

Integrating Argumentation, Text and Community:

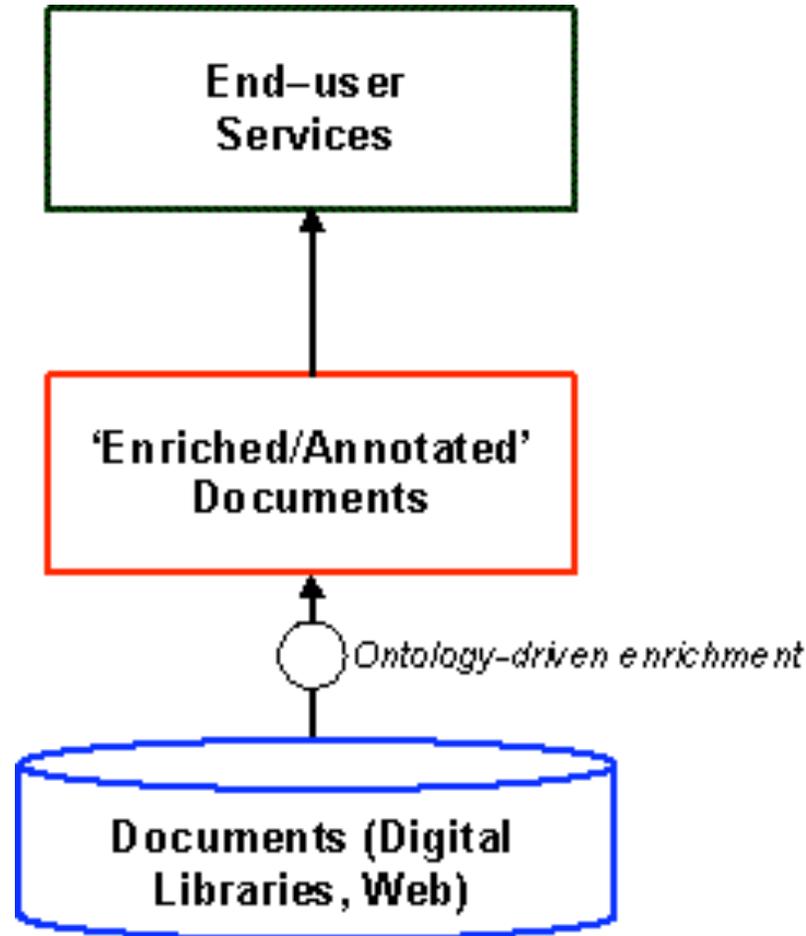
Toward an ontology and services

*Neil Benn, Simon Buckingham Shum,
John Domingue*

CMNA Workshop, 30 July 2005



Vision within our tradition



- **Ontology-driven document enrichment** (cf. ScholOnto project & Semantic Web stuff)

Overview of talk

- Research Focus
- The Ontology
- Opening a conversation
- Example
- Conclusion



Analytical Lens on Digital Lib.

- *What is being debated about this topic?*
- *Who are the experts on this research topic?*
- *What is this particular author's theoretical framework (underlying philosophy)?*
- *What are the main philosophical camps in the field, and is there anyone that subscribes to more than one competing camp?*
- These kinds of questions "support students' access and entry into the conversation of their chosen discipline"

[Davidson & Crateau (2000) INTERSECTIONS: Teaching Research Through a Rhetorical Lens]



So, above *this* we can place...



Analogical Constraint Mapping Engine ACME

Search

[Advanced Scholar Search](#)
[Scholar Preferences](#)
[Scholar Help](#)

Scholar

Results 1 - 10 of about 113 for [Analogical Constraint Mapping Engine ACME](#).

[CITATION] Integrating structure and meaning: A distributed model of **analogical mapping**

C Eliasmith, P Thagard - *Cognitive Science*, 2001

[Cited by 27](#) - [Web Search](#)

[Incremental structure-mapping](#)

KD Forbus, RW Ferguson, D Gentner - *Proceedings of the Cognitive Science Society*, 1994 - [psych.nwu.edu](#)

... The **Structure-Mapping Engine** : Algorithm and Examples . *Artificial Intelligence*, 41, 1-63 **Analogical mapping** by **constraint** satisfaction. ...

[Cited by 50](#) - [View as HTML](#) - [Web Search](#) - [psych.northwestern.edu](#) - [grg.cs.northwestern.edu](#) - [grg.nwu.edu](#) - [all 6 versions »](#)

[PS] [Analogical](#) asides on case-based reasoning

MT Keane - *EWCBR*, 1993 - [ftpagr.informatik.uni-kl.de](#)

... techniques, although portions of the model have been parallelized recently (see

[6]). Holyoak & Thagard's [14] **Analogical Constraint Mapping Engine (ACME)** ...

[Cited by 7](#) - [View as HTML](#) - [Web Search](#) - [portal.acm.org](#) - [portal.acm.org](#) - [Library Search](#)

[PS] [On order effects in analogical mapping](#): Predicting human error using IAM

MT Keane - *Proceedings of the Seventeenth Annual Conference of the ...*, 1995 - [historical.ncstrl.org](#)

... Holyoak & Thagard's (1989) **Analogical Constraint Mapping Engine (ACME)** uses parallel **constraint** satisfaction in an interactive network to find a single global ...

[Cited by 5](#) - [View as HTML](#) - [Web Search](#) - [cs.tcd.ie](#)

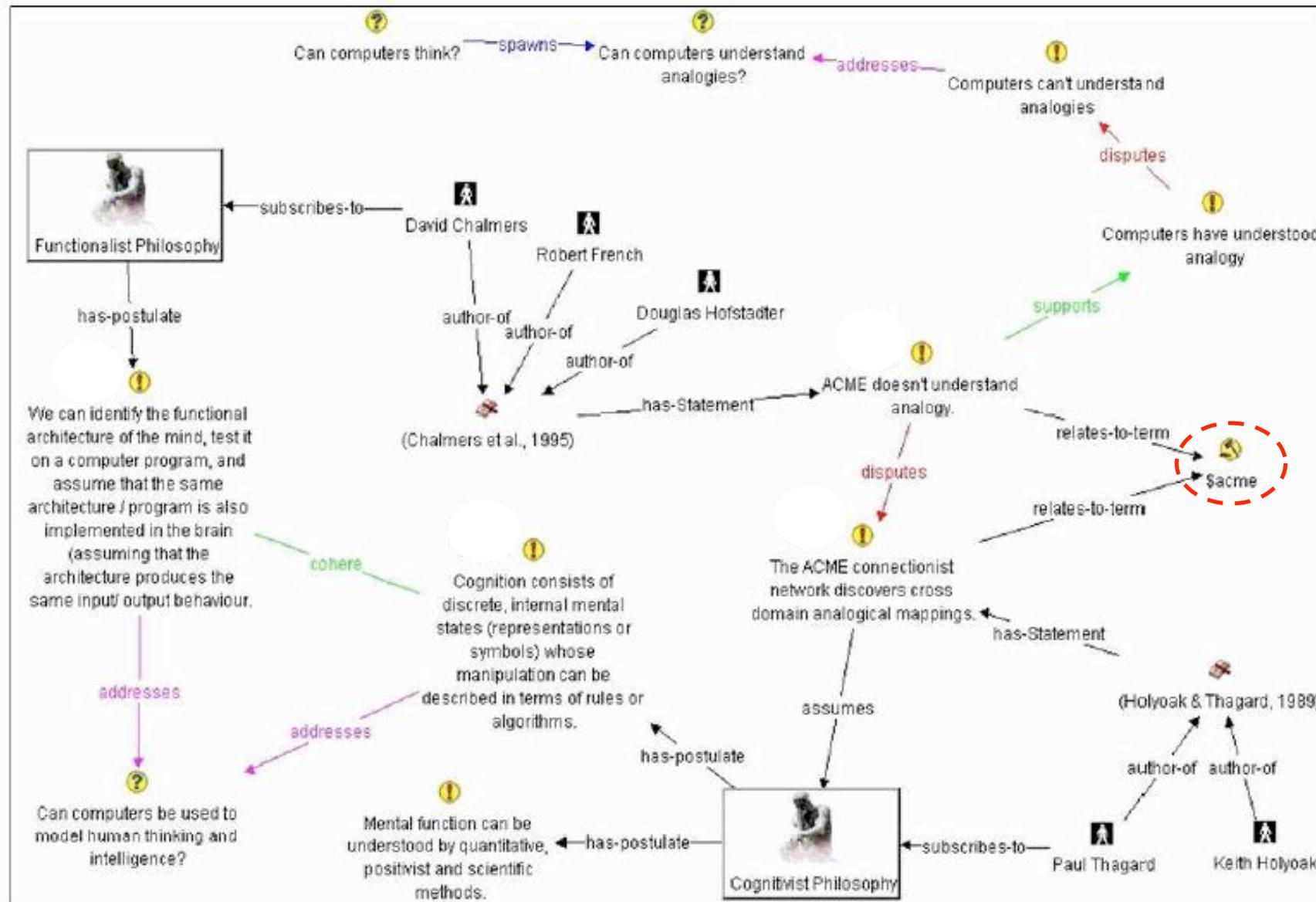
[Towards a computational model of evaluating and using analogical inferences](#)

