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An Approach for Bridging the Gap Between Business Rules and the Semantic Web

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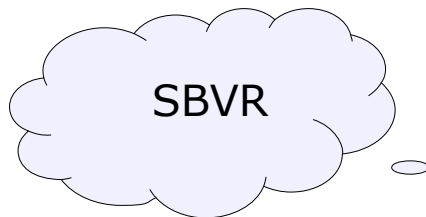
Orlando 2007-10-26



Nature of the Task – Mapping

SBVR

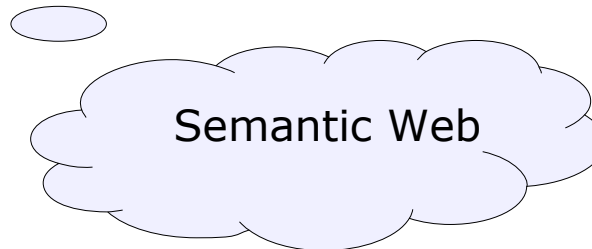
- OMG Specification, since 2006
- Semantics of Business Vocabularies and Business Rules
- essentially based on first order and modal logic
- orientation on the language of **business people**



?

Semantic Web (Vision, W3C Standards)

- based on various logics
- orientation on **machine processing** of logic-based knowledge

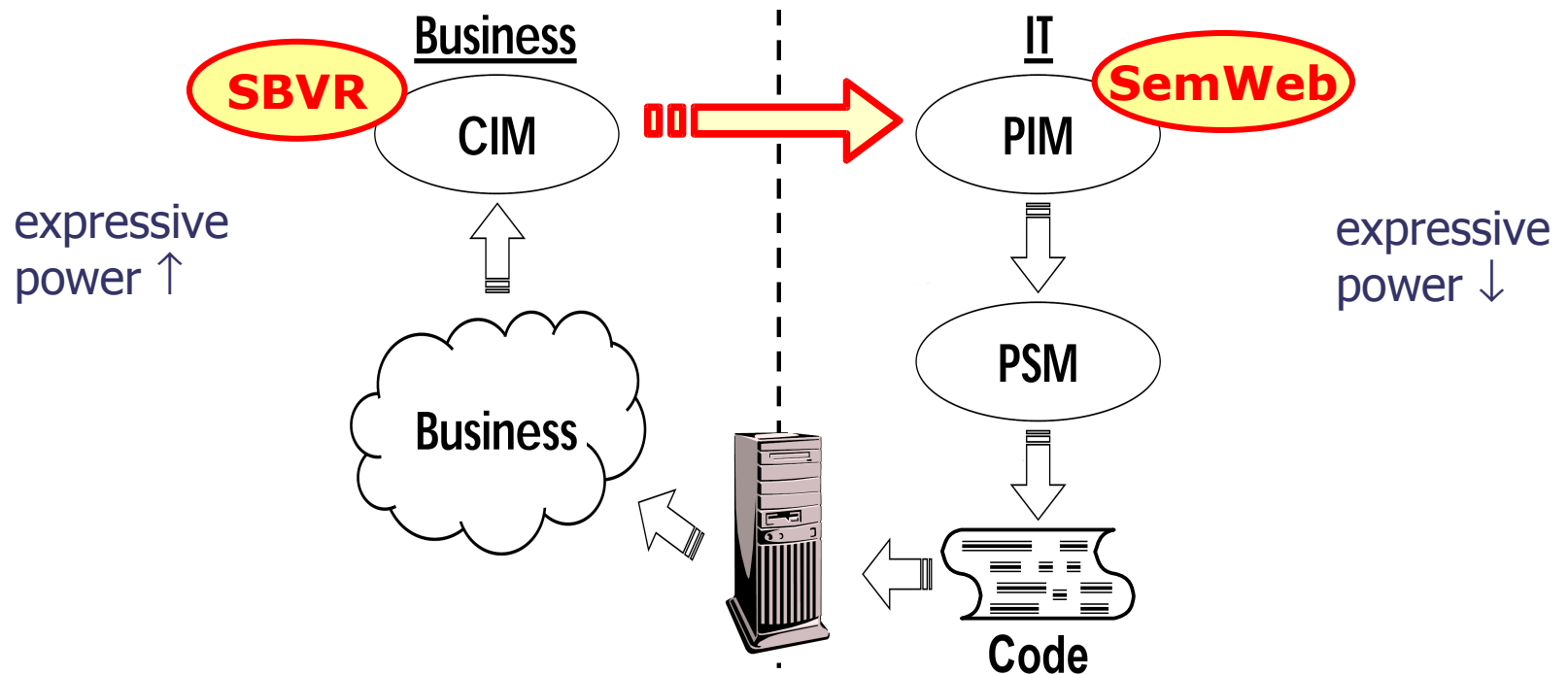


Content

1. Motivation
2. Source Language SBVR
 - model driven context
 - example
3. Targeting Semantic Web
 - language selection
(OWL, R2ML)
4. Mapping
 - procedure
 - examples
5. Summary and Outlook

SBVR in the MDA context

- An Example for "Model Driven Integrity Engineering" (MDIE) -



"MDA Big Picture" following [Schacher]

Example: Domain Model in SBVR

– following [Baisley], fragments –

Vocabulary

employee

...

