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CROSS-DOMAIN MODELLING – A NETWORK OF CORE ONTOLOGIES FOR THE CIRCULAR ECONOMY

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PROJECT INFORMATION

- HORIZON-CL4-2021-RESILIENCE-01-26
- RESEARCH AND INNOVATION ACTION
- COORDINATOR LINKöPING UNIVERSITY
- EU FUNDING €3 300 802
- DURATION 36 MONTHS
- 11 PARTNERS

LINKÖPING UNIVERSITY
imec
Concular
IMPAKT
CIRCULARISE
Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG
circular.fashion
Lindner
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Content

- Project Overview and Motivation
- Methodology
- Ontology Network and ODPs
- Use Case Examples
- Conclusions and Future Work

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The Onto-DESIDE Project

Ontology-based Decentralized Sharing of Industry Data in the European Circular Economy

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Motivation and Background

- Circular Economy

  "a model of production and consumption, which aims to share, lease, reuse, repair, refurbish and recycle existing materials and products as long as possible"

- Circular Value Network
  - Configurations of multiple actors
  - Information, Resources, Energy and Value flows
  - Different domains are involved (e.g., production, manufacturing, materials)

- Data/Information from cross-industry domains are today not built on a common conceptual ground

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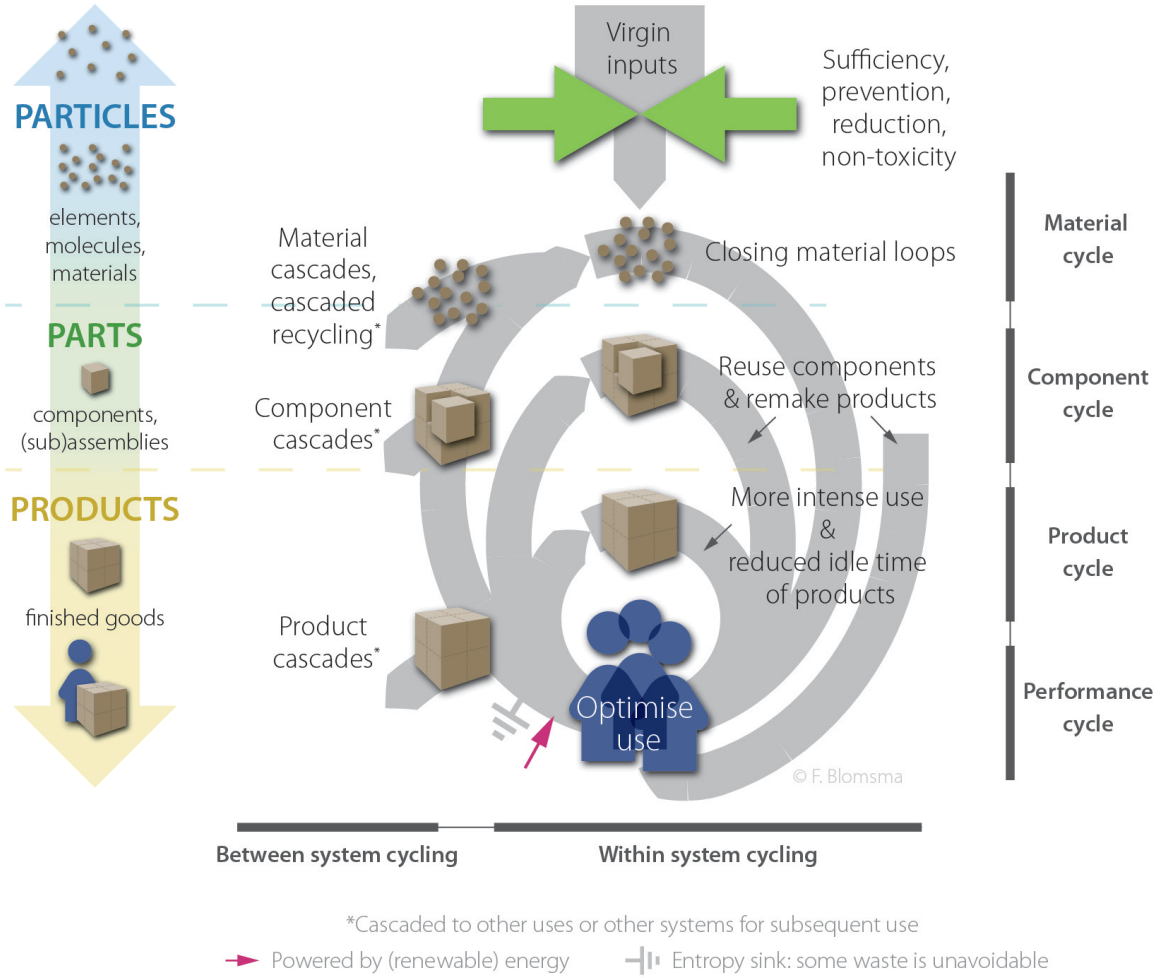
- Circular Strategies



