Standardisation in Interoperability

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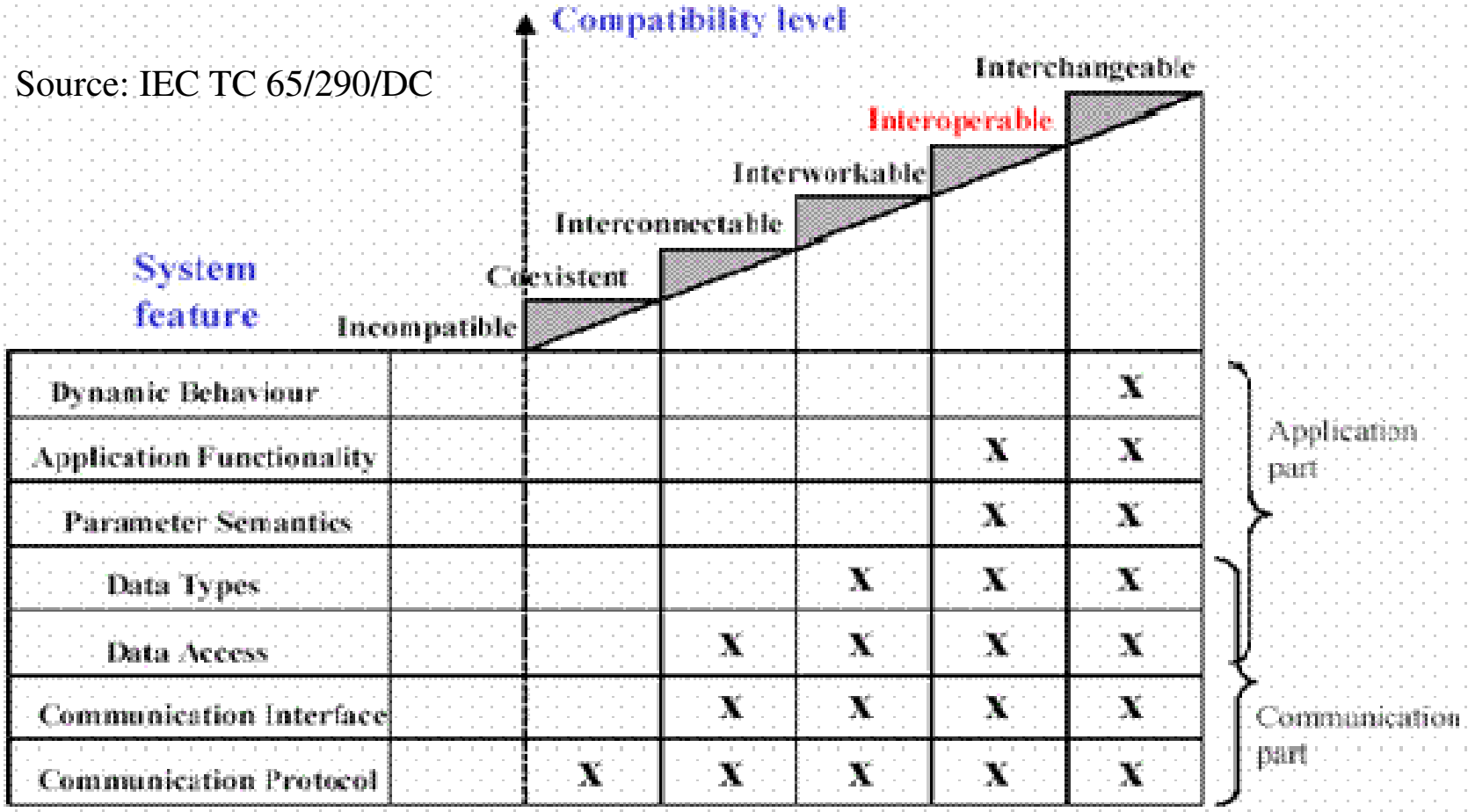
Needs for Interoperability

- Introduction of IT in industry has lead to a plethora of heterogeneous business applications
- R&D efforts on application integration provided only marginal solutions due to the continuous evolution of business systems
- New challenges appear through business globalisation with needs for short response times in business communication, coordination, cooperation and collaboration.

