ONTO COMMONS
ONTOLOGY-DRIVEN DATA DOCUMENTATION FOR INDUSTRY COMMONS

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OAS AKTIENGESELLSCHAFT

Demonstrator 6 OAS - Ontology based yard management

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OAS is a company specialized in

- Weighing systems
- Plant construction
- Process control technologies
- **Yard Management**

Ontology based yard management:

Yard management comprises the planning, organisation, management, processing and control of the entire flow of materials and goods. Effective yard management main benefits' are:

- Increase the transparency and efficiency of the entire flow of materials and goods.
- The optimal coordination of all logistical processes is of crucial importance here.
- Especially on the factory premises in manufacturing companies or complex logistics centres, the coordination of the flow of goods on the premises is of great importance. With a constantly increasing flow of traffic on the factory premises, the challenge is to make the logistics processes as efficient as possible and to ensure cost-saving loading and unloading.

Demonstrator main goal:

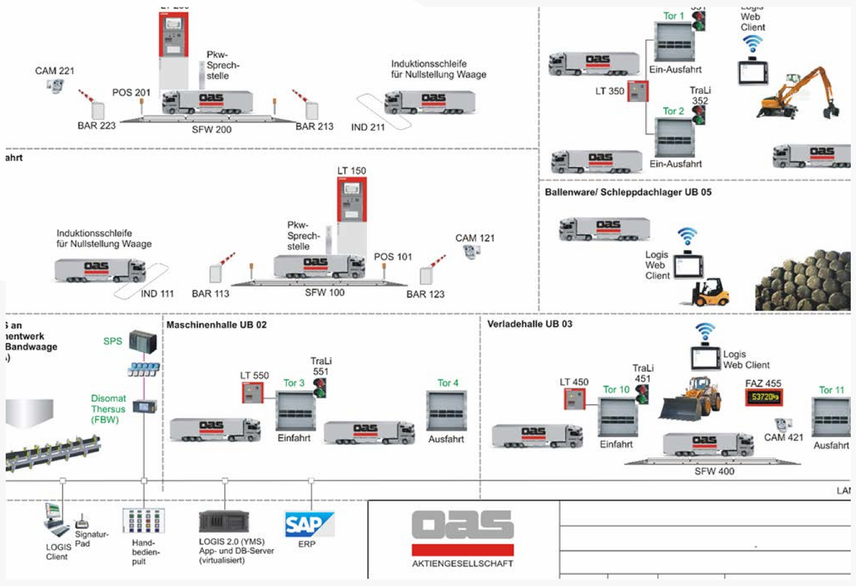
Improve the automation of yard management!

The demonstrator within OntoCommons aims at improving effectiveness and responsiveness of decision-making in logistics control systems (yard management) based on data sharing built around data streams:

- Semantically describe the data streaming from yard management by dedicated PSS ontology.
- Ontology should support standardization of yard management services; yard sites do differ from each other leading to very individual solution for each site.
- Defining rules for configuration and scheduling of yard system using ontology.

OAS uses the Yard Definition in current SW development and in their products. Yard Definition is used internally up to now and grew over time without a defined plan with respect to interoperability & reusability. Objective is to build an ontology that will form the metadata basis of the Yard Management Ecosystem data.

Two main set of steps in developing OAS Demonstrator:



Setup set of steps:

- creation/update of the ontology for standardized and interoperable Yard Definition and yard configuration and scheduling inference rules to support decision-making.
- Enlarge the SW for yard management with the ontology and rules supporting decision making within yard configuration and/or run time scheduling of vehicles.

Runtime set of steps:

Use the SW and ontology at runtime to support decision making in the scope of yard/site services:

- Service: Yard configuration based on the ontology and rules for a particular yard.
- Service: OAS System operation based on defined workflow and rules – scheduling of vehicles and activities within a yard.

Main challenges

- The definition of the basic rules for yard configuration is a long process as these rules do not exist in any written form and relies on the knowledge of the involved actors.
- Several iterations are needed in order to get a meaningful set of rules that can be applied in several yard configuration processes.