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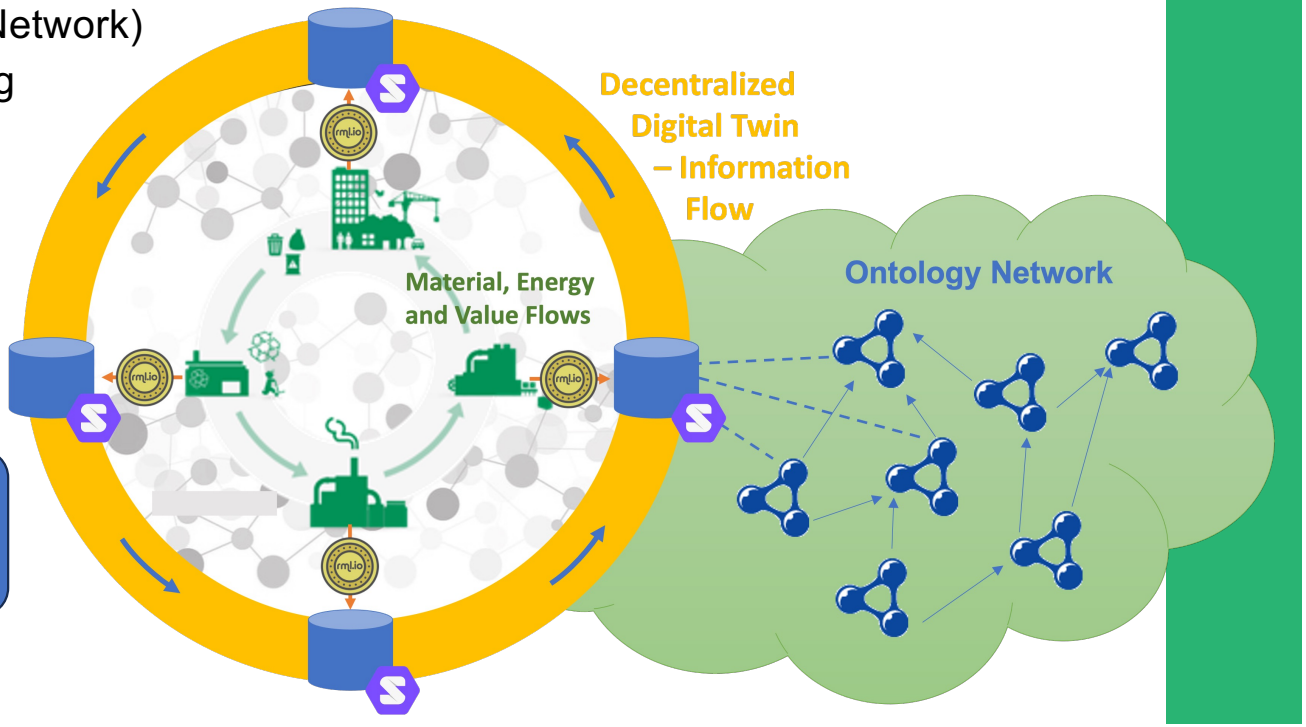
Motivation and Background

