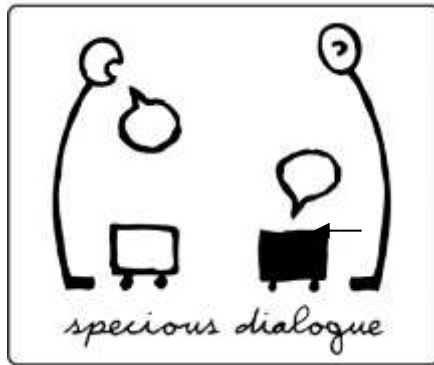


Digitale Welt und digitale Assistenz



Who was world champion in 1990 ?



“Search for more songs of this artist.”



Bitkom-Akademie
17/10/2013
Daniel Sonntag,
DFKI

Who was world champion in 1990 ?

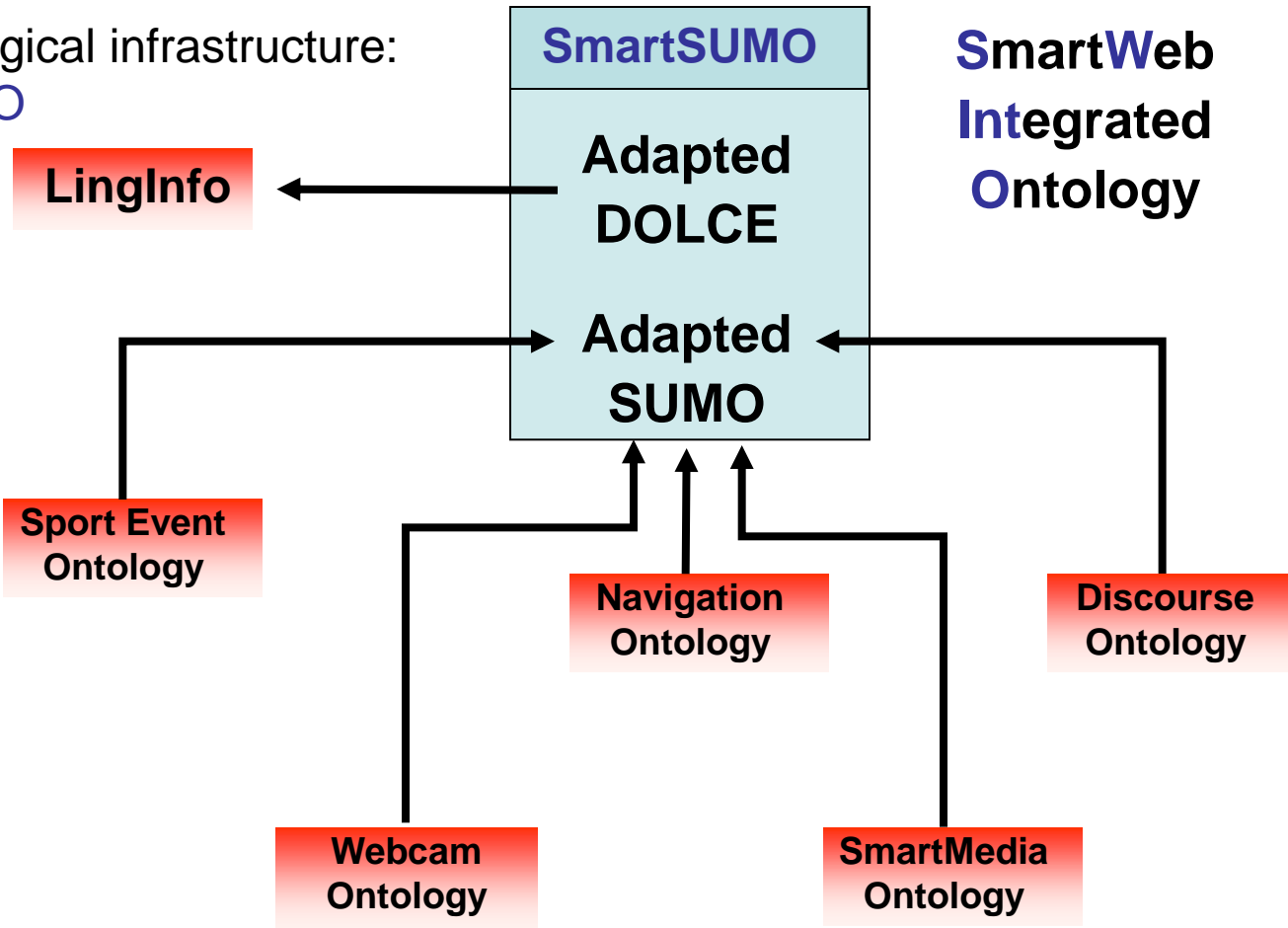
Anno 2007



Question Answering Functionality

Ontologies

Ontological infrastructure:
SWIntO





Siri Patent

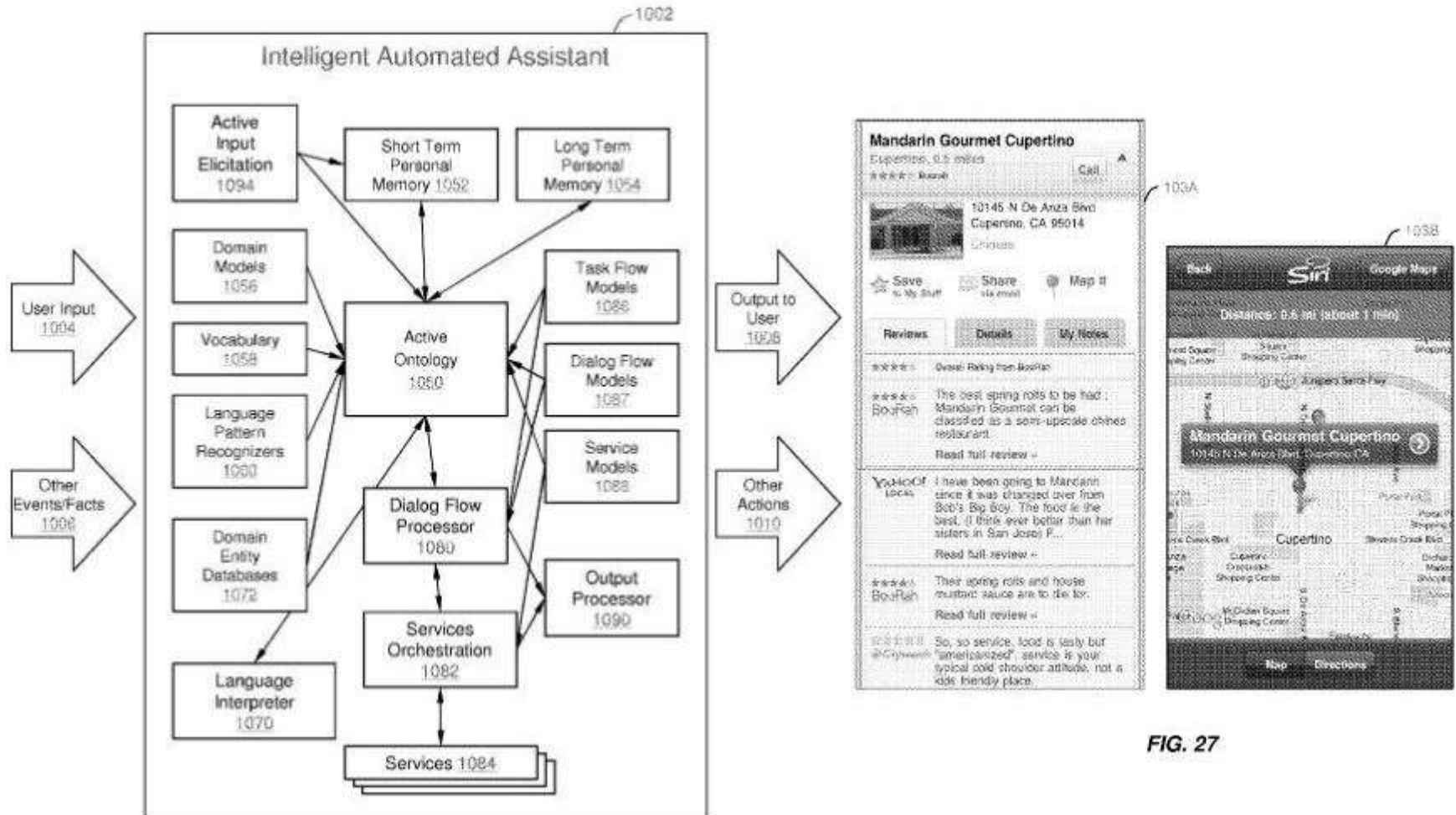
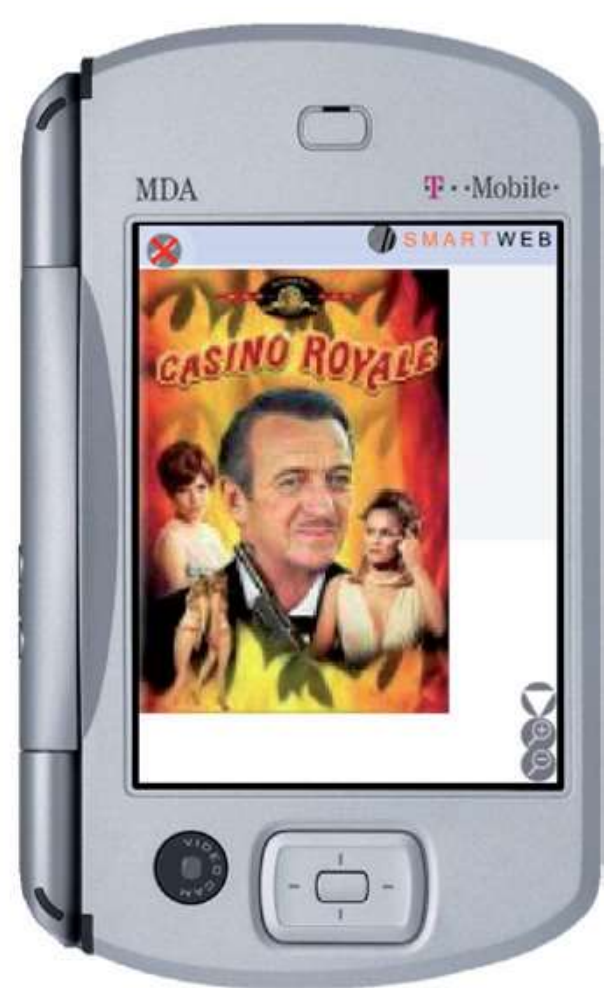


