Semantic Graph Visualisation for Mobile Semantic Web Interfaces

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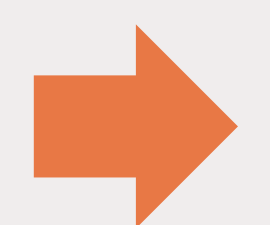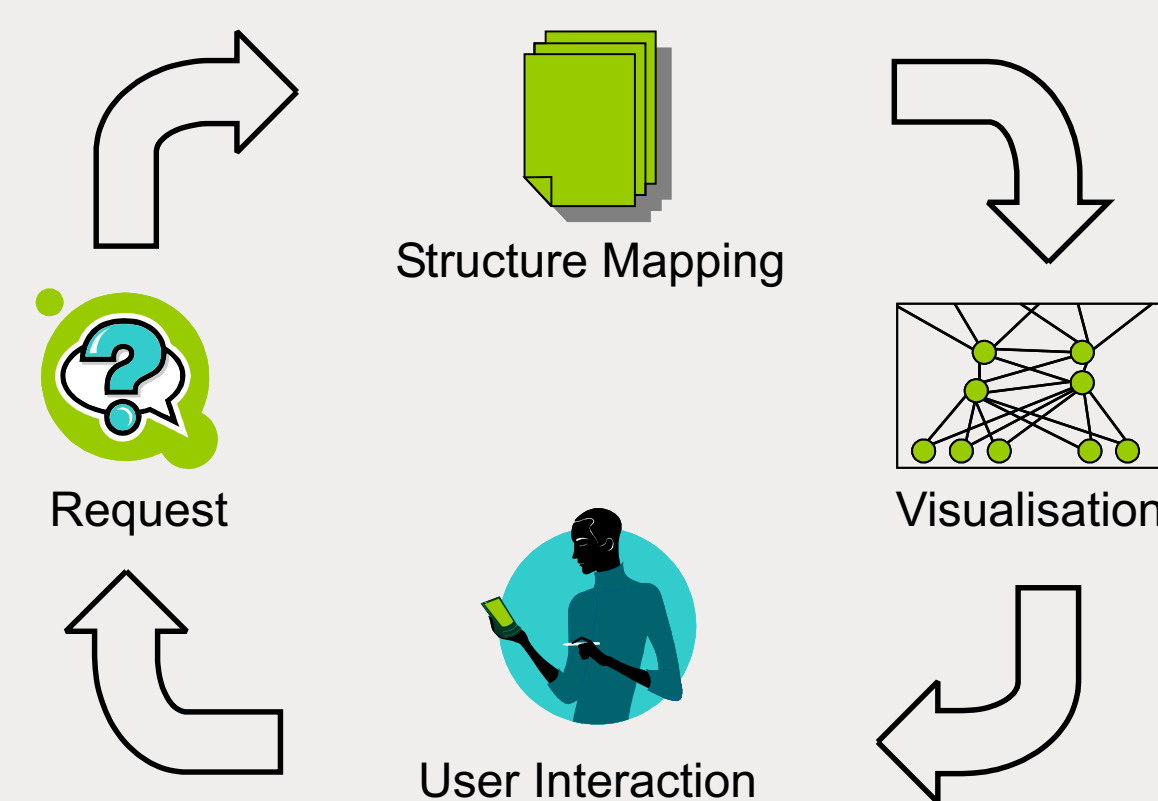
Smartweb Requirements

- Multimodal dialogue with question answering functionality.

- Speech is dominant input modality for interaction.

- Multimodal recognition for speech or gestures.

- Result rendering for Semantic Web data content: text, images, videos, graphics, and synthesis of speech.

- Control the message flow in the system.

- Develop a context-aware, mobile, multimodal user interface.

- Use a smartphone as interaction device.

