The e-lite Research Group

e-Learning, e-Intelligence, e-Interaction

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Dip. Automatica e Informatica
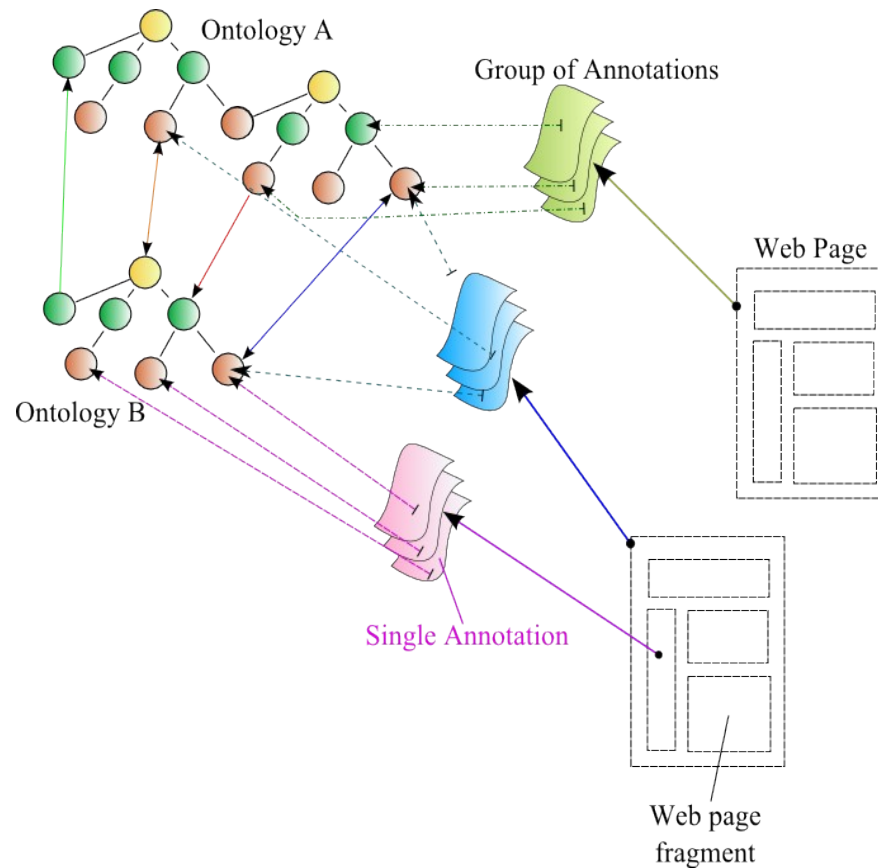
e-lite Research Group http://elite.polito.it

The Research Group

- Dipartimento di Automatica e Informatica, Politecnico di Torino
- Active since 2002
- Mission: "smart" solutions to improve web-based systems and technologies

