

# EIT Workshop, Berlin

**(1) Mediation through Explanations in Dialogue Systems**

**(2) Multimodal Interaction in (Mobile) Industry Environments**

**Daniel Sonntag (DFKI)**

15/12/2010



Supported by



Federal Ministry of Economics and Technology

» Advent of structured databases in Semantic Web  
RDF structures and respective query languages

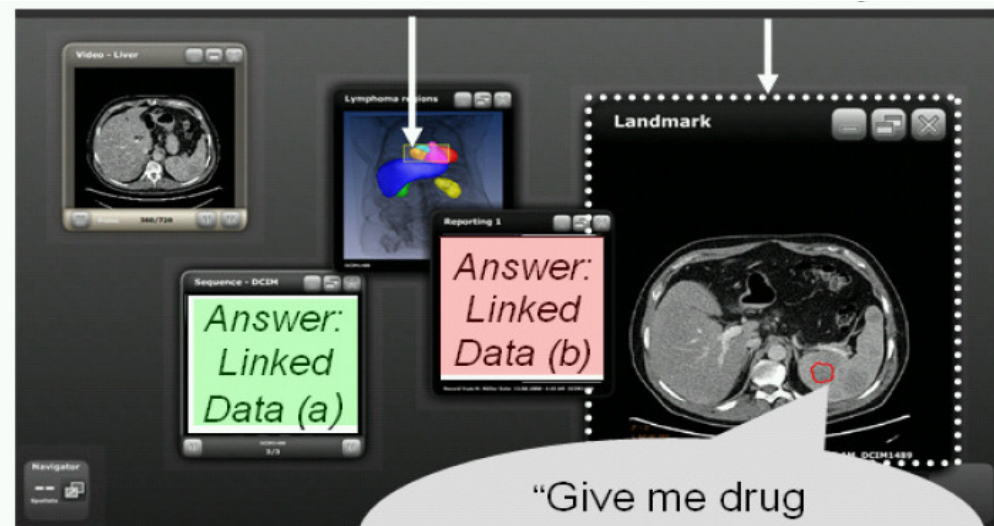
e.g., SPARQL, RDCQ

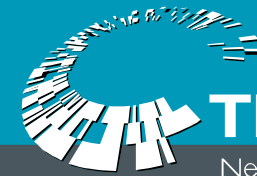
» These languages are  
patterns, which can  
operators such as “

» For the next generation  
interaction systems  
during data retrieval  
a major role.

» In order to implement  
efficient reasoning  
non-schematic RDF  
like queries, Uncertain RDF (URDF).

