

# SEMANTICS @ROCHE

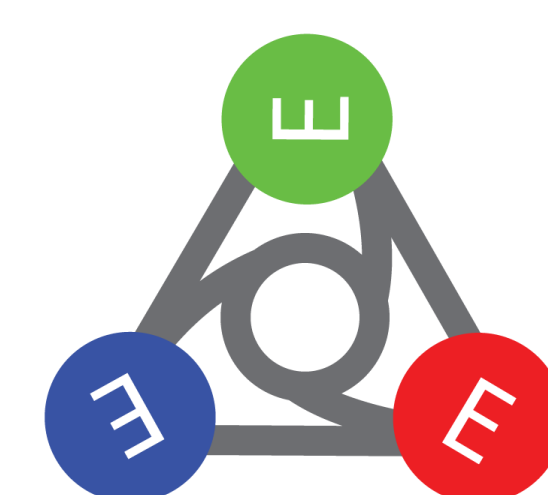
Connecting the Data Dots

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Gerhard Goldbeck - Goldbeck Consulting Ltd, UK



## Elementary Multiperspective Material Ontology (EMMO): A foundational ontology for science-based applications



### Issues addressed

- Semantics requires conceptualization
- Dealing with conflicting conceptualizations
- Current Foundational Ontologies are not based on scientific concepts: causality, scales of matter, observations and models etc.



### EMMO: conceptualization framework for

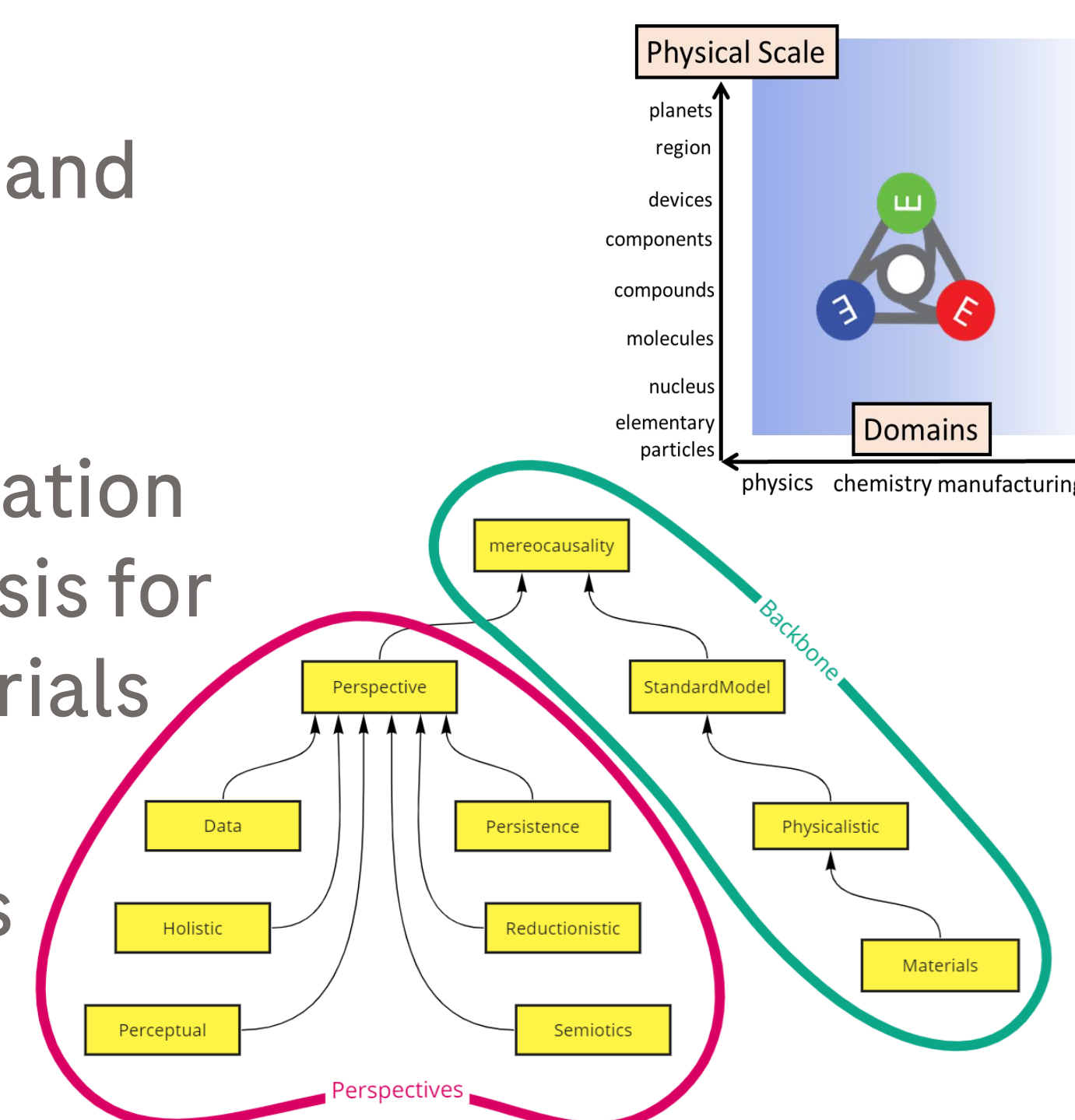
- All physical scales
- wide range of science and engineering domains