- Onto-DESIDE project (Ontology-based Decentralized Sharing of Industry Data in the European Circular Economy)
  - A shared vocabulary (Ontology Network)
  - An open platform for data sharing
  - Methods for finding, assessing, setting up and evaluating circular value networks
  - Evaluation in three use case domain
    - Textile
    - Electronics
    - Construction

Target is **cross-domain**



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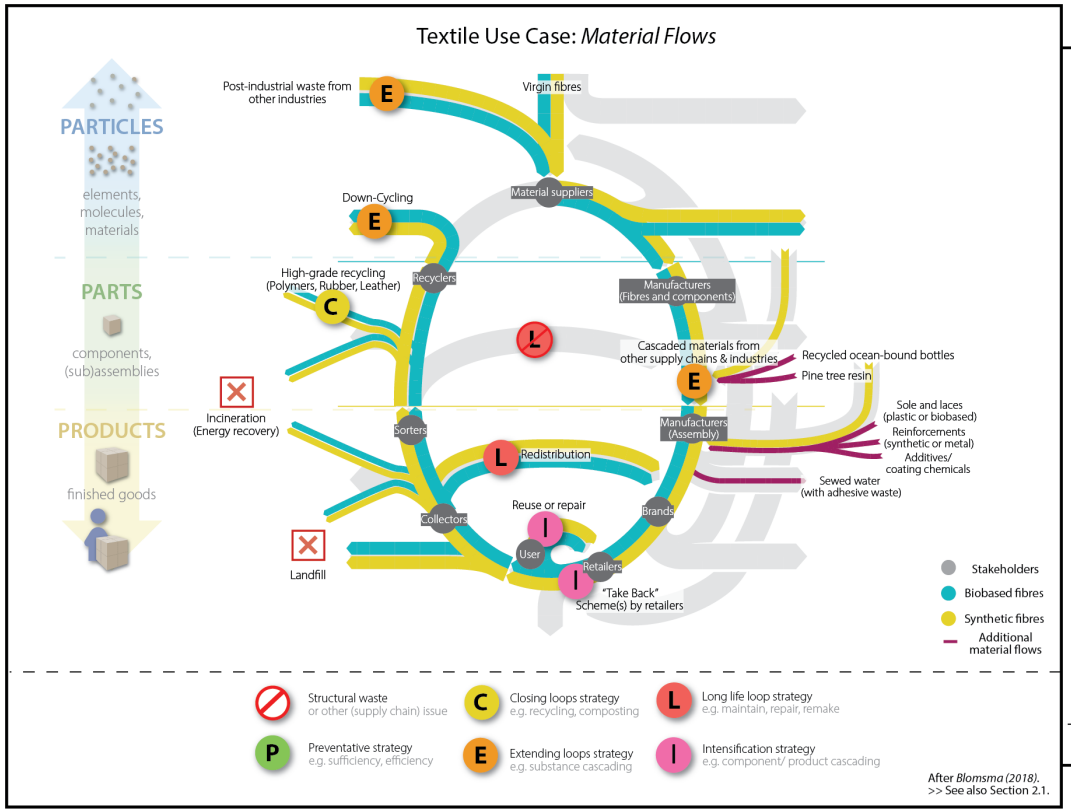
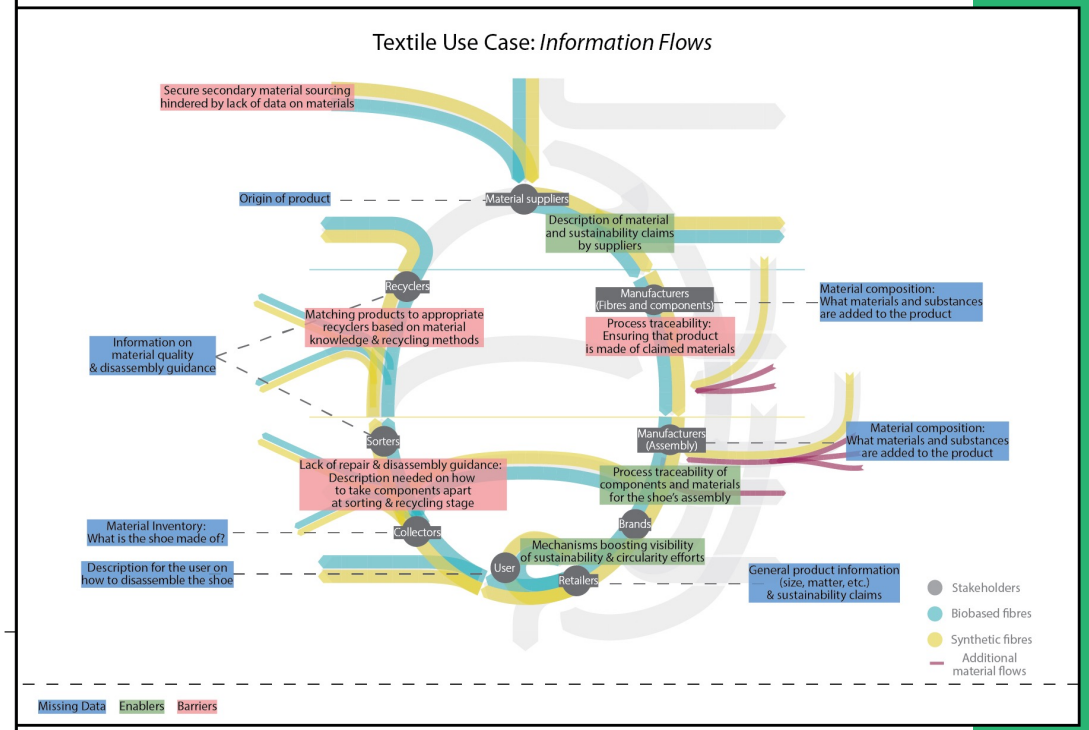
Motivation and Background





