

Introduction to the Semantic Web example applications

ITTALKS



- **ITTALKS** is a database driven web site of IT related talks at UMBC and other institutions. The database contains information on

<http://ittalks.org/>

- Seminar events
- People (speakers, hosts, users, ...)
- Places (rooms, institutions, ...)
- Web pages with DAML markup are generated
- The DAML markup supports agent-based services relating to these talks.
- Users get talk announcements based on the interests, locations and schedules.

Electric Elves: Towards an Agent Facilitated Human Organization

Milind Tambe
University of Southern California
Information Science Institute

UMBC, ECS, LHS
2:00pm - 12:00pm, Tuesday, February 20, 2001

Abstract

Past few years have seen a revolution in the field of software agents, with agents now proliferating in human organizations, helping individuals in tasks such as information gathering, activity scheduling, managing email, etc. The "Electric-Elves" effort at USC/ISI is now taking the next step: dynamic teaming of all such different heterogeneous agents, as well as proxy agents for humans to serve not just individuals, but to facilitate the functioning of entire organizations. The ultimate goal of our work is to build agent teams that assist in all organization activities, enabling organizations to act coherently, to robustly attain their mission goals and to react swiftly to crises. The results of this work could potentially be relevant to all organizations, including the military, corporations, and universities and research institutions. As a step towards this goal, we have had an agent team of about 15-20 agents, including 10 proxies (for 10 people) running 24/7 for the past four months at USC/ISI. The proxies communicate with us using different types of mobile wireless devices, and attempt to track our locations using wireless GPS transmissions. These agents assist us in several tasks: they track people's locations, reschedule meetings, decide presenters for research meetings (by auctioning research talk slots), and even order our lunch and dinner. In this talk, I will outline some of the lessons we have learned over the past several months in running this agent system. I will also outline our approach on some of the key research challenges, including agents' adjustable autonomy.

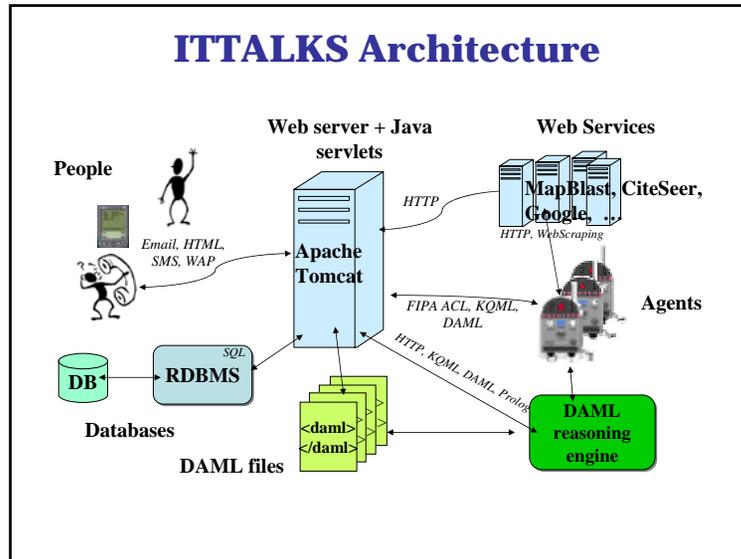
Biosketch

Dr. Milind tambe is a project leader at the University of Southern California Information Sciences



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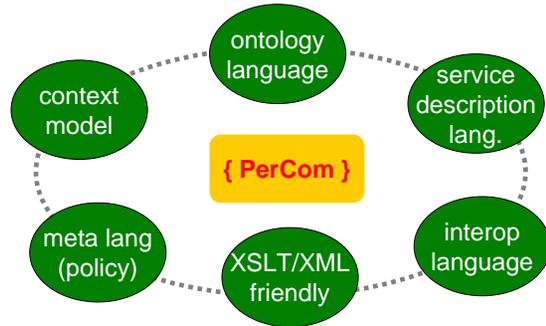
http://ebiquity.umbc.edu/

- Our research group's web site generate both HTML and OWL.
- HOW?** This is relatively easy since the content is in a database.
- PHP is sufficient for the job.
- HTML pages have links to corresponding OWL
- WHY?** This exposes the information to programs and agents – no more web scraping.

The screenshot shows the ebiquity website with the following navigation links: ABOUT US, RESEARCH, PEOPLE, PUBLICATIONS, NEWS, PHOTOS, EVENTS, CONFERENCES, INTER. Below the navigation is a search bar and a list of links: About Us, Research, People, Publications, News, Photos, Events / Talks / Meetings, Conferences / Call for Papers, RSS Feeds, and Blog.

Mobile & Pervasive Computing Uses

How does OWL Help?



OWL provided a uniformed language which met many needs in developing a complex pervasive computing system.

OWL as an Ontology Language

- Key Benefits
 - Helps to separate the task of knowledge engineering and system engineering
 - Helps to define “semantic” specifications for applications that exploit KR and reasoning
 - Opens the door to the Semantic Web for mobile and pervasive computing applications
 - Gaining access to a vast amount of information on the Web
 - Applications will be less restricted by their sensing capability



OWL as a Service Description Lang.