### EMMO Backbone:

- Mereocausality foundation
- Standard-model as basis for physical objects, materials

### EMMO Perspectives:

- Multi-domain concepts
- Common-sensical

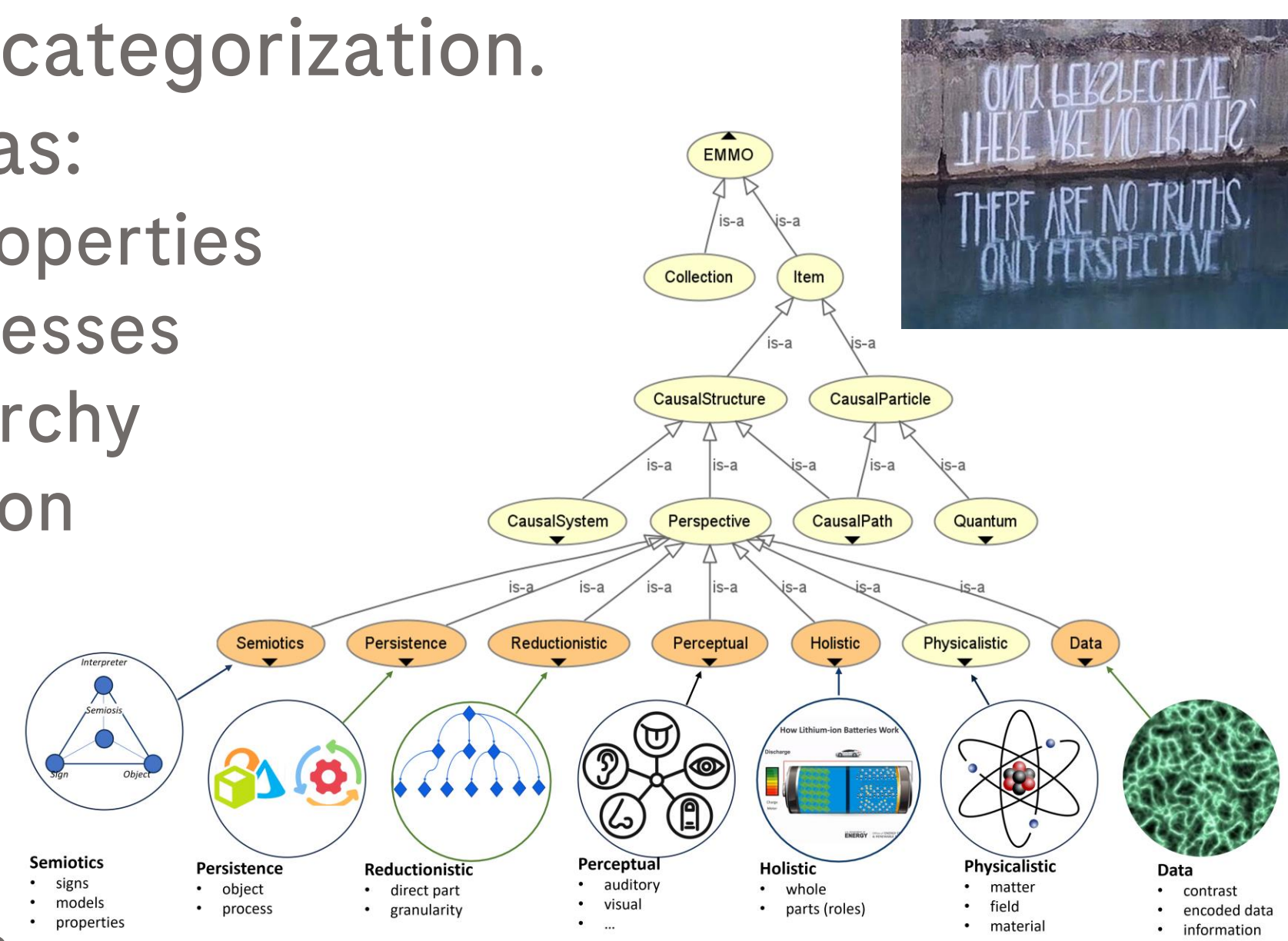


### EMMO Perspectives

A Perspective covers “things” according to a specific, common-sensical categorization.