- Research topics
  - Semantic Web
  - Ambient Intelligence
  - Accessibility
  - Eye-tracking
  - e-Learning
  - Service-Oriented Architectures
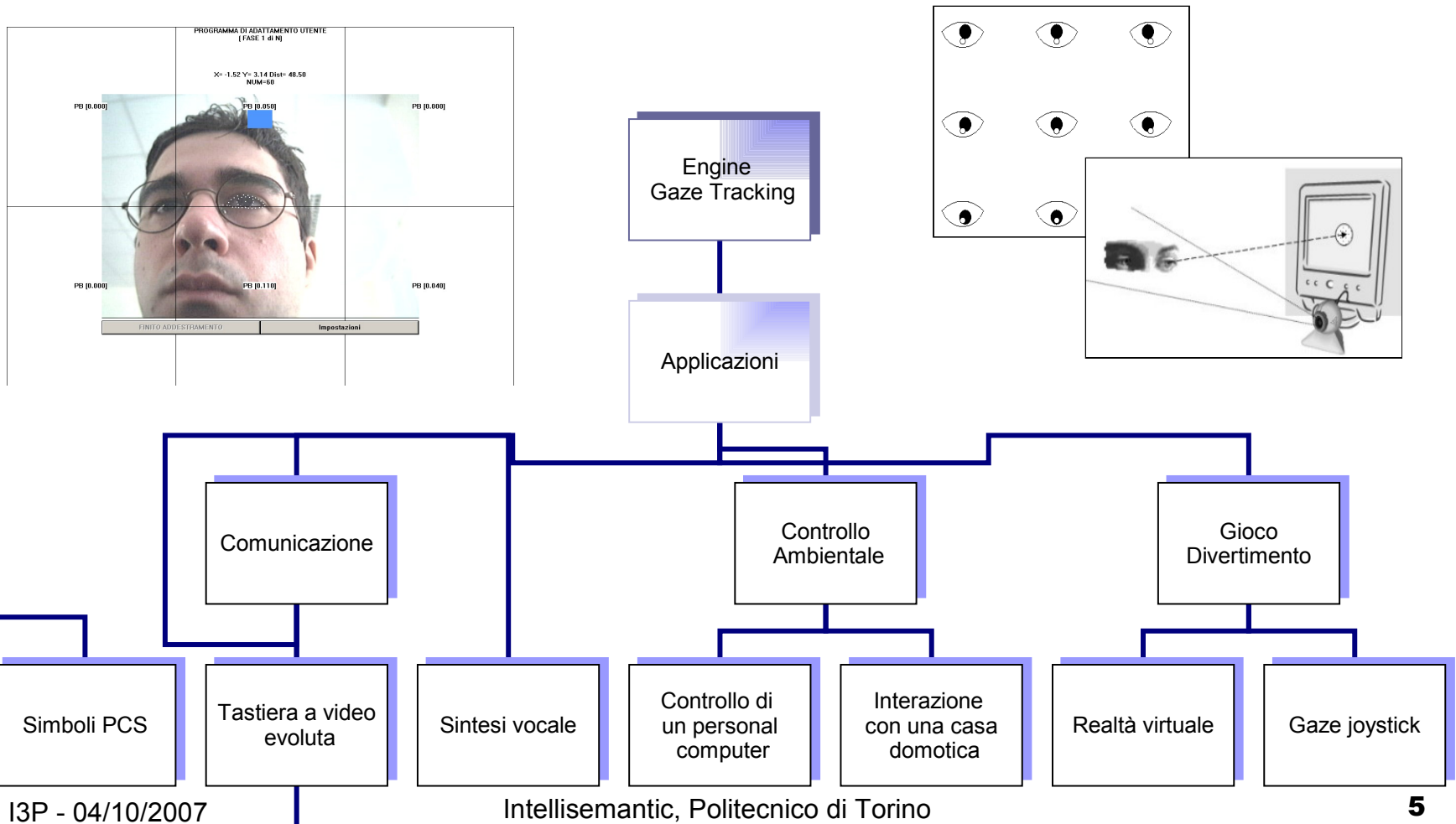 - Multimedia applications
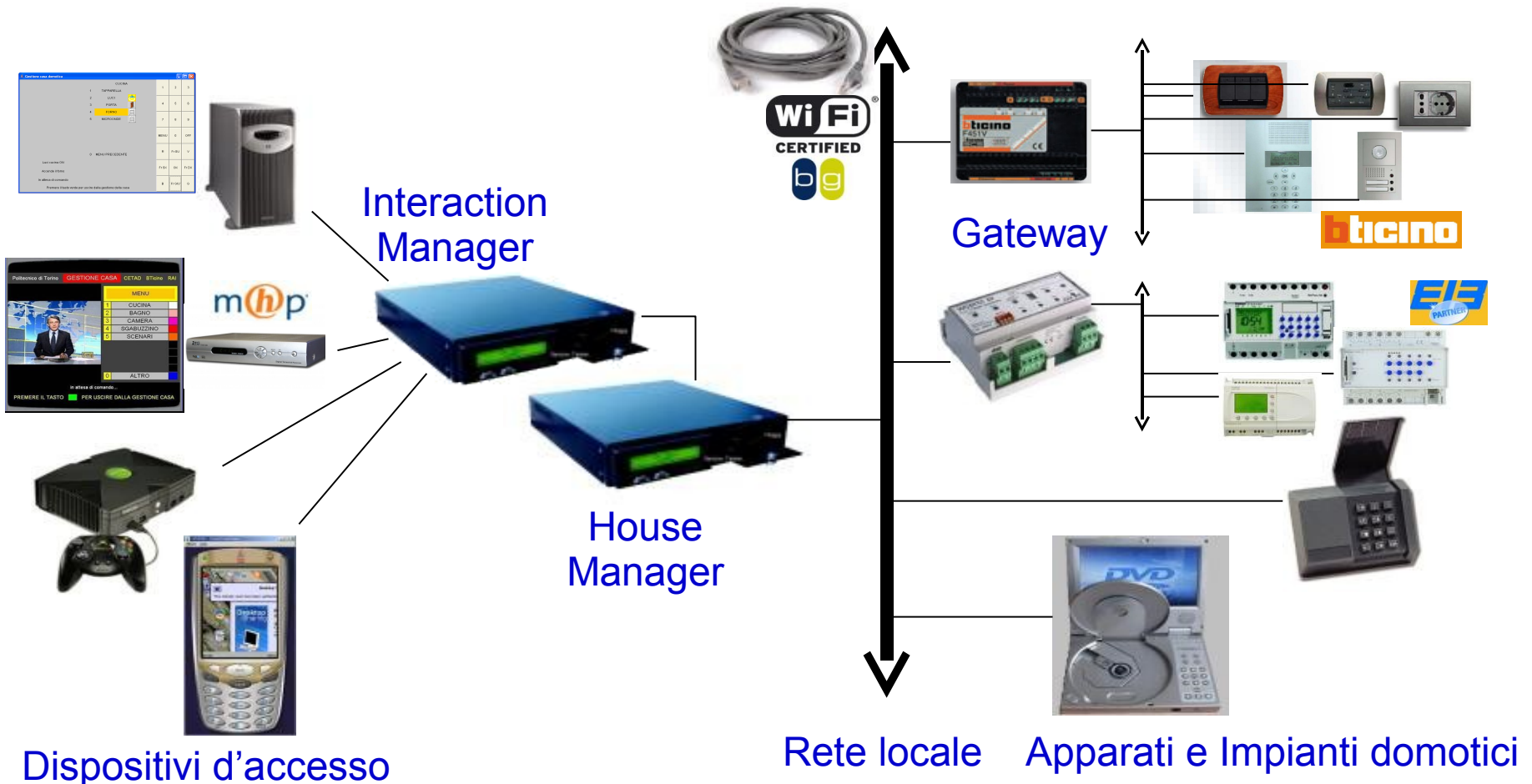
Main research areas (I)