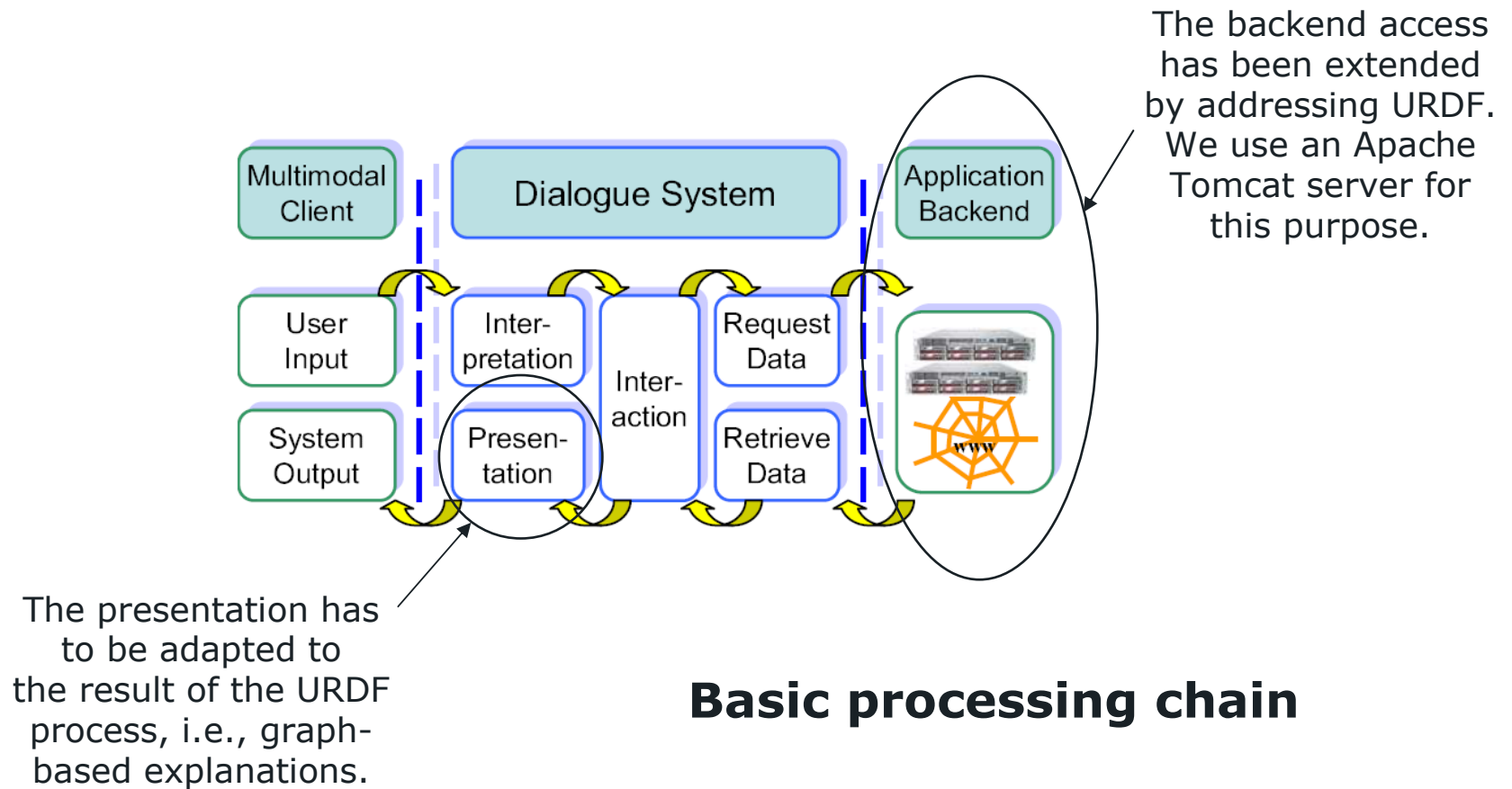
<http://www.dfki.de/RadSpeech/>





# Dialogue System Framework

# Core Answering Workflow



# Yago and Info Boxes

**Nicolas Sarkozy**



**Born** 28 January 1955 (age 55)  
Paris, France

**Political party** Union for a Popular Movement (2002–present)

**Other political affiliations** Rally for the Republic (1976–2002)

**Spouse(s)** **Marie-Dominique Culioli** (1982–1996)  
**Cécilia Ciganer-Albéniz** (1996–2007)  
**Carla Bruni-Sarkozy** (2008–present)

**Children** **Pierre Sarkozy** (by Culioli)  
**Jean Sarkozy** (by Culioli)  
**Louis Sarkozy** (by Ciganer-Albéniz)

**Residence** **Élysée Palace**

**Alma mater** Paris X University Nanterre

**Profession** Lawyer

**Religion** Roman Catholicism

**Cécilia Attias**


**First Lady of France**

**In office** 16 May 2007 – 10 October 2007

**Preceded by** **Bernadette Chirac**

**Succeeded by** **Carla Bruni**

**Carla Bruni-Sarkozy**<sup>[1]</sup>



**Wife of the F**

**Incumbent**

**Assumed office** 2 February 2008

**President** **Nicolas Sarkozy**

**Preceded by** **Cécilia Ciganer-Albéniz**

**Born** 23 December 1967 (age 42)  
Turin, Italy

**Birth name** Carla Gilberta Bruni Tedeschi


**Nationality** Italian, French<sup>[1]</sup>

**Spouse(s)** **Nicolas Sarkozy**

**Children** Aurélien Enthoven (with Raphaël Enthoven)

**Charles**

*Prince of Wales; Duke of Rothesay (more)*



**Spouse** **Lady Diana Spencer**


Charles Philip Arthur George

**House** Maternal: House of Windsor  
Paternal: House of Schleswig-Holstein-Sonderburg-Glücksburg

**Father** **Prince Philip, Duke of Edinburgh**

**Mother** **Elizabeth II**


**Born** 14 November 1948 (age 61)  
Buckingham Palace, London

**Signature** 

**Religion** *Christian (Church of England)*

**Diana**

*Princess of Wales; Duchess of Rothesay*



**Spouse** **John Spencer, 8th Earl Spencer**

Prince Henry of Wales


**Full name** **Diana Frances Spencer**<sup>[N 1]</sup>

**House** House of Windsor

**Father** **John Spencer, 8th Earl Spencer**


**Mother** **Frances Shand Kydd**

**Born** 1 July 1961  
Park House, Sandringham, Norfolk


**Died** 31 August 1997 (a   
**Pitié-Salpêtrière Ho**

**Burial** **Althorp, Northampton**

**Madonna**



**Guy Ritchie**




Guy Ritchie, September 2008

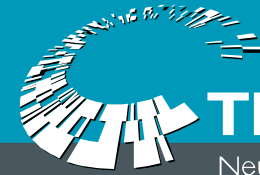
**Born** **Guy Stuart Ritchie**  
10 September 1968 (age 41)  
Hatfield, Hertfordshire, England