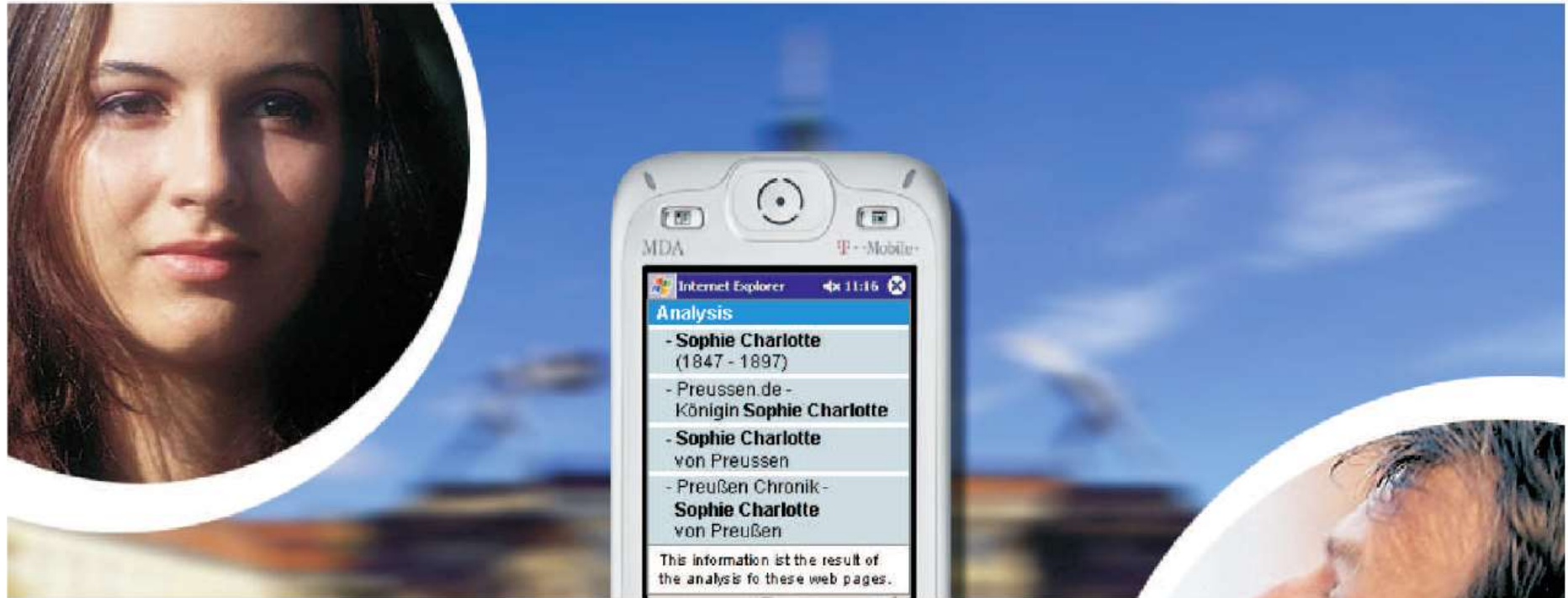
FIG. 27



2006 WM Demonstrator

Detect and communicate uncertainties in the results.

Provide processing feedback and explanations.



U: "Now I would like to know who built Castle Charlottenburg."

S: "It's not in my knowledge base. I will search the Internet for a suitable answer. Empty results are not expected, but the results won't be entirely certain." (600 ms)

S: "I think it was built by Johann Nehring and Martin Grünberg." (10000 ms)

Upon request, SmartWeb reveals its sources of information.





Thumb Design Study

2006

„Annotate, here, with Hodgkin-Lymphoma“

2012

A native iPhone implementation for the medical imaging domain is also available!

Our mobile thumb interaction approach tries to make use of a touchscreen based thumb interface for result exploration.

Take screen-based smartphones as a basis and add new, gesture-based antiprocentric interaction forms to it.

A potential speech-based interaction can then be smoothly integrated.

We implemented the thumb interface with Adobe Flash technology.

The thumb gestures can be easily tracked with customized Actionscript 3 events such as Thumb-Down-Event, Thumb-Eng-Press-Event, Thumb-Slide-Down-Event, etc.) and interpreted by the display manager which also handles the events when the user's thumb is dragged over a certain screen element (e.g., an icon).

We believe that new opportunities in mobile dialogue environments can emerge rapidly when combining speech input with this only recently utilized result exploration paradigm without small keyboards or digitizing pens.