K Forbus, D Gentner, JO Everett, M Wu - *Proceedings of CogSci97*, 1997 - [grg.nwu.edu](#)

... The systematicity **constraint** reflects a (tacit) preference ... of cognitive models of



...a layer of analysis



Extract from Robert Horn's Turing Debate Map



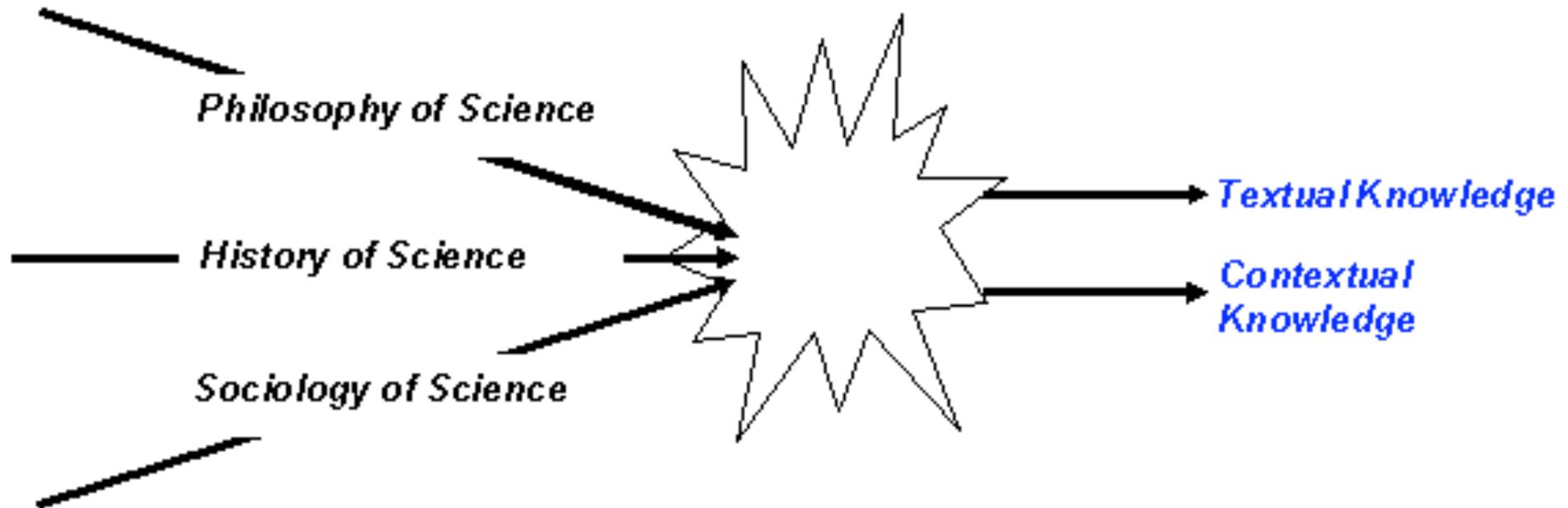
Research Question

- What is the nature of a suitable formalisation for representing academic debate and enabling analysis of an academic domain?



Ontology behind the wheel

- Kinds of **objects**, **attributes** of objects, and **relations** between objects that make up an academic domain



- Textual (**within publications**); Contextual (**surrounding publication production**)

Tri-partite Ontology

- Contextual Knowledge
 - Community of Practice
- Textual Knowledge
 - Lexical Knowledge (Field-specific Content)
 - Argumentation Knowledge



Community of Practice Concepts

Concept	Attributes	Typical relations
Person	Name, Gender	researcher-at → [Institution] author-of → [Publication] collaborates with → [Person] believes → [Statement]
Project	Name, Start Date, End Date	has-member → [Person] or [Institution]

- Concepts from AKT Reference ontology
- E.g.
 - [Neil Benn] student-at [Knowledge Media Institute]
 - [Neil Benn] author-of [benn2005integrating]
 - [AKT Project] has-end-date [01-06-2005]
 - [AKT Project] has-member [Knowledge Media Institute]



Lexical Concepts

Concept	Attributes	Typical relations
Lexical-Term	Gloss, Definition	{broader-term, narrower-term, equivalent-term, opposite-term, part-of, has-part} → [Lexical-Term]

- ‘Conceptual’ system of the field – the content
- Classic Thesauri relations
- E.g. (in Bioethics research domain)
 - **[Life:** “Any form of living animal or vegetable...”] **has-narrower-term** **[Human Life:** “Any living entity which has human DNA...”] **has-associated-term** **[Human Personhood:** “This is a form of human life which is considered to be a person whose life and health should be protected. No consensus exists about when this begins.”]



Argumentation Concepts

- Natural Argumentation focus:
 - The kinds of **moves** in publications
 - As an aid to **structuring** a mass of information in academic fields
 - Two levels of Argument Structure (**Individual** & **Collective** Argument)



Argumentation Concepts (2)