**Occupation** **Filmmaker, Screenwriter**

**Years** 1995–present

 **max planck institut informatik**

**IE error-prone and inherently noisy**



# Example Dialogue

» The dialogue concentrates around the questions

about  
about  
of an

» 1 U

» 2 S

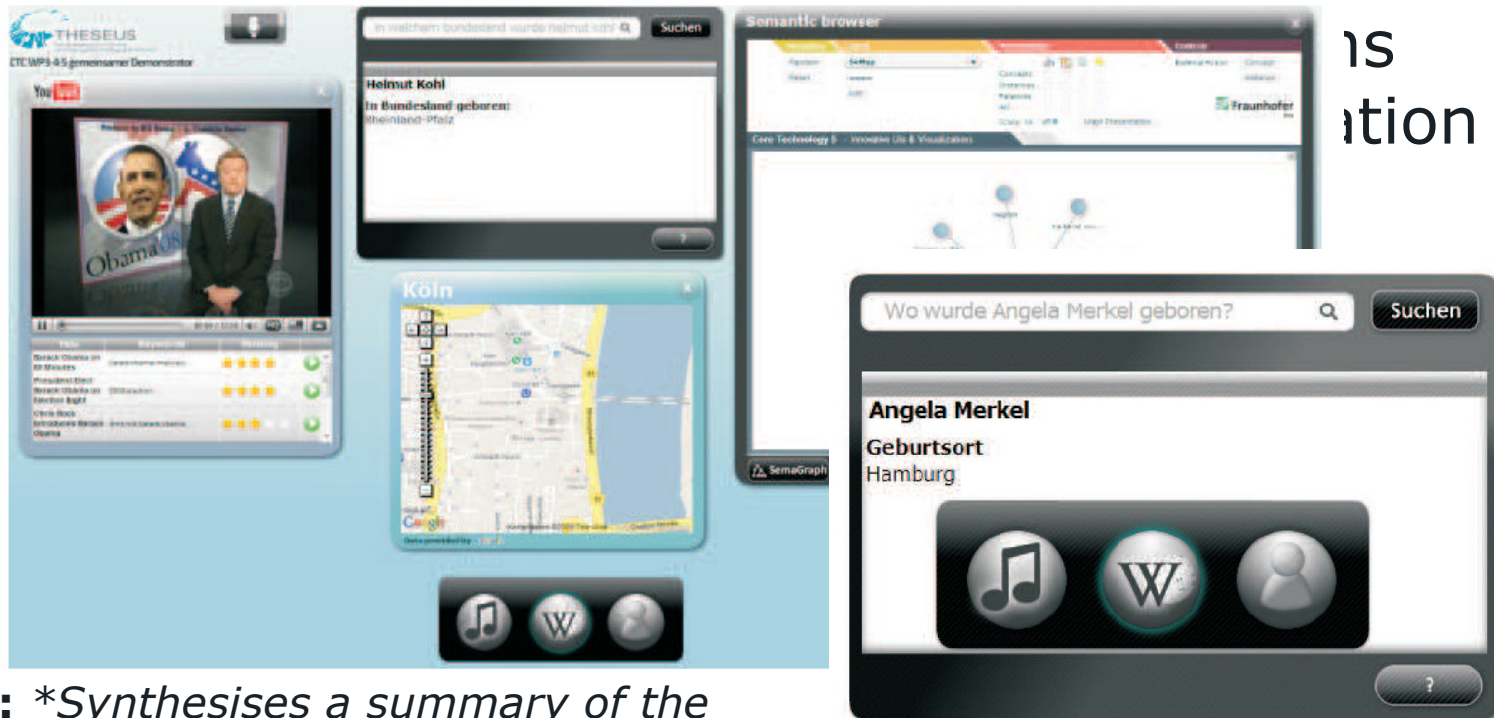
» 3 U

» 4 S

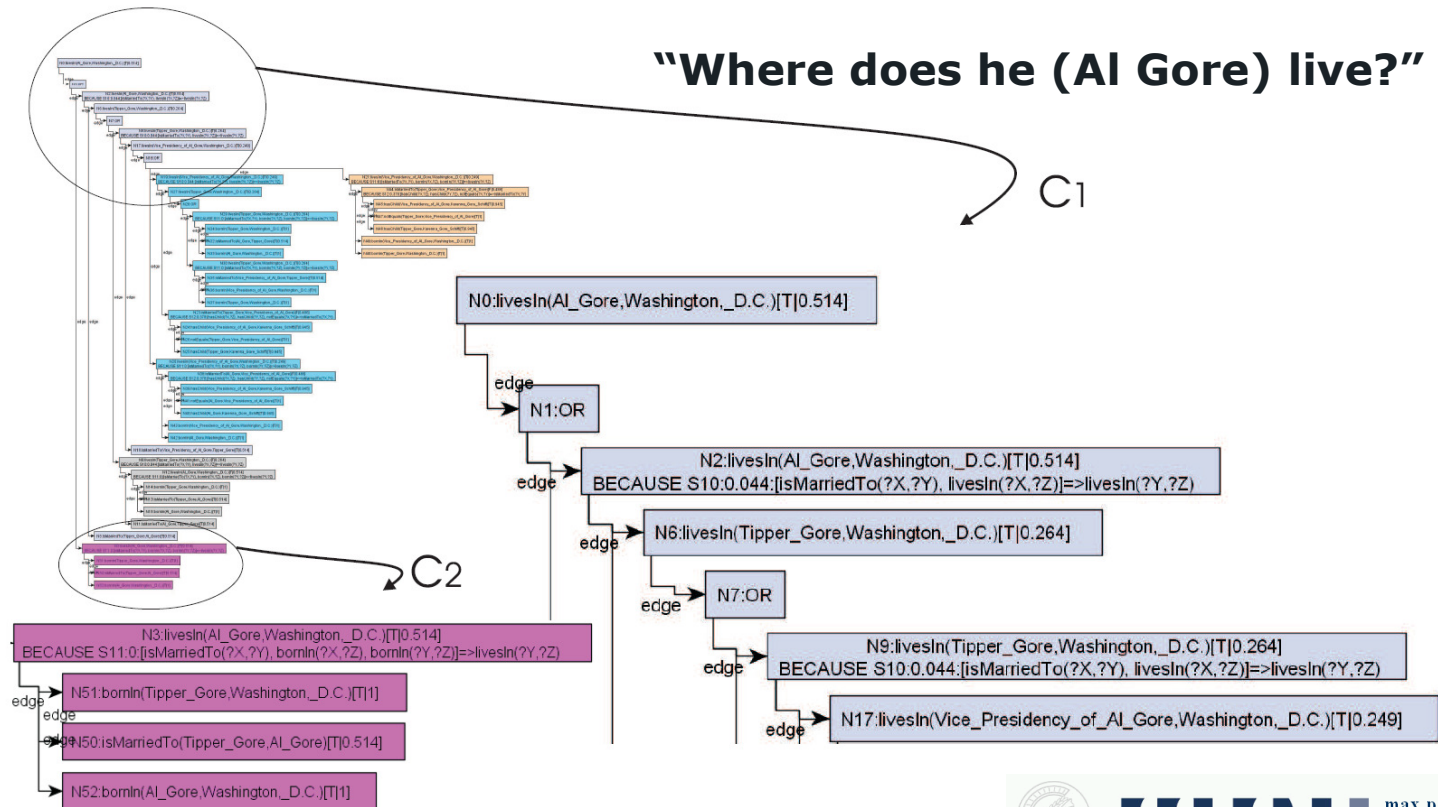
» 5 U

» 6 S

» 7 S: *\*Synthesises a summary of the graph's interpretation.\**



# Complex Explanation Graph

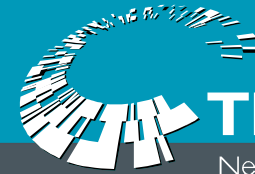


$$C_1 : \text{ livesIn}(a,b) \leftarrow \text{ marriedTo}(a,c) \wedge \text{ livesIn}(c,b)$$

$$C_2 : \text{ livesIn}(a,b) \leftarrow \text{ marriedTo}(a,c) \wedge \text{ bornIn}(a,b) \wedge \text{ bornIn}(c,b)$$

