ISO 15926
Original purpose and possible future

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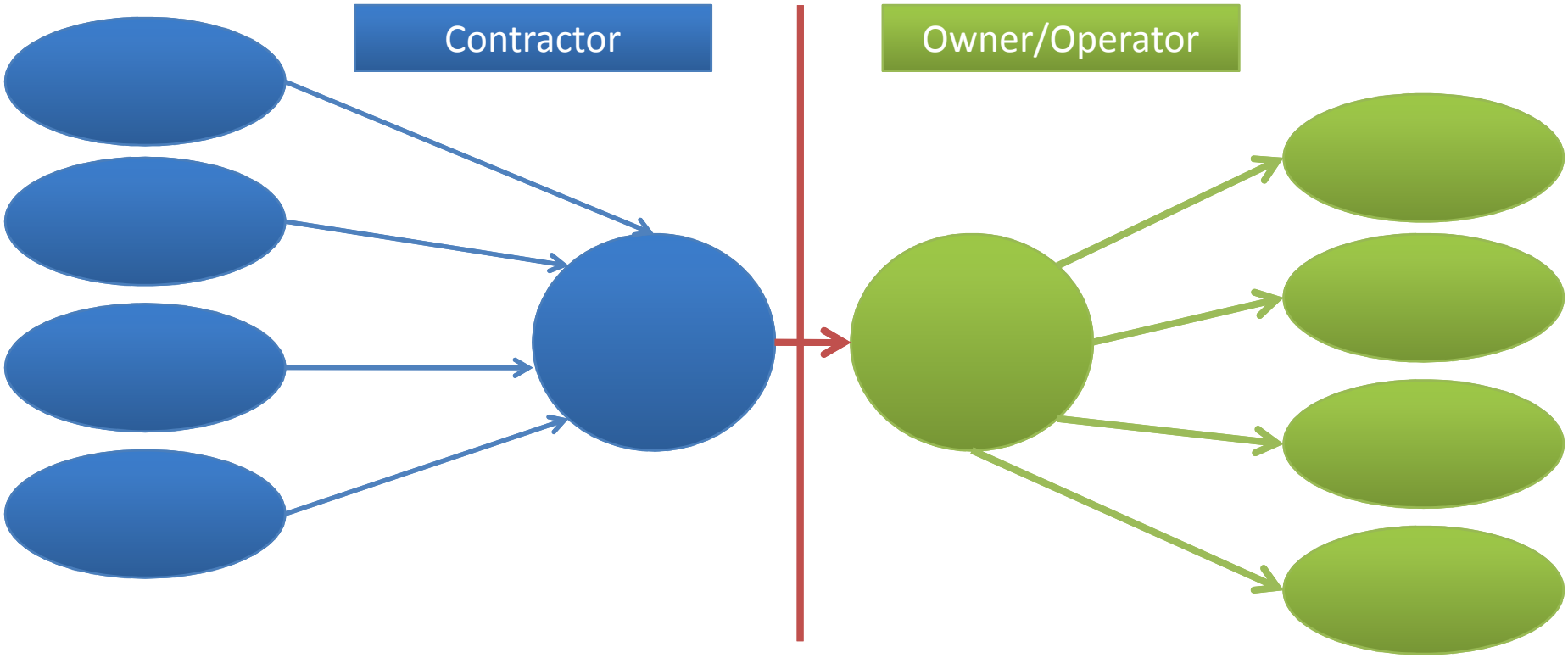
Original Purpose

- Integration and exchange of plant data throughout the life of the plant
- Initial focus on the integration of design data from different design systems and the hand over of design data from design contractor to owner/operator.

