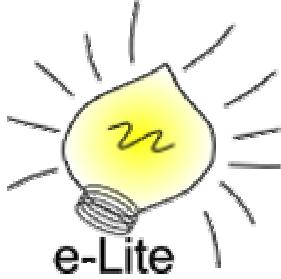




Ontosphere3D

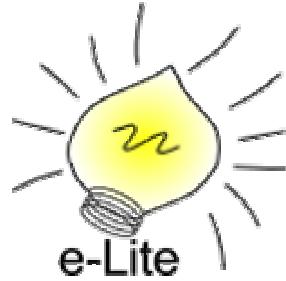
A multidimensional visualization tool
for ontologies

alessio.bosca, dario.bonino @ polito.it



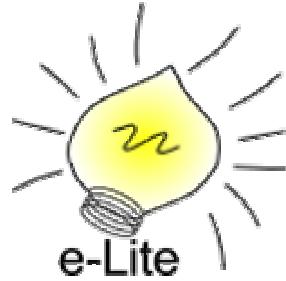
Summary / Agenda

- The context
- 3D representation and Visual cues
- Ontosphere3D
 - Scenes
 - Interactions
- Future trends
- Conclusions



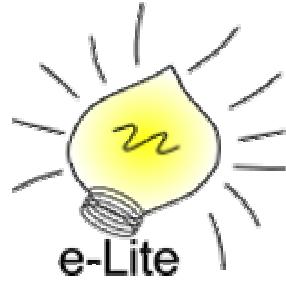
The context

- Ontologies are becoming more and more in use
- Ontology engineering is a rather complex task
- Domain experts shall not necessarily be ontology engineers
- Ontology visualization / inspection shall be “accessible” to non-experts



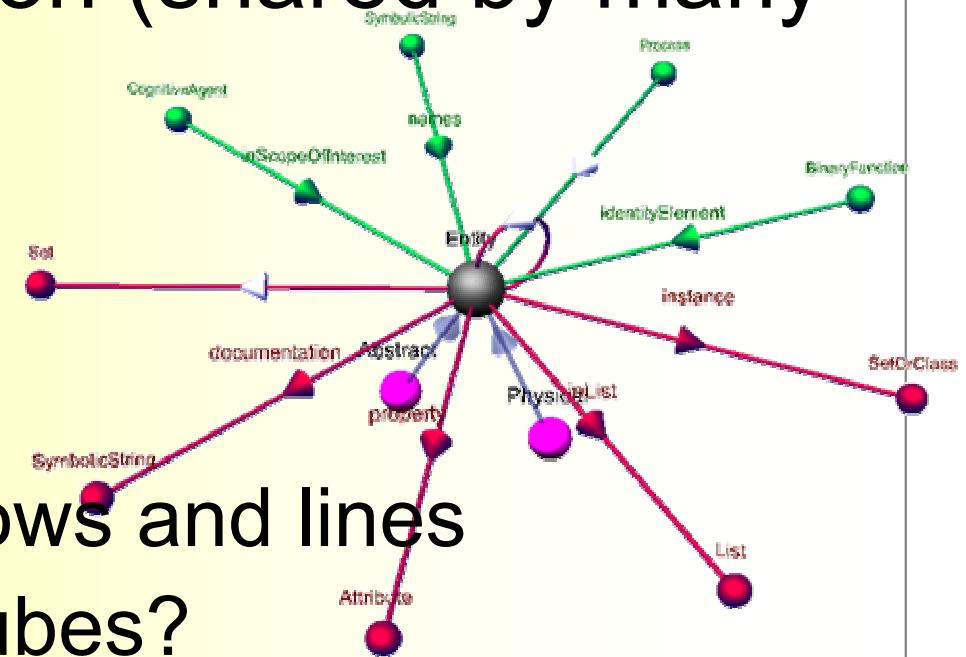
Requirements

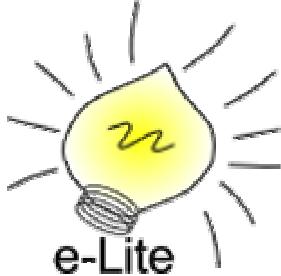
- Ontology domain must be easy to grasp
- Ontology representation must be as “natural” as possible
- Visualization must be focused on specific areas of interest
- Visualization shall be clear and easy to manipulate
- Logic views may help



Solutions

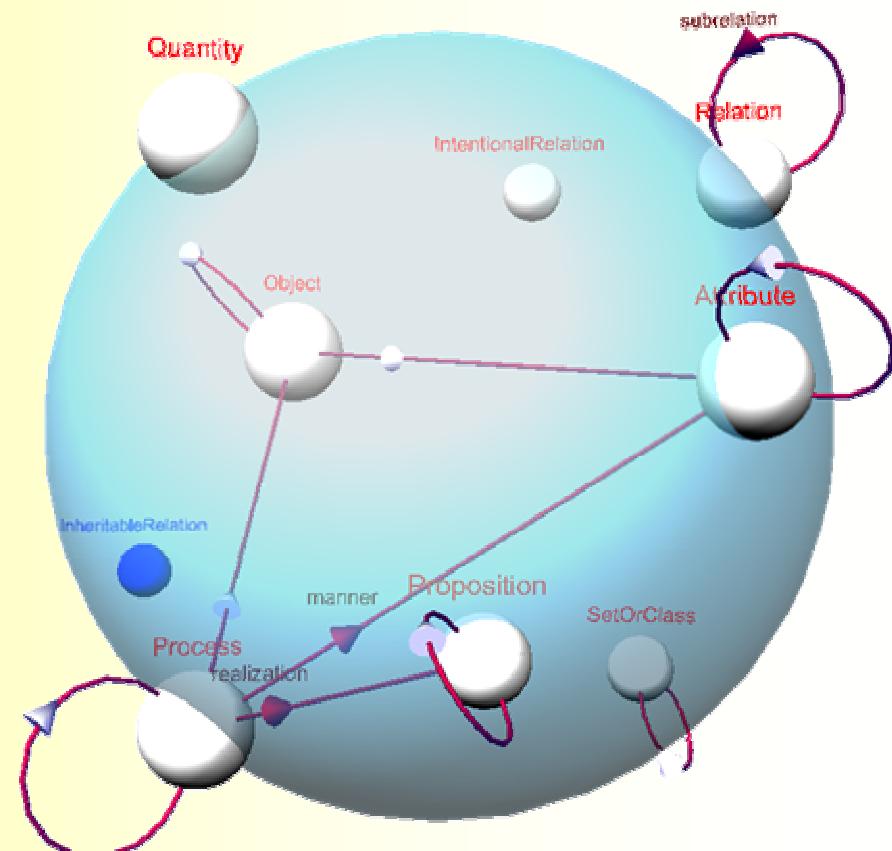
- Root concepts are often sufficient to understand the ontology domain
- “Natural” representation (shared by many approaches):
 - Hierarchy → trees
 - Loops → circles
 - Concepts → spheres
 - Other relations → arrows and lines
 - Instances → may be cubes?