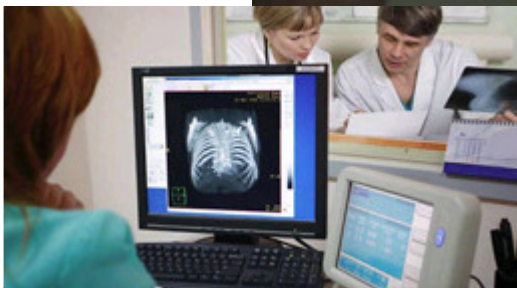
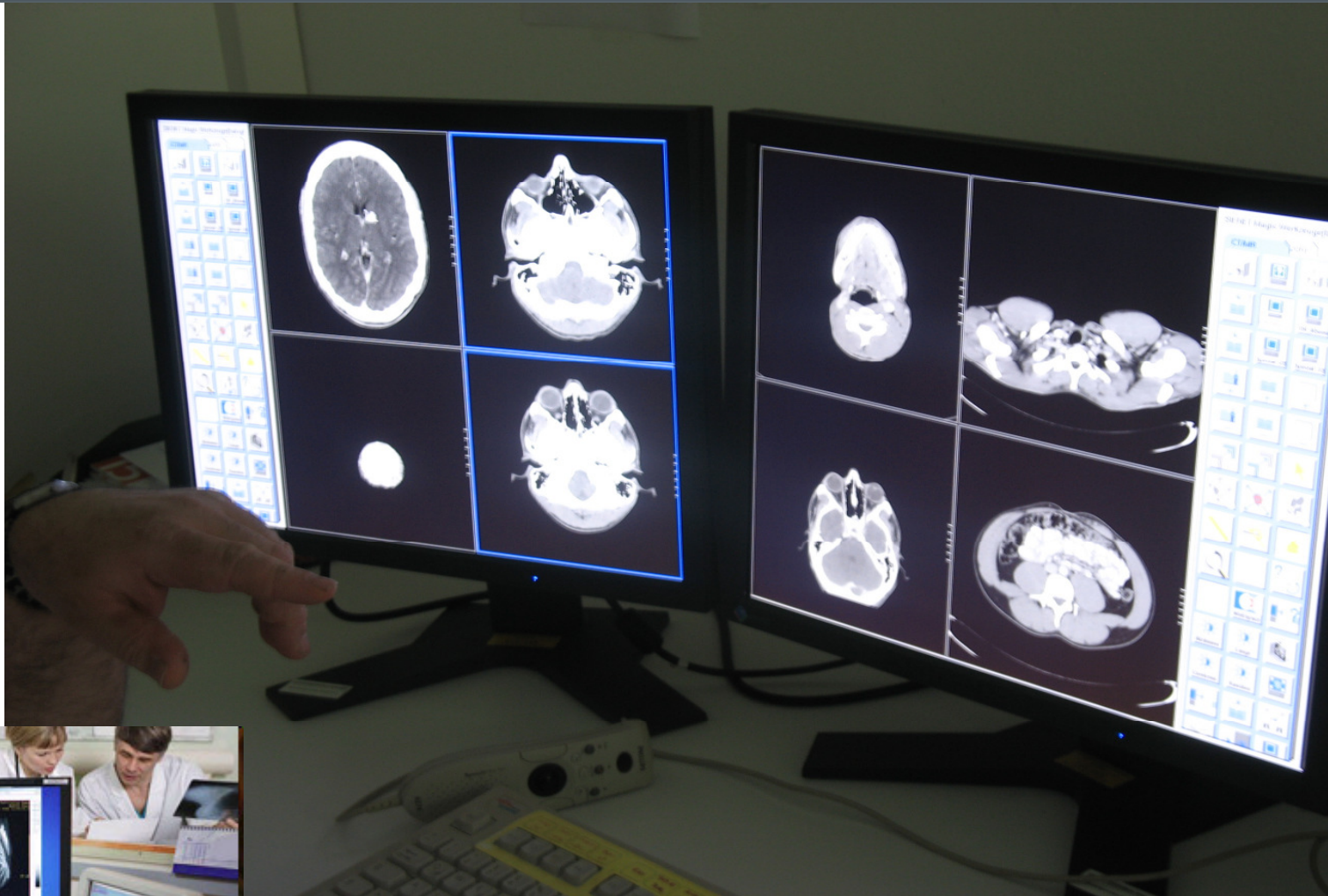