The “world” seen as:

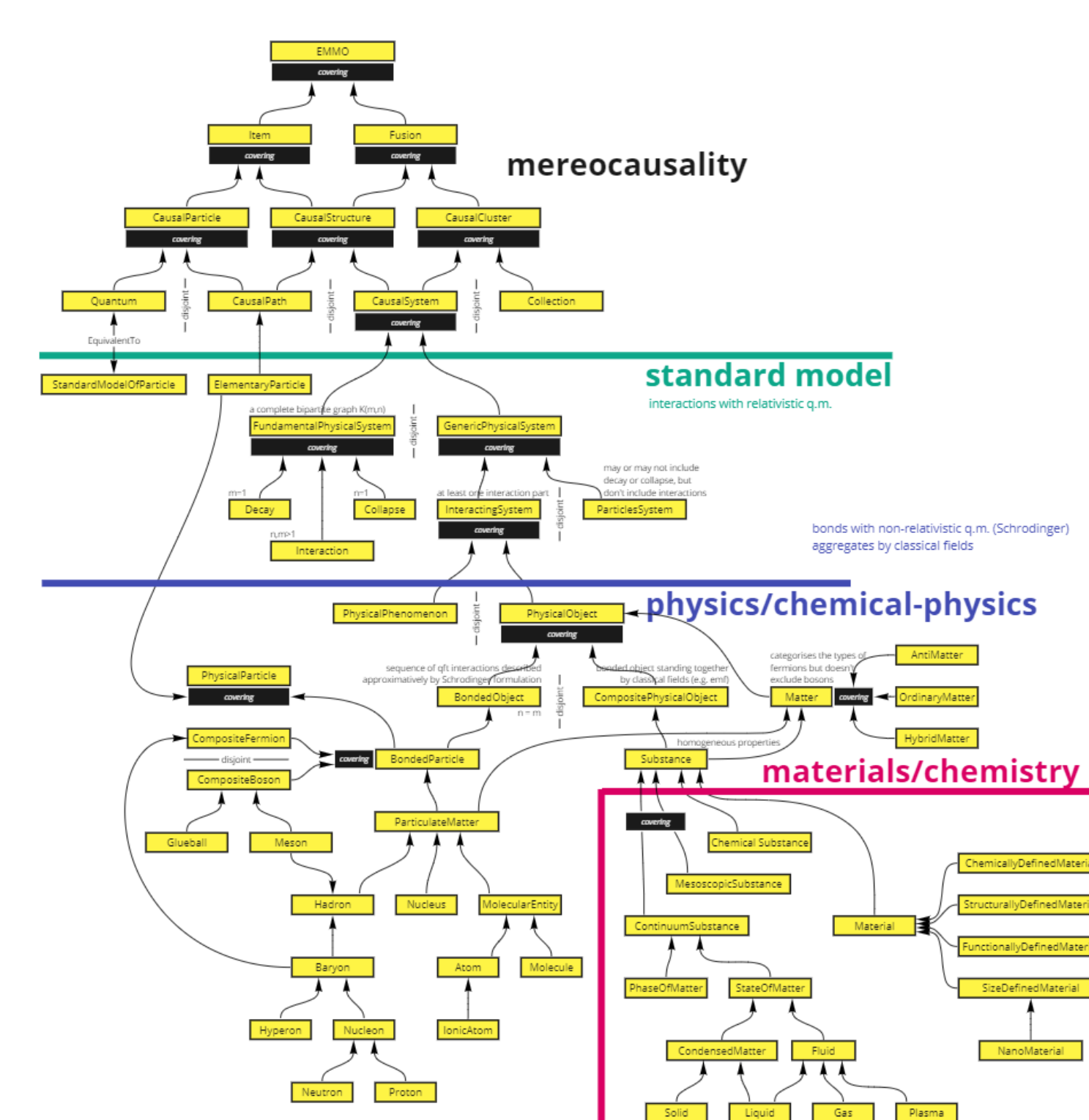
- Models, Signs, Properties
- Objects and Processes
- Granularity hierarchy
- Sensual perception
- Wholes and Parts/Roles
- Physical Matter
- Contrasts, Data, Information



### EMMO Backbone

From:  
Mereocausality,  
space-time (4D)  
foundation and  
elementary particles  
to:

