

# SAP Research: An Industry Perspective on Semantic Technologies

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26.01.2012 TU Darmstadt



# Agenda I

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Introduction to SAP & SAP Research

The Semantic Challenge (recap)

SAP Semantic Strategy

Semantic Technologies in Emergency Management Software

- Introduction to Emergency Management & Research Project SoKNOS
- Ontologies for supporting software products in the emergency management domain

Product-driven Use Cases and Ontology-based Improvements

- Use Case 1: System Extensibility
- Use Case 2: Improved Discovery of External Sensor Observation Services
- Use Case 3: Flexible Information Exchange (between well established systems)
- Use Case 4: Improved Search
- Use Case 5: Plausibility Checks
- Use Case 6: Improved Information Visualization

# Agenda II

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## Lessons Learned

### Semantic Technologies in SAP Prototypes & Products

- Active Information Store
- FindGrid

### Future Application Areas: “The Business Web”



# SAP & SAP Research



# Agenda

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## **1** SAP Overview

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## **2** SAP Research Overview

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# SAP Today

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**53,800+**

SAP employees worldwide

**120**

countries

**25**

industries

**37**

languages

**75**

country offices

**1,200+**

services partners worldwide



# New Demands of Business Software

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Instant use and instant value everywhere



Lower total IT cost



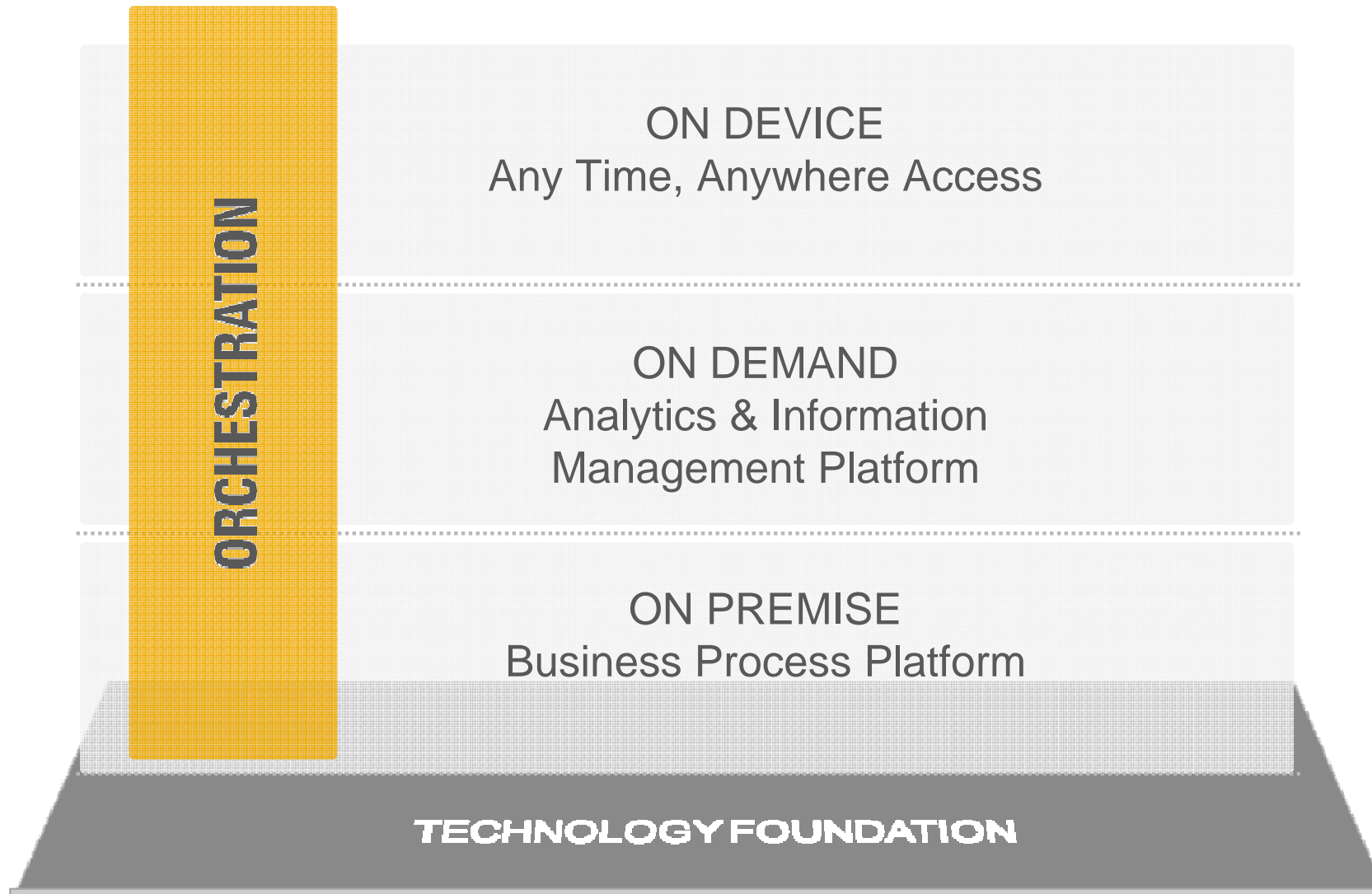
Enable sustainable growth



**“The ultimate customer is the business consumer.”**

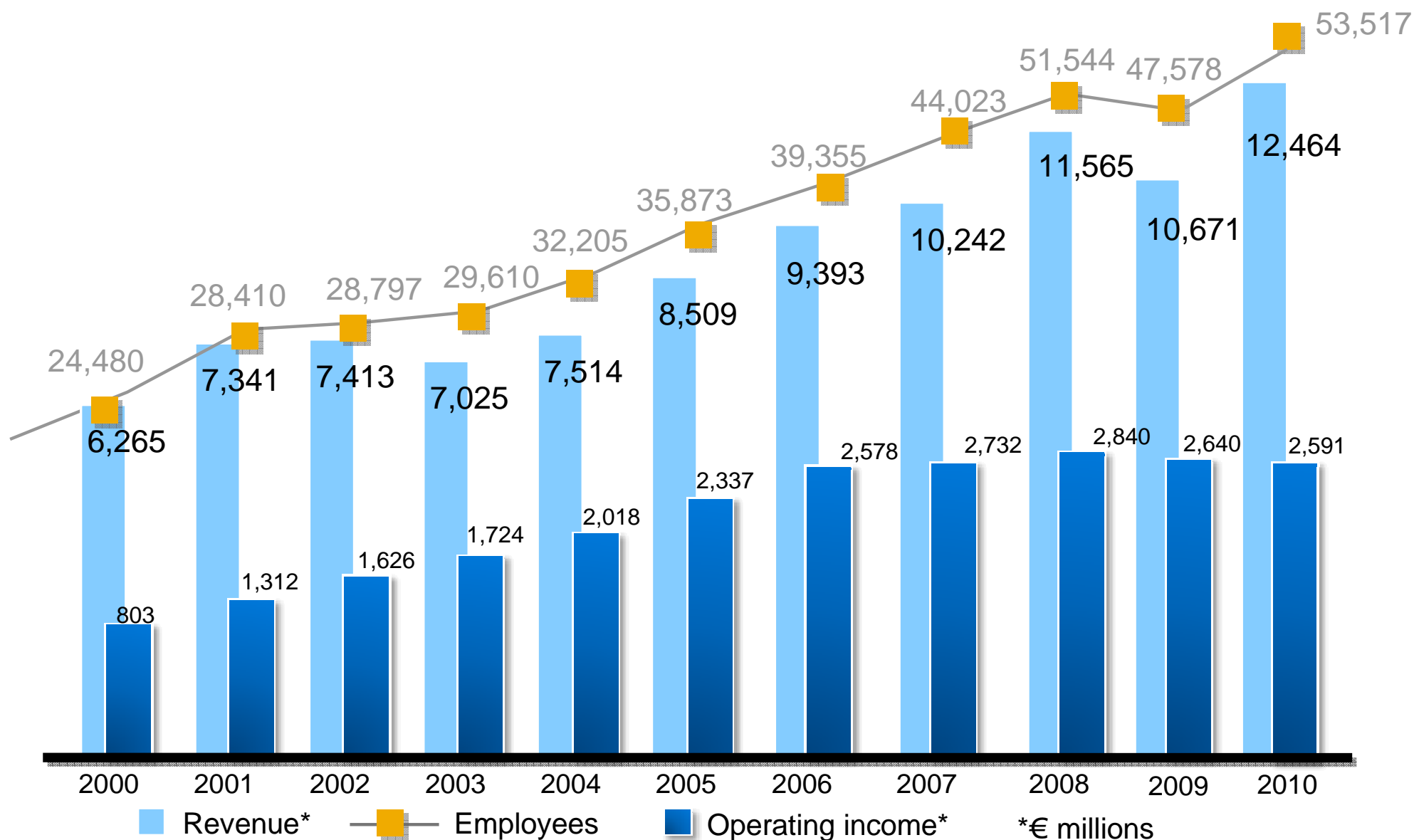
# SAP Product Strategy

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# SAP's Performance in the Last 10 Years



# Agenda

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1 SAP Overview

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**2 SAP Research Overview**

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# About SAP Research

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SAP Research is the **global technology research unit** of SAP, with a network of **19 research locations** worldwide covering a portfolio of **seven research practices**.

SAP Research's own network consists of **500 employees** (including PhD candidates) across five continents.

SAP Research has established a worldwide collaborative network with more than **800 partners from industry and academia**.

# Strategic Objectives

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Drive **business impact** by exploring and materializing emerging IT trends

Act as a **thought leader** to SAP and SAP's customers as well as partners

Conduct **collaborative** internal and external **research projects**

**Co-innovate** with customers, industry, and academic partners leveraging the concept of **living labs** as platforms for open innovation

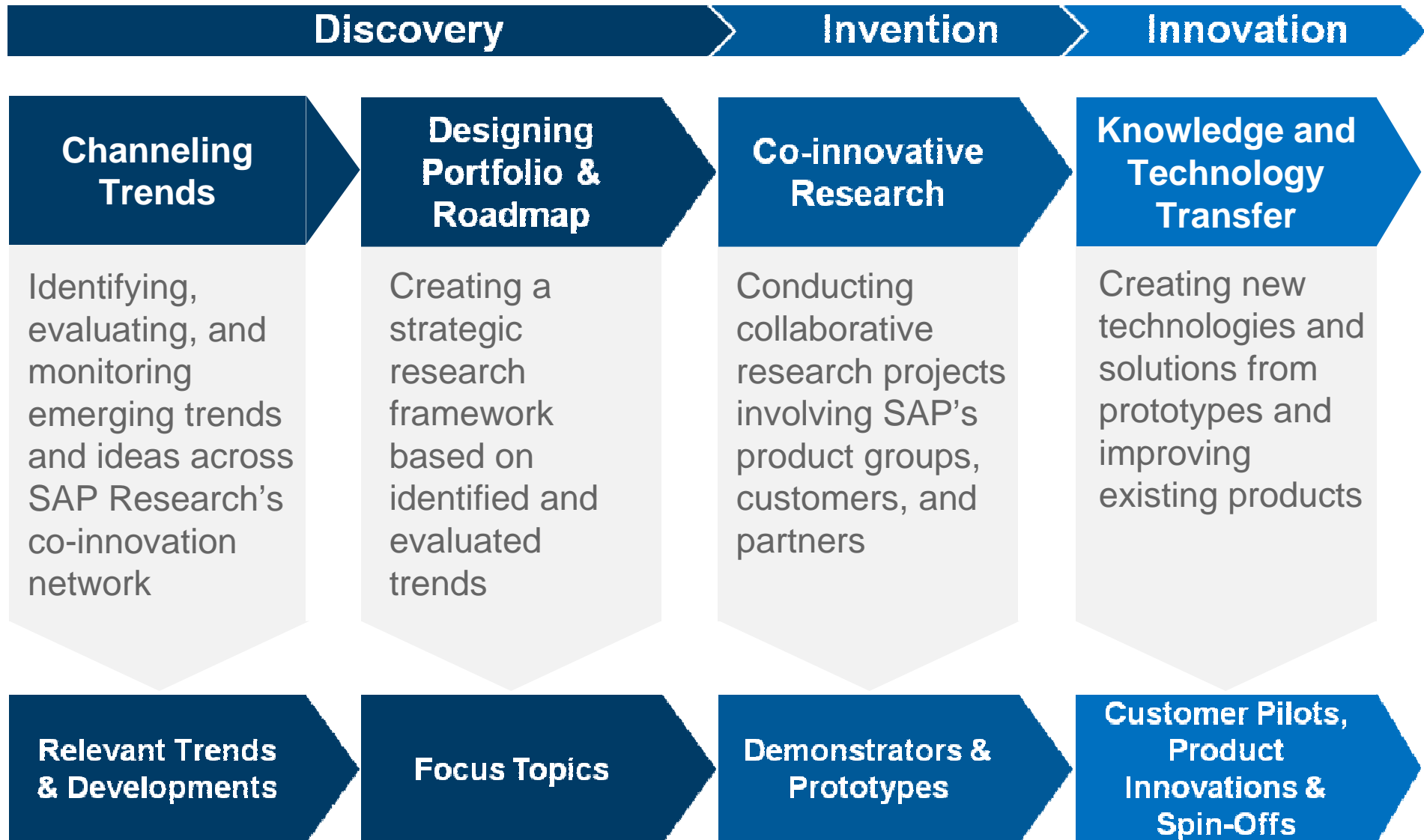
Acquire and develop **top talents** for SAP



# A Global Team

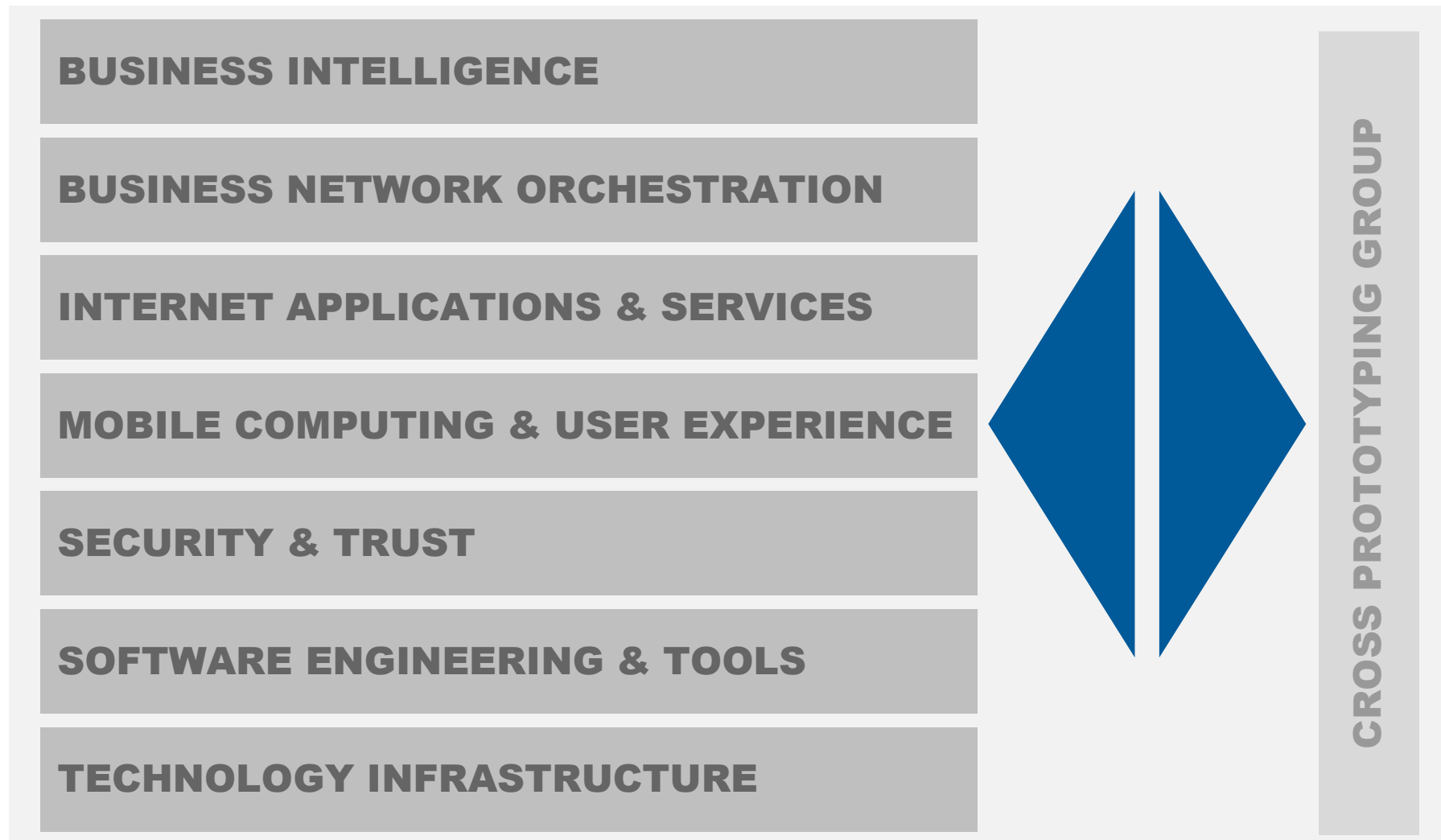


# SAP Research Process



# SAP Research Practices

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# SAP Research's Living Labs



## Future Factory Initiative Dresden, Germany

Fostering research and development for the manufacturing industry



## Future Retail Center Regensdorf, Switzerland

Streamlining retail, warehousing, and supply chain processes using various technologies



## Future Public Security Center Darmstadt, Germany

Strengthening emergency response and simulation of control center operations



## Technologies for Emerging Economies Pretoria, South Africa

Addressing the challenges of small, midsize, and micro-enterprises in developing countries



# SAP Research's Living Lab Future Public Security Center

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**Location:** SAP Research Darmstadt

**Focus:**

- Drawing on existing SAP Research expertise in the field of public security
- Strengthening emergency response and simulation of control center operations

**Details:**

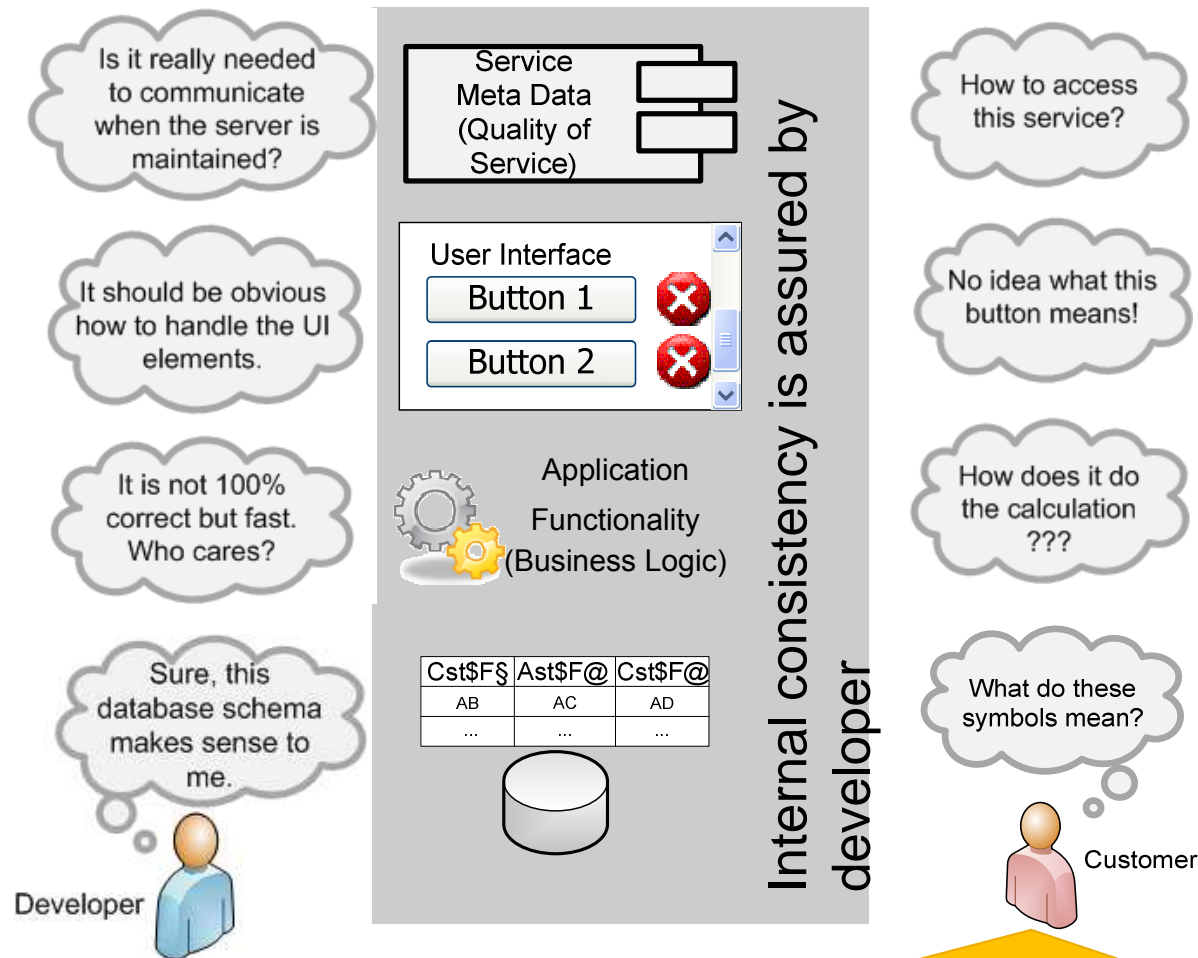
- User-oriented prototype solutions for civil protection and emergency response
- Disaster management command staff can use a multi touch screen to maintain a fast and comprehensive overview of the situation





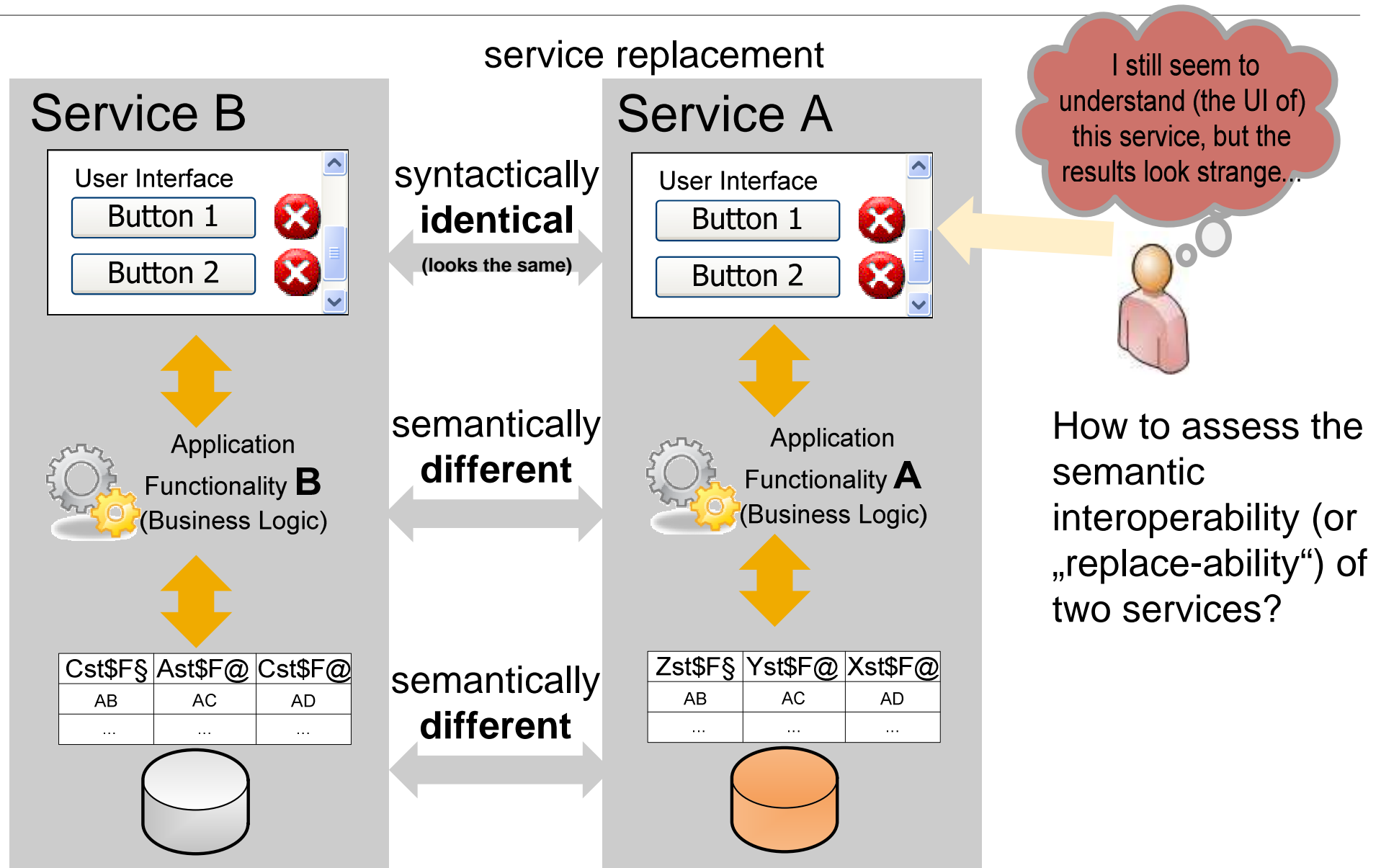
# The Semantic Challenge (recap)