# Image Analysis in Biomedicine **MEDICO**



**THESEUS**

Neue Technologien für das  
Internet der Dienste



Retrieval and examination of 2D picture series

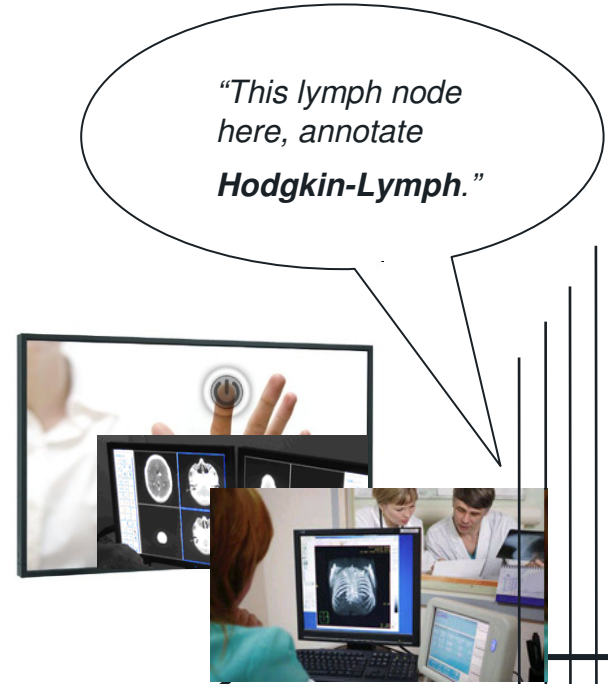
# Radiology Environment



Neue Technologien für das Internet der Dienste

**Desktop <->**

*Touchscreen,  
Speech  
and Multimodality*

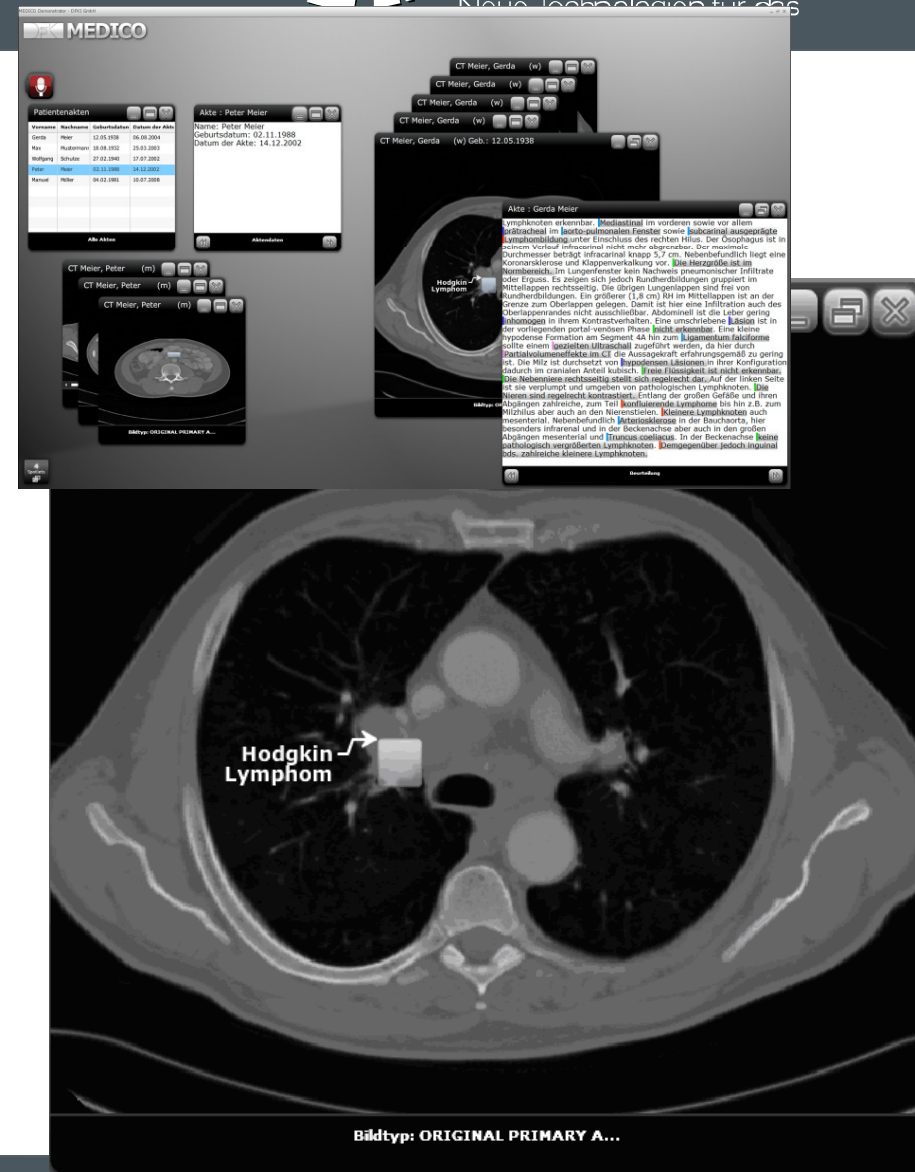


*CT/MR Imaging  
Center*

# Speech Dialogue Evaluation



- » The dialogue-based annotation can be done at a rate of approx. 