

# Improving the Usability of Integrated Applications by Using Interactive Visualizations of Linked Data

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# Agenda

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## Introduction

## Prototype

- Architecture
- Interaction

## User Study

- Hypotheses
- Setup
- Results

## Conclusion



# Introduction

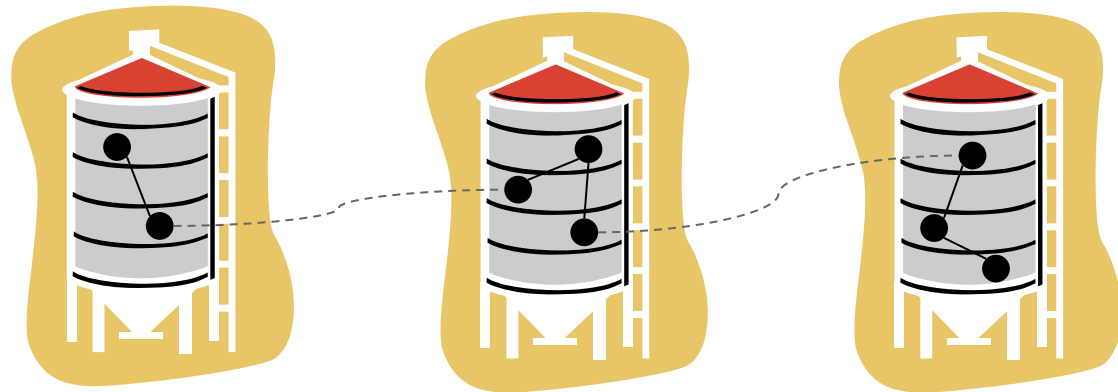
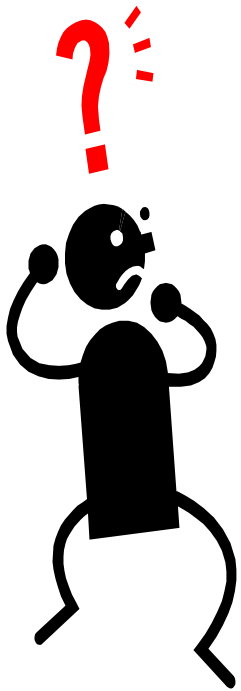
# Motivation

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Information contained in “silos” (aka IT systems)