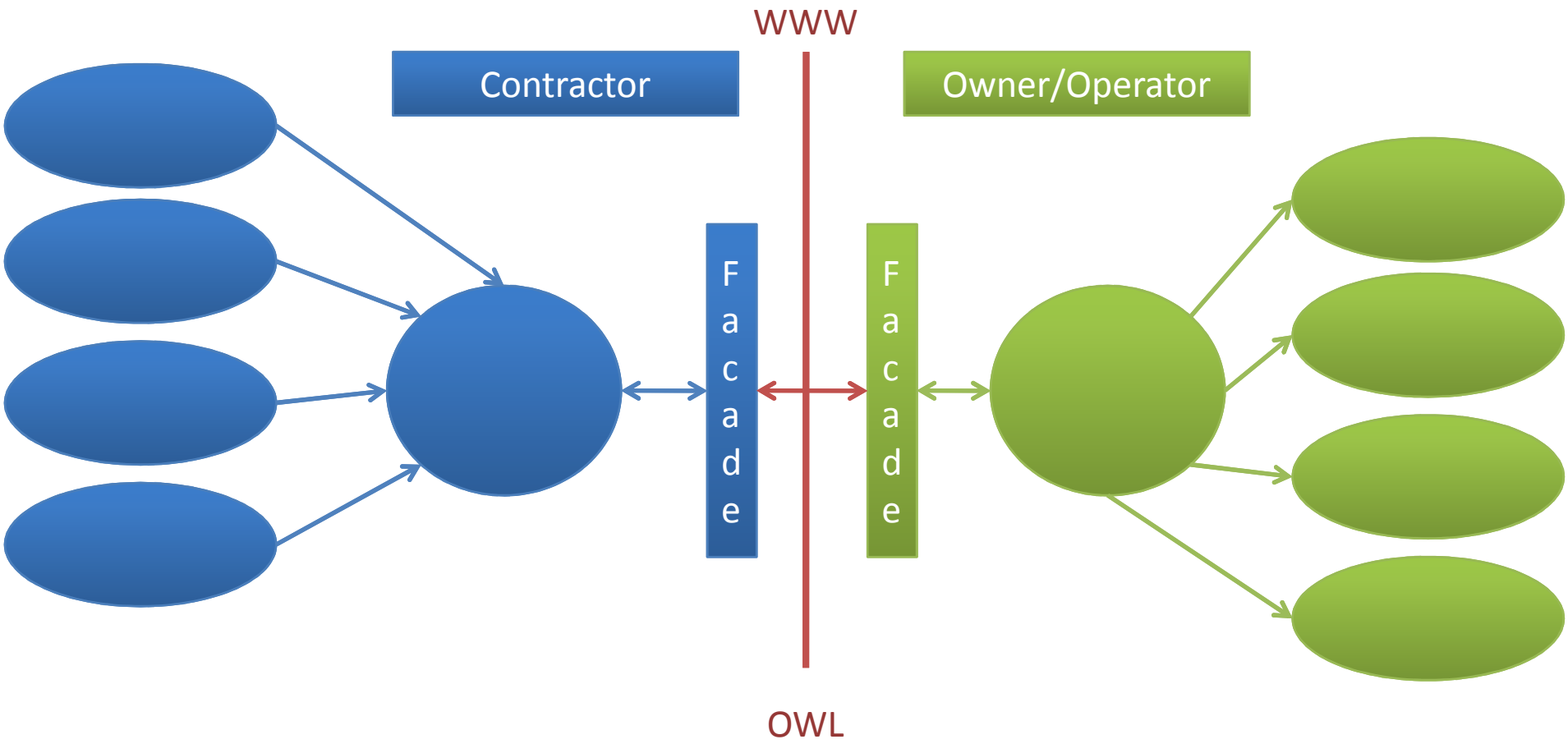
Integration and Exchange



Some Key Requirements

- Unique identifiers for equipment and equipment classes
- Reconciliation of different identifiers across different systems
- Ability to check completeness of design data
- Correctly distinguish between (for example):
  - Plant
  - Tags
  - Equipment items
  - Planned
  - Actual
  - Specification (equipment types)

Part 7



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Six effects of ontologies

Hepp, Martin: **Ontologies: State of the Art, Business Potential, and Grand Challenges**, in: Hepp, M.; De Leenheer, P.; de Moor, A.; Sure,Y. (Eds.): Ontology Management: Semantic Web, Semantic Web Services, and Business Applications, ISBN 978-0-387-69899-1, Springer, 2007, pp. 3-22.