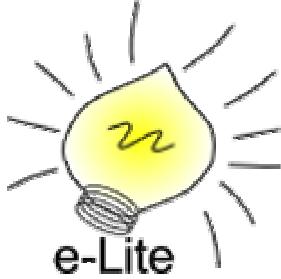




Solutions II

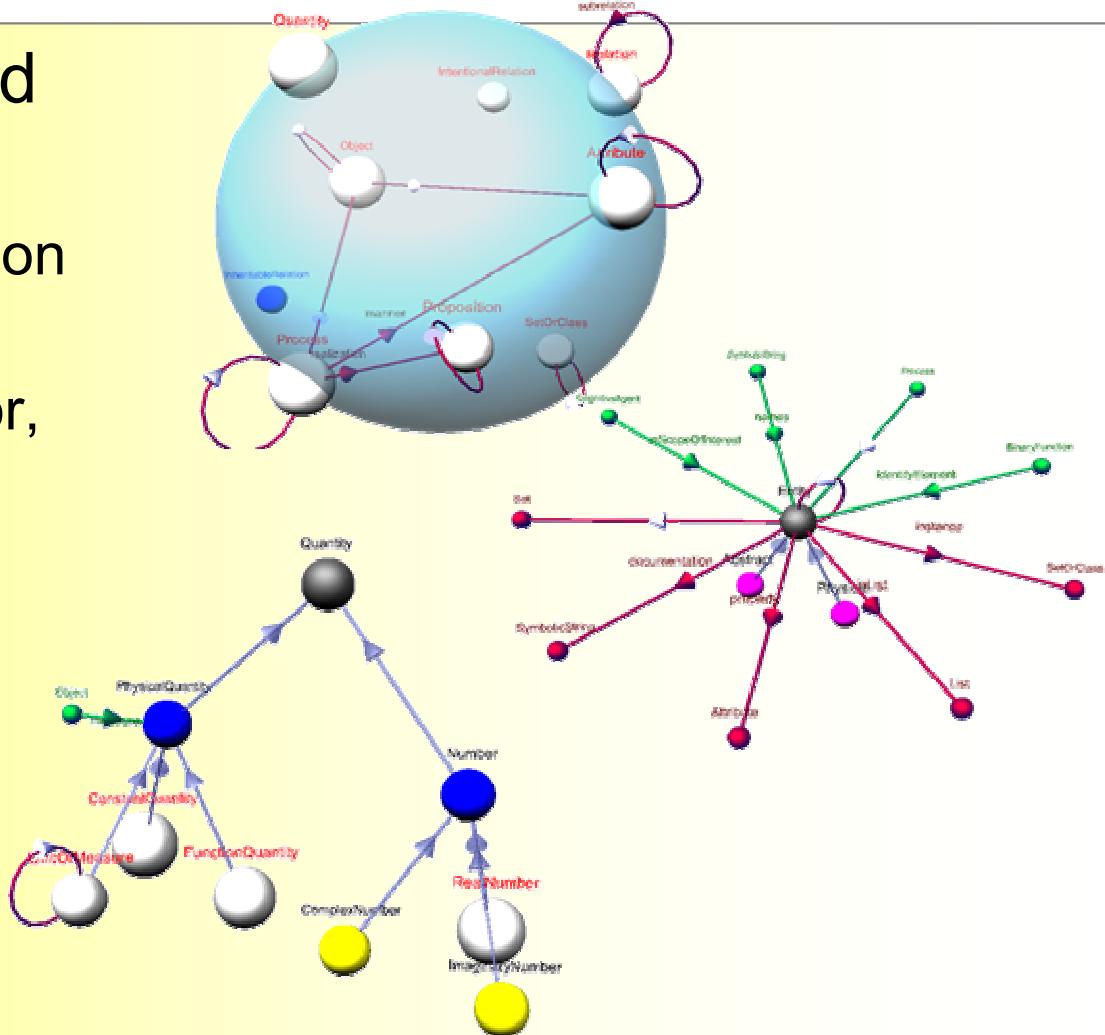
- Visualization must be focused on specific areas of interest
 - User-definable logic views, including only a subset of the ontology concepts and relations may help

