

Who the hell needs description logics anyway?

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Real People (not AI Researchers) have real problems!

“Is my data compliant with that
Ontology (schema)?”

“How do I tell my customers how
to send me data?”



Description Logics - Axioms about the world

- **Ontology Definition:** A busy father is a male person with at least 2 children
- **Single Fact:** Stefan is a busy father
- **Question:** Is my data compliant to the ontology?

Real People: Children Missing in Data!



AI Researcher: Sure!
Children are: Skolem constant 1
and
Skolem Constant 2



About Missing Boats...



An OWL 2 Far? ISWC2008 Panel

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Goals for the Semantic Web

- Provide a common knowledge representation (syntax & semantics)
- Facilitate publishing, data integration and information retrieval
- Make possible semantically interoperable web applications and services
- Enable question answering across global knowledge

The Semantic Web

A significant advance in knowledge management

- the KR (RDF/OWL) via typing and naming (URIs) **trivializes data integration**
- explicit formal semantics **enables reasoning and inference of global knowledge**
- **RDFS**, adds substantial background knowledge via *types*, and makes possible ***queries at various levels of knowledge granularity***
- **OWL increases our ability to more accurately capture knowledge**, constrains meaning (minimizes misunderstanding), enables quality assurance, semantic equivalence and instance classification

Comments on Semantic Web Languages

- **Standardization via the W3C** is one of the most **powerful** aspects of the semantic web effort
- Continue **research and development** to address unfulfilled needs and knowledge inconsistencies
 - Needs for (geo)spatial-temporal reasoning, probabilistic, quantitative reasoning, trust and disagreement
- **Alternatives** should be strongly considered as candidates for new specifications, provided they formally address **interoperability**

Current challenges

- **Modeling quality is poor**
 - **Ill-prepared** to accurately represent using (SW) language
 - **URIs: Mint your own** or **defer to authority?** URI equivalence and reference is still a outstanding community challenge
 - **KR:** different modeling leads to **incompatible** or **hard to** integrate knowledge
 - Increasingly expressive OWL ontologies actually *decrease* the ability to integrate data unless you exactly conform (need for modularity/repair)
- **Performance is a major hurdle**
 - large graphs are expensive to query (new technologies are getting better)
 - expressive ontologies are expensive locally, nvm at the SW scale
 - *need infrastructure for deploying SW knowledge*
 - *modularity and distributed reasoning for query answering*

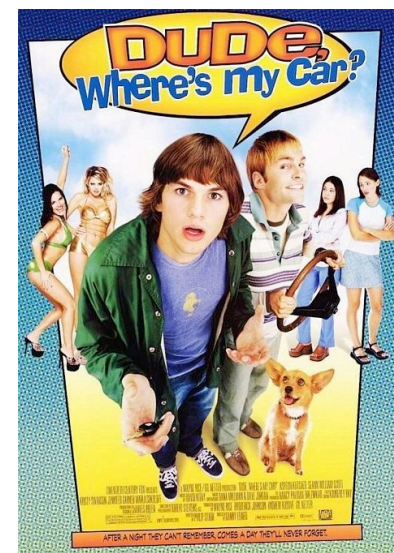
An OWL 2 Far ISWC 2008 panel

Tim Finin, UMBC

28 October 2008

Dude, where's my KR Language?

- OWL is the KR language of choice in 2008
 - It's a well designed KR language
 - It has lots of open source reasoners, tools, etc.
 - It's marginalized much of the 'competition'
- But it is ill suited for many application
 - It's too much for some, though RDF & N3 provide a "*worse is better*" alternative
 - It's too little for others
- Maybe we're a victim of our own success



Has OWL won the KR wars?