6 annotations per minute (including the visual feedback phase) whereas the desktop-based annotation comes to a rate of approx. 3 annotations per minute.
- » Most importantly, the prototype dialogue system delivers semantic annotations which are unavailable in the current clinical finding process at the partner hospitals and the radiologist can directly detect errors visually.

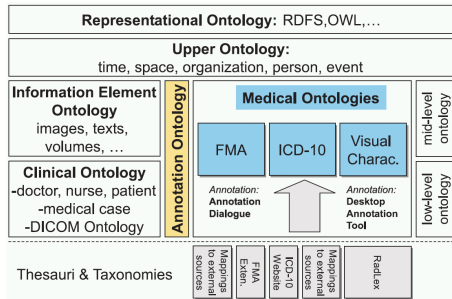




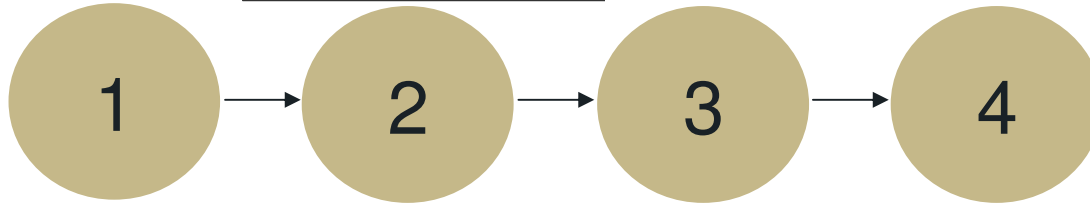
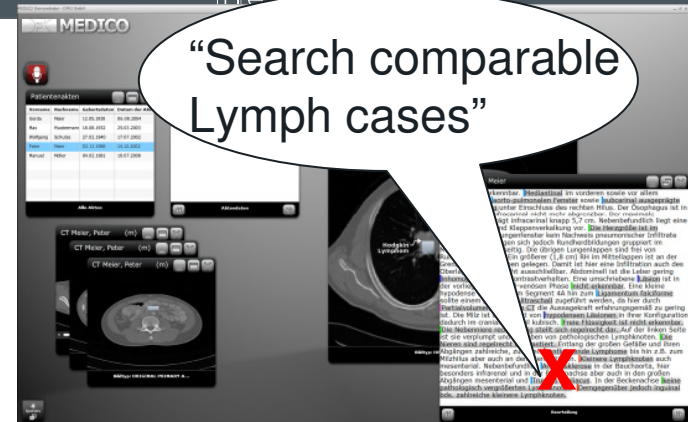
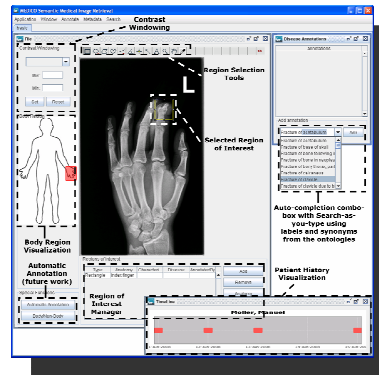
# Incremental Knowledge Acquisition THESEUS