1. Using philosophical notions as guidance for identifying stable and reusable conceptual elements
2. Unique identifiers for conceptual elements
3. Excluding unwanted interpretations by means of informal semantics
4. Excluding unwanted interpretations by means of formal semantics
5. Inferring implicit facts automatically
6. Spotting logical inconsistencies

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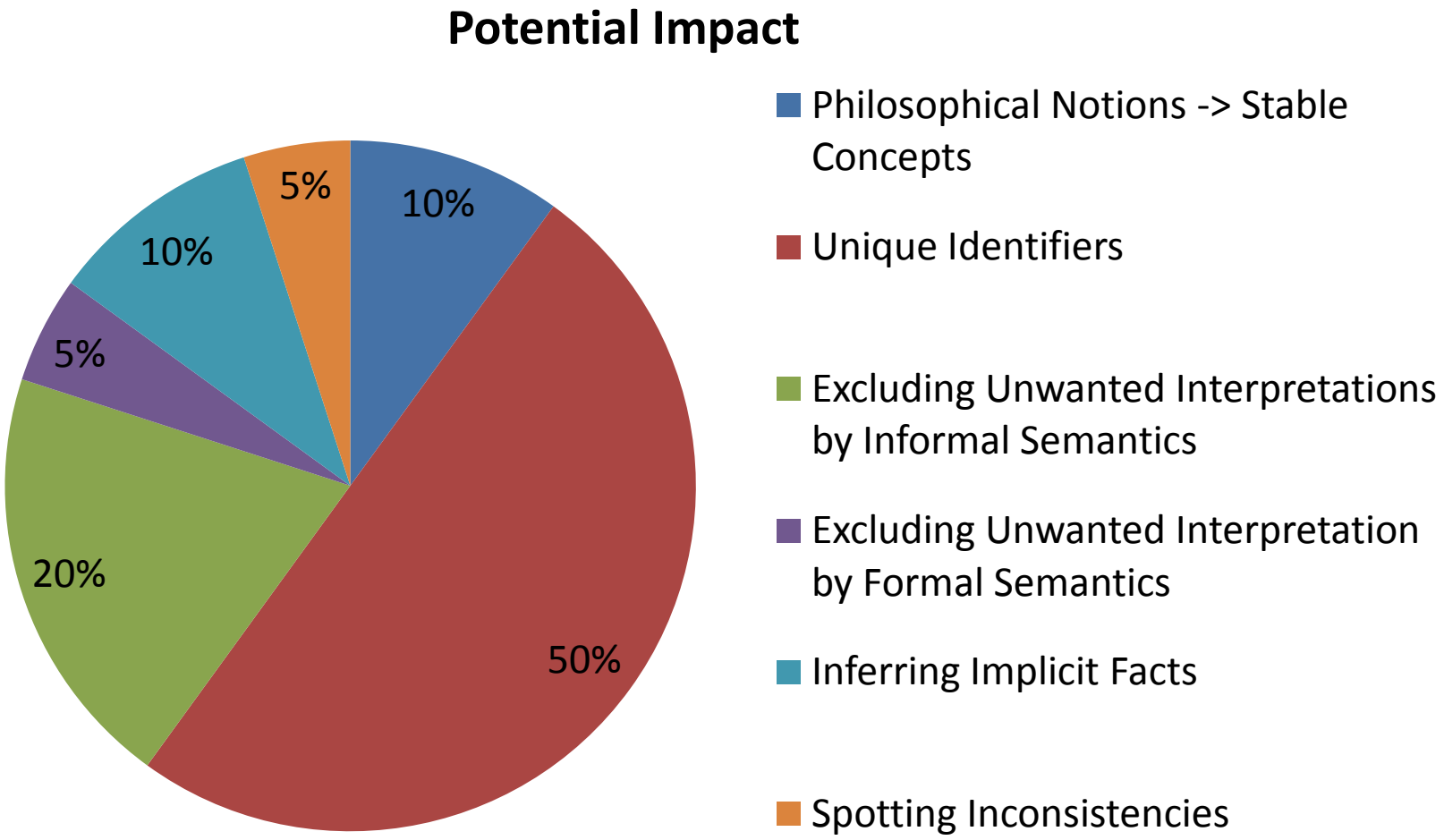
The Effects of Ontology



