Festo Semantic Platform


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Festo – We live automation!

A little semantics goes a long way...
Festo – an independent, family-owned company

**Products**

- **Factory Automation**
- **Process Automation**

**Components**

- > 30,000 products

**Solutions**

- > 300,000 customers

**Industry segments (examples)**

- Food & Beverage
- Automotive
- Electronic Light Assembly
- Electronics
- Water technology
- Biotech / Pharmaceutical

**Other activities**

- Festo Didactic Industrial training & education
- Bionic Learning Network

- 61 sales companies
- 8% R&D share, > 100 patents/year

~3.1 bn. Euro turnover in 2017
Knowledge Base

Data Pipeline

Reasoning (core part OWL2-RL + SWRL with NAF)

Domain Expert in the loop

Applications

Bridging the Semantic Gap

Skill-based systems engineering

Knowledge Reasoning (core part OWL2-RL + SWRL with NAF)
Meeting complexities in component compatibility

Basic Components
(thousands $10^3$)

Motor
Controller
Mounting kit

Geometrical + electrical compatible components

Drive Trains
(millions $10^6$)

Drive trains combinations filtered according to product manager input

Complex Cartesian Systems
(septillions $10^{24}$)
Data Integration Pipeline

Data Integration challenges due to Product Lifecycle
(Idea, Prototype, Simulation, Assembly...)

- Change Data Capture
- Import Selection
- Mapping
- Enrichment

- SQL
- SQL + Scripting
- (R2)RML
- RDF/OWL
Data Integration Pipeline

Change Data Capture → Import Selection → Mapping → Enrichment

SQL → SQL + Scripting → (R2)RML → RDF/OWL

Identifier Management
Top-level classes in the electric domain

Complex Cartesian Systems

- 135272 axioms
- 100 SWRL rules

Inference of compatibility relations:
- OWL2-RL SWRL with NAF
- Using RDFox reasoner
Supplier

- **provides**
- **implements**
- **can be composed to**

Resources

- **Skills**
  - `open()`
  - `suck()`
  - `extend()`
  - `moveLin()`
  - `movePtp()`
  - `close()`
  - `reject()`

Offered Capabilities

- **Basic**
- **Composed**

Checker

- **Matching problem**
- **Planing problem**
- **PDDL + DL?**

Manufacturer

- **requires**
- **consists of**

Required Capabilities

- Tasks
- Application
Experiences and challenges change....

Establish use case

- Domain Expert
- Knowledge Engineer

Challenge:
- finding a working modelling / reasoning approach

Productive System

- Domain Expert
- OWL
- tailored tools and DSLs

Challenge:
- enabling the domain experts
- building the infrastructure
- data integration and tracability
- avoid lock-in
- data and software engineering

Expand use cases

- polyglot?

Bridging the semantic gap

Challenge:
- finding the right mix of techniques
And there is more ....
Thank you for your attention