Universidade do Porto
FEUP Faculdade de Engenharia

INESCPORTO
INSTITUTO DE ENGENHARIA DE SISTEMAS E COMPUTADORES DO PORTO
LABORATÓRIO ASSOCIADO

Second International Symposium on Engineering Systems
MIT, Cambridge, Massachusetts, June 15-17, 2009

The Semantics of Systems Engineering Projects

António Lucas Soares, Carla Sofia Pereira and Cristóvão Sousa

Manufacturing Systems Engineering Unit - INESC Porto
Dep. of Informatics Engineering - FEUP

contents

- introduction
- semantics and collaboration
- collaborative conceptualization: theories and tools
- application cases
- conclusions and further work

introduction

assumptions

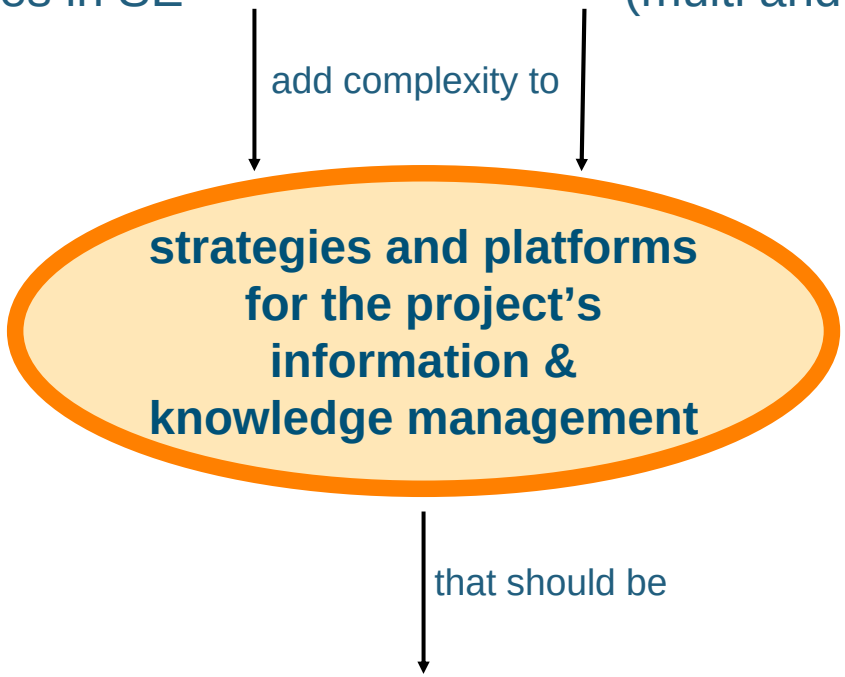
- systems engineering activities are **knowledge** and **collaboration intensive** and their complexity is increasing

- **information management** and **knowledge sharing** (Im&Ks) are a critical success factor in large and complex projects

challenges (1)

increasing collaborative and distributed practices in SE

different social contexts involved (multi and inter-organizational teams)



situational and contextual

setup in a projects's compatible time-frame

challenges (2)

conceptualization of the domain(s) **shared** among all the project participants

is a critical activity to

knowledge organization system

fundamental to

structuring, **storing** and **retrieving** project information

effective understanding in **collaborative practices**

hypothesis

an effective I&Km support to a systems engineering project can only be achieved through **highly customized information architectures** and **knowledge organization systems**

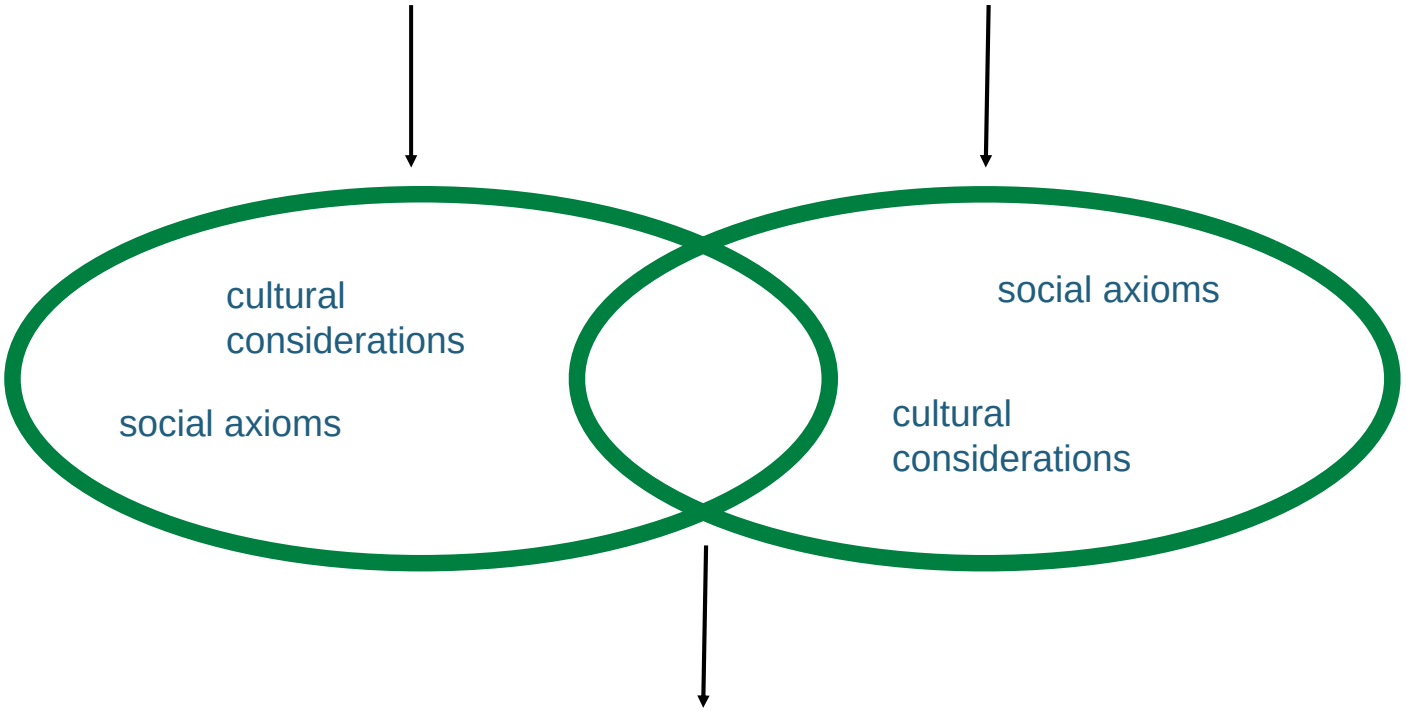
belief

the development of semantic artifacts in collaborative networks of organizations should be based on a **continuous construction of meaning**, rather than pursuing the delivery of highly formalized accounts of domains

