

# Actionable Agents for the Masses

Deborah McGuinness, Rensselaer Polytechnic Institute

We are living in a world where data is exploding, smart devices are ubiquitous, and non-geeks (as well as geeks) routinely request information from some form of intelligent agents. Some people are asking relatively simple questions that may be answered by a database lookup or SPARQL query to what appears as one integrated (up to date and trusted) source. For example, is UA5724 on time today? Answers from the official airlines site or trusted travel aggregator sites may be perceived as reliable enough for people to feel confident in acting on the information. Increasingly however, agents are being given more complex tasks that may require multiple data sources, some potentially with unknown sources or reliability. Also, agents are being asked for advice or judgments. As question answering becomes more complex, often additional information is requested about data sources, recency, and explanations or rationales for answers before users are willing to take action. Further, often users may not have training in computer science and thus they may desire explanations in natural language and/or visualizations that may be interactive instead of more typical computer vernaculars.

This scenario of enabling agents that can provide recommendations in human understandable and interactive format provides many opportunities and challenges for knowledge representation and reasoning research. I will name a few:

- Provenance – encoding, propagation, and presentation of information about what data was used, where it came from, and how it was manipulated in the answering process.
- Explanation – models for encoding, manipulating, and presenting support for as well as evidence against a particular answer or viewpoint.
- Context-awareness – representing and understanding enough about context to determine how to present an answer, when an answer is appropriate, and what supplemental material might be useful to allow an answer to be understandable enough and trustworthy-enough to act on.
- Semantic sweet spots – strategies for adding “appropriate amounts” of semantic markup when none is available, strategies for determining level of granularity for encoding in ontologies and using in applications, strategies for building models that are maintainable by non-ontology experts.
- Data deluge and information integration issues – strategies for ingesting, integrating, and presenting vast quantities of disparate data using potentially varying vocabularies.
- Mobile or otherwise constrained platforms – determining, representing, and reasoning with information about how to modify agents so that they can work under power constrained, time constrained, and screen real estate constrained settings. This could require limited languages, reasoning strategies such as partitioning or resource-bounded computation, alternative presentation strategies, etc.

We are exploring many of these issues in applications ranging from next generation health information portals, semantic monitoring of environmental and ecological data, semantic advisors, to name a few.