RadComet



DigitalPen



RadSpeech



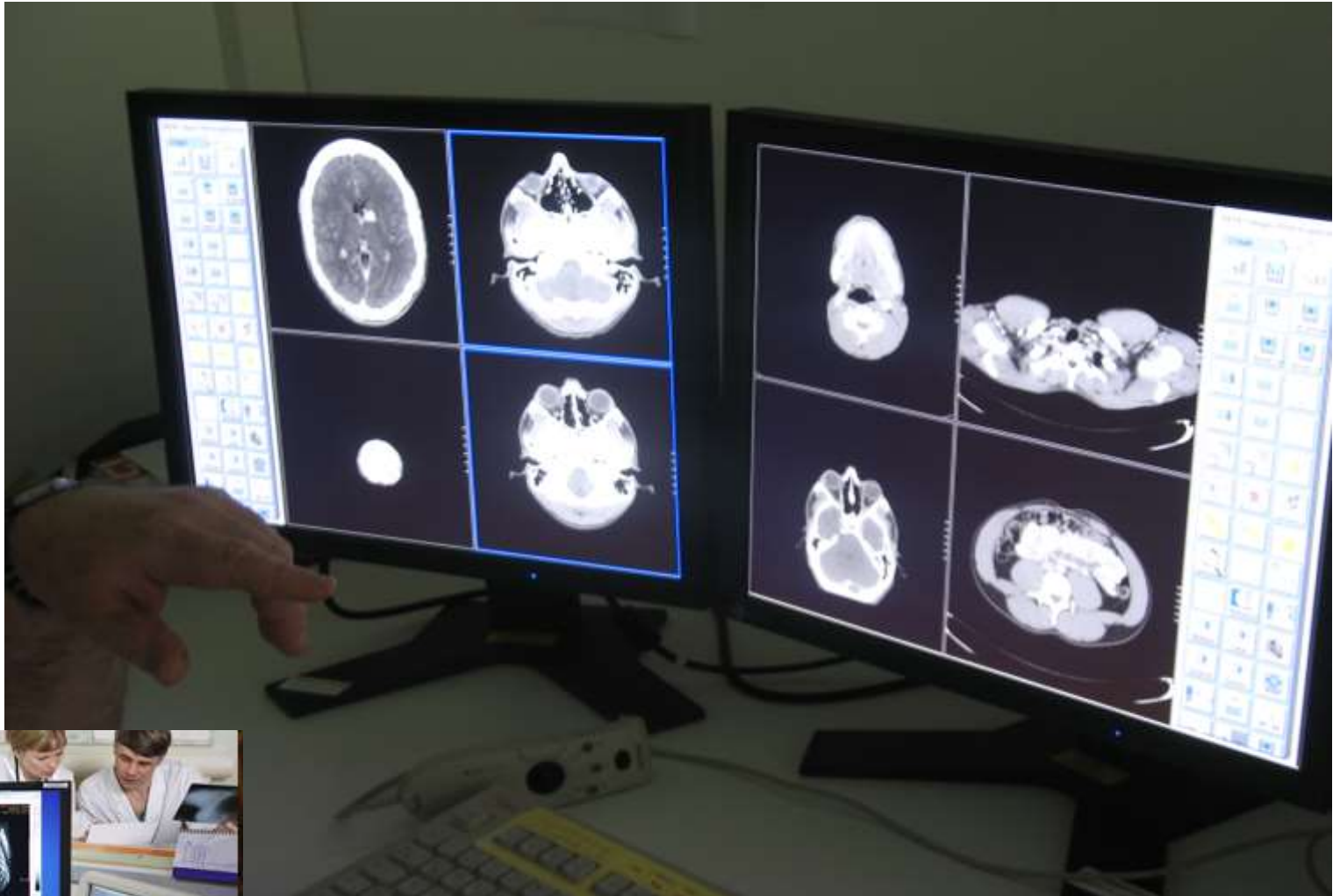
ERglasses



