



Joining forces towards a harmonized ontology for materials modelling marketplace services:

The European Virtual Market Place Ontology (EVMPO)

Martin Horsch, STFC, UK (VIMMP )

Georg J. Schmitz, ACCESS e.V. (EMMC & MarketPlace)

Freiburg, 6<sup>th</sup> and 7<sup>th</sup> of November 2018





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## EU marketplace projects

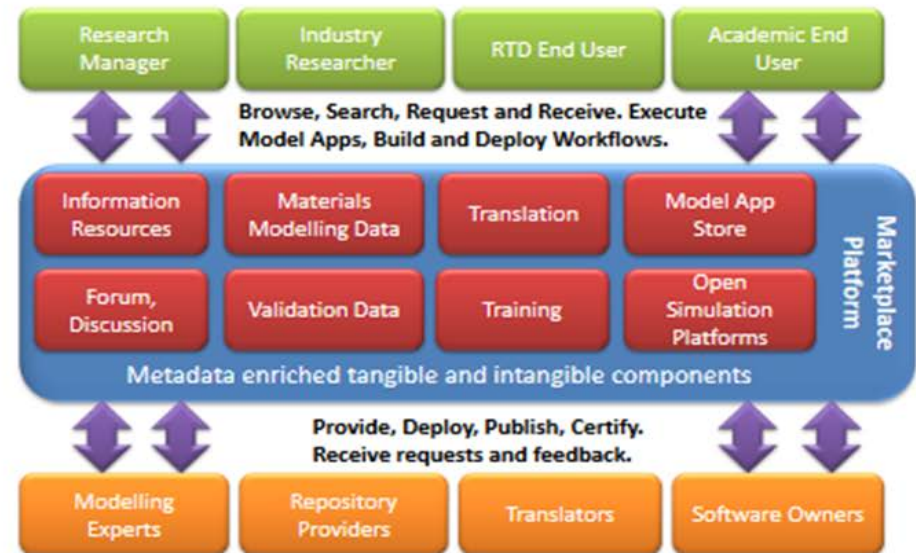


**VIMMP**  
VIRTUAL MATERIALS  
MARKETPLACE

## – Virtual Materials Marketplace (GA 760907)

VIMMP Marketplace Concept: serving all stakeholders and **facilitating the exchange between providers and consumers** of products and services.

The VIMMP will provide End User Interfaces to Information, Resources, Discussion Forum, Databases and repositories, Translation and Training services, Validated Models and Modelling Apps, the ability to utilise Open Simulation Platforms to build and deploy workflows and to execute materials modelling Apps via cloud-based computing resources.