Neue Technologien für das Internet

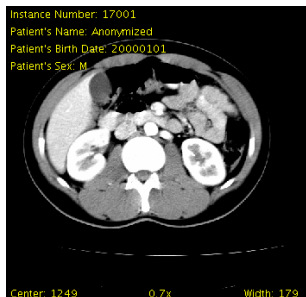
## Structured/Structural Knowledge



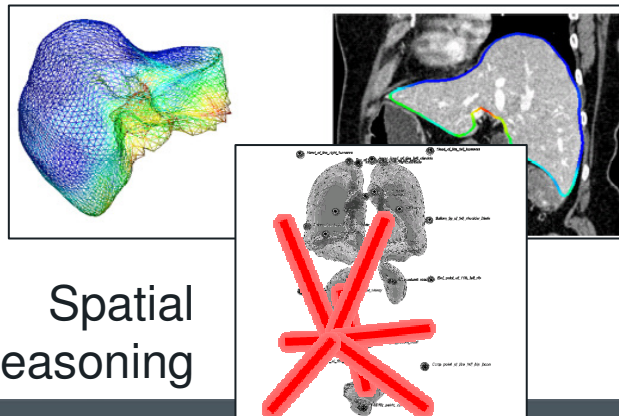
## Desktop Annotation



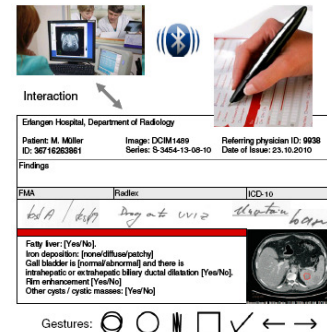
## Dicom

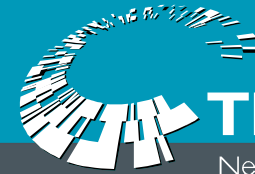


## Automatic Image recognition



## Spatial reasoning



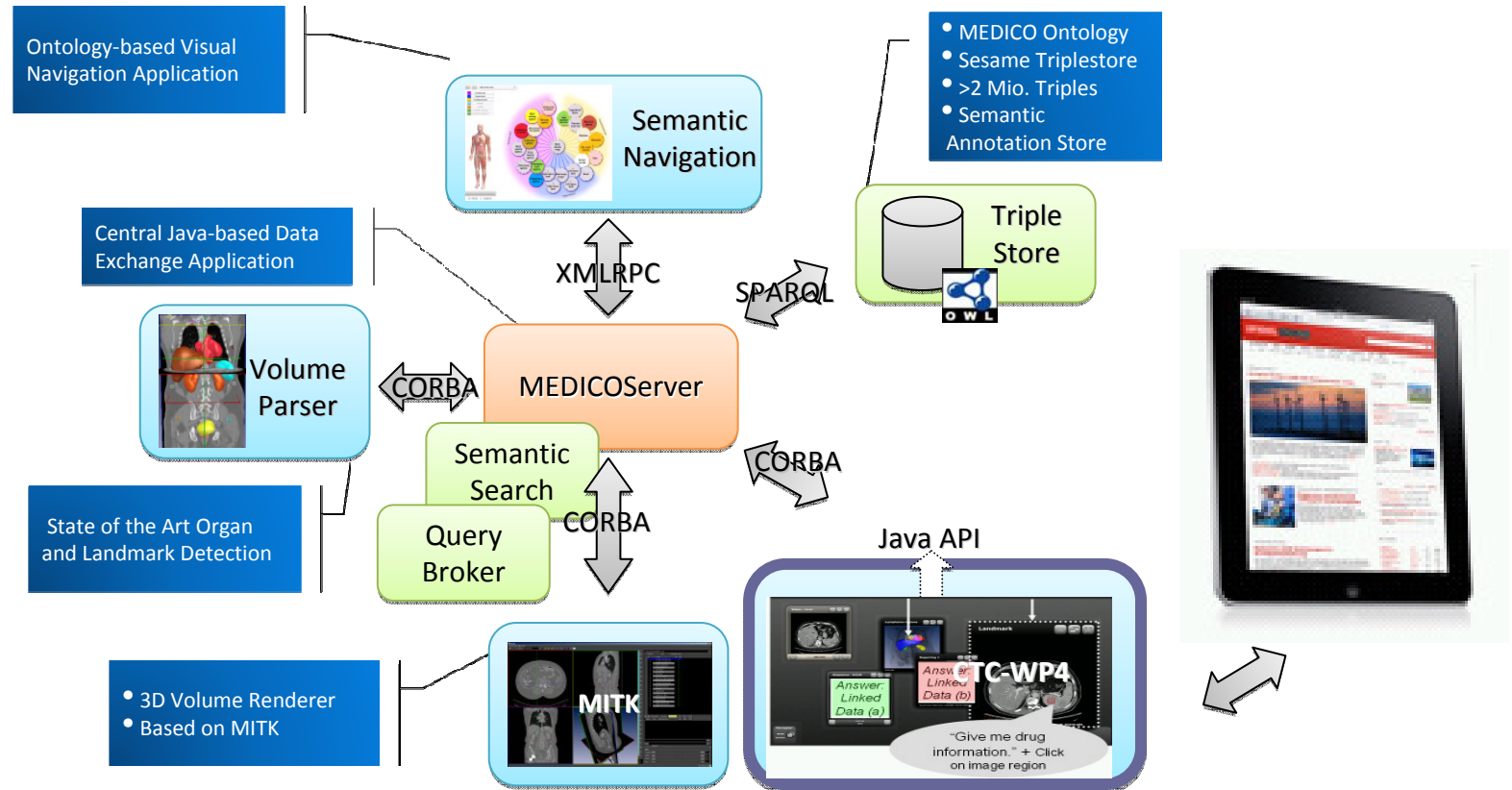


Information extraction is key for  
information mediation.