Compatibility Levels

Source: IEC TC 65/290/DC



System feature	Incompatible	Coexistent	Interconnectable	Interworkable	Interoperable	Interchangeable
Dynamic Behaviour						X
Application Functionality					X	X
Parameter Semantics					X	X
Data Types				X	X	X
Data Access			X	X	X	X
Communication Interface			X	X	X	X
Communication Protocol		X	X	X	X	X

Interoperability and Standardisation

Standards are of key importance to enable enterprise interoperability

But !

How to achieve interoperability ?

Interoperability and Standardisation

- Through the creation of (ISO 14258)
  - Integrated environments
    (to make a whole prior to execution)
  - Unified environments
    (to make alike prior to execution)
- Through specific support of
  - Federated environments
    (to support execution through a priory defined profiles)

Interoperability and Standardisation

- Integrated
  - Models: use of common modelling language
    (ISO EN 19440, CEN/ISO 11354 NWI)
  - Applications and Processes:
    use of common programming language
    (ODP Enterprise language)

Interoperability and Standardisation

- Unified
  - Models: use of common meta model
    (CEN/ISO 11354 NWI, UEML)
  - Applications and Processes:
    use of common syntax and semantic
    (UEML)

Interoperability and Standardisation

- Federated
  - Models: use model profiles
    (CEN/ISO 11354 NWI, ISO 16100)
  - Applications and Processes:
    use application and process profiles
    (ISO 15745, ISO 16100)

