KUEHNE+NAGEL

Boundaryless EAM with Semantic Web Tools

The Open Group London Event and Member Meeting

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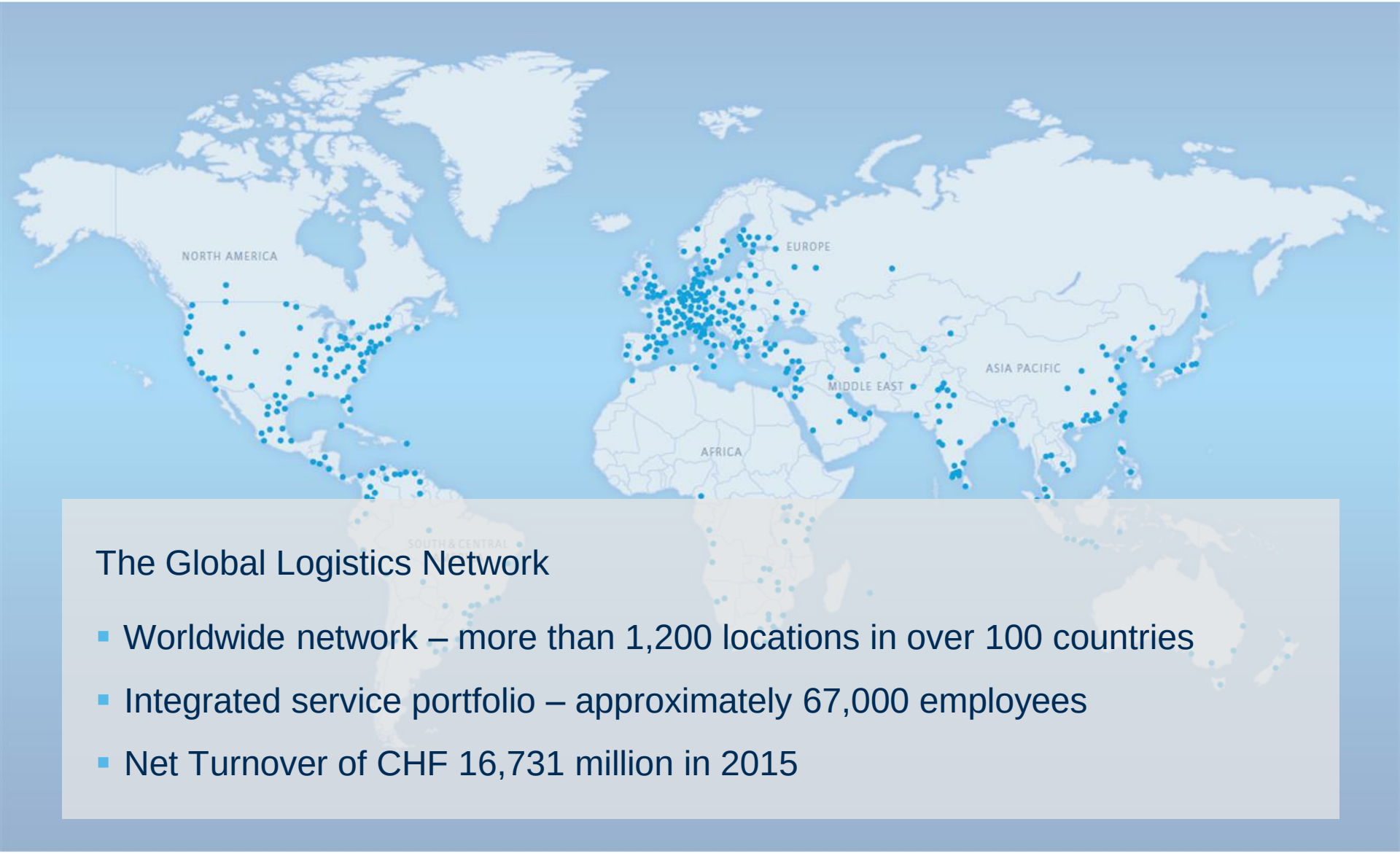
April 25-28, 2016 – London (UK)