- Chemical physics
- Chemicals
- Materials



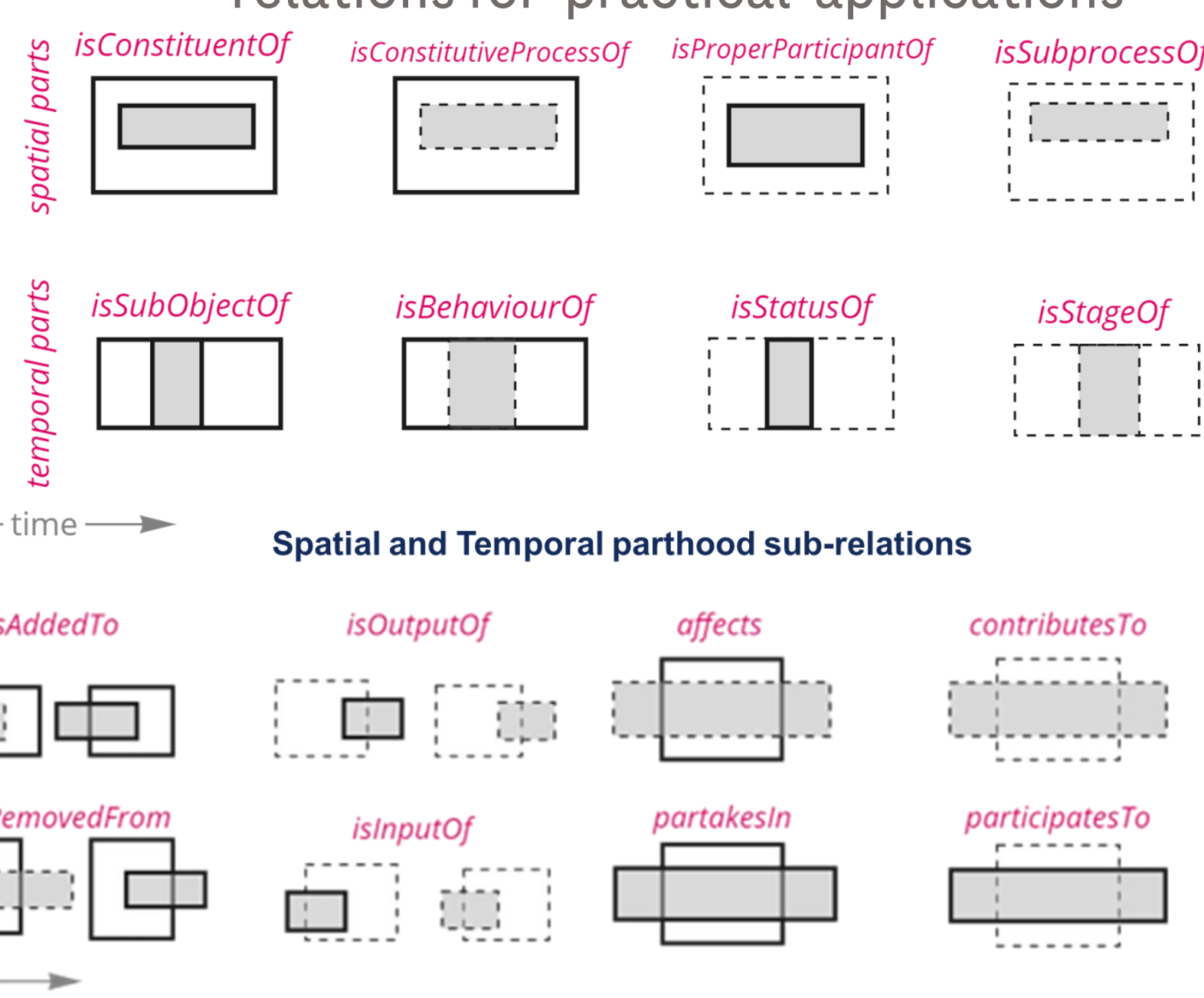
### EMMO Relations

3 fundamental ones:

- EMMORelation
- causal
- mereological
- semiotical

Causality includes temporal  
Semiotical incl. has property

Parthood and causal /temporal  
relations for practical applications



4D approach and space/time  
graphical representation of entities.

Proper overlap sub-relations (continuous line standing for objects, dashed line for  
processes, and relations going from the grey to the white boxes)

### EMMO Modules and Applications

Mereocausality

Perspectives

Disciplines

Domains

EMMO can be expressed in different ways:

- Concept board
- owl-dl, owl-el
- First Order Logic
- Direct Acyclic Graph

Workflows

Information

Metrology, Units

Materials

Chemistry

Manufacturing

Crystallography

Characterisation

Nuclear Energy

Battery

### Acknowledgements and References

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Collaborators: Emanuele Ghedini, Francesco Zaccharini (University of Bologna), Jesper Friis (SINTEF)

EMMO is available under CC by 4.0 licence on <https://github.com/emmo-repo/EMMO>

Contact: [gerhard@goldbeck-consulting.com](mailto:gerhard@goldbeck-consulting.com)