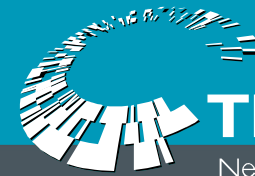
Multimodality is seamless  
interaction with heterogeneous  
interfaces.

E.g., 3D to 2D slices and  
annotations.

# Neue MEDICO Architektur

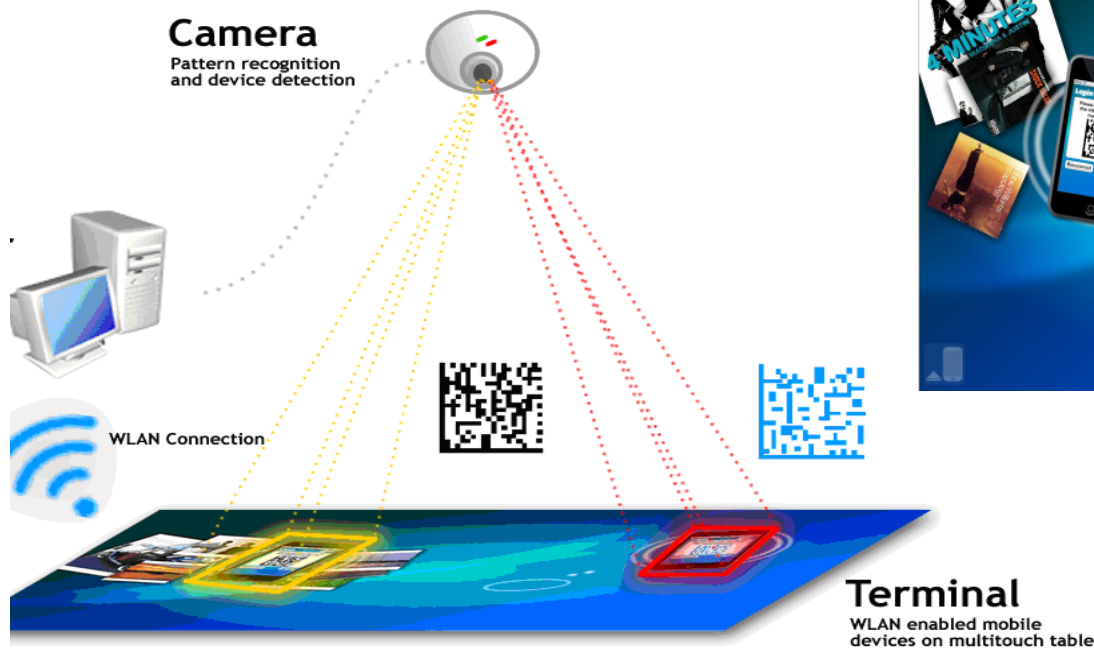


# COMET. Combined Scenario, Recognition of Devices and Media Exchange



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Neue Technologien für das  
Internet der Dienste



Data Matrix Barcode software