manager

Definition

employee that manages others

General concept

employee

Synonym

supervisor

employee₁ *is under* employee₂

Synonymous Form

employee₂ *over* employee₁

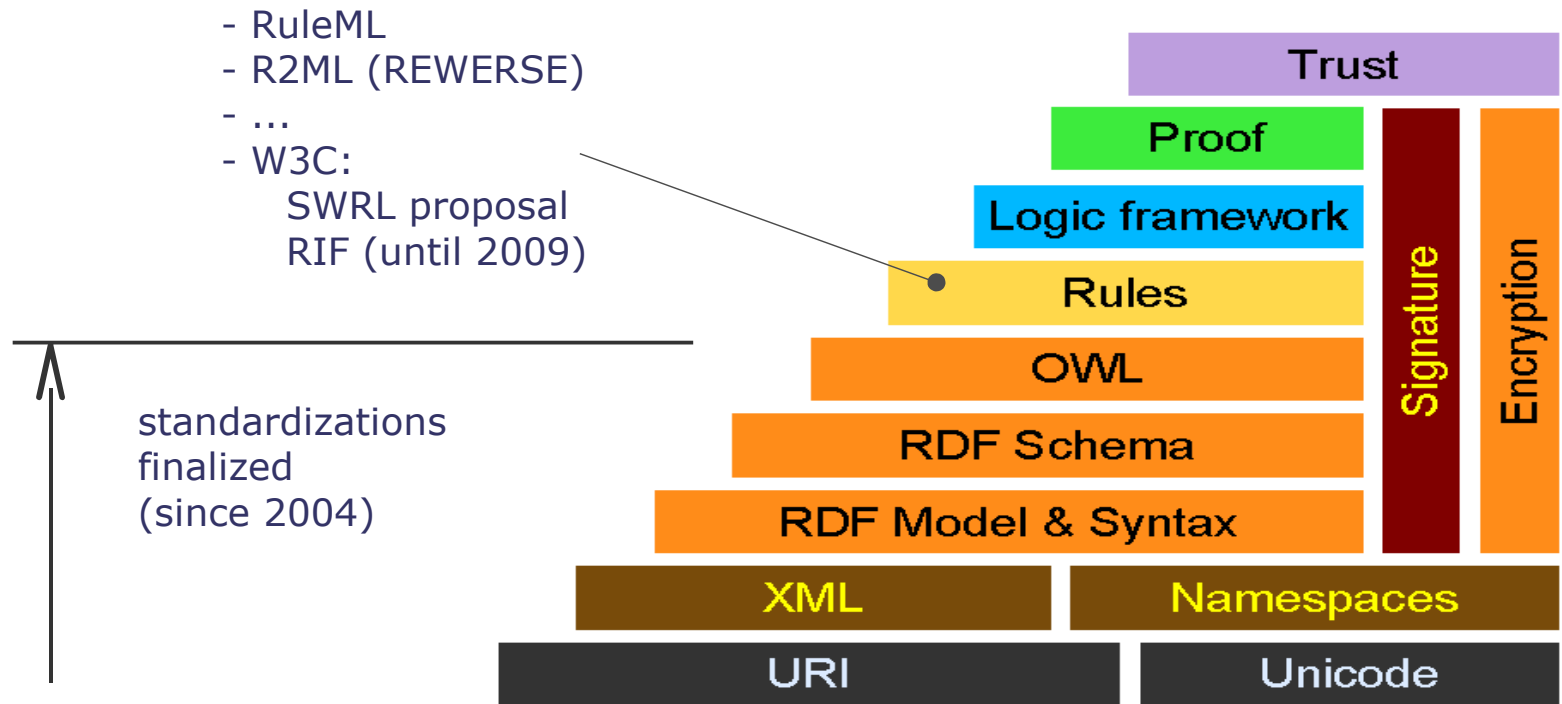
Rules

MC No Selfmanagement

Rule Statement

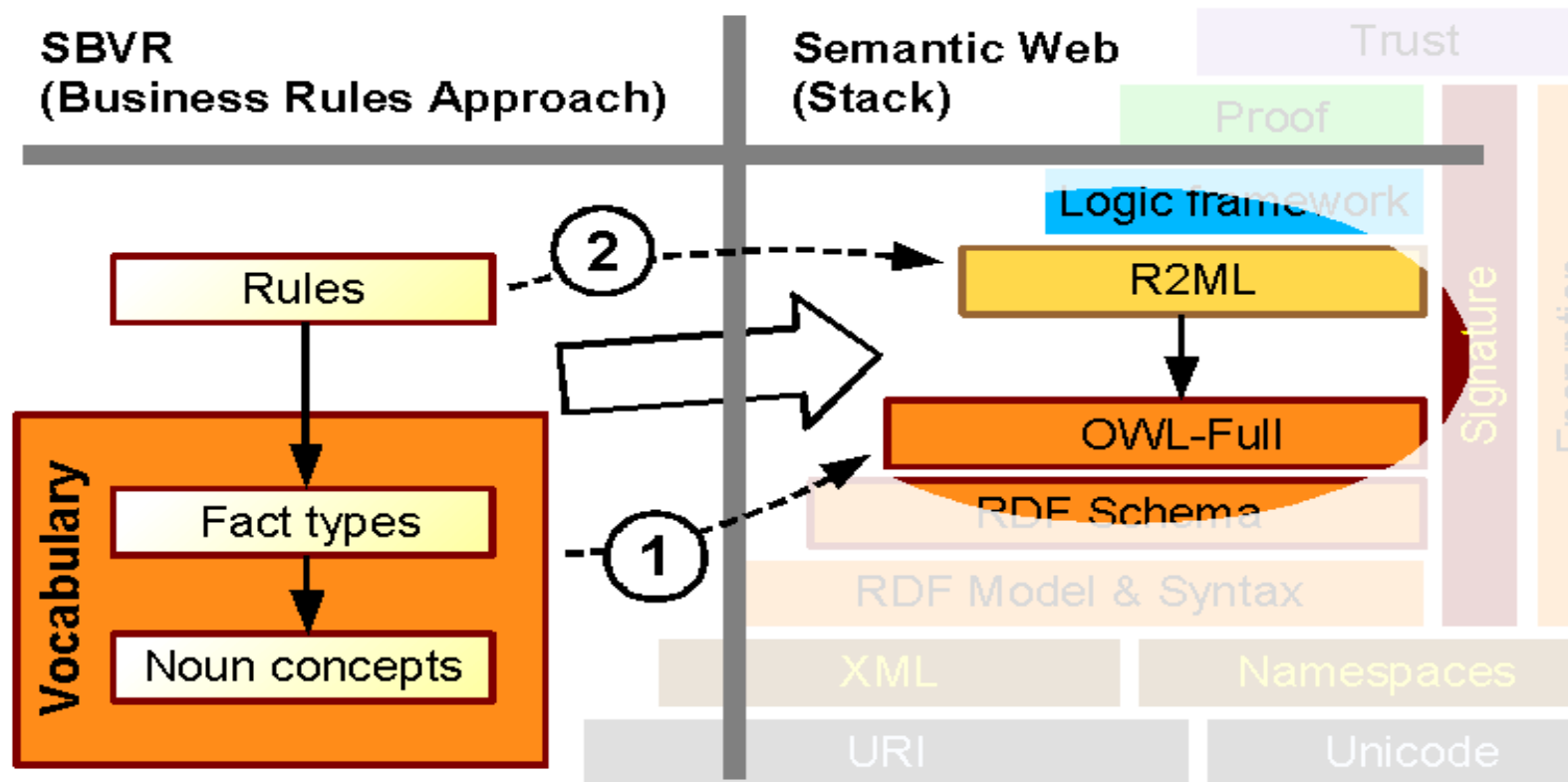
It is prohibited that an employee *is a*
manager *over* the employee

