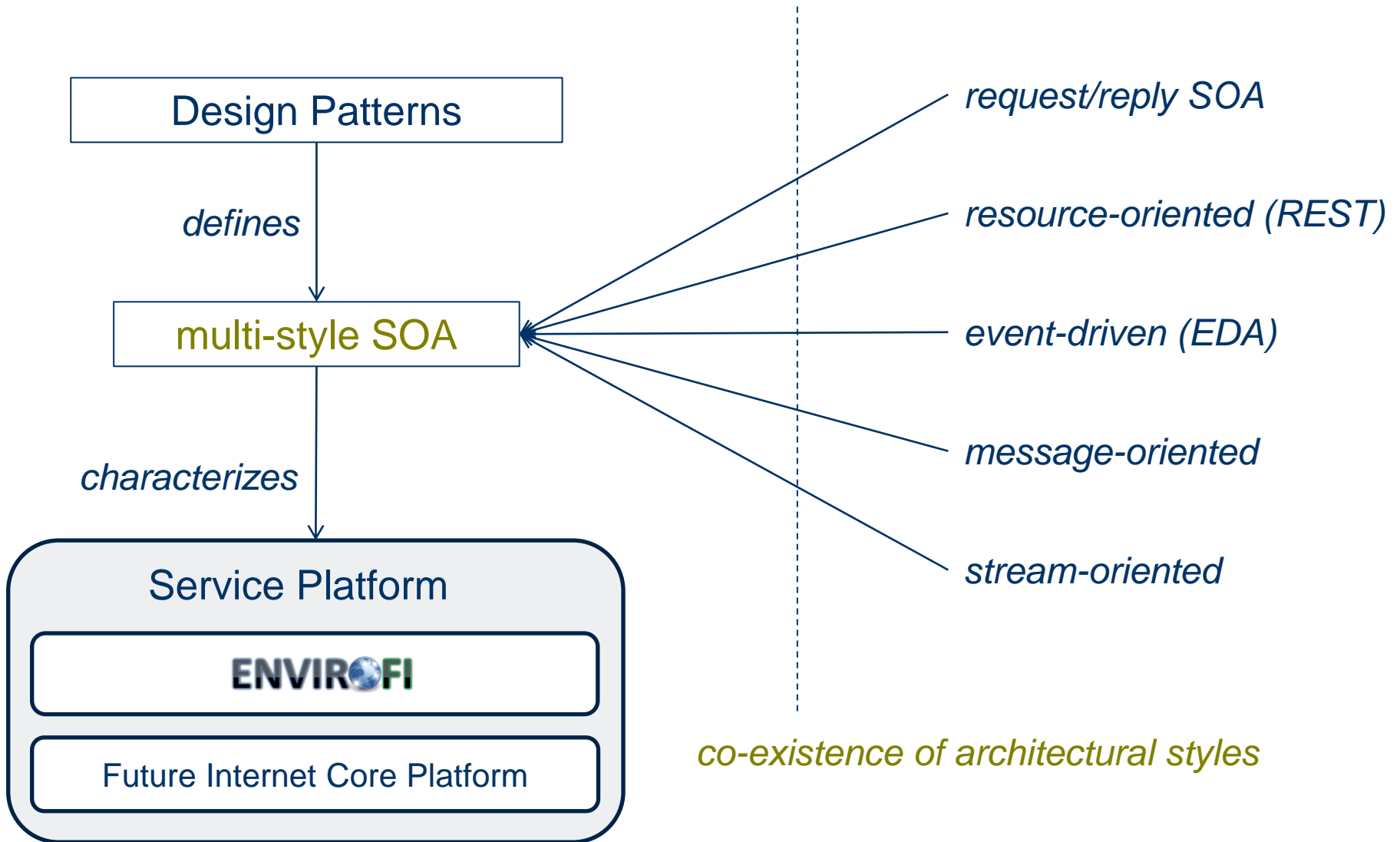ENVIROFI

Future Internet Core Platform

coordinated set of **architectural constraints** that restricts the roles/characteristics[features] of **architectural elements** and the **allowed relationships** among those elements
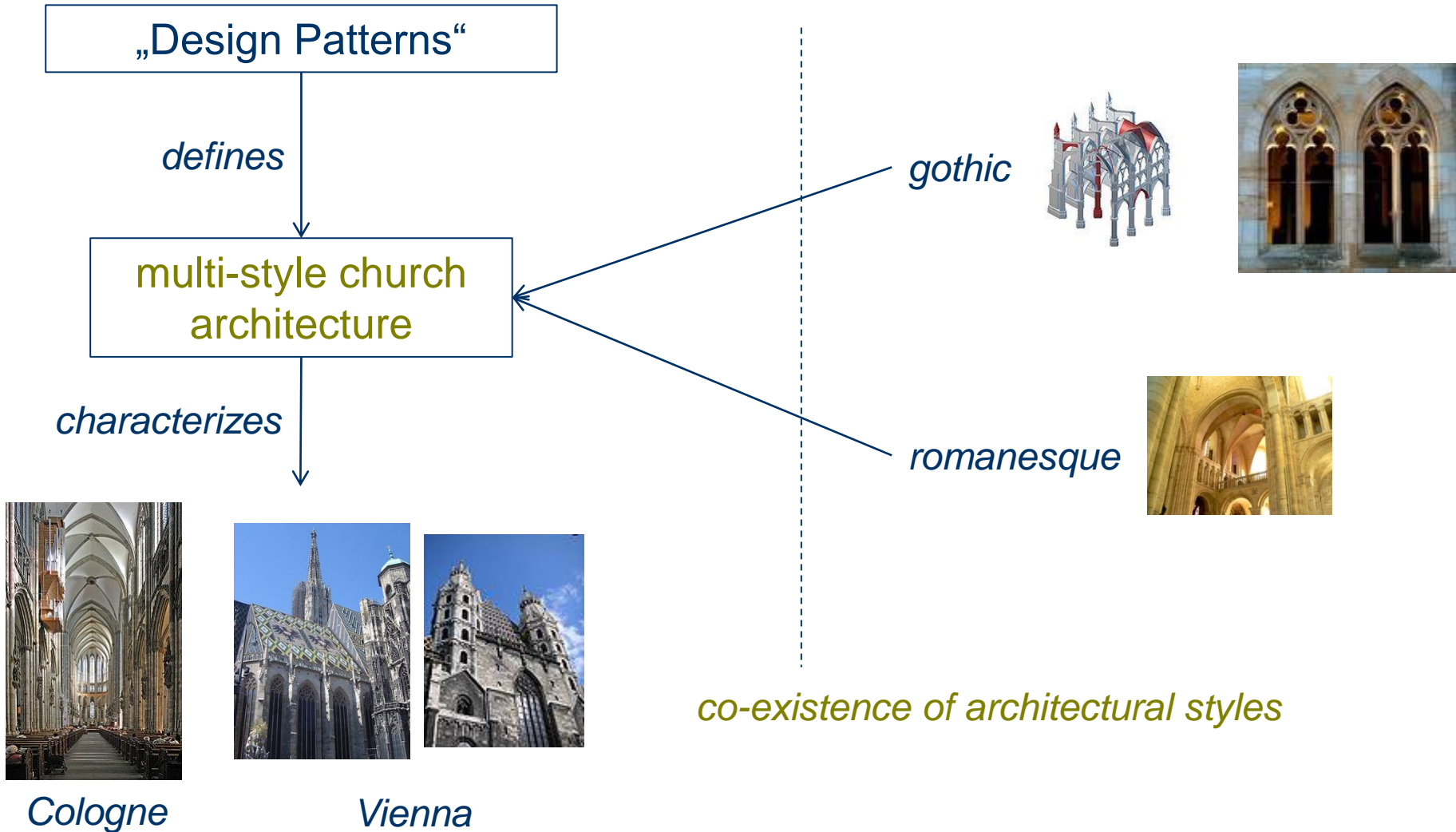[Fielding, 2000]

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Service-oriented Architectural Styles

SOA Design Patterns   [Erl, 2008]

defines

coordinated set of **architectural constraints** that restricts the roles, characteristics and the **allowed relationships** of **services** and **service consumers**
[Usländer, 2010]

Service-oriented Architectural Style

characterizes

Service Platform

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Multi-style SOA

Design Patterns

defines

multi-style SOA

characterizes

Service Platform

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request/reply SOA

resource-oriented (REST)

event-driven (EDA)

message-oriented

stream-oriented

co-existence of architectural styles

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Analogy: Multi-style Church Architecture