# Meanings are not a big problem in a monolithic system



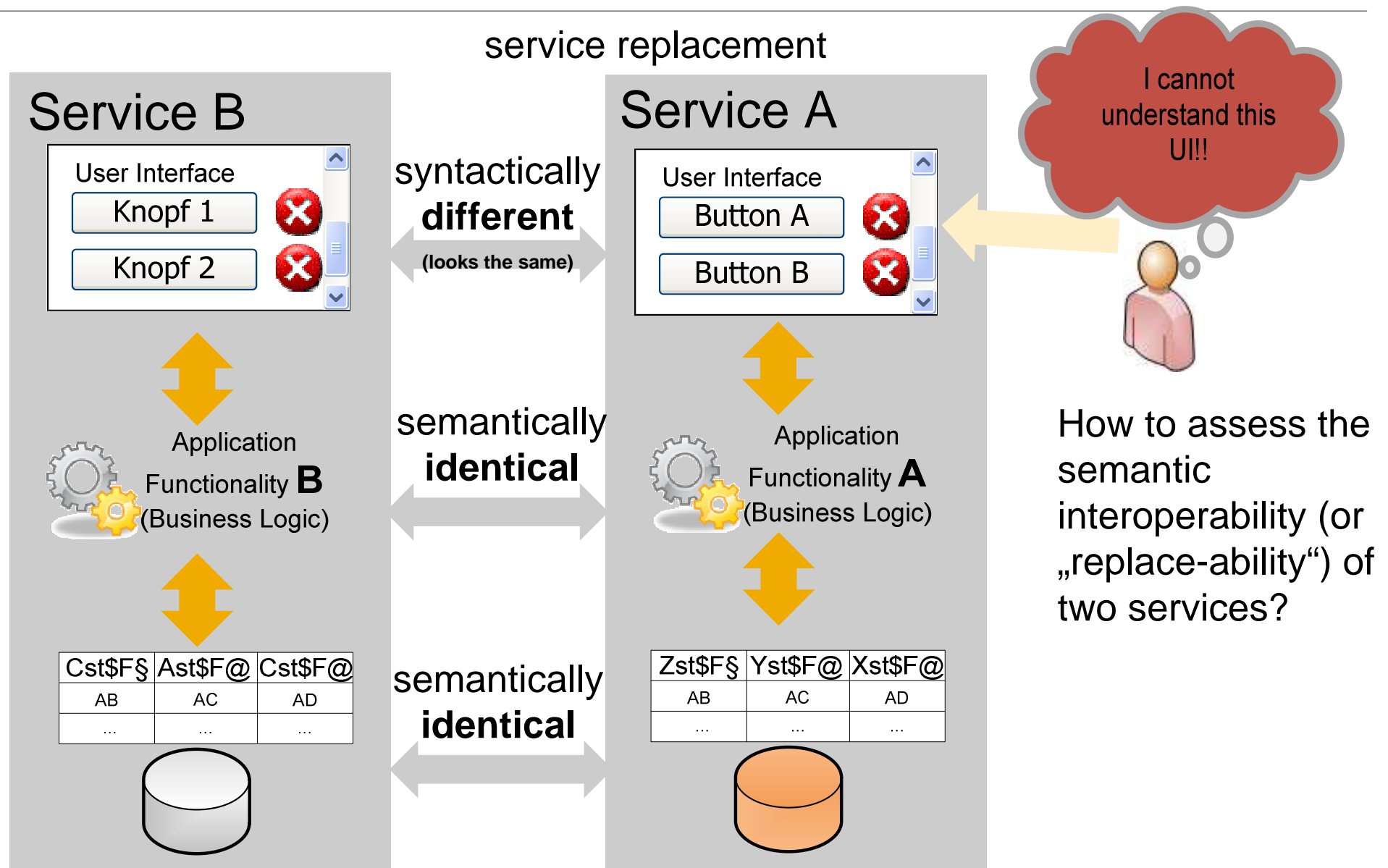
**Explanation of the implicit meaning is delivered by tutorials, consultants, hot-lines and documentation**

# Implicit Semantics Create a Big Mess in Heterogeneous Distributed and modular Systems (Case I)





# Implicit Semantics Create a Big Mess in Heterogeneous Distributed and modular Systems (Case II)





# SAP Semantic Strategy

# The time is now!

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**Enterprise adoption of Semantic Technology is at the intersection of three major trends:**

## **Explosion of Data/Information Overload**

- Large volumes of data can be turned into machine-processable semantics when related data is linked together and enriched with metadata.

## **High-performance computing**

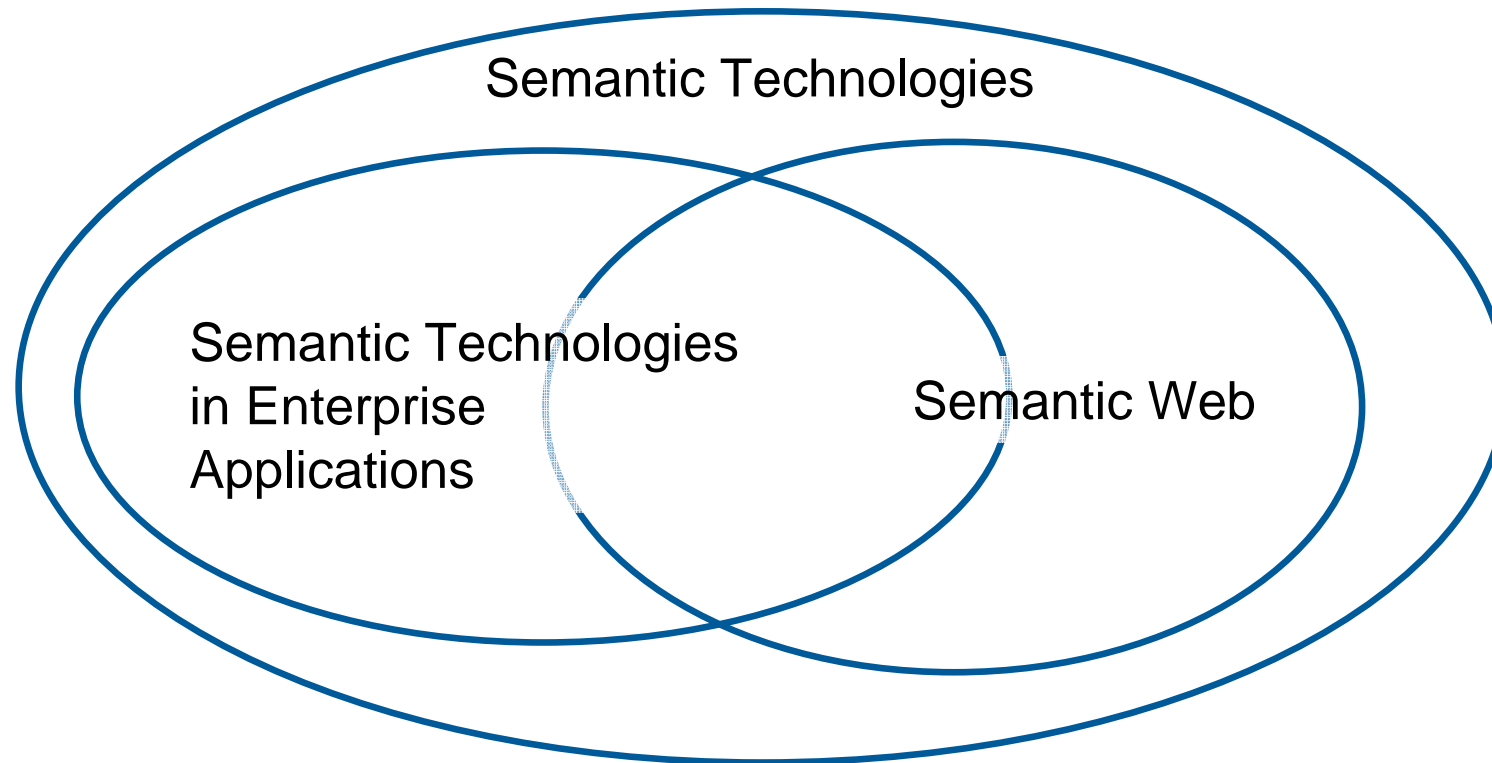
- In-memory computing can make semantic processing of high volume of linked data feasible for enterprise applications

## **Semantic algorithms**

- Semantic processing of data via machine reasoning, natural language processing, etc., can deliver more intelligent and adaptable solutions for business

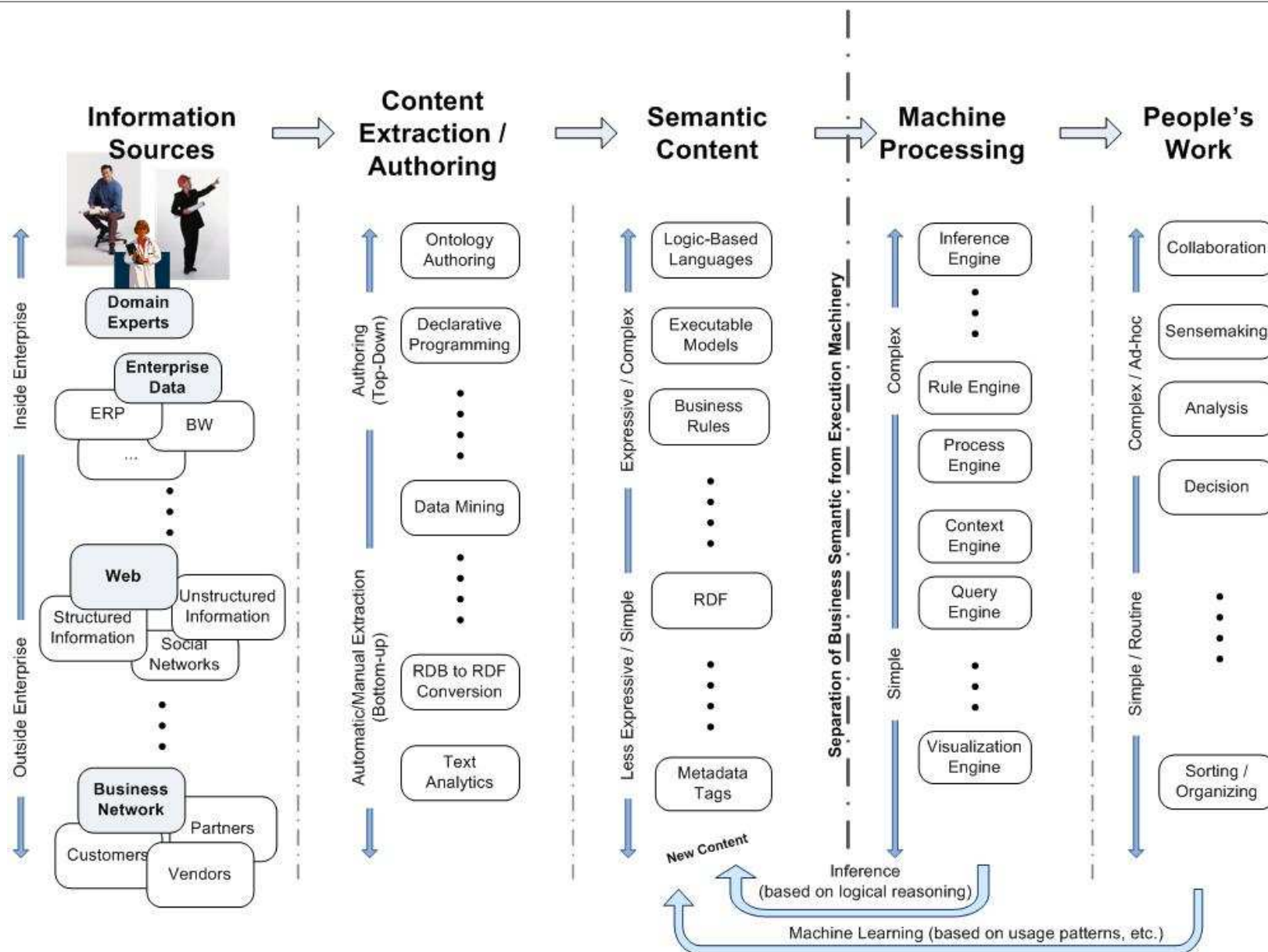
# Semantics in Enterprise Applications

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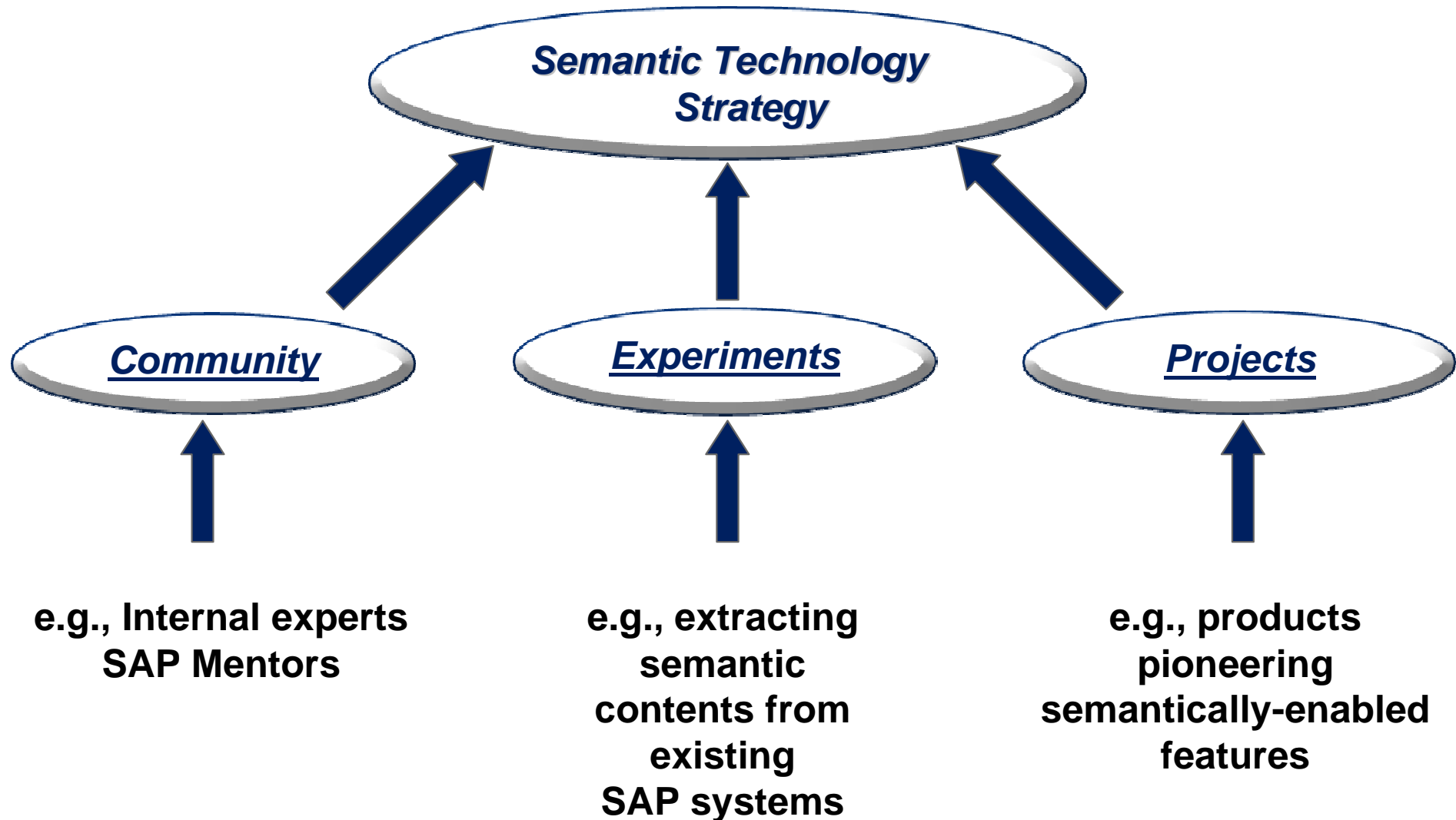
**Semantic Technologies include – but are not limited to – the W3C Semantic Web**

# Semantic Technologies Landscape Map



# Our Approach

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# Vision

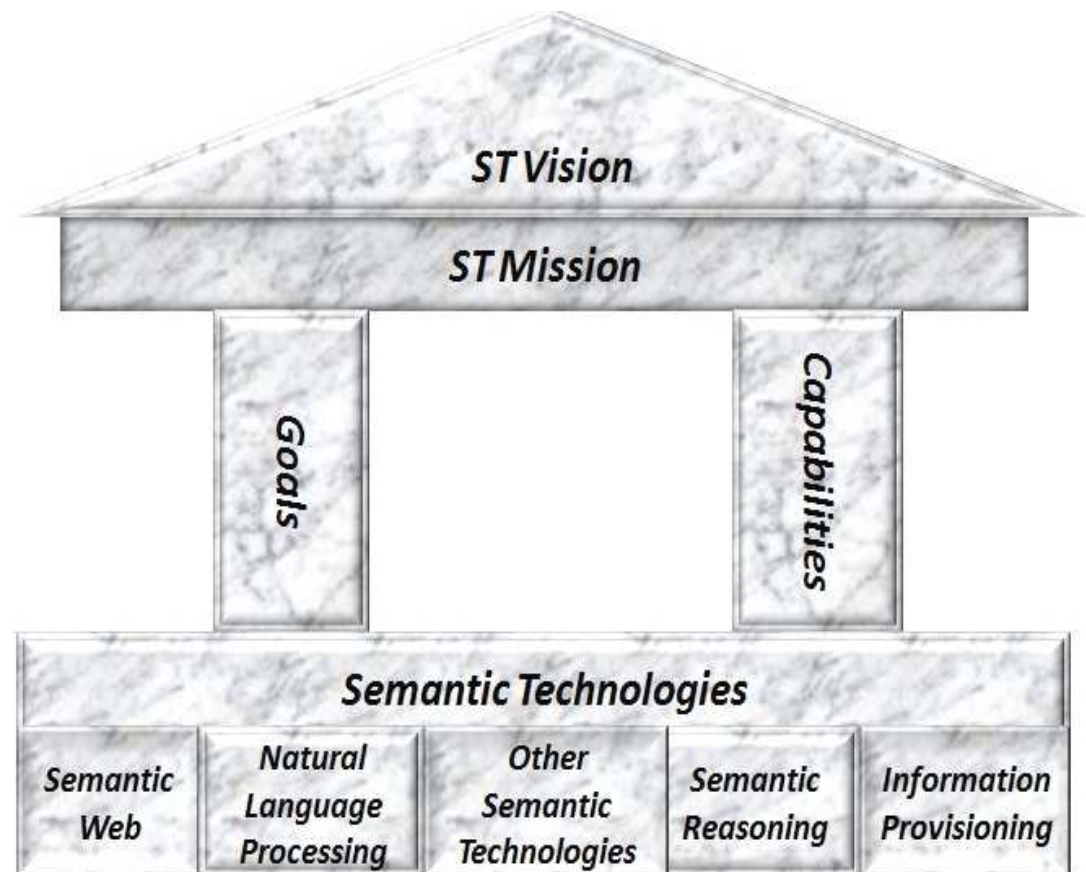
## *Semantic technologies make information clear in SAP enabled business and people networks*

Enhanced value of information to our customers

Information semantically clear in SAP enabled business and people networks

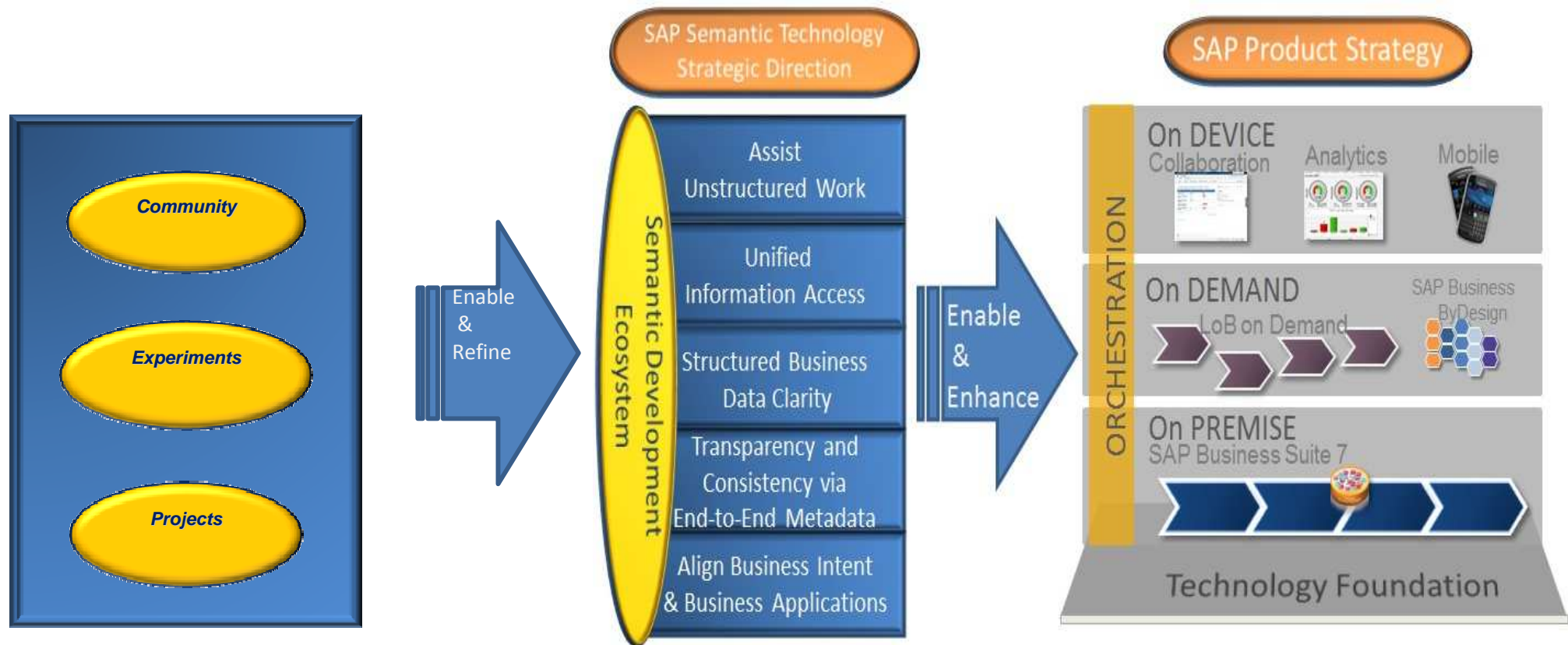
Machines help humans achieve their goals

