Hacking Reality:
Ontology Design Patterns and Semantic Abstractions in Ontology Integration

This hackathon will bring together a number of ontologies, ontology design patterns and high level semantic abstractions to create an ontology around the area of accident and risk.

Hackathon Proposal for Ontology Summit 2014

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The Issue & Proposal

Bottleneck-Reuse :

- Ontology Design Patterns have been proposed to address Re-use of semantic content
- Such work is in some ways analogous to software prototyping

We Propose:

- a hackathon which takes 1-2 extant design patterns as re-usable content,
- Adds some additional concepts as needed to form a new Pattern
- looks for data patterns in real data and links this all together to make (or at least describe) an application
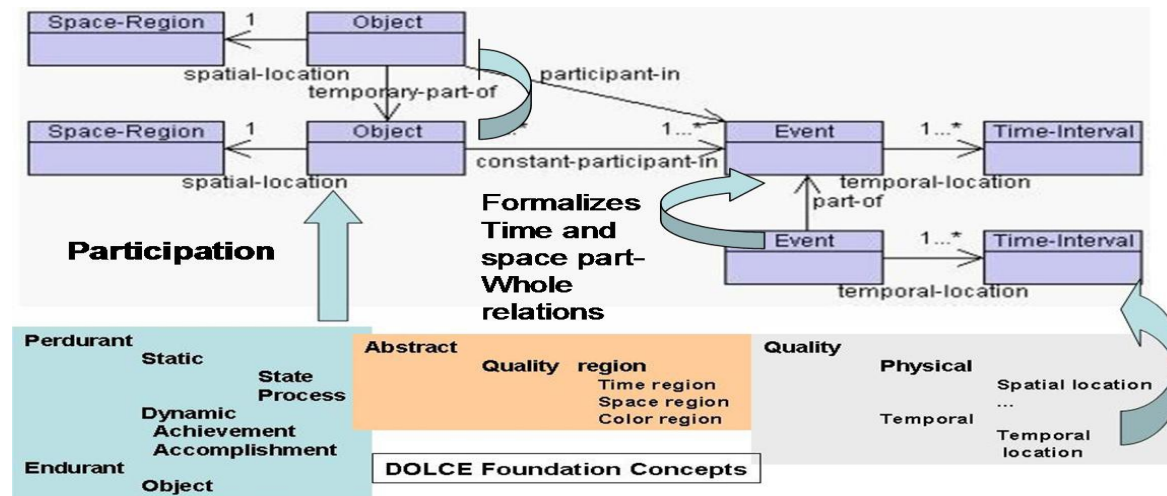
Hackathon Area

http://purl.org/NET/c4dm/event.owl#

Use Risky Situation as a unifying use case that uses ontology patterns for Events, Situations, &Participation
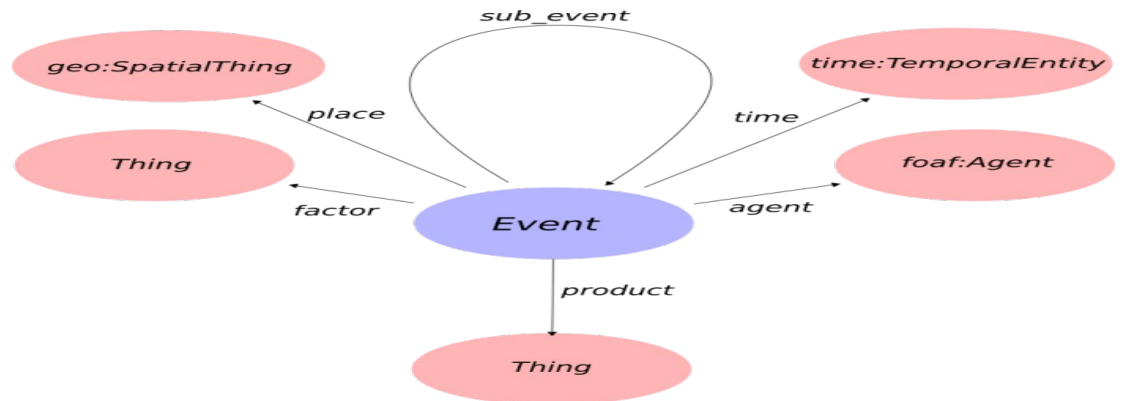
If enough progress is made this new pattern could be used to propose / design a simple application

Initial Topic - Ontologizing Risky Situations & Events

Risk: High level abstract pattern is easy:

- Risk = probability x Impact

Probability = percentage chance of event occurring

Impact = effect on goal

Semantic Abstractions:
- Mathematical Probability
- Event pattern
- Business Goals
  - Sentiment: Impact on Goal = importance of goal?