- ■ H-DOSE platform

Ontology A

Group of Annotations

Web Page

Ontology B

Single Annotation

Web page fragment

Main research areas (II)

- Ontology visualization

Main research areas (III)

■ Gaze tracking and accessible software

Intellisemantic, Politecnico di Torino

Main research areas (IV)

- Ambient Intelligence

Interaction Manager

House Manager

Gateway

WiFi CERTIFIED

bticino F451V

EIB PARTNER

Dispositivi d'accesso

Rete locale

Apparati e Impianti domotici

Current projects and collaborations

Research activities in semantic applications

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e-lite Research Group http://elite.polito.it

Outline

- **Past activities**
  - ☐ Automatic web service composition
  - ☐ H-DOSE
  - ☐ Autonomic Dose
  - ☐ Social+Semantic
  - ☐ Ontosphere3D

- **Current activities**
  - ☐ 'Intelligent' Domotic House Gateway
  - ☐ Accessible applications
  - ☐ Eye tracking technology

Searching for documents: DOSE

- Integrate semantic information into currently available web applications

- Requirements:
  - Easy integration (standard technologies shall be adopted)
 - Document-based approach: resources are web pages, no more fine grained information is considered

DOSE

- Distributed Open Semantic Elaboration Platform
- Web Service platform for semantic information retrieval (ICTAI 2004/07, SAC 2004/05, ISWC 2003)
- Works on html or text pages
- Uses shallow semantics
  - ontology+graph navigation as inference
  - based on conceptual spectra
- Available on http://dose.sourceforge.net

DOSE analysis

	Processing phase			
	Search input	Processing	User feedback	Search results
Functionality	Text keywords Concepts	"Semantic" Vector-space model	Ranked list of results Spectra of results	URI of results
Interface	Web service – no direct user interaction – methods to be called by application software			

