

Approach to building ontologies

A high-level view

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Introduction

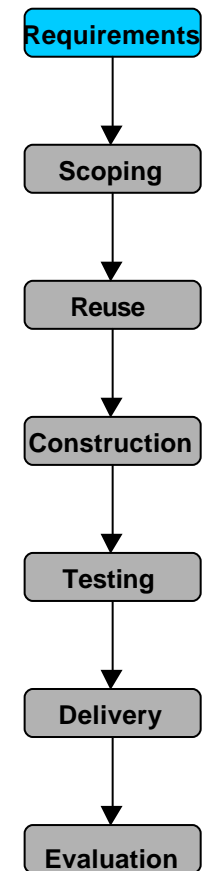
- Describe **key** steps in our approach
- Illustrate with a case study
- **Not** a discussion of project management
- Help inform integration of DL ontology building into wider knowledge base projects

Key steps

- **Requirements gathering**
- **Content scoping**
- Reusing existing components
- **Construction**
- **Internal testing**
- Delivery
- Evaluation

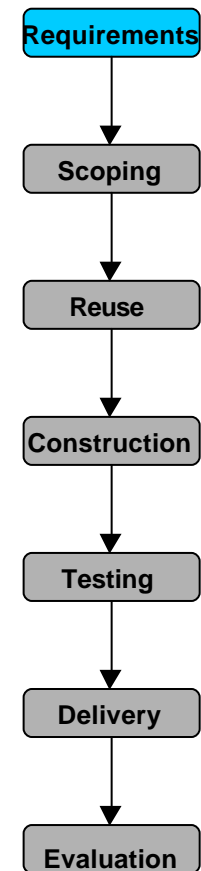
Requirements gathering

- What can a DL based ontology offer and should I use one?
 - Most people hold misconceptions
- Key functions
 - Organising/ maintaining a **large** vocabulary within a knowledge base
 - **Integrating** vocabularies from several knowledge bases



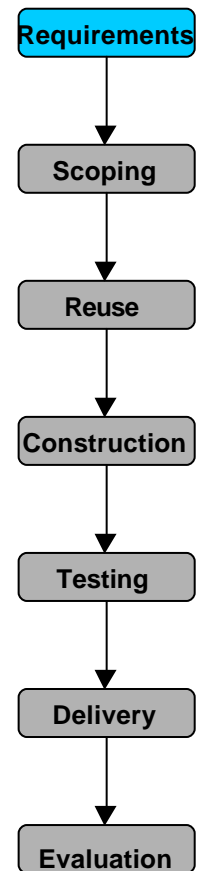
Case study – a Drug Ontology

- Research group builds a knowledge base of **prescribing guidelines** for specific conditions
 - KB excludes prescribing ‘common sense’ information.
 - E.g. ‘Don’t suggest a drug if it will interact with patient’s medication or other conditions’.
- Need **additional** knowledge bases to hold
 - General drug interactions
 - General contraindications



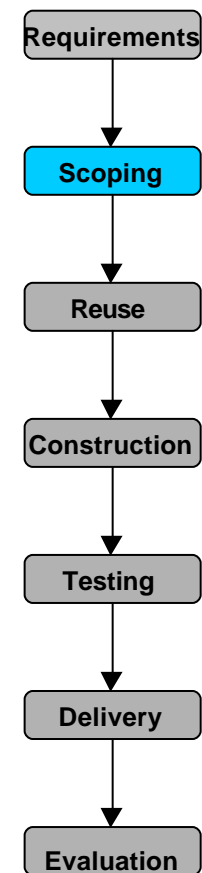
Drug Ontology case study - requirements

- Require a **single vocabulary** to integrate the information in each KB in a logically consistent way to support inference
- Problems which DL ontologies **can** address
 - Vocabulary will be **large** (1000's of terms)
 - Hard to maintain consistently by hand.
 - Concepts cover a **wide** range of granularity
 - Need to be organised in a classification
 - Concepts are **complex**
 - Multiple ways of classifying the same concept



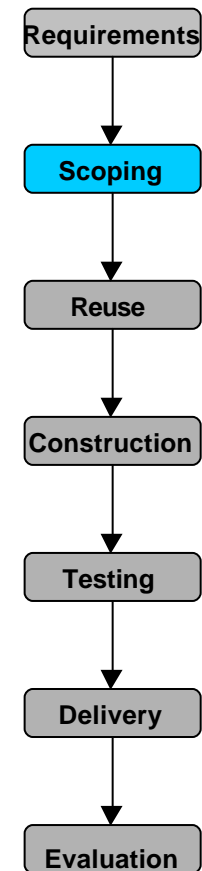
Content scoping

- *Description* Logic Ontology building is **descriptive!**
 - Focus taken away from enumeration and manual classification
- Determine expected coverage and **complexity** of concept descriptions required.