Bridge the gap between Business Applications and Business Intent on any platform across any network through any device



# Strategic Vision

*Semantic technologies make information clear in SAP enabled business and people networks*



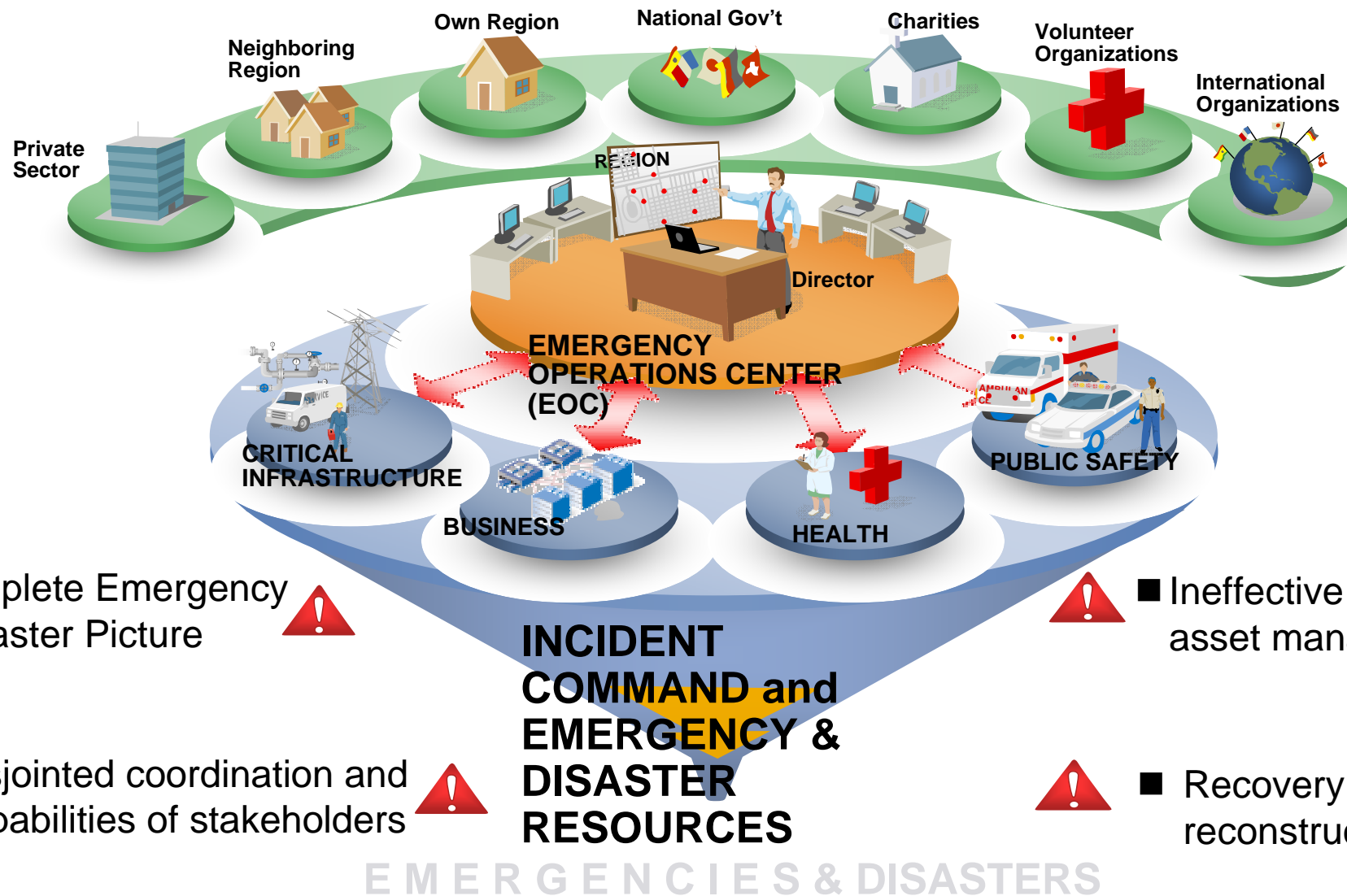




# SoKNOS

## The Next Generation of Emergency Management Systems

# Current Situation in Managing Large Incidents





# SoKNOS Partner



GEFÖRDERT VOM



Bundesministerium  
für Bildung  
und Forschung



Berliner Feuerwehr



Berufsfeuerwehr Köln



Deutsche  
Hochschule der Polizei



Deutsches  
Forschungszentrum  
für Künstliche  
Intelligenz GmbH



Fraunhofer  
Gesellschaft



ifgi  
Institut für Geoinformatik  
Universität Münster



TECHNISCHE  
UNIVERSITÄT  
DARMSTADT

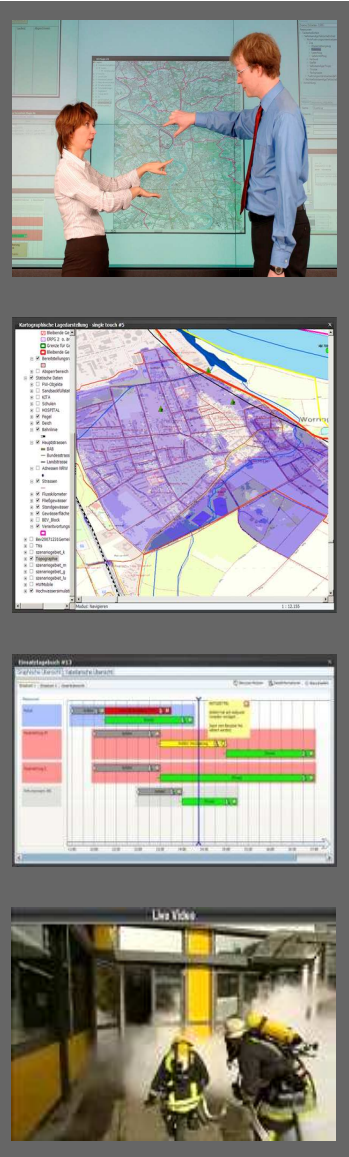


TECHNISCHE  
UNIVERSITÄT  
DRESDEN



THE STATE UNIVERSITY  
OF NEW JERSEY

# Vision & Ziele für das Katastrophenmanagement der Zukunft

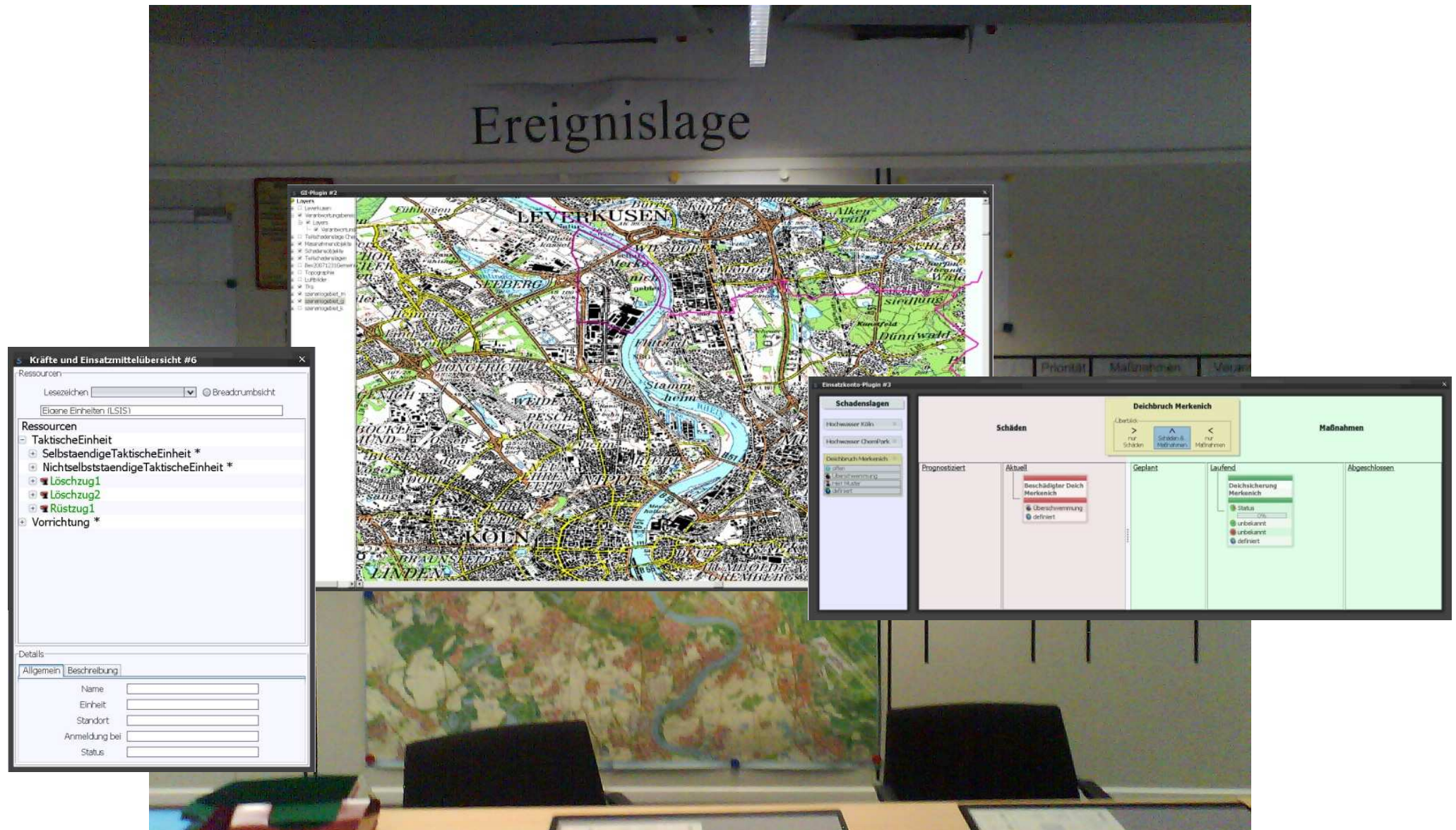


**Vision: Schnelle, informierte Entscheidungen reduzieren Reaktionszeiten. Hilfe kommt schneller und effektiver.**

- **Gemeinsam die Lage erfassen**
- **Vernetzt Handeln**
- **Bürger und externe Experten besser einbeziehen**



# SoKNOS – User-centric Approach



# Highly Flexible, Service-based System. Adjustable to the Needs of the Current Situation

**S³-Portal**

**Einsatzkonto - verbunden mit lokalem S3 :: Anzeige aktueller Objekte**

**Schadenslagen**

- Hochwasser Köln
  - Hochwasser
  - Dr. Schmidt
- ChemWerk Iridium
  - Brand
  - Herr Mustermann
- Hochwasser Worringen
  - Hochwasser
  - Frau Musterfrau

**Schäden**

Prognostiziert: Beschädigter Deich, Dammbrech, Worringen

**Maßnahmen**

Laufend: Deichsicherung (11:18 - 10.02.2010, 13:18 - 10.02.2010, unbekannt)

**Werkzeugkiste #2**

Werkzeugliste von Florian Probst  
Standardwerkzeuge

Plugin-Werkzeuge

Plugins

Trannen

Plugins starten...

**Kartographische Lagedarstellung - single touch #5**

Legend:

- Bleibende Ge...
- ERPG 2 o. 8r
- Grenze für Ge...
- Bleibende Ge...
- Bereitstellungs...
- Absperbereich
- Statische Daten
- FW-Objekte
- Sandsackfüllstat
- KITA
- Schulen
- HOSPITAL
- Pegel
- Deich
- Bahnlinie
- Hauptstrassen
- BAB
- Bundesstrass
- Landstrasse
- Adressen NRW
- Strassen
- Flusskilometer
- Fließgewässer
- Standgewässer
- Gewässerfläche
- BEV\_Block
- Verantwortungs...
- Bev(2007)1231 Gemei...
- Tks
- szenariogebiet\_k
- Topographie
- szenariogebiet\_m
- szenariogebiet\_g
- szenariogebiet\_lu
- HWMobile
- Hochwassersimulat

**Situational Map**

**Web Service Verzeichnis Plugin #10**

Eigene Dienste | Fremde Dienste | InterS3

Status	Name	Verwendet
<input checked="" type="checkbox"/>	Mobiles Sensornetzwerk Merkenich	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Sensordatenservice - Rheinpegel	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Sensordatenservice - Rheinpegel Nord	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Sensordatenservice - Rheinpegel Sued	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Sensordatenservice - Luftqualität NRW	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Sensordatenservice - Mobile Gassensoren	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Geobasisdatenservice - Gewässernetz NRW	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Geobasisdatenservice - Hochwasser	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Geobasisdatenservice - Hangneigung	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Geobasisdatenservice - Strassenkarte NRW	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Simulationsdienst - Flächenhafte Verteilung	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Simulationsdienst - Gausches Ausbreitungsmodell	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Service zur multikriteriellen Lageanalyse	<input type="checkbox"/>
<input checked="" type="checkbox"/>	WFS Bereitstellungsraume	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Geobasisdatenservice - Topographie weltweit	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Geobasisdatenservice - Strassendaten weltweit	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Geobasisdatenservice - DGM weltweit	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Geobasisdatenservice - Luftbilder weltweit	<input type="checkbox"/>

**Einsatztagebuch #4**

Alle Schadenslagen

Hochwasser Köln

Hochwasser Worringen

ChemWerk Iridium

Brand in Silo

Brandbekämpf...

04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00

09.02.2010

Kategorie	Typ	Name	Status	Verantwortl.
Teilschadenslage	Brand	ChemWerk Iridium		Herr Mustern
Problem	BrandMitMenschenInGefahr	Brand in Silo		
Schadenslage	Hochwasser	Hochwasser Köln	Bedrohung	Dr. Schmidt

**Web Service Repository**

**Deichsicherung**

Ueberpruefung...

Bevoelkerung ...

Evaluierung

Deichueberpru...

**Details Aktivität Ueberpruefung der Deic...**

Name

ig der Deichsicherungsmassnahmen

ID

102

Startzeit

Endzeit

Status

nicht aktiv

Verantwortl.

Einsatzleiter

Ort

Deich

Beschreibu...

lfung sollte Erkunder zu Rate ziehen

Ressourcenverwaltung

**Planning Tool**

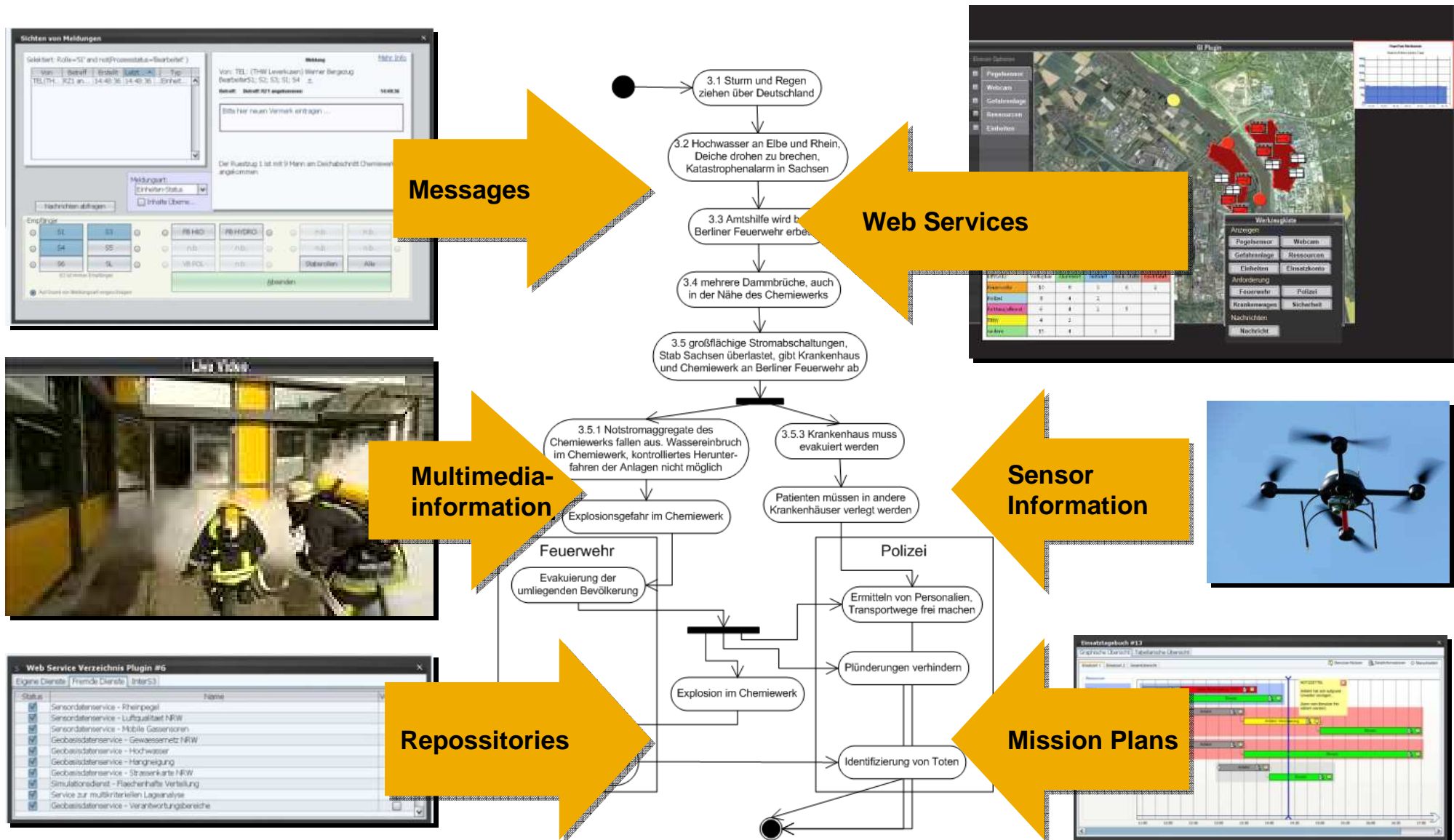
**Mission Diary**

**Mission Account**

**Tool Box**



# Focus: Service - Integration



# New Generation of Emergency Management Systems: SoKNOS Prototype



Kanzlerin Dr. A. Merkel und Gouverneur A. Schwarzenegger



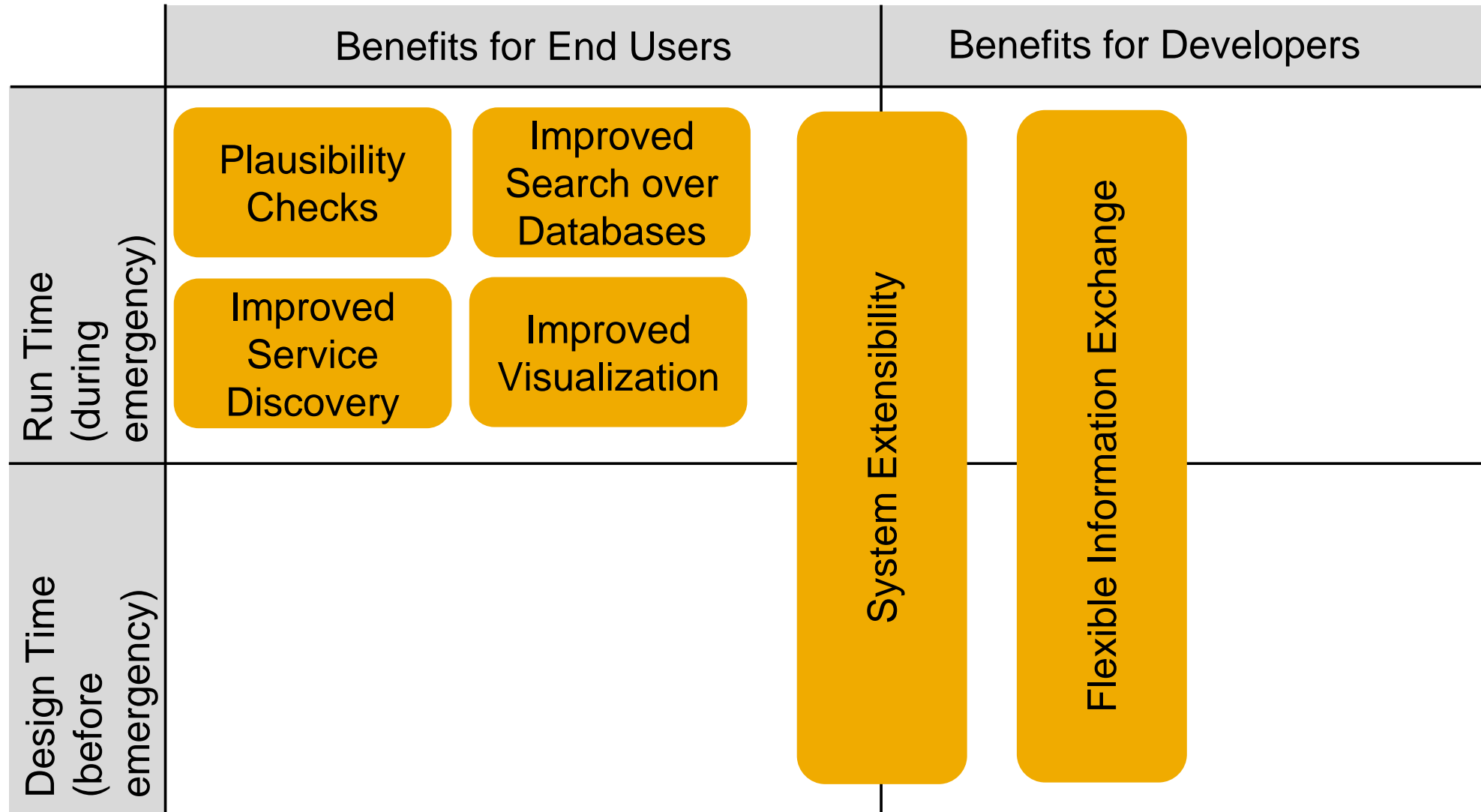
David Skellern, CEO NICTA



# Overview Use Cases

How can semantic technologies support modularized and distributed IT Systems?