semantics and **collaboration**

semantic spaces

specific groups see most of their world (the "project's world") differently because of specialization (e.g., scientific/technical/professional specialization)



they see enough of their world similarly for them to cooperate and collaborate

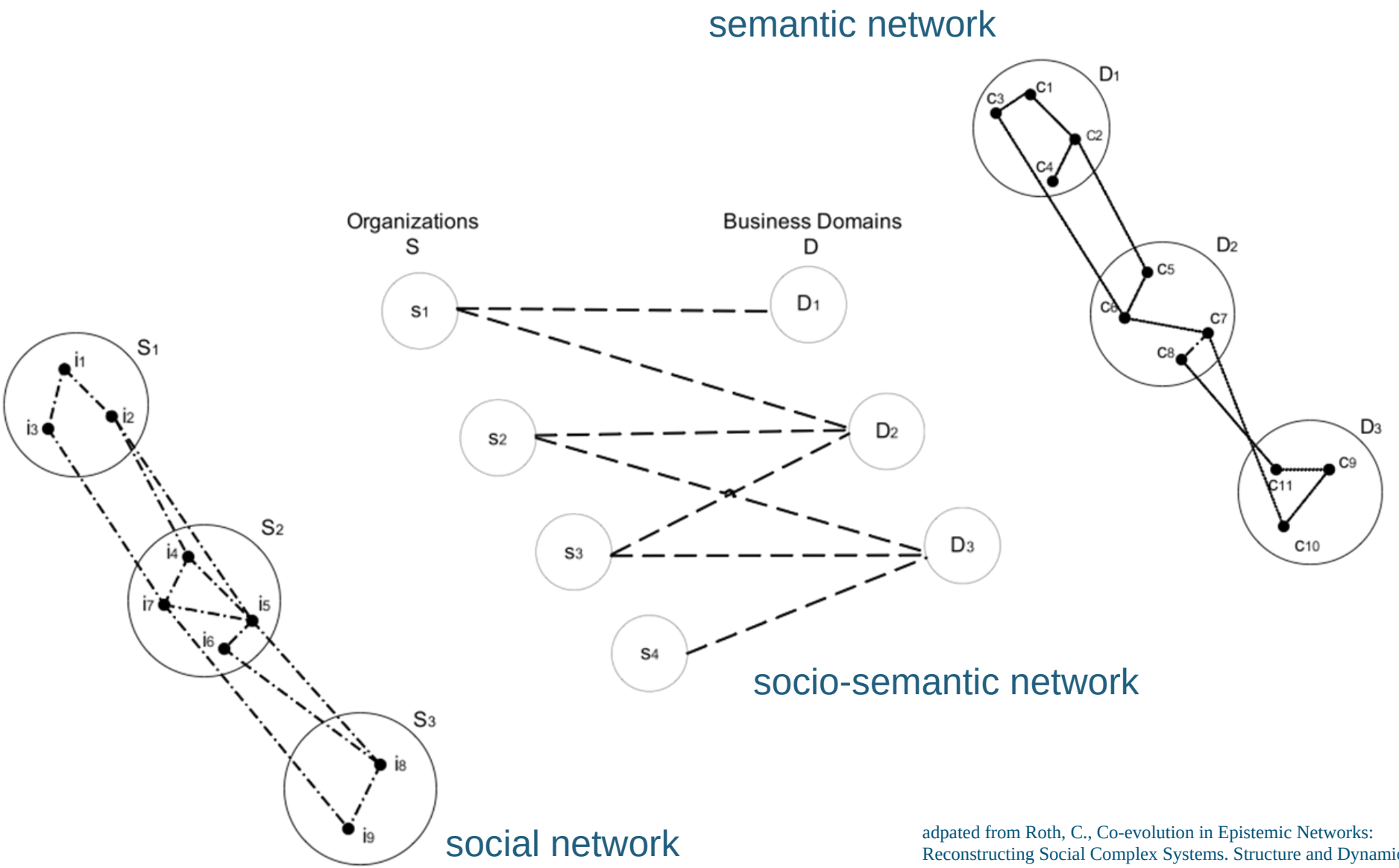
adapted from: Redding, G., Separating Culture from Institutions: The Use of Semantic Spaces as a Conceptual Domain and the Case of China. Management and Organization Review 4:2 257–289, 2008.

research topic

[semantics] + [collaboration]