Interoperability and Standardisation

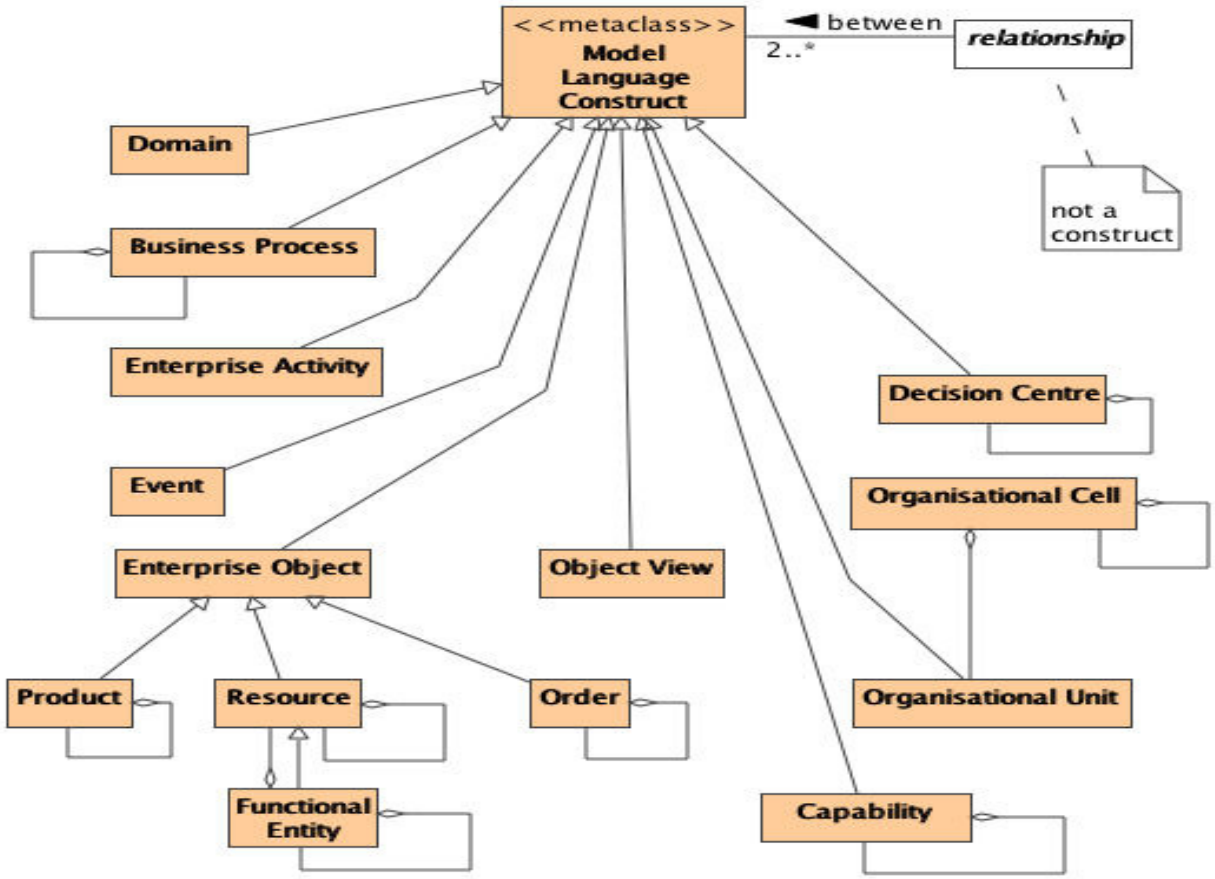
- CEN/ISO 19440

  Language Constructs for Enterprise Modelling

  defines a set of fourteen language constructs for enterprise modelling together with their definitions and descriptions and identifies their relations to the four basic model views (Function, Information, Resource, Organisation). The latter allow to reduce model complexity during the modelling process.

Interoperability and Standardisation

CEN/ISO 19440 *Language Constructs for Enterprise Modelling*



Interoperability and Standardisation

- ISO 15745 (multiple part standard)

  Open systems application integration frameworks

  ….outlines an Application Integration Framework (AIF) - a set of elements and rules for describing profiles, which will enable a common environment for integrating applications and provide for developing templates for Application Interoperability Profiles (AIPs), and their component profiles - process profiles, resource profiles, and information exchange profiles.