# Semantic Technologies: Central Use Cases for IT-Systems



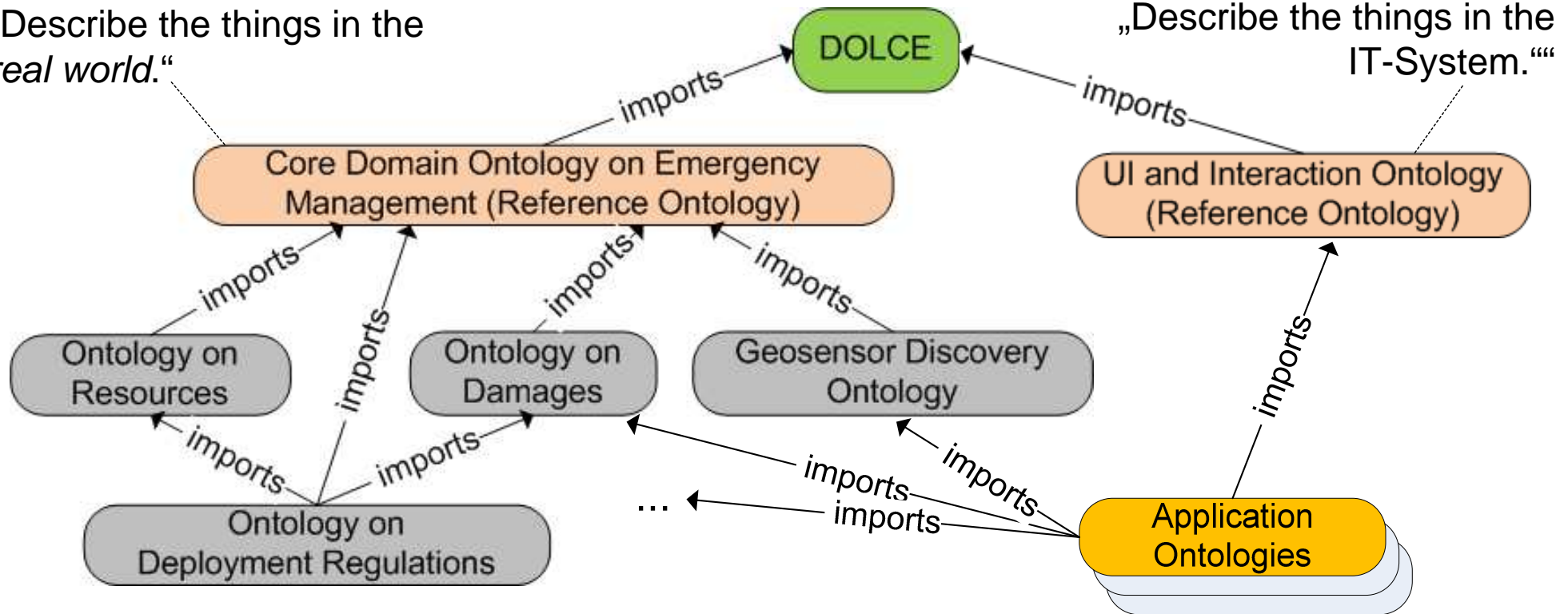




# Behind the Scene: Ontologies

# Ontology Stack

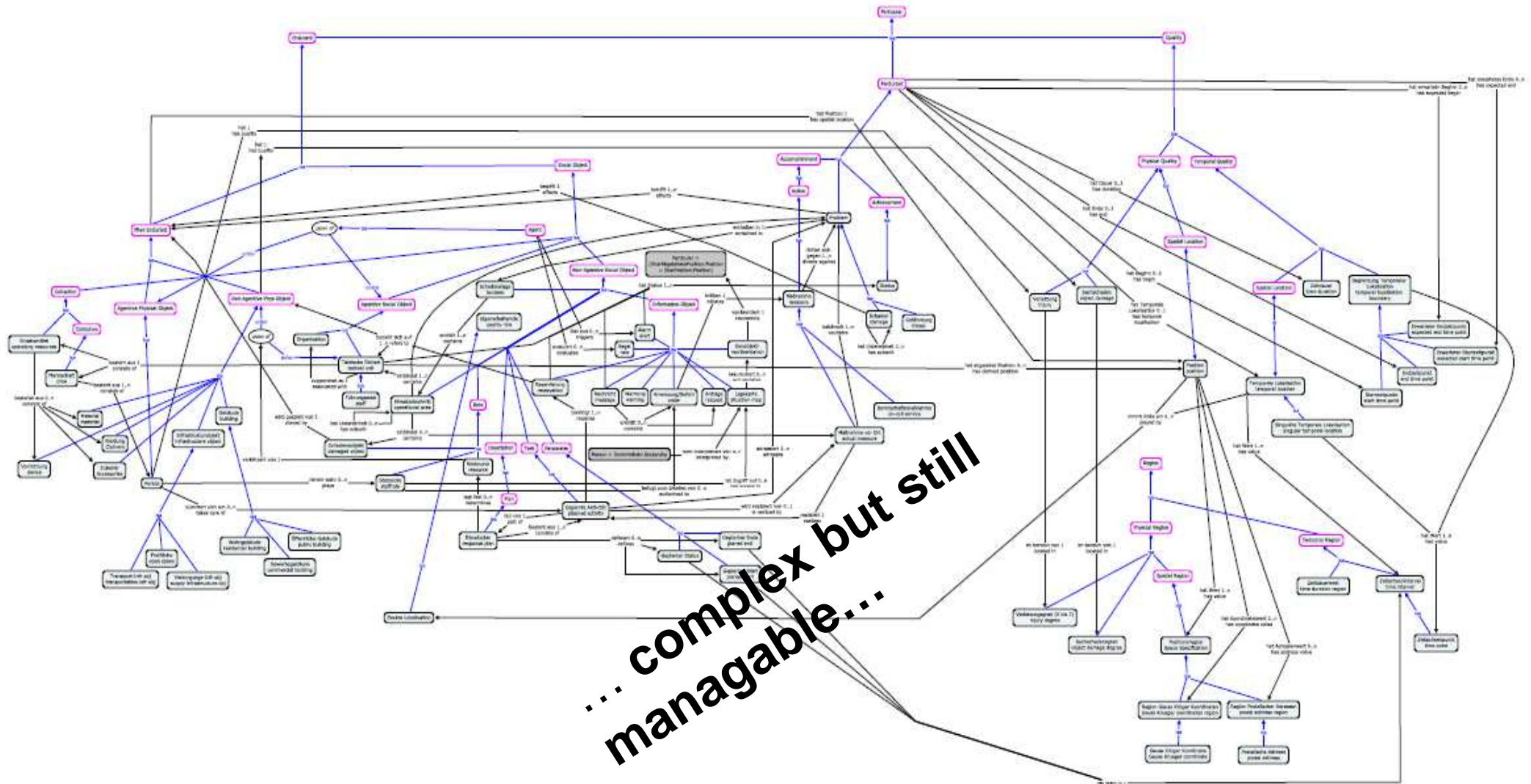
„Describe the things in the  
*real world.*“



The top-level ontology DOLCE constraints the domain and application ontologies.

Result: High conceptual flexibility on lower levels while maintaining comparability of concepts via top level.

# Reference Ontology for Emergency Management





**Use Case 1: System Extensibility**

**Use Case 2: Improved Discovery of External Sensor  
Observation Services**

**Use Case 3: Flexible Information Exchange**

**Use Case 4: Improved Search**

**Use Case 5: Plausibility Checks**

**Use Case 6: Improved Information Visualization**



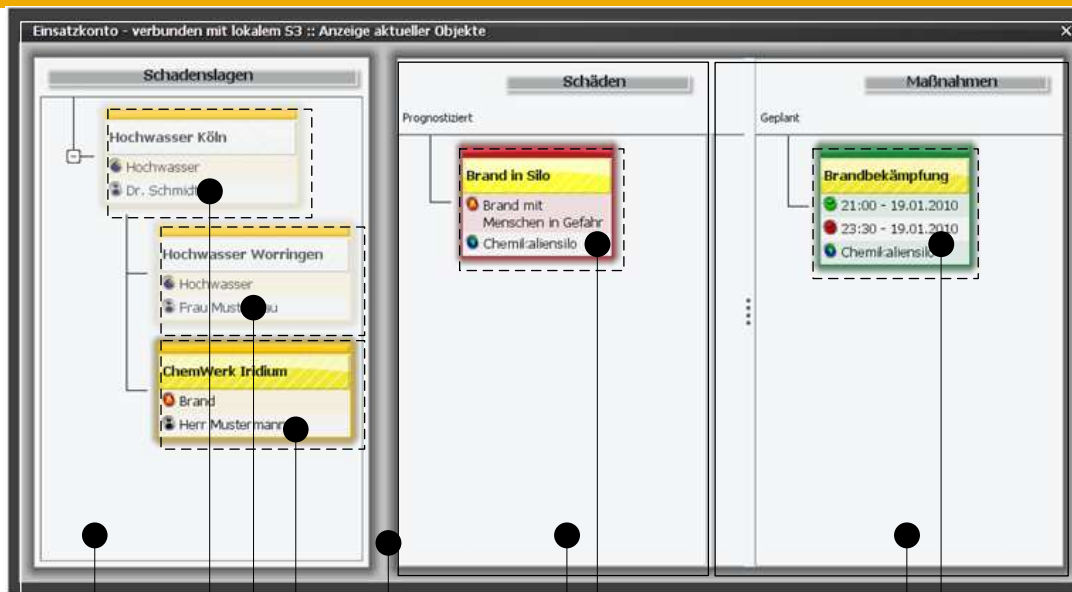
# Semantics-based Integration of System Modules in SoKNOS

The screenshot displays the SoKNOS interface. On the left is a large, empty white area. On the right, a map of the Rhine region is shown, with a red outline highlighting a specific area near Levenhagen. A red arrow points from the text 'select & highlight' to this red outline. Below the map, there are two panels. The left panel is titled 'drag & drop' and contains a list of modules with checkboxes. The right panel is titled 'Pegelnetz Fluss' and shows a line graph of water levels over time.

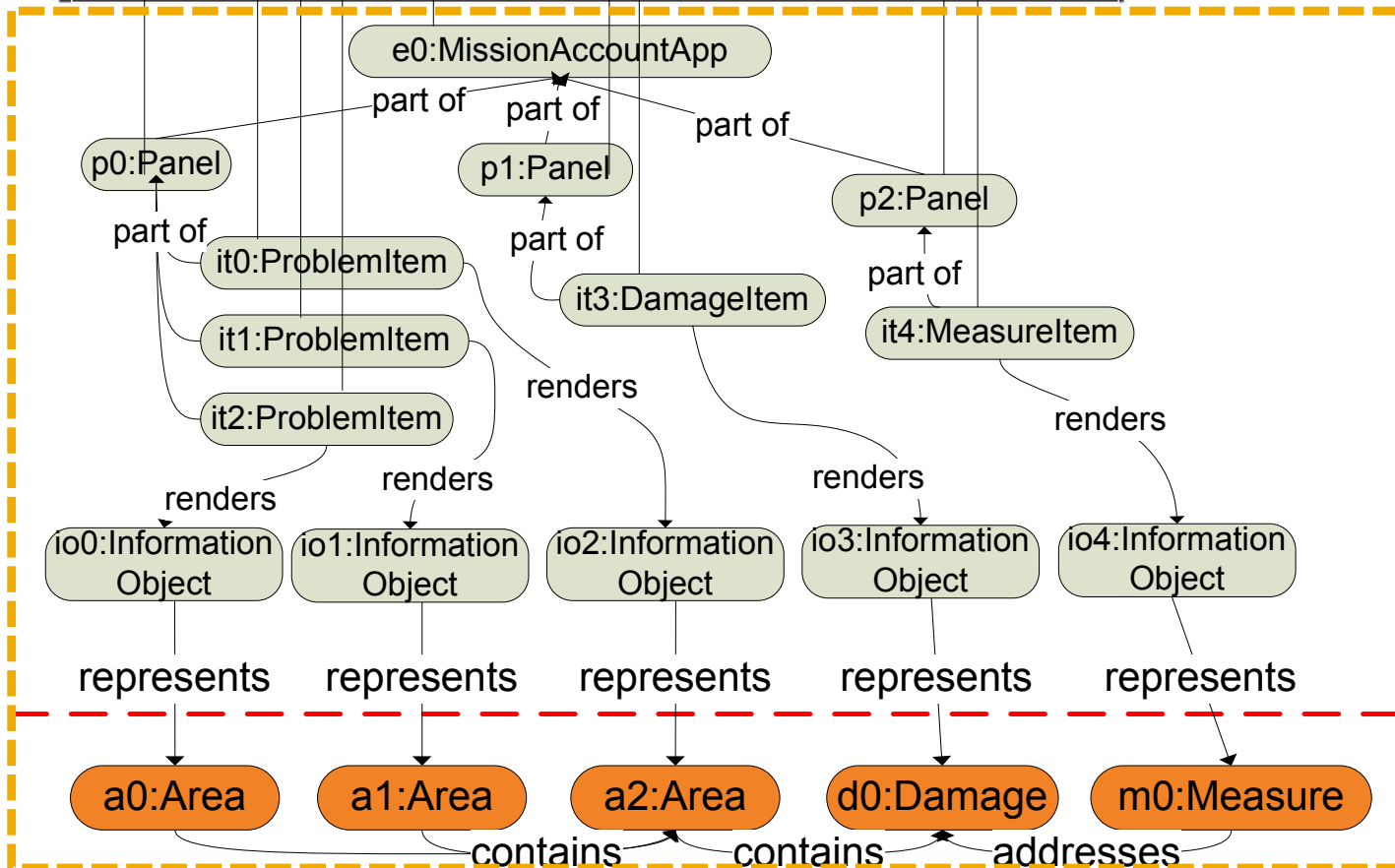
select & highlight

drag & drop

Information exchange between (really!) independent modules  
→ Quick configuration of the system. Advantage: high flexibility to adopt to current situation.



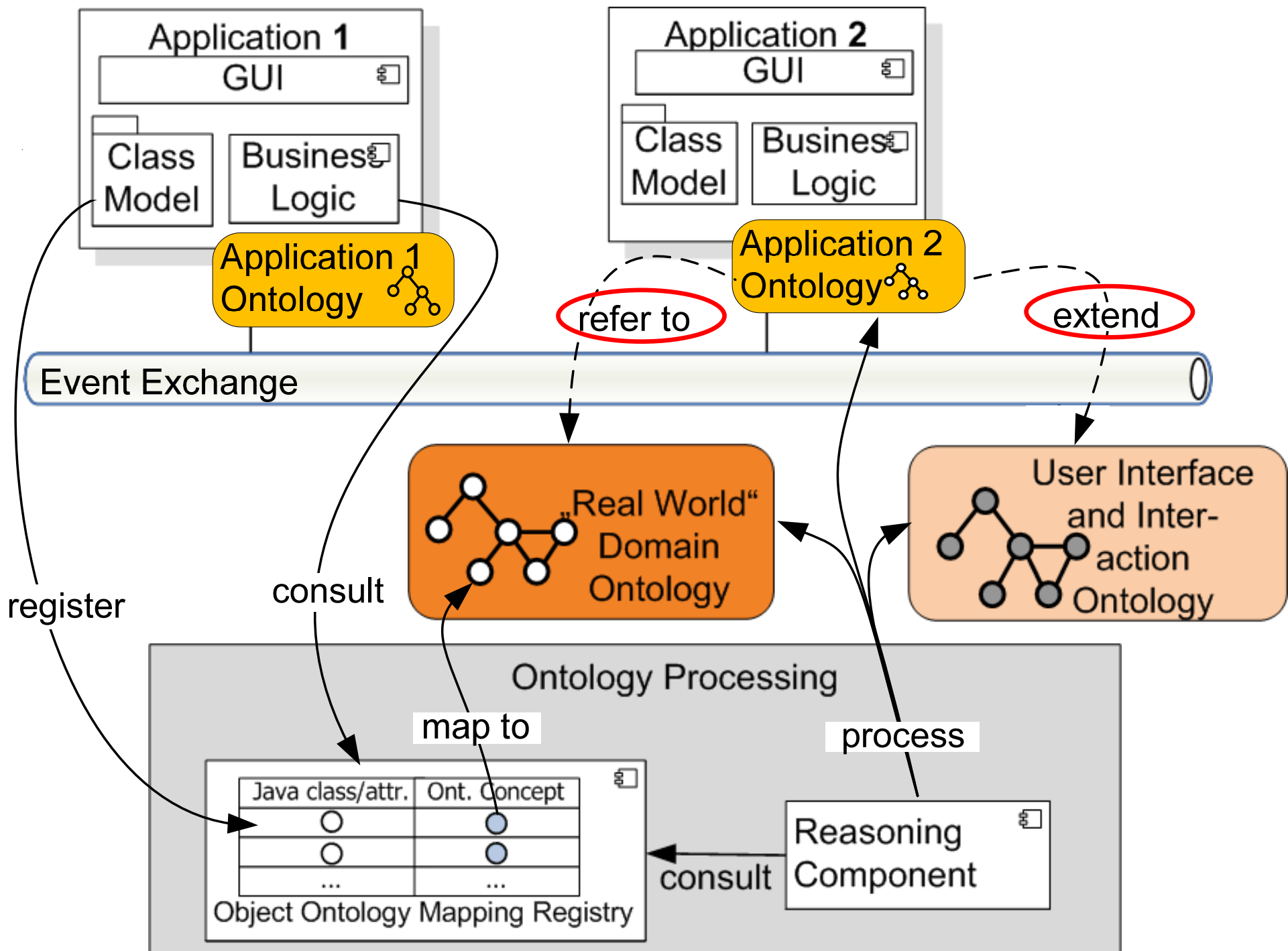
Specialization of  
the UI Ontology &  
Snippets from the  
Domain Ontology  
→ **Application  
Ontology**



User Interface &  
Interaction Domain  
Ontology

Real World  
Domain Ontology





# Integrating Applications developed in Flex resp. Java

The screenshot displays the SAP S3-Portal interface with two side-by-side applications. The left application, titled 'Ressourcen-Verwaltungs-Flash-Plugin #4', is a Flash application for Resource Management. It features a tree view of resources under 'LKW' (DA-CW 1175, F-HF 54, F-U2 5724, F-MN 4872), 'PKW', 'FLUGGERAETE', and 'HUBSCHRAUBER' (F-XB 8423). Below this is a 'Details' section with tabs for 'Allgemein', 'Beschreibung', and 'Koordinaten'. The 'Allgemein' tab shows details for 'F-HF 54', including 'ORGANISATION: POLIZEI FRANKFURT', 'OPERATIONAL AREA: STADT FRANKFURT', 'BESATZUNGSSTÄRKE: 5', and 'STATUS: TRANSFERRING'. The right application, titled 'Einsatzkonto - verbunden mit lokalem S3 :: Anzeige aktueller Objekte', is a Java application for Mission Management Tool. It displays a 'Schadenslagen' (Incident Types) list with items like 'Überschwemmung in Merkenich' and 'Deichbruch bei Merkenich'. Below this is a 'Schäden' (Incidents) section with a 'Prognostiziert' (Forecasted) tab showing items like 'Überschwemmung Wohngebiet' and 'Hochwasser'. The 'Maßnahmen' (Measures) section shows a 'Geplant' (Planned) tab with items like 'Fahrzeug bereitstellen' and 'Löschzug Köln'. A red arrow points from the 'F-HF 54' resource in the left application to the 'Fahrzeug bereitstellen' measure in the right application. A text box 'select & highlight' is positioned near the arrow.

select & highlight

Flash Application for  
Ressource Management

Java Application  
„Mission Management Tool“



**Use Case 1: System Extensibility**

**Use Case 2: Improved Discovery of External Sensor  
Observation Services**

**Use Case 3: Flexible Information Exchange**

**Use Case 4: Improved Search**

**Use Case 5: Plausibility Checks**

**Use Case 6: Improved Information Visualization**

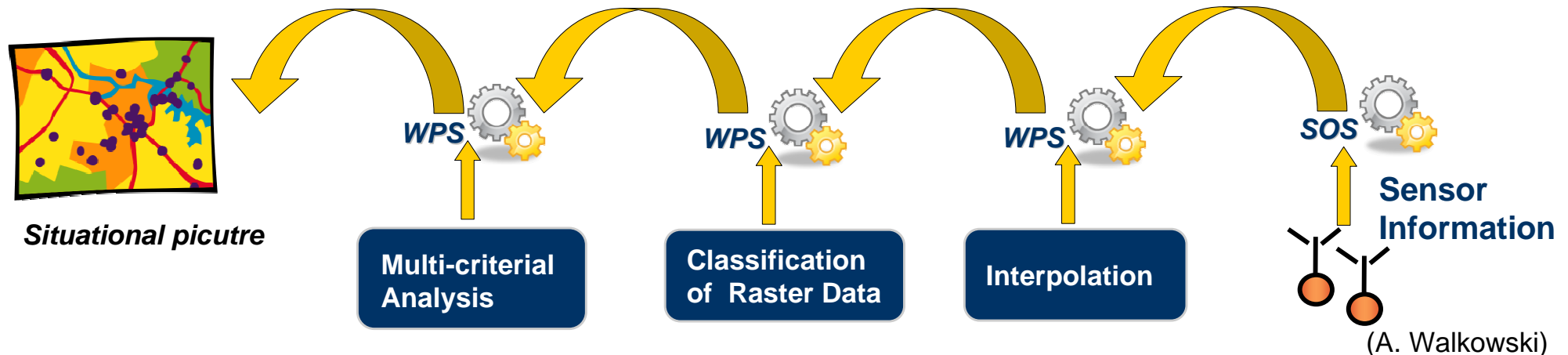
# Use Case 2: Improved Discovery of External Sensor Observation Services

## Motivation:

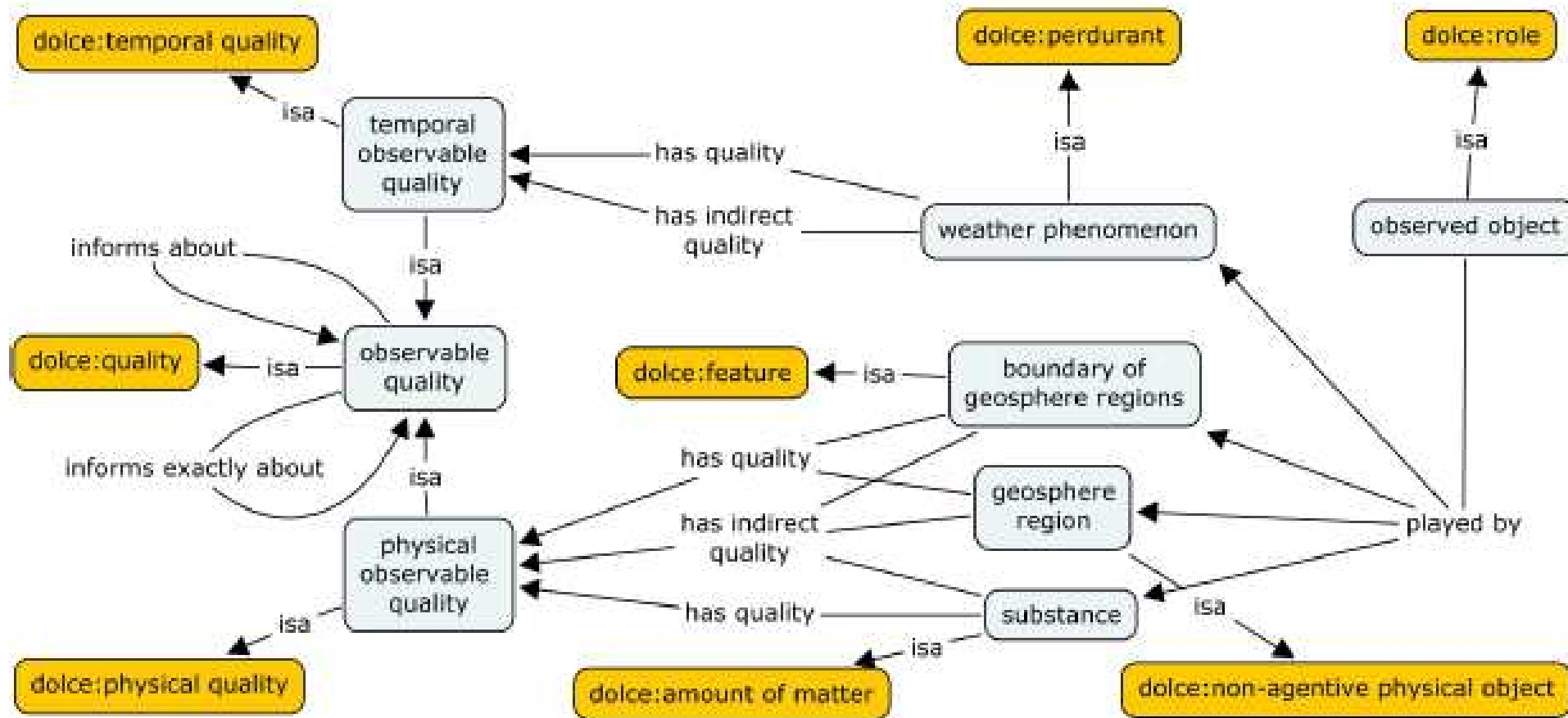
- An accurate picture of the crisis situation is essential.
- Sensor Services can deliver this information, but finding them under time pressure is difficult.
- Enable the crisis management team to find sensor observation data fast and reliable.

## Solution:

- Semantic annotation of Web Services designed according to the SOS specification (OGC).



# Ontology for Sensor Observation Services



The ontology is based on the OGC specification for sensor observation services.