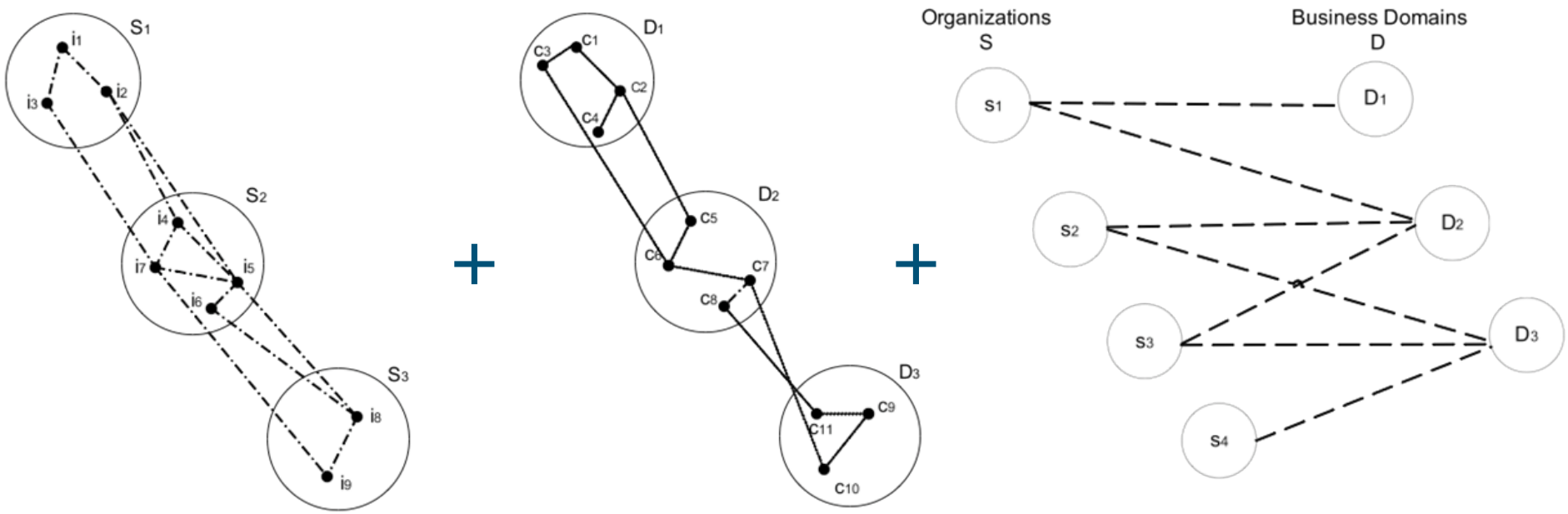
[socio-semantics]

semantic and social networks



adpated from Roth, C., Co-evolution in Epistemic Networks: Reconstructing Social Complex Systems. Structure and Dynamics: eJournal of Anthropological and Related Sciences, vol. 1 (3), 2006