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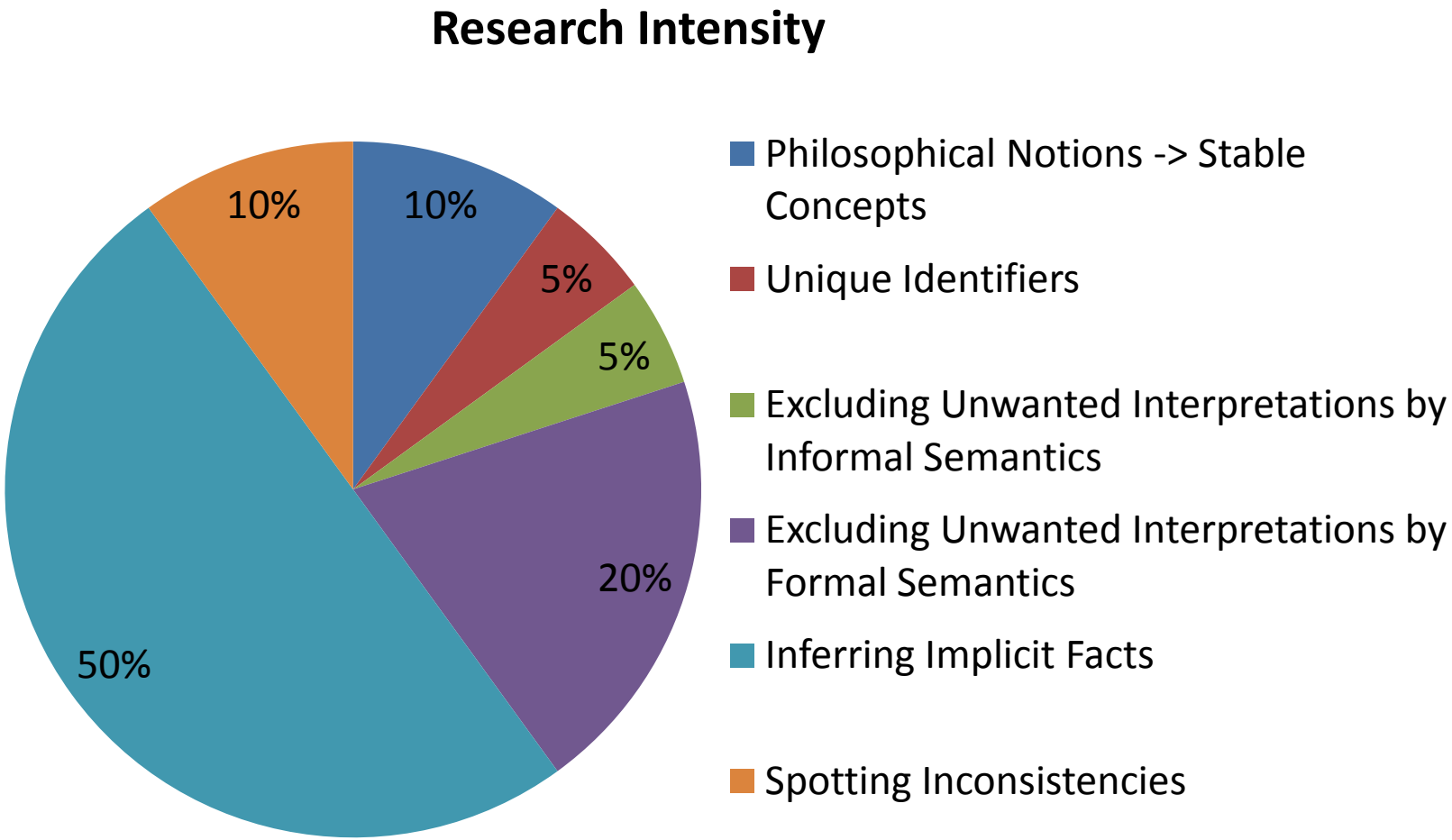
The Effects of Ontology