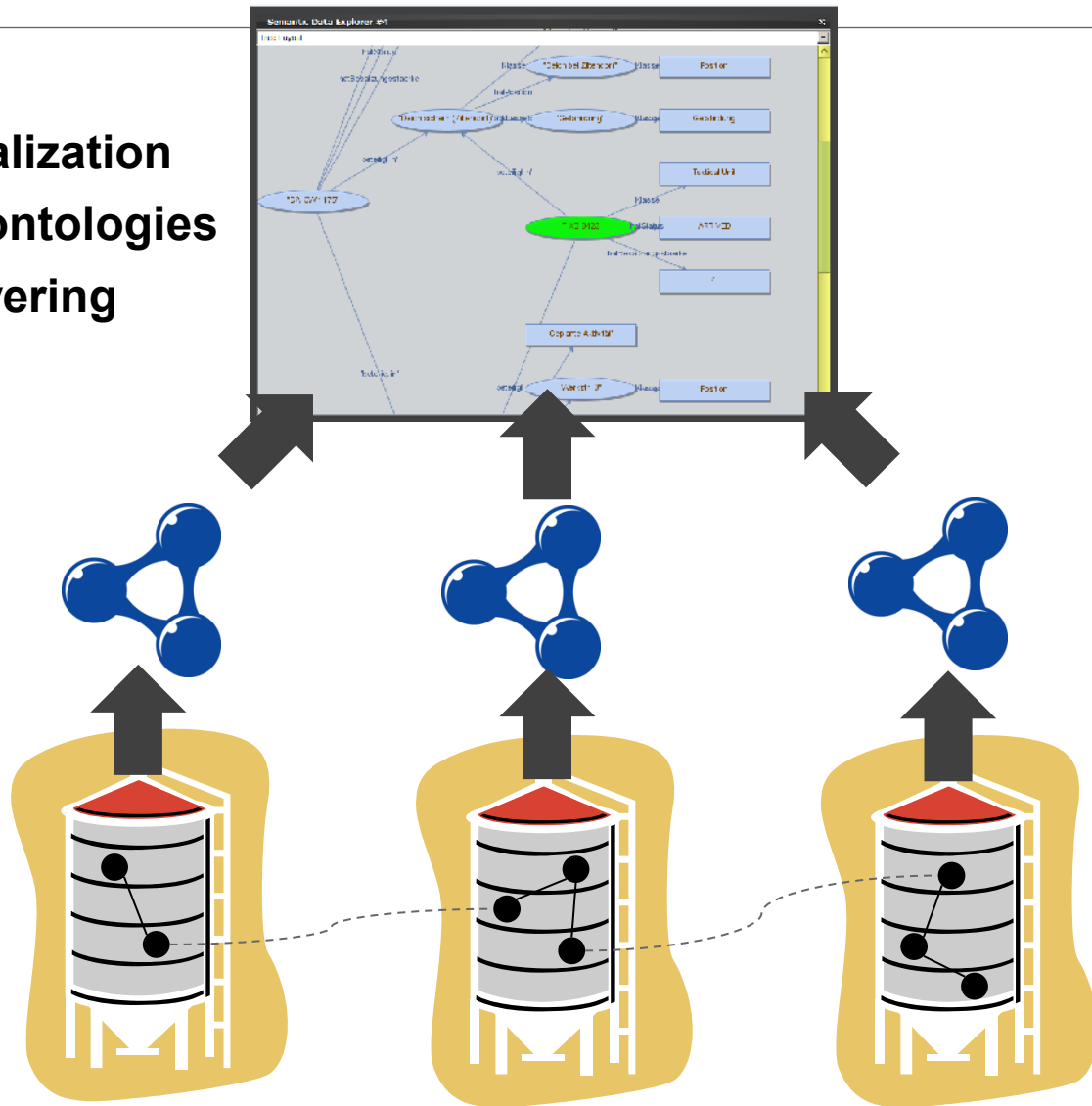
...hard to grasp interrelations

...deriving information from data is a hard task



# Idea

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





# Prototype

# Architecture

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## Containers

- ...encapsulate applications**
- ...provide application's data as linked data**
- ...facilitate interaction with other applications**