Agenda

- Business Overview
- Semantic Web Project
- Outlook and Questions



The Global Logistics Network

- Worldwide network – more than 1,200 locations in over 100 countries
- Integrated service portfolio – approximately 67,000 employees
- Net Turnover of CHF 16,731 million in 2015

Comprehensive Global Logistics Solutions

World Class Capabilities and Positioning

Airfreight

Top 2 globally

Contract Logistics

Top 2 globally

Seafreight

No.1 globally

Overland

Top 3 in Europe

Integrated Logistics

No.1 globally

- 3.8 million TEUs shipped
- 1.25 million tons handled
- 22.5 million road orders
- 9.5 million m² Logistics Centre footprint
  683 locations
  58 countries
- 750 experts in 7 global Logistics Control Centres

Note: All figures relate to 2015

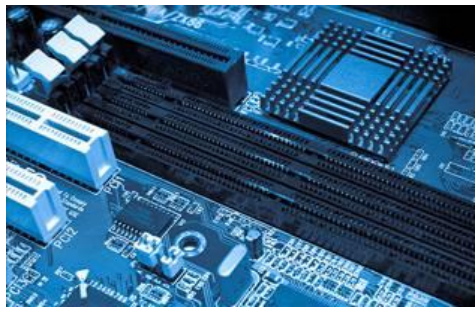
Dedicated Solutions for the World's Major Industries

Aerospace

Automotive

Consumer

High-Tech



Industrial

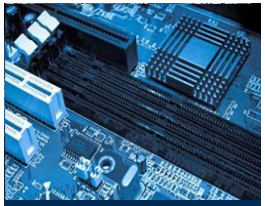
Oil & Gas

Pharma & Healthcare

Contract Logistics

Focus Verticals & Services

Automotive



High-Tech

Consumer

Aerospace

Pharma & Healthcare

Industrials

Production Logistics

Spare Parts Logistics

E-commerce

Co-Packing

Distribution

Advanced Warehousing

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- **Semantic Web Project**
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Evaluation of Semantic Web Tools for EAM

Project from September 2015 to January 2016

Capabilities of EAM Tools (Kuehne + Nagel)

1. Meta Modelling (flexible data structures)
2. Sophisticated Reporting (own query language)
3. Integration of Enterprise Information Sources
4. Visualization
5. Simple User Interface
6. Support of Different Stakeholders

Assumption:

Through semantic web and modern web technologies all required capabilities can be addressed

Semantic Web and the Technology Stack

Tim Berners Lee et.al. “The Semantic Web”, Scientific American, May 2001

Sparql Protocol And Rdf Query Language (SPARQL)
Query language for RDF graph databases
Uses similar syntax as SQL (SELECT WHERE …)

Web Ontology Language (OWL)
Family of knowledge representation languages (OWL Lite, OWL DL, OWL Full, OWL2 EL, OWL2 QL, OWL2 RL) based on description logic – provides simple inferencing