Semantic Web Overview

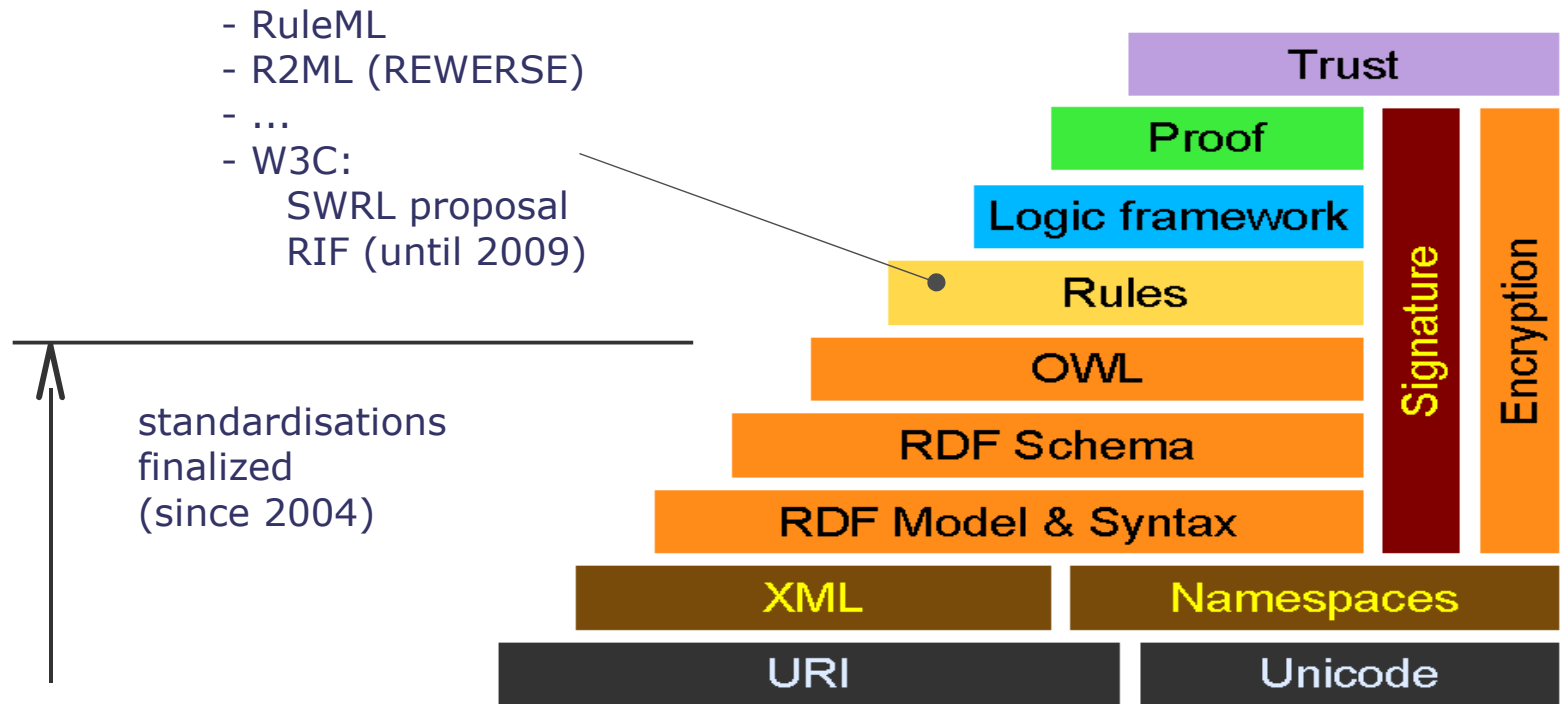


Semantic Web Stack (Version 2002)