MediVa

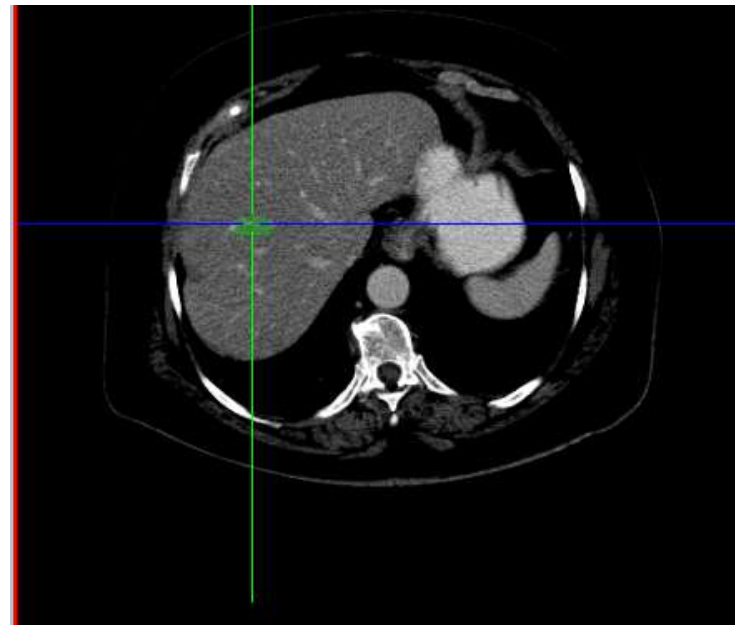
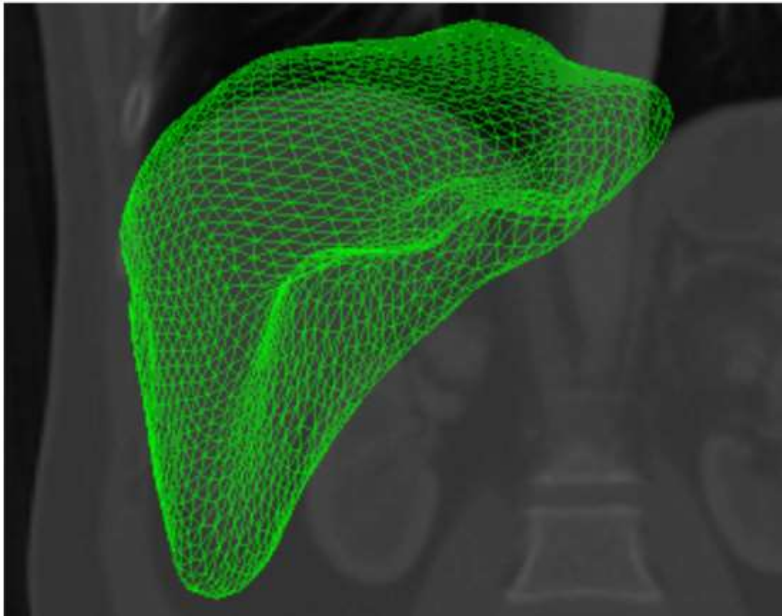