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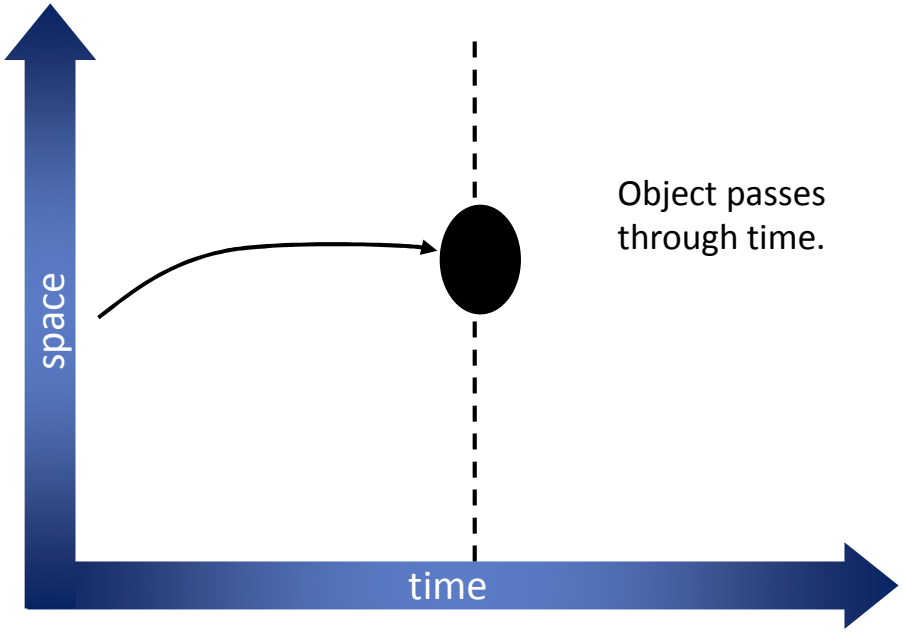
3D

The present

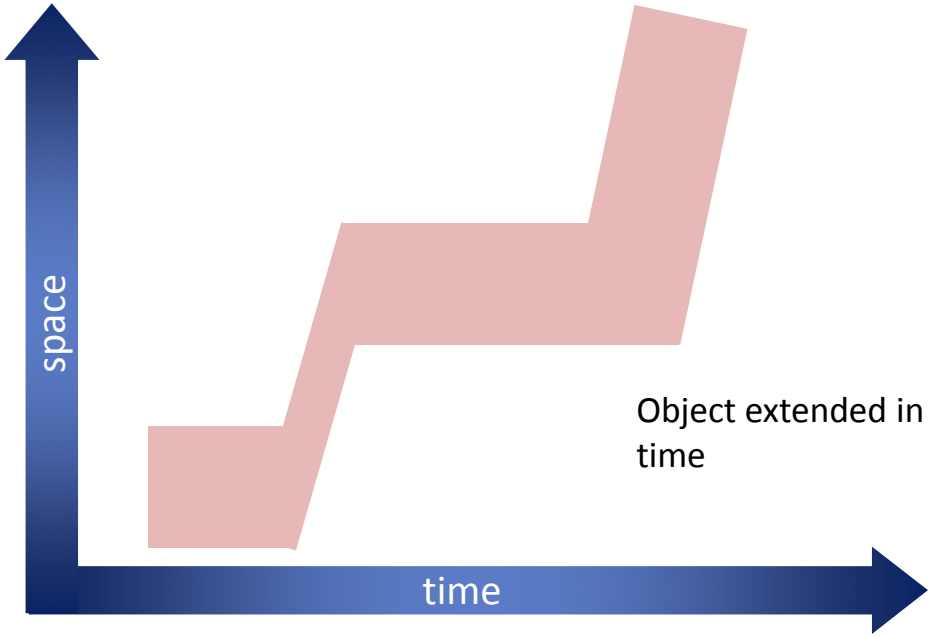
(all that exists)