DOSE – logic architecture
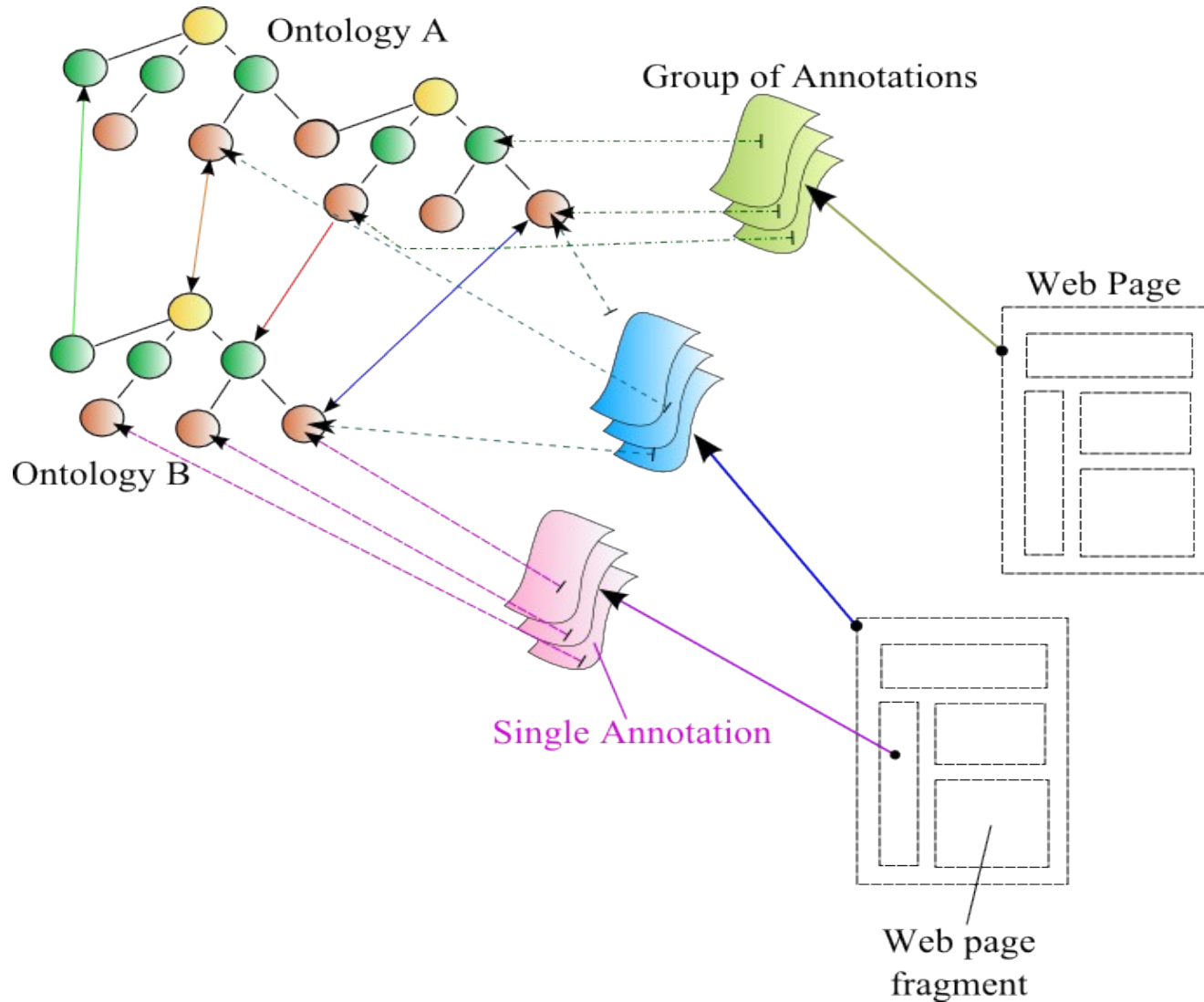
Autonomic DOSE

- Autonomic update of poorly covered knowledge areas (ICAC 2004)
  - Monitors the query results
  - If queries are correctly mapped but no results are available
    - Starts an information gathering cycle by querying Google for relevant docs and by classifying them