SmartPen



Retrieval and examination of 2D/3D image series

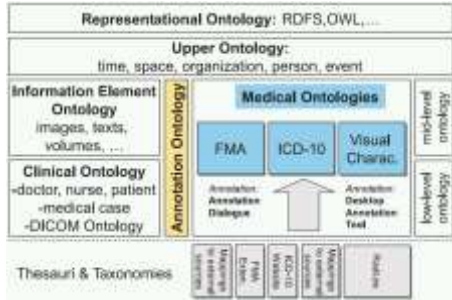
Semantic Annotation and Search of Similar Lesions



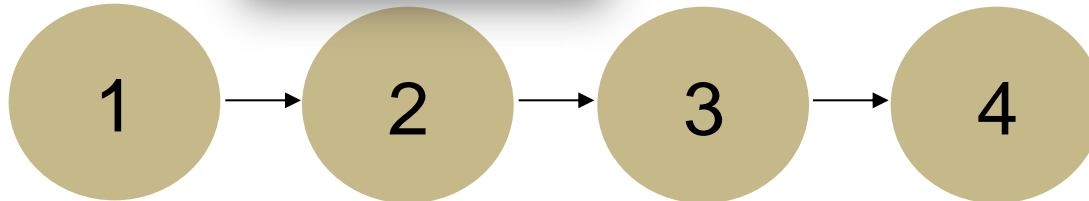
Incremental Knowledge Acquisition

Structured/Structural Knowledge

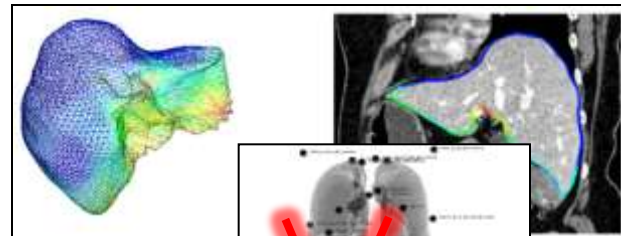
Desktop Annotation



Dicom



Automatic Image recognition



Spatial reasoning



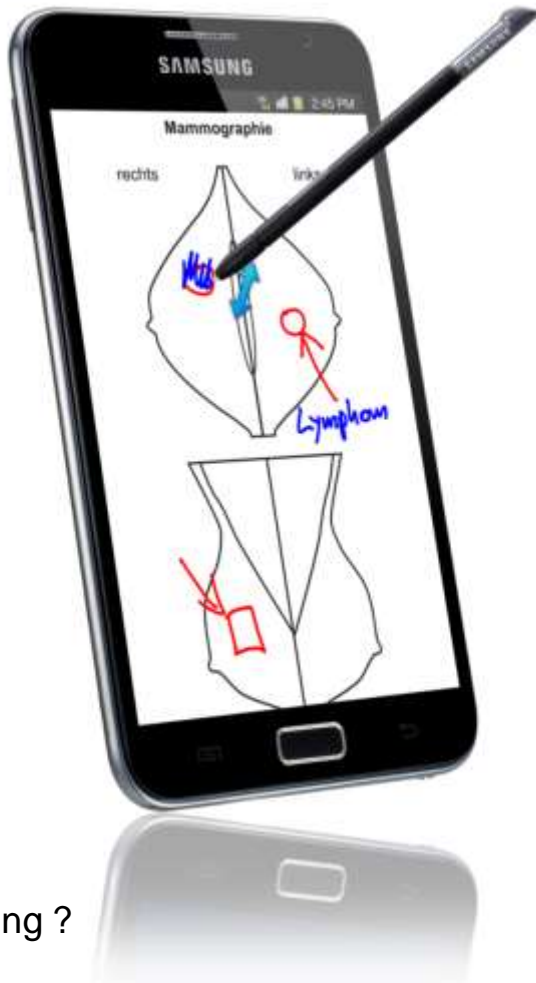
German High Tech Award 2011



- Make dialogue-based radiology image reporting possible
- Reduce turn-over times and annotation errors
- Facilitate structured reporting

With the iPad's FDA approval, a breakthrough for mobile medical imaging, especially in the U.S., can be expected. With RadSpeech, we aim to build the next generation of intelligent, scalable, and user-friendly mobile semantic search and image annotation interfaces for the medical imaging domain.

Usability and Active User Input



Mobile Learning ?

Größe: 6 6 Verkalzung: Spezialfille: Lokalisation (cm v. Mamille / h): *Øsuspekt Herdbefund*

Dichtetyp: I: lipomatos II: *Ø* kroglandulär III: inhomogen dicht IV: extrem dicht

Mammographie

Herdbefund: Form: rund / oval / lobulär / irregulär; Begrenzung: glatt / mikrolobuliert / überlagert / unscharf / spikiert; Strahlendichte: hyper- / iso- / hypodens / fettäquivalent; Größe in cm: *Ø*