- Key benefits
 - Enables **semantic** service discovery and matching
 - Expressing more detailed and more precise service description
 - Provides a means for ubiquitous service composition
 - Allows intelligent applications to have fine-grain control over system execution
 - E.g. is it economic to print using a close by printer?
 - E.g. is it polite to display my email using the room’s project?



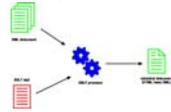
OWL as a Language for Interoperability



- Key benefits
 - Encourages independently developed systems to interoperate
 - A standard language backed up the W3C
 - Industrial organizations tend to follow W3C standards
 - Amateurs tend to develop programs based on W3C standards
 - Enables knowledge sharing and reasoning
 - APIs for processing RDF/XML -- the normative exchange syntax of OWL -- are widely available and suitable for building commercial strength applications
 - OWL has well defined language semantics for building OWL reasoners. A few number of OWL reasoners are now available.
 - Provides standard constructs for ontology mapping
 - Multiple ontologies will likely to exist in a shared PerCom space
 - Ontology mapping can help apps. that adopt different ontologies to interoperate

OWL is XSLT/XML Friendly

- Key benefits
 - Information expressed in OWL can be transformed into other languages for external processing
 - OWL => Prolog rules or Jess rules
 - OWL => XHTML
 - OWL => PHP, JavaScript
 - Maximizes the reusability of the knowledge that is encoded in OWL
 - Not all useful tools and applications can process OWL
 - Not all XML developers are willing to switch to OWL
 - Not all users think OWL (esp. in RDF/XML) is easily readable



OWL as a Meta Language

- Key benefits
 - Helps to define new languages to control the high level behavior of a complex system (e.g. policy languages)
 - It's inflexible to adjust the dynamic behavior of a complex system by writing low level code
 - Using meta languages, users can change system behavior without needing to change the low-level system implementation
 - Meta languages (e.g. policy) defined using OWL can be used to work with other knowledge that is expressed in OWL
 - Security -- define policy to control actions that are expressed in OWL
 - Privacy protection -- define policy to protect user private information that are expressed in OWL

OWL for Defining Context Model

- Key benefits
 - Helps to overcome semantic ambiguities in representing contexts using programming languages
 - Java representations of contextual knowledge has limited expressiveness
 - OWL representations have well defined semantics
 - Encourages the reuse of previously defined context model
 - Generic context models (e.g., time, space, actions, policy) can shared and reused by different context-aware systems
 - Tools (e.g., reasoners, APIs) associated with these generic context models often can also be used by different system implementations



Ontology-Driven PerCom Systems

How Different Systems Use Ontology					
	Context modeling	Interop. Language	Define Meta-Lang. (Policy)	Enhance service discovery	XML/XSLT Integration
myCampus (CMU)	X	X	X		X
Task Computing (Fujitsu)		X		X	
EasyMeeting (UMBC)	X	X	X		
Context Broker Architecture (UMBC)	X	X	X		

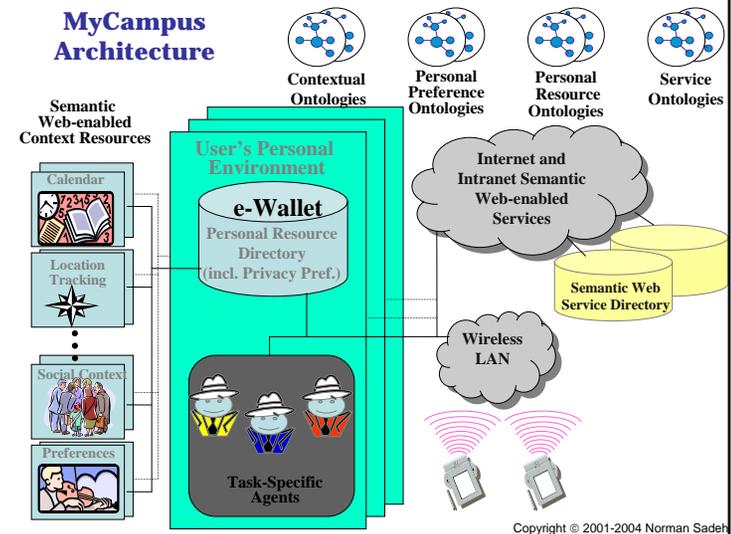
CMU MyCampus Project

- **Objective:** Enhance campus life through context-aware services accessible over the WLAN
- Ontologies
 - Personal/contextual: location, calendar, organizational etc.
 - Privacy preferences: who has access to what, "obfuscation" rules
 - Web services: automated service identification and access (OWL-S)



