

# Organization Analysis with Protégé

***Towards “Living” Theorizing?***

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Sixth International Protégé Workshop  
7-9<sup>th</sup> July 2003

# [ Attempt of Organization Analysis ]

- Review of organization studies to create ontology structure
  - Processes, structures and boundaries framework (Pettigrew et al. 2000)
  - Interdependence as a denominator for organization context
- Populating ontology with empirical data
- Protégé for leveraging of knowledge of organisation studies domain
  - Maps and relations among concepts – easier reframing and new connections
  - New angles – new ideas
- Protégé as an R&D tool rather than an application to edit a stable ontology

# [ Empirical Case: Data Collection and Generation ]

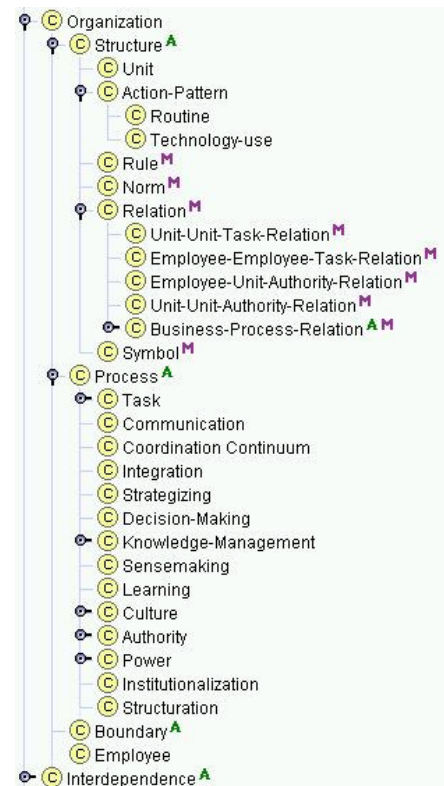
- Documentary Analysis (intensive, Intranet, 700 pages of raw data)
- Structured Interviews (25, 1 hour on average)
- Observation (branch work, physical structure, visual tools like wall with project management documentation)
- Participation (work with information systems)
- Talks, context study, notices...
- Process and obstacles:
  - Information requirements and interpretation
  - Get all information needed while access is active
  - Preparation for interviews

# [ From Literature Review: Organisation Context and IT ]

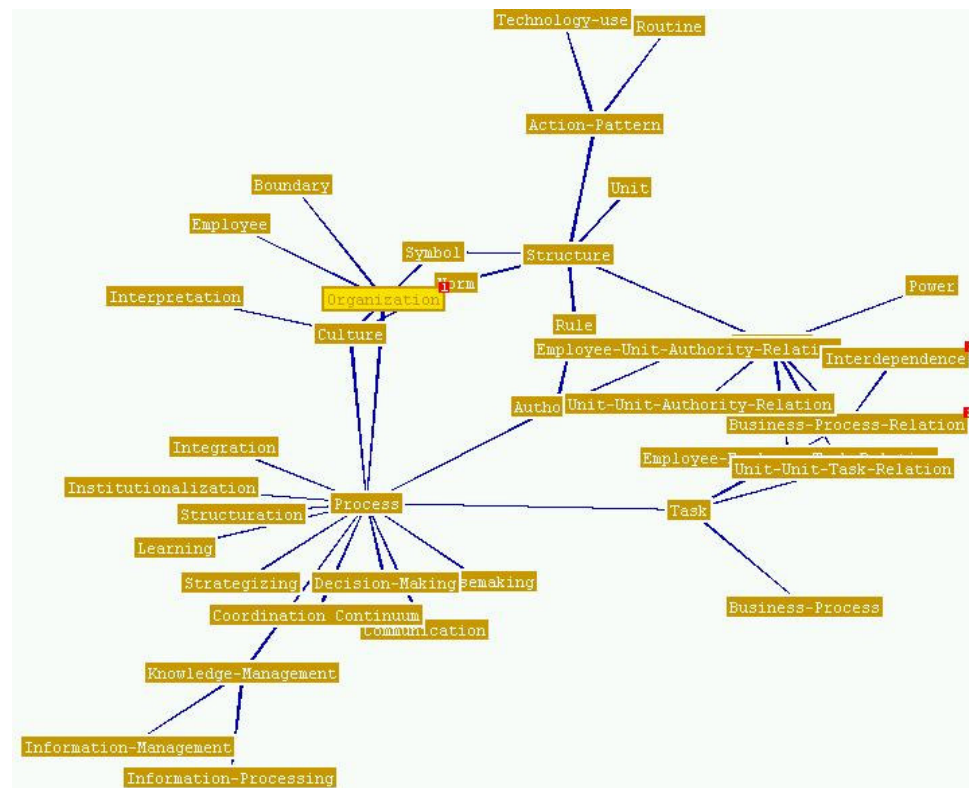
<i>Processes</i>	<i>Structures</i>
<b>Institutionalization processes and IT</b> <i>Isomorphism and imitation</i> <b>Strategising</b> Decision-making <b>Integration</b> <b>Communication</b> <b>Coordination</b> Collaboration and teamwork Learning Culture <b>Power</b> <i>Structuration</i> <i>Interpretation</i> <i>Sensemaking</i> Information processing <b>Information and knowledge management</b>	<b>Social structure</b> –Routines –Norms –Rules –Controls –Relations <b>Interdependence</b> <b>Power Distribution</b> – <b>Authority Hierarchy</b> – <b>Information Access</b> <b>IT Function</b> <u>Work Organisation through information lens:</u> –Application routines –Reliability routines –Learning and training routines –Innovation routines –Evaluation routines –Controls –Relations among immediate and adjacent co-workers for: –IT support –Teamwork –Workflow (specialization)