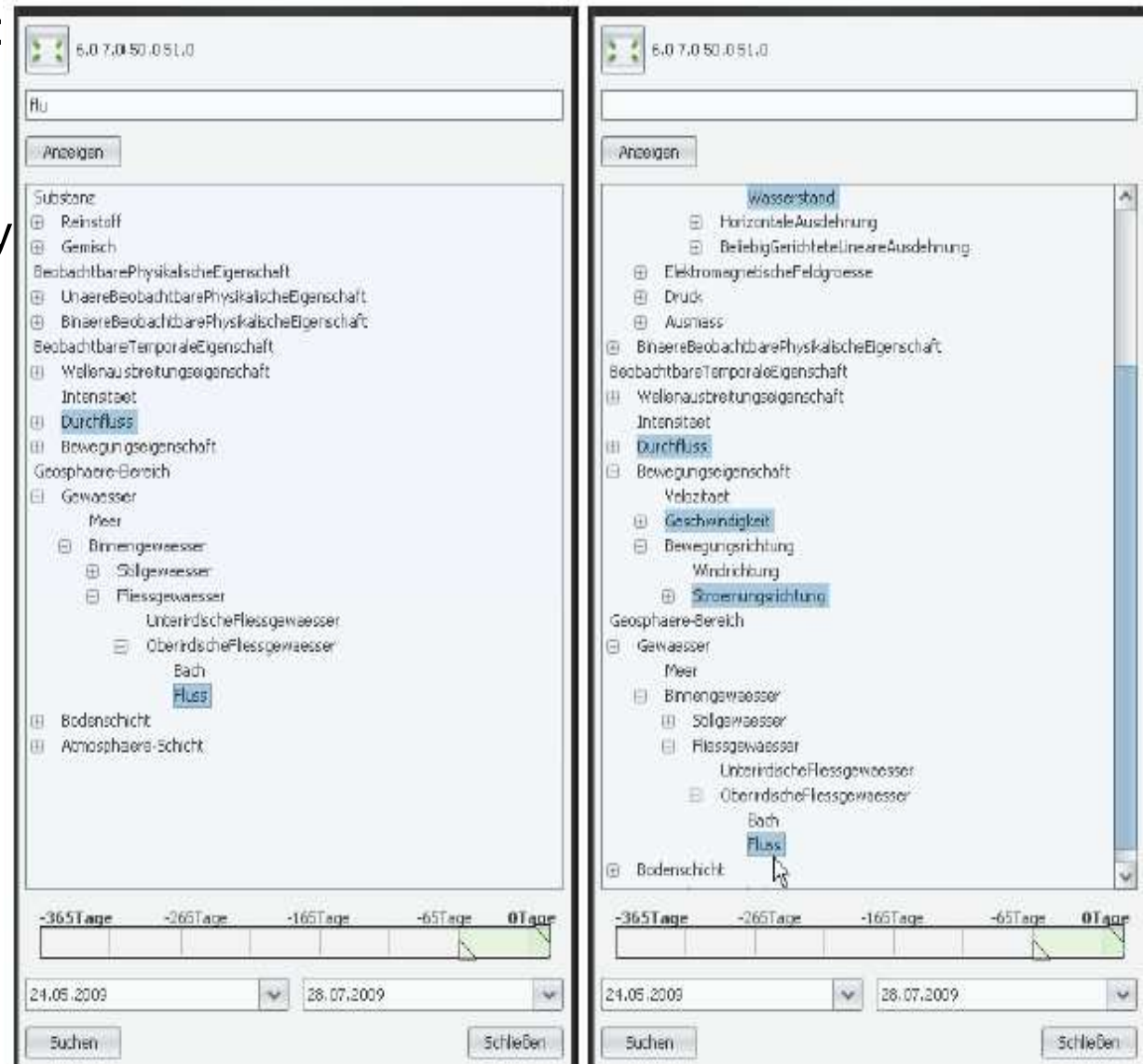
# Ontology-based Search for Sensor Observation Services

User specifies via the ontology:

- Feature (entity) of interest entity (e.g. wind, water body,)
- Observed quality of that entity (e.g. speed, direction, depth, concentration of x)

The approach extends existing OGC standards.

**Goal: Semantic support for catalog services**







**Use Case 1: System Extensibility**

**Use Case 2: Improved Discovery of External Sensor  
Observation Services**

**Use Case 3: Flexible Information Exchange**

**Use Case 4: Improved Search**

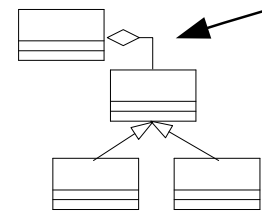
**Use Case 5: Plausibility Checks**

**Use Case 6: Improved Information Visualization**

# Data Models and Ontologies Serve Different Purposes

Goal: Flexible Information Exchange → 1:1 Mappings are Not Helpful

**Goal:** efficient programming



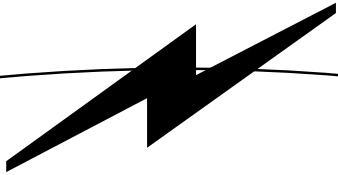
Class Model

- task-specific approach  
- prescriptive  
- simplicity over precise representation

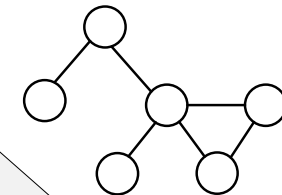
develops

software developer

Complete 1 : 1 Mappings are unlikely due to different goals



**Goal:** „complete picture“, semantic account of terms in a domain



Ontology

- generic approach  
- descriptive  
- precise representation over simplicity

develops

ontology engineer

**Assumption:**

shared conceptualization of a domain

Good software requires both:

1. Efficient code (fast, reliable, easy to maintain)
  2. Sound and formal semantics of the exchanged information items
- Both requirements need to be fulfilled without hampering the other.

# Example: Oil & Gas - ISO 15926 Reference Ontology and Datamodels in IBM IIF

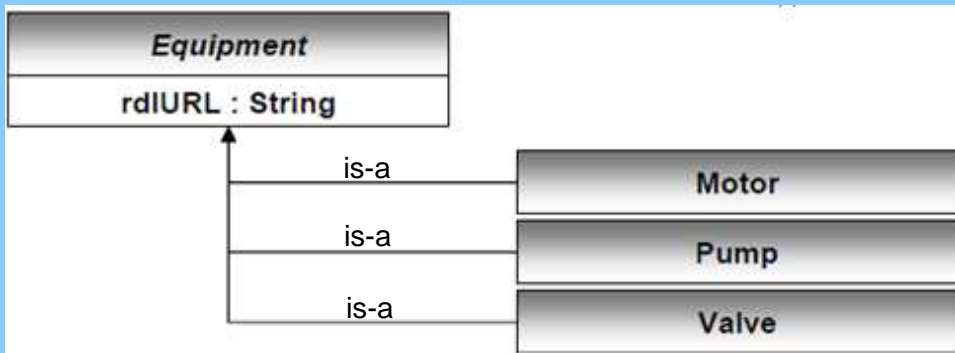
ISO 15926 has 10.000+ equipment types represented as OWL classes.

Representing each such OWL class per equipment type as a UML class would lead to 10.000+ sparsely populated DB tables.

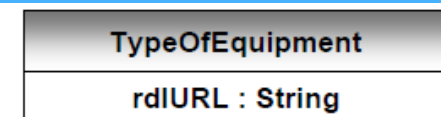
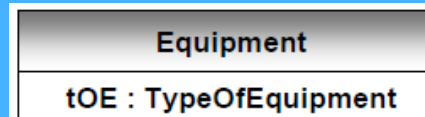
Therefore, IBM's Integrated Information Framework deviates from the standard by introducing a pragmatic class model.

**At development time:** Terms from the ontology are used to develop efficient class model

## ISO 15926 – Reference Ontology



## Pragmatic Class Model



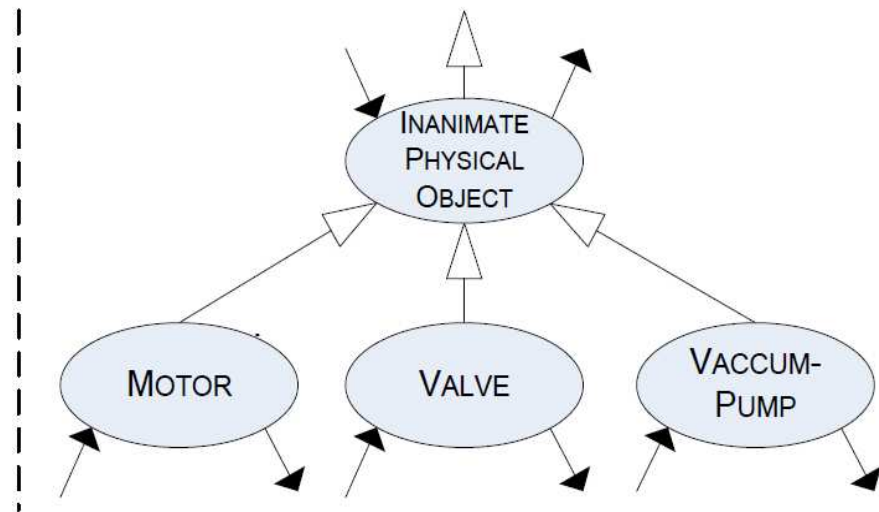
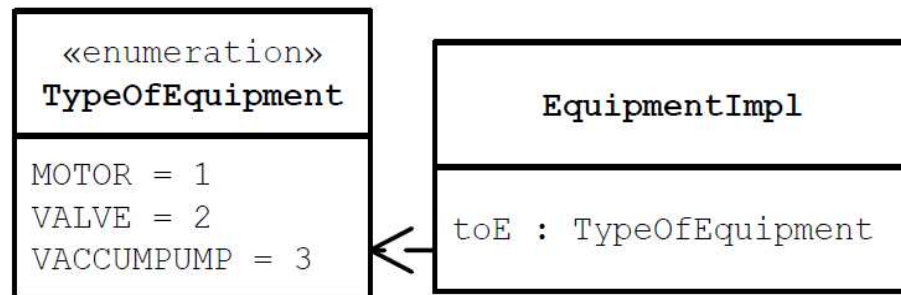
motor:TypeOfEquipment

pump:TypeOfEquipment

valve:TypeOfEquipment

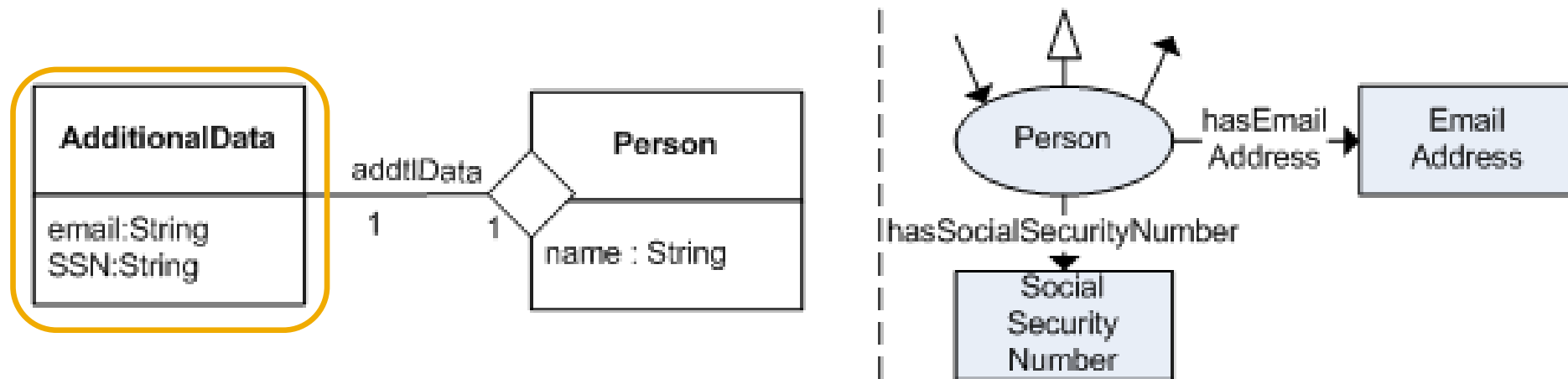
1. Connection to the ontology is lost completely, or
2. Semantic content is reduced drastically.

# Mismatches between Data Models and Ontologies: Multi-Purpose Classes



Keeps number of classes low but matching the class to a single category in the ontology is impossible.

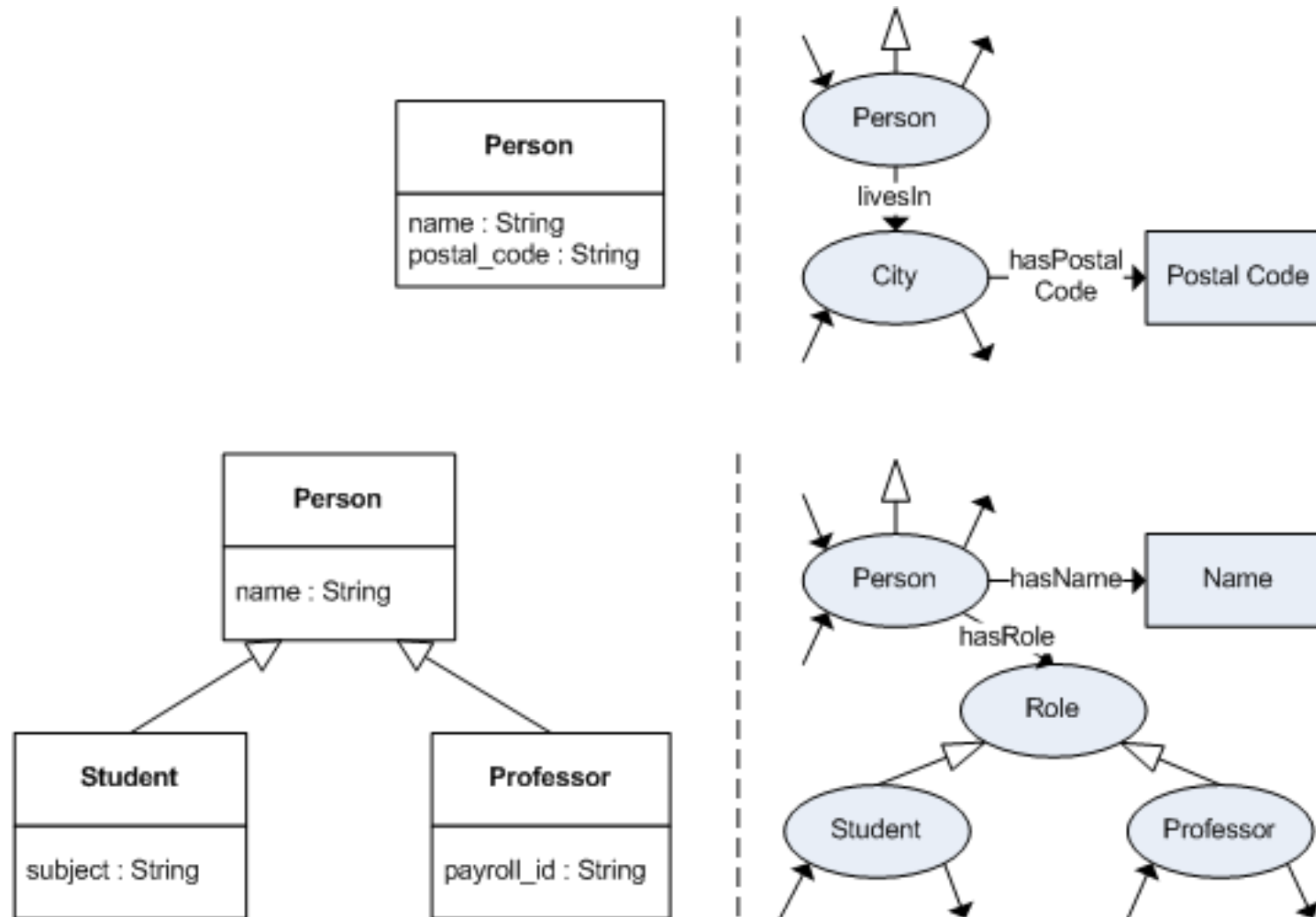
# Mismatches between Data Models and Ontologies: Artificial Classes



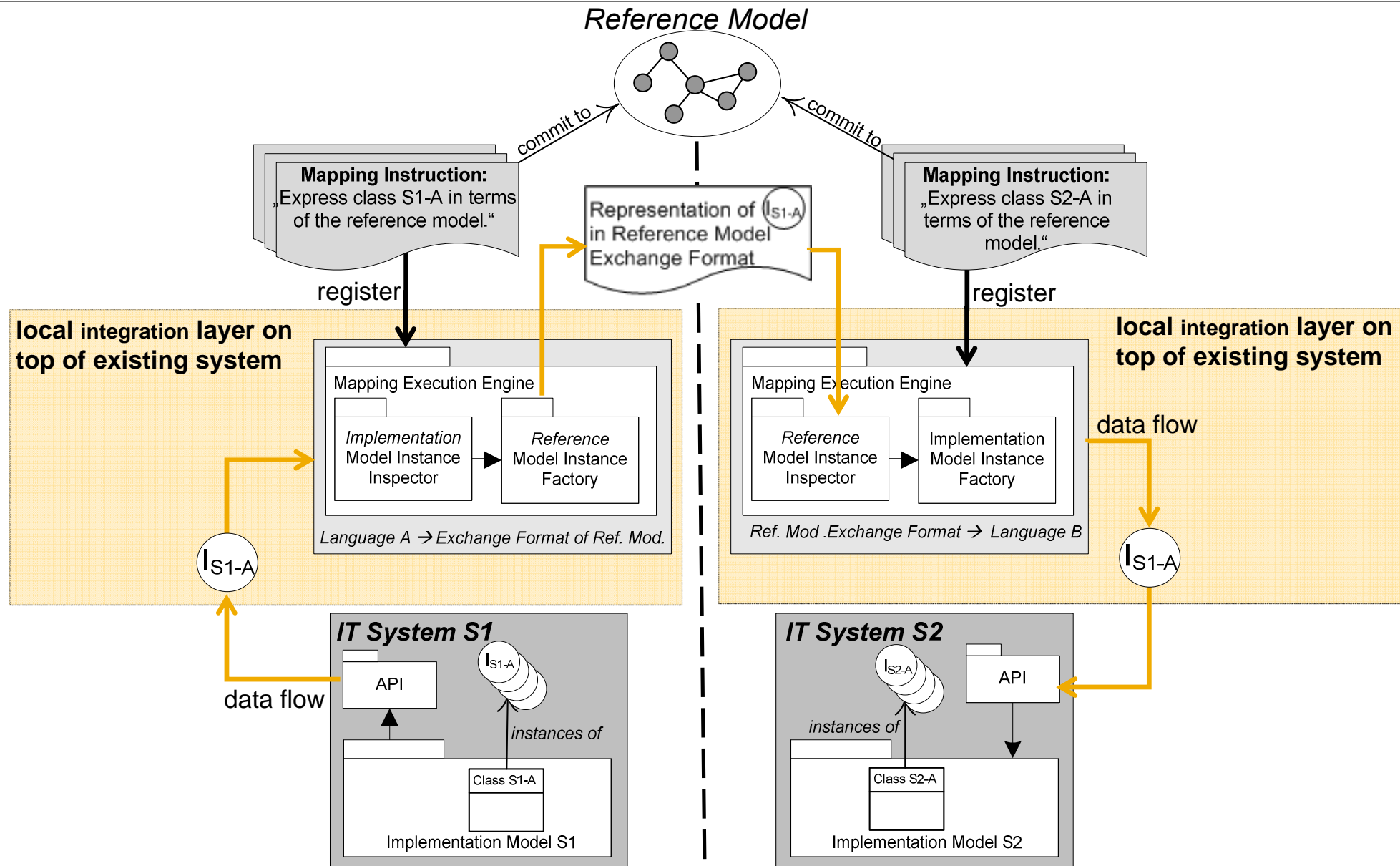
- Artificial classes have no intuitive counterpart in the domain ontology.
- Software developer uses implicit contextual knowledge: If the address contains „@“ then the address is an email-address.



# Mismatches between Data Models and Ontologies: Shortcuts



# Information Exchange based on Reference Models



# Solution

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- Establish a common Reference Model (Reference Ontology + Domain Ontology).
  - DOLCE & core ontology for emergency management
- Perform **non-intrusive** semantic annotations of instances-
  - Data Models of existing system are not changed
- Perform mappings on **instance level**, not on class level-
  - Due to strong disparities between implementation model and Reference Ontologies, mappings on class level are not suitable
- Use rules for performing the mapping at **run-time**-



**Use Case 1: System Extensibility**

**Use Case 2: Improved Discovery of External Sensor  
Observation Services**

**Use Case 3: Flexible Information Exchange**

**Use Case 4: Improved Search**

**Use Case 5: Plausibility Checks**

**Use Case 6: Improved Information Visualization**



# Use Case 3: Improved Search

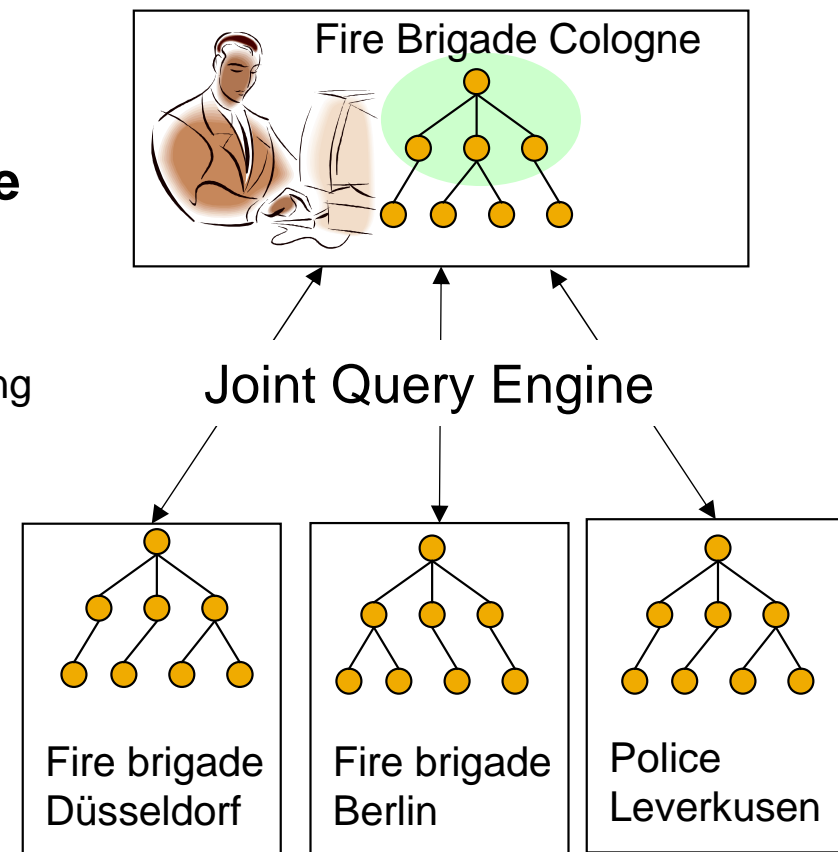
**Motivation:** In a large incident, numerous cooperating organizations require the integration of heterogeneous, distributed databases for conducting efficient operational resource management.