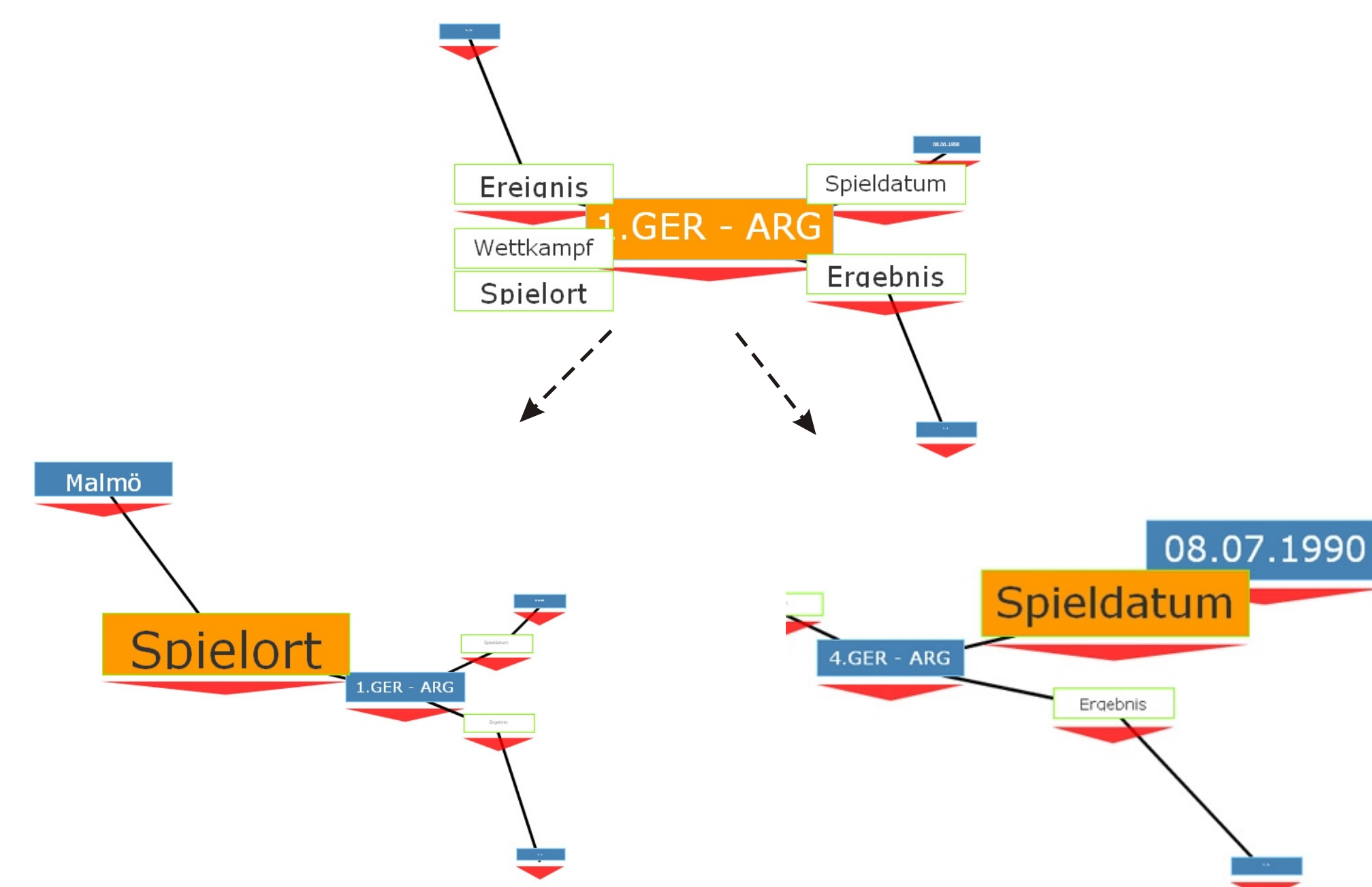## Semantic Graph Visualisation

- Summarise multimodal results and find appropriate mapping toward a lower-level visual object and its attributes.