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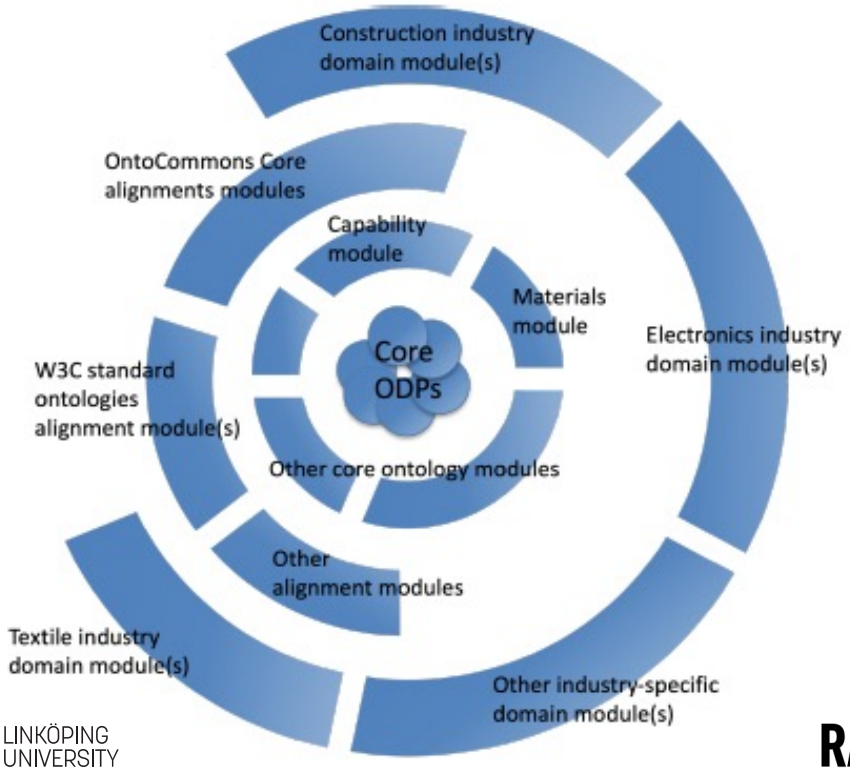
Motivation – Why an Ontology Network?