„Design Patterns"

defines

multi-style church architecture

characterizes

gothic

romanesque

co-existence of architectural styles

Cologne

Vienna
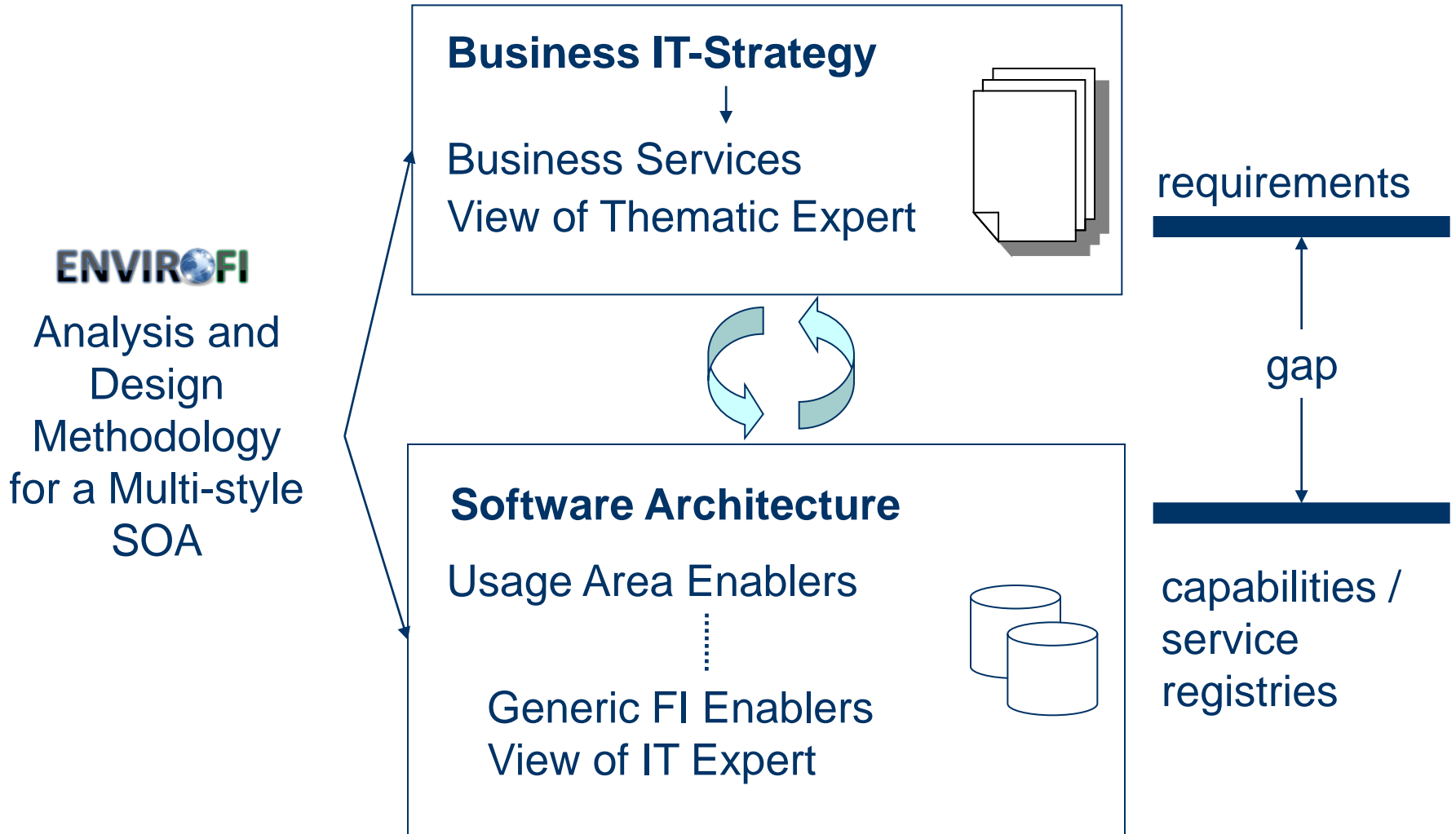
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Challenge (2)

How to map requirements to capabilities in a systematic way ?

Response:

There is a need for an Analysis and Design Methodology for a multi-style SOA.

Basis: extended use case descriptions [Cockburn, 2001]

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Need for an Analysis and Design Methodology

Analysis and Design Methodology for a Multi-style SOA

Business IT-Strategy

Business Services
View of Thematic Expert

requirements

gap

Software Architecture

Usage Area Enablers

Generic FI Enablers
View of IT Expert

capabilities / service registries

Challenge (3)

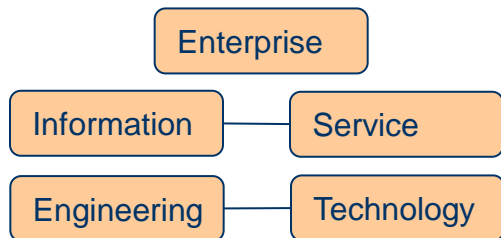How to edit the Architecture Document ?