Verkalzung: gutartig: Haut- / Gefäß- / Popcornkalk; dystrophisch: mittelgrad. suspekt: amorph / granulär; hochsuspekt: fein pleomorph / fein linear / -verästelt; Verteilungsmuster: diffus / segmental / regional / linear / gruppiert

Architekturströrung: Spezialfille: Lokalisation (cm v. Mamille / h):

Herdbefund: Form: rund / oval / lobulär / irregulär; Begrenzung: glatt / mikrolobuliert / überlagert / unscharf / spikiert; Strahlendichte: hyper- / iso- / hypodens / fettäquivalent; Größe in cm: *Ø*

Verkalzung: gutartig: Haut- / Gefäß- / Popcornkalk; dystrophisch: mittelgrad. suspekt: amorph / granulär; hochsuspekt: fein pleomorph / fein linear / -verästelt; Verteilungsmuster: diffus / segmental / regional / linear / gruppiert

Architekturströrung: Spezialfille: Lokalisation (cm v. Mamille / h):

BI-RADS*

0 1 2 3 4 5 6

0 1 2 3 4 5 6

Im Vgl. zu: *01/02/2010*

Beurteilung: BI-RADS* rechts 0 1 *2* 3 4 5 6

BI-RADS* links 0 1 *2* 3 4 5 6

Empfehlung: *Kontrolle in 12 Monaten*

Datum: *10.02.2014* *Seelmeier*

MI 11/2013

Digital Pen



Interaction

Erlangen Hospital, Department of Radiology

Patient: M. Müller
ID: 36716263861

Image: DCIM1489
Series: S-3454-13-08-10

Referring physician ID: 9938
Date of Issue: 23.10.2010

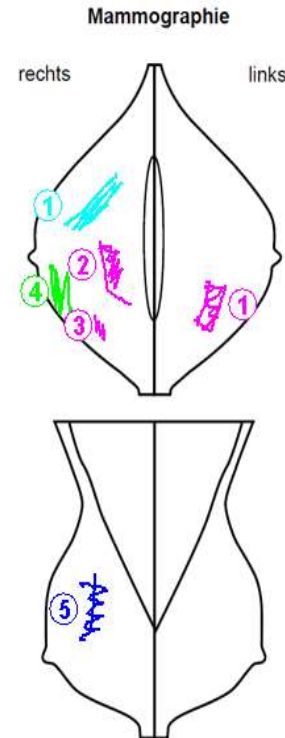
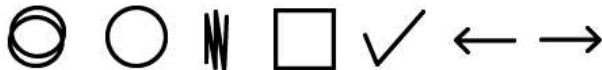
Findings

