



Semantic challenges in social software

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My story, so far

- November 2006 : PhD thesis on “Knowledge sharing in social networking systems” :
 - Mixture of KM, sociology and computer science
 - Researched the way knowledge sharing takes place in social networking systems
 - Researched the evolution of online social networks in time by analysing FOAF files
- Nov 2006 – Nov 2007 : travelling
- Now : working at STAR Lab, researching semantic aspects of service-oriented architectures and community-driven ontology evolution

Structure of this presentation

- Objectives :
 - Discuss social software and the way it is evolving
 - Discuss some semantic challenges which already exist or which could become relevant in the future
 - Discuss aspects of the application of social software in organisations
 - Provide a broad overview to incite further discussion during the workshop
- Contents :
 - Introduction
 - An integrated social software architecture
 - Knowledge sharing between communities

Introduction

Social software

- Social software :
 - multiple people use it
 - software contains social functions
 - is web-based
- The social software concept often does not encompass cmc (email, voip, IM)

Popular social software

- Blogging & CMS : Wordpress, Drupal, Joomla,...
- Collaborative authoring : wikis & google docs
- Social tagging (e.g. del.icio.us)
- Social networking systems : Facebook, mySpace, linkedIn,...

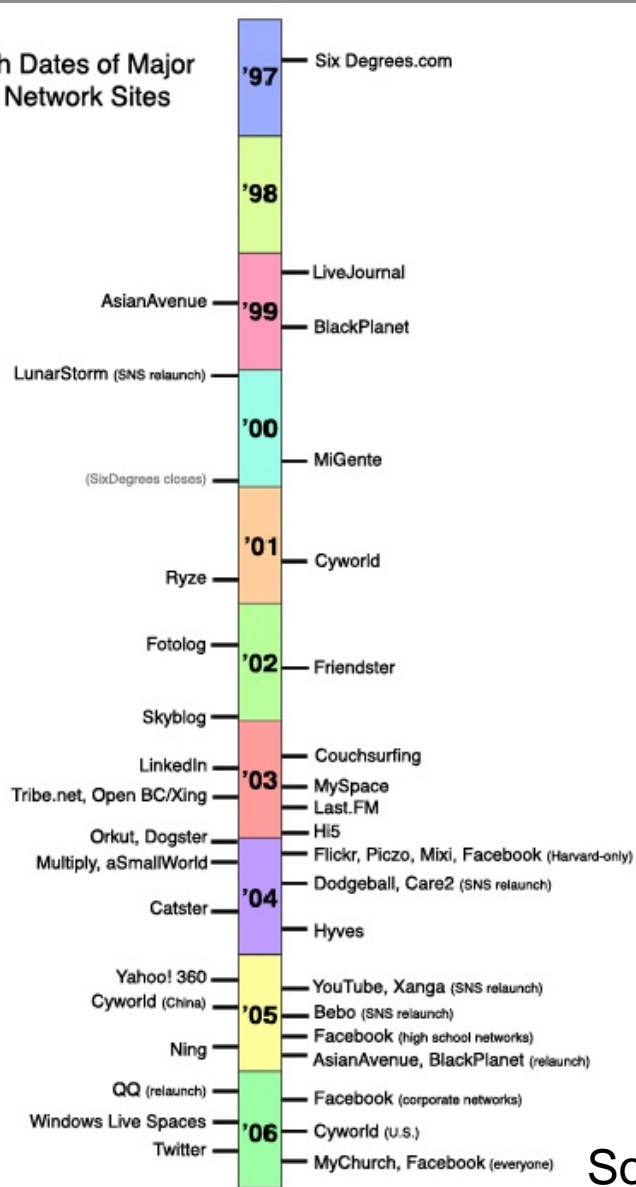
Social networking systems

Def : A social network system allows people to

1. construct a public or semi-public profile within a bounded system
2. articulate a list of other users with whom they share a connection
3. view and traverse their list of connections and those made by others within the system

(Boyd & Ellison 2007)

Social networking systems



- More and more SNS are appearing
- Becoming more and more specialized (Nike, Obama, Mastercard, Cisco, Church, University of South Carolina,...)

Source : Boyd & Ellison 2007

Social networking systems

The economic potential of these systems is perceived by industry to be very high :

- 2005 : mySpace bought by NewsCorp (Rupert Murdoch) for 580 million \$
- 2007 : Microsoft invests 240 million \$ to buy 1,6% of Facebook's shares, giving the system an estimated value of 15 billion \$
- 2008 :
 - AOL buys Bebo for 850 million \$
 - Cisco bought Tribe.net
- The question still remains what to use them for. Can social networking systems really be useful ?

Evolutions in social software

Socialprise

- Def : “the mash-up of social networking features and standard enterprise computing applications”

(http://www.nytimes.com/2008/04/09/technology/techspecial/09socialprise.html?_r=2&ref=techspecial&oref=slogin&oref=slogin)