epistemic network

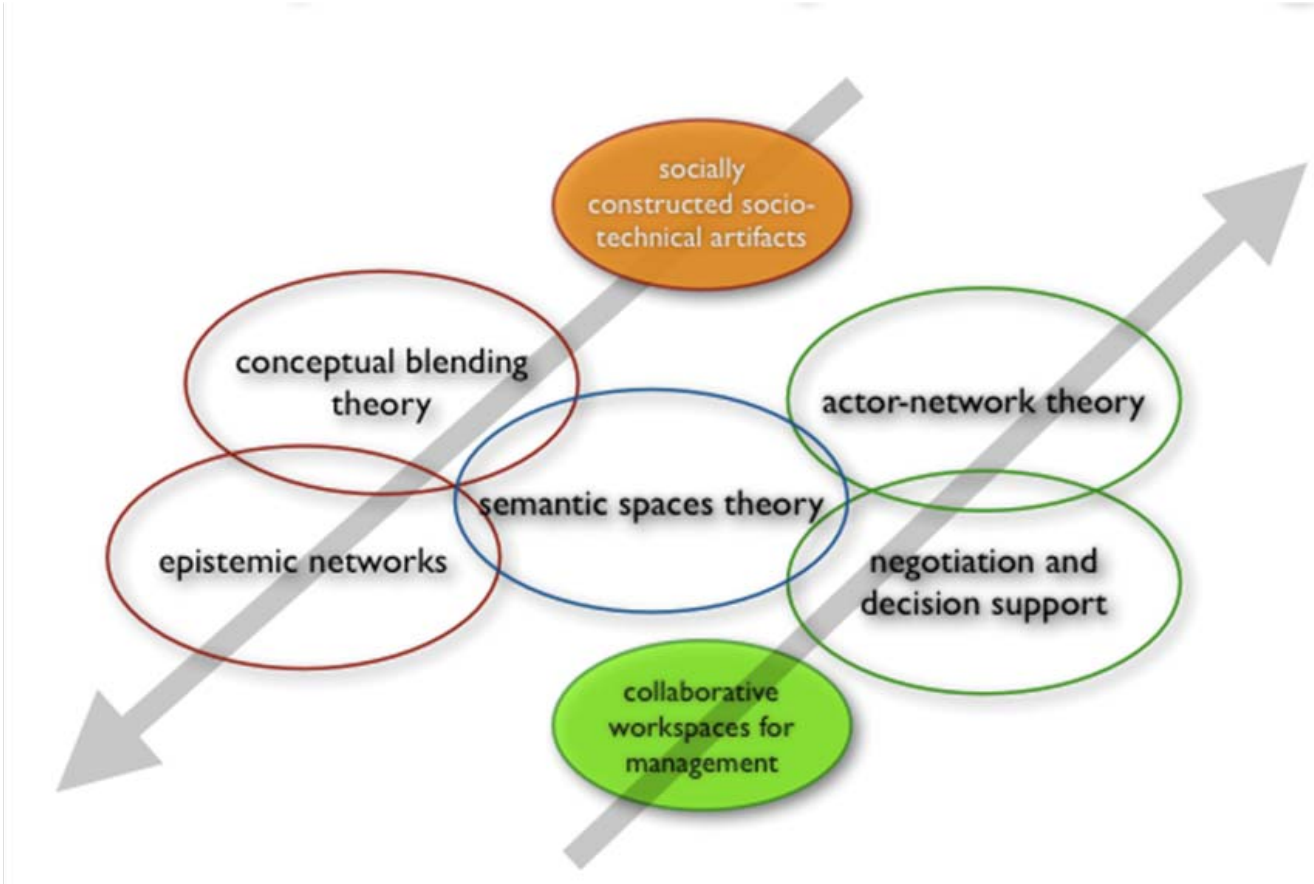


social network + **semantic network** + **socio-semantic network**

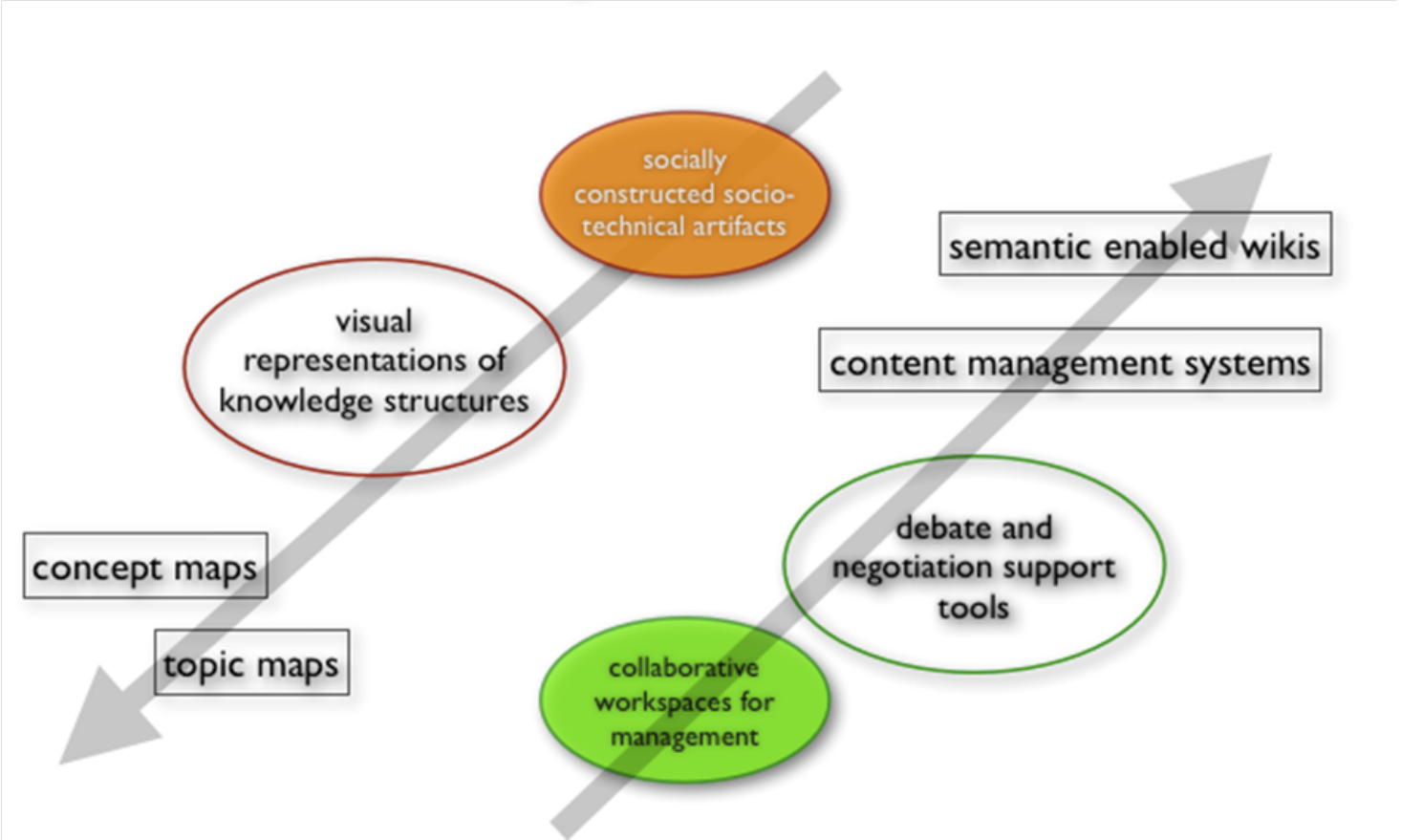
from the perspective of information and knowledge management, ES projects can be studied as epistemic networks

conceptualization: **theories and tools**

supporting **theories**



supporting **tools**

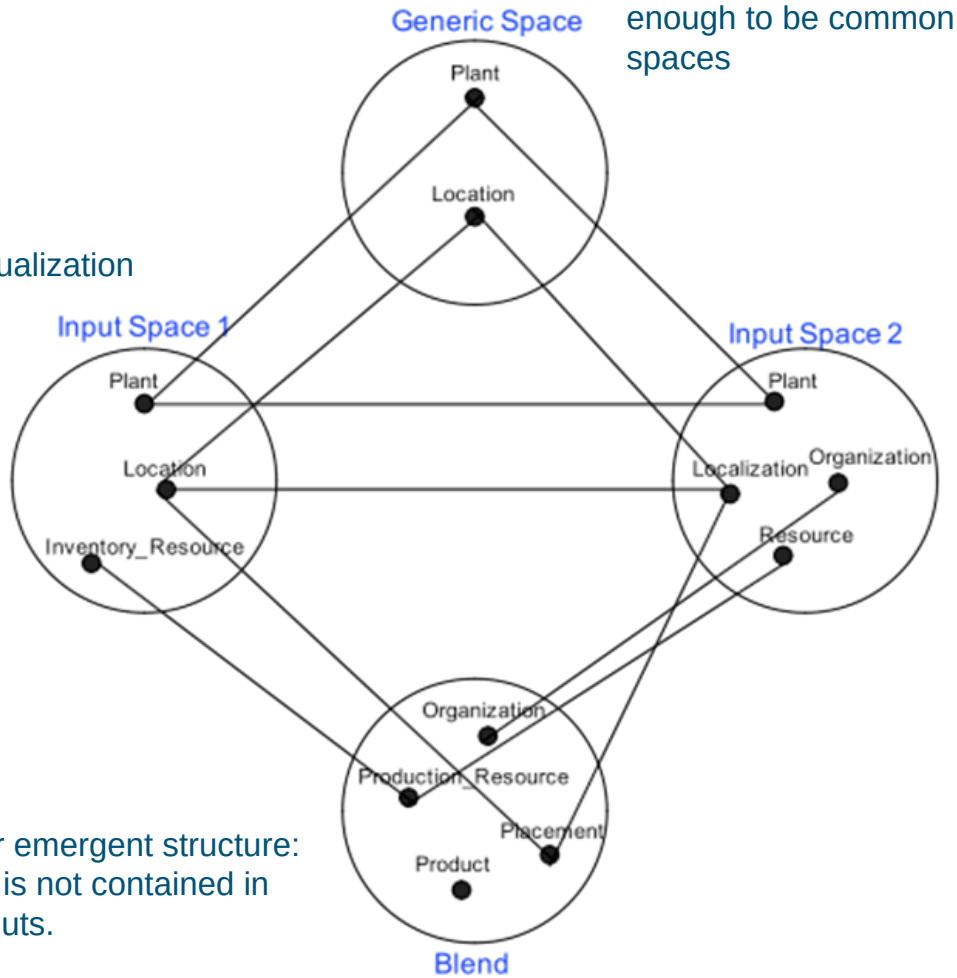


conceptual blending theory

(or *theory of conceptual integration*)

Provides information that is abstract enough to be common to all the input spaces

Contains the initial conceptualization a project team member



Contains new or emergent structure: information that is not contained in eitheir of the inputs.