**Solution:**  
**Joint-Query Engine & SAP AutoMappingCore**

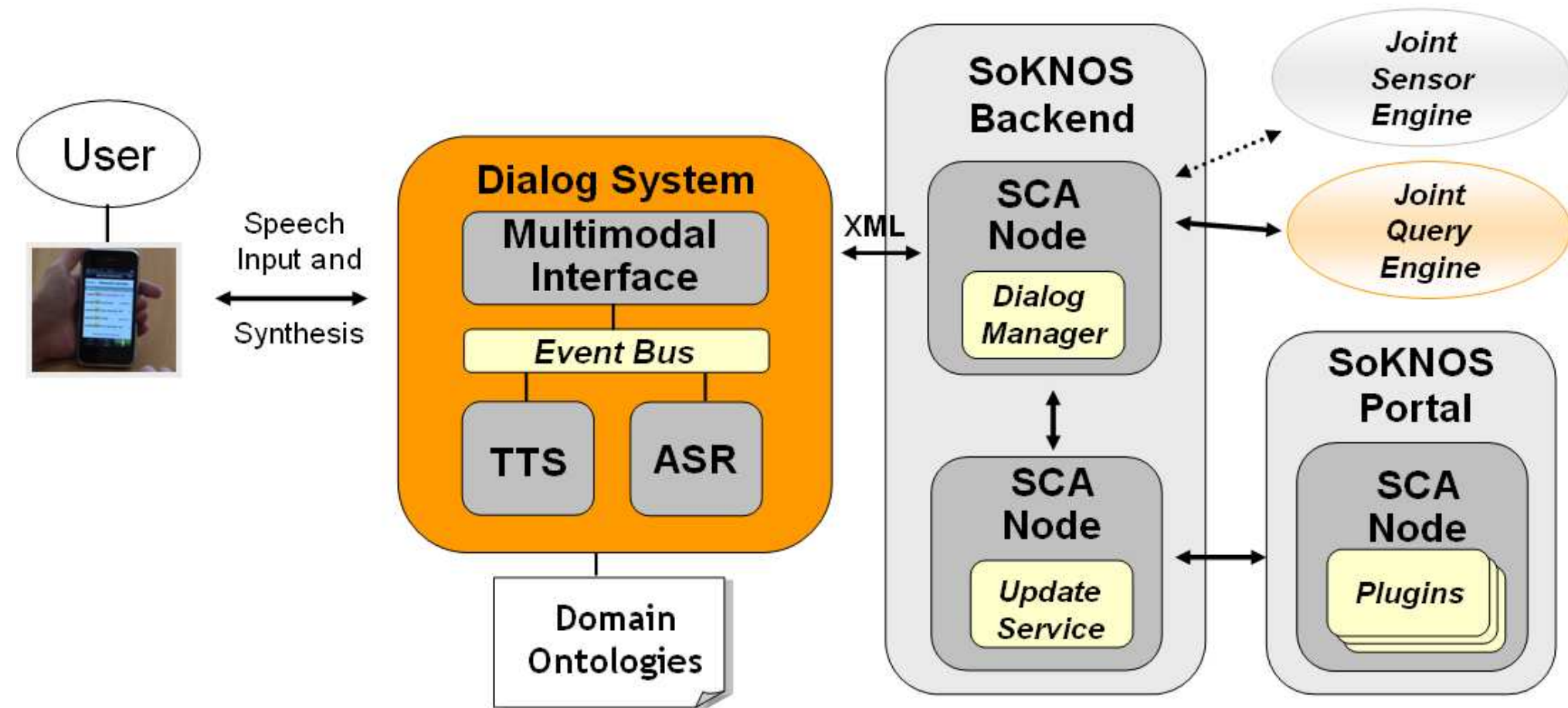
The **JQE** processes the query by unifying different names of input-concepts like, e.g. "helicopter", defined in the SoKNOS resources ontology, which is mapped to the different underlying databases' data models.

The **SAP AutoMappingCore** makes suggestions for possible mappings based on different ontology and schema matching metrics.

The approach is based on F-Logic and OntoBroker.



## Use Case 4: Improved Search





**Use Case 1: System Extensibility**

**Use Case 2: Improved Discovery of External Sensor  
Observation Services**

**Use Case 3: Flexible Information Exchange**

**Use Case 4: Improved Search**

**Use Case 5: Plausibility Checks**

**Use Case 6: Improved Information Visualization**



## Use Case 5: Plausibility Checks

---

**Motivation:** Time pressure and unknown situations pose a high stress level on the incident command team. Decisions need to be taken quickly. Wrong decision can have severe consequences. **It is important to double check the user's actions for adequacy and consistency.**

### **Solution:**

The German “deployment regulations for incidents” was transformed into an ontology.

Based on this body of knowledge, it is possible to check if the assigned forces to a particular task are adequate.





**Use Case 1: System Extensibility**

**Use Case 2: Improved Discovery of External Sensor  
Observation Services**

**Use Case 3: Flexible Information Exchange**

**Use Case 4: Improved Search**

**Use Case 5: Plausibility Checks**

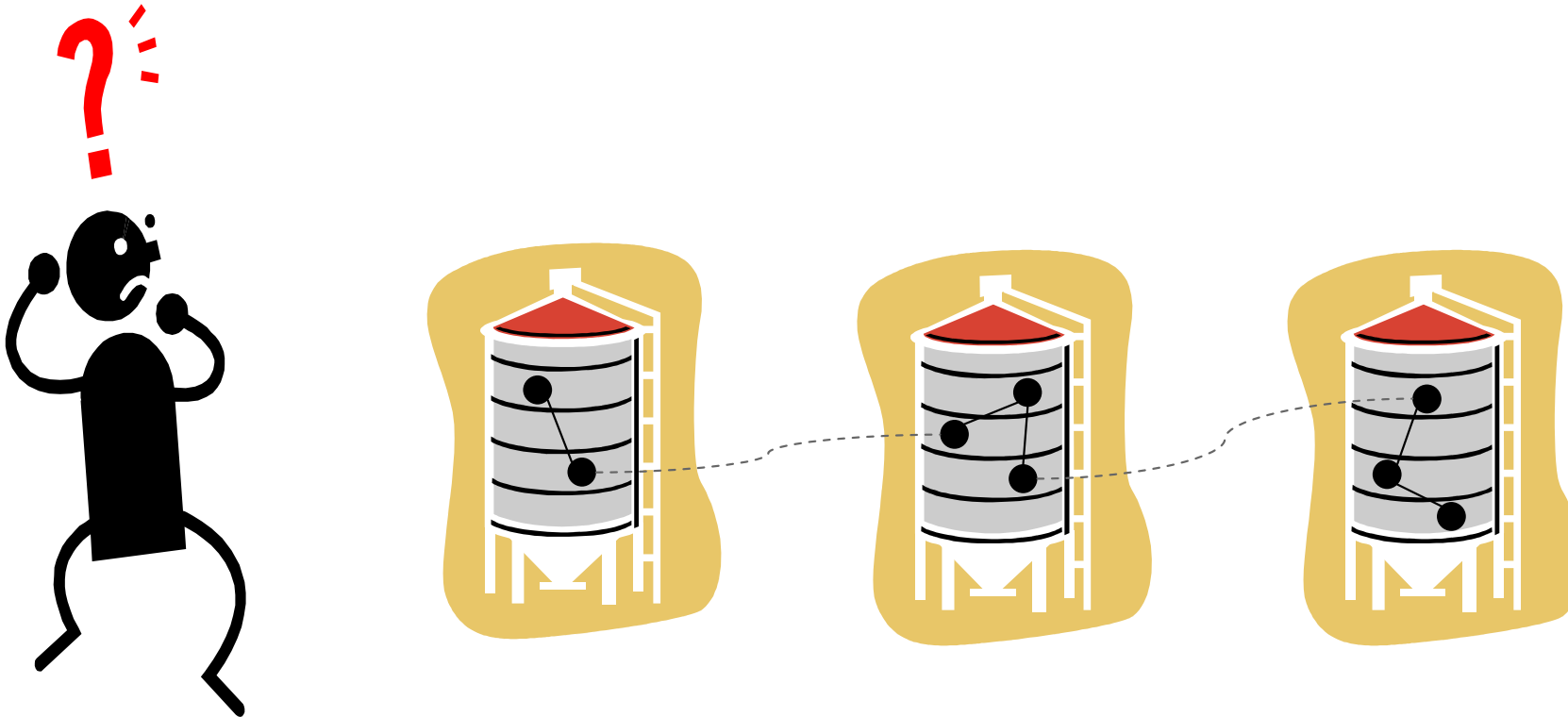
**Use Case 6: Improved Information Visualization**



# Use Case 6: Improved Information Visualization

## Motivation

- Information contained in “silos” (aka IT systems)
  - hard to grasp interrelations (especially for end users across organization boundaries)
  - deriving information from data is a hard task

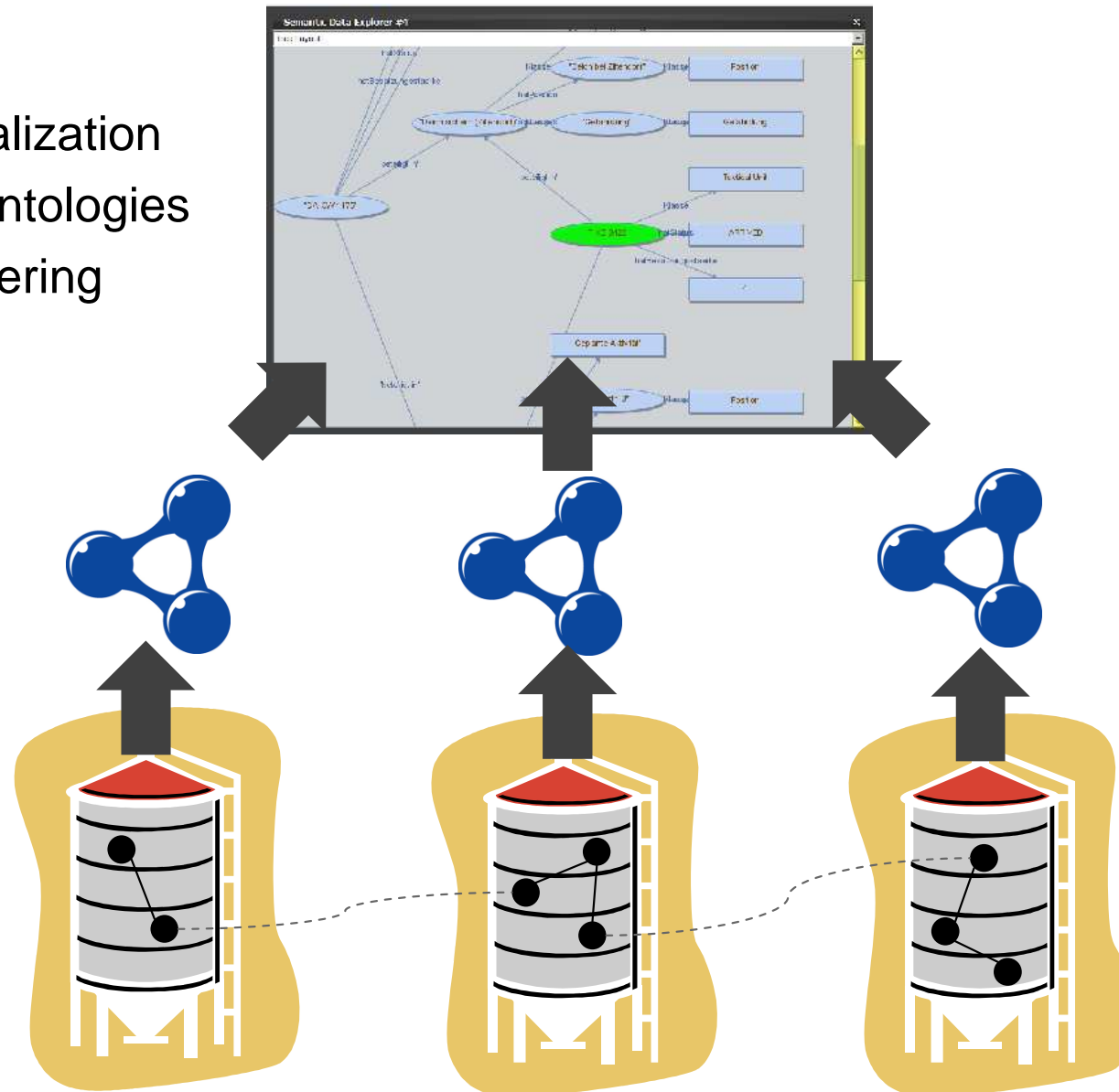


Heiko Paulheim, Lars Meyer (2011) *Ontology-based Information Visualization in Integrated UIs (IUI)*

# Use Case 6: Improved Information Visualization (cont.)

## Idea

- Create a unified visualization  
...based on ontologies
- Reasoning for discovering  
implicit relations



# User Interaction

---

- Visualizing objects
  - by dragging and dropping them onto the canvas
- Navigating
  - by opening nodes (double clicking)
- Hybrid visualization
  - selected objects in the graph are highlighted in original application
  - and vice versa



# Setup

The screenshot displays the SAP Mission account interface, titled "Mission account :: Showing laufende Objekte". It is divided into two main sections: "Schadenslagen" (Disaster Scenarios) and "Schäden" (Damages).

**Schadenslagen:** This section lists four disaster scenarios:

- Feuer in Chempark (Brand, Dr. Schmidt)
- Überschwemmung in Merkenich (Hochwasser, Dr. Schmidt)
- Feuer in Industriepark (Brand, Dr. Meyer)
- Überschwemmung in Frankfurt (Oder) (Hochwasser, Dr. Meyer)

**Schäden:** This section shows a list of damages, categorized by "Prognostiziert" (Forecasted), "Aktuell" (Current), "Geplant" (Planned), and "Laufend" (Ongoing). The "Prognostiziert" column lists several damages, including "Deichbruch bei Merkenich", "Deichbruch bei Wiesdorf", "Deichbruch bei Kasselberg", and "Deichbruch bei Rheindorf".

**Maßnahmen:** This section shows a list of measures, categorized by "Laufend" (Ongoing). The "Laufend" column lists several measures, including "Kasselberg evakuieren", "F-LK 5845", "Deich sichern (Rheindorf)", and "F-VI 243".

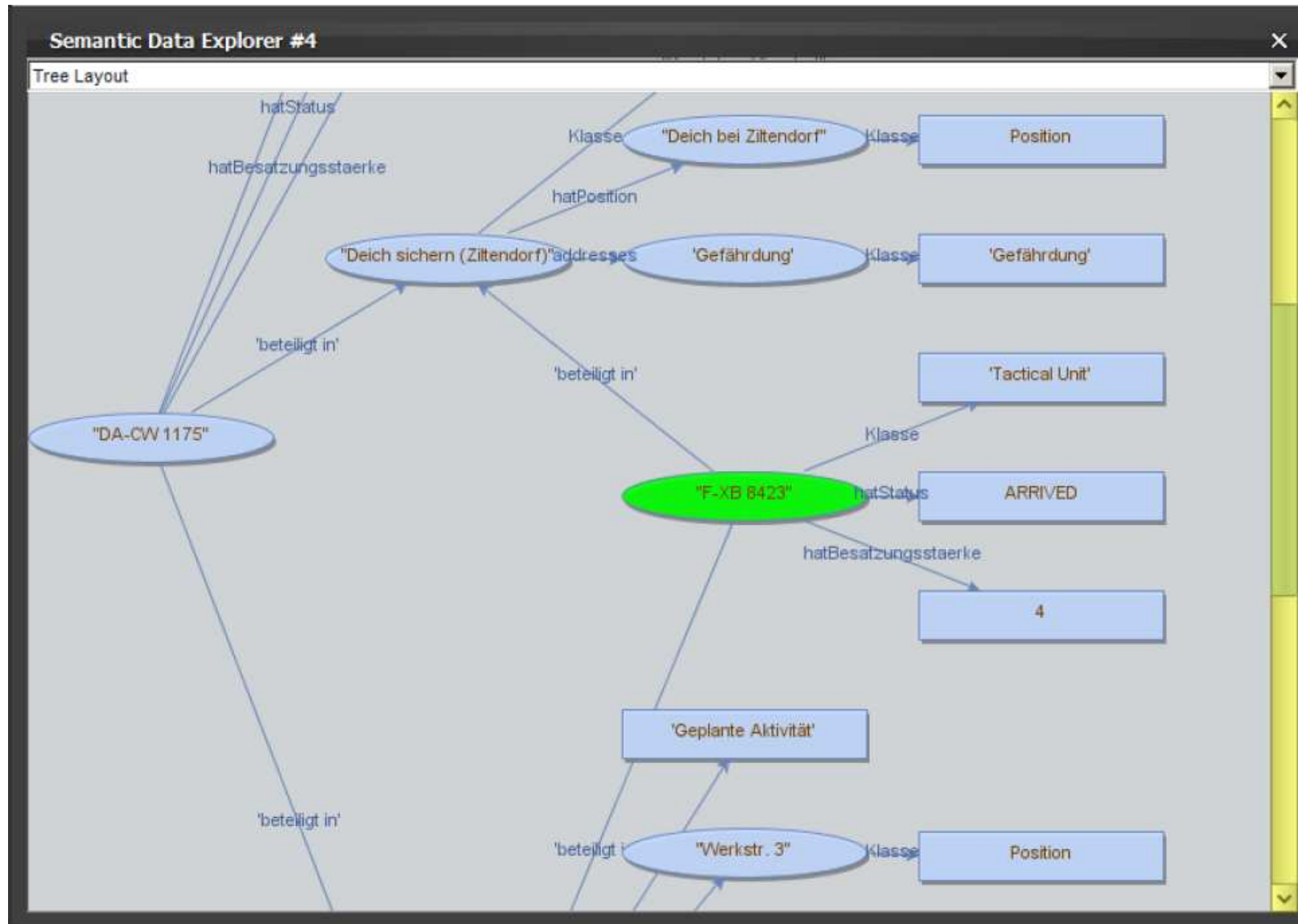
**Resource Management (Flex) #3:** This section shows a list of resources, categorized by "Ressourcen" (Resources). The "Ressourcen" column lists several resources, including "F-XB 8423", "F-HH 4823", "F-LK 5845", and "F-XZ 5845".

**Details:** This section shows the details of the selected resource, "F-LK 5845". The details are organized into three tabs: "Allgemein" (General), "Beschreibung" (Description), and "Koordinaten" (Coordinates). The "Allgemein" tab is active, showing the following information:

Allgemein	Beschreibung	Koordinaten
Name	F-LK 5845	
Organisation	Flugbereitschaft Rhein-Main	
Einsatzgebiet	Südhessen	
Besatzungsstärke	7	
Status	IDLE	

Red arrows indicate the flow of information from the "Schadenslagen" and "Schäden" sections to the "Maßnahmen" section, and from the "Resource Management" section to the "Details" section. A blue box with the text "select & explore" is positioned between the two sections, and another blue box with the text "Understand the intended meaning of an information object." is positioned below it.

# Screenshot Semantic Data Explorer



Heiko Paulheim, Lars Meyer (2011) *Ontology-based Information Visualization in Integrated UIs (IUI)*



# Lessons Learned

# Lessons Learned

---

## Ontology Engineering Process

- Involving the end user (rather obvious)
- Establishing the role of an ontology engineer (in analogy to master courses in software engineering).
- “Ontology editors need improvement in their browsing mechanisms, help systems and visualization metaphors.” [Garca-Barriocanal], A statement from 2005 which unfortunately still holds true.
- Ontologies are still too hard to use for software engineers while the benefit is not directly obvious

# Lessons Learned

---

## Software Engineering Process and Ontologies

- Developing new mechanisms for semantic annotations.
  - Use Case 1 & 3: Approach for non-intrusive annotation of instances during run-time (executable mapping).
- Addressing performance.



# Lessons Learned

---

## **Ontology Usage and Suitability**

- Finding the right modeling granularity.
- Domain experts were not used to concepts needed to create a formally correct ontology (DOLCE)
- End users were irritated by modeled domain terminology that was not part of their colloquial language.
- Finding the right visualization depth.

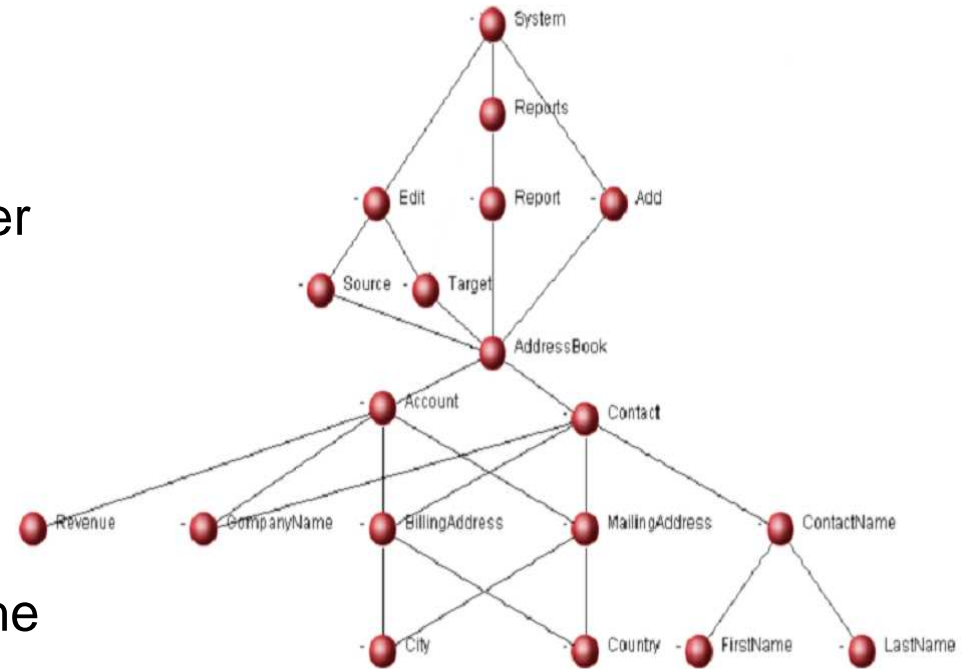


# Prototypes & Products

# Answers Anywhere Natural Language Platform

## Answers Anywhere:

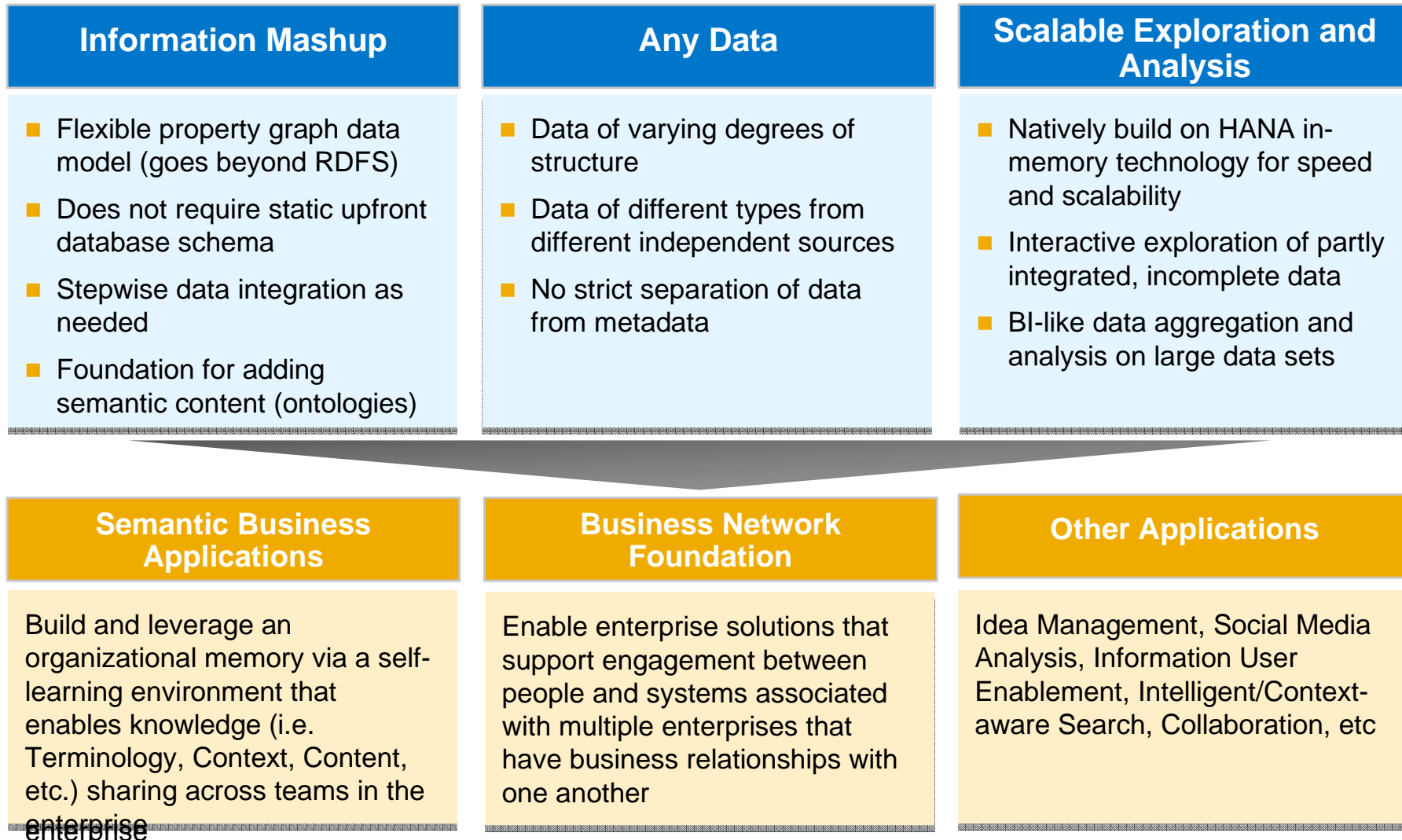
- Is an adaptive, agent-oriented software
  - architecture for building natural language-based user interfaces
- Breaks up complex problems into smaller pieces, which are then acted upon in parallel, by a community of software components called Agents
- Networks of agents, organized to represent a target domain, collaborate and compete to interpret the 'intent' of the user input
- Agents maintain awareness of the 'context' of the interaction, enabling disambiguation ('Did you mean David Sharpe or Thomas David'), and dialoging (or followup queries/actions) ('Enter a date for making the Payment to AT&T')



# “Active Information Store” –

## *Flexible Graph-based Information Management in SAP HANA*

*A scalable schema-flexible data store as part of SAP HANA that supports the storage, processing, combination, exploration and analysis of irregularly structured data from different sources.*



# CODE NAME “FindGrid”

Stefan Scheidl, Semantic Business Applications



# CODE NAME “FindGrid” – A Semantic Business Application

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## FindGrid

FindGrid empowers teams to perform knowledge-intensive collaborative work:

Create, consolidate and summarize artifacts such as Cases, Folders, Bookmarks, Tags, Notes & Pictures emerging during the research process.