**VIMMP**  
VIRTUAL MATERIALS  
MARKETPLACE



**MarketPlace**

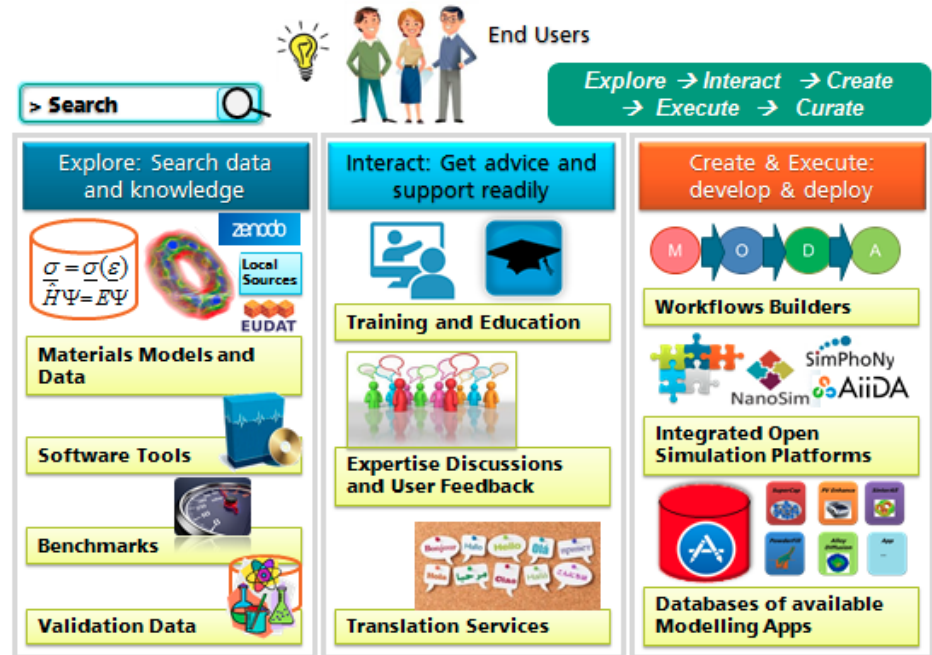


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## EU marketplace projects



- **Connect relevant actors** and stakeholders with each other and industry, breaking through geographical and community barriers
- **Facilitate collaboration** and open information exchange
- **Connect materials data** repositories to enable Big Data informatics and analytics on materials (Machine Learning, AI...)
- **Accelerate development** of materials modelling solutions (ICME...)



Many sources of **data, information and knowledge** that needs management, processing and curation!

\*The MARKETPLACE project is funded by Horizon 2020 under H2020-NMBP-25-2017 call Grant agreement # 760173



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## The EVMPO task force

The EVMPO task force is a joint effort of the VIMMP and MarketPlace projects

### ***Core Members:***

Martin Horsch, STFC, UK (VIMMP)

Georg J. Schmitz, ACCESS e.V. (EMMC & MarketPlace)

Adham Hashibon, Fraunhofer IWM (EMMC member & MarketPlace coordinator)

Welchy Leite-Calvacanti, Fraunhofer (VIMMP coordinator)

### ***Tasks:***

- generate taxonomy relevant to services offered by the Marketplaces
- identify existing ontologies being available as open and free owl files
- make use of existing ontologies as a common basis
- merge/combine these ontologies into an EVMPO.owl V0.1
- assign responsibilities for a further sustainable development



### **Scope:**

Develop an ontology for the services offered in the marketplaces and their operations:

- harmonize ontology development of both projects at an early stage
- exploit synergies between the projects
- combine expertise of both projects and of all their partners

### **Strategy:**

Develop an ontology for materials modelling marketplaces which

- limits to the two toplevels of ontology (*.....for the time being*)
- uses existing ontologies to implement/expand sub-ontologies
- is compliant with the European Materials Modelling Ontology (EMMO)
- elaborates one „public service“ in detail as an example



### ***Output:***

Ontology in form of an owl file (or a compatible format) including documentation of underlying reasoning (doc/ppt or directly within owl)

Creating a well elaborated ***top-level ontology***:

- is the primary scope of the task force
- allows for integration of existing work done by groups on sub-ontologies
- allows to implement future – different - sub-ontologies all referring to the top level entities

### ***Methods/Tools:***

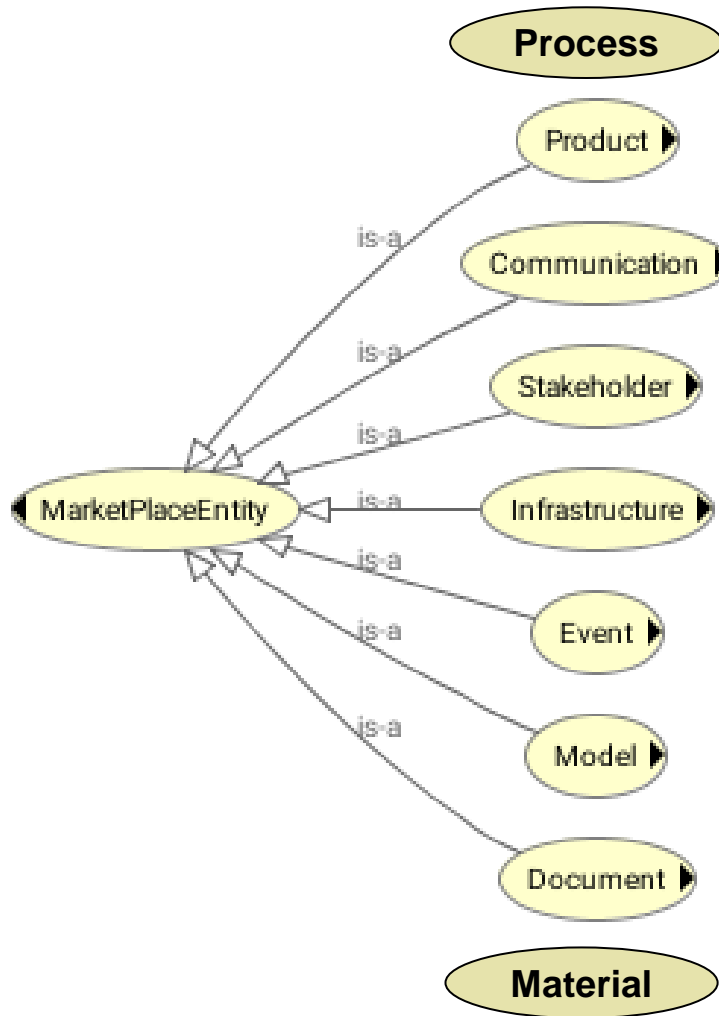
- Protégé
- Web-protégé,.....