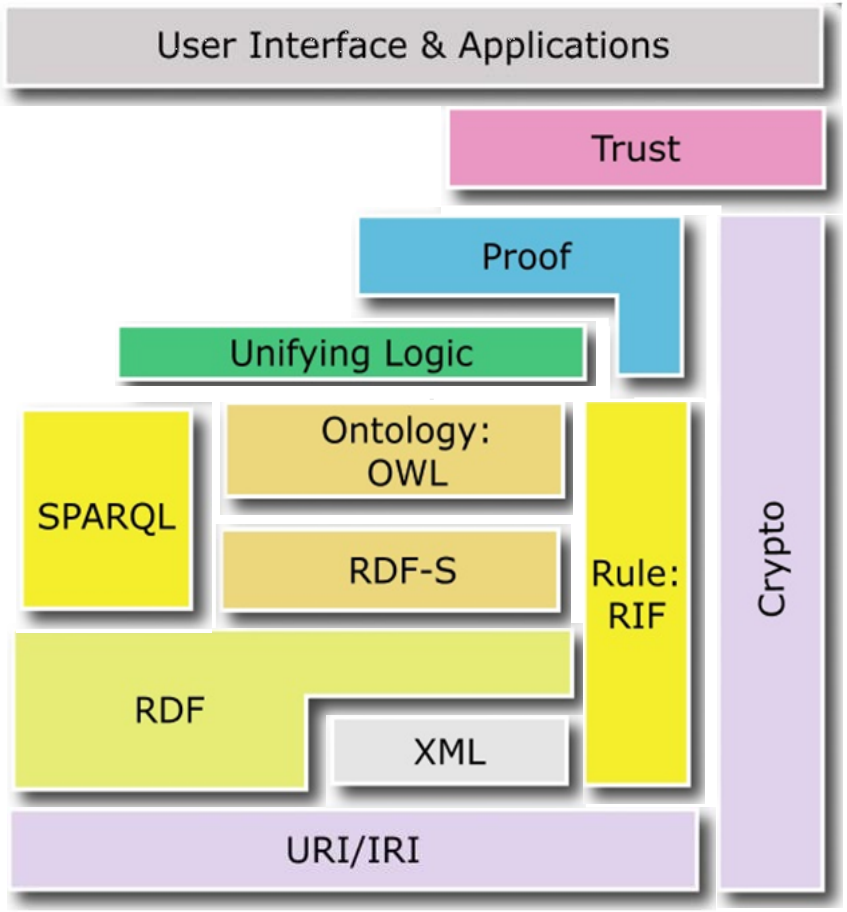
kn:HAM kn:locatedIn kn:WEU
kn:Warehouse-HH1 kn:locatedIn kn:HAM

=> kn:Warehouse-HH1 kn:locatedIn kn:WEU

RDF Schema (RDFS)
Extension of RDF with classes, datatypes, domains, ranges…

Resource Description Framework (RDF)
Triples (subject predicate object) based on URI’s and primitives, e.g. (turtle syntax)

@prefix kn: http://kuehne-nagel.com
kn:HAM kn:locatedIn kn:WEU



Tool Selection for Evaluation Prototype

two key components

OWL Editor

Protégé was selected

- large set of plugins
- collaboration support (web version)

Note: the collaboration feature wasn't used, because of the limitations of the web version

Note: Commercial products were not investigated

Triple Store (RDF)

GraphDB from Ontotext was selected

- free version
- simple setup
- widely used RDF database
- supports all required features