Risky events as part of Situations.
 That is, some Situations are risky because they involve events that bear some type of risk. There could be uncertainty is perceiving and predicting events and the consequences of actions.

Ground this in some accident statistics.

Accident statistics reveal factors of risk and establish the dependencies of accident rates on the characteristics and parameters of roads, cars, pedestrians, traffic and the environment of the accident location

References to mine for data - or get someone from this area:

1. Campbell, B.N., Najm, W. G. et al, 2003, Examination of Crash Contributing Factors Using National Crash Databases, National Highway Traffic Safety Administration, US Department of Transportation, ,DOT- HS 809 664, DOT-VNTSC-NHTSA-02-07.

2. Chang, D., 2008, National Pedestrian Crash Report. : National Highway Traffic Safety Administration, US Department of Transportation,, DOT HS 810 968, Washington, DC.

3. Zegeer, C.V., Stewart J.R., Huang H.H., et al, 2005, Safety Effects of Marked Versus Unmarked Crosswalks atUncontrolled Locations, Final Report and Recommended Guidelines, US Department of Transportation, Federal Highway Administration, HRT-04-100, 112

ODP Hackathon Activities

Firm up Topic Area

Leverage the Best Ontology Patterns & related Concepts
- Accident, Risk (Mathematical Probability)
- Events, Situations, Participation, Accident etc.

If we are able, we would aim to extend this into a basic risk application.

 This would use some semantic abstraction of risk itself, combining events, situations, probabilities and impacts, and integrate data such as accident statistics to support a simple query and calculation application.

A possible outcome would be the specification of such an application for future development.

We also need data

- Data
  - Validate the patterns with real data such as accident
  - Find data resources in the "wild" (events, news, impacts)
    - Discern patterns in these – reconcile with ODPs
    - Reasoning over these? Effect of reasoning constraints on availability / collection of data

For an Application

- Gather a diverse corpus of data about events, goals / impact, news etc.
- Align these semantically within one unifying ontology
- Model probability semantically and create / find test data for numerical probabilities
- Carry out SPARQL query against combined probability / event / Impact of event
- Returns numbers: Feed those into a simple calculation application

Who's In?

☐ Ontologists

☐ Linked Data experts

☐ Querying experts

☐ Domain experts

☐ People with patterns in the various elements of
  - Events
  - Goals / Business / motivation etc.
  - Mathematical / Probability

Tools / Environments

❑ Environment for modelling ontology
- – Protégé / WebProtégé / CMAP/ Others?

❑ Environment for Business review / presentation?

❑ Environment for instance data

❑ SPARQL Querying

❑ Calculation / spreadsheet for results

Prototype application: Risk Assessment

❑What are the risks related to X?

❑Should I worry about Y?

❑What should I worry about tomorrow?

Figure out a use case for something like the above, and determine the queries needed to satisfy this / these

Build prototype risk application

Hackathon Description

❑ Create a complete ontology for the different subject areas
  - Linked within a common set of partitions?
  - Consistent work-view locally to the application

❑ Have something which can be stood up in e.g. Protégé / WebProtégé

❑ Run queries (SPARQL)

❑ Take the output and ingest into a simple application or a spreadsheet

Outcomes

❑An understanding of the factors influencing reusability

- − Ontology Design Patterns versus Semantic Abstraction
- − Be able to frame concepts from different ontologies within one framework
- − Identify what it took to make different ontologies re-usable for this application
- − Conceptual: Use / usefulness of SKOS, other tools to formalize "Concept"

❑Use-case Driven Ontology Integration, or how:

- − Use case drives queries
- − Queries drive ontology requirements
- − Ontology requirements drive re-use

❑How available data determines ontology use / re-use

❑Understand the integration considerations:

- − Partitioning of the model concepts
- − Reconciling diverse views of a concept (e.g. event)
- − Linking available data to integrated ontologies

ODP Future

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