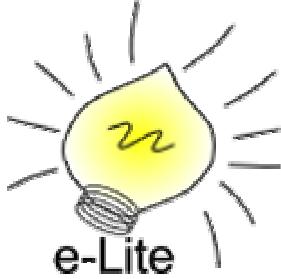




Solution III

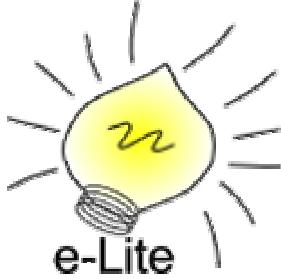
- Visualization clear and easy to manipulate
 - 3D (one more dimension available)
 - Visual cues (size, color, transparency)
 - Rotation, Pan, Zoom operators
 - Hide / Show facilities
 - Different scenes for different tasks





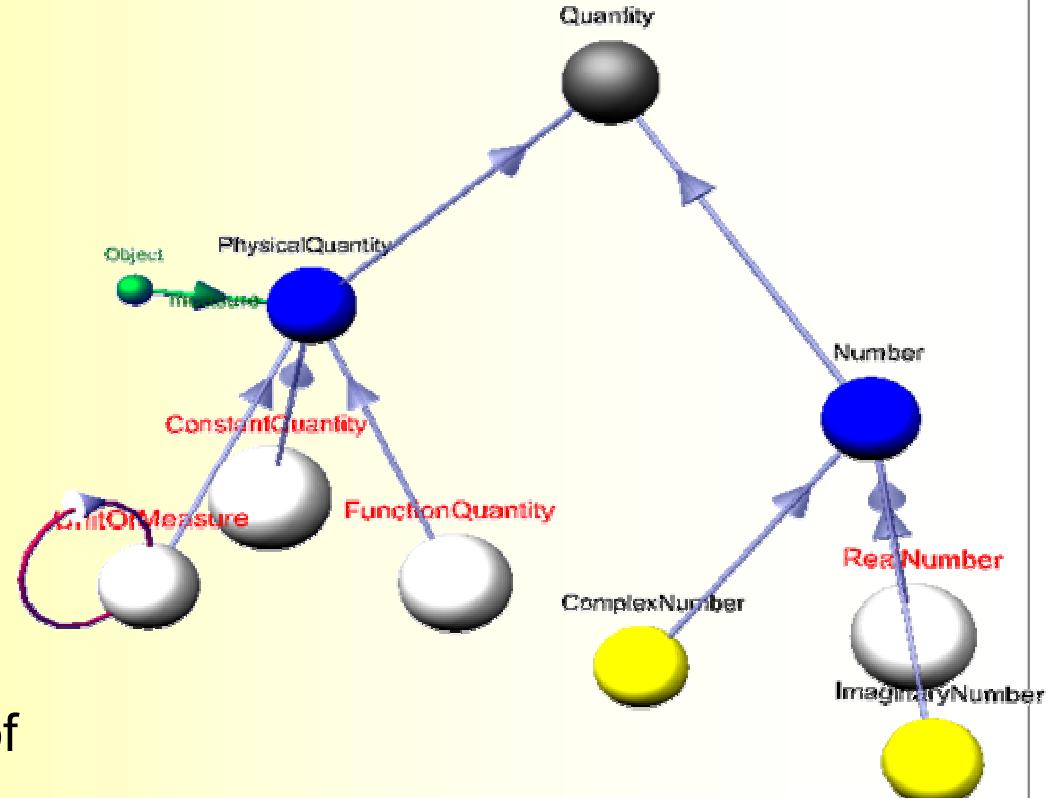
3D representation

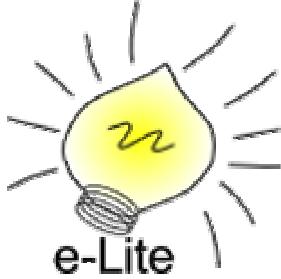
- One more dimension (with respect to 2D)
 - Lay outing is easier
 - Manipulation is “simple”
- Visual paradigm:
 - Concepts → Spheres
 - Relations → Arrows
 - Instances → Cubes



3D representation (II)