[Berners-Lee]; adapted

Splitting Transformation, Target Languages

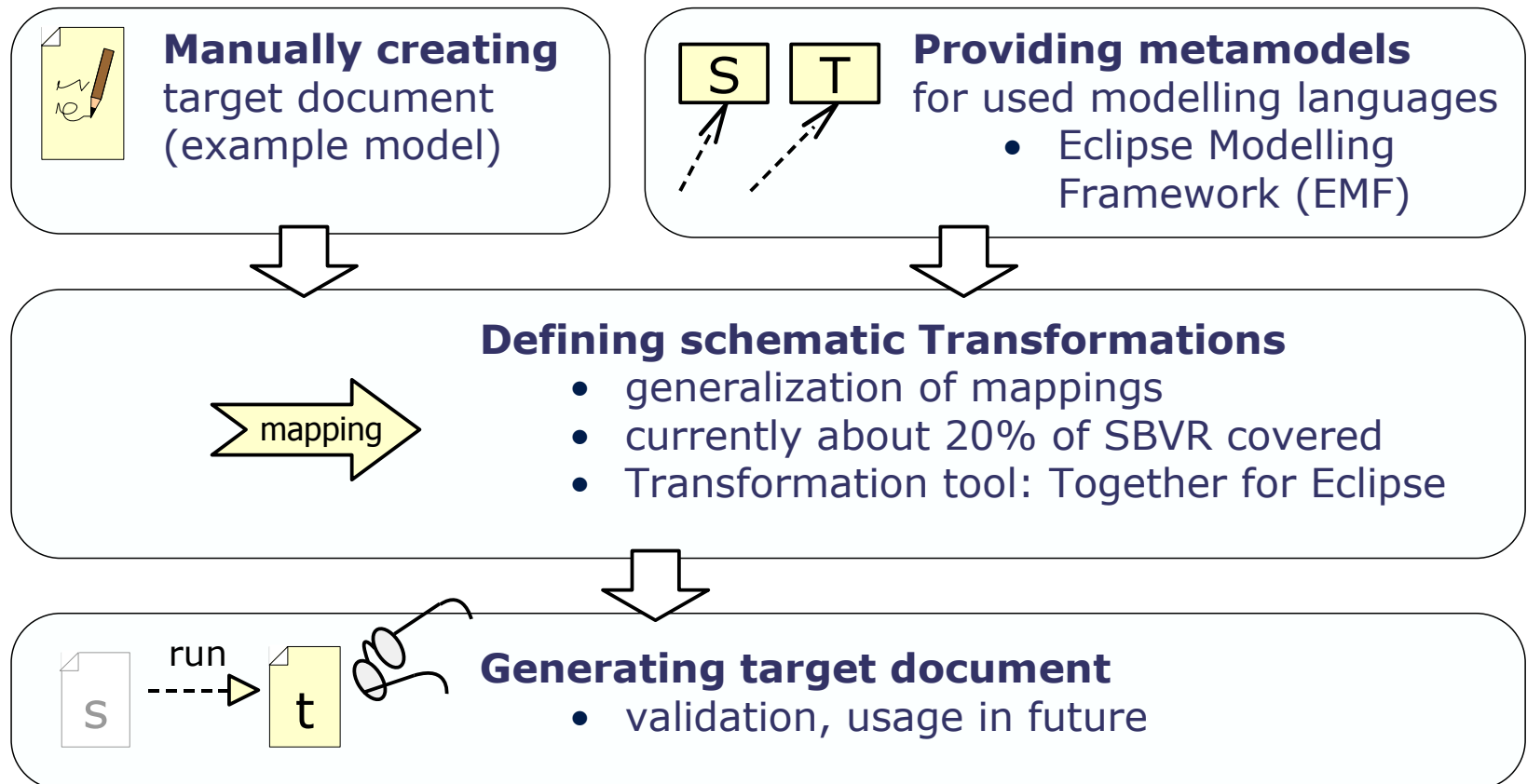