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## Top-level ontology (preliminary as of Oct 23<sup>rd</sup> 2018)



Work in progress!

agreement for most of the top level entities identified by NOW...

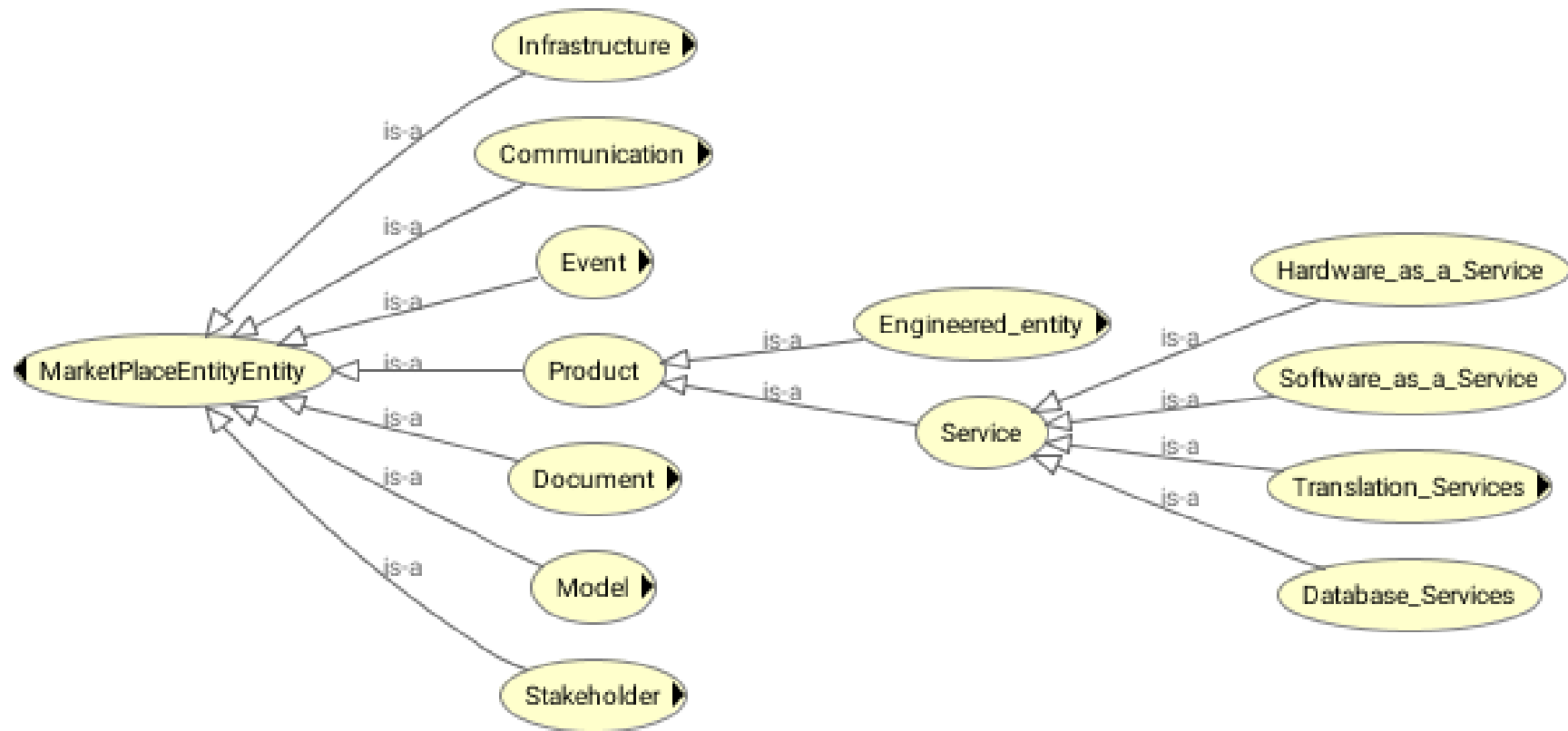
Need for more?

