Is an upper-level ontology useful?

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A tale of two clothes stores - the wardrobe vs the drawer

- IS AN UPPER-LEVEL ONTOLOGY USEFUL?
What is in the drawer?

Perhaps t-shirts – not sure.

Can’t tell how many

There is a blue one with leaf patterns, a black one with some wording, something green...

Basically, without lifting things out we can’t really tell.
What’s in the wardrobe?

- At least 4 pairs of trousers (1 x grey, 2 x fawn, 1 x blue)
- At least 10 shirts (2 x white, 2 x pink, ....etc)
- Perhaps 4 suits or sports jackets
- One suit bag – no idea of the contents
- Two outer jackets
- Other unknown jacket-looking clothes
What is the special technology that provides insight here?

The hanger

Cheap, simple, easy to use.
Which is easier to use in a systematic way?

Easy!

Challenging!
Data gets meaning from the ontology.

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How does an ontology give meaning to the data?

- via rdf:type (is-a) relationships to Classes (верхний уровень)
- via Class – Subclass relationships (подклассы)
- via Domain and Range constraints (не показаны)
- via Disjoint statements (непересекающиеся)

Bobo on Bobo’s perch
Modularity & Reuse Example

A typical set of enterprise systems...

- Home Office
- Exempt employee
  - Salary
- Hourly worker
  - Pay rate

...converted into departmental ontologies

- User
  - hasAccessTo
  - locatedIn
- Database
  - installedOn
- Server
  - locatedIn
- Datacenter
  - locatedIn
- City

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Common Meaning Extracted

HR Department

- Building
- Personnel
  - a kind of Exempt employee
    - Salary
  - a kind of Hourly worker
    - Pay rate
  - assignedTo
  - locatedIn
- Home Office
- Jurisdiction

IT Department

- Personnel
- Building
  - a kind of User
    - hasAccessTo
    - locatedIn Datacenter
    - installedOn Server
- Country
  - ISO code
  - locatedIn City

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Linking Commonality with a General Ontology

HR Department

IT Department

Identical concepts will collapse into one.
- Building, Personnel,

Related objects find their commonality

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With this result, federated queries are easy.
Modularity & Reuse—Review

- Started with two separate data sets
  - Typical, uncoordinated application data repositories
- Created a general ontology
  - Extracted shared, reusable concepts from each
- Adjusted the HR ontology
  - Now specializes concepts from HR perspective
- Adjusted the IT ontology
  - Now specializes concepts from IT perspective
Don’t let anyone tell you it’s easy – it’s not!

• It’s a lot of work to retrofit
• Agreeing on terminology between teams, or else agreeing to adopt the external upper-level ontology
• Agreeing on, or adopting minting patterns for URIs (both ontology & instance)
• Updating schema to link to upper
• Better to start off with an upper-level ontology
Ontological Commitment

• Be careful!
• Before you import, be sure that you agree with the **whole** of the ontology “tree” you’re connecting to, not just **part** of it.
• This means you agree with or can live with **all** its assertions (i.e., triples) and inferences.
• This is called “Committing to an Ontology”
• The best approach is not to retrofit, but to start with the upper-level ontology
But there are lots of benefits

• The ‘hanger’ could be any ontology – having an explicit set of semantics is a great benefit
• The ‘hanger’ as an upper ontology makes it easier to group and sort information types across multiple sources
• The ‘hanger’ makes it easier to bring in new information into your stores
• The ‘hanger’ helps you to develop modular, reusable architectural components
• Data becomes more readily interoperable
• Queries can be written so that they can be more easily federated
If upper ontologies are so helpful, which should I use?

• Upper and Middle:
  • Cyc: Gigantic scale
  • SUMO: Large scale
  • schema.org (lightweight, growing)

• Upper Only: small scale
  • DOLCE-Lite
  • Basic Formal Ontology (BFO)
  • gist: business focus
  • l0: Italian Government

There is some choice

Pick something that is appropriately scaled to your problem domain

I work in enterprises (public and private sector) so gist is designed to suit my work.
gist – an upper ontology for business information models

143 Classes
108 Object Properties
1692 Axioms
25 Domain constraints
46 Range constraints

https://www.semanticarts.com/gist/

gist is our minimalist upper ontology. It is designed to have the maximum coverage of typical business ontology concepts with the fewest number of primitives and the least amount of ambiguity. Our gist ontology is free (as in free speech and free beer—it is covered under the Creative Commons 3.0 attribution share-alike license). You can use as you see fit for any purpose, just give us attribution.
A Selection of gist Top Classes

Artifact
An intentional, person-made thing, which could be physical or content.

Category
A concept or label used to categorize other instances informally. Things that can be thought of as types are usually Categories.

Collection
Any identifiable grouping of instances. For instance, a jury is a collection of people.

Commitment
An obligation (possibly unilateral).

Organization
A generic organization that can be formal or informal, legal or non-legal. It can have members, or not.

Event
Something happening over some period of time, often characterized as some kind of activity being carried out by some person, organization, or software application.

Physical Identifiable Item
You could, at least in principle, put an RFID tag on members of this class. Physical things are made of something. E.g., statues are made of bronze.

Intention
Goal, desire, aspiration. This is the "teleologic" aspect of the system that indicates things are done with a purpose.

Place
Union of all the geo classes.

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So, Is an upper-level ontology useful?

• You stand on the shoulders of giants – much heavy lifting has already been done.
• Many ontologies and derived application profiles are built with the primary purpose being to directly structure and add meaning to specific kinds of data.
• That’s fine if they are just going to be standalone items, but most times they are not because we want to integrate data from multiple sources and schemas.
• So, for portfolios of systems, an ontology whose primary purpose is to organize and unify other ontologies is very useful.

• So “yes!”, an UPPER-LEVEL ONTOLOGY is very useful.

• Practice Recommendation:
  • Start your ontology development by extending from an upper-level ontology.
  • Which one? Any ... just use one.
Thank you for attending

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