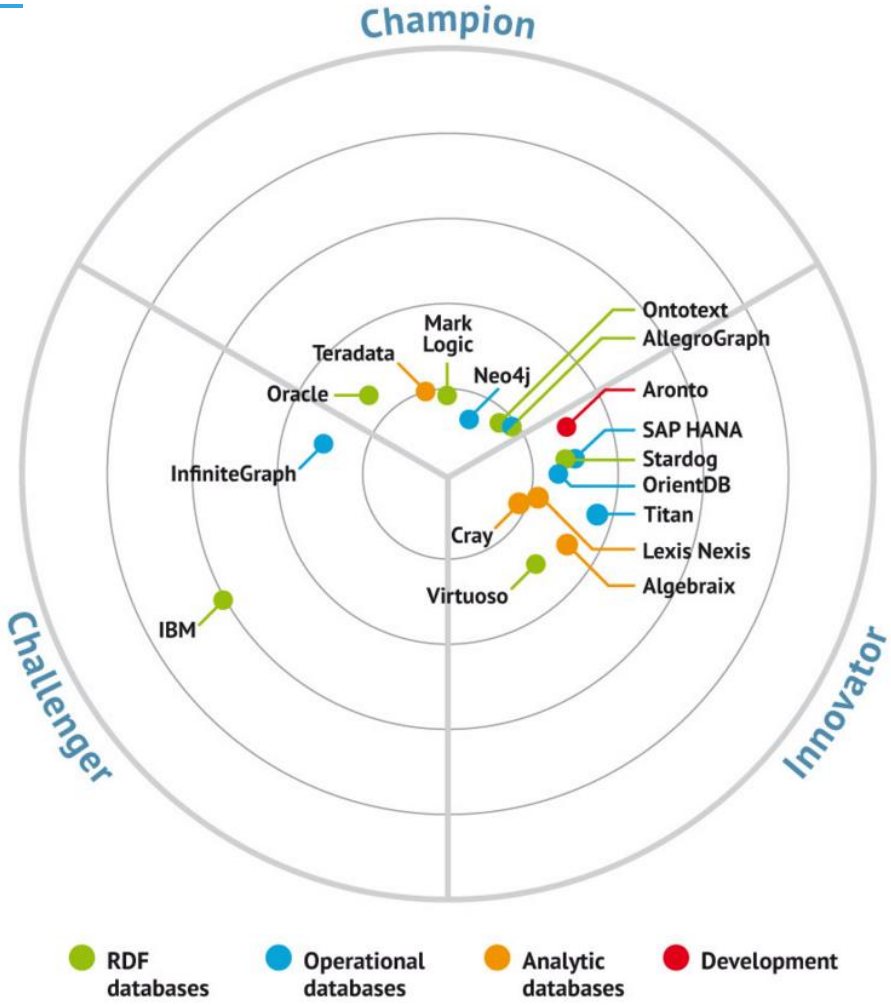
Note: no commercial product selection

Features that we looked into

- SPARQL 1.1
- OWL2
- User roles
- API's
- Runtime Environment
- Inference/Reasoning Engine
- Stackoverflow Count
- Free Version