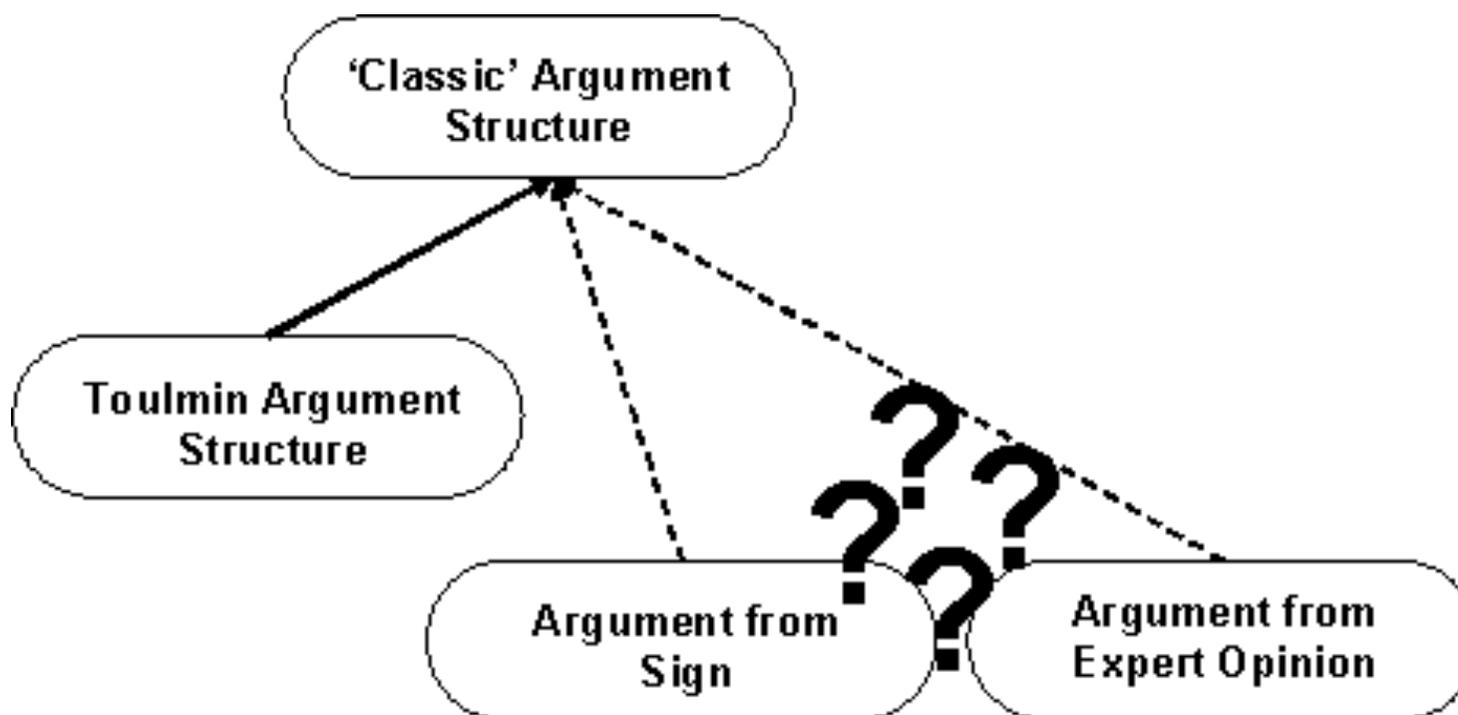
Concept	Attributes	Typical relations
Issue	Text	generates-issue → [Issue]
Statement	Text	{supports, disputes} → [Statement/Argument] {cohere, incohere} → [Statement/Argument] relates-to-term → [Lexical Term] addresses → [Issue]
Argument	Premises, Conclusion	<i>(same as above)</i>
Toulmin Argument	Grounds, Warrant, etc	<i>(same as above)</i>

- E.g.
 - [Iss1: "When is abortion morally acceptable?"] generates-issue
 - [Iss2: "When does human personhood start?"]
 - [S1: "Human personhood begins at conception"] addresses [Iss2]
 - [S2: "Human personhood begins at birth"] addresses [Iss2]
 - [S1] disputes [S2]

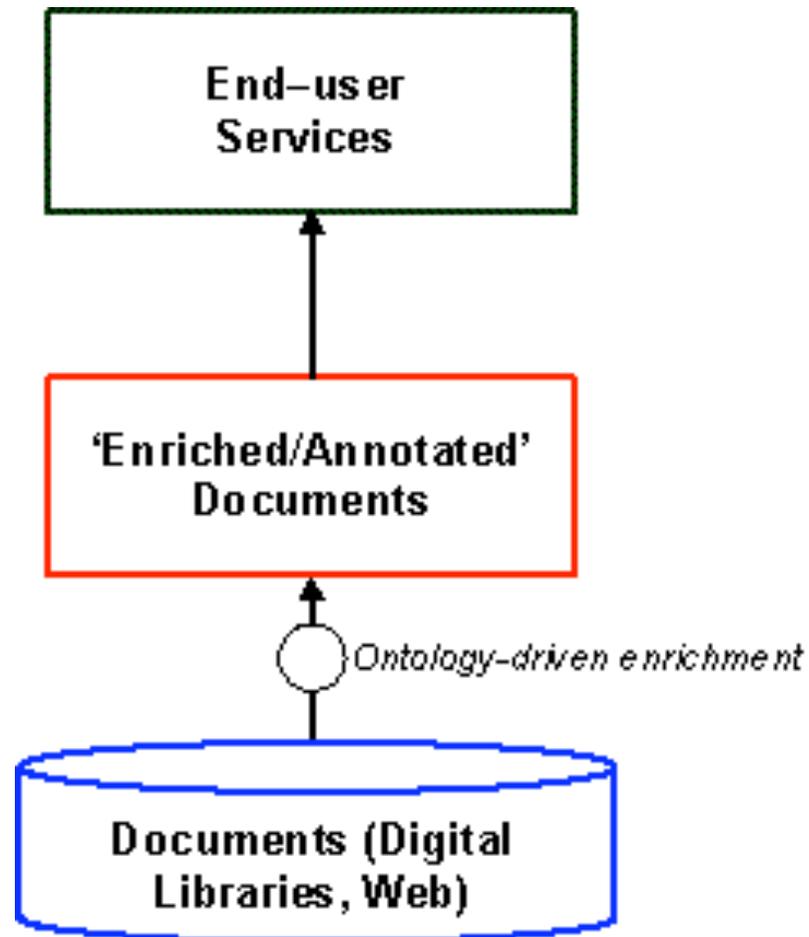


More ingredients in the pot?

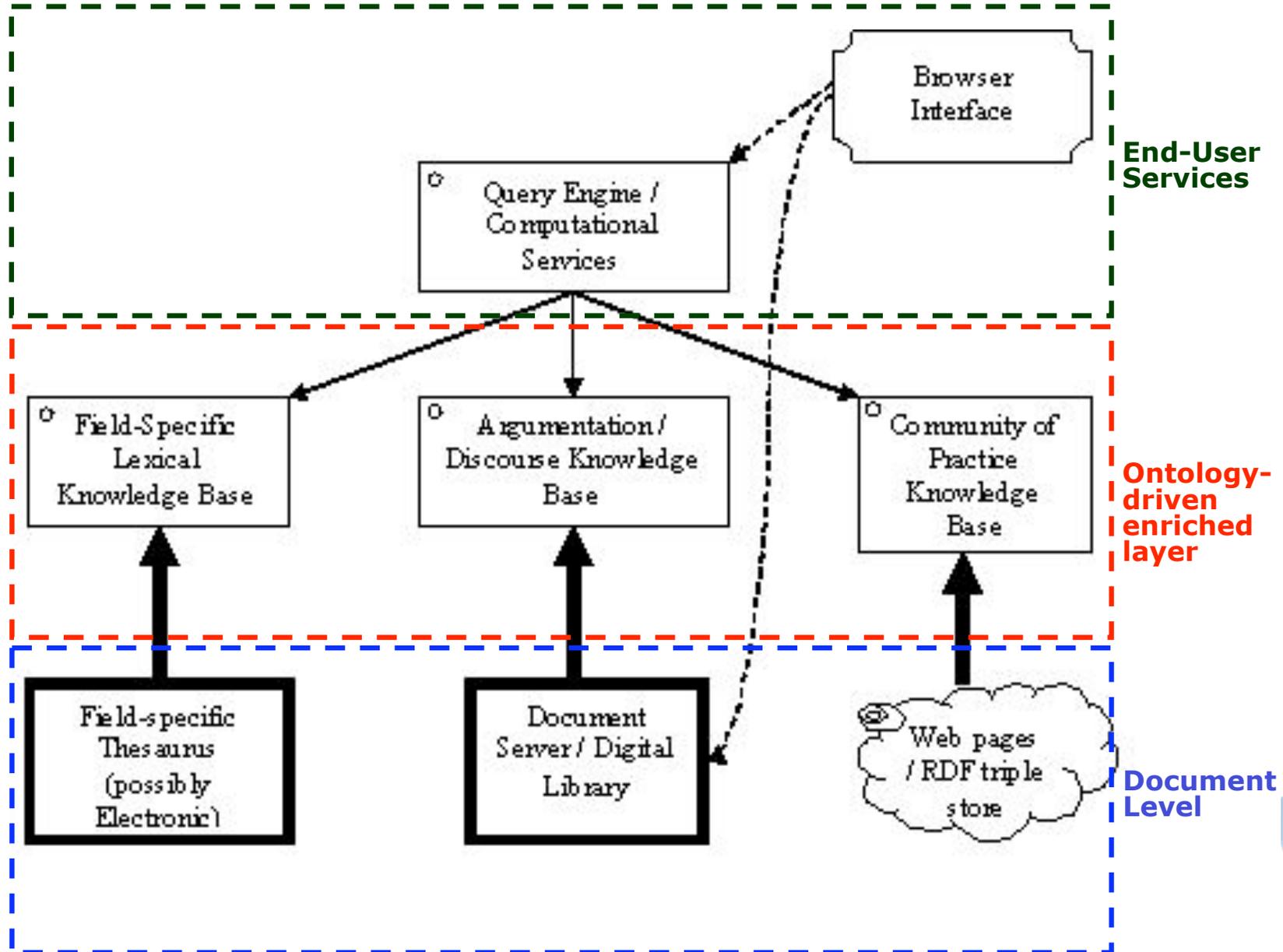
- Starting conversation with you, the experts



Revisit...