- Find out visual pattern interrelationships.

- Automate the visualisation of multimodal graph information which complements natural language generation output.

- Provide consecutive information displays communicated from the server to the client.

Provide Semantic Graph Visualisation Solution: Semantic Navigation
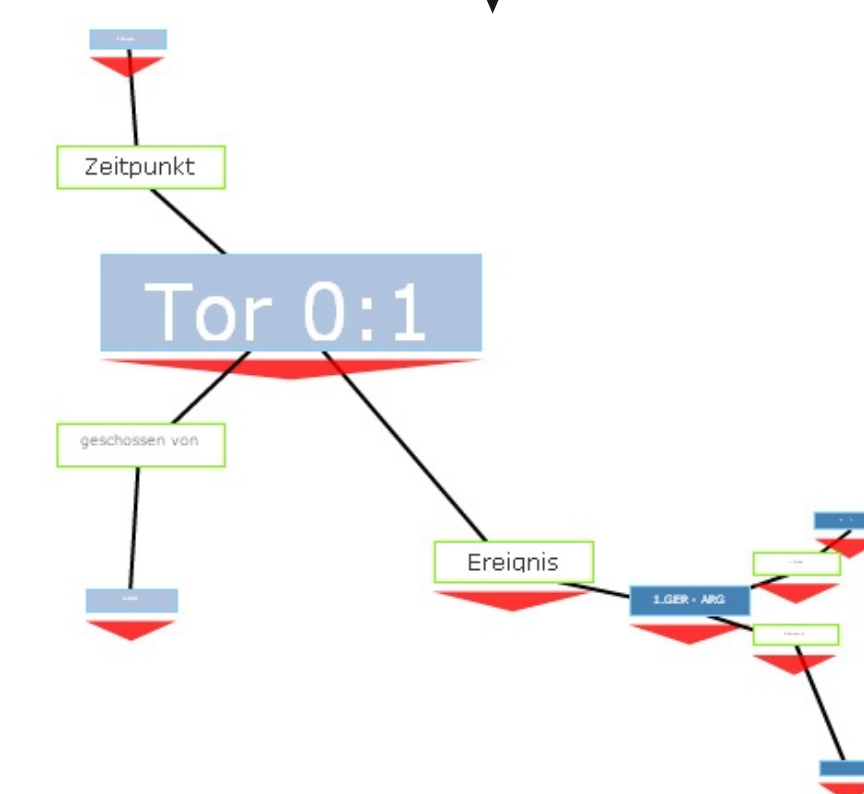
Semantic Navigation

- RDF result proximity graph delivers input for visual graph structure and navigation.

- Navigate and select focus by clicking ontology instances.

  Show only informative textual attributes (Information Filtering).

  Group similar instances together (Structure Mapping).

Standards

- W3C EMMA: for multimodal I/O representation, time stamps, status information, process numbers, generic container for content structures.

- SmartWeb SWEMMA: EMMA Extension for representing queries, results, and status objects.