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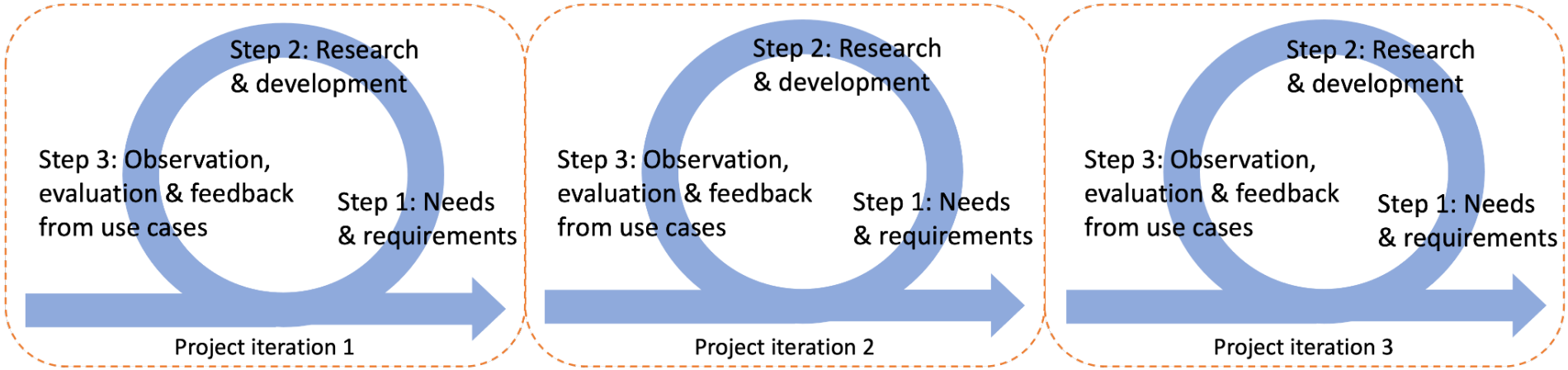
Methodology

Project Methodology



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Ontology Engineering Methodology

- Inspired by eXtreme Design, but…
  - less initial scoping
  - no fixed set of external resources
  - more focus on architectural principles
  - requirements outside of the development loop
    & priority on identification of cross-domain requirements

