Ontologies: *Expert Systems all over again?*
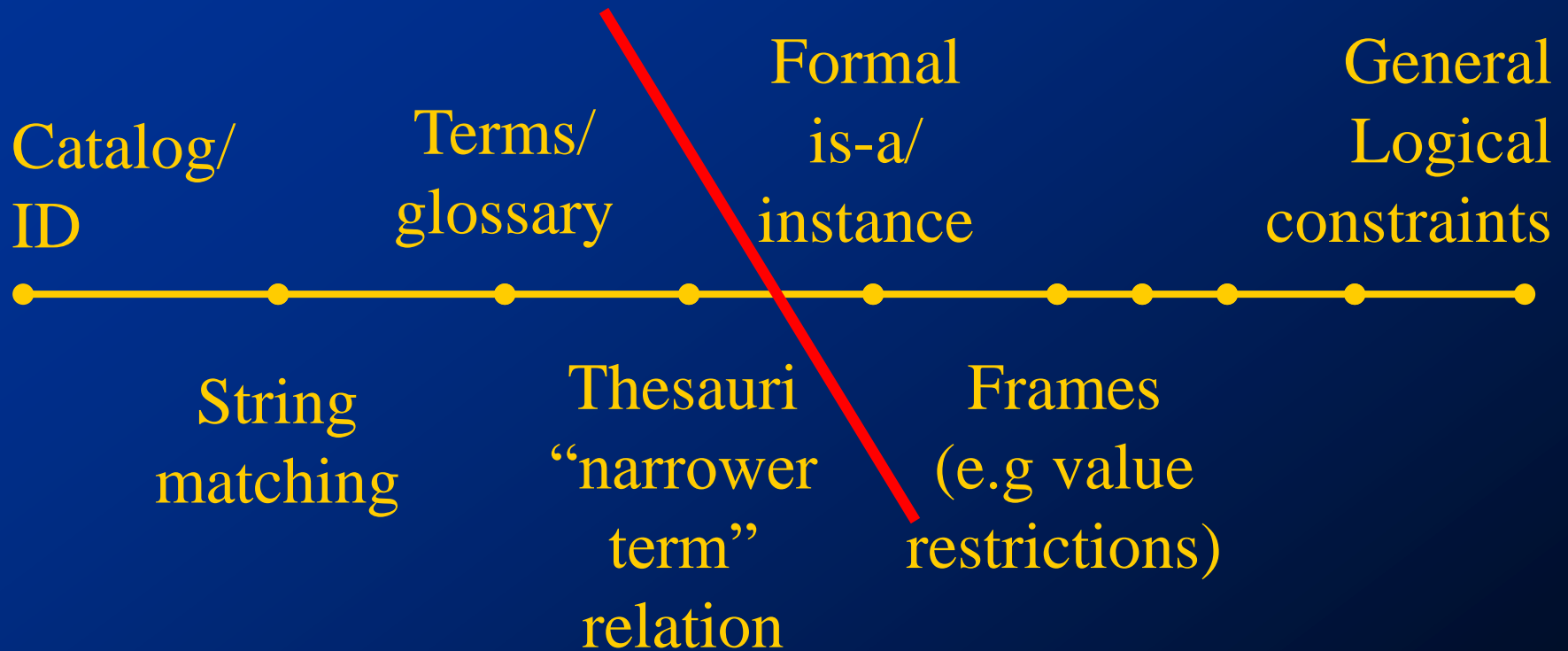
Motivations

- Growing attention to Ontology
- Ontologies represent knowledge about real world domains
- Isn't this what expert systems were doing all along?

What is an Ontology?

Catalog/
ID

Terms/
glossary

Formal
is-a/
instance

General
Logical
constraints

String
matching

Thesauri
"narrower
term"
relation

Frames
(e.g value
restrictions)

Keywords

- Conceptual Content
- Shareable
- Reusable/Portable/non-brittle
- Controlled Vocabulary
- Generalization/specialization
- Inference
- Semantics
- Structured Descriptions

Panelists

- Chris Welty, Vassar College & IBM
- Debbie McGuinness, Stanford KSL
- Mike Uschold, The Boeing Company
- Michael Gruninger, U. Toronto
- Fritz Lehmann, Cycorp

Chris Welty – Recent Work

- Ontologies for Software Architectures
- Enable re-use of software architecture knowledge
- Specific re-use of documents and document components

Basic Revelation

The Average IQ is 100

What this means to us

- Quality of system depends on quality of knowledge
  - bad knowledge → bad system
- Expert systems commerce emphasized *technology*
- Ontologies emphasize *knowledge*
  - Taking the time to *get it right* pays off

Mike Uschold: The Boeing Company

- The 'Enterprise Ontology'

- EuroKnowledge: Ontologies and PSMs

- Ontology Application Framework

Ontologies

- Some early hype
- Initially:
  - proliferation of ontologies (esp. 'high road')
  - with few reported applications
- Difficult problems
  - general purpose translators
- More recently:
  - Surge of lightweight ontology applications

Horses for Courses

- Various purposes:
  - reuse and sharing
  - interoperability
  - structuring knowledge bases, KA
  - browsing / search   **<== Emerging Area!**
- Find low-hanging fruit
  - especially in industrial context
- Keep the vision, academic research

Michael Gruninger –
Research Interests

- Axiomatization of enterprise modeling ontologies (TOVE)

- Implementation of ontologies with industrial partners

- Axiomatization of PSL (Process Specification Language) at NIST.

Why Ontologies?

- Within AI, ontologies arose out of the need to support sharable reusable knowledge bases.

- What are the barriers to achieving this?

- *Lack of adequate axiomatizations to correctly and completely capture the intended interpretations of concepts.*

Problems arising from Unintended Models

- Industrial applications where the existence of unintended models prevents reuse and sharing:

- interoperability (STEP, WPDL, PSL)

- benchmarking

- merging and integration of existing ontologies (XML)

- electronic commerce

Problems with Interoperability

Process Planner A

- *material*

- *resource*

- *work-in-progress*

Process Planner B

- *resource*

- *machine*

- *stock*