- RDF for interaction with Semantic Mediator.
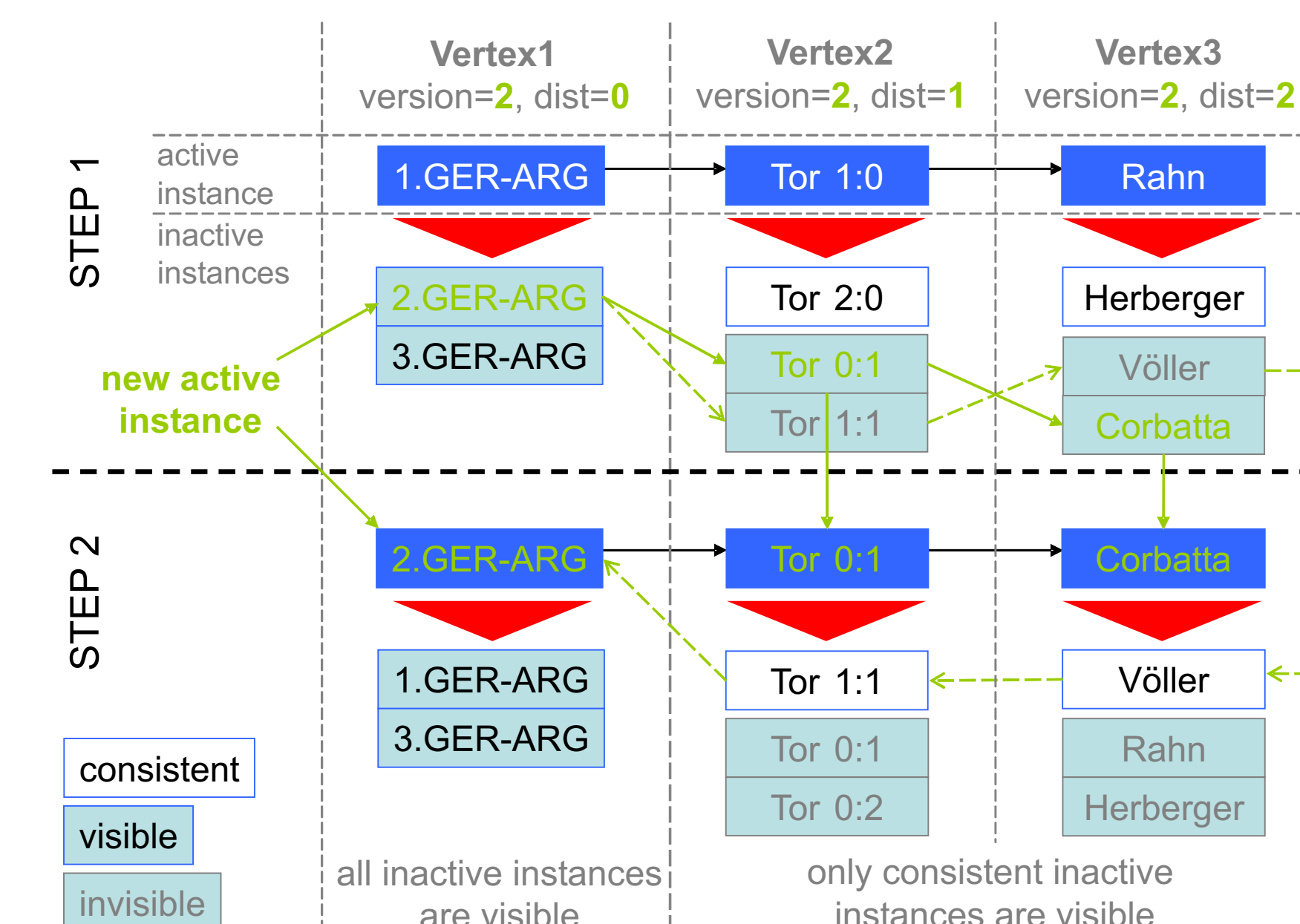
- MPEG-7 for describing Multimedia content data.