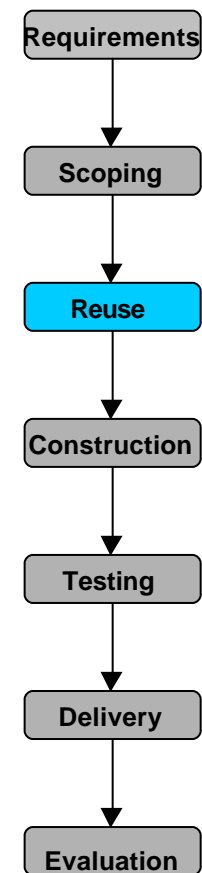
Drug Ontology case study - scoping

- Sample concepts from each knowledge base.
 - guideline KB–
 - if on **anti-anginal** ...
 - Anti-anginal definition will need to include clinical **condition concepts** in definition (angina).
 - Angina definitions will need to include **anatomy** and **physiology** concepts in definition (heart, blood flow)



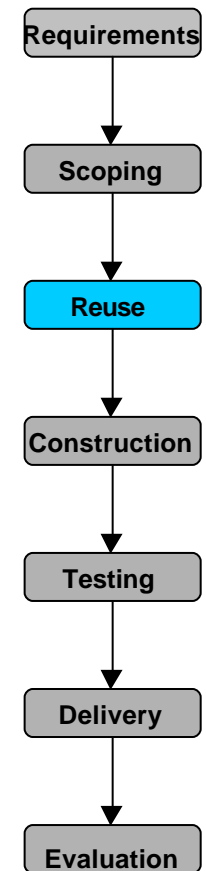
Reusing existing components

- Reuse as much as possible especially at the higher levels of the ontology.
 - Standard upper level ontology
 - Previously built domain ontologies
- Make what you build reusable



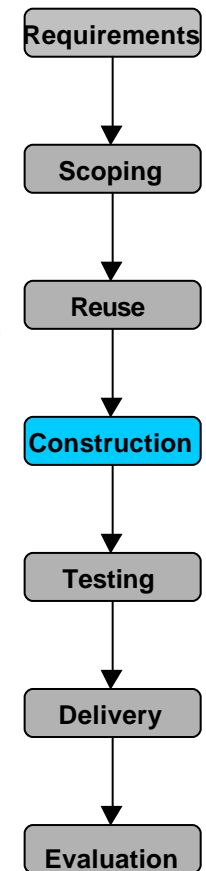
Drug Ontology case study - components

- Upper level ontology reused
- **Anatomy** and **physiology** domain ontologies reused and amended.



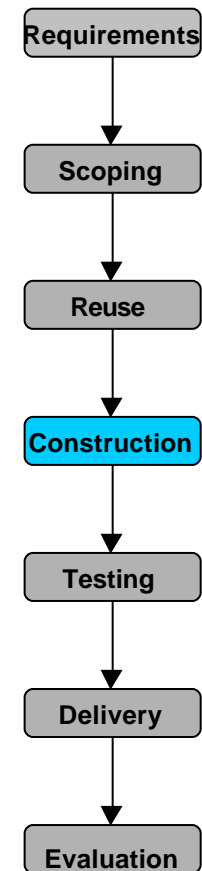
Construction

- Often split into **two** tasks
 - Terminology knowledge **acquisition**
 - Interacting with domain experts
 - Terminology knowledge **low-level modelling**
 - Expressing knowledge in formal and consistent manner
 - Use a suite of design patterns and methodologies



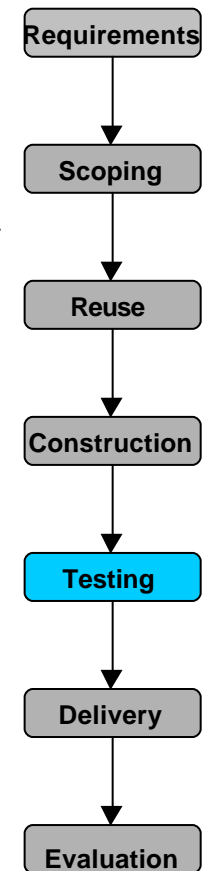
Drug Ontology case study – knowledge acquisition

- Use an **intermediate** representation
 - Simpler, less constrained
 - Customised to a domain
 - Authoring tools



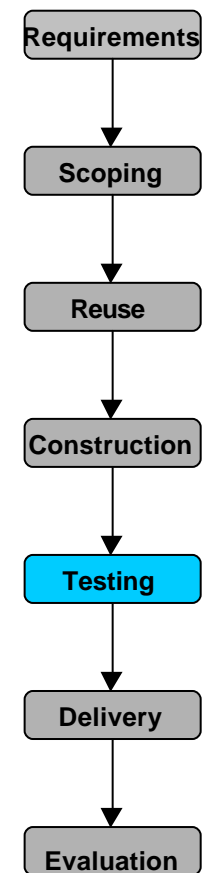
Internal testing

- What does the logic give you?
- Logical consistency checked **automatically**
- Semantic consistency can be **assisted** by the DL reasoner
 - By classification – miss-classification
- Additional tools
 - By query and visualisation – missed classification



Case study – internal testing

- Pain classed as a nervous system disease
- Incorrect definition of pain



Evaluation

- Testing of ontology within final application
- Case study - evaluation
 - Problem integrating existing vocabularies.
 - Meaning **cannot** be taken on face value
 - No human to intervene
 - Must also explicitly take into account **context** is which term is used.
 - Reference material versus Patient record