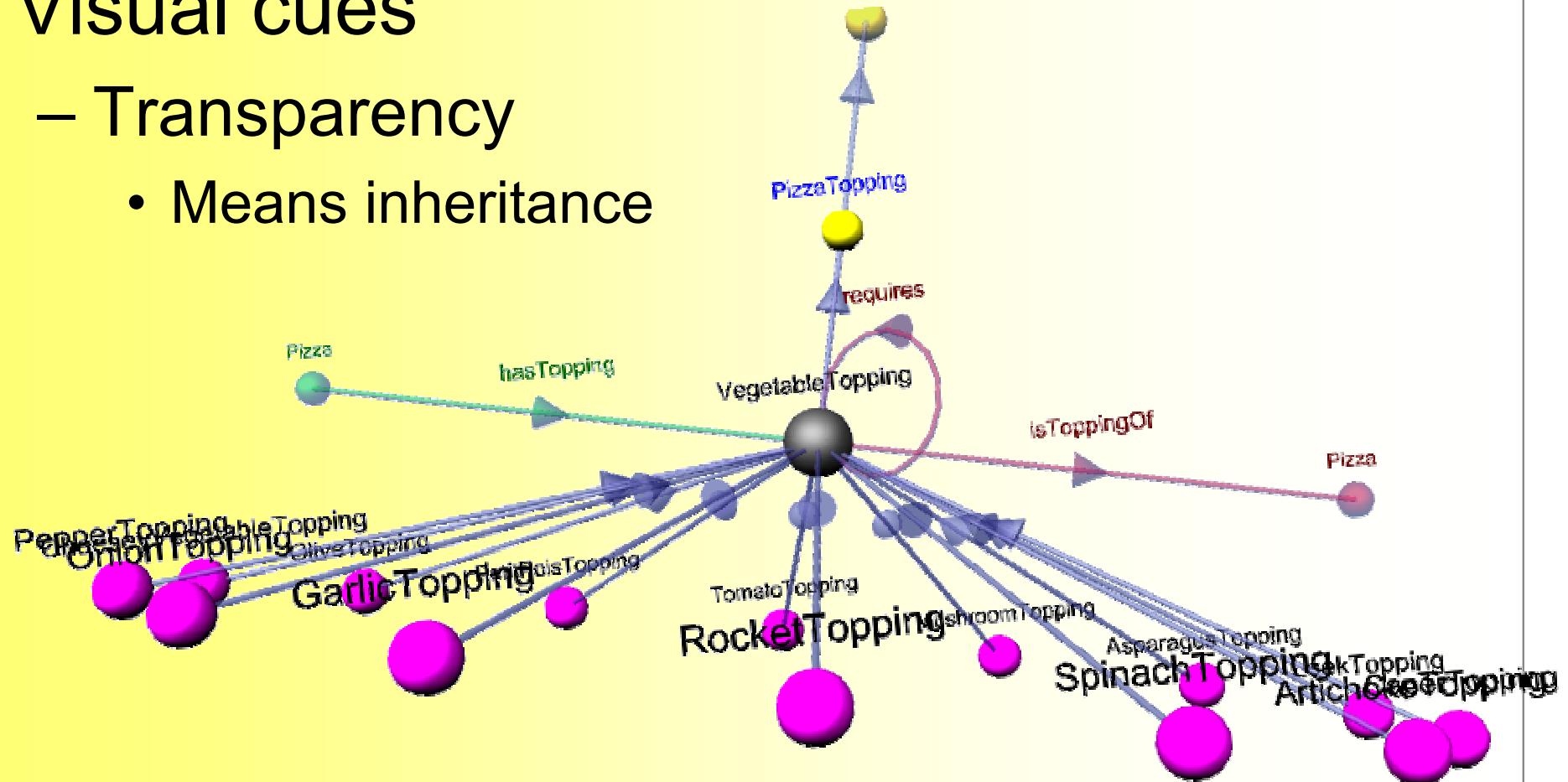
- Visual cues
 - Color
 - Different colors for different levels in the isA hierarchy
 - White means collapsed
 - Black indicates the focus
 - Green means incoming
 - Red means outgoing
 - Size
 - Grows with the number of subsumed / aggregated entities

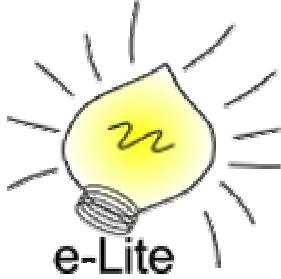




3D representation (III)

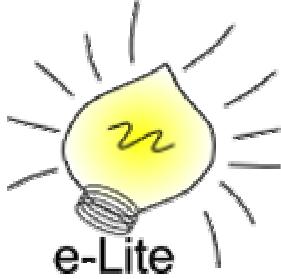
- Visual cues
 - Transparency
 - Means inheritance





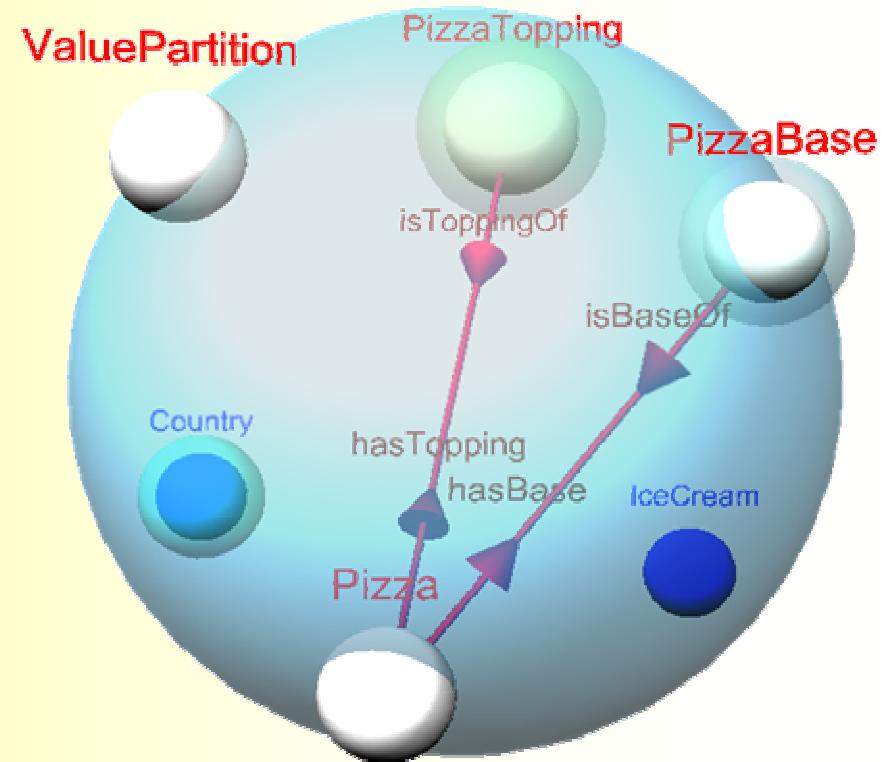
Ontosphere3D

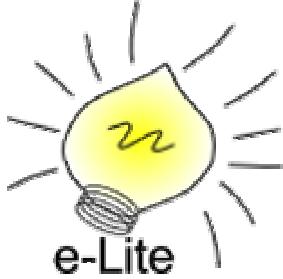
- It is a protégé plug-in
 - But can work as standalone application as well as Eclipse plug-in (with different ontology access APIs)
- It is based on scenes
 - 6 scenes
 - Overview
 - Hierarchy browsing
 - Concept focus
 - Instance overview
 - Facts
 - Dependency tree