1. Physical objects do not have temporal parts.
2. Different physical objects may coincide (non-extensional).

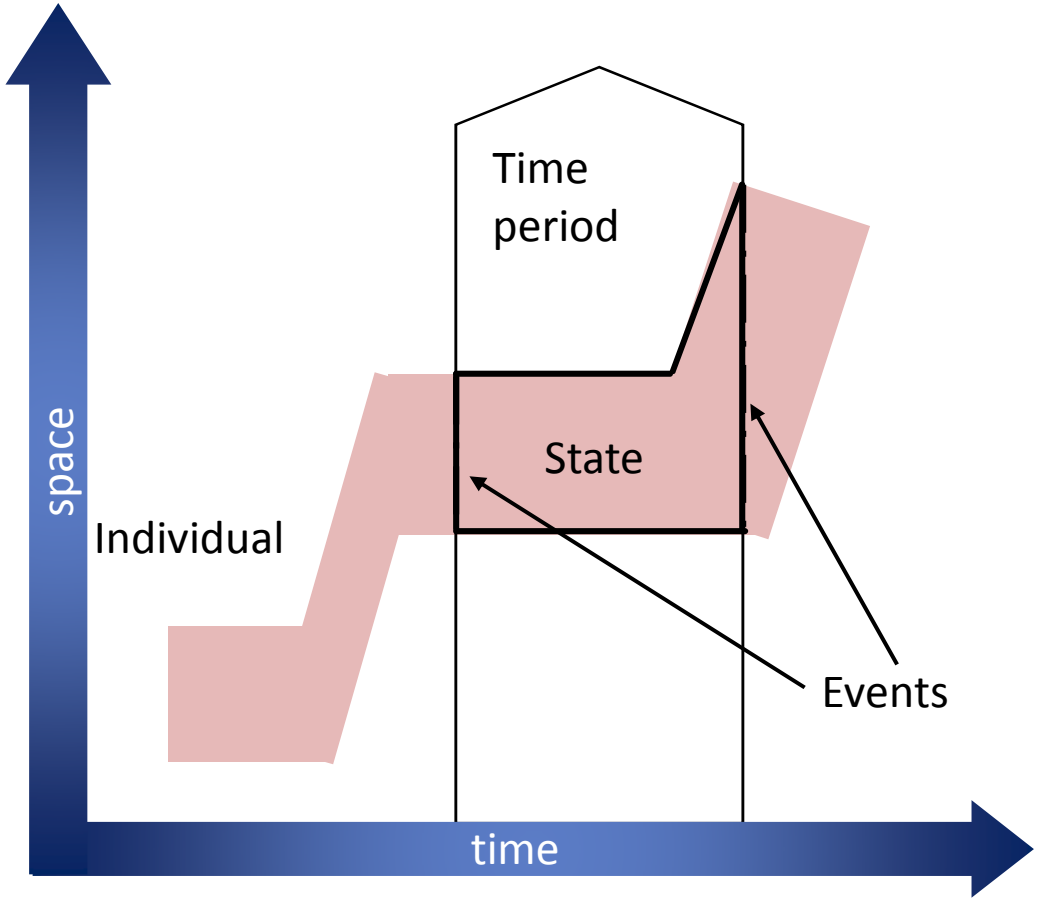
4D + Extensionalism

The past and the future exist as well as the present

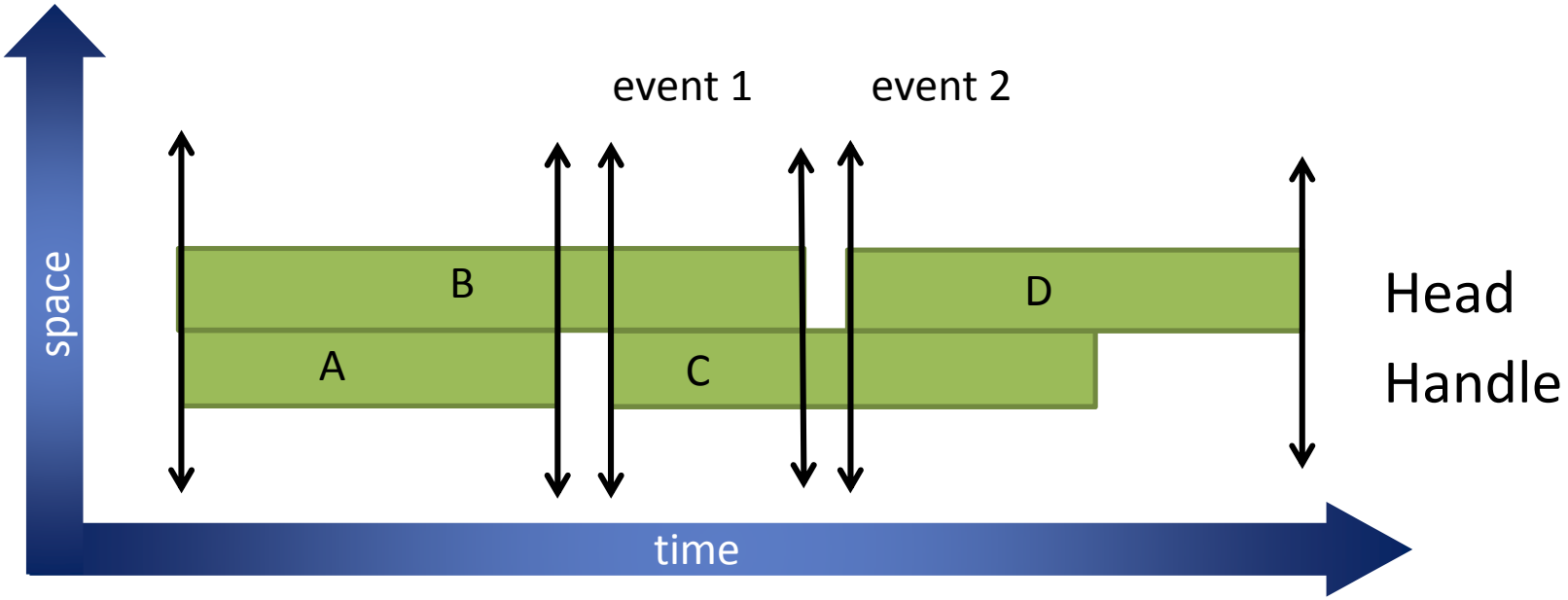


1. Individuals extend in time as well as space and have both temporal parts and spatial parts.
2. When two individuals have the same spatio-temporal extent they are the same thing (extensionalism).

States



The life of a Broom



Axioms

Complex Systems in Knowledge Based Environments

“Ontology Meets Business”

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Some Approaches to Specifying the ISO 15926 Ontology

- Entity-Relationship + Reference Data Library
  - EXPRESS
  - UML
- Description Logic
  - OWL
- First Order Logic
  - Common Logic
- Category Theory

Entity Relationship + Reference Data Library

Advantages

- We have it (in EXPRESS)!
- Relatively expressive
- Data Models have about the same descriptive power has Description Logics
- Straightforward route to implementation in an SQL environment

Disadvantages

- Not able to take advantage of Web tools
- Big Clunk between data model and Reference Data
- EXPRESS is becoming a backwater

Description Logic

Advantages

- Has a range of web based tools available
- OWL has a lot of momentum behind it
- Can support useful portions of the requirements (e.g. Part 7)

Disadvantages

- Description Logics (including OWL) have limited expressivity relative to the full ISO 15926 ontology
- Different versions of the ISO 15926 ontology are required to use DL/OWL over the full range.