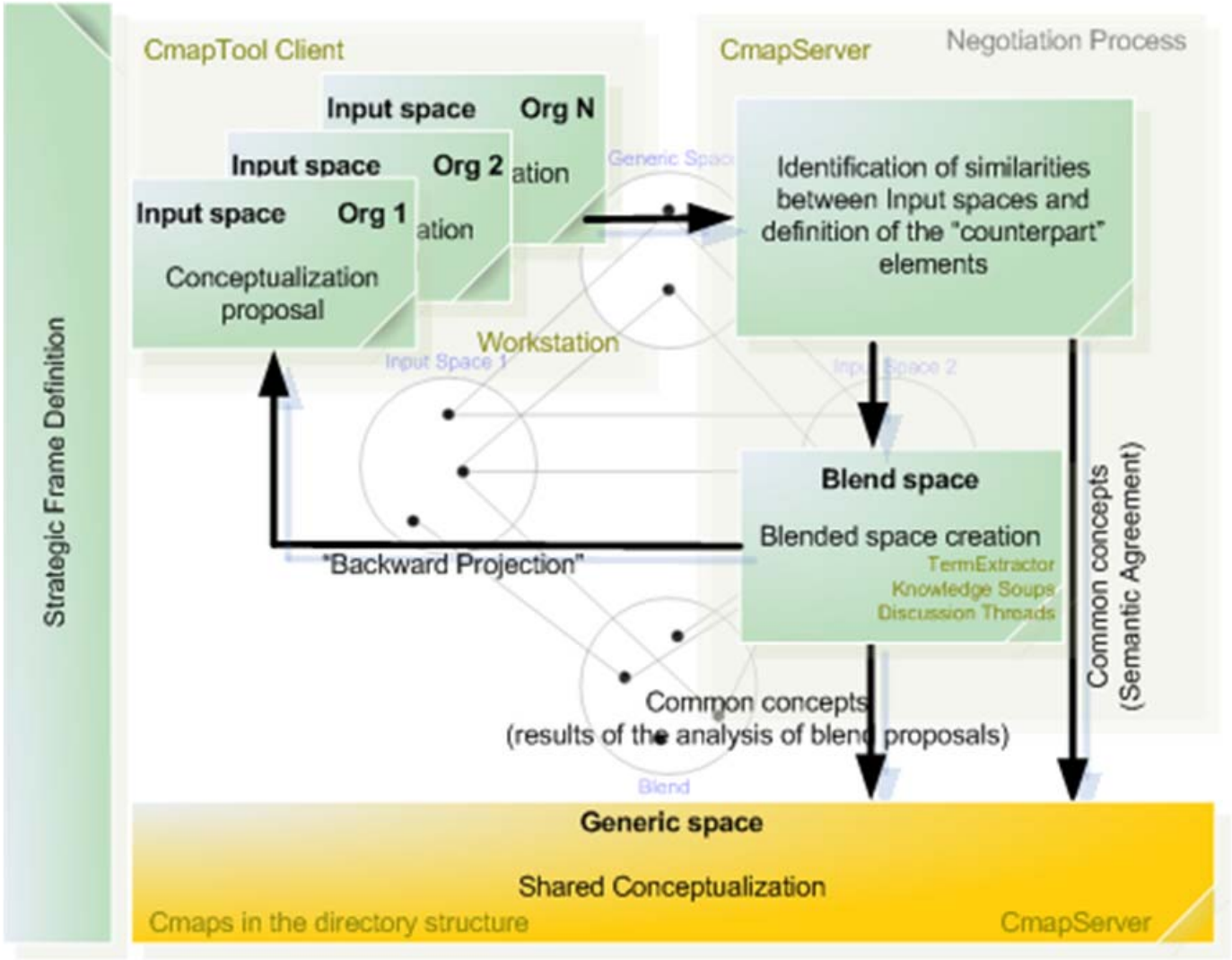
adapted from: Fauconnier, G., Turner, M., Conceptual Integration Networks. Cognitive Science, vol. 22 (2), pp. 133 – 187, 1998