Graphical User Interface

"How did Germany play against Argentina in the World Cup?"
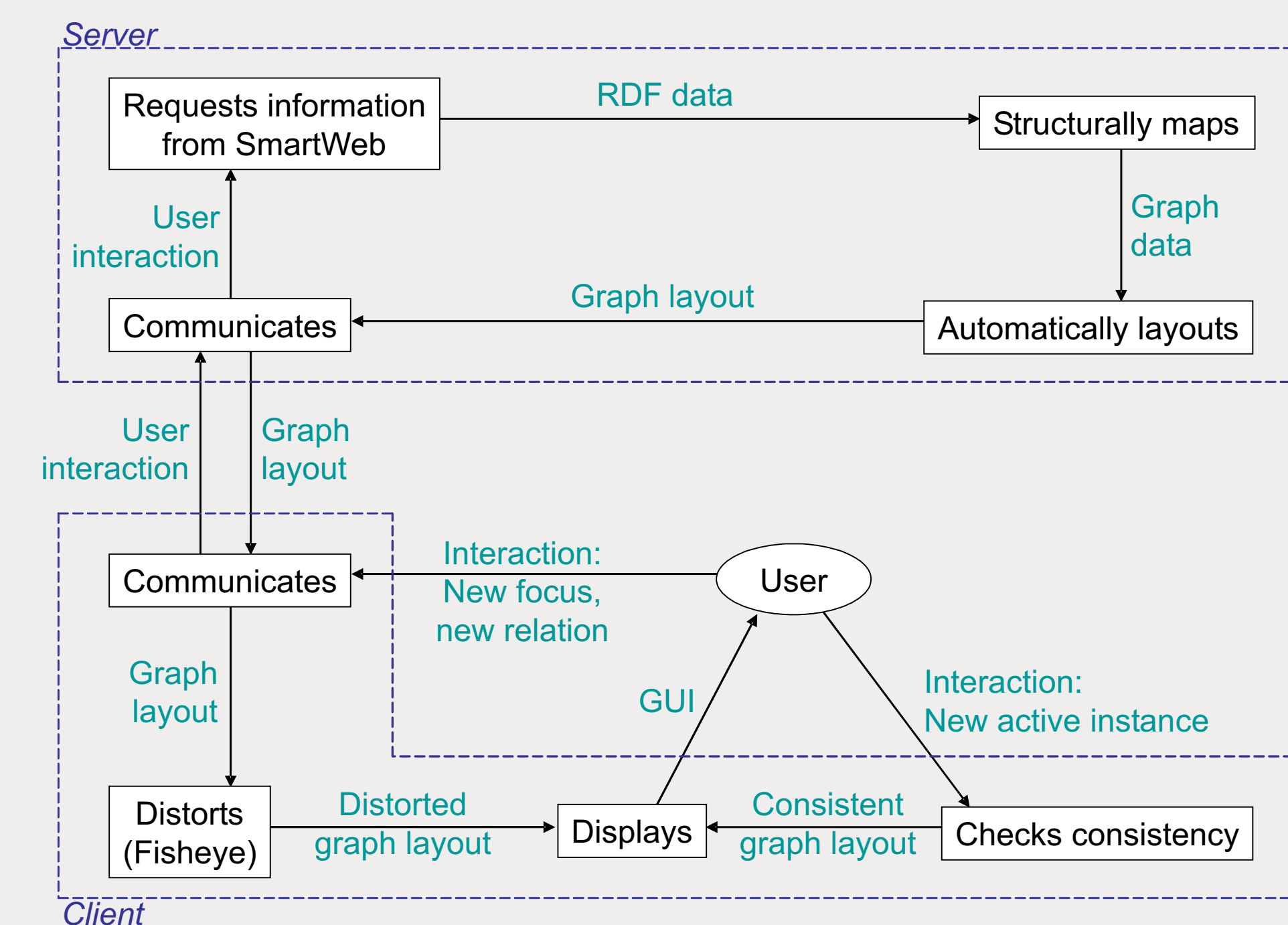

Multimodal Answers: "Fünf Spiele" (*five matches*) and Semantic Navigation

- Smooth transitions between consecutive displays:
  In STEP1 the user clicks on a further game instance "2.GER-ARG".
  In STEP2 the system updates all related node instances.