Interoperability and Standardisation

ISO 15745 *Open systems application integration framework*

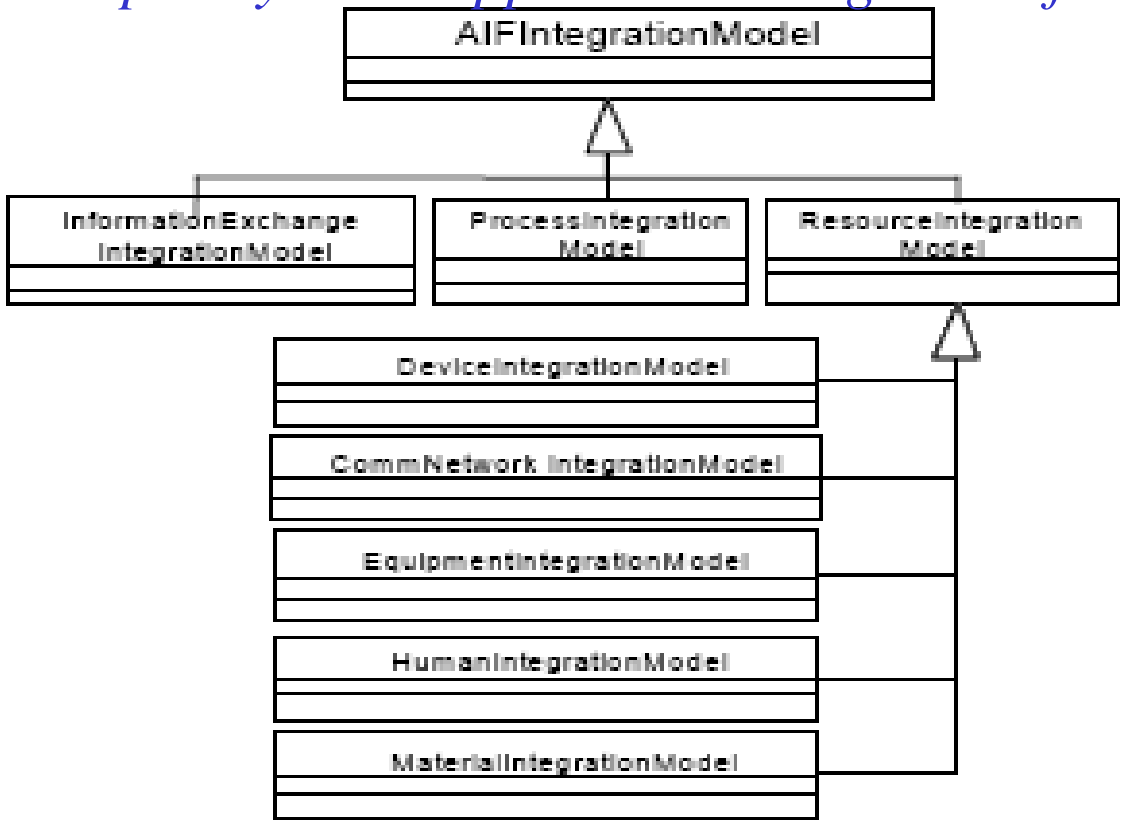


Figure 7 - Classes of AIF Integration Model

AIF = Application Integration Framework

Interoperability and Standardisation

ISO 15745 *Open systems application integration framework*

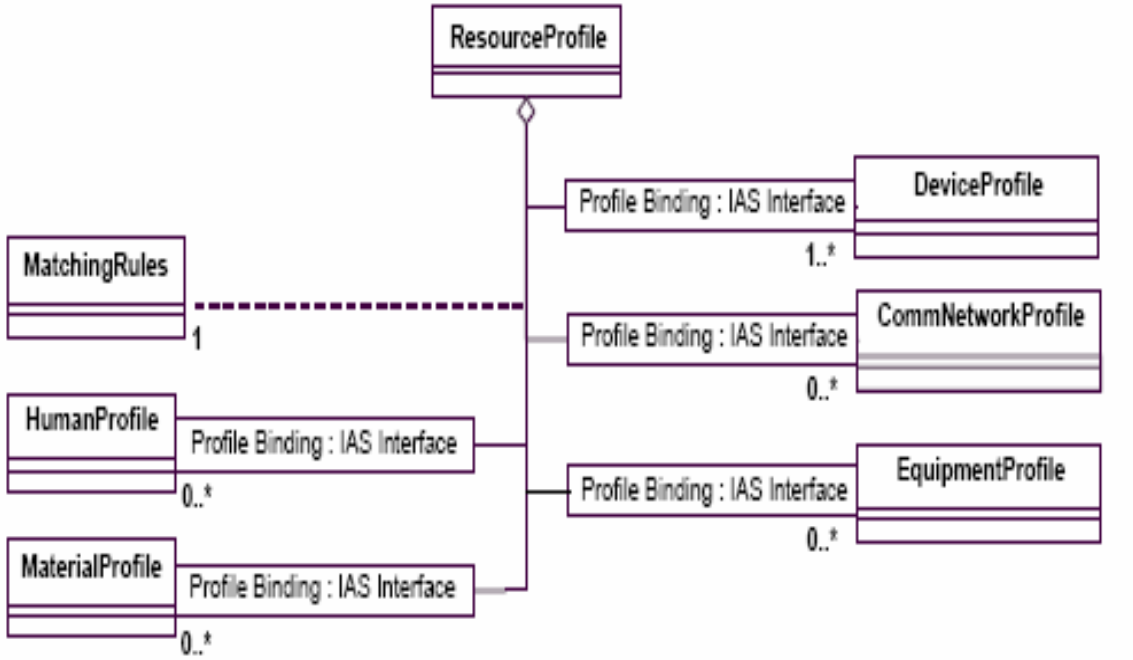


Figure 11 - Composition of Resource Profile

Interoperability and Standardisation

- CEN/ISO 16100 (multiple part standard)

  Manufacturing software capability profiling for interoperability

  ..specifies a framework for the interoperability of a set of software products used in the manufacturing domain. To facilitate integration into manufacturing applications and a methodology for constructing profiles of manufacturing software capabilities and requirements for interface services and protocols used to access and edit capability profiles and associated templates used in the capability profiling method.

Interoperability and Standardisation

CEN/ISO 16100: Interoperability requirements to exchange information:

- to describe software capability in unambiguous terms to enable common understanding;
- to offer business benefits delivered by components providing the software capability;
- to find candidate software components with certain capabilities automatically using web search engines;
- to express the dependencies of one software component on other software components in terms of their capabilities;
- to manage the implications of a manufacturing application change on a software capability.

Interoperability and Standardisation

- CEN/ISO 16100 *Manufacturing software capability profiling for interoperability*