Social+Semantic web

- National project "TRAME"
- Video + Images + video segmentation
- Multi-archive sources
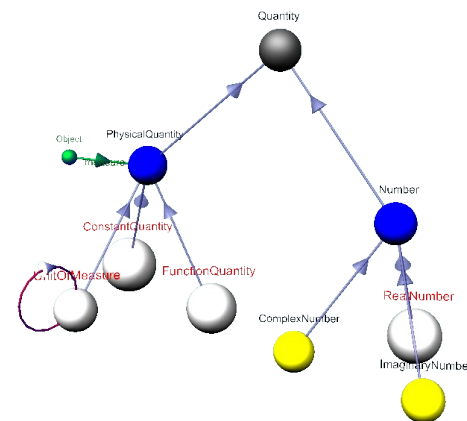 - Meta-data alignment (semi-semantic)
- Social tagging platform
- User study
- Ontologies vs. Folksonomies

OntoSphere 3D

- Interactive, 3D visualization of ontology models
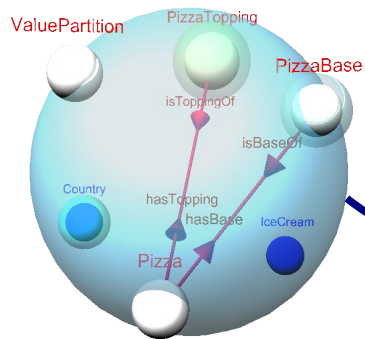 - based on 6 different scenes
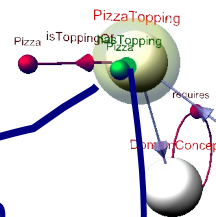 - information about ontology entities is conveyed through visual cues
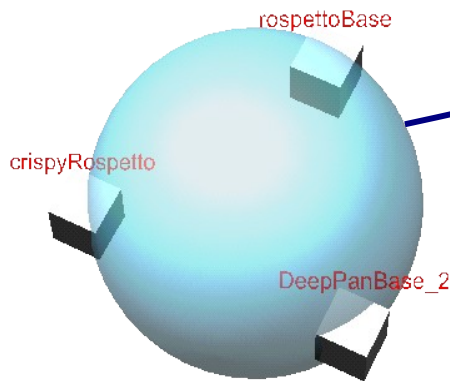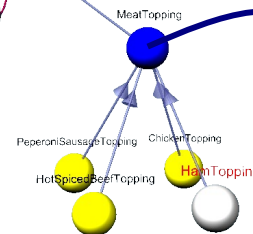   - size
    - color
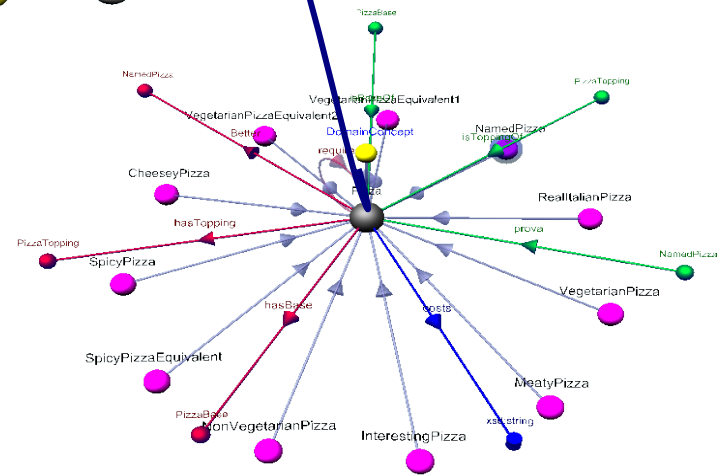   - shape
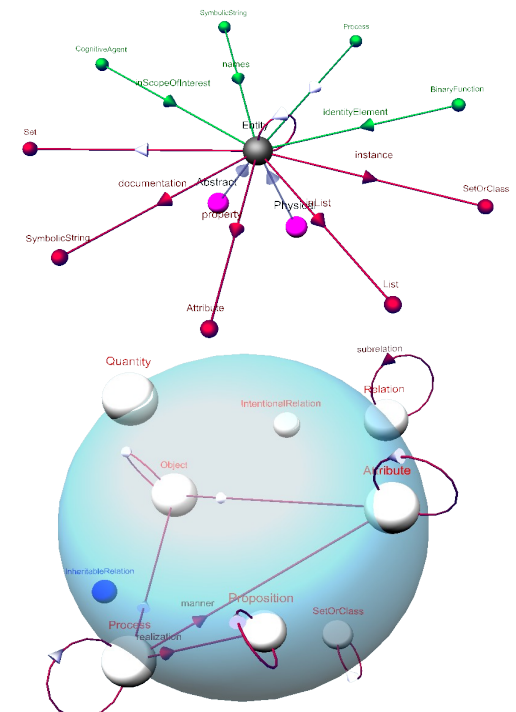
Ontosphere 3D - Interaction