## Central link repository

- ...stores links between application objects**

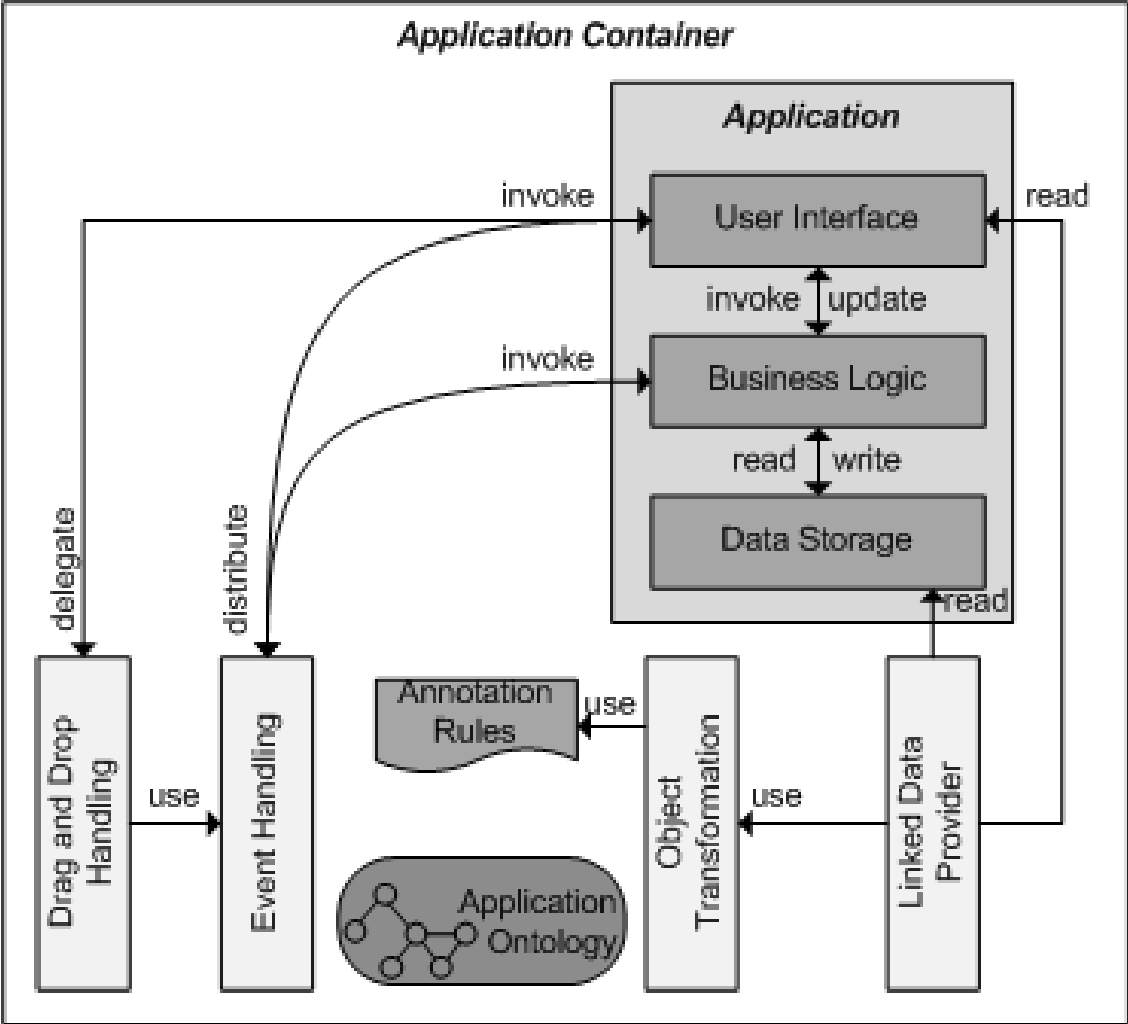
## Central reasoner

- ...integrates data and discovers implicit knowledge**

## Semantic Data Explorer

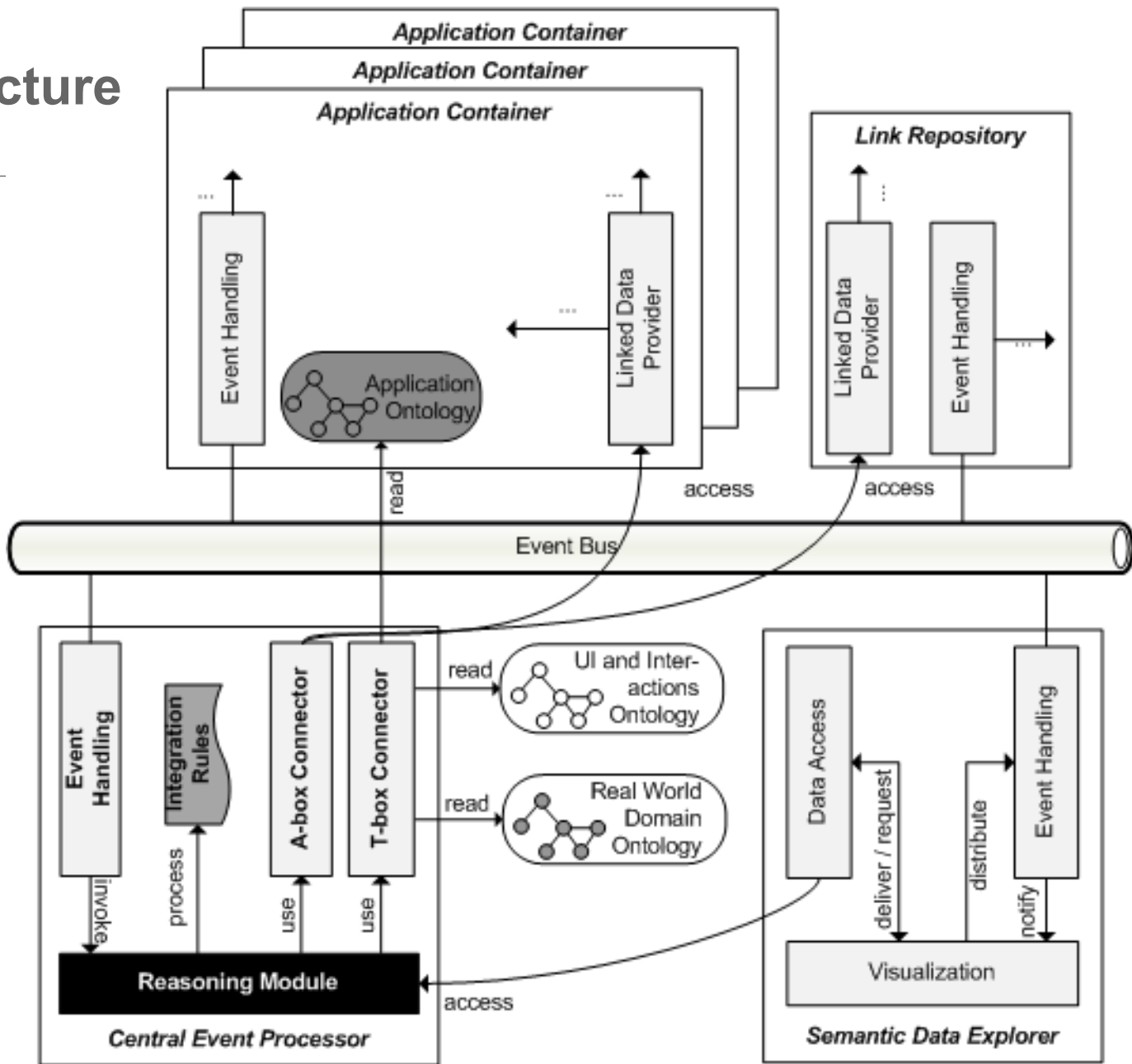
- ...provides unified visualization**

# Architecture: Application Containers

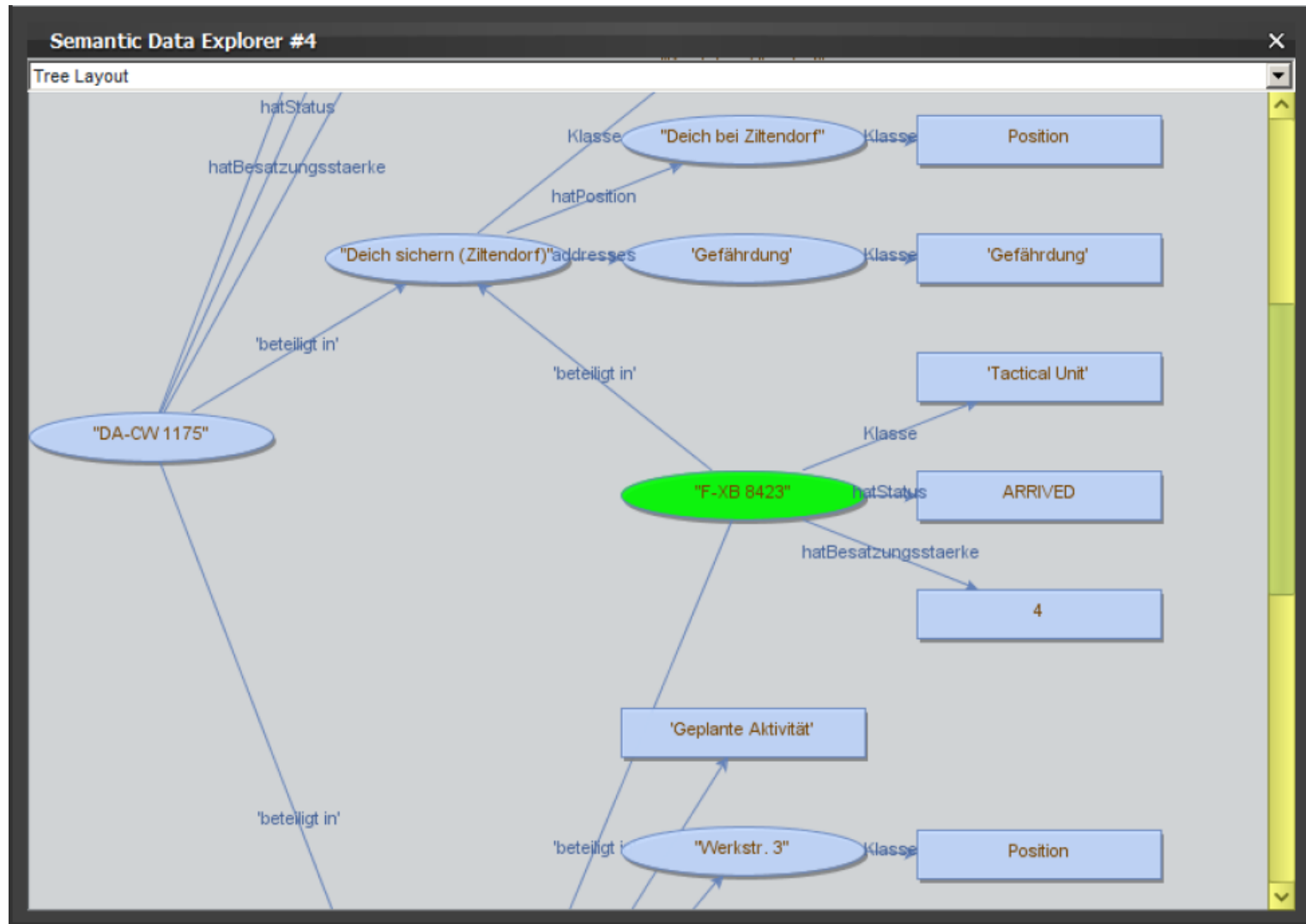




# Architecture



# Screenshot



# Interaction

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## 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**