Need to change hierarchy?



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## Top-level ontology – Services as a Product







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## Relation/integration with existing ontologies

vcard (http://www.w3.org/2006/vcard/ns) : [K:\IP\_MICRESS\ANTRAE...

File Edit View Reasoner Tools Refactor Window Help

vcard (http://www.w3.org/2006/vcard/ns)

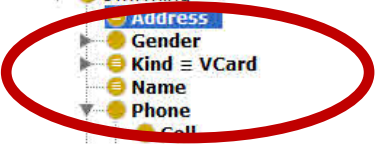
Active Ontology x Entities x Individuals by class x DL Query x

Annotation properties Datatypes Individuals

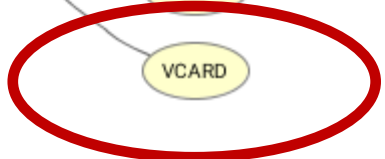
Classes Object properties Data properties

Class hierarchy: Address

- owl:Thing
  - Address
    - Gender
    - Kind ≡ VCard
    - Name
    - Phone
      - Cell
        - Fax
        - Pager
        - Text
        - 'Text phone'
        - Video
        - Voice
        - BBS
        - Car
        - Modem
        - Msg
        - PCS
      - 'Relation Type'
      - Type
        - Home
        - Work
        - Dom
        - Internet
          - Intl
          - ISDN
          - Label
          - Parcel
          - Postal
          - Pref
          - X400
      - VCard ≡ Kind
        - Email
        - Tel



e.g. vcard



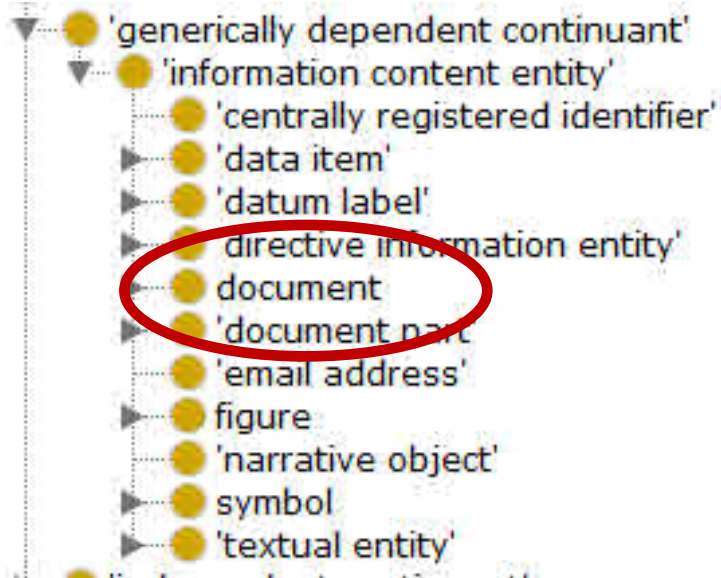


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## Relation/integration with existing ontologies