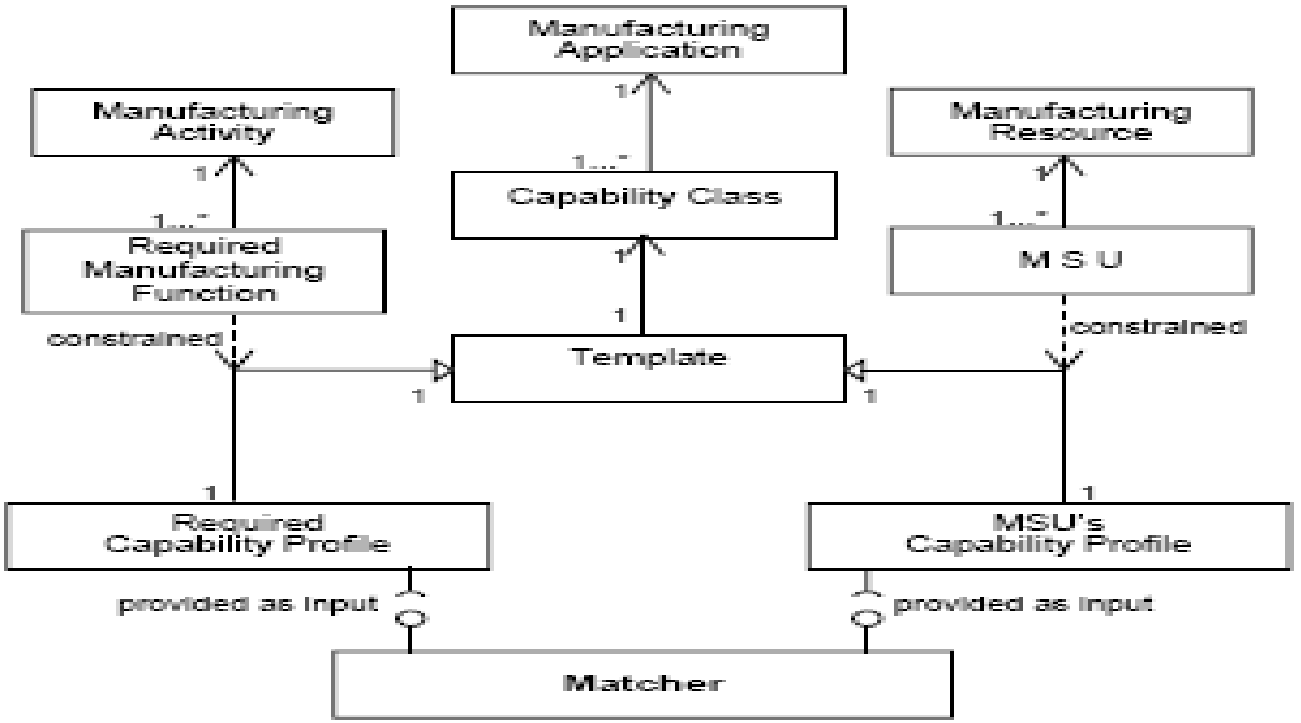


Figure 3 — Matching capability profiles

Interoperability and Standardisation

- CEN/ISO 11354 NWI (New Work Item)

  Requirements for establishing manufacturing enterprise process interoperability

  specifies requirements for interoperation both within and between operational environments of manufacturing enterprises.

  It defines an interoperability framework and specifies requirements for processes and underpinning metadata that must be in place to establish solutions to various concerns of interoperability (business, processes, services, data).

  It describes the particular requirements of different types of environments (unified, integrated, and federated).

  It focuses on requirements to enable communication rather than defining the communication itself, and is thus independent of specific technologies.

Interoperability and Standardisation

INTEROPERABILITY FRAMEWORK

Three basic dimensions:

- **Interoperability concerns**
  represent interoperability concerns between two enterprises