# User Study

# Hypotheses

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**Using the Semantic Data Explorer will result in**

**...less errors**

**...faster task processing times**

**...greater user satisfaction**

# Setup

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**Domain: Emergency Management**

**Tasks with three levels of complexity**

**Two blocks (varying order):**

**...with Semantic Data Explorer**

**...without Semantic Data Explorer**

**Measured:**

**...time,**

**...error rate,**

**...user satisfaction questionnaire after each block**

# Setup

Mission account :: Showing laufende Objekte

**Schadenslagen**

- 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**

Prognostiziert      Aktuell      Geplant      Laufend

- Deichbruch bei Merkenich
  - Hochwasser
  - unbekannt
- Deichbruch bei Wiesdorf
  - Hochwasser
  - unbekannt
- Deichbruch bei Kasselbera
  - Hochwasser
  - unbekannt
- Deichbruch bei Rheindorf
  - Hochwasser
  - unbekannt

**Maßnahmen**

- Kasselberg evakuieren
  - 13:55 - 16.09.2010
  - unbekannt
  - Kasselberg
  - F-LK 5845
    - unbekannt
- Deich sichern (Rheindorf)
  - 13:55 - 16.09.2010
  - unbekannt
  - Deich bei Rheindorf
  - F-VI 243
    - unbekannt