Left click on a concept

Left click on a concept

Right click on a concept – contextual menu
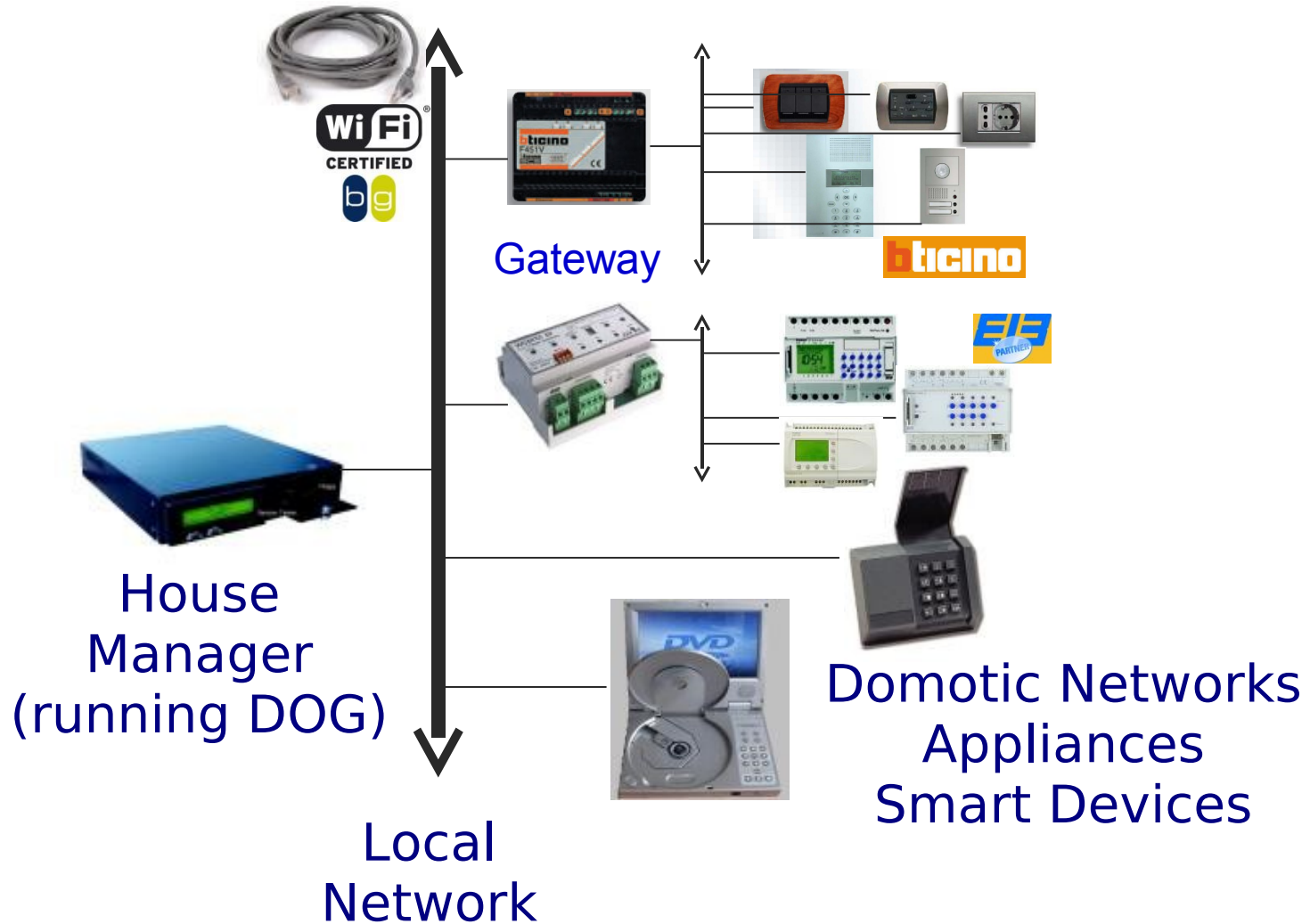
Domotics research