e.g. IAO

### Information Artifact Ontology

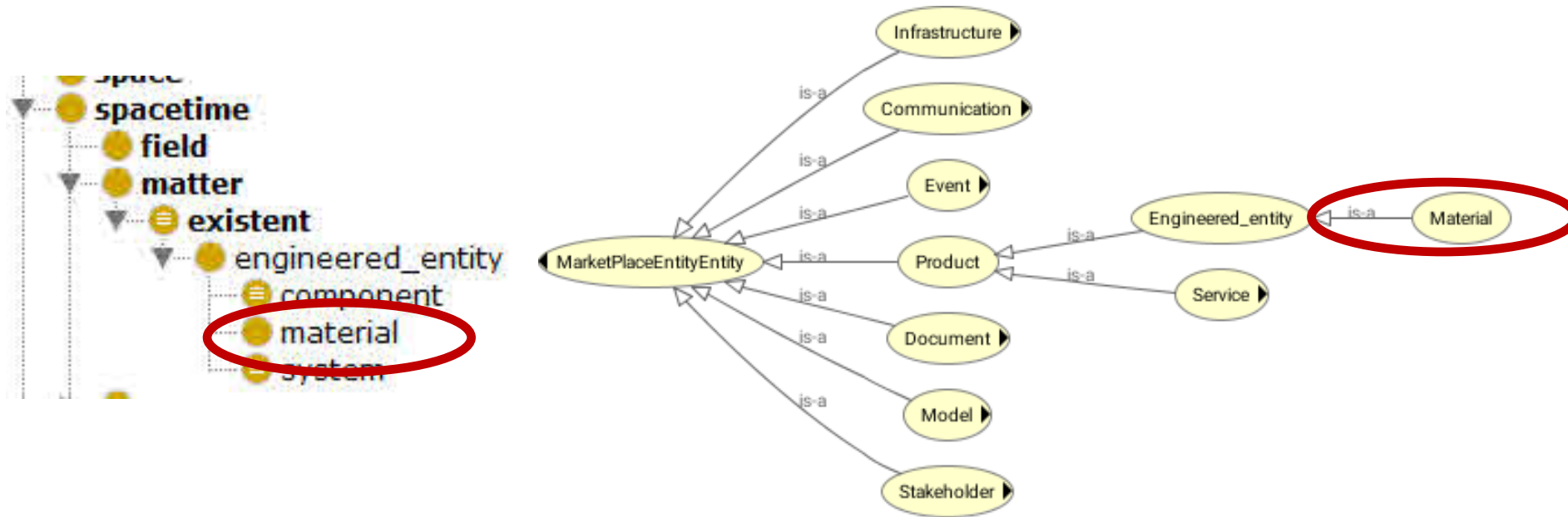




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## Relation/integration with EMMO

Some examples of interaction with EMMO  
(preliminary! to be verified! )

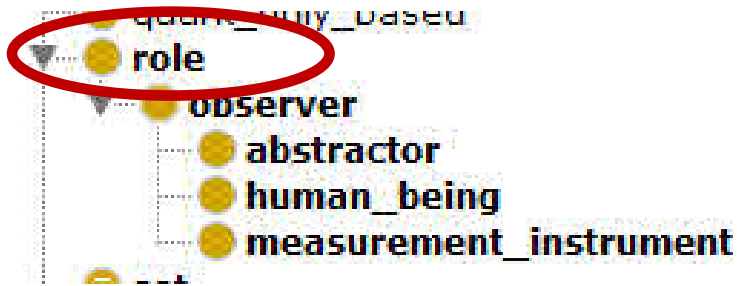




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## Relation/integration with EMMO

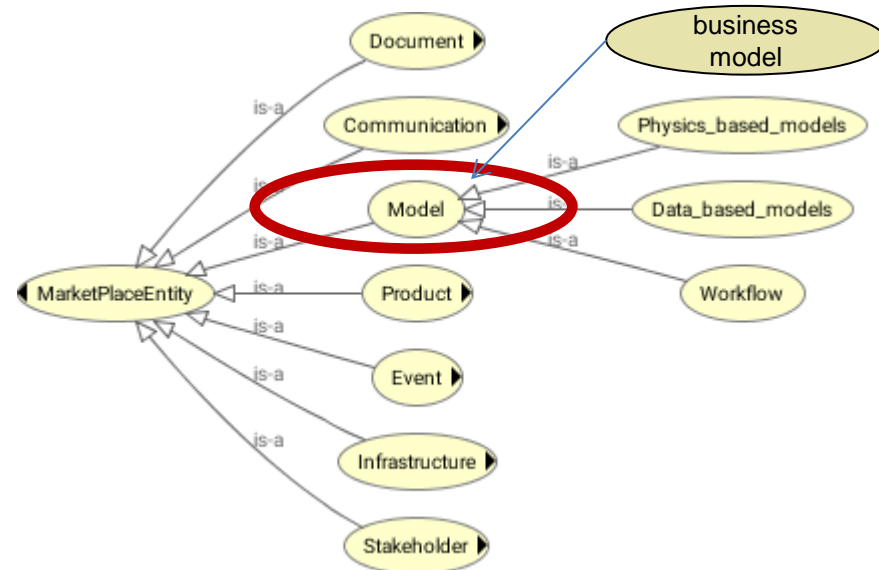
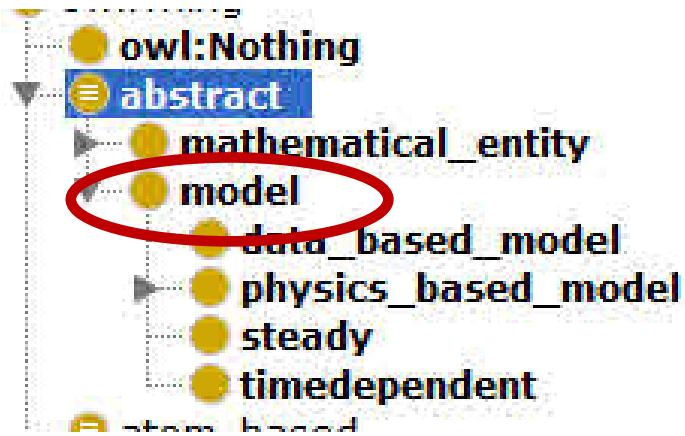
Some examples of interaction with EMMO  
(preliminary! to be verified! )