application cases

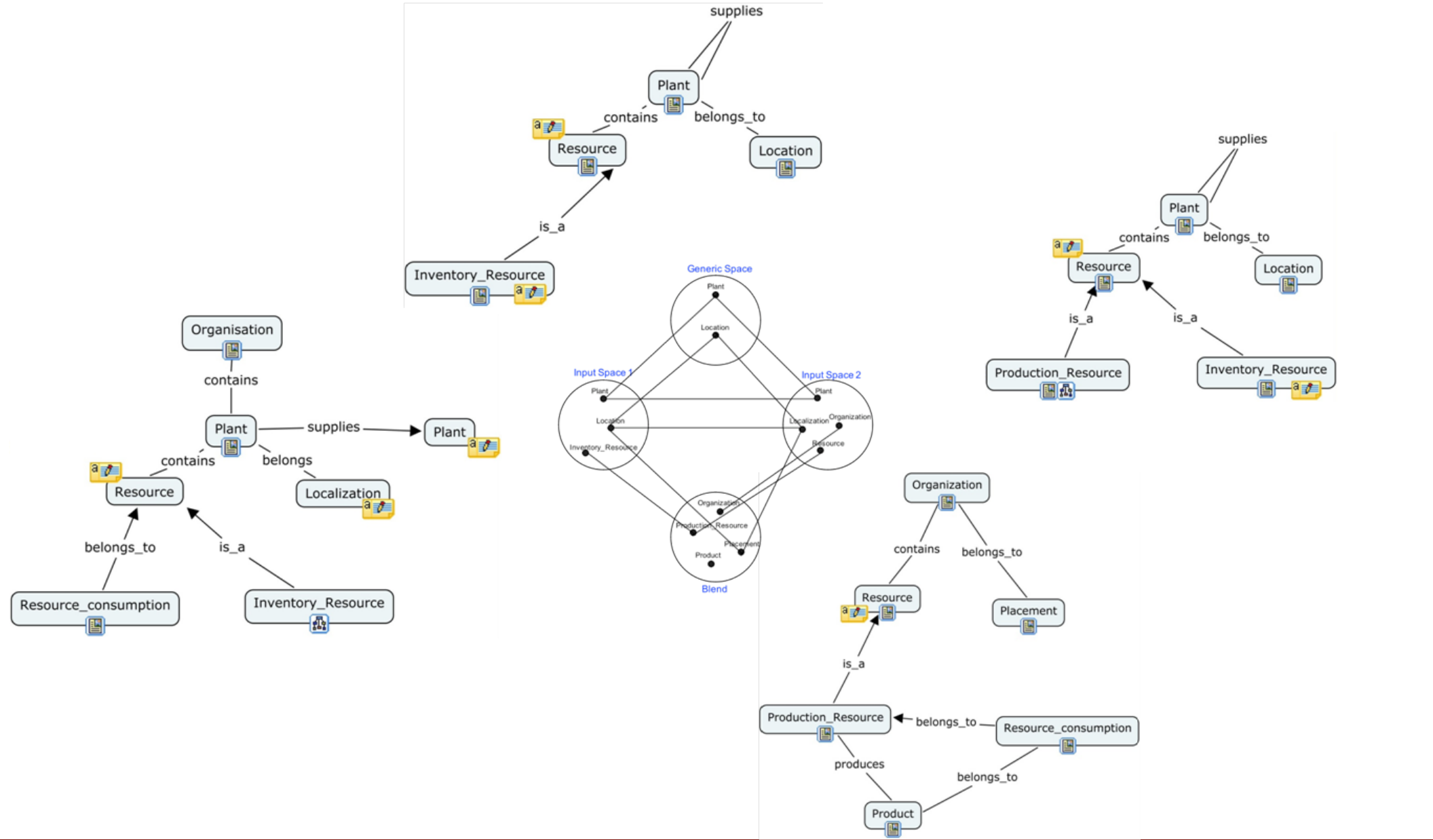
AC+DC project: **context**

- **goals**: to develop the “dynamic supply chain collaboration concept” that promotes a highly reactive “5-Day-capable” system that cuts down inventories in the automotive supply network
- **structure**: 19 partners from 7 countries: European car manufacturers, suppliers, and research institutes; 9 tasks grouped in 3 work packages
- **needs**: to build an ontology to be used in the several tasks in order to support the sharing of information and knowledge produced during the project execution
- **domains**: *“domains, processes and tasks”, “supply-chain management”, “product development”, “dynamic supply loops*”

a CBT based method

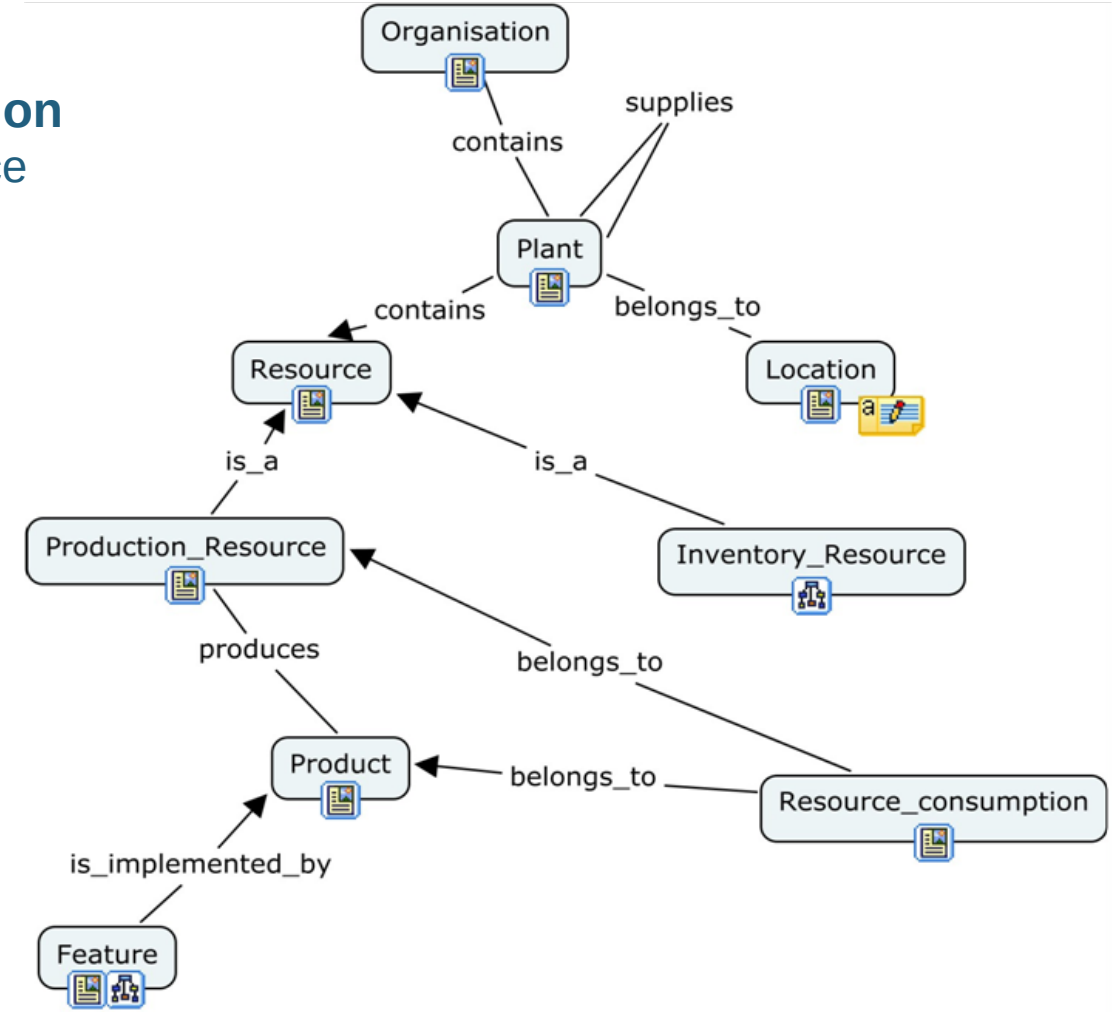


using **concept maps** to implement the CBT based method (1)



using **concept maps** to implement the CBT based method (2)

