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Ideas for Collaborative Ontology Development on the upcoming Web 3.0 Era

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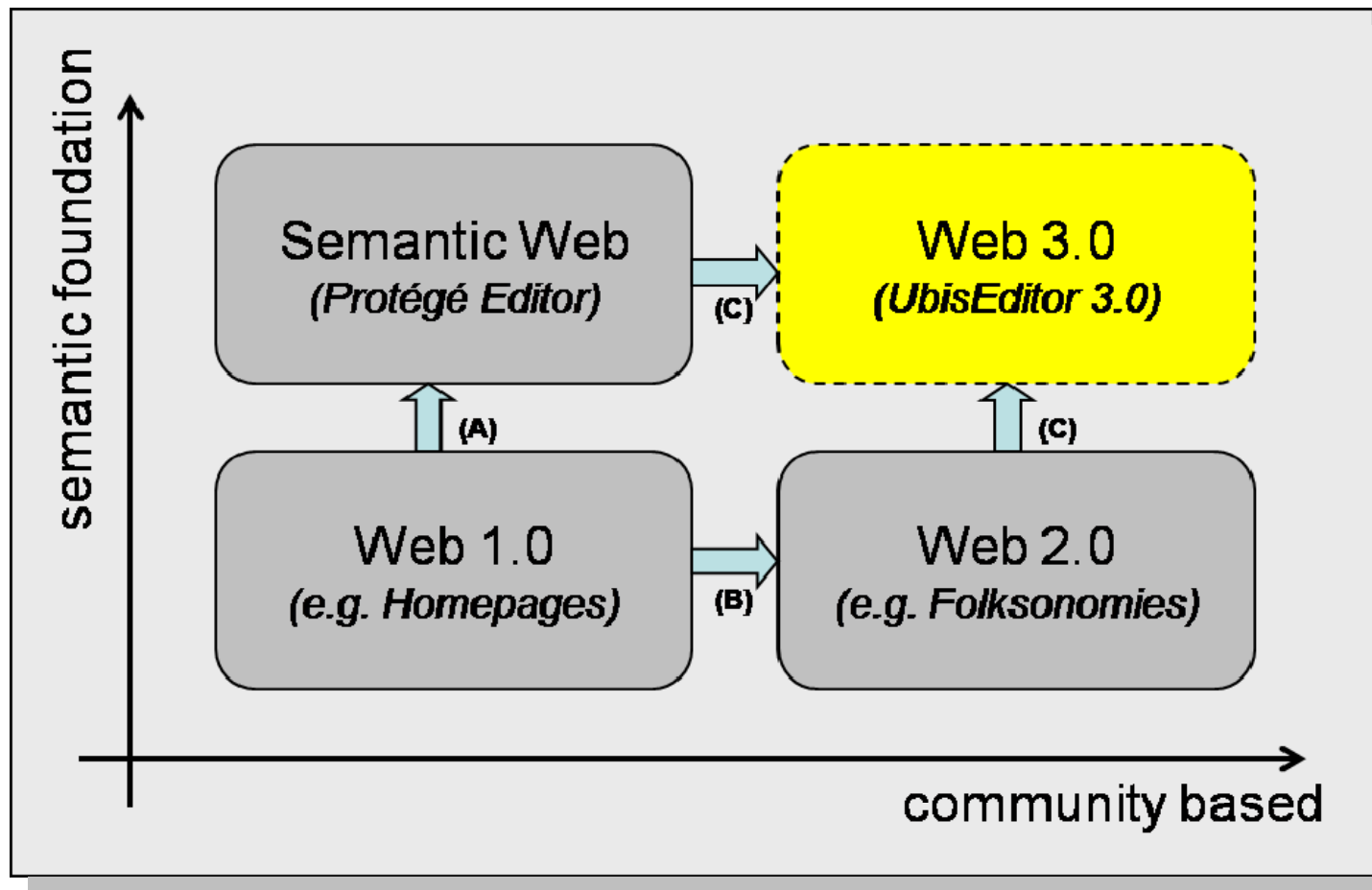
Outline

- Context and Motivation
- UbisEditor
 - Ontology Visualization
 - Editing Functionalities
 - Aspects of Collaborative Editing
 - Personalized Ontology Views
- Conclusions and Future Work



Web 3.0

- Definition by Wahlster and Dengel:
Web 3.0 = Web 2.0 + Semantic Web



UbisWorld

- Combining user modeling and ubiquitous computing
- UbisWorld = GUMO + UbisOntology + External Ontologies

The screenshot displays the UbisWorld interface. At the top, there is a navigation menu with several categories: GUMO, HUGO, EXTERN, and WORO. Below these are various ontologies: Basic, Context, Domain, Extended, UbisEarth, UbisMovies, UbisBooks, UbisPeople, SUMO, DOLCE, SWINTO, OPENCYC, AMAZON, and UNSPSC. A row of colored buttons represents different types of elements: Physical (grey), Spatial (green), Temporal (yellow), Situational (orange), and Actional (red).

