Faculty of Computer Science, Institute for Software and Multimedia Technology, Chair of Software Engineering

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

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Orlando 2007-10-26

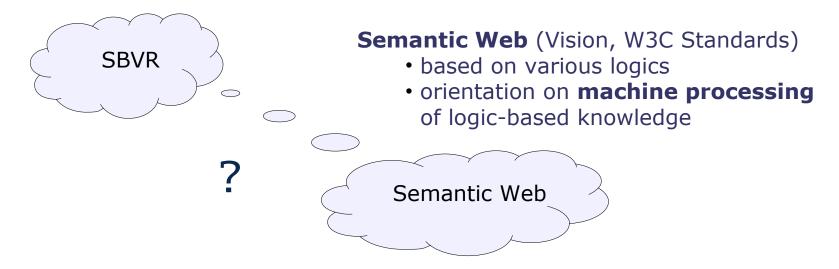




# Nature of the Task - Mapping

### **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





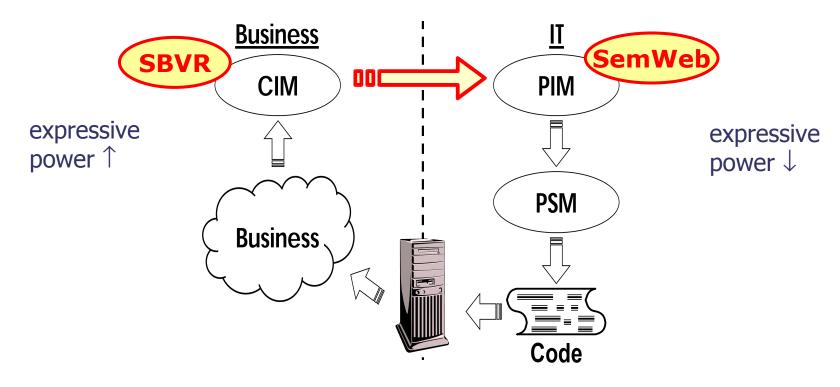
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### SBVR in the MDA context

- 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 <u>employee</u> Synonym <u>supervisor</u>