Initial set of core ODPs developed first

- Modularity & complexity trade-off

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Ontology Network and ODPs

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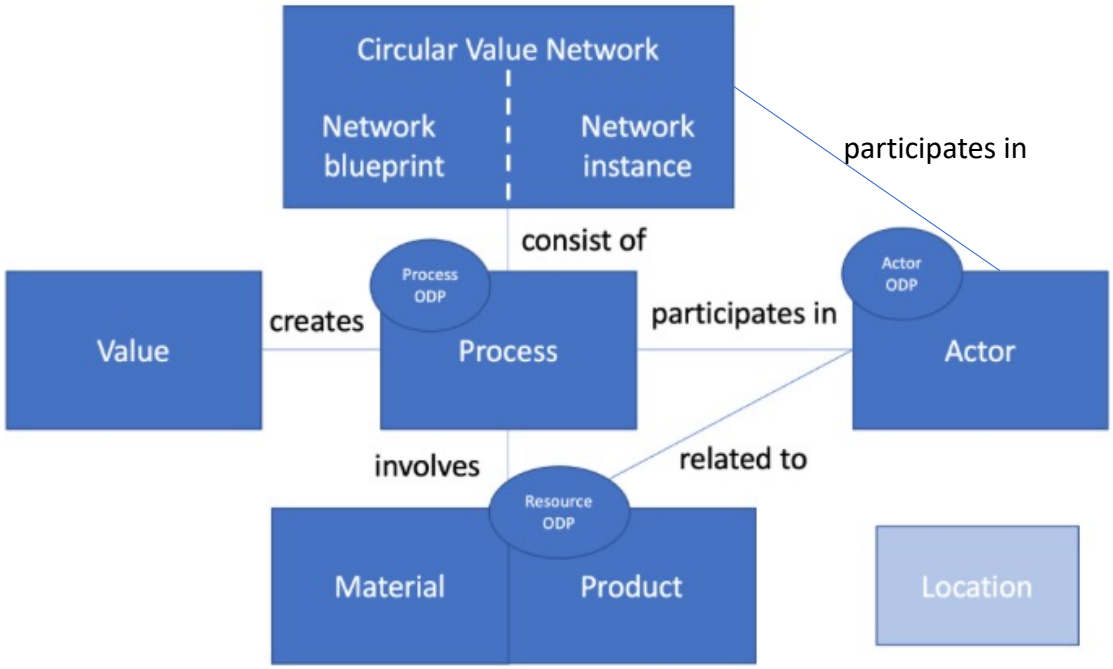
Ontology Network

- Ontology Network development
  - First drafts are online: https://w3id.org/CEON/
  - Focus is on capturing different perspectives and contextualization



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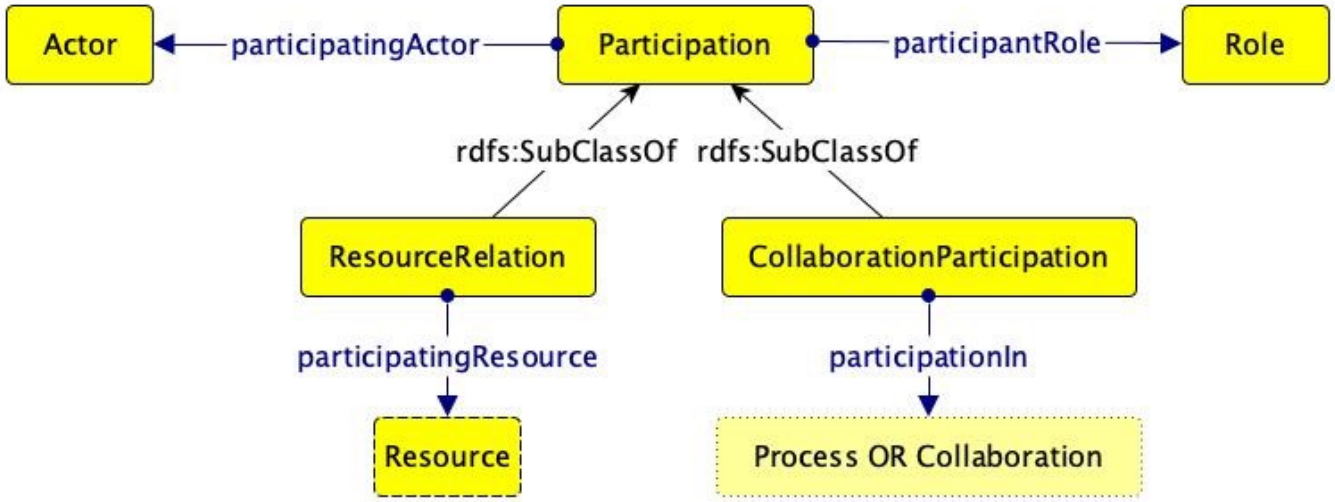
Example: Actor ODP