Resource Management (Flex) #3

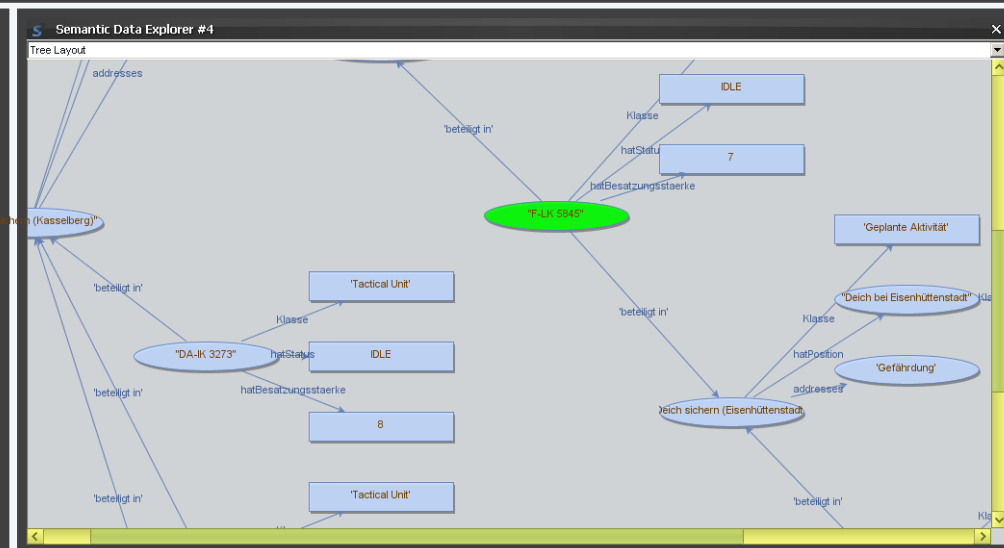
**Ressources**

- F-XB 8423
- Flugzeuge
  - F-HH 4823
  - F-LK 5845
  - F-XZ 5845

**Details**

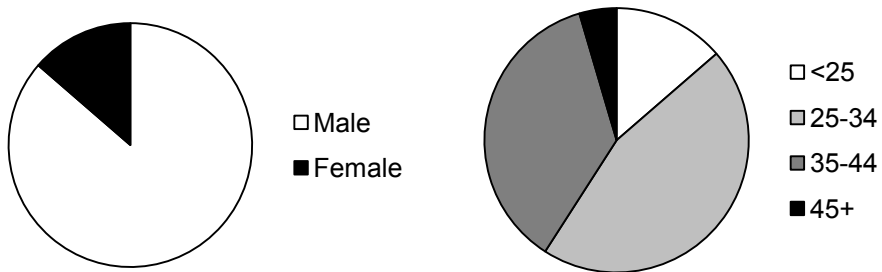
Allgemein      Beschreibung      Koordinaten

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

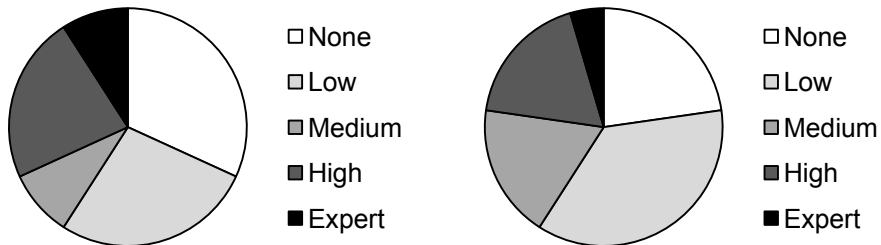


# Participants

## 22 voluntary participants:



## Different levels of expertise w.r.t. to ontologies / semantic networks:



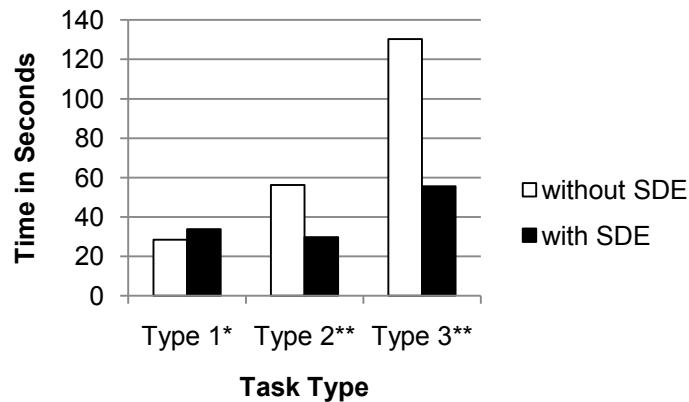


# Results: Task Processing Times

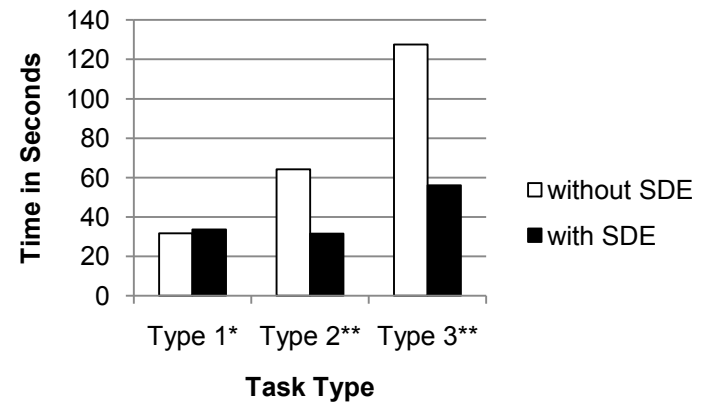
Highly significant speedup for medium and highly complex tasks