any stakeholder has\_some role



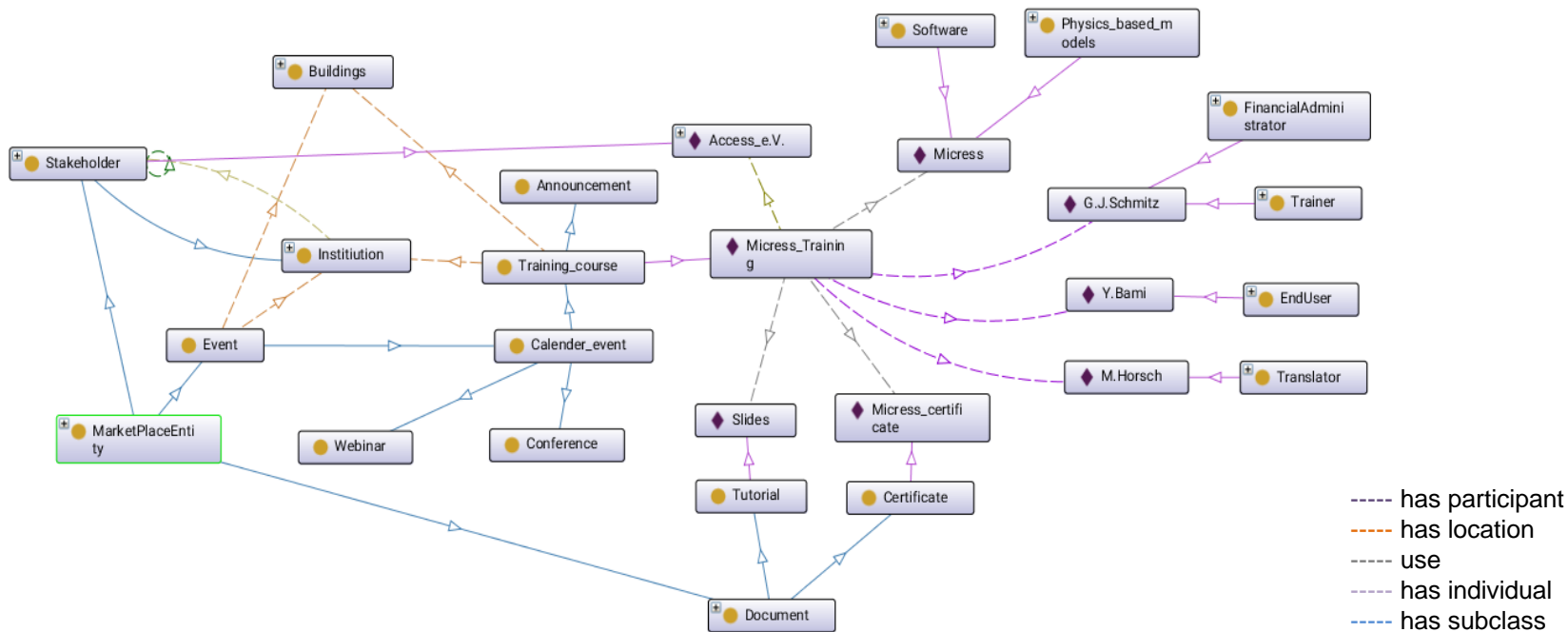
Some examples of interaction with EMMO  
(preliminary! to be verified! )





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## examples for a more detailed, public branch





