Perspectives for a Model-driven Service Engineering Discipline

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Status Quo and Solution Outline

- **Services:**
  - deployment paradigm (SOA) and platform (WSF)
  - business and workflow modelling

- **Service Engineering:**
  - model-driven development
  - ontology-based semantic modelling
Research Challenge

Development and Deployment Process – Methods and Techniques
Research Direction – Rigour and Formality

- **Motivation** for formal foundations:
  - modelling for collaboration and exchange of information
  - automation of analyses and code generation

- **Modelling activities**:
  - semantic service description
  - service matching and composition

- **Proposal**: *ontology-based modelling foundations*:
  - concepts representing entities of a domain and relationships between these concepts that explain the properties of concepts,
  - an extended relationship subexpression language using process combinators realises process expressions that characterise accessibility relations between states of a system,
  - Additional extensions can cover data aspects by introducing names to represent for instance parameters.

  with subsumption-based reasoning

- **Existing approaches**: OWL-S and WSMO (service ontologies) and WSPO (service process ontology)
Research Direction - Methods and Techniques

- Central development activities: description, reasoning, and transformation
- Description and visual modelling:
  - layered modelling: business services, architecture, process execution and description
  - UML extensions: service and process semantics
- Formal Reasoning:
  - process analysis: abstract composition of individual services to processes
  - process implementation: matching of abstract service requirements and provided services
- Transformations:
  - horizontal: UML to ontology representation (and vice versa)
  - vertical: between the layers – ideally automated in a process-centric context
Discussion and Outlook

The objectives of **model-driven service engineering**:
- industry aims of cost reduction through automation and improved maintenance
- semantic integration and process-orientation focusing on composition and transformation activities

A **discipline of ontology-based model-driven service engineering** needs to go further. Other relevant perspectives:
- **Standards and Interoperability**:
  - deployment: SOAP, WSDL, UDDI as core platform [W3C]
  - development: MOF-compliant, ODM-based UML extensions [OMG]
- **Cooperation and Trust**:
  - models as the basis of contracts
  - certification as the central trust mechanism