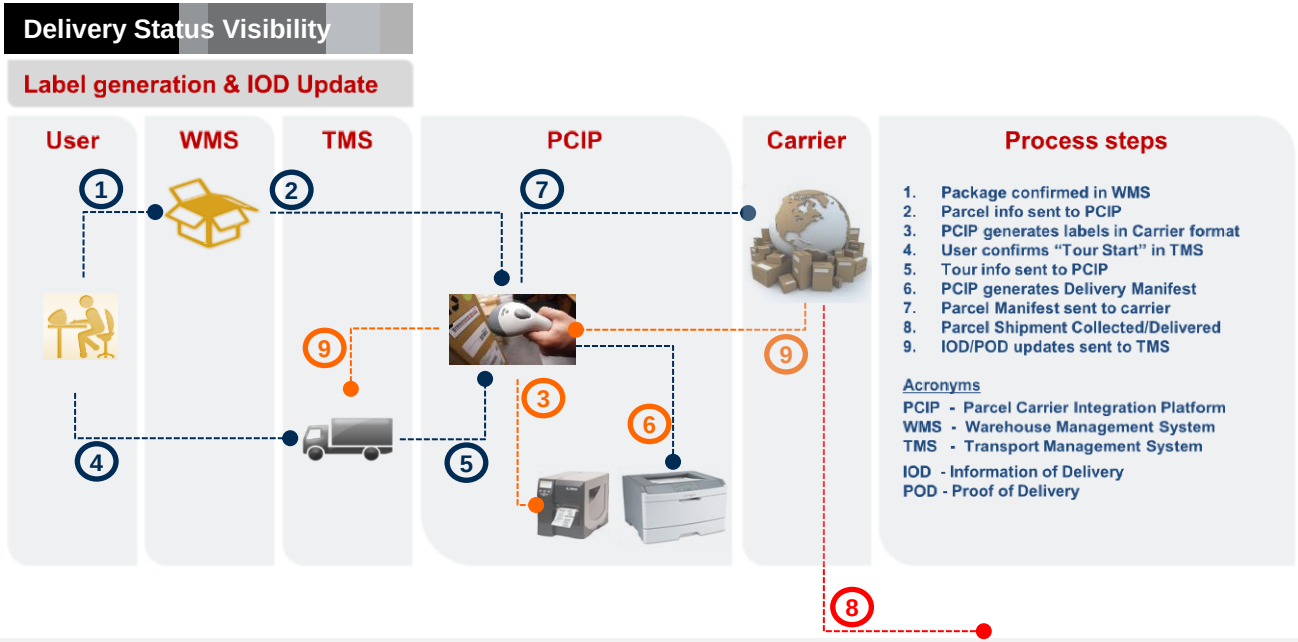
Market Overview for Graph Databases

Bloor Research



Evaluation based on a Concrete Business Demand

Business impact analysis for the Parcel Carrier Integration Platform



Analysis of business and IT structures to support the incident manager

Elements

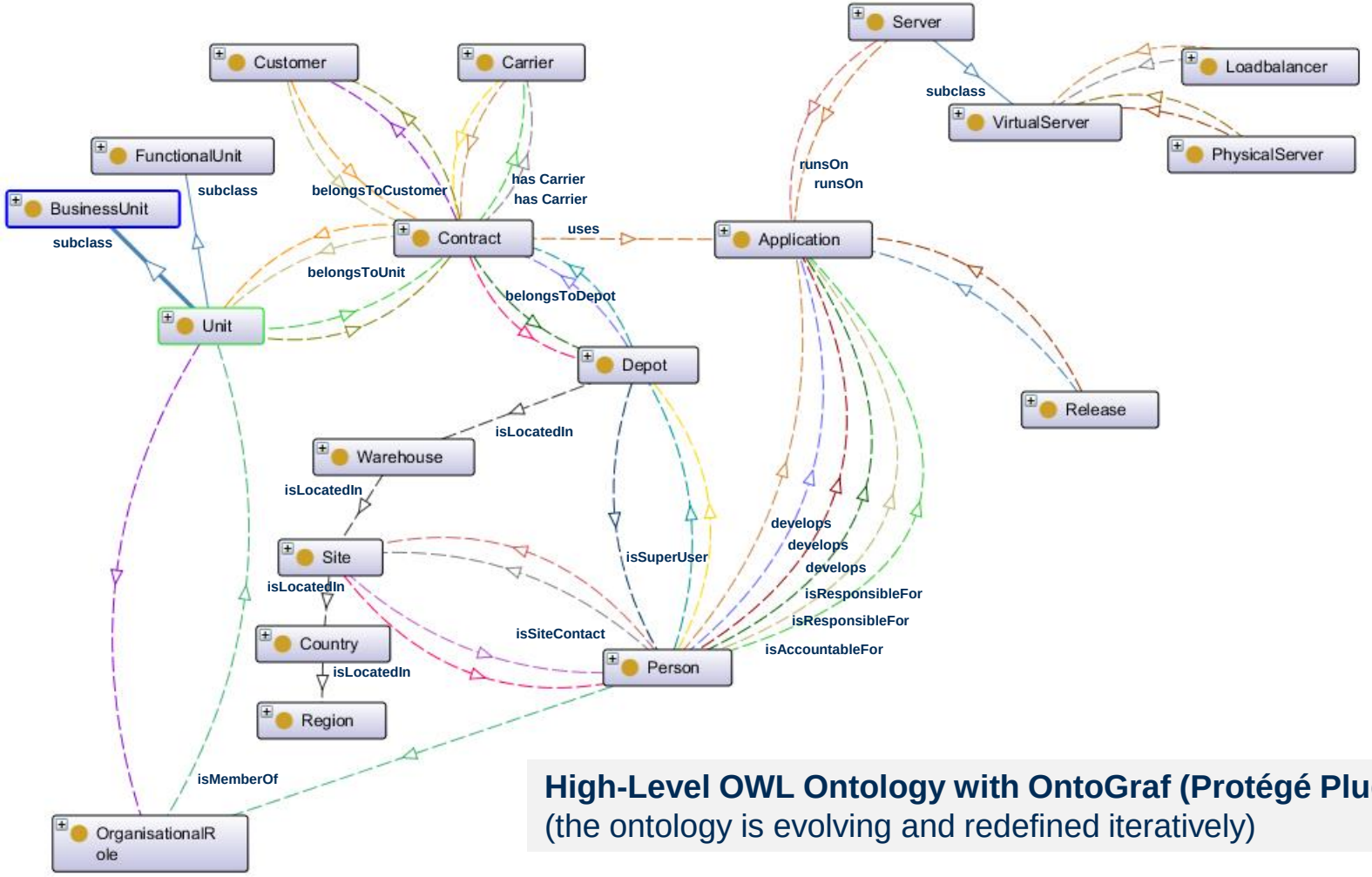
- Customers and carriers
- Organizational structures
- Servers and applications