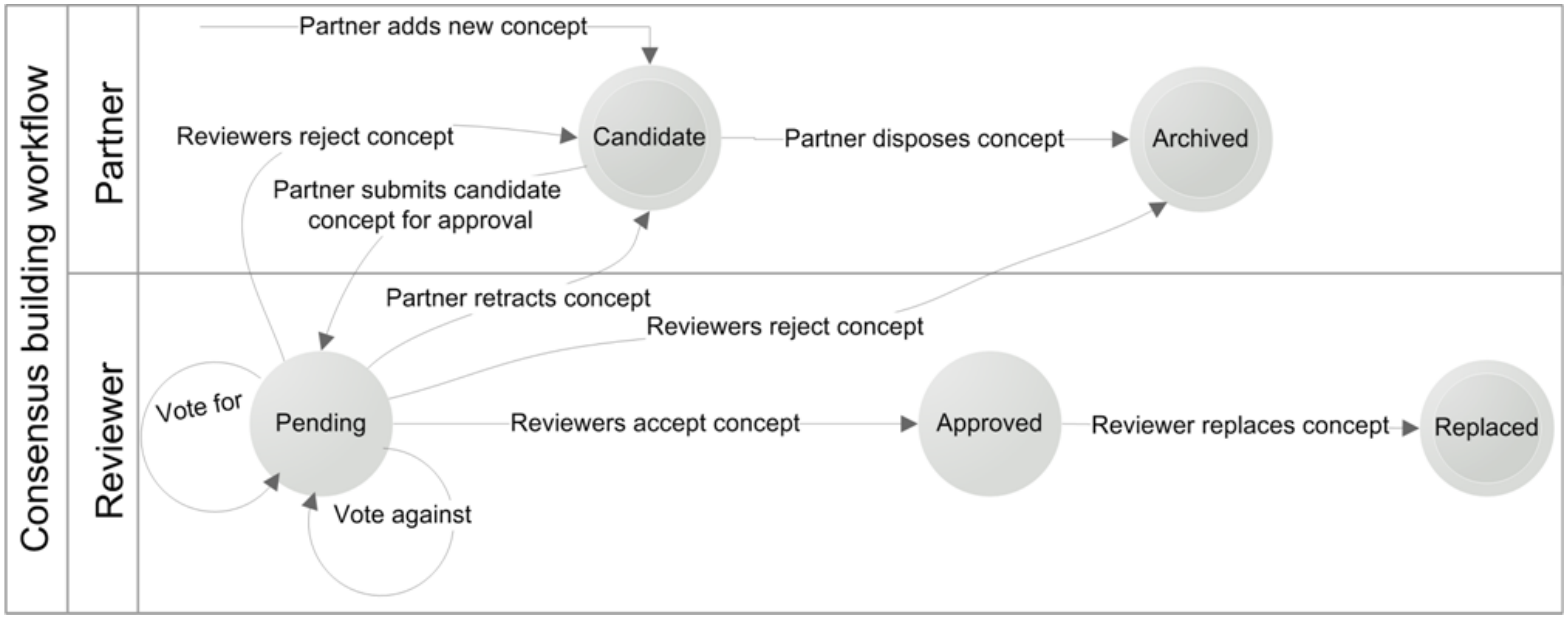
shared conceptualization
(status of the generic space after the execution of the method)