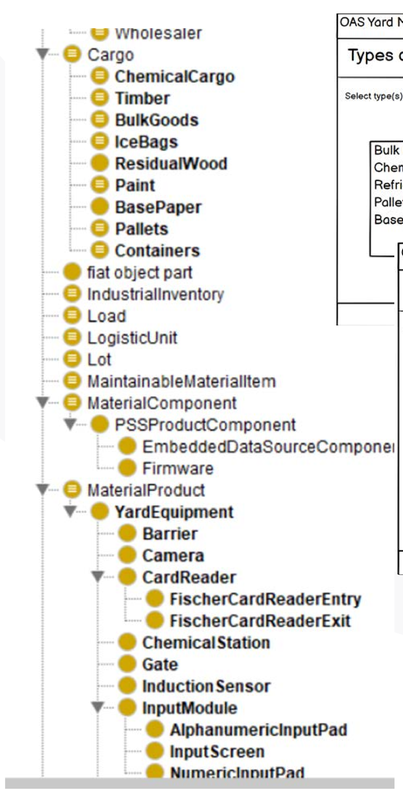
Solution

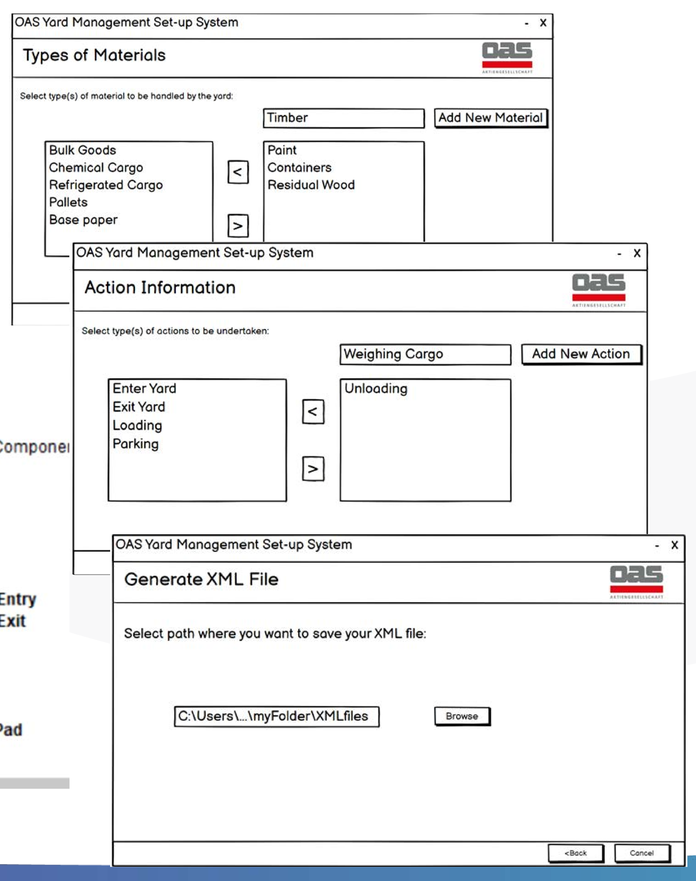
Software Solution

- creation/update of the ontology and yard set-up inference rules.
- enlarged SW for yard management with the ontology and rules supporting decision making within yard configuration and/or scheduling of vehicles

OAS ontology

- The ontology models all the elements in a yard and the rules model the basic configuration of a yard (e.g. a gate must be before a scale) as well as the required behavior of the SW and the actors in the system (e.g., when a truck is carrying dangerous materials, it should be redirected to the special load/unloading area).
- BFO is the Top Level Ontology
- IOF Core is the Mid Level Ontology
- Based on IOF Product Service System ontology (and using partly IOF Supply Chain ontology)
- Key elements of the Ontology include OAS products (equipment in the yard), Cargo/Materials, Information collected/provided, Agents involved, etc.
- Protégé tool and LOT method are used to adapt and instantiate the ontologies





Expected impact of using semantic technologies

- Robust solutions (ontologies, rules, software) that allow for easy setup and configuration of a new yard.
- Shorten time to make a new yard configuration for a new client/ site/ domain: expected 30% reduction of time spent in new site configuration.
- It is currently expected that at least 50% of the components can be standardised.

Further adoption of semantic technologies in OAS organization

- using experience gained in OntoCommons for applying ontologies to improve interoperability (by using references to other metadata) and reusability (by expressing metadata and data with standards) of data outside of OAS Ecosystem.
- Applying approach for other OAS systems and data to extend services (Product Service Systems).

The challenges/obstacles that could hinder a sustainable adoption of semantic technologies:

- Communication between the domain experts and ontology experts is difficult to establish.
- The methods and tools to support such communications are still not well applied in SMEs.
- Clear guidelines about the levels of abstraction of the rules using ontologies to make them effective are needed.
- Relation to mid- level ontology is useful to generalise and keep entities open for diverse configurations, but requires more time.

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