- Goal: develop intelligent domestic environments, relying on OTS technology

- Challenges:
  - Integration of heterogeneous domotic equipment
  - Comprehensive modeling of topology, devices, actions, effects, context, ...
  - Integration of intelligent behaviors
  - Standard distributed computing technologies (WS, XML, OWL, OSGi, ...)
  - Coupling with assistive technology
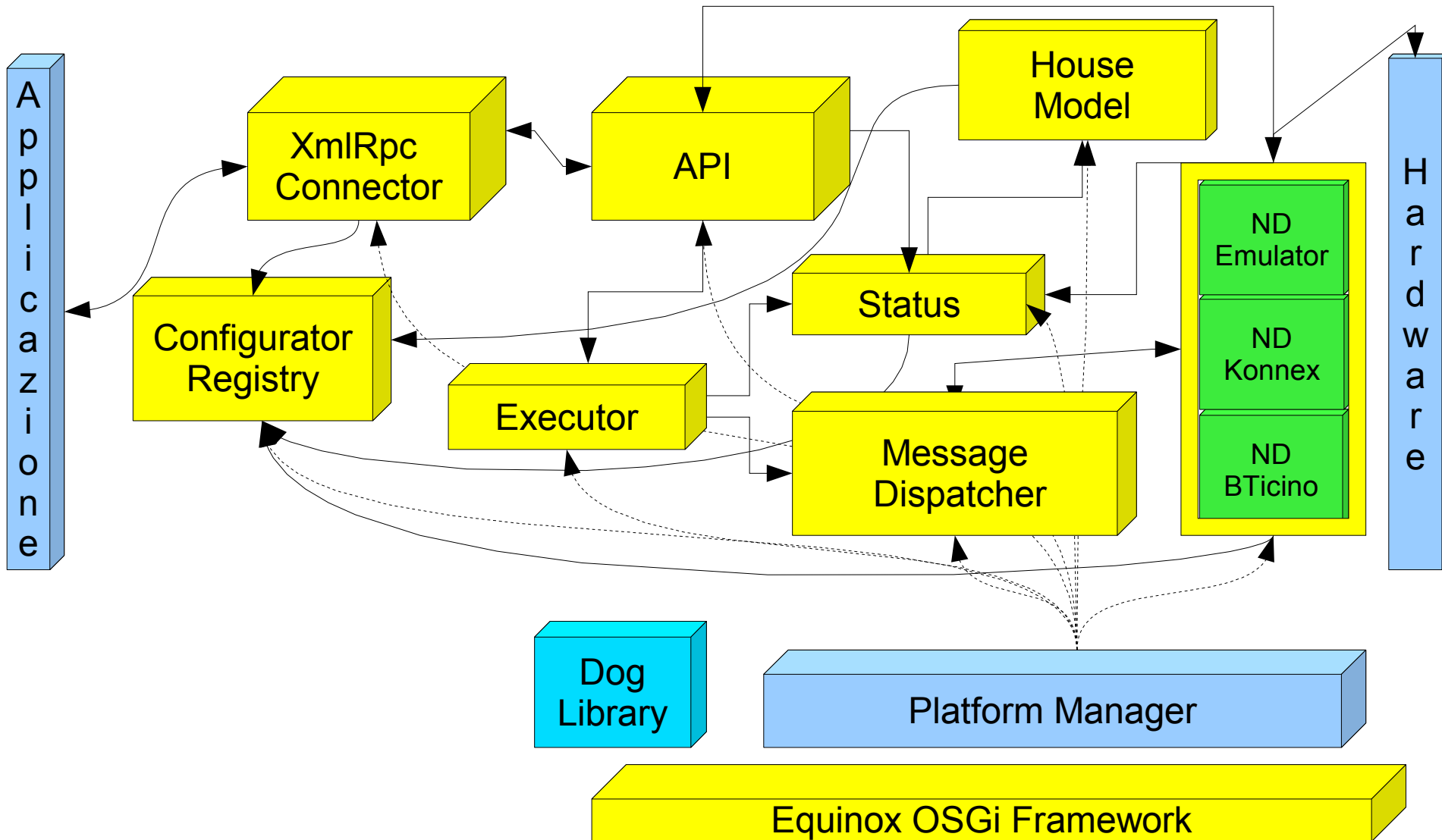
DOG – Domotic Osgi Gateway