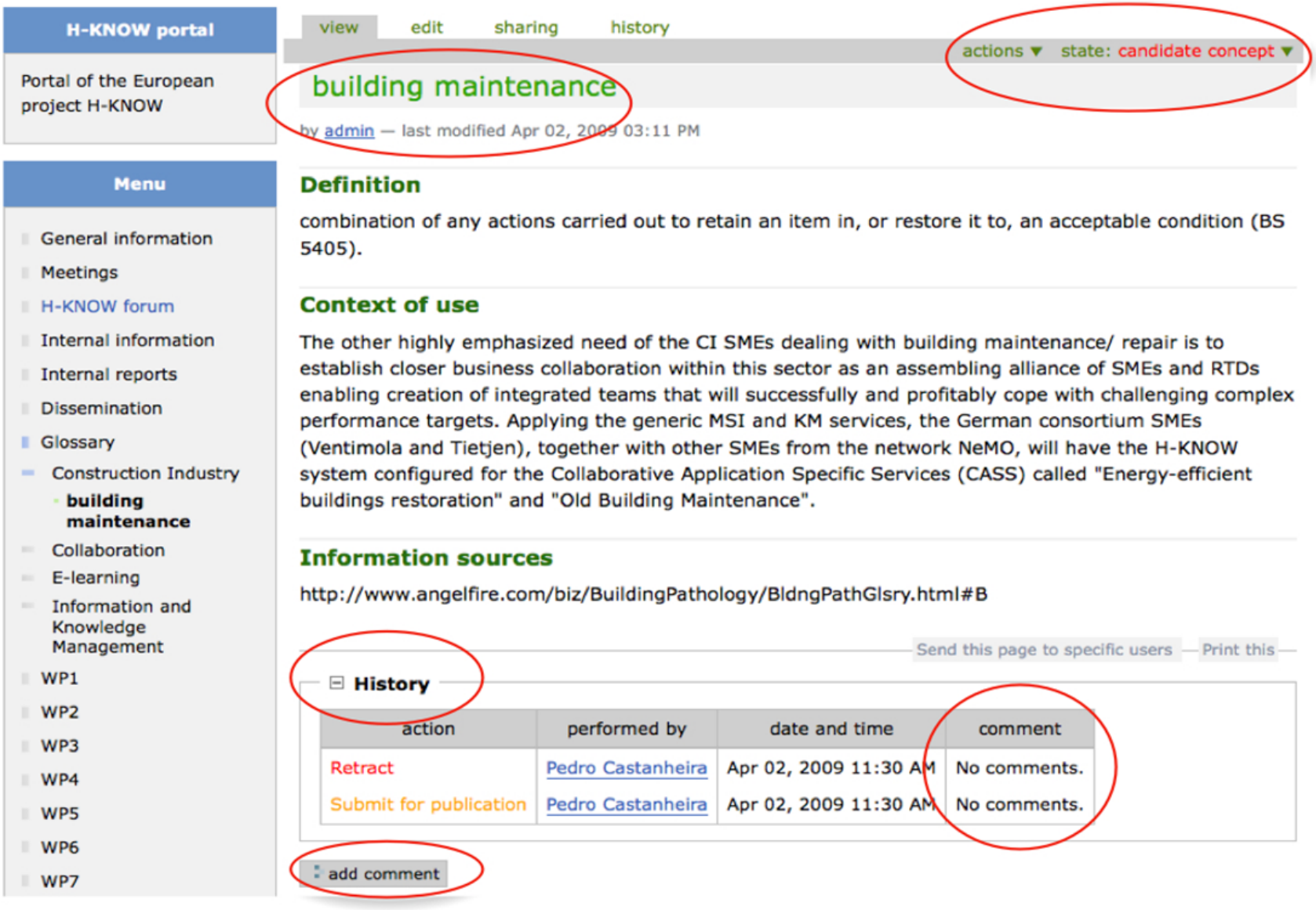


H-Know project: **context**

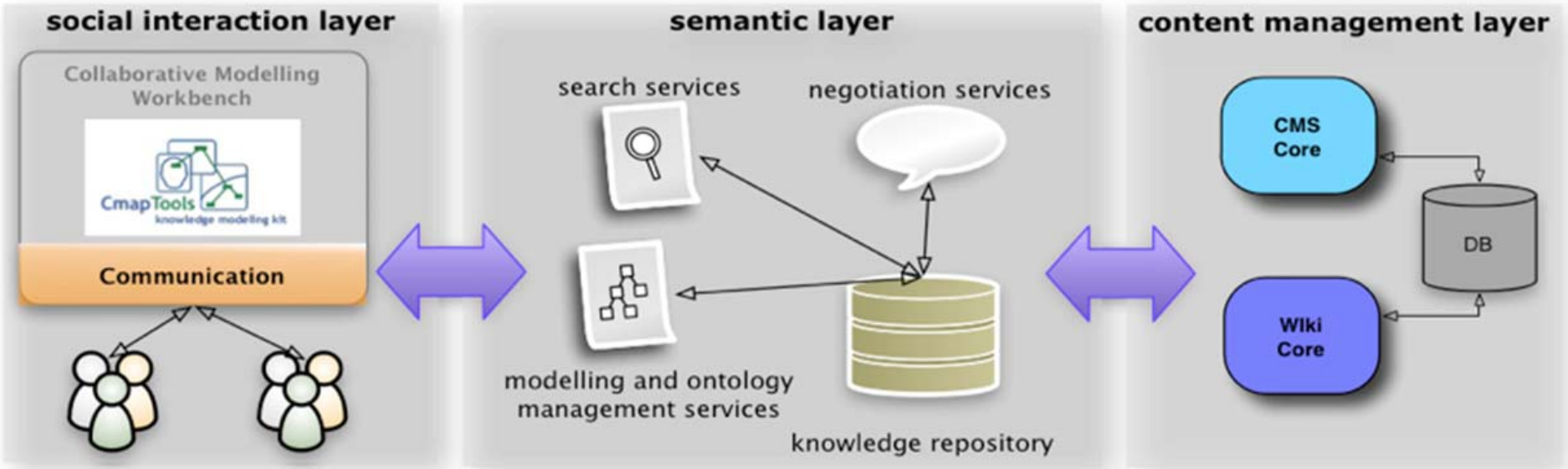
- **goals**: to develop an ICT solution, to support SME's collaborative networks in integrating collaboration, knowledge and learning in the rehabilitation, restoration & maintenance field
- **structure**: 15 partners from 5 countries (SMEs, RTD institutes, industrial associations); 21 tasks grouped in 7 work packages
- **needs**: to build a glossary to create a shared understanding of the project domains
- **domains**: "*building rehabilitation, restoration and maintenance", "collaborative networks", "learning management", "management of social interaction"*

consensus building




H-KNOW portal
Portal of the European project H-KNOW
Menu
General information
Meetings
H-KNOW forum
Internal information
Internal reports
Dissemination
Glossary
Construction Industry
building maintenance
Collaboration
E-learning
Information and Knowledge Management
WP1
WP2
WP3
WP4
WP5
WP6
WP7
view
edit
sharing
history
actions ▼
state: candidate concept ▼
building maintenance
by admin — last modified Apr 02, 2009 03:11 PM
Definition
combination of any actions carried out to retain an item in, or restore it to, an acceptable condition (BS 5405).
Context of use
The other highly emphasized need of the CI SMEs dealing with building maintenance/ repair is to establish closer business collaboration within this sector as an assembling alliance of SMEs and RTDs enabling creation of integrated teams that will successfully and profitably cope with challenging complex performance targets. Applying the generic MSI and KM services, the German consortium SMEs (Ventimola and Tietjen), together with other SMEs from the network NeMO, will have the H-KNOW system configured for the Collaborative Application Specific Services (CASS) called "Energy-efficient buildings restoration" and "Old Building Maintenance".
Information sources
http://www.angelfire.com/biz/BuildingPathology/BldngPathGlsry.html#B
Send this page to specific users
Print this
History
action
performed by
date and time
comment
Retract
Pedro Castanheira
Apr 02, 2009 11:30 AM
No comments.
Submit for publication
Pedro Castanheira
Apr 02, 2009 11:30 AM
No comments.
add comment

an architecture to support the collaborative conceptualisation process



conclusion

- the cases studied in our (action)research validate the adoption of socio-semantics as the theoretical support to manage semantics and collaboration in large and complex projects
- the practical methods and tools developed so far support well the collaborative conceptualization process
- however, our initial hypothesis is not yet fully proved
- further case studies are envisaged to develop both the theory and practice of socio-semantics in ES projects

ongoing work: who?

- PhDs contribution @ INESC Porto and FEUP
  - Carla Pereira finishing her PhD on the **adaptation of the Conceptual Blending Theory to support methods and tools for collaborative conceptualization**
  - Cristovão Sousa starting his PhD on **reference models (socio-technical configurations) and a method for the design of highly customised, optimal and time-efficient Im&Ks structures in ES projects**
  - Vitor Santos starting his PhD on **explaining the information and knowledge sharing behaviour in large scale projects and their relation with the organizations IS&IT strategies**

thank you for your attention