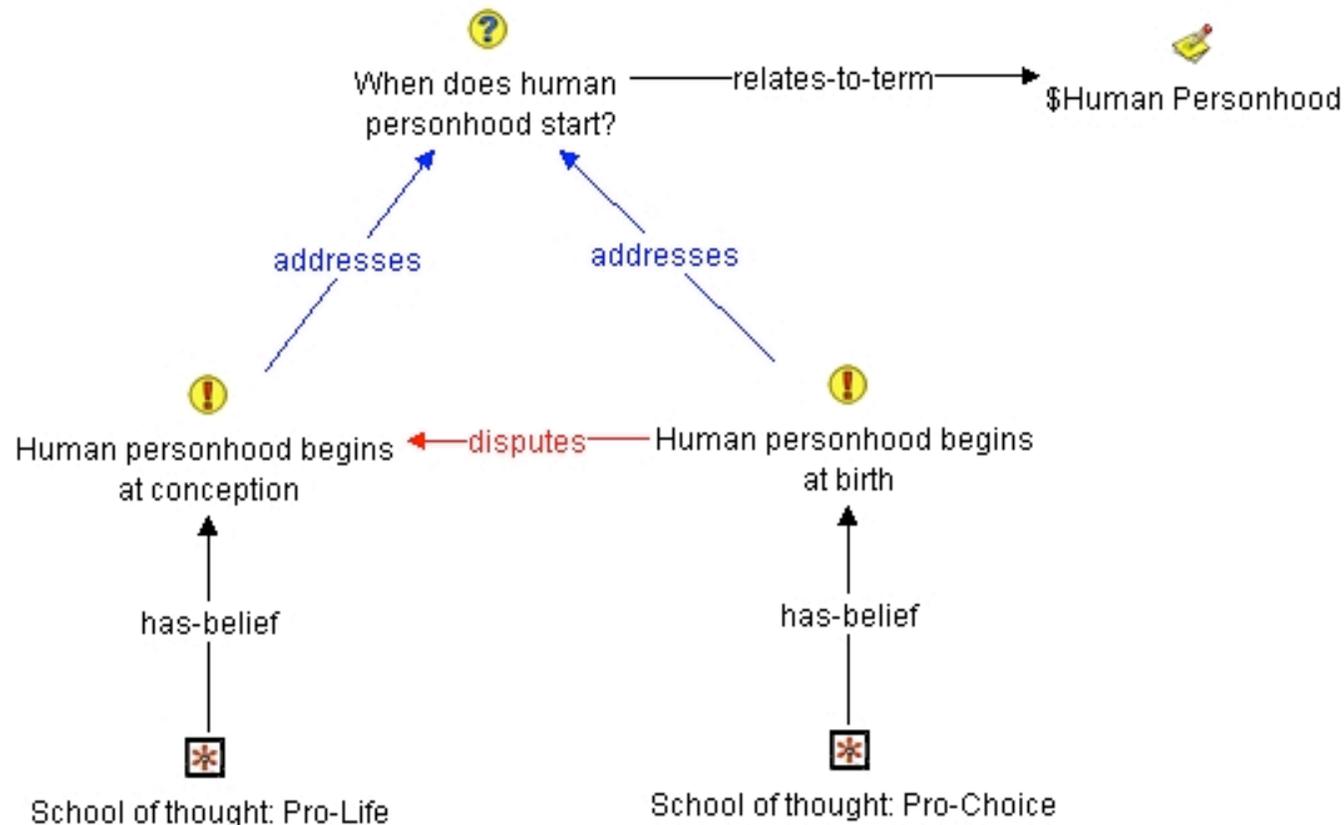


...vision within our tradition (2)