Semantic Web Overview



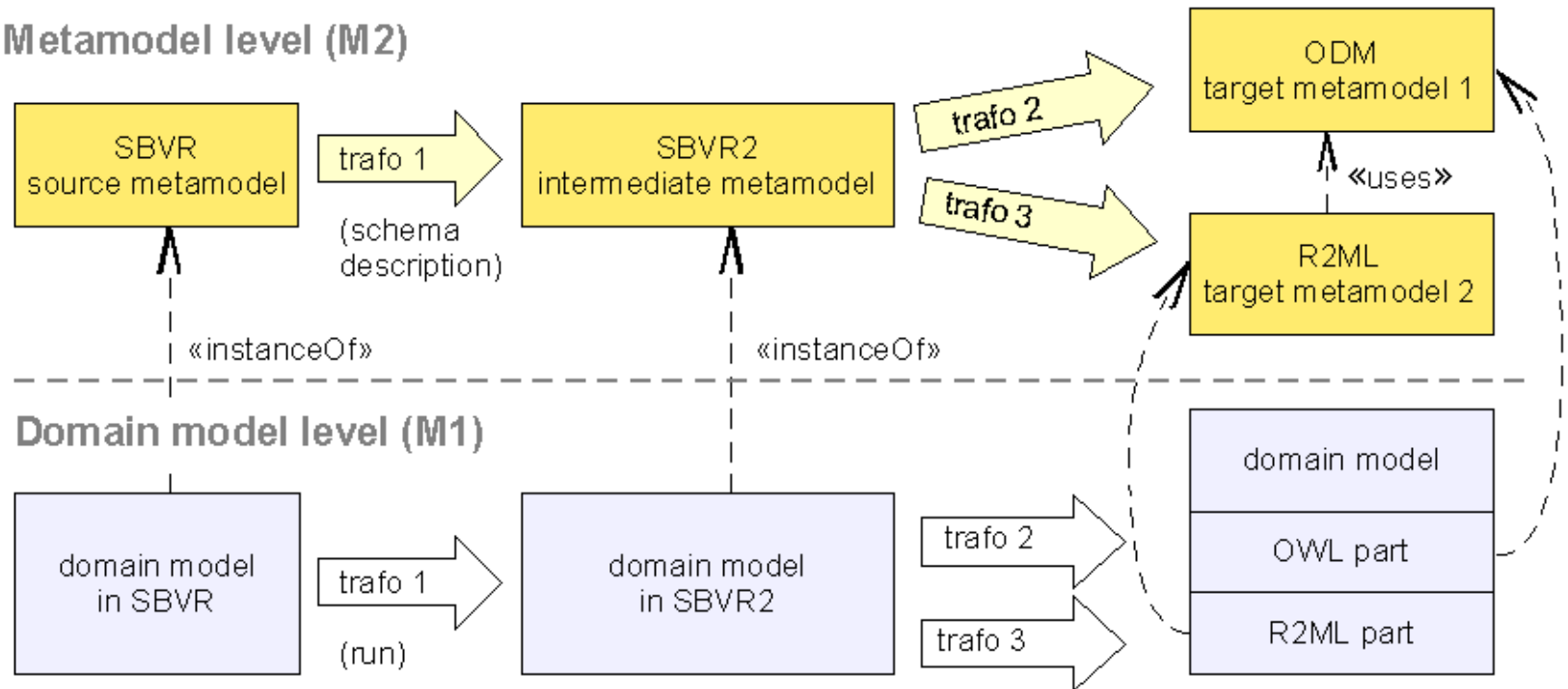
Semantic Web Stack (Version 2002)
[Berners-Lee]; adapted