The main content area is titled "Physical Elements in UbisWorld". It contains the following text: "Physical objects like persons, devices, furniture but also systems and categories like film genres or environmental topics are presented in this basic ontology." Below this text are two links: "Open Next Level" and "Close All". There is also a search bar and a "Store as Shortcut" button.

The ontology tree is expanded to show the following structure:

- Physical Elements
 - Being
 - Thing
 - Loading..
 - System
 - SUPIE Products

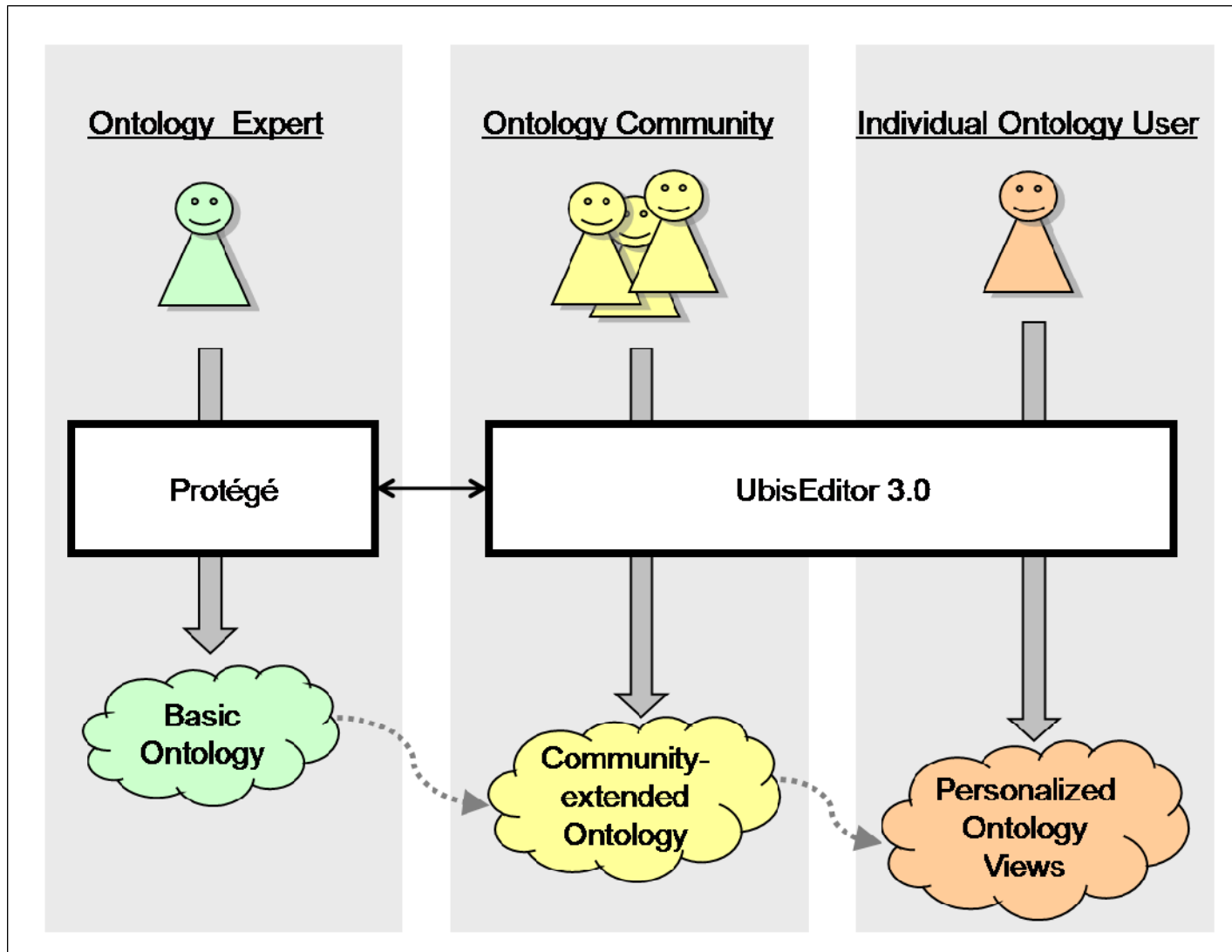


Motivation

- Online ontology editor for UbisWorld needed
- Shall be used by ontology experts and by user community
- Ontologies grow in size and complexity
- Difficult to manage by one person or small group
- Early approaches (e.g. WebOnto, Ontolingua) had performance problems
- Basic idea comparable to WebProtégé