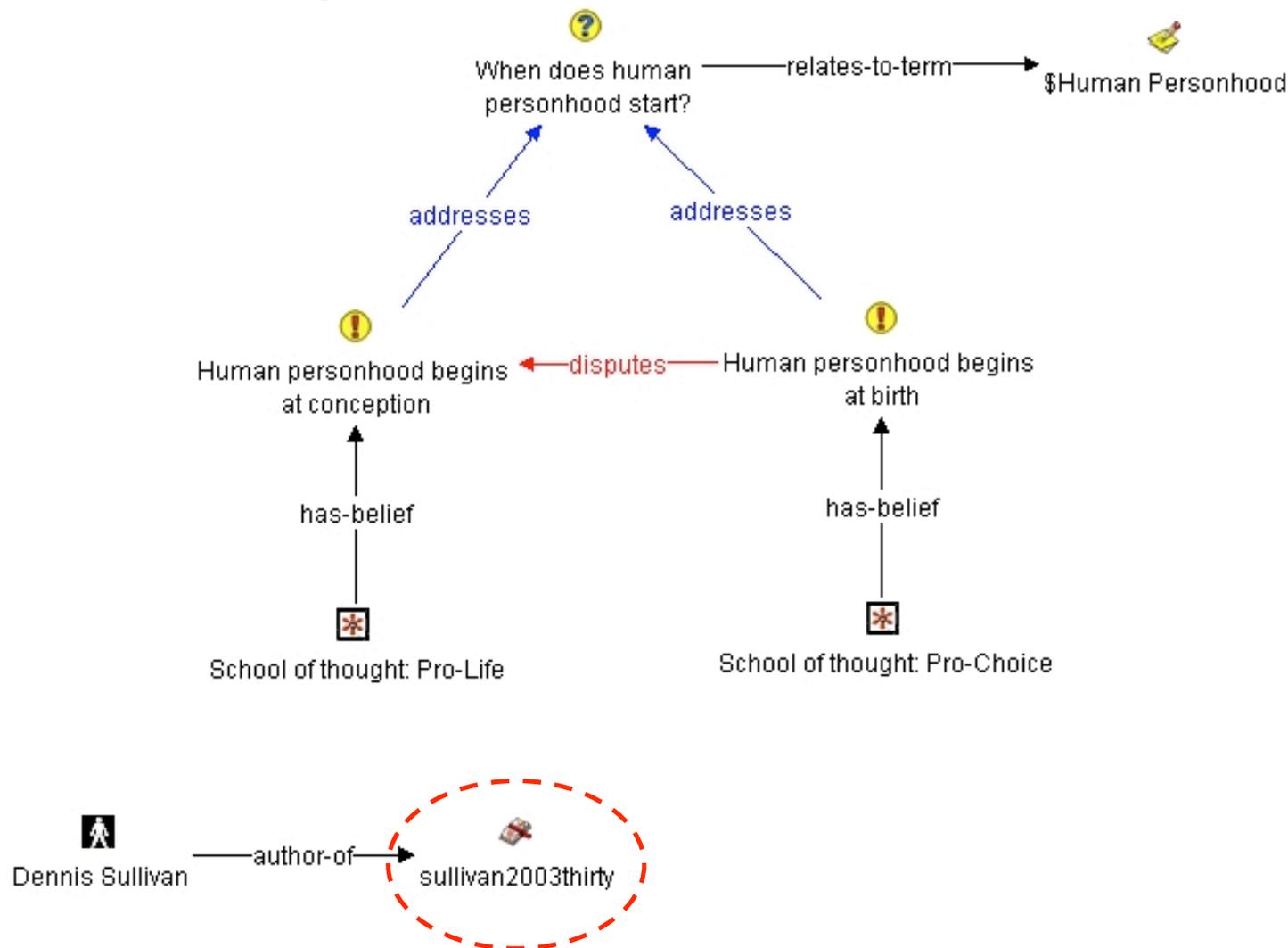
Example Walkthrough

- Simplified Debate in Bioethics Research Domain



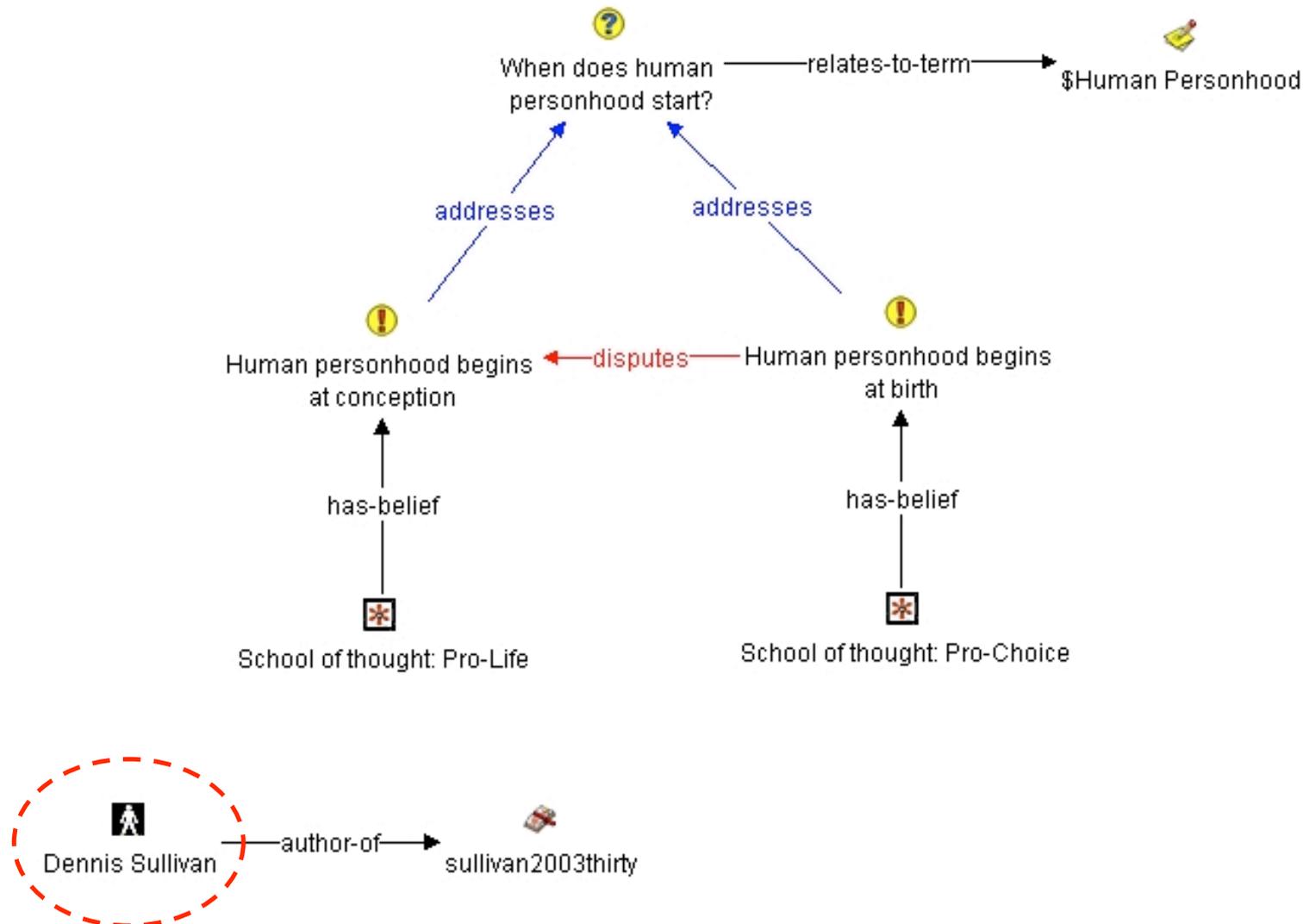
Example Walkthrough (2)

- Publication by Dennis Sullivan

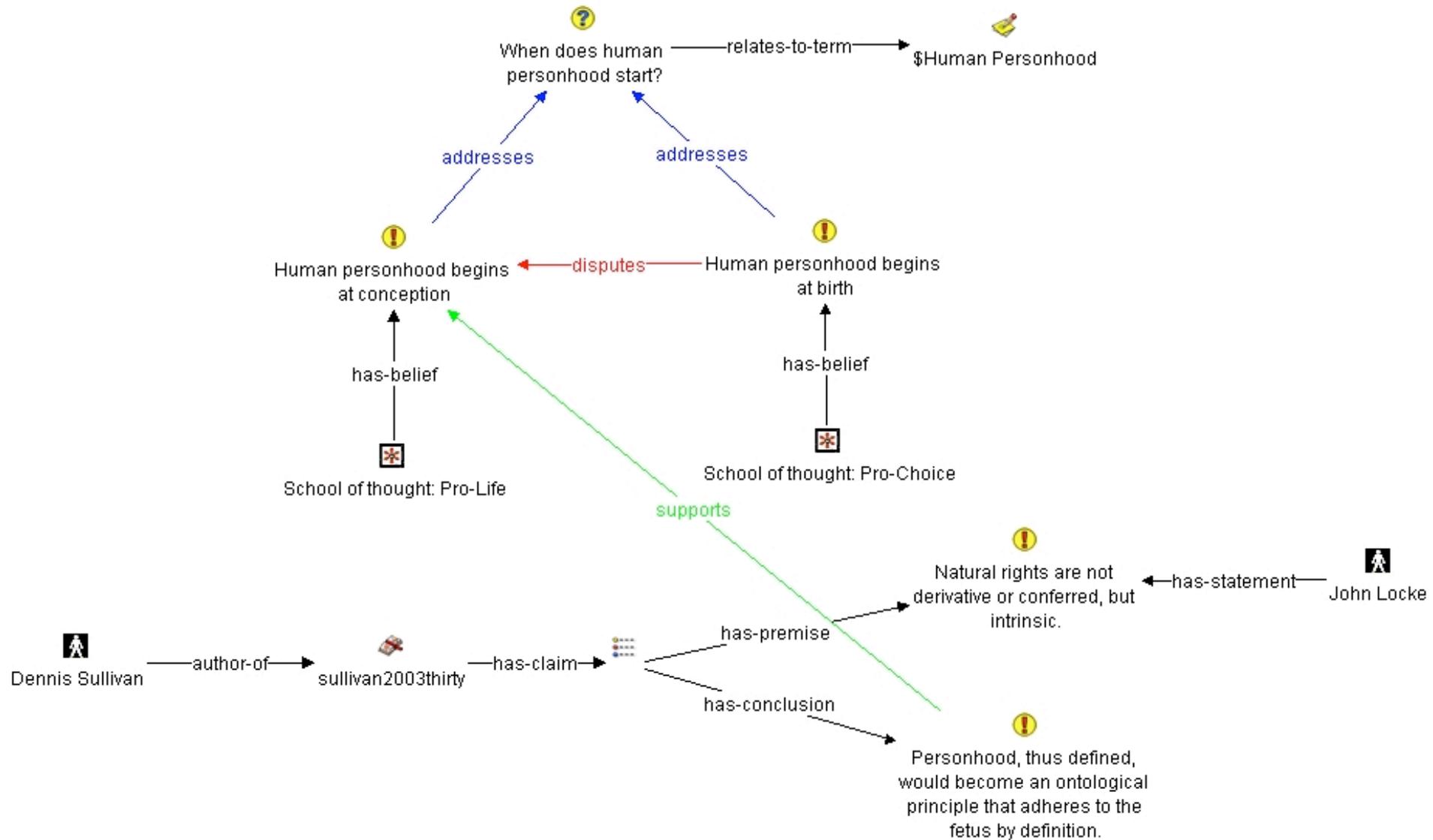


Example Walkthrough (3)