<http://www.cs.cmu.edu/~sadeh/mycampus.htm#Video>

MyCampus Architecture



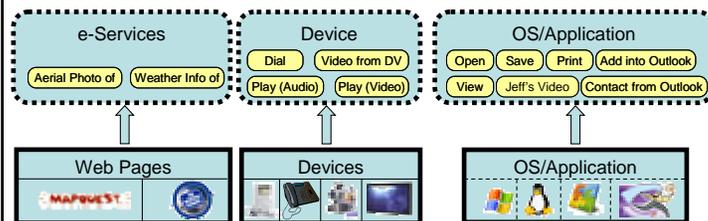
Fujitsu Task Computing

<http://www.taskcomputing.org/>

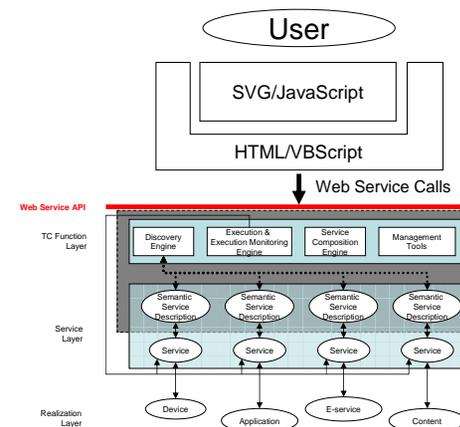
- **Objective:** Make computing available throughout the physical environment while it is effectively invisible to the users



Play Jeff's Video
Dial Contact from Outlook
Weather Info of FLA, CP
...

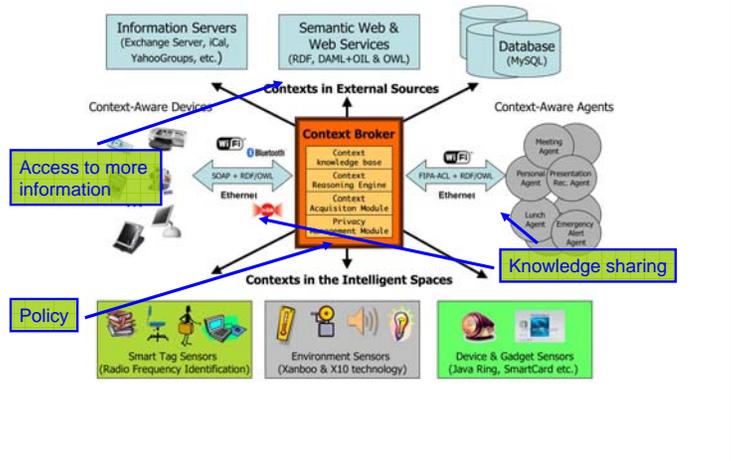


STEER-SIS for Web Services

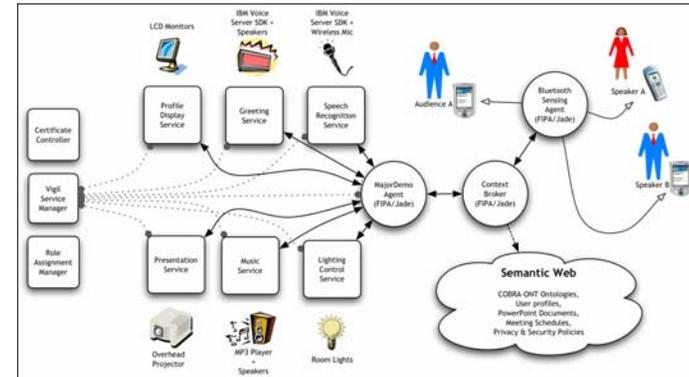


The Context Broker Architecture

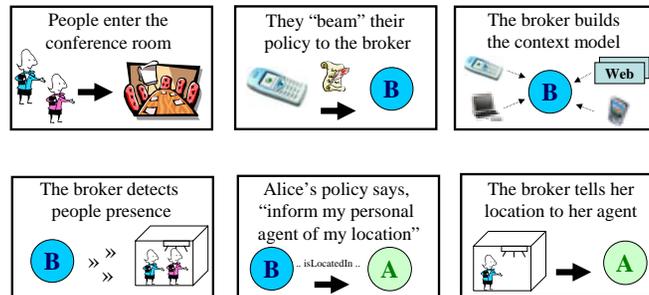
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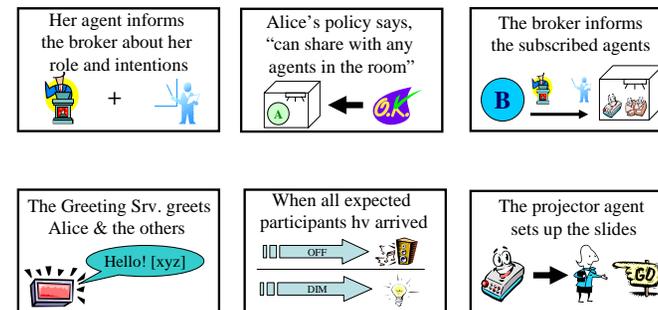
The EasyMeeting System



An EasyMeeting Scenario



An EasyMeeting Scenario



The SOUPA Ontology