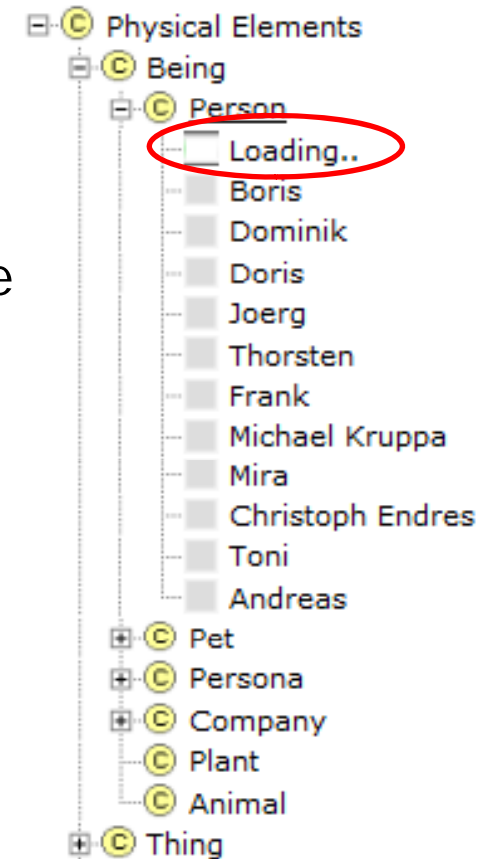
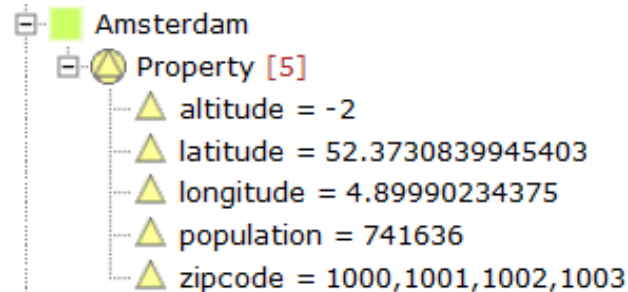


UbisEditor



Ontology Visualization

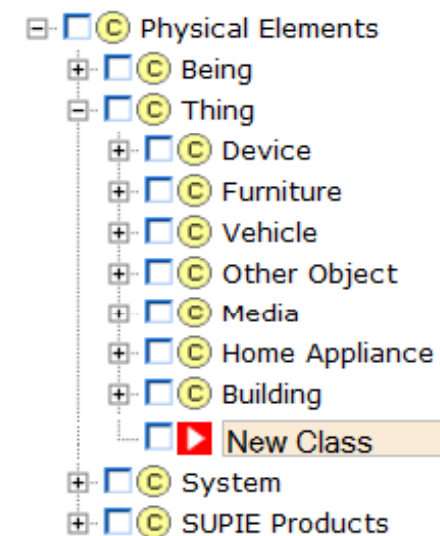
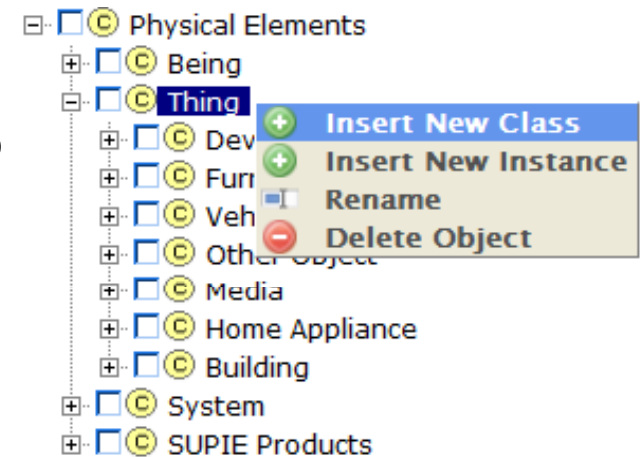
- Ajax-based ontology tree visualization
- Data requested from server only when user opens tree node
- Visualization of very large knowledge sets possible
- Additional structure by using limitation nodes
- Properties of objects shown in the tree