**Enterprise Memory is created**, harmonized and sustained automatically as teams work with FindGrid.

## SEMANTIC BUSINESS APPS

- Leverage semantic technologies
- Working close with Customer and End-Users (Colgate, Sanofi-Aventis, Kaeser...)
- Started 2008 in SAP Research (Global Business Incubator)
- Now Part of Technology and Innovation Platform (TIP In-Memory)

# CODE NAME “FindGrid” – A Semantic Business Application

---

## SOLUTION-IN-EARLY-ADOPTION

SAP solutions in the early-adoption phase are innovative solutions that are still being enhanced through significant collaboration with customers who are early adopters.

- Availability for **selected customers**
- **Product specific support** provided by development team
- Not yet a standard product with unrestricted availability and standard lifecycle support

# FindGrid customer base

Customer	Scenario
Colgate	Consumer Insights
Sanofi-Aventis	R&D, Medical Research
Kaeser	Competitive Insights
Nestlé	R&D, Food Research
Fujitsu	Business Solution Sales
Blanco	IT Service
Deutz	Service to Engineering (Quality Loop)
DuPont	tbd
Deloitte	Co-Innovation for Business Expertise Finder

# Big Picture

Information Retrieval



# Exemplary Use Case



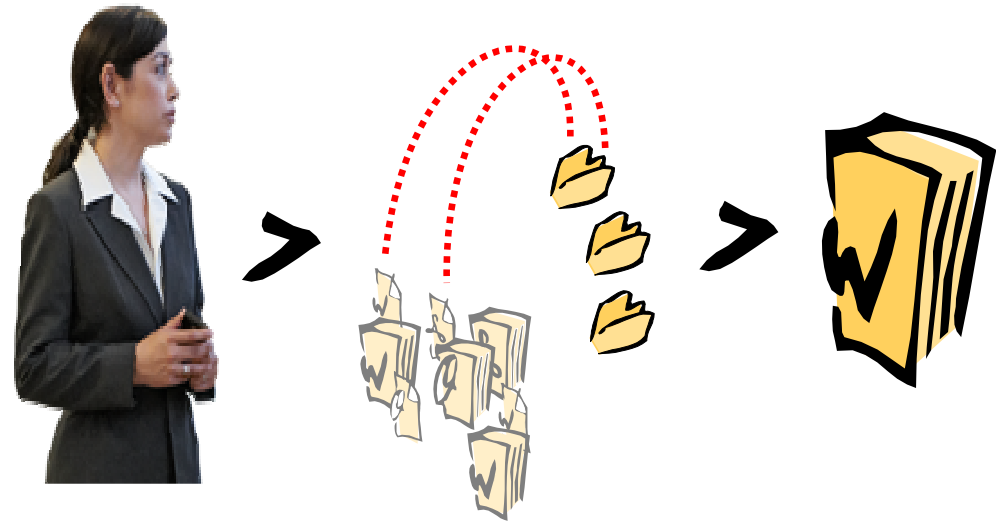
The car manufacturer GreenCars wants to build a long range electric car.

## USER

- Development engineer at GreenCars

## TASK

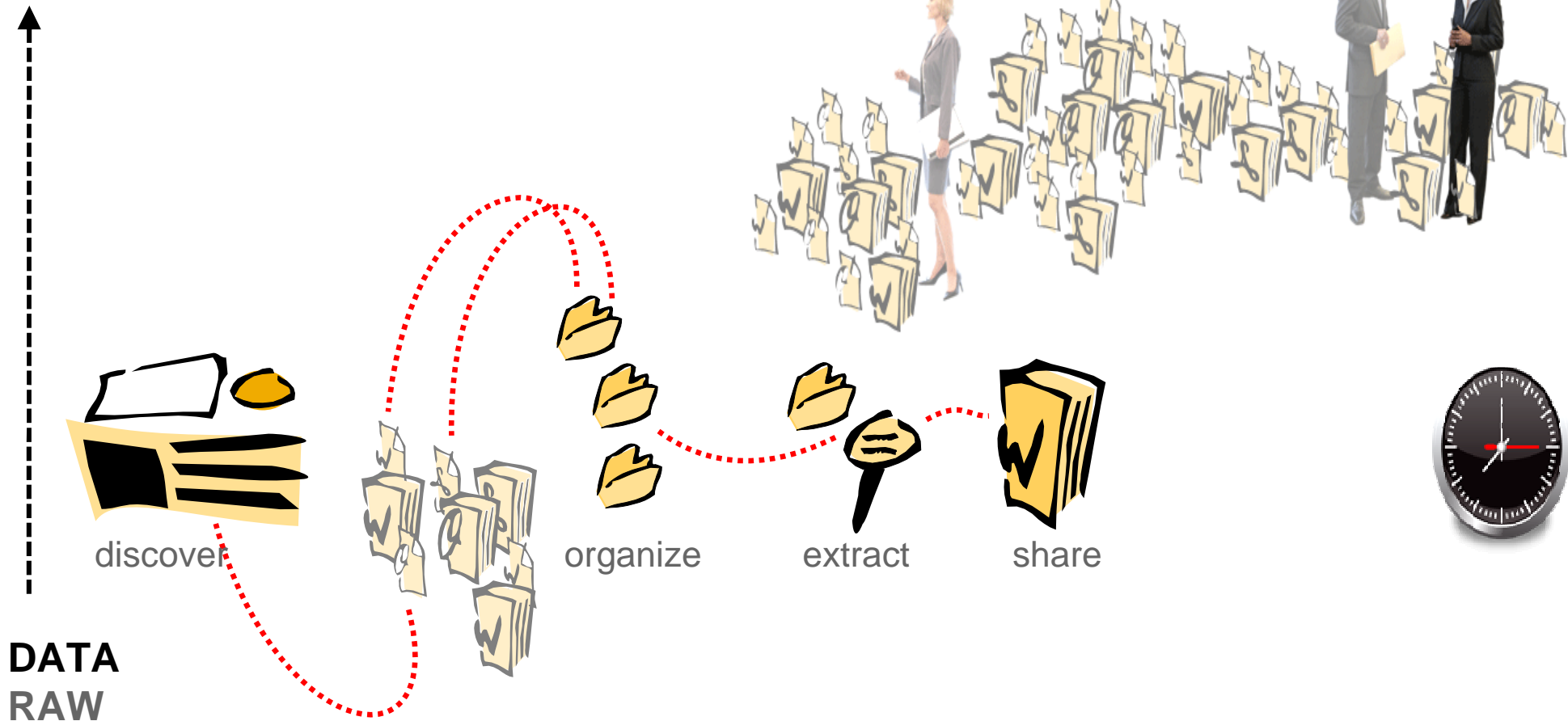
- Collect Information on batteries
- Keep/ present insights in a dossier





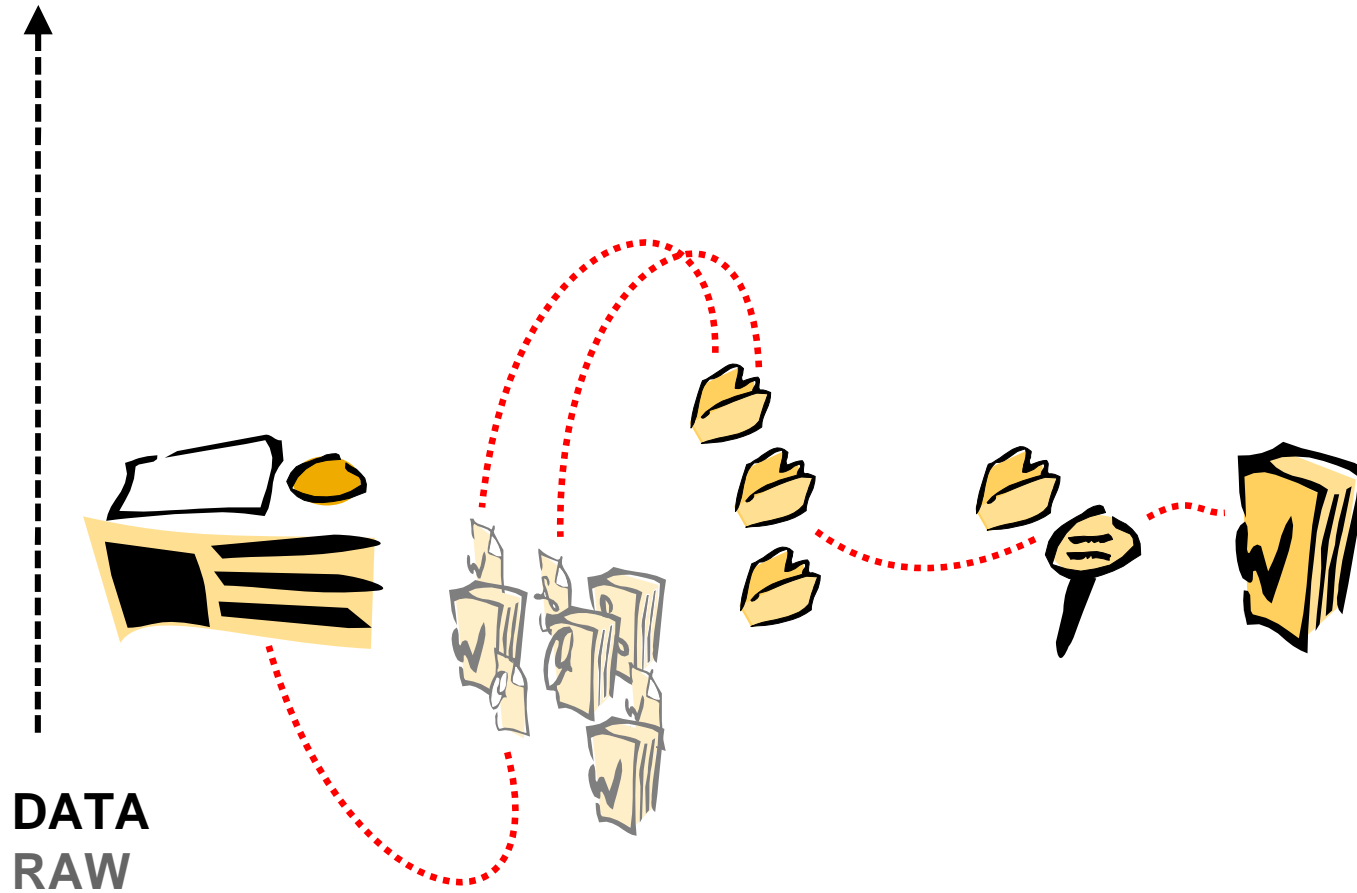
# Gathering information takes time

**INFORMATION  
STRUCTURED**



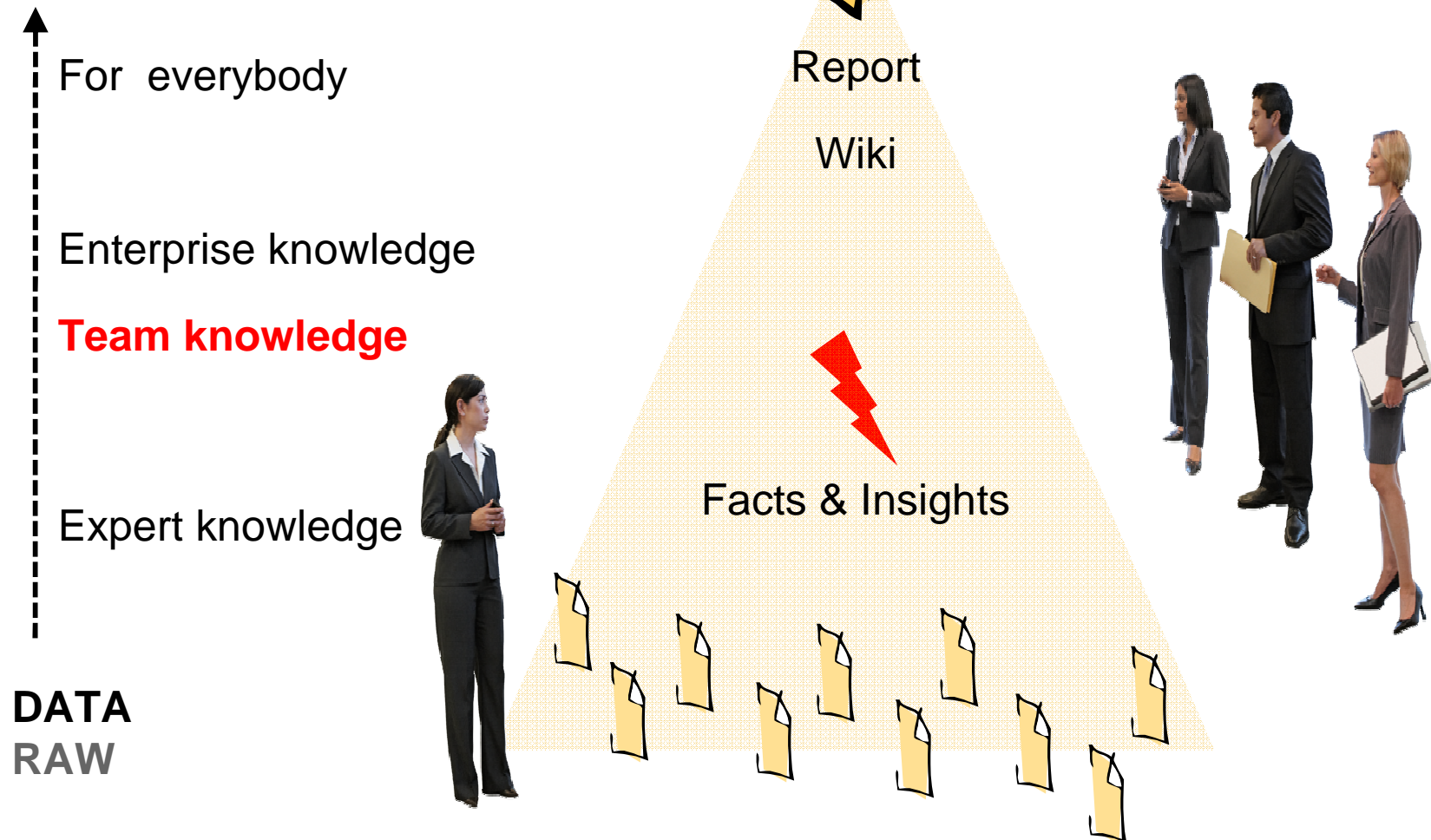
# Expert knowledge get lost

**INFORMATION  
STRUCTURED**



# Expert knowledge get lost

## INFORMATION STRUCTURED



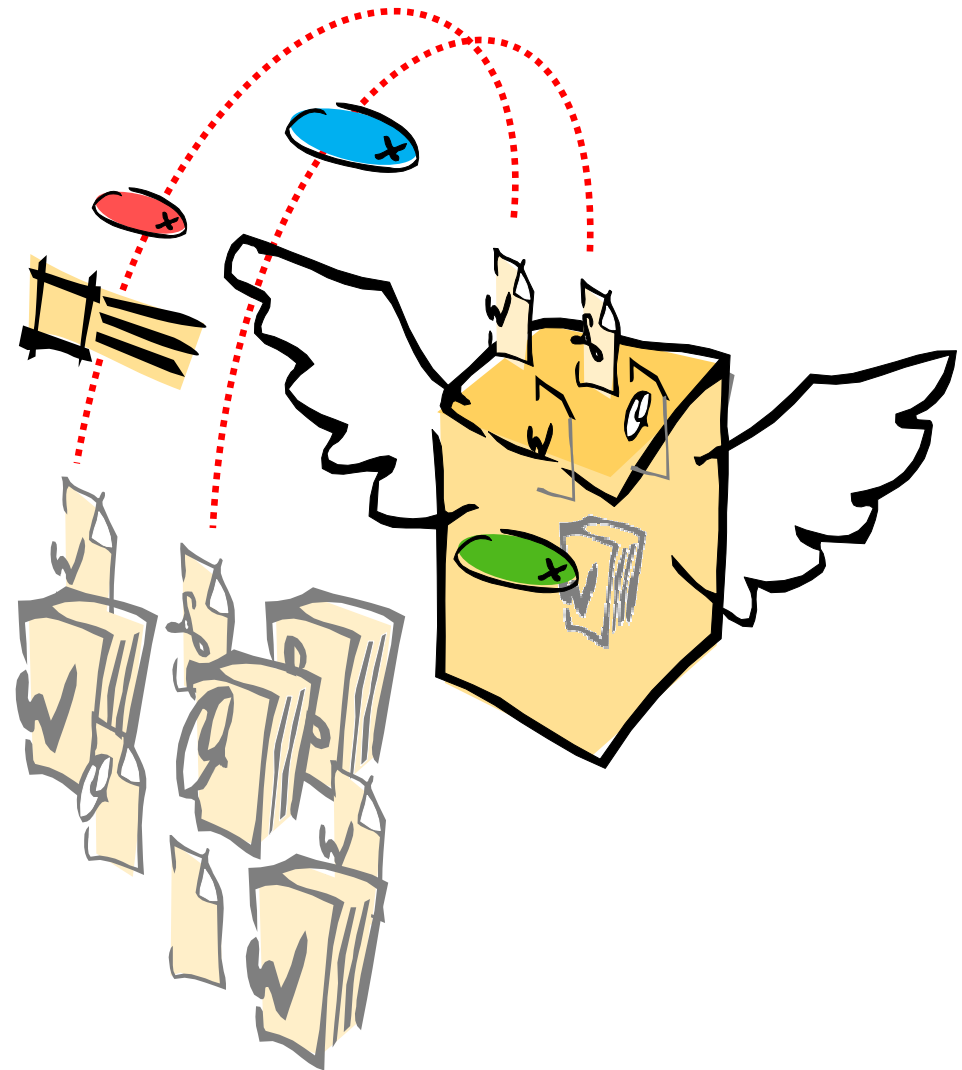
# CODENAME “FindGrid”

An application to organize, discover and share knowledge.

Build on top of existing knowledge, based on semantic relations.

## TASK

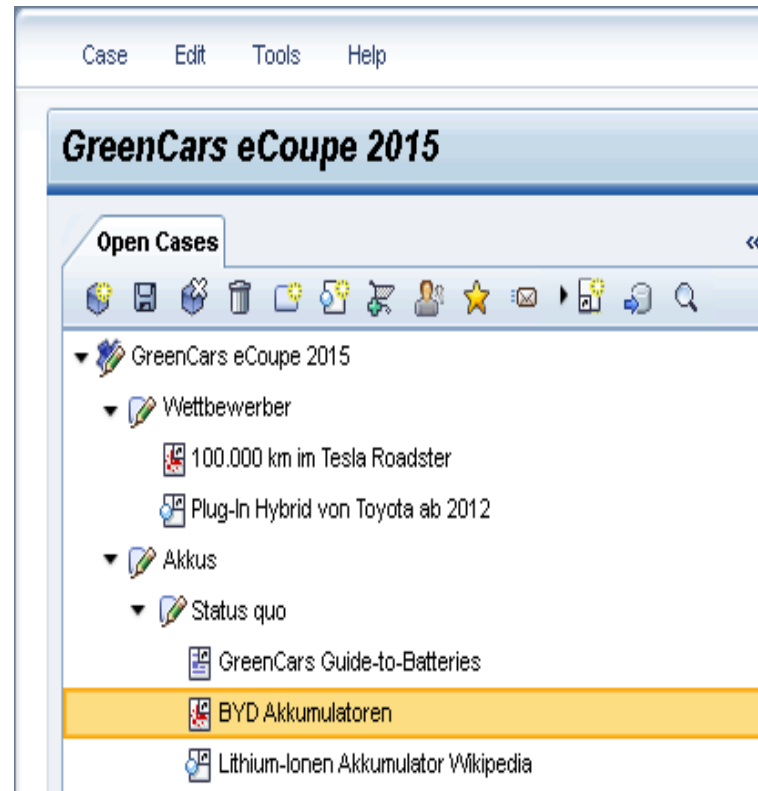
- Collect Information on batteries
- Keep/ present insights in a dossier



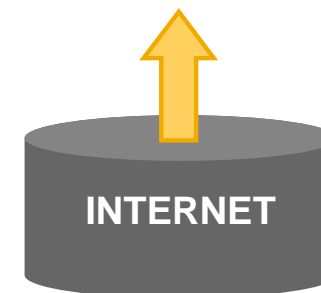
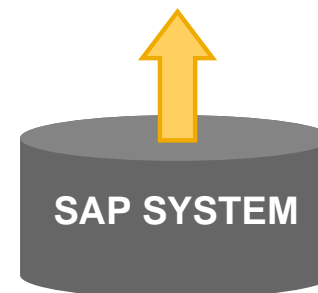
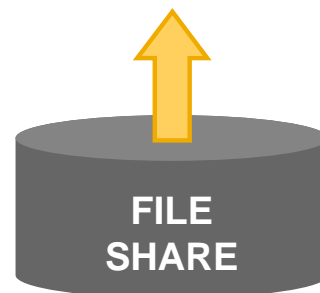
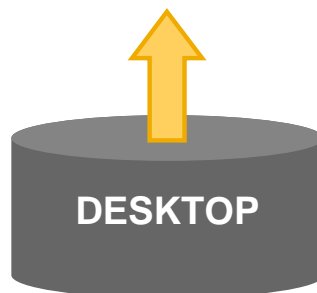
# CODE NAME “FindGrid”

Organize. Discover. Share.