Covered IT incidents

- server failure
- carrier connection failure

Ontology

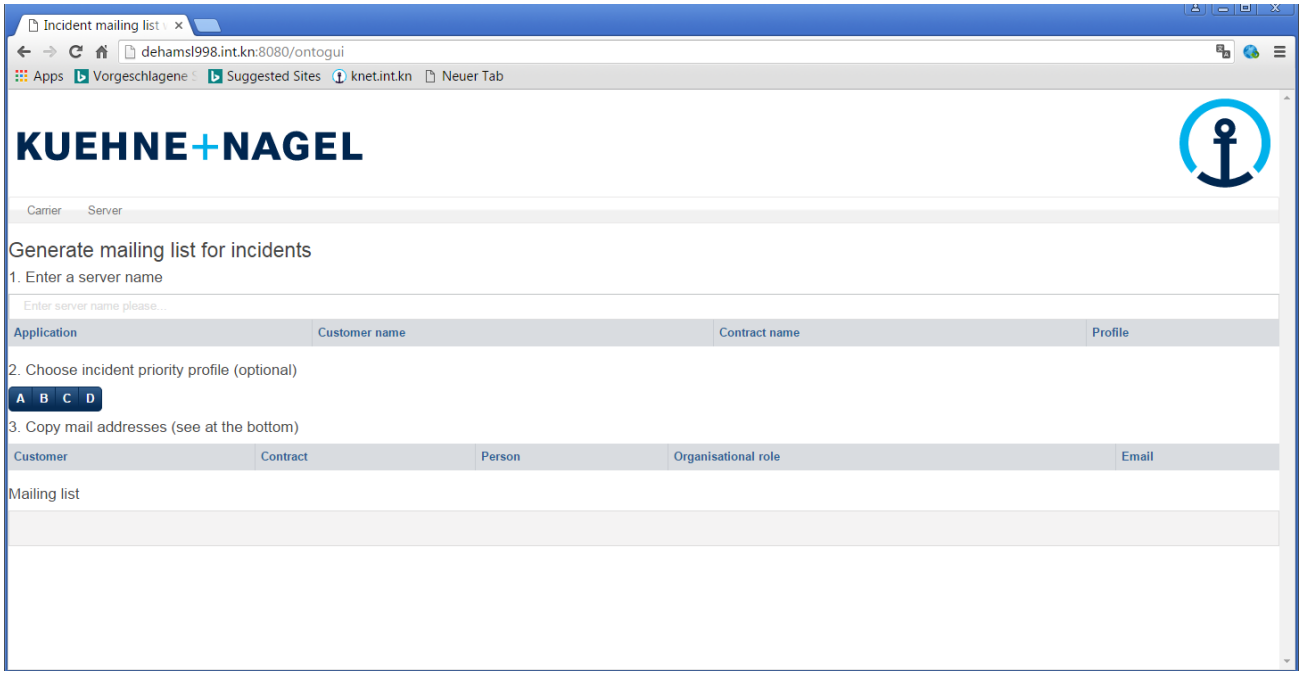
Following ontology was defined during the prototype project



High-Level OWL Ontology with OntoGraf (Protégé Plugin)
(the ontology is evolving and redefined iteratively)

Web UI-Prototype with AngularJS and Bootstrap - Demo

(mainly selected, because of existing knowledge and layout reuse)



Application flow

1. **Server or carrier is selected**
2. **Impacted customers are shown**
3. **Responsible persons are shown**