# Ontology of Organization Elements

- Using Protégé “knowledge acquisition” and object-oriented ontology building software
- A Semantic Web development from Stanford University
- Becomes recognized standard in ontology building



# Ontology of Organization Elements (graph)



# Ontology Descriptive Statistics

## What Does It Say?

### Summary

	System	Included	Direct	Total
Classes	14	29	43	86
Slots	33	19	8	60
Facets	12	0	0	12
Instances	0	5	950	955
Frames	59	53	1001	1113

Entered entities,  
mostly  
dependencies

### Classes

	Mean	Std. Dev.	Max
Parents	1.17	0.6	4
Children	1.17	3.13	22
Relations	0.47	1.08	5
Direct Slots	0.73	2.14	15
Slots	2.19	2.86	15
Direct Instances	12.94	48.78	404

### Instances

	Mean	Std. Dev.	Max
References	1.82	7.64	236
Referencers	1.82	4.57	41

Degree of  
interdependence in  
described structure:  
entity has X  
references and  
referred by Y times

### Slots

	Mean	Std. Dev.	Max
Direct Classes	1.05	0.96	6

### Facets

	Mean	Std. Dev.	Max
Direct Bindings	0.0	0.0	0

Characteristics per  
entity/dependence

Per object like  
“employee” or “unit-  
unit task relation”

July 2003

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# [ Protégé Facilities for Theorizing ]

- Parent-child relations – for concept decomposition
- Multiple inheritance – for linking concepts (:Norm and :Symbol are elements of structure and cultural processes both)
- Reconfiguration of facets, when attaching a slot to various frames (down to class hierarchy)
- Abstract classes – for auxiliary and root concepts
- Meta-classes – for properties of concept *per se*, not instances
- Self-reflexivity for processes: a class is also an *individual* of itself with own slots/properties – “power points/increases itself”



# Use of Facilities. Design and Modelling Choices

- Creating ontology means design choices
- No “grand” over-loaded classes for complex concepts
  - Interdependence as a conceptual link – meta-class (plan)
  - Interdependence as a root concept – abstract class (also “structure,” “task,” or “transaction”)
  - Interdependence as a task relation among workers, a concrete link – class/subclasses as types
  - Interdependence as a reified link – subclass of:RELATION
  - Interdependence as a link enacted in particular real context – instance
- Slots with subclasses of :Structure are used for description of subclasses of :Process
- Reified relations: special classes, not slots
- When create ontology or model – TRACE CHOICES, heuristics and conventions!!!

# Example: Task and Authority Interdependence

- Interdependence as a root concept (analysis versatility and multiplicity): *“Each relation like employee-unit, unit-unit or business process ownership contributes to various interdependence patterns to interpret.”*
- Example of research-valuable conclusion: *“high amount of enacted interdependencies for business processes definition for core IS replacement initiative highlights its political quality.”*



# [“Living Theorizing?”]

## ■ **Dynamism**

- Dynamic networks of concepts that could be visualized (TVizGraph plug-in)

## ■ **Versatility and multiplicity**

- Ease of data restructuring or just reframing how one would look at it
- Keeping track of meanings and their juxtapositions behind a model demands significant knowledge of domain (organization theory)

## ■ **Visibility**

- Traditional “research models” may take decades of text pages to describe

# [ Ontology-based Research? ]

- Concept of ontology is traditionally used to delineate “what” is studied in philosophy, social sciences, and organization studies
  - Independent reality, factors, constraints – objectification, visibility, positivism
  - Socially constructed multiple reality – every ontology is only one possible view on knowledge domain – dynamism, versatility, multiplicity, interpretivism
- Ontology as a research method like case study, ethnography or survey
- Validity of ontology-based representation – procedures of data entry and modelling choices are important (“framework from literature,” “data from documents and interviews”)

# [ Data Leveraging ]

- Reusing ontology-based data – high
  - Data is structured
- Sharing ontology-based data – low?
  - Every ontology is based upon complicated, contextual and “tacit” knowledge – difficult to re-make sense from outside
- Standardized ontologies for transfer of empirical data – within a project or well-established standards are needed
- Technological issues
  - Weak query engine - Protégé Axiom Language (PAL Queries and EZPal tabs), Formal Concept Analysis, F-logic and Prolog are yet complicated for an end-user. What about functionality of SQL?
  - Export and import of structured but non-ontological data, like tables

# [ Knowledge Acquisition? ]

- Being a “knowledge acquisition tool” or “knowledge base editing system” could encounter a critique
- Knowledge models and metaphors:
  - Object (Simon 1981)
  - Process (Weick 1995) and pattern (Snowden 2002)
  - Interpretation (Winograd and Flores 1986)
  - Relationship (Dilthey 1976)
- Contemporary approach to knowledge as a process poses it as socially recurrently constructed and context-bounded – inextricable
- Nevertheless “knowledge model”/architecture of Protégé is advanced and interestingly fits with theories of knowledge. See theorizing versatility and use of facilities above

# Research Presentation: Keeping Grounds Clear

- Paradigms, interpretative schemes or just languages (?) of computer scientists and “soft” scientists, including business school researchers
- Translation is needed for the parties to recognize value, validity and applications. Some examples:
  - Ontology: same word, variety of established meanings
  - User requirements versus organisational context
  - Intelligence for web/systems, metadata exchange versus corporate information management (broad and human)
  - Knowledge management...what does it mean for parties?
- Generic issue for research assisted with software, Semantic Web developments or elements of intelligence like automatic reasoning



# Examples from Ontology: Interdependence Analysis

Author will readily address your  
personal enquiry on ontology  
details at [v.v.diatlov@soton.ac.uk](mailto:v.v.diatlov@soton.ac.uk)  
as examples are based on  
sensitive data