Editing Process

- Right-click opens context menu
- Changing parents of nodes using drag&drop
- Multilingual editing of labels
- Editing of properties using similar grid
- User has to push button to commit changes to server
- Database backend altered according to performed changes

| Language | Label |
|--------------------|----------------------------|
| English (EN) | Netherlands |
| Dutch (NL) | Koninkrijk der Nederlanden |
| Frisian (FY) | Nederlân |
| ↓ | |
| Ganda (EG) | |
| Georgian (KA) | |
| German (DE) | |
| Greek, Modern (EL) | |
| ↑ | |



Rights Management and Quality Control

- Rights Management:
 - Role-based (e.g. standard user, ontology developer)
 - Context menu adaptive to rights of user (e.g. delete not allowed)
 - Visibility of tree branches

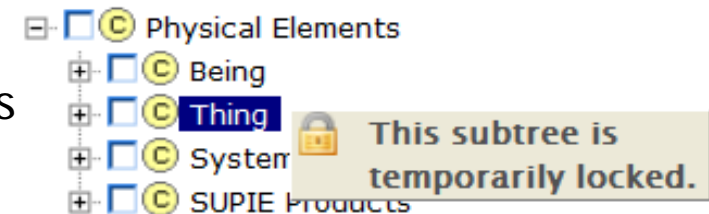


- Quality Control:
 - Store ID of user with performed changes
 - Five-star rating system
 - Needed extension: rating of raters



Collaborative Ontology Editing

- Transaction management:
 - Locking of tree branches when user starts editing process
- Change management:
 - Display change history of an object and of whole ontology
 - Annotation and discussion of changes
 - Possibility to revert changes
- Conflict resolution:
 - Role-based strategy
 - Community-based (voting)
- Search functionality



Search For Element:

Enter Search String:

Personalized Ontology Views

- User-created personalized ontology view
- Check boxes to select needed objects
- Appropriate OWL-file provided for download

| | |
|--|---|
| <input checked="" type="checkbox"/> <input checked="" type="radio"/> Physical Elements | <code><owl:Class rdf:ID="N..00100006.Furniture"></code> |
| <input type="checkbox"/> <input checked="" type="radio"/> Being | <code><rdfs:label> Furniture </rdfs:label></code> |
| <input checked="" type="checkbox"/> <input checked="" type="radio"/> Thing | <code><ubis:category> 10 </ubis:category></code> |
| <input type="checkbox"/> <input checked="" type="radio"/> Device | <code><ubis:creator> USER..matthias </ubis:creator></code> |
| <input checked="" type="checkbox"/> <input checked="" type="radio"/> Furniture | <code><rdfs:subClassOf rdf:resource="#N..00100004.Thing"/></code> |
| <input type="checkbox"/> <input checked="" type="radio"/> Vehicle | <code></owl:Class></code> |
| <input type="checkbox"/> <input checked="" type="radio"/> Other Object | |
| <input type="checkbox"/> <input checked="" type="radio"/> Media | |
| <input checked="" type="checkbox"/> <input checked="" type="radio"/> Home Appliance | |
| <input checked="" type="checkbox"/> <input checked="" type="radio"/> Entertainment Electronics | |
| <input checked="" type="checkbox"/> <input checked="" type="radio"/> TV | |
| <input checked="" type="checkbox"/> <input checked="" type="radio"/> Video Recorder | |
| <input type="checkbox"/> <input checked="" type="radio"/> DVD Recorder | |
| <input checked="" type="checkbox"/> <input checked="" type="radio"/> DVD Player | |
| <input type="checkbox"/> <input checked="" type="radio"/> Satellite Receiver | |
| <input checked="" type="checkbox"/> <input checked="" type="radio"/> Music Player | |

Conclusions

- Ontology visualization using Ajax-based trees
- Editing using context menu and grids
- Role-based rights management
- Locking mechanism
- Search functionality
- Personalized ontology views

Future Work

- UbisEditor as a stand-alone application
- Import functionality
- Change management
- Annotation and discussion facilities
- Conflict resolution
- Evaluation of visualization and editing techniques

Thank you.

Please register at
www.ubisworld.org

Thank you for your attention.