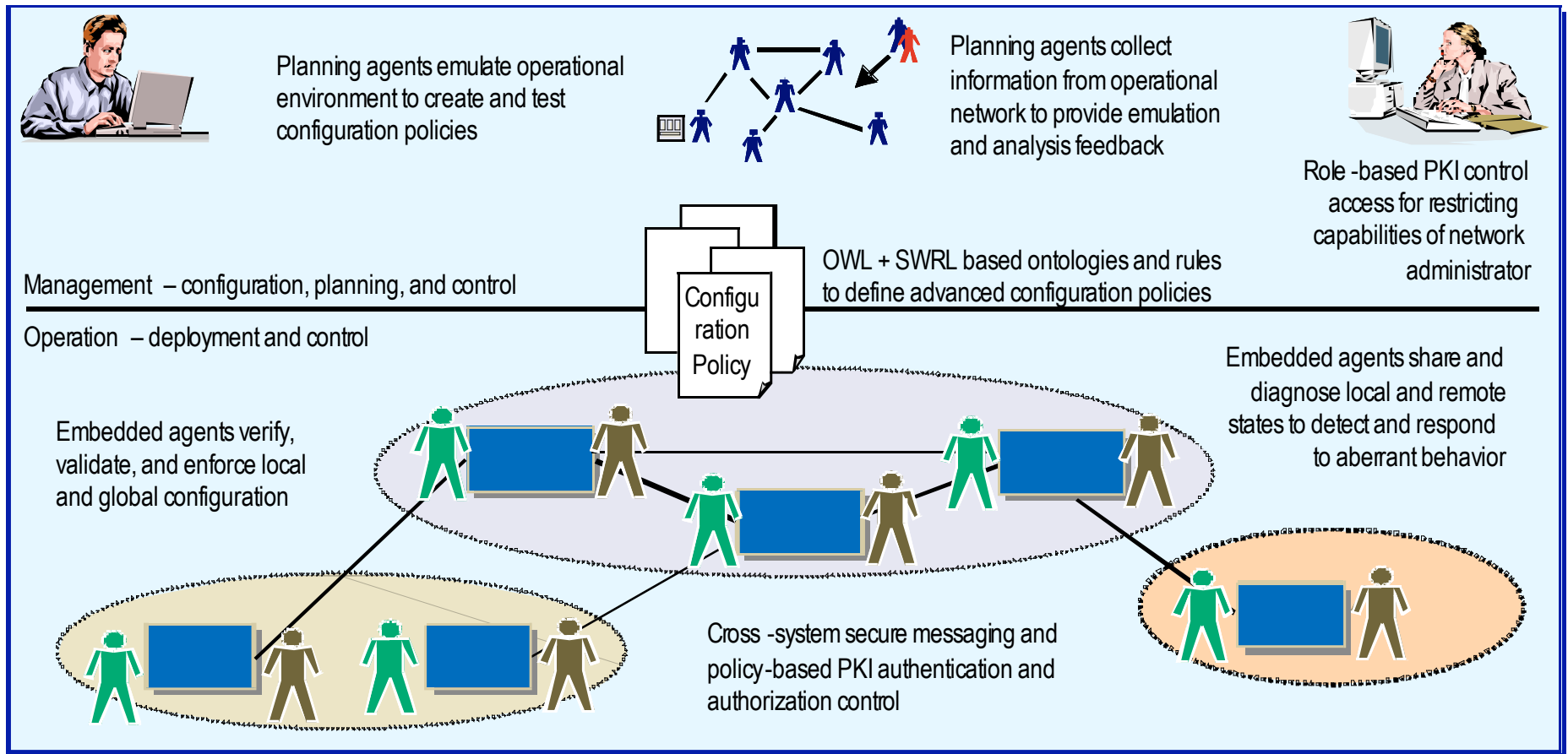
- Researchers used to have many KR systems with different properties to choose from
- Today, the default KR language for new projects seems to be OWL
- The ubiquitous nature of the Web and natural desire for reuse and interoperability have put an emphasis on standards
- Moving us toward a KR monoculture
- Monocultures can be limiting & even dangerous

An example with unmet needs

- Populating a KB from text
 - A project at the Human Language Technology Center of Excellence at JHU
 - Read a stream of text documents; extract entities, relations, and events; add/update KB
- OWL has poor support for some key needs
 - Managing contradictory inputs
 - Centrality of provenance, attribution
 - Representing uncertainty
 - Temporal qualification



Another example with unmet needs



PbA -WAN-C&M 001 v1

Self configuring network routers running in a coalition environment demonstrating constraints on border gateway protocol. Distributed SWRL policies converge to configurations. Joint work between Shared Spectrum Co. and UMBC supported by DARPA STTR.

Let a couple of flowers bloom

- The Web might be a universal information infrastructure
- But OWL wasn't designed to be a universal KR language
- We should recognize that OWL doesn't address many needs and encourage experimentation
- While preserving an OWL standard that meets specific Semantic Web requirements (what are they?)

AN OWL 2 FAR?

Ian Horrocks

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October 28, 2008





OWL(2) QUESTIONS AND ANSWERS

IS OWL(2) USEFUL IN APPLICATIONS?

- Absolutely!
 - Representing incomplete and semi-structured information
 - Developing large and complex vocabularies, e.g., in bio-medicine, geology, astronomy, aerospace, ...
 - Schema/Data integration
 - ...
- UK NHS £6 billion IT project uses an OWL ontology



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IS IT A UNIVERSAL PANACEA?

- Of course not!



OWL(2) QUESTIONS AND ANSWERS

IS OWL(2) TOO EXPRESSIVE?

- No!



OWL(2) QUESTIONS AND ANSWERS

IS OWL(2) TOO EXPRESSIVE?

- No!
 - Some applications need all of OWL's features
 - and some need even more
 - Some applications need only a subset of OWL's features
 - but probably not the same features
 - interoperability provided by OWL
 - OWL2 has "Profiles" with attractive computational properties
 - union of these profiles roughly equivalent to full OWL



OWL FALLACIES



OWL FALLACIES

OWL(2) IS BASED ON A STRANGE/EXOTIC LOGIC

- OWL(2) is just good old fashioned First Order Logic
 - studied by many of us in college
- OWL(2) uses a fragment of FOL
 - that is well suited to ontology languages
 - for which query answering is deducible
 - that works well in practice
- Such FOL fragments are known as Description Logics



OWL FALLACIES

OWL DOESN'T SCALE

- OWL tools can *already* deal with
 - Ontologies with 100s of thousands of classes
 - Datasets with 100s of millions of triples
- OWL2 has several “Profiles” with nice computational properties
 - OWL2 QL has same worst case complexity as RDBs
 - OWL2 EL & RL both have polynomial worst case complexity



OWL FALLACIES

OWL DOESN'T WORK WELL IN APPLICATION X

- Therefore, OWL is useless



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I HAVE SEEN SOME BADLY DESIGNED OWL ONTOLOGIES

- Therefore, OWL is useless



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OWL DOESN'T WORK WELL IN APPLICATION X

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I PREFER LANGUAGE X

- Therefore, OWL is useless



CHOOSE HOPE OVER FEAR

OWL(2) is not a universal panacea, **but**:

- Is already deployed in a wide range of applications
- Is an investment in the future of the Semantic Web
- Is a tremendous success for Semantic Web research



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Semantic Web community should spend more time **boasting** about OWL and less time **bitching** about it!