Overview scene

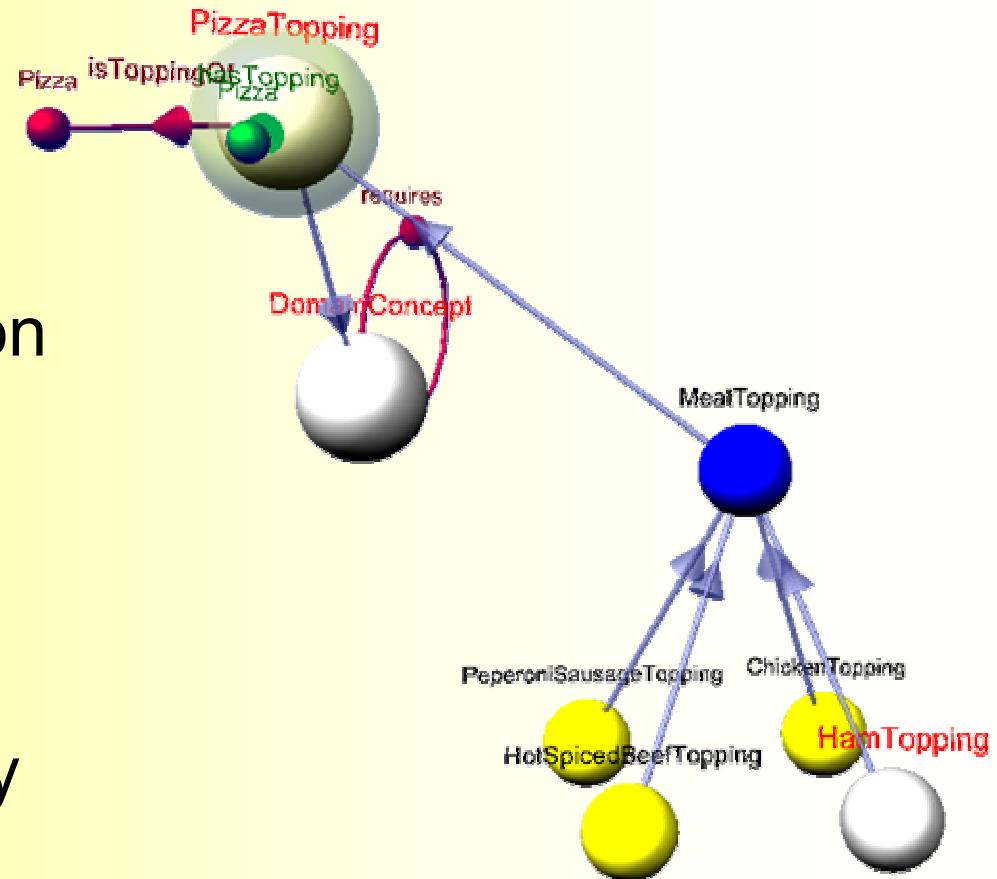
- Shows root concepts projected on a sphere
- Allows the definition of logical views
- Shows the relations between the selected concepts

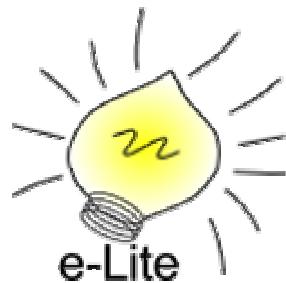




Hierarchy browsing

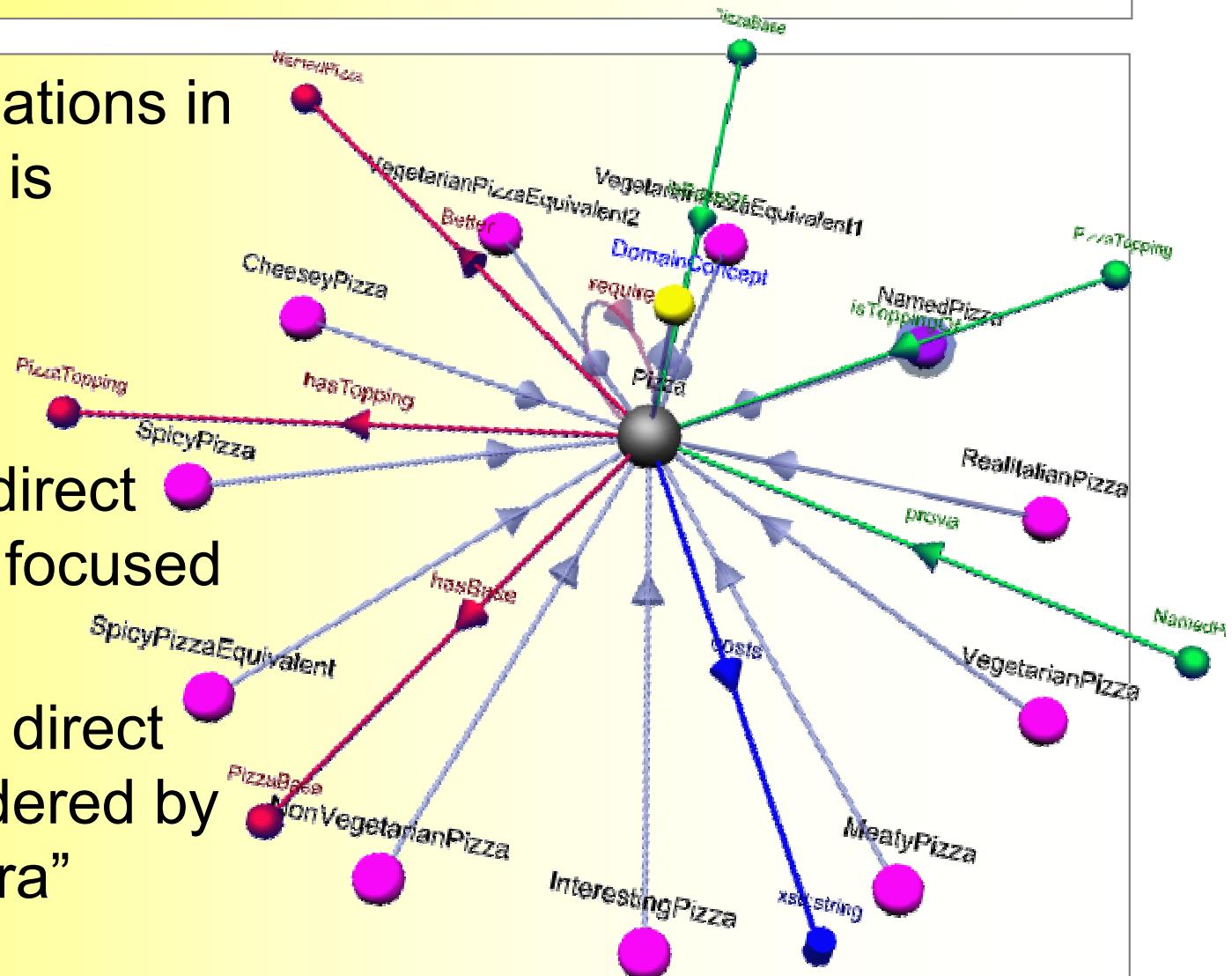
- Allows to browse a hierarchy of concepts
- Implements dynamic collapsing mechanisms
- Shows all the relations involving the concepts on the scene
- Relations to concepts outside the shown tree can be hidden
- The presence of direct instances is rendered by means of an “aura”