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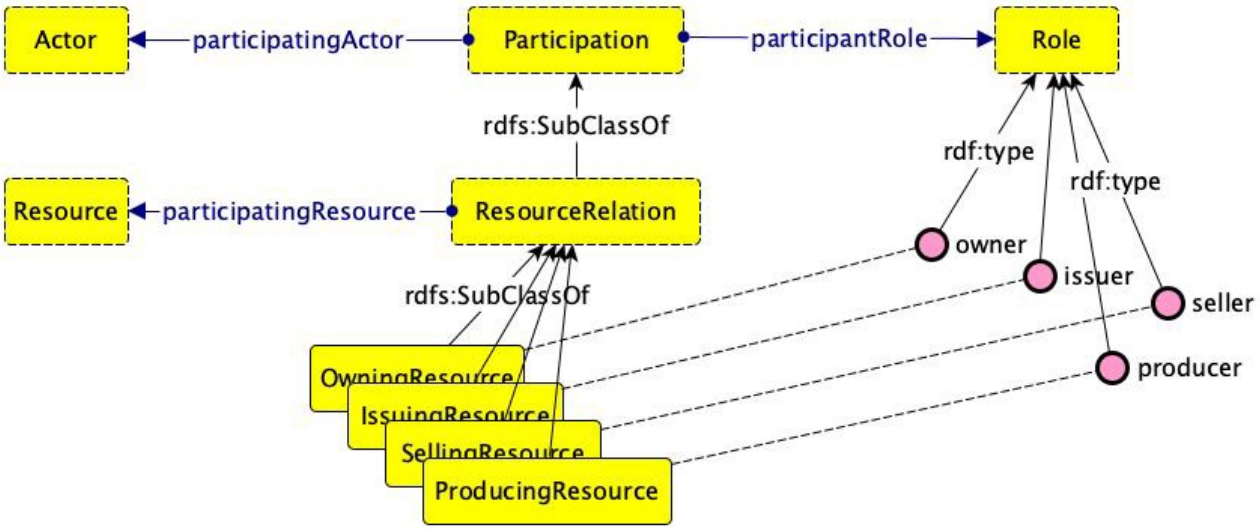
Example: Actor Module



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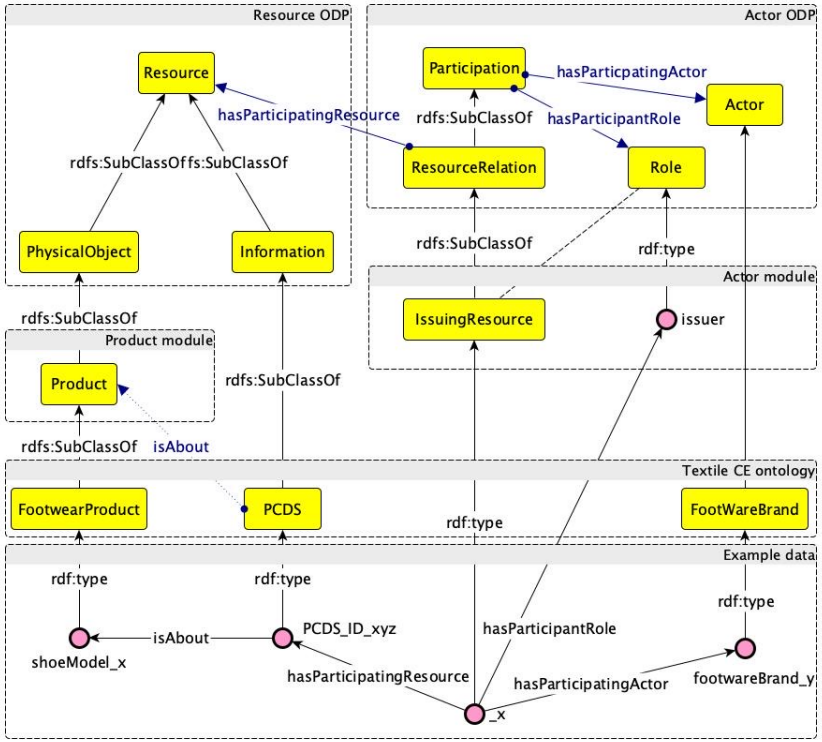
Use Case Examples