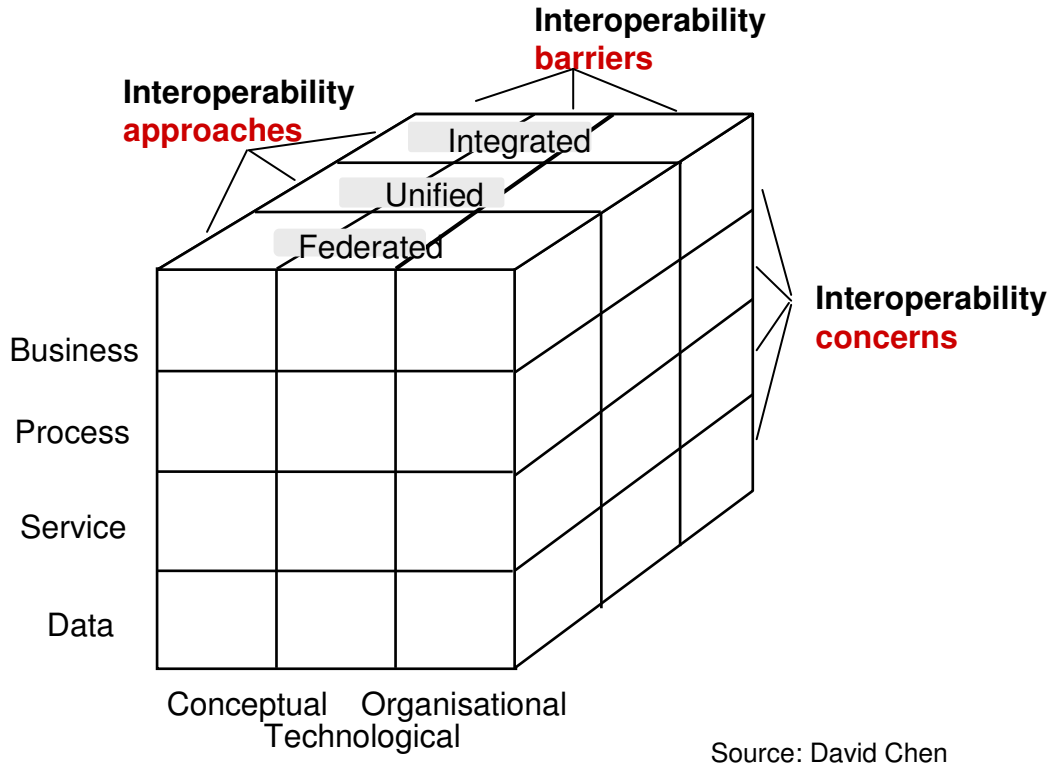
  Data, Service, Process, Business

- **Interoperability barriers**
  represent incompatibilities between two enterprises

  Conceptual, Technological, Organizational

- **Interoperability approaches**
  represent the ways in which the barriers are removed