Mapping Procedure and Prototyping

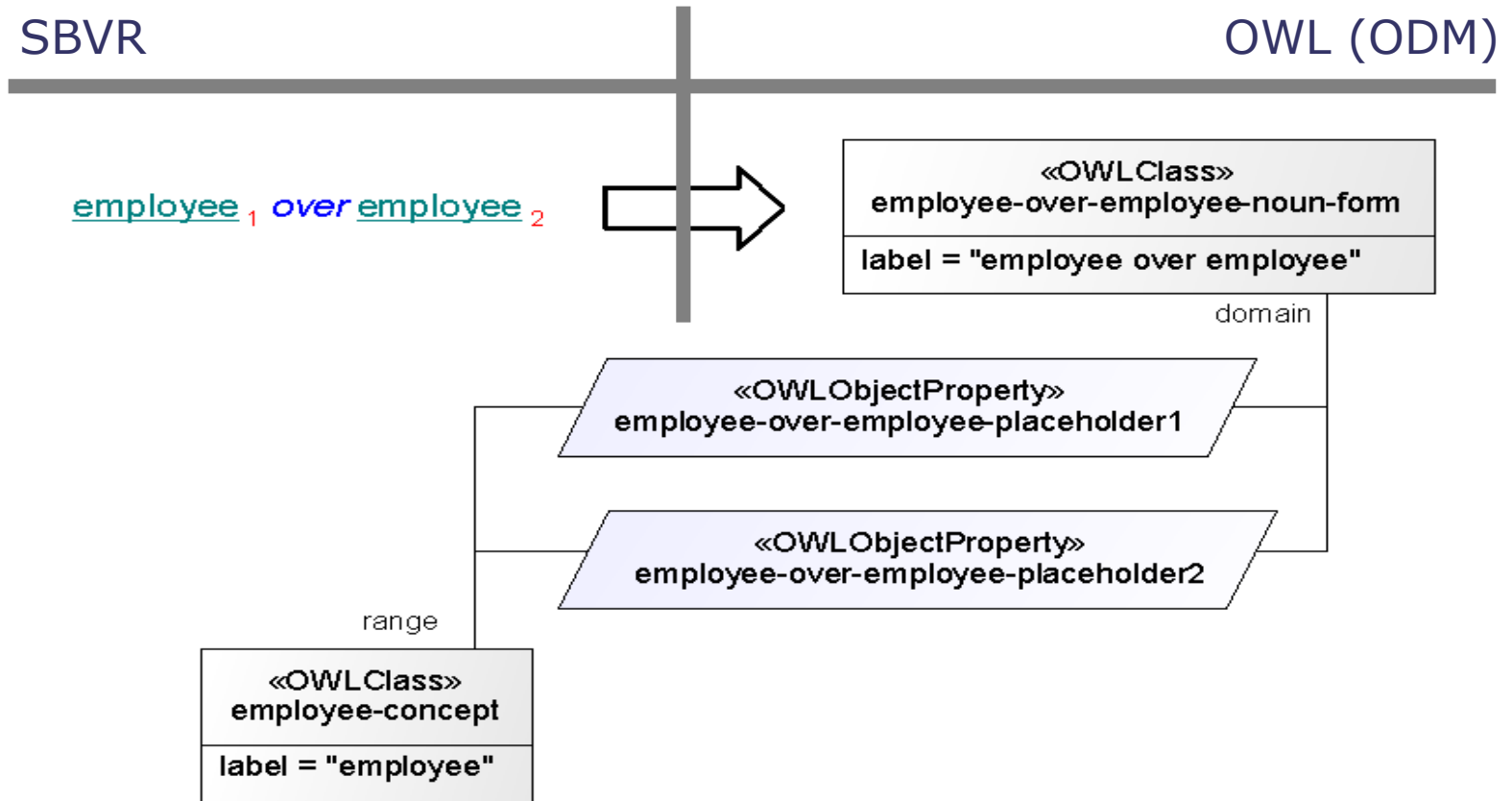


Transformation Chain

Metamodel level (M2)



Example: Mapping of Vocabulary



Rule Mapping

1. Integrity rules (in SBVR having modality, explicitly described)

<input type="checkbox"/> alethic	It is necessary that...	r2ml::AlethicIntegrityRule
<input type="checkbox"/> alethic	It is possible that...	no mapping possible
<input type="checkbox"/> deontic	It is obligatory that...	r2ml::DeonticIntegrityRule
<input type="checkbox"/> deontic \neg	It is prohibited that...	
<input type="checkbox"/> deontic	It is permitted that...	no mapping possible