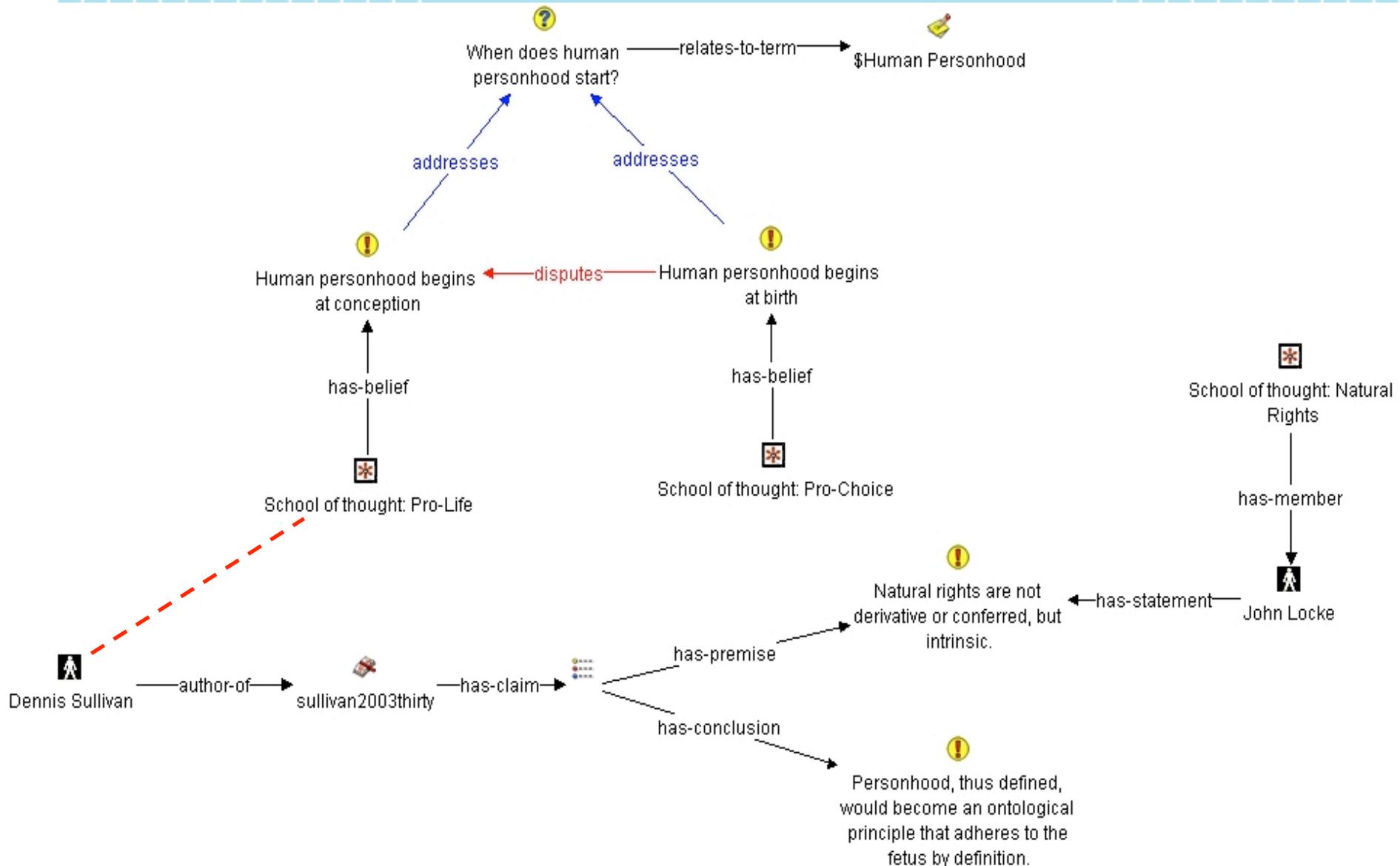
- What philosophy informs his views? To what Schools of thought does he subscribe?



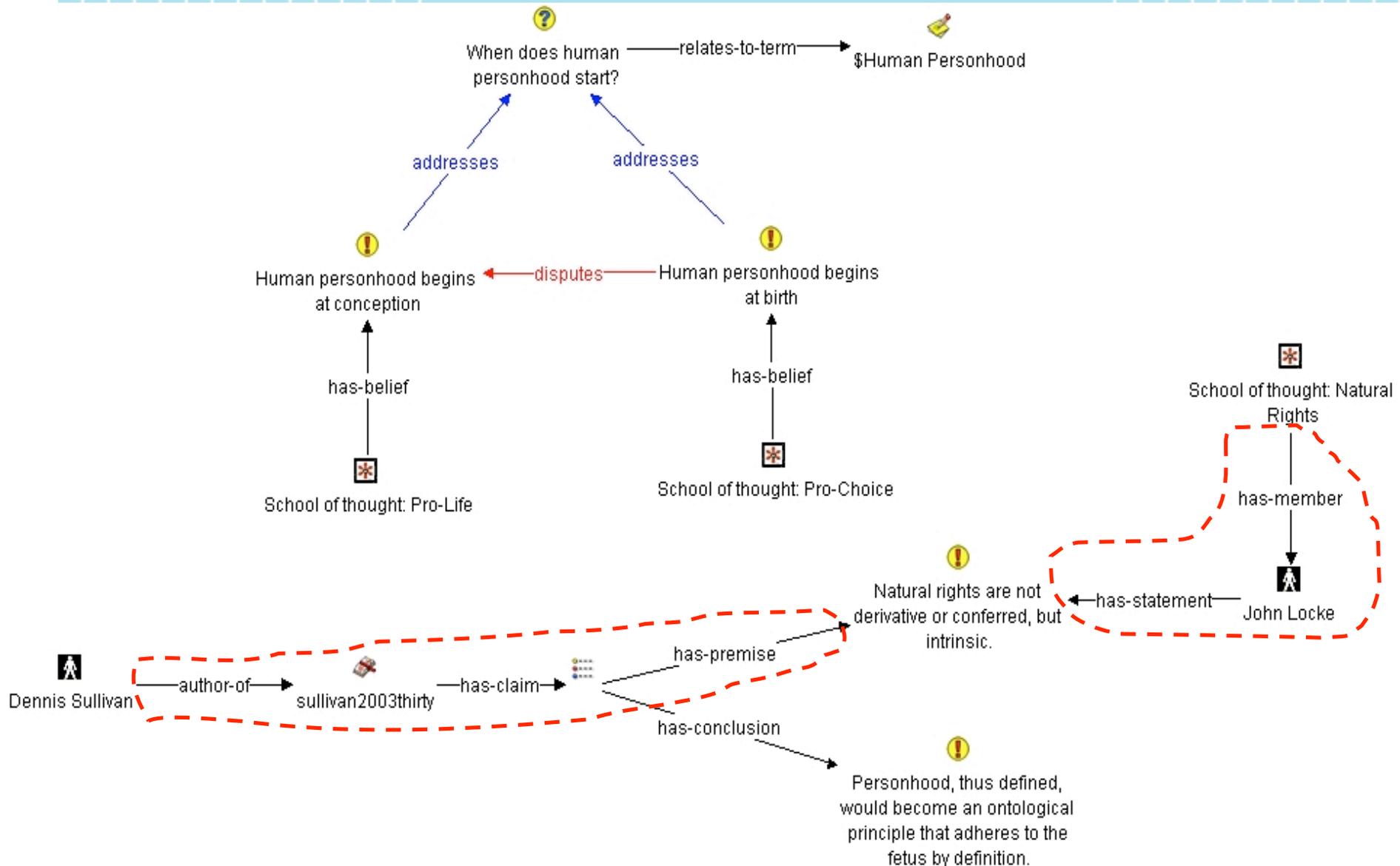
Example Walkthrough (4)