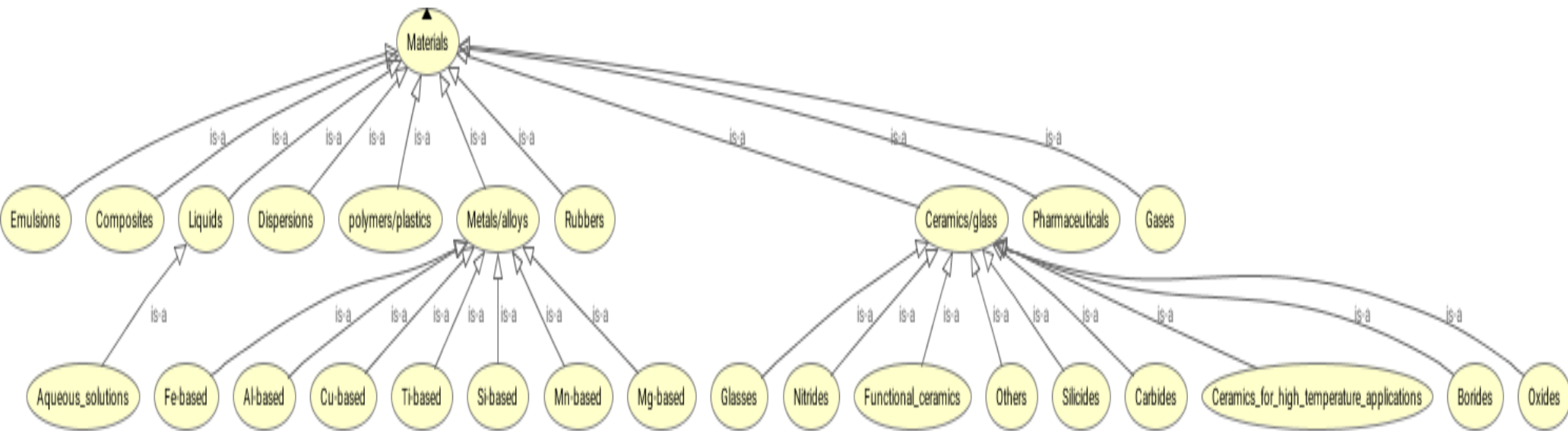


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## examples for more detailed branches (MarketPlace)

Some examples of more detailed branches elaborated by the individual projects

### Materials







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## examples for more detailed branches (MarketPlace)

Software:

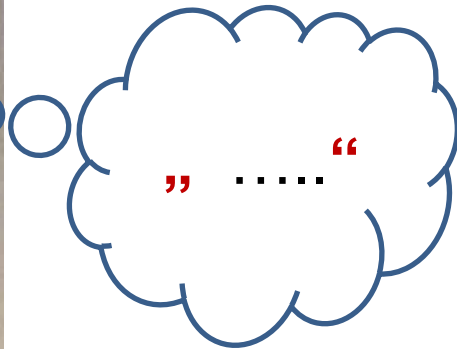




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## Different languages.....

example: „quotation“



- |                      |   |
|----------------------|---|
| ▷ quotation          | ▣ ▷ die Schätzung Pl.: die Schätzungen          |
| ▷ quotation          | ▣ ▷ das Zitat Pl.: die Zitate                   |
| ▷ quotation          | ▣ ▷ die Anführung Pl.: die Anführungen          |
| ▷ quotation          | ▣ ▷ die Belegstelle Pl.: die Belegstellen       |
| ▷ quotation          | ▣ ▷ die Kalkulation Pl.: die Kalkulationen      |
| ▷ quotation          | ▣ ▷ die Bezugnahme Pl.: die Bezugnahmen         |
| ▷ quotation          | ▣ ▷ das Zitieren <i>kein Pl.</i>                |
| ▷ quotation [KOMM.]  | ▣ ▷ das Angebot Pl.: die Angebote               |
| ▷ quotation [KOMM.]  | ▷ der Kostenvoranschlag                         |
| ▷ quotation [KOMM.]  | ▣ ▷ die Offerte Pl.: die Offerten               |
| ▷ quotation [KOMM.]  | ▣ ▷ der Kostenanschlag Pl.: die Kostenanschläge |
| ▷ quotation [FINAN.] | ▣ ▷ das Preisangebot Pl.: die Preisangebote     |