employee, is under employee,

Synonymous Form <u>employee</u> over <u>employee</u>

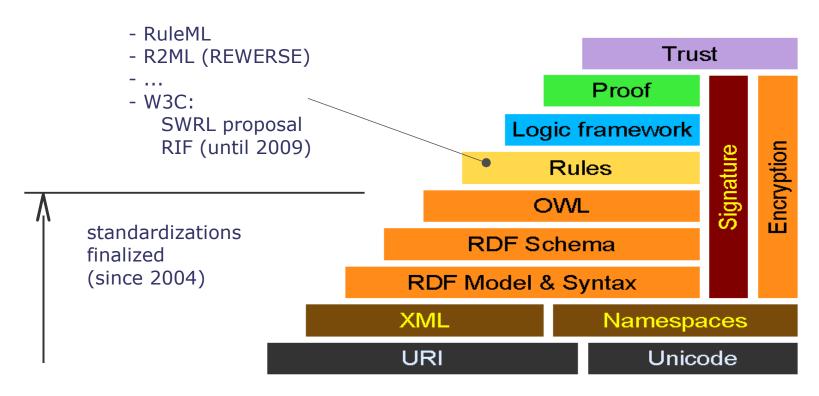
Rules

MC No Selfmanagement

manager over the employe



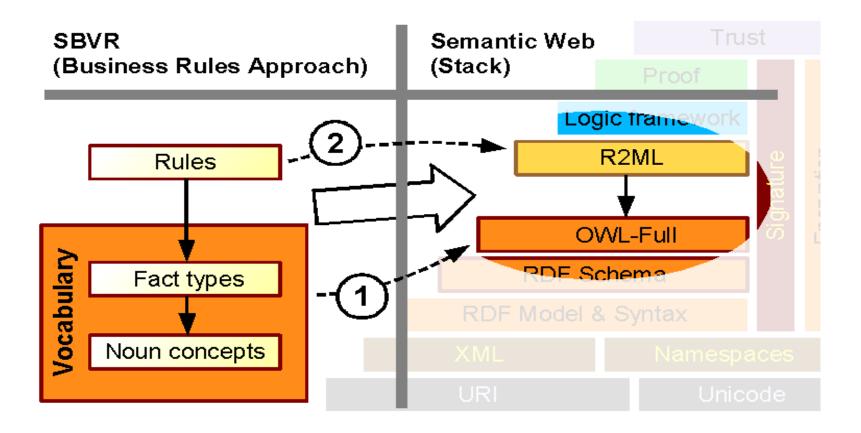
### Semantic Web Overview



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

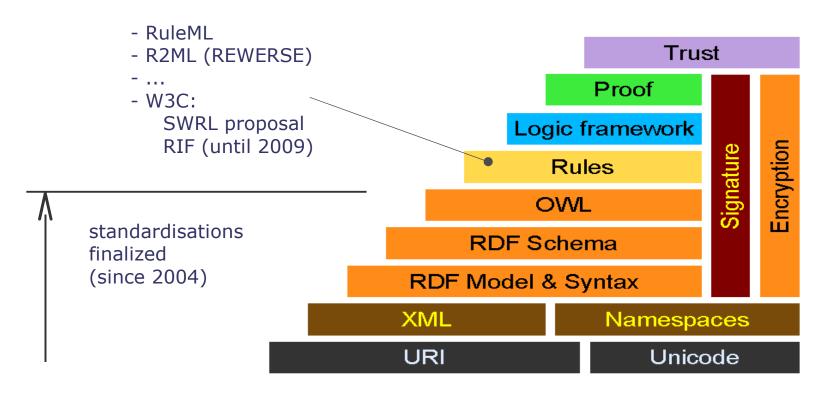


# Splitting Transformation, Target Languages





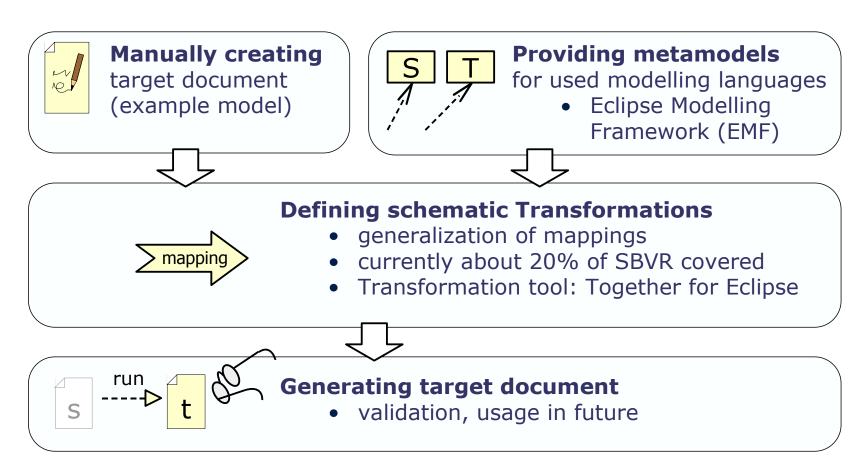
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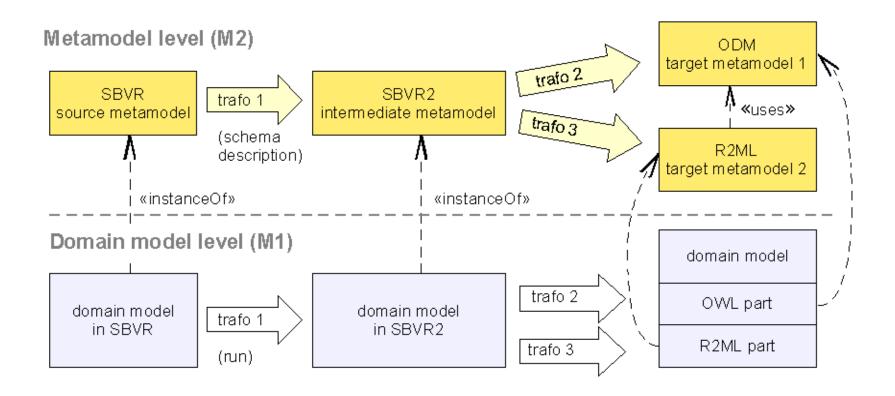


# Mapping Procedure and Prototyping



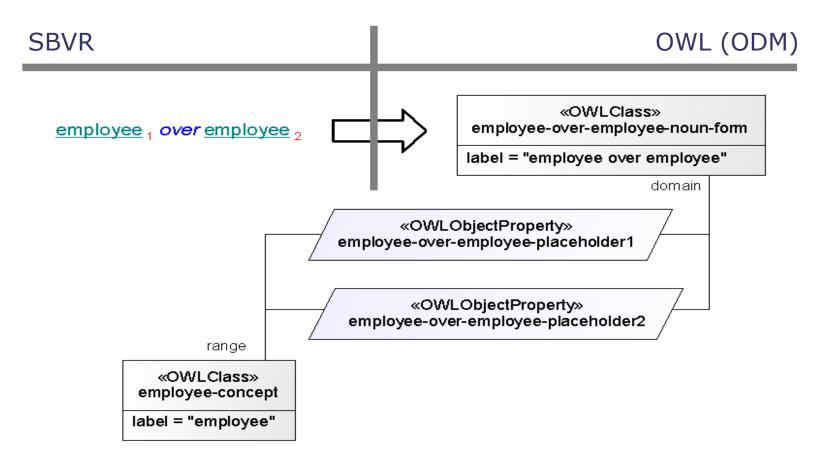


### Transformation Chain





# Example: Mapping of Vocabulary





# Rule Mapping

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

alethic alethic	It is necessary that It is possible that	r2ml::AlethicIntegrityRule no mapping possible
deontic	It is obligatory that	r2ml::DeonticIntegrityRule
deontic –	It is prohibited that	
♦ 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 <u>employee</u> is a <u>manager</u> over the <u>employee</u>.

```
\Box_{\text{deontic}} \neg \exists e_1 \in \underline{\text{employee}} \exists e_2 \in \underline{\text{manager}} (\underline{\text{thing is thing }} (e_1, e_2) | \underline{\text{employee}} \underline{\text{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"</pre>
                                            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)