  Integrated, Unified, Federated

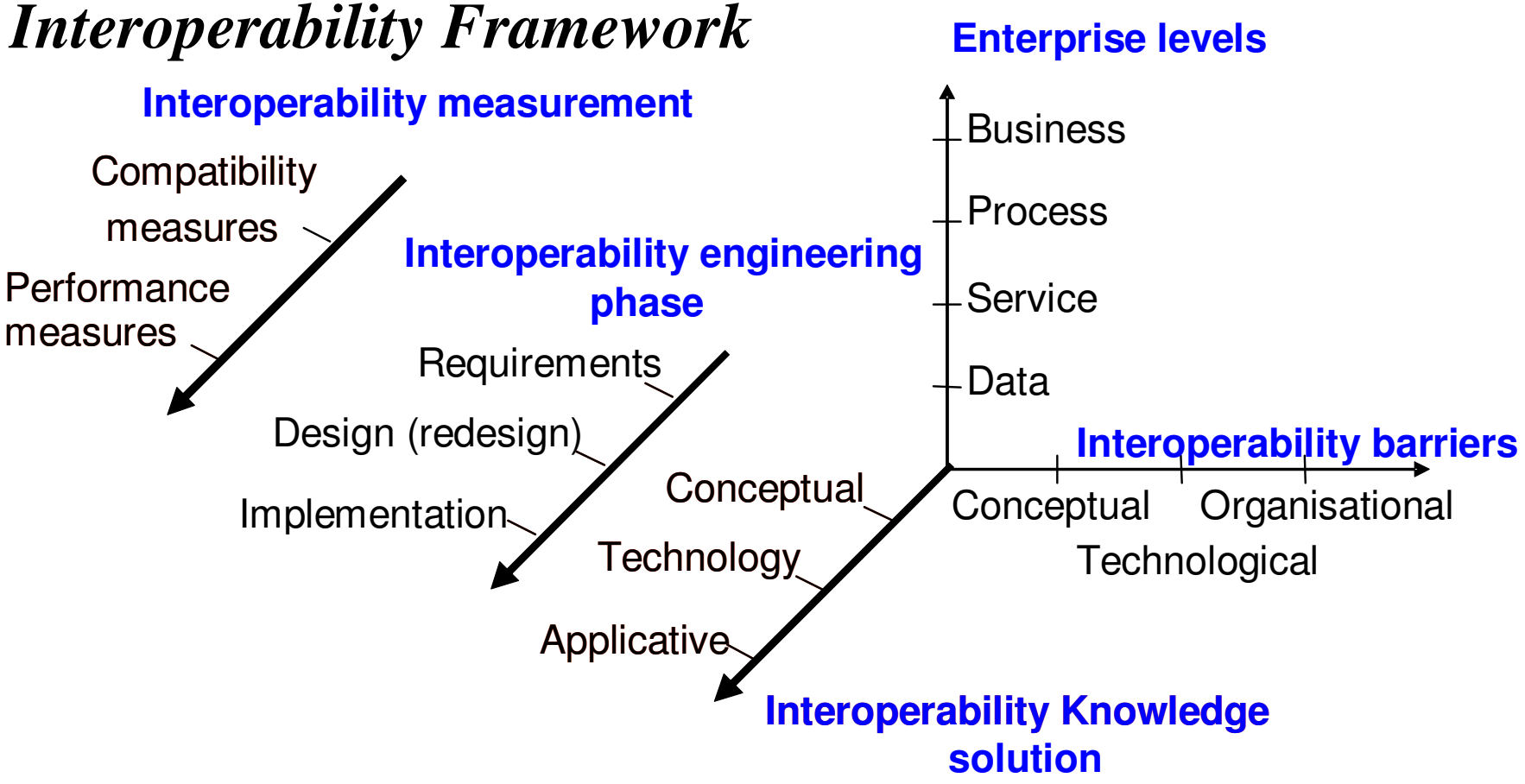


Source: David Chen
INTEROP-NoE
Final Presentation, 2007

Interoperability and Standardisation

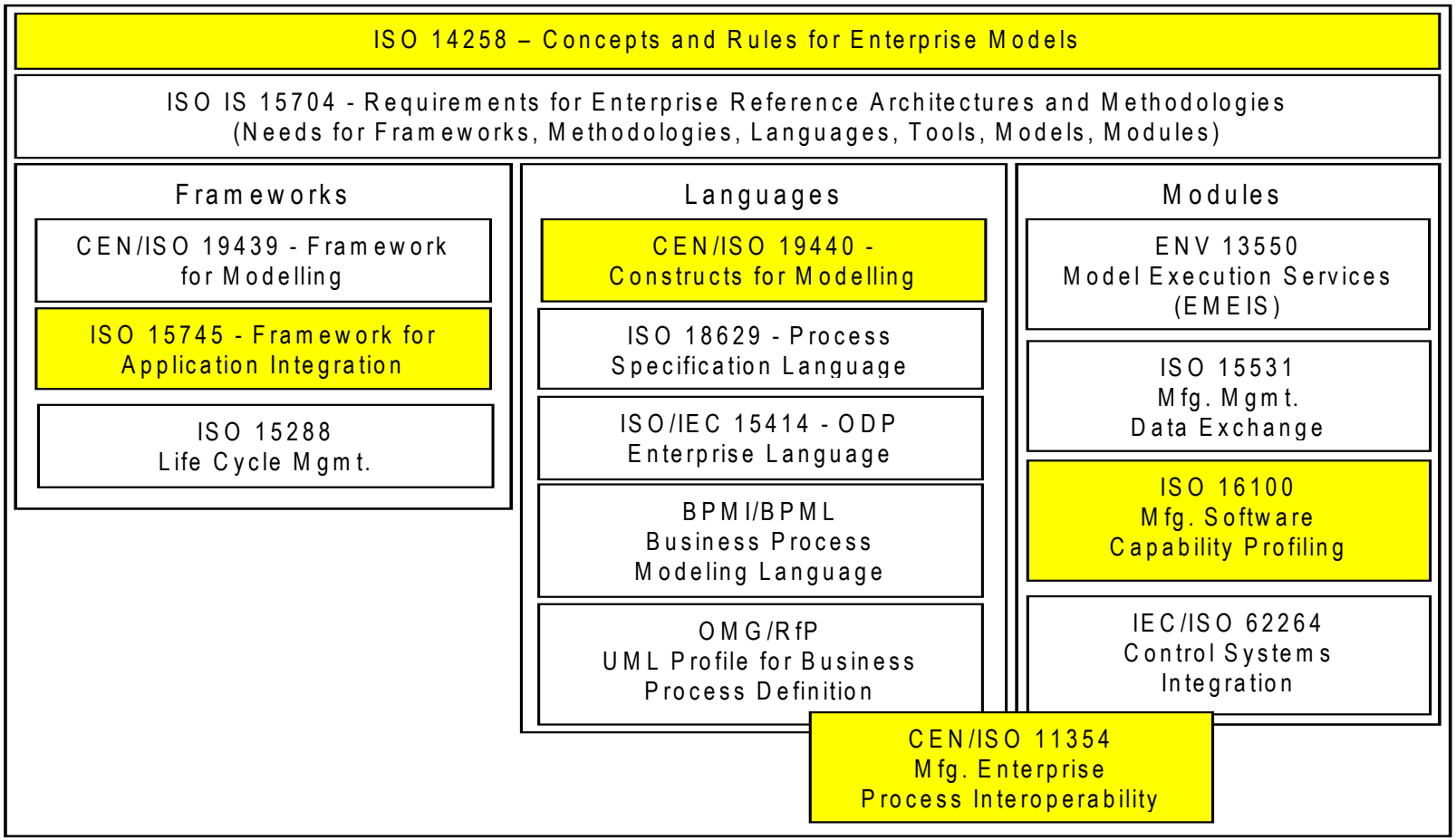
CEN/ISO 11354 NWI (continued)