2. Derivation rules (in SBVR implicitly described)

e.g. via closed definitions
not considered here

Example: Deontic Rule to R2ML

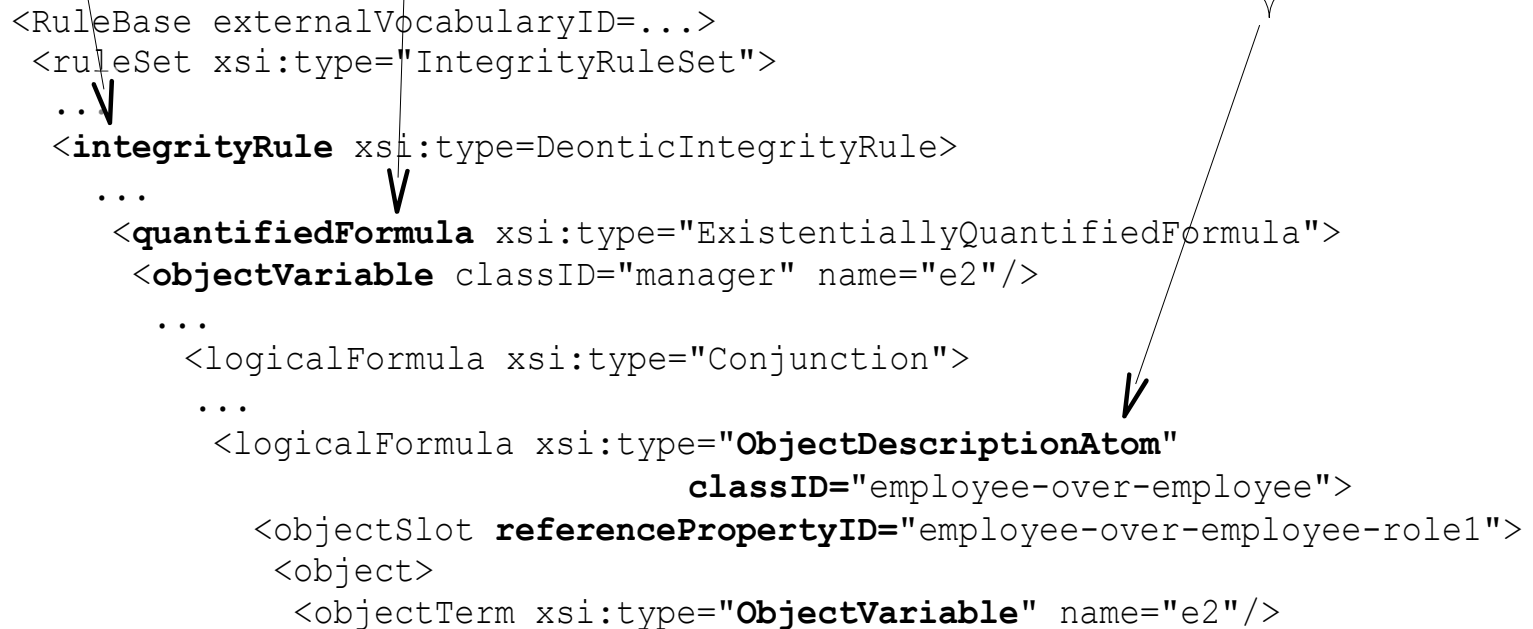
It is prohibited that an employee is a manager over the employee.

$$\square_{\text{deontic}} \neg \exists e_1 \in \text{employee} \exists e_2 \in \text{manager} (\text{thing is thing} (e_1, e_2) \mid \text{employee over employee} (e_2, e_1))$$

```

<RuleBase externalVocabularyID=...>
  <ruleSet xsi:type="IntegrityRuleSet">
    ..
    <integrityRule xsi:type=DeonticIntegrityRule>
      ...
      <quantifiedFormula xsi:type="ExistentiallyQuantifiedFormula">
        <objectVariable classID="manager" name="e2"/>
        ...
        <logicalFormula xsi:type="Conjunction">
          ...
          <logicalFormula xsi:type="ObjectDescriptionAtom"
            classID="employee-over-employee">
            <objectSlot referencePropertyID="employee-over-employee-role1">
              <object>
                <objectTerm xsi:type="ObjectVariable" name="e2"/>

```



Summary and Outlook

- Conclusion
 - mapping approach is suitable (SBVR → Semantic Web)
 - prototype extensible (conceptually, EMF, Together QVT)
 - loss in expressive power (anticipated)
- Vision
 - excellent opportunities for automating SBVR-specified business rules
 - by efficient transformer tools via the Semantic Web (OWL, RIF)