Also for sub group of non expert users

All users



Non experts only



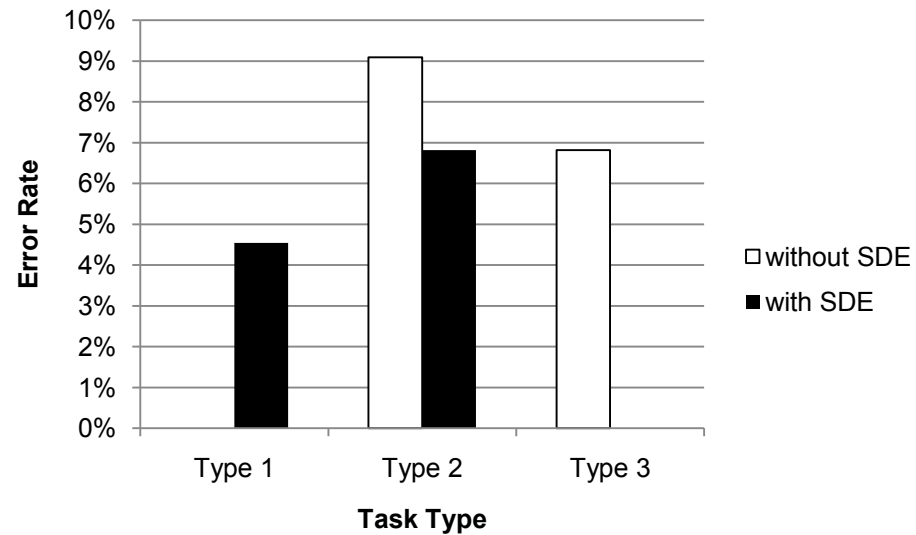
\*  $p < 0.05$ ; \*\*  $p < 0.01$

# Results: Error Rate

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**Insignificant results**

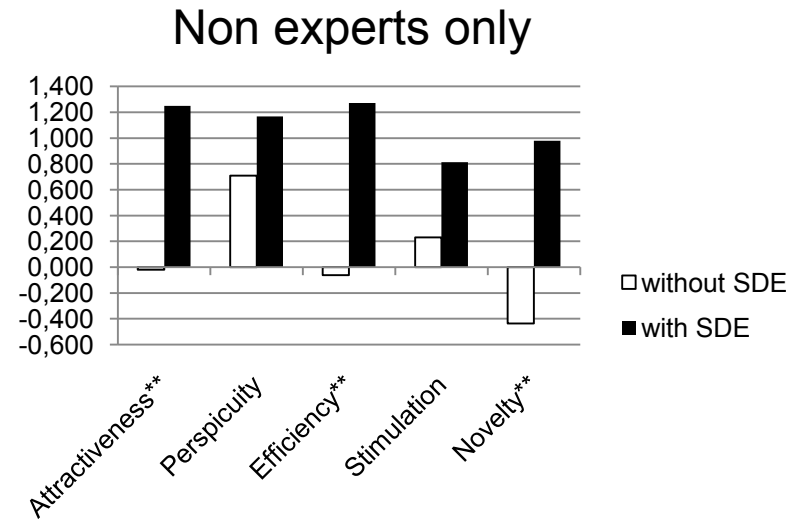
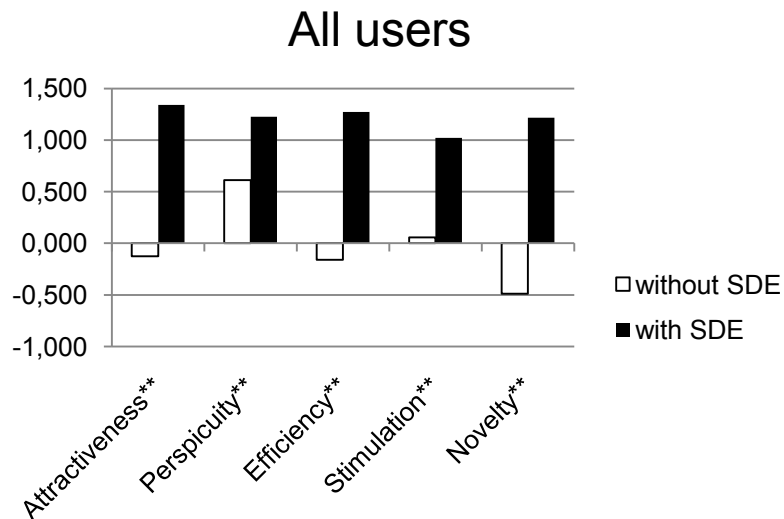
**Low overall error rate**



# Results: User Satisfaction

Highly significant improvements on all five criteria

...on three criteria for sub group of non expert users



\*  $p < 0.05$ ; \*\*  $p < 0.01$



# Conclusion

# Conclusion

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**Hybrid visualization useful**

**also for non-expert users**

**Many possible improvements, but even...**

**“A little visualization can go a long way.”**



# Thank You!

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