Interoperability Framework



Interoperability and Standardisation

Related standards

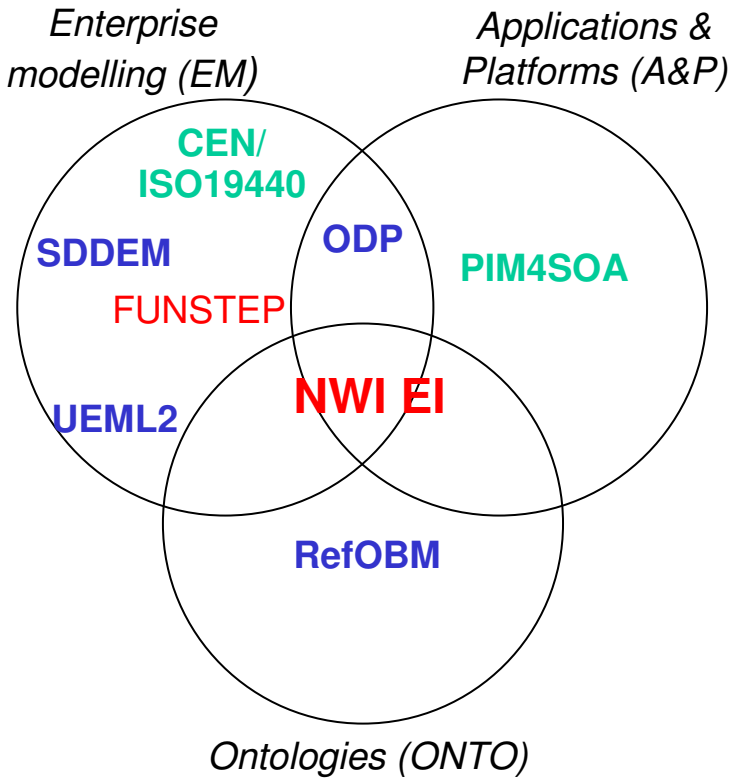


INTEROP-VLab Standardisation Strategy

- VLab has the goal to influence standards of enterprise interoperability
- Benefits
  - More visibility and awareness of interoperability standards
  - Publication opportunities for work on related standardisation (I-ESA'08, other conferences, journals, Web portals, …)
  - Competitive advantage (Industry partners)

Work Items

- Focus on the EI standardisation items, identified in the INTEROP / ATHENA project
- These items are of different readiness (red – most developed, green - available standards, blue - potential)
- Prepare implementation via active participation in the respective SDOs



Source: INTEROP Deliverable D11.6, with modifications

INTEROP-VLab Action plan

- Identification of and contacts with VLab members to be actively involved in SDOs
- Nomination of INTEROP results to be brought to NWIP EI status together with VLab members to be involved
- Dissemination via INTEROP-VLab Newsletter, events…
- Invited session at I-ESA'08: *Standardisation of Interoperability* (with yearly follow-on)
- Presentation of demonstrators (Automotive…)

Long term impact

- On standardisation through
  - efficient collaboration between research in VLab and Poles and international standardisation organisations and
  - introduction of New Work Item Proposals (NWIP)
- On industry use of standards through guidance on relevant standards
- On research-industry collaborations through faster and better set-ups according to identified Vlab strategies

Conclusion

- Standardisation can strongly enhance enterprise interoperability
- However, the current state of standardisation is not yet sufficient to allow easy implementation at the operational level.
- Many of the standards are still on the conceptional level and more details are still required to make them truly useable in the operation.
- Work is required
  - in areas of languages and supporting platforms, especially for the business process model creation and execution.
  - in the harmonisation of standards
- INTEROP-VLab is starting active involvement