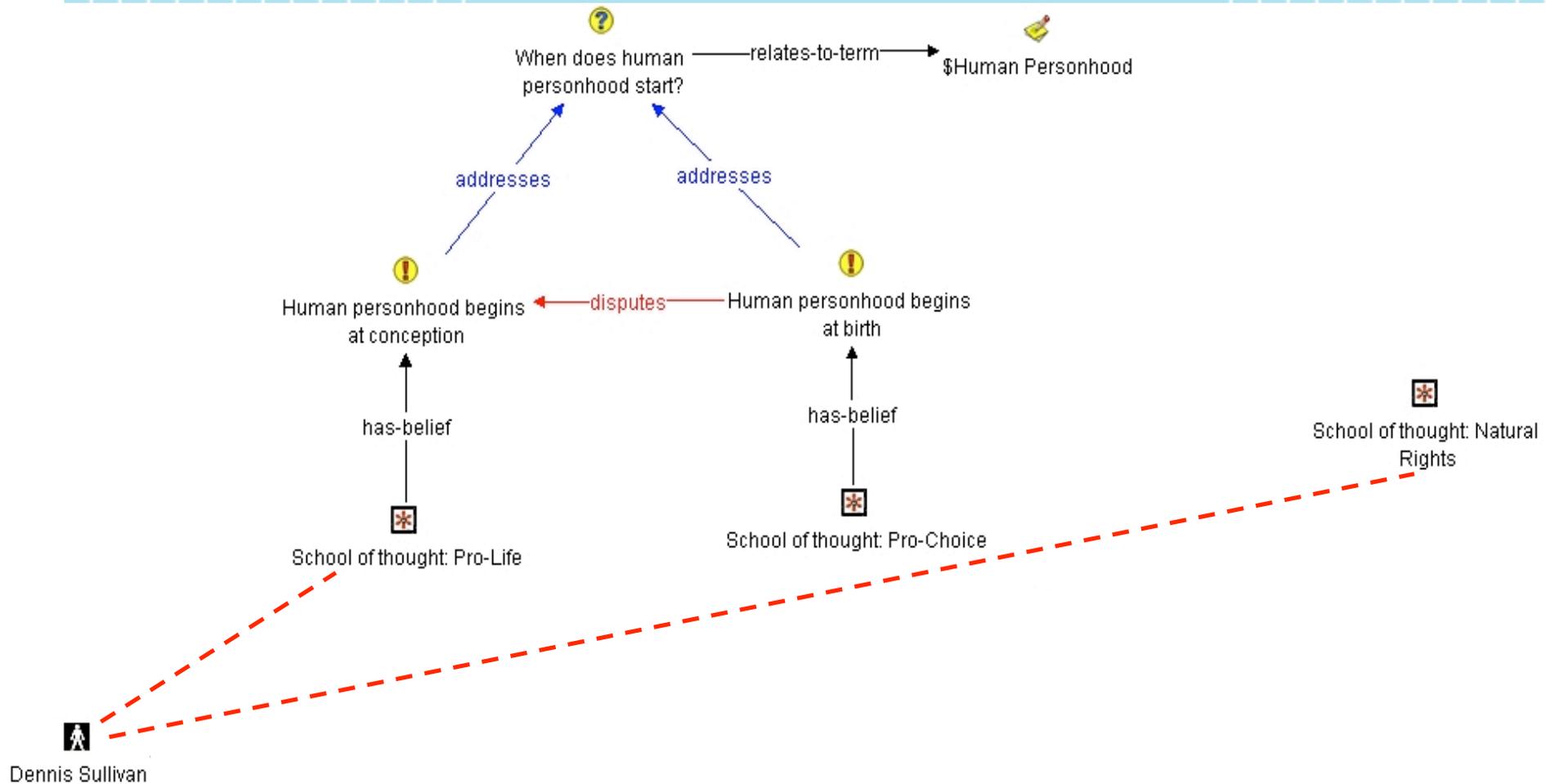
Example Walkthrough (5)



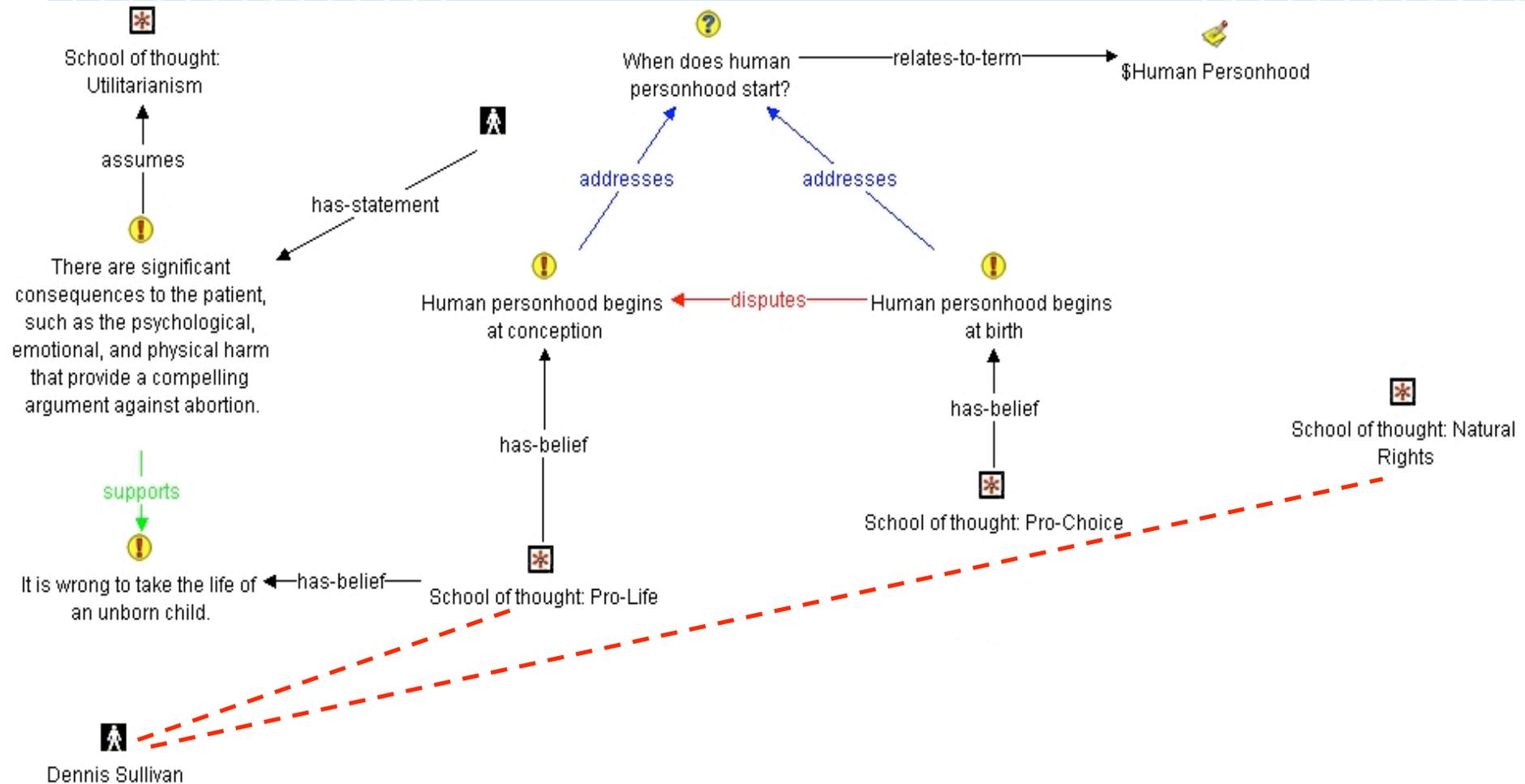
Example Walkthrough (6)