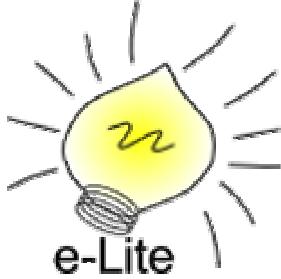




Concept focus

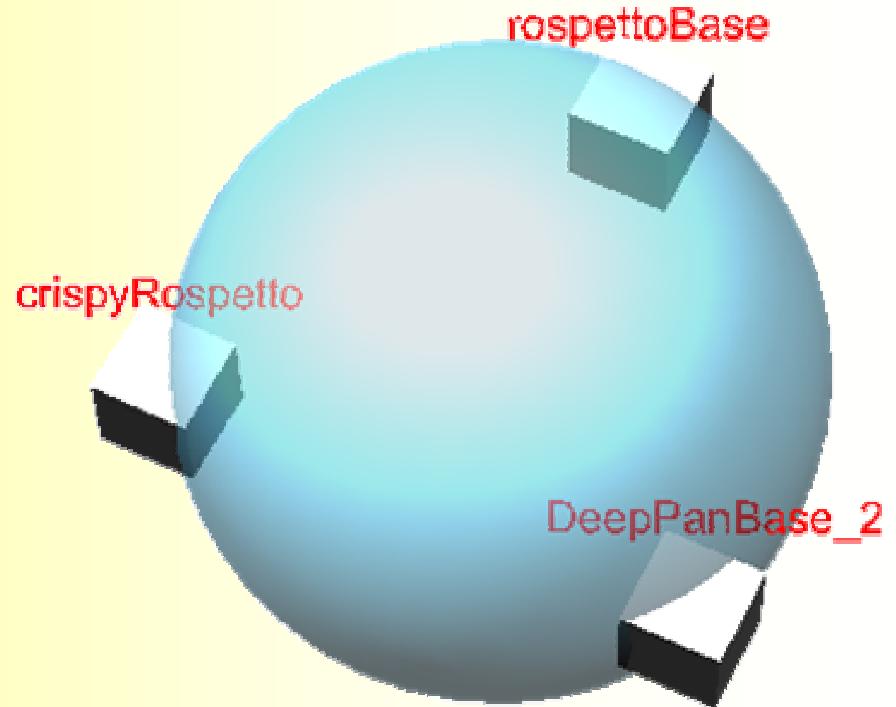
- Shows all the relations in which a concept is involved
 - Direct
 - Inherited
 - Shows only the direct ancestors of the focused concept
 - The presence of direct instances is rendered by means of an “aura”