- All inactive instances of the focus node "2.GER-ARG" remain selectable, as well as all consistent nodes. All activated instances which are (1) related to the focus node and (2) at a short distance are highlighted.
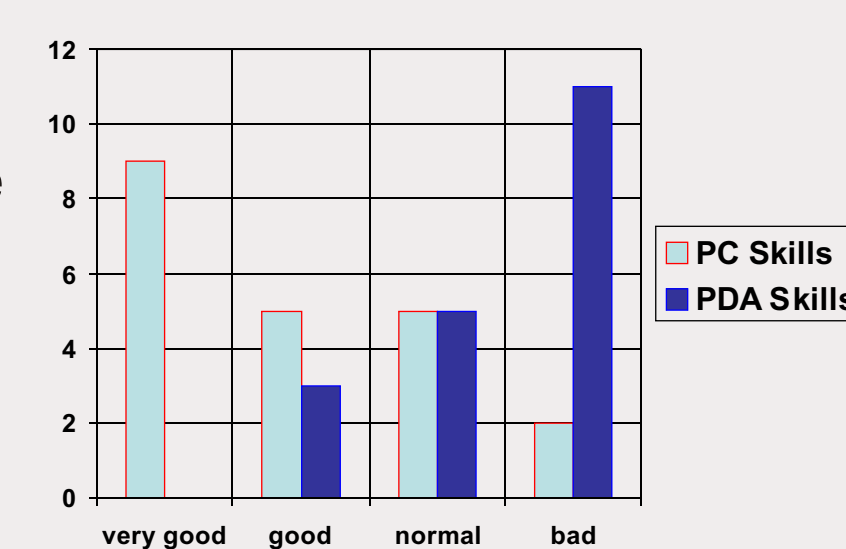

Dialogue System Integration

- The GUI on the client is connected to the automatic graph layouter that resists on the server. All data transfer between server and client is organised by special XML structures transmitted over socket connections in both directions for graph structure data to be exchanged, the graph node layout positions, and user interaction logging.
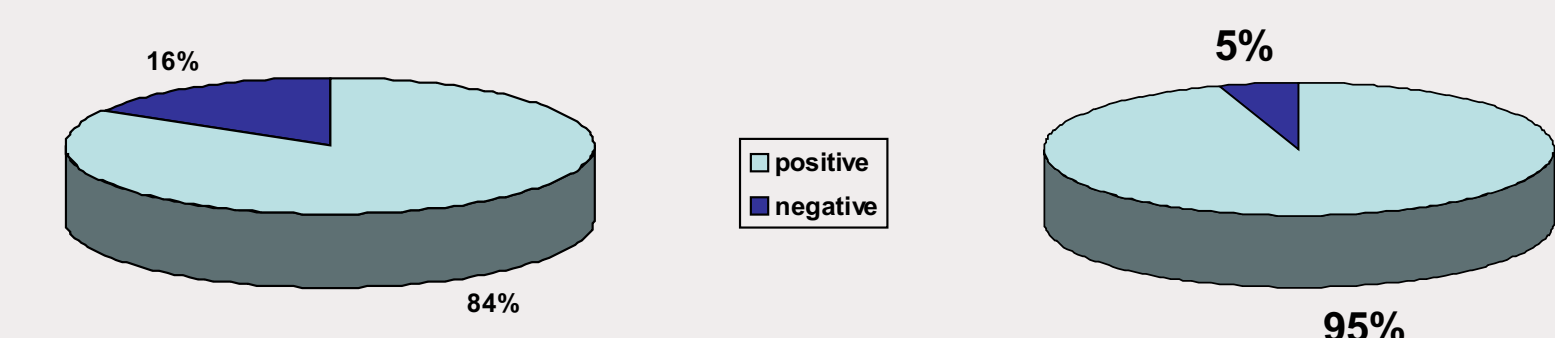

User Evaluation

- We conducted two evaluations that involved 20 users of different device skills in testing design ideas. User acceptance in mobile usage scenarios has been evaluated.

- 84% describe the graph interaction possibilities as easy to understand (after an initial demonstration), 95% easily understand the difference between instance nodes and relation nodes.

- Users accept our semantic graph visualisation approach! We provided an answer to the question how conceptual data models facilitate the generation of semantic navigation structures on mobile devices.