- **Based on the OSGi framework**
- **Enables high level access to several domotic networks/plants including**
  - ☐ Bticino MyHome
  - ☐ Konnex
- **Uses ontologies for modeling**
  - ☐ the house
  - ☐ the domotic devices
  - ☐ device status, commands, capabilities

DOG – context

Gateway

House
Manager
(running DOG)

Local
Network

Domotic Networks
Appliances
Smart Devices

DOG – internal architecture

On-going: DOG-Ont

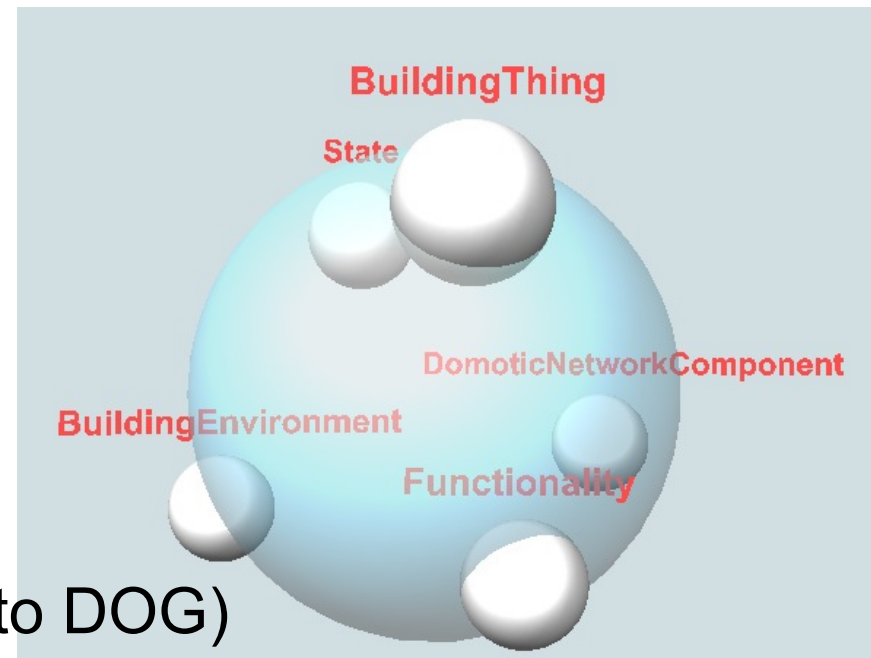- **House modeling ontology, allows to**
  - ☐ model
    - environment
    - devices
    - domotic networks
    - functionalities
    - states
  - ☐ answer queries on
    - configuration (functional to DOG)
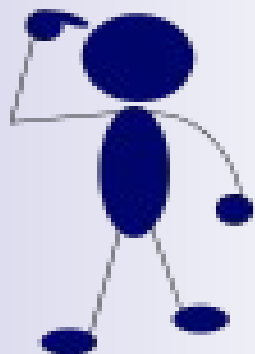   - capabilities

On-going: DOG-lite

- Reasoning on DOG-ont for
  - managing specific devices as generic devices
    - e.g. a Dimmer Lamp can be controlled as a simple Lamp (on/off)
- Next steps:
  - checking constraints on
    - security
    - comfort
    - etc.
  - autonomic operations (some ideas on this)

References and pointers

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Dip. Automatica e Informatica

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References

- The H-DOSE platform
  - http://dose.sourceforge.net
- OntoSphere3D
  - http://ontosphere3d.sourceforge.net/
- TRAME project
  - http://trame.polito.it/ (when it works... often under maintenance)
- Papers
  - http://elite.polito.it