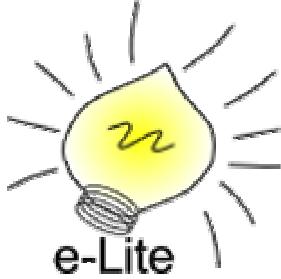




Instance overview

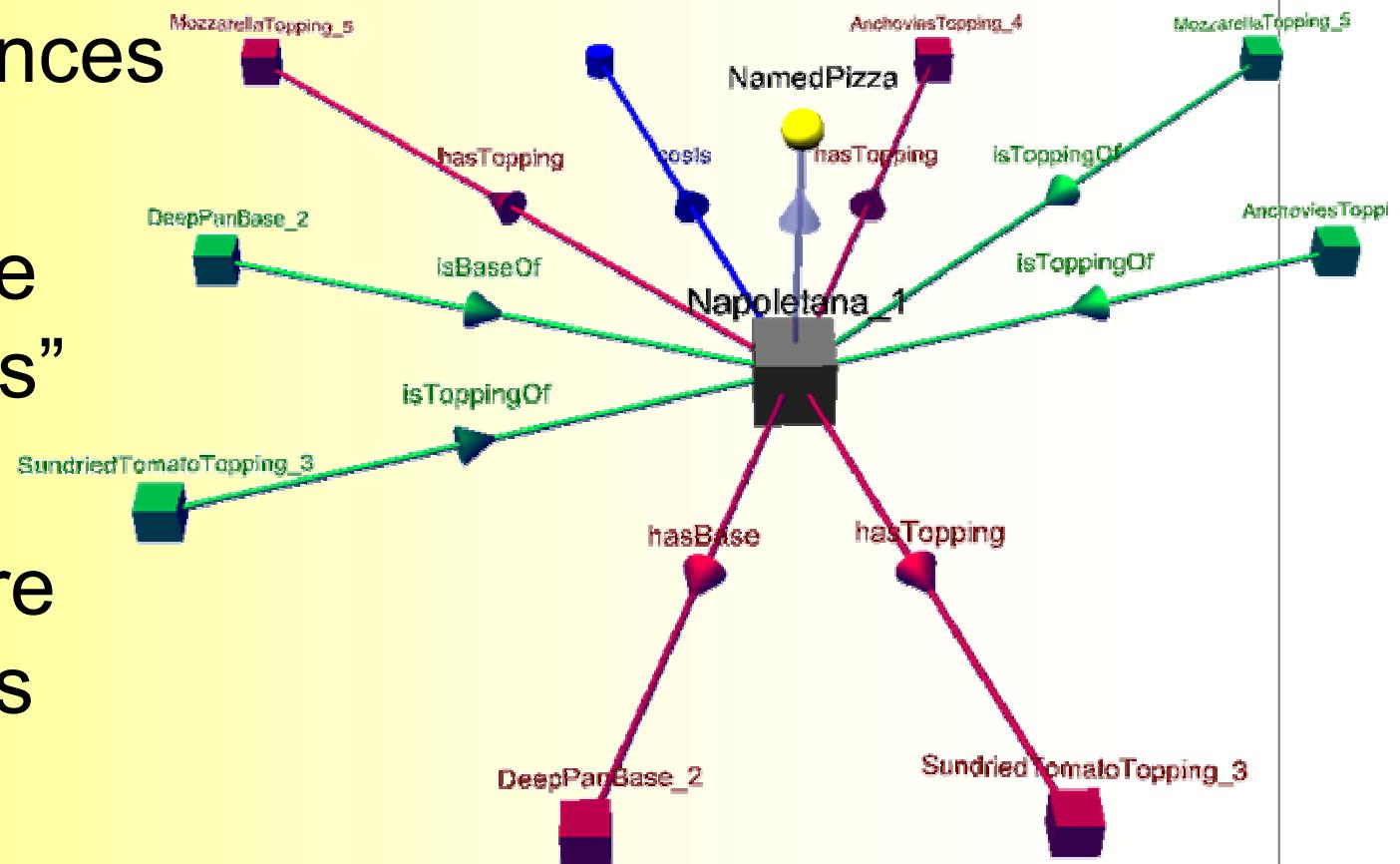
- Shows the instances of a given concept onto a sphere
- White instances take part in relationships with other instances (facts)
- May become overcrowded if the number of instances is high (in the CIA FactBook for example)

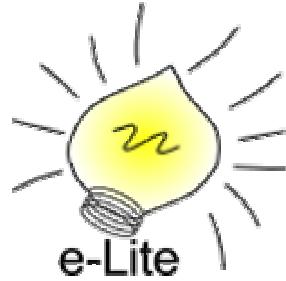




“Facts”

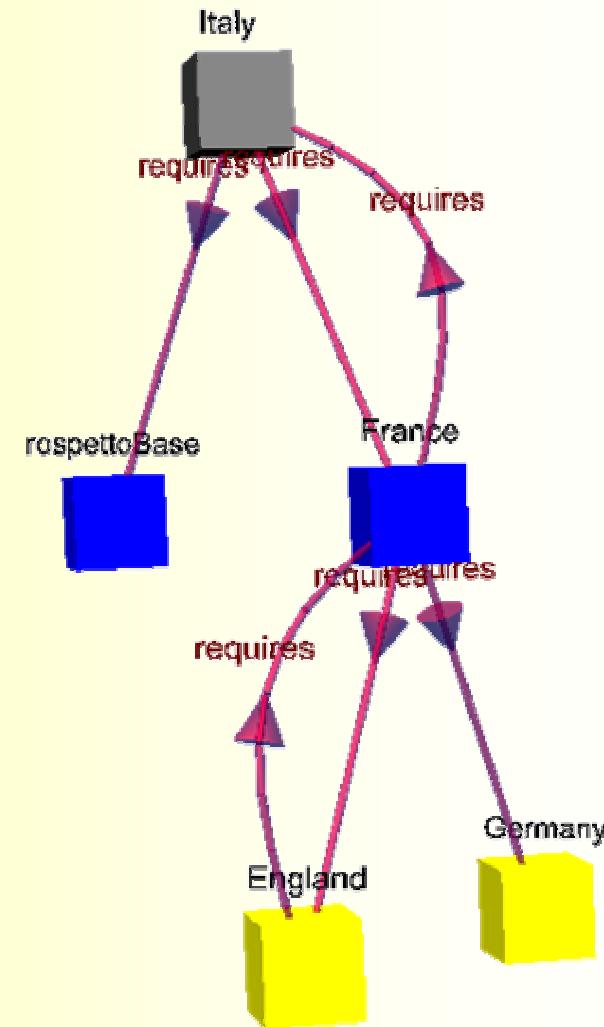
- Shows relations between instances (Facts)
- Is similar to the “Concept focus” scene
- XSD values are represented as cylinders