FMA	Radlex	ICD-10
<i>kd A / desky</i>	<i>Drug auf UV12</i>	<i>Ureterin karns</i>

Fatty liver: [Yes/No].
Iron deposition: [none/diffuse/patchy]
Gall bladder is [normal/abnormal] and there is
intrahepatic or extrahepatic biliary ductal dilatation [Yes/No].
Rim enhancement [Yes/No]
Other cysts / cystic masses: [Yes/No]



Gestures:



Rechts

chtetyp:
I. lipomatös
II. fibroglandulär
III. inhomogen dicht
IV. extrem dicht

erdbefund

irm: rund / oval / lobulär / irregulär
egrenzug: glatt / mikrolobuliert / überla
rahlendichte: hyper- / iso- / hypodens- / fe
öße in cm: 7,8

erkalkung

tartig: Haut- / Gefäß- / Popcornkall
astartig / rund / Eierschale

strophisch

ttelgrad. suspekt: amorph / **granulär**
chsuspekt: fein pleomorph / fein li
rteilungsmuster: diffus / **segmental** / n
chtitekturstörung:

ezialfälle:

kalisierung (cm v. Mamille / h): 2, 14

Rad:

Second annotation

Third annotation

t=0 who -

ERmed

Erweiterte Realität in der Medizin

Finalist Cebit Innovation Award 2012 (6 von 80)

Augmented Reality



Stift Annotation.



„Zeige die Resultate am Bildschirm“



ERmed - Ambientes Arbeiten (Human Asp

Ästhetik
Perzeption
Mentales Modell
Soziale Umgebung
Entscheidungsunterstützung
Multimodale Dokumentation
Entscheidungs-Feedback und
grounding)

Synchronisierte Echtzeit-Erweiterung:

Menschliche Informationsaufnahme
Menschliche Reaktionen
Entscheidungsfindung
Multimodalität
Interaktivität

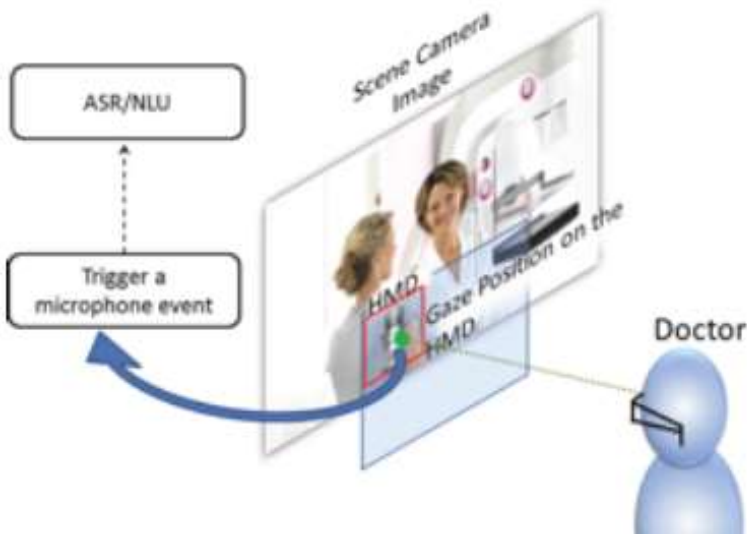
Mobile Intelligenz als Arbeitsumgebung:

Arbeitsgedächtnis und Arbeitsumgebung
Erweiterte Kognition



Cognitive Enhancement

Der Faktor Mensch ist einer von vielen Faktoren, industrielle Assistenz-Systeme zur kognitiven Verstärkung und physischen Entlastung erfolgreich in Medizinanwendungen zu integrieren.



Mobile Eye Tracker



Mobile HMD



Lessons Learned

- IUI Integration zum richtigen Zeitpunkt (Forschung-Industrie-Spannung)
- Zulassung (Approval)
- Eingebettete Intelligenz und Umgebungsintelligenz
- IUI = Digitale Welt (KI) und Digitale Assistenz (HCI)