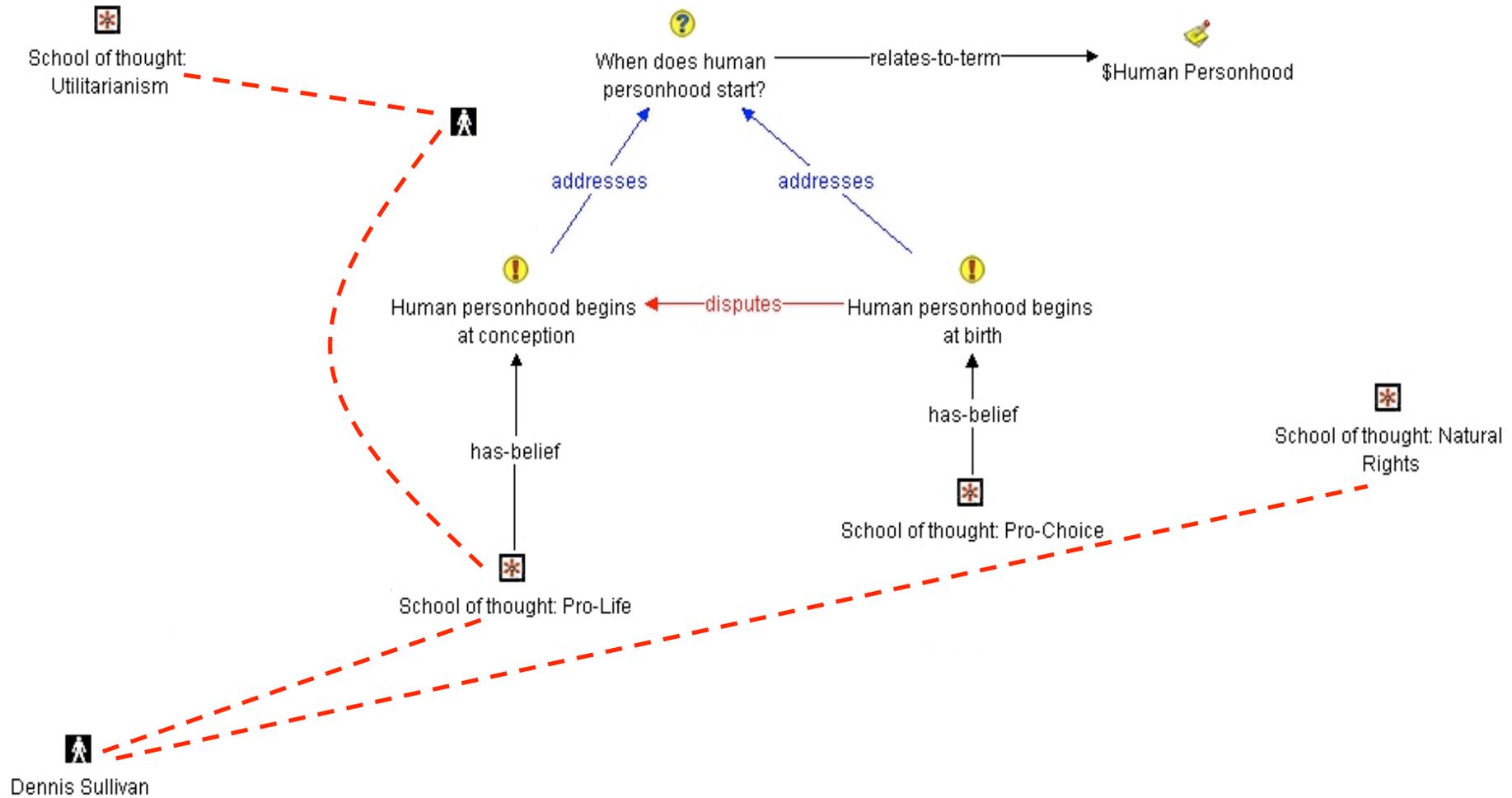
Example Walkthrough (7)



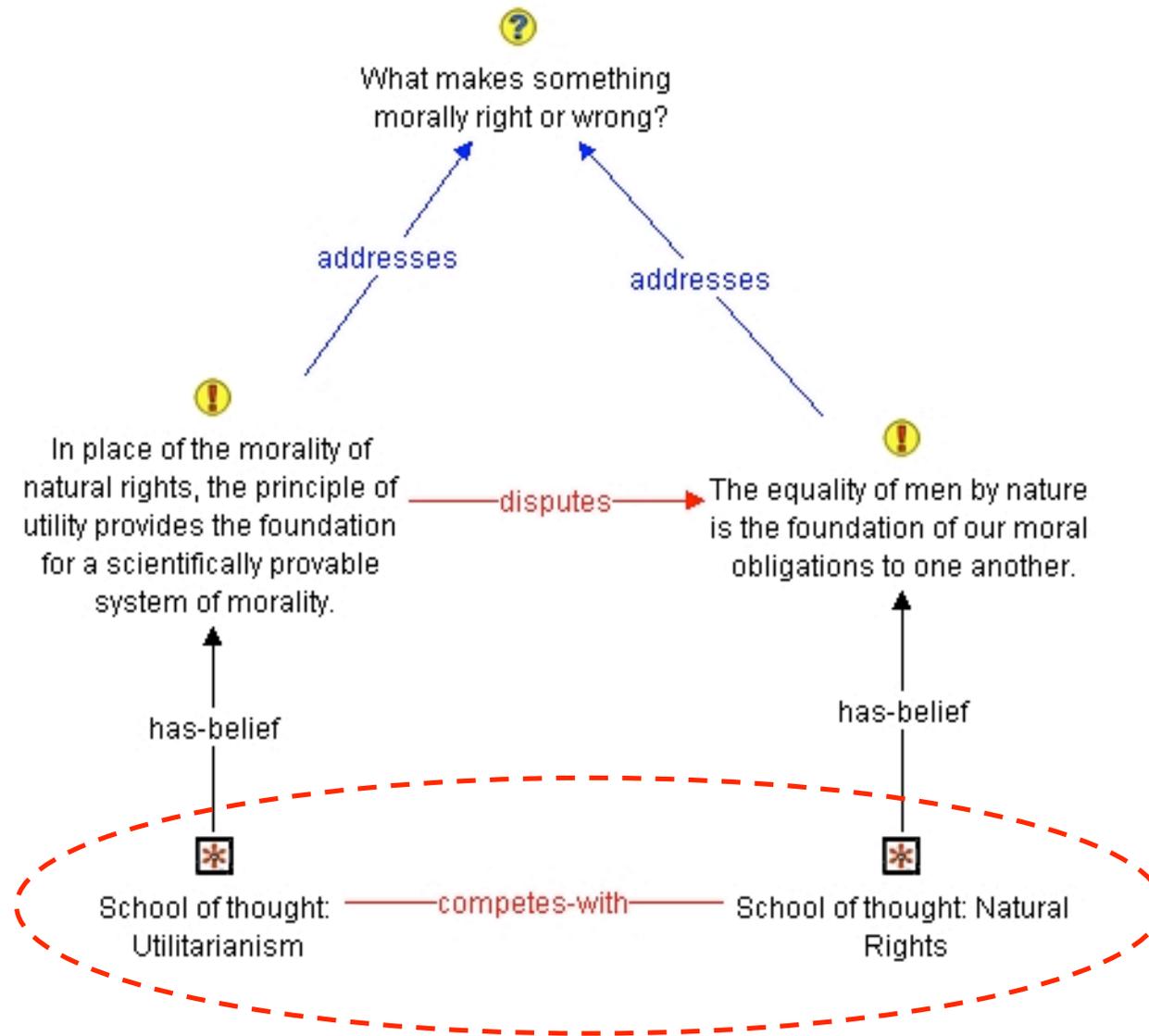
Example Walkthrough (8)



Example Walkthrough (9)



Example Walkthrough (10)



Conclusion

- **Conceptual Framework:**
 - For integrating the different kinds of knowledge in an academic domain
 - To support useful kinds of browsing and filtering over digital libraries
- **Fine-print – the modelling isn't for free:**
 - Human (librarians, information scientists)
 - Need technical architecture (right interface, tools, training, etc.) for scaling up
 - Could be cave-man drawing/early sketches of things we might be seeing in the future



Neil Benn

Knowledge Media Institute

kmi.open.ac.uk/benn