- Create structure
- Search sources
- Add bookmarks



Lithium-Ionen-Akkus x

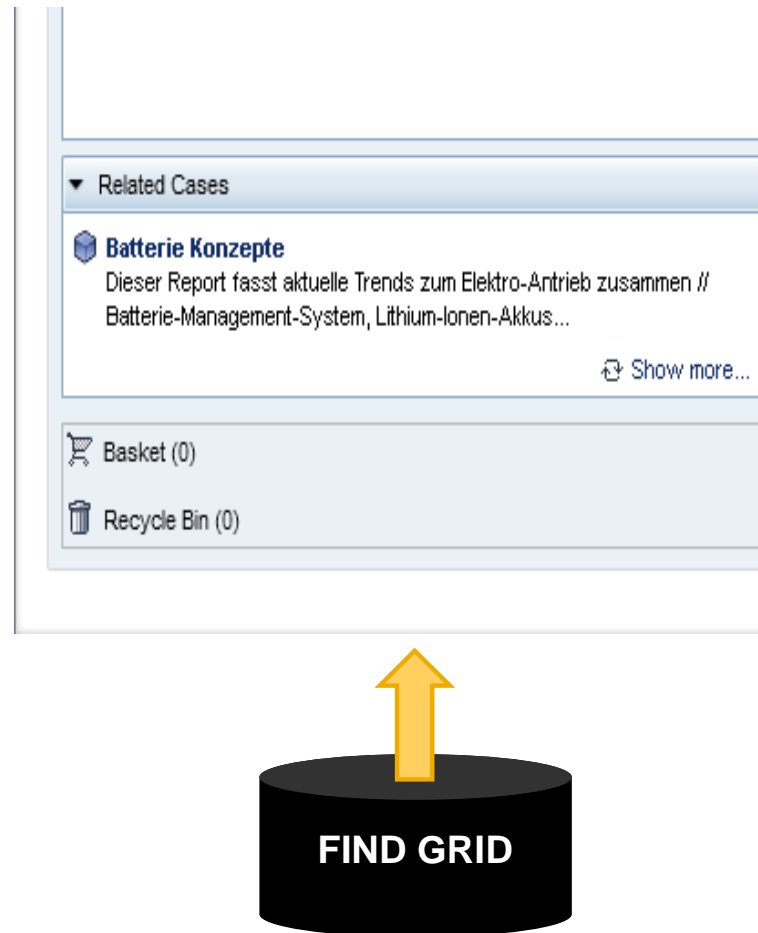




# CODE NAME “FindGrid”

Organize. Discover. Share.

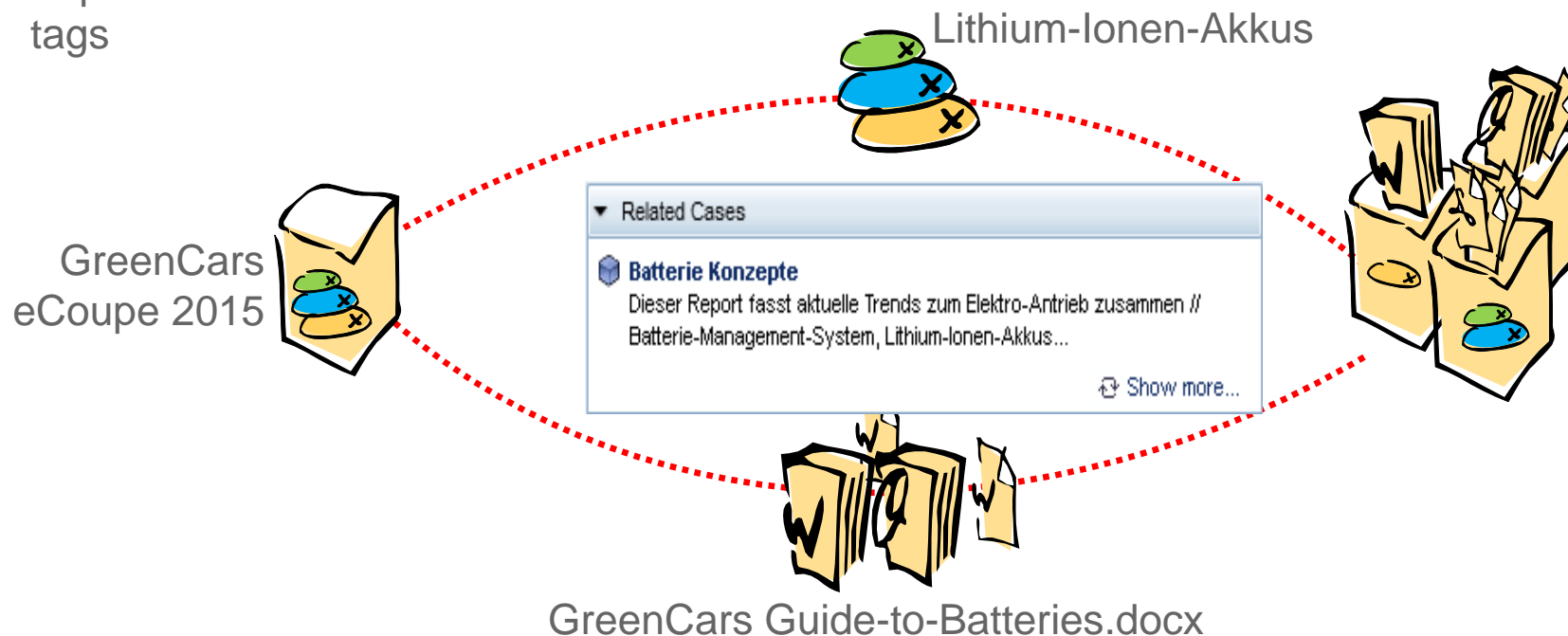
- **Similar Cases** will be suggested



# CODE NAME “FindGrid”

Organize. Discover. Share.

- **Similar Cases** will be suggested
- Explore relations via bookmarks and tags



# CODE NAME “FindGrid”

Organize. Discover. Share.

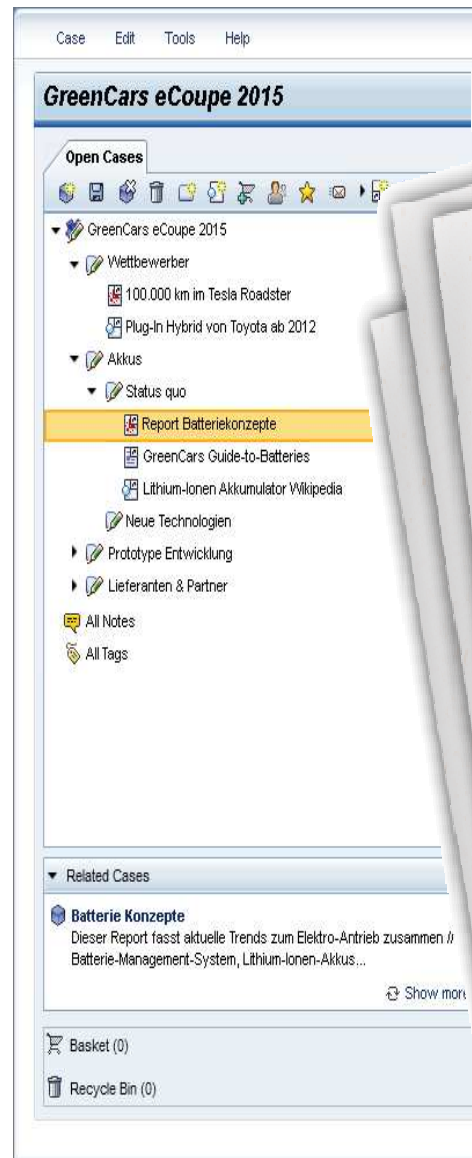
- Open suggestion
- Evaluate content
- Extract facts
- **Related Terms** will be suggested
- Keep facts

The screenshot displays the SAP FindGrid interface. At the top, a menu bar includes 'Case', 'Edit', 'Tools', and 'Help'. The main window is titled 'Text Analysis' and shows a report titled 'Report Batteriekonzepte'. Below the title, there is a search bar labeled 'Enter term'. The report content is organized into a grid of tags: 'BMS (1) +', 'Ladezyklen (2) +', 'Lithium-Ionen-Akkus (4) x', 'Nickel-Metallhydrid-Akkus (1) +', and 'Tesla Motors (2) +'. The 'Lithium-Ionen-Akkus (4) x' tag is highlighted in yellow. To the left of the main window, a 'Related Cases' panel is visible, showing a case titled 'Batterie Konzepte' with a description: 'Dieser Report fasst aktuelle Trends zum Elektro-Antrieb zusammen // Batterie-Management-System, Lithium-Ionen-Akkus...'. Below this description is a 'Show more...' link. To the right of the main window, a text snippet is displayed: 'Continental – die Lieferanten der Lithium-Ionen-Akkus -tur'. Below this, a quote is shown: '„Zu Lithium-Ionen-Akkus gibt es derzeit keine Alternative“, sagt Martin Winter, Inhaber einer – von VW, Evonik und Chemetall finanzierten – Stiftungsprofessur für Angewandte Materialwissenschaften zur Energiespeicherung und Energieumwandlung an de'. Below the quote, another yellow-highlighted tag is shown: 'Mit einer Lithium-Ionen-Batterie wird es über 300 Kilometer weit kommen.' -'. To the right of this tag are two buttons: 'Open...' and 'Add to Notes'. At the bottom right of the main window are 'Analyze' and 'Close' buttons. At the bottom center, there is a link labeled 'All Tags'. Hand-drawn annotations include a red circle with an 'X' over the 'Lithium-Ionen-Akkus (4) x' tag, a purple oval with an 'X' over the 'Mit einer Lithium-Ionen-Batterie...' tag, and a dashed line connecting the two.

# CODE NAME “FindGrid”

Organize. Discover. Share.

- Collect information
- Present insights



## 2. Akkus

Owner: Christina Brand \* Modified On: November 16, 2011

### 2.1 Status quo

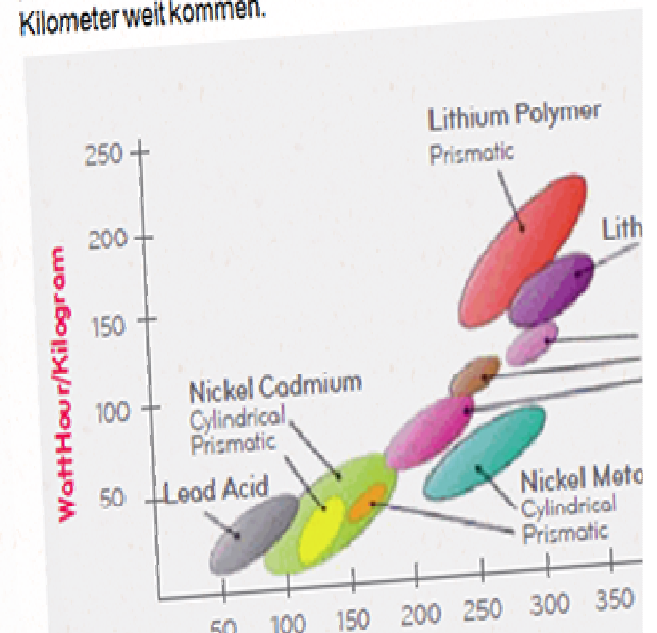
Owner: Christina Brand \* Modified On: November 16, 2011

#### 2.1.1 Report Batteriekonzepte

Creator: Christina Brand \* Created On: November 16, 2011

##### [Lithium-Ionen-Akkus]

Derzeit hat ein 1000 kg schweres Auto mit einer 100 kg schw Reichweite von 70 Kilometer. Mit einer Lithium-Ionen-Batterie Kilometer weit kommen.



# Build on existing knowledge



„I could build my presentation based on your report in a **couple of hours!**“

„It took me **some days** to prepare the report.“

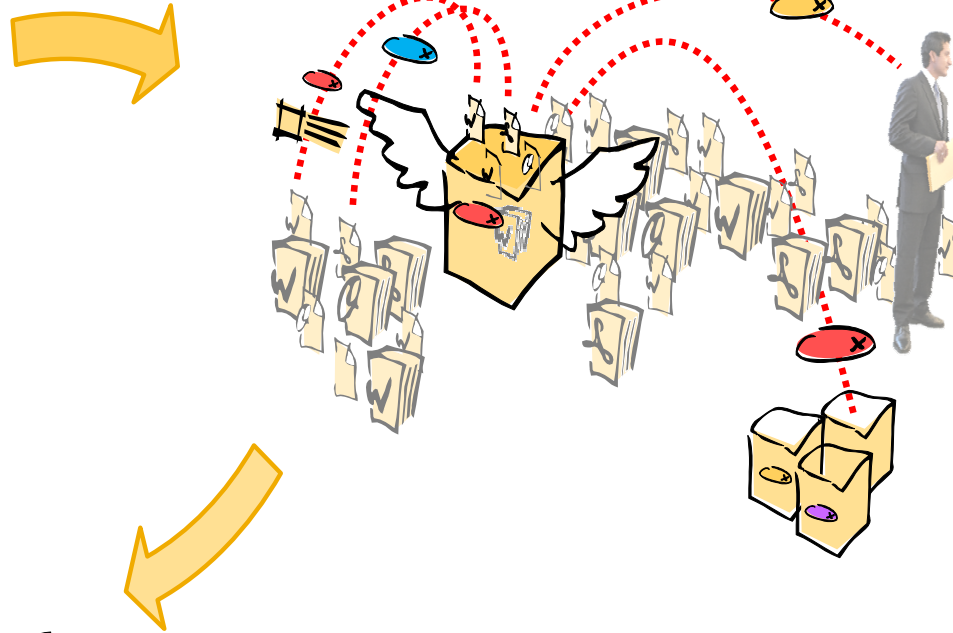
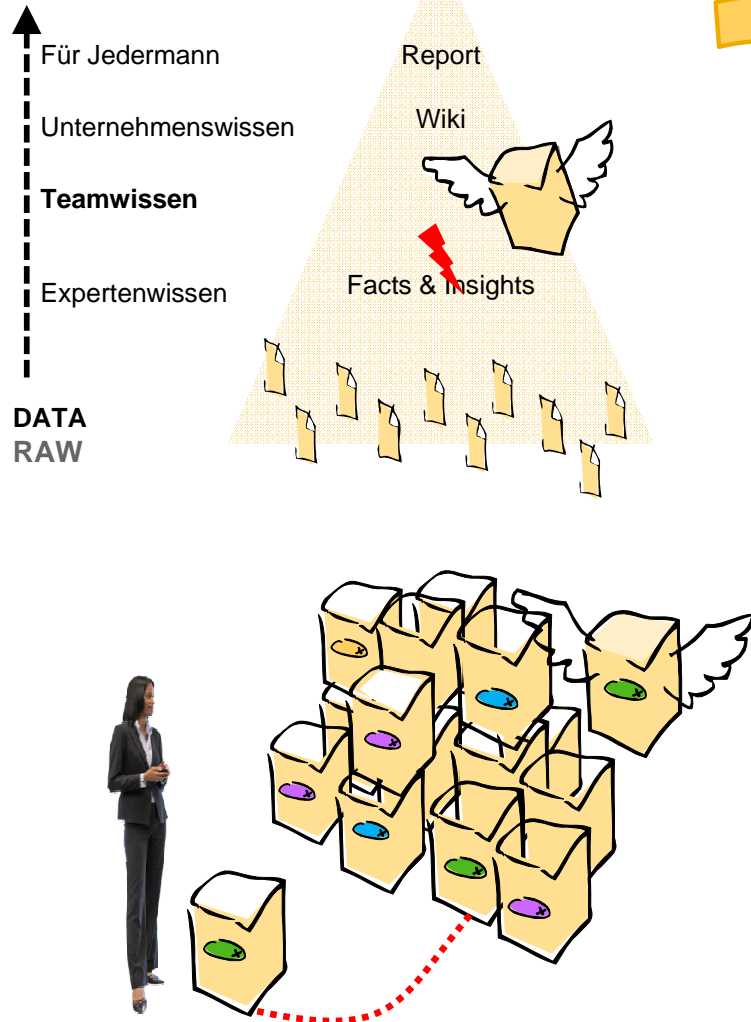




# CODE NAME “FindGrid”

Build enterprise knowledge

## INFORMATION STRUCTURES



- Collect Information on batteries
- Build on existing knowledge
- Keep insights in a dossier
- **Keep and leverage expert knowledge**





# The Business Web



# How will the Business Environment of the Future Look?

- Relies on the Internet as a fundamental and critical infrastructure
- Brings consumers, governments and business users together
- Manages real-time all data sources
- Delivers on mobile devices and is easy to use
- Behaves like a social network for enterprises



# Business Web Vision:

---

The Business Web is envisioned as an easy access, real-time trading network that provides the necessary secure infrastructure, technologies, applications and content to deliver end-to-end business services optimized for mobility.

# Trends

## **Collaborative Business**

Businesses are moving away from static supply chains towards **adaptive and dynamic value networks formed through collaboration**

## **Internet of Services**

Business activities from mainstream industries need to be presented as **consumable services**

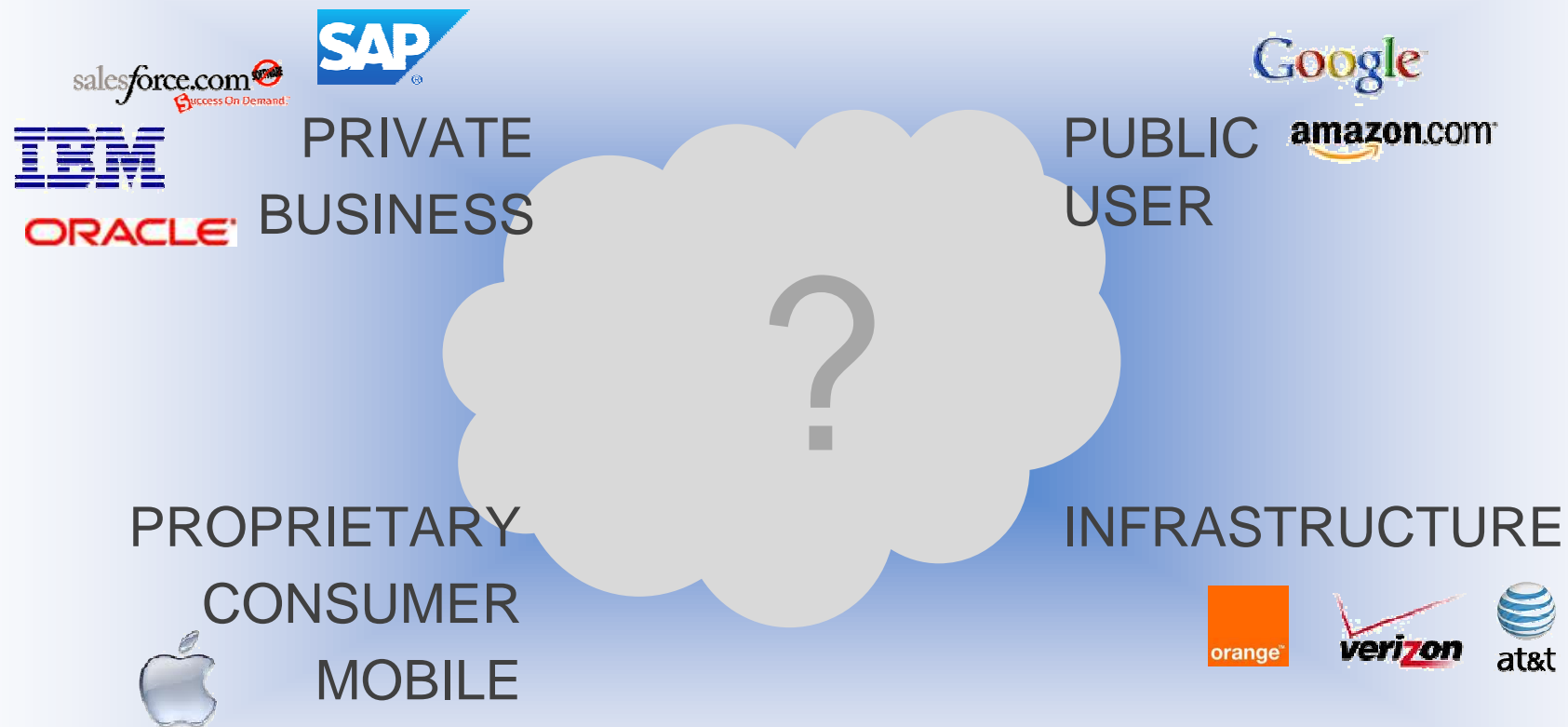
## **Internet of Things**

**Massive volumes of information from intelligent and connected things** will change the way businesses and consumers interact

## **Technology Disruption**

Traditional business models are being disrupted by technology trends including **enterprise mobility, in-memory capabilities, real-time analytics and cloud computing**

# Market Gap





# What Do We Want to Demonstrate?

## **New Business Model**

---

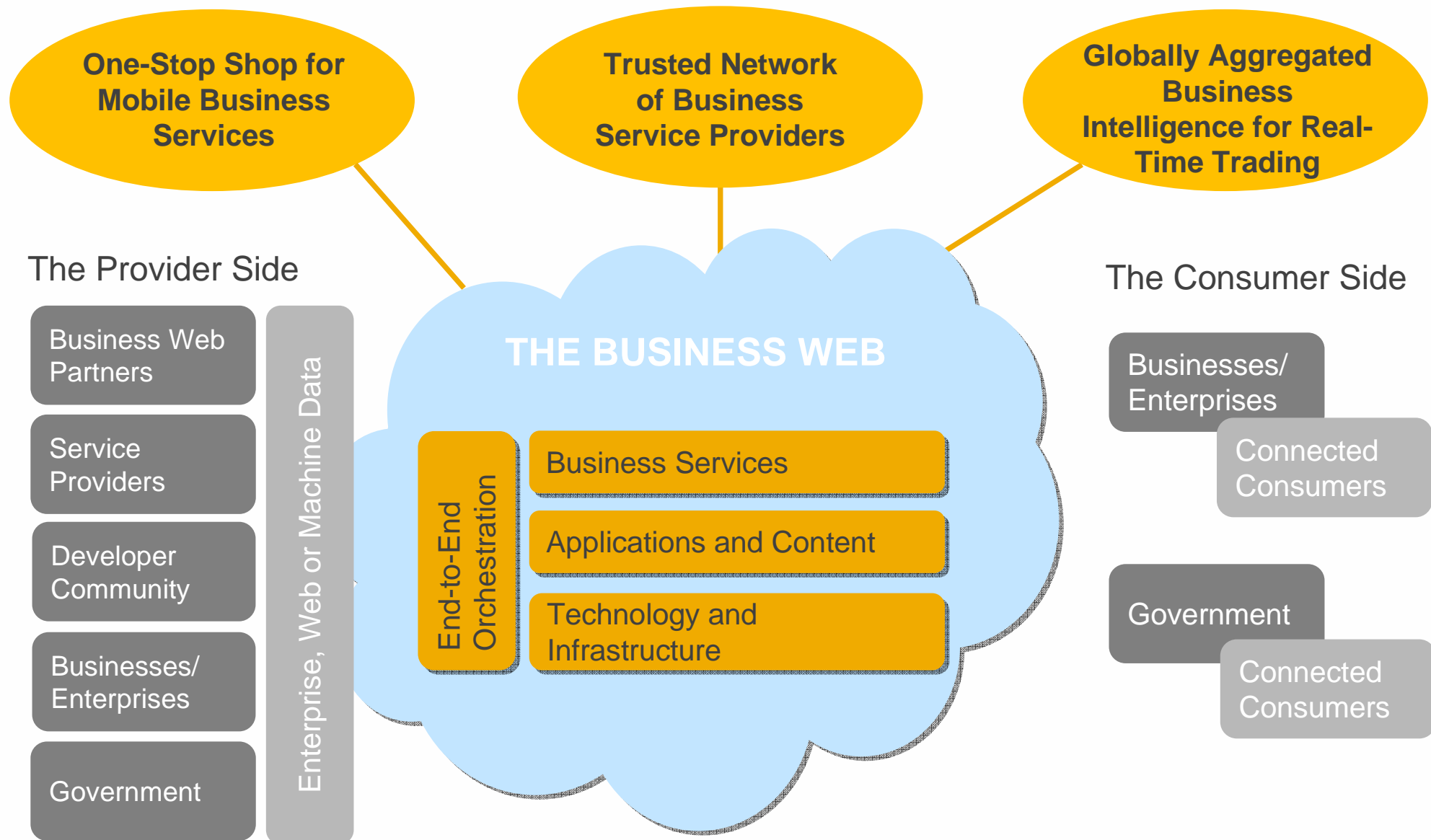
- Define a new value network that is profitable for all players
- Identify compelling opportunities

## **Innovation Showcase**

---

- Appropriate Security
- Real-time Performance
- Ease of On-Boarding
- Speed of Development
- Ease of Assembly / Orchestration (Data and Processes)
- Exciting Mobile User Experience

# How the Business Web Supports Business Networks





# Thank You!

Contact information:

Dr. Florian Probst  
f.probst@sap.com

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