Some challenges for the OWL environment

- ISO 15926 in principle allows
  - Referring to relationships as objects
  - Referring to data records as objects
  - Class of class (multiple layers of class/instance relationships)
- So OWL can only support restricted views of a full ISO 15926 ontology
  - But these are views that can then take advantage of OWL tools

First Order Logic

Advantages

- Relatively expressive
- Good match to ISO 15926 requirements

Disadvantages

- Still some limitations
- Limited tools available

Category Theory

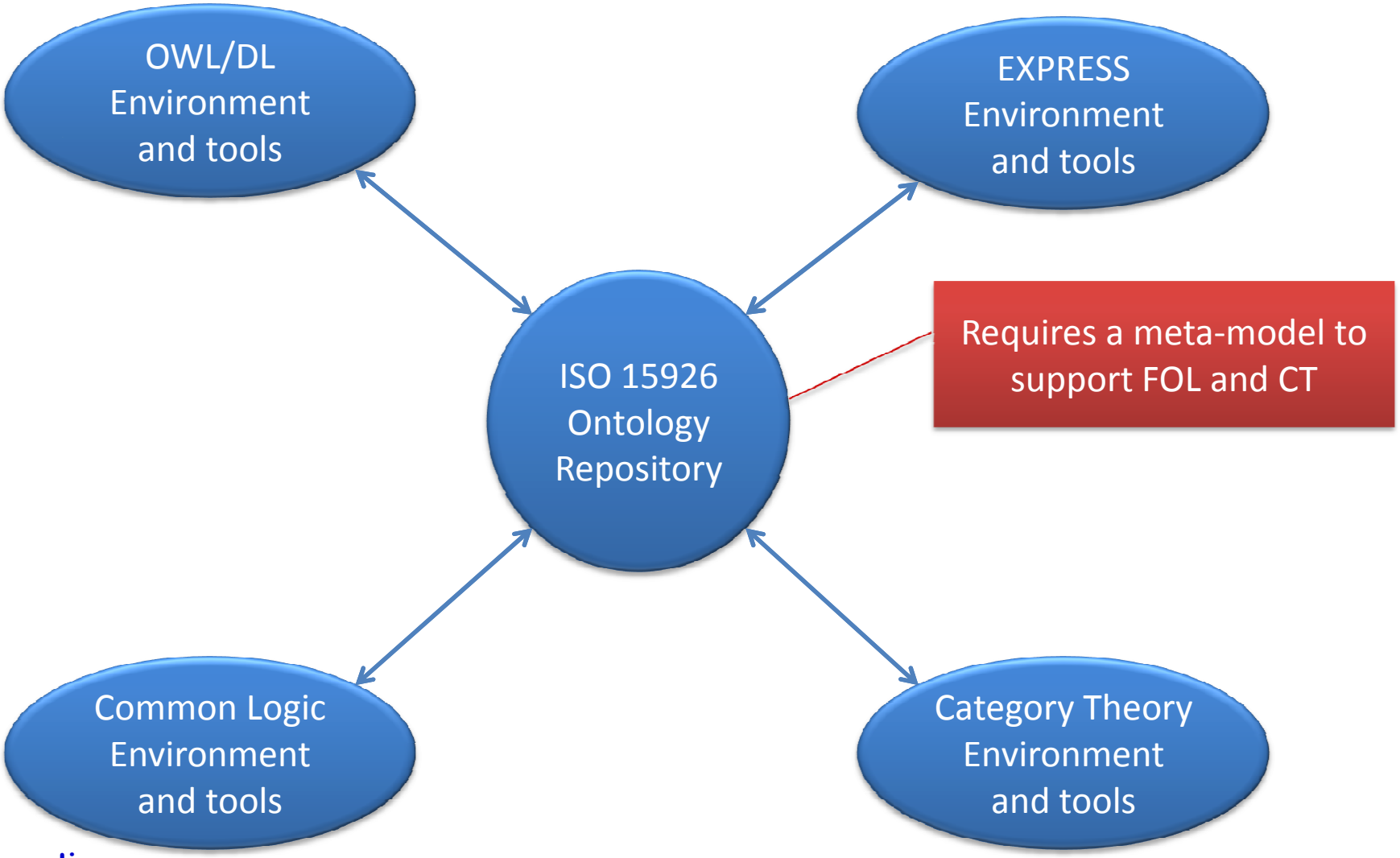
Advantages

- Potentially very powerful

Disadvantages

- Very little work done
- No tool support
- Needs demystfying

A Vision for the Future



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Questions?