Response:

Iterative documentation according to an interpretation of the viewpoints of the ISO Reference Model for Open Distributed Processing (RM-ODP).

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Documentation according to RM-ODP Viewpoints

(1) Iterative Design

(2) Incremental Edition of Architecture Viewpoints
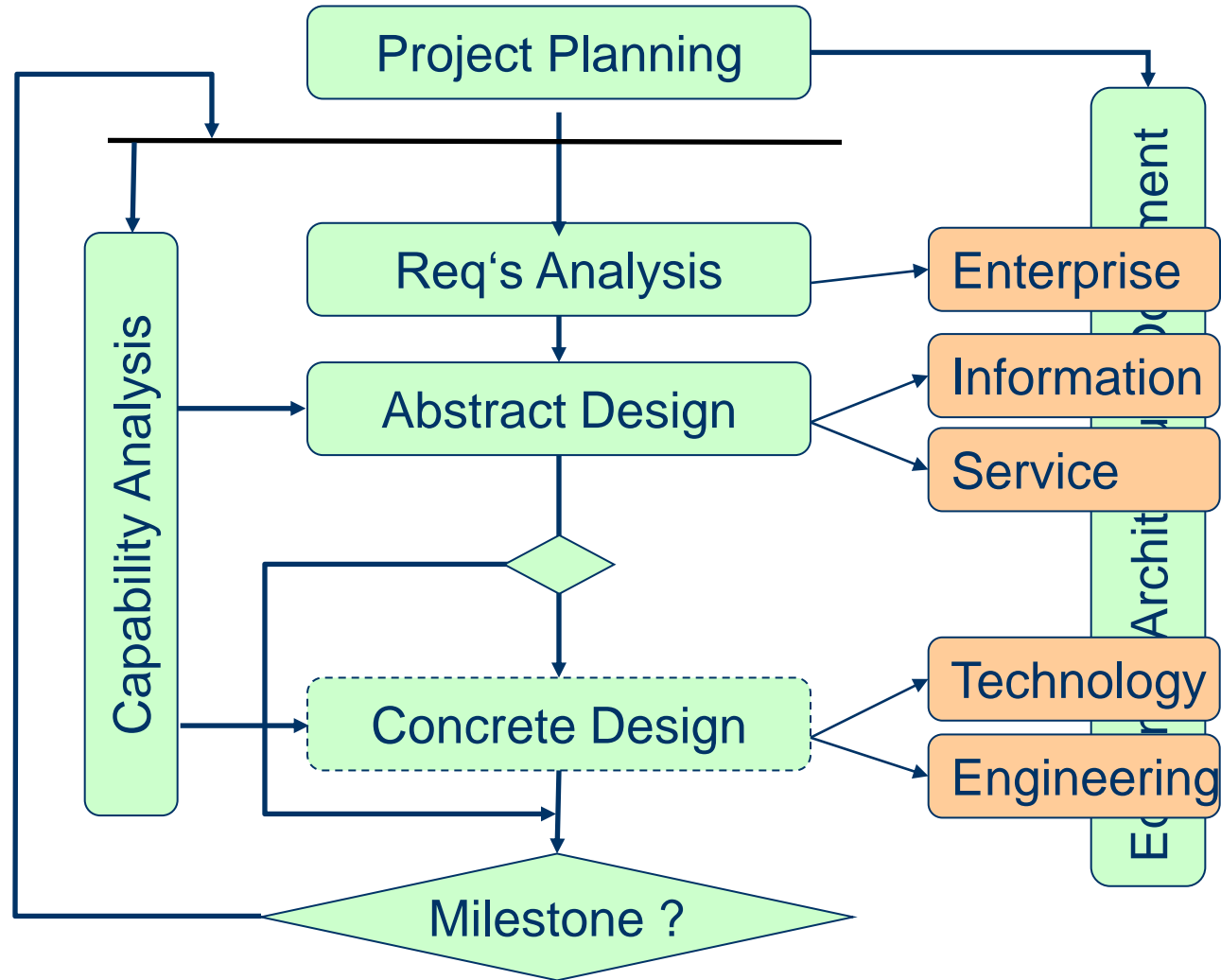
THANK YOU FOR YOUR ATTENTION

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