Textile


Resource ODP
Actor ODP
Resource
Participation
hasParticpatingActor
Actor
hasParticipatingResource
rdfs:SubClassOf
hasParticipantRole
rdfs:SubClassOffs:SubClassOf
ResourceRelation
Role
rdfs:SubClassOf
rdf:type
PhysicalObject
Information
Actor module
rdfs:SubClassOf
IssuingResource
issuer
Product module
Product
rdfs:SubClassOf
rdfs:SubClassOf
isAbout
Textile CE ontology
FootwearProduct
PCDS
rdf:type
FootWareBrand
Example data
rdf:type
rdf:type
rdf:type
isAbout
PCDS_ID_xyz
hasParticipantRole
shoeModel_x
hasParticipatingResource
hasParticipatingActor
footwareBrand_y
_x

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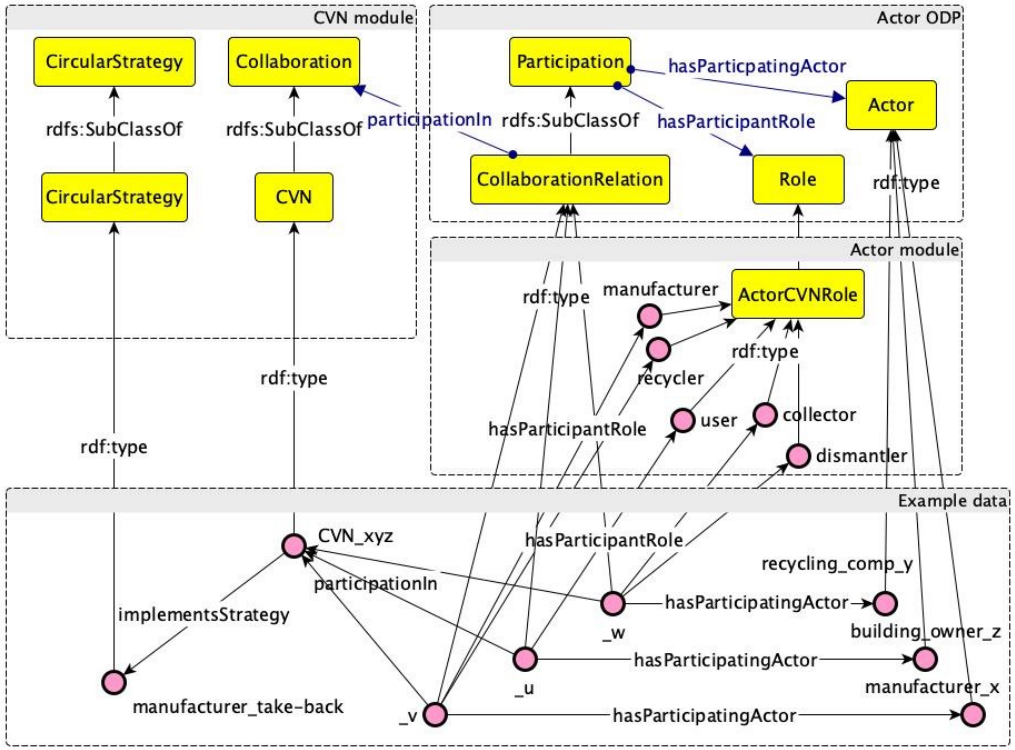
Construction



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Conclusions and Future Work

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Conclusions

- Ontology Network
  - Fill gap on missing CE and CVN concepts
  - Provide core ODPs for aligning to existing ontologies
  - Core ODPs for cross-domain interoperability
- Extended methodology for CE use cases

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Future Work

- Release of the use case specific modules
- Alignment modules
- Further extend methodology
- Tool support & guidelines for extension

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Thank you!
Questions?

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