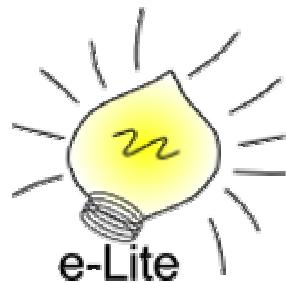




Dependency tree

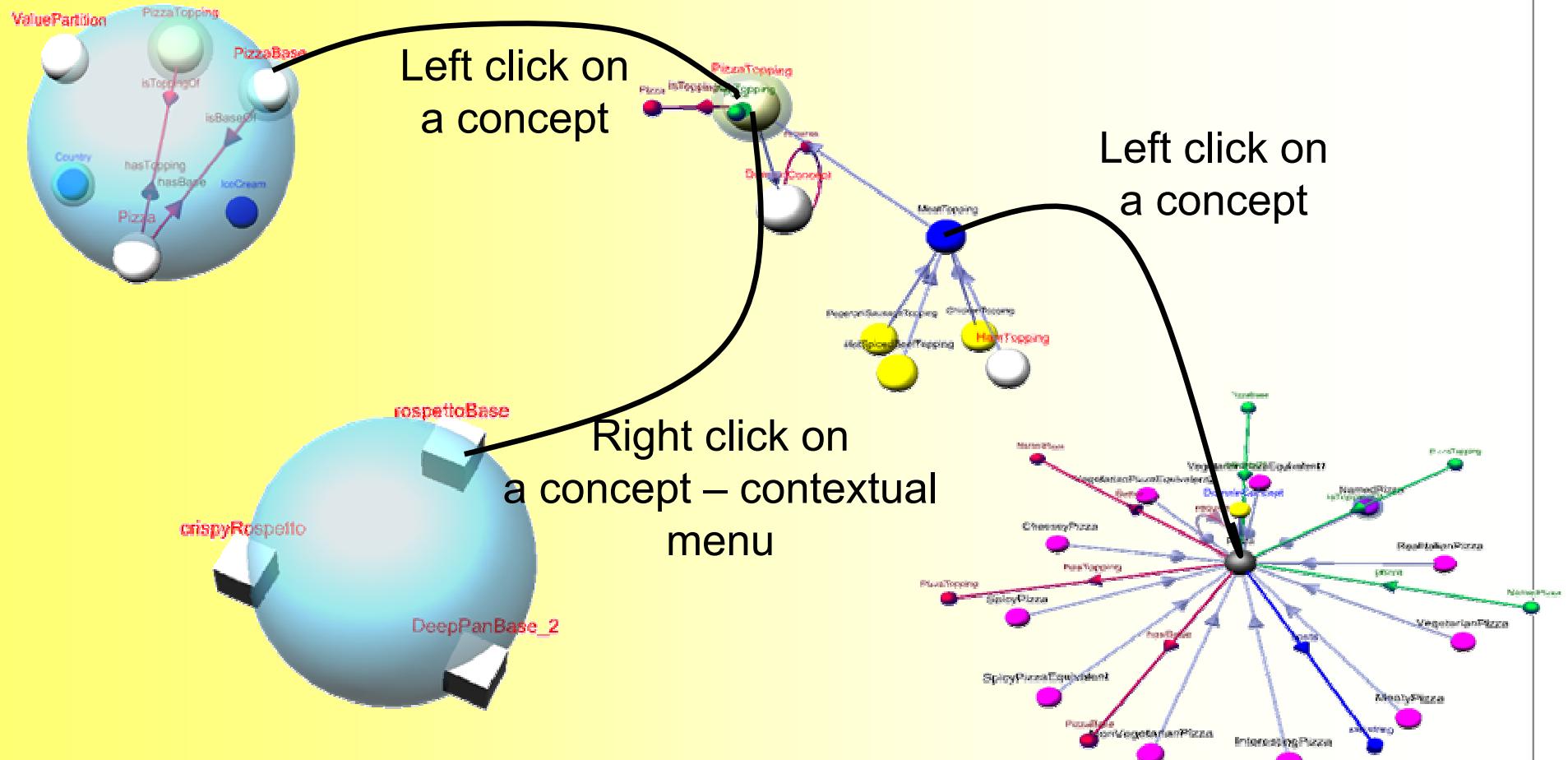
- Organizes along a tree the instances involved in a selected relationship (e.g. requires)

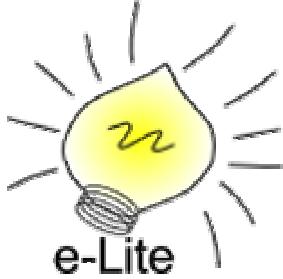




Interactions

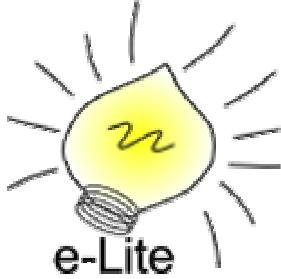
- Scenes interchange at mouse clicks





Future trends

- Logical views stored inside ontologies rather than in a separate file
- Direct editing (drag and drop, etc)
- Query facility (creates logical views as result of a RDQL/SPARQL query on the ontology)
- GUI enhancements / full management of relations (transitivity, inverseOf, subPropertyOf,...)
- High-performance standalone for dealing with huge ontologies (OpenCyc, e-Class,...) that take hours to be loaded in Protégé



Conclusions

- Ontosphere3D can be a viable solution for ontology visualization, even for not experts
- It's a very active project so:
 - Feedback
 - Suggestions
 - CommentsAre welcomed !!!



Thanks

Dario Bonino (dario.bonino@polito.it)
<http://ontosphere3D.sourceforge.net>