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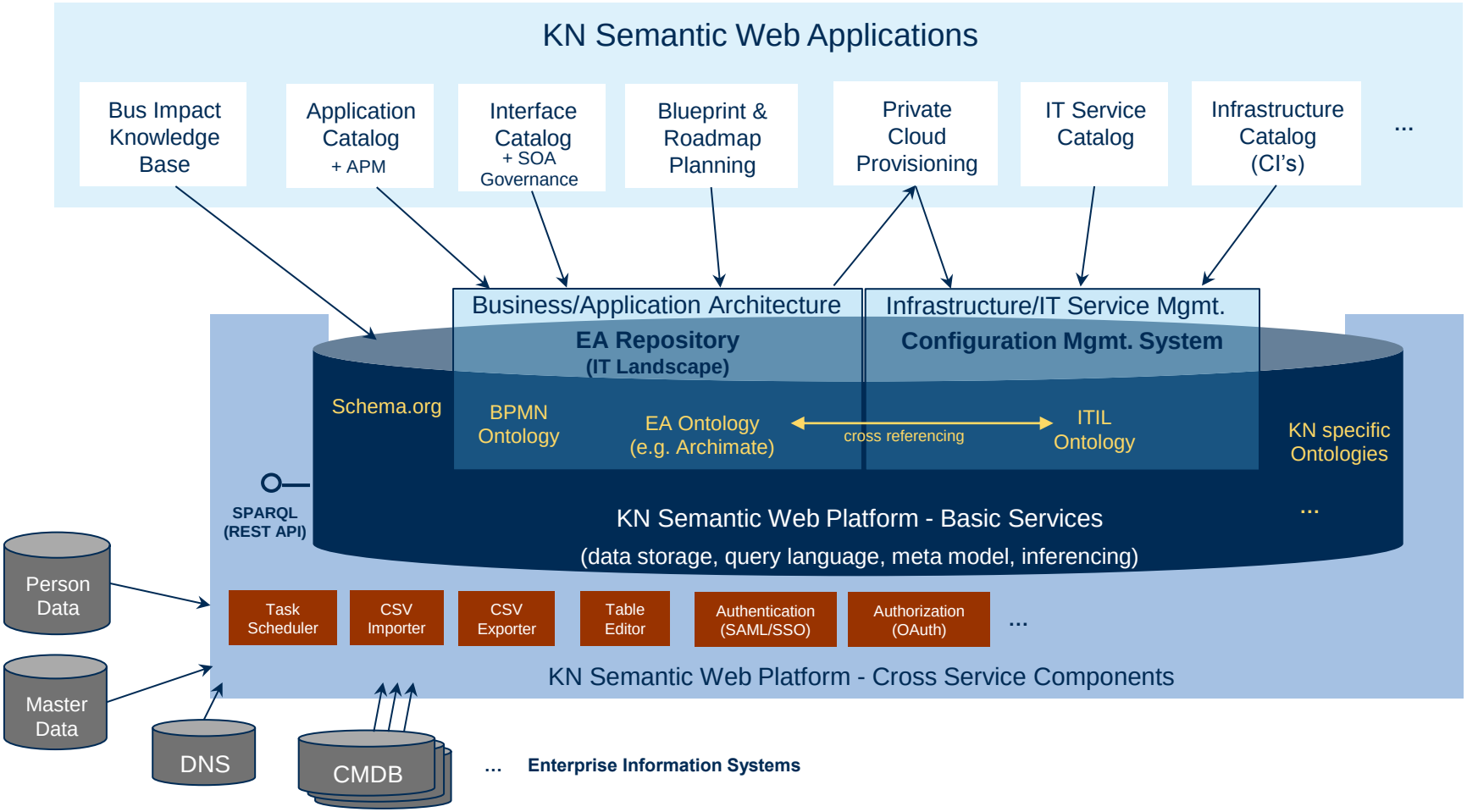
Outlook

Three projects started to address different aspects on the next level

Incident Collaboration	Semantic Web Platform (university project)	ITIL Ontology Evaluation (master thesis)
• Implementation of a Business Impact Knowledge Base based on semantic web (semantic web sub project) • Agile approach • For all corporate core applications • Focus on organizational aspects	• Evaluation of viable ontologies for EAM use cases (e.g. Archimate) • Interface Catalog selected as use case • Comparison with EAM tool implementation • Identification of platform components	• Evaluation of ITIL ontology for infrastructure use cases • ITSMO selected as ontology • Identification of platform components

Vision for KN Semantic Web Platform

Collaborative initiative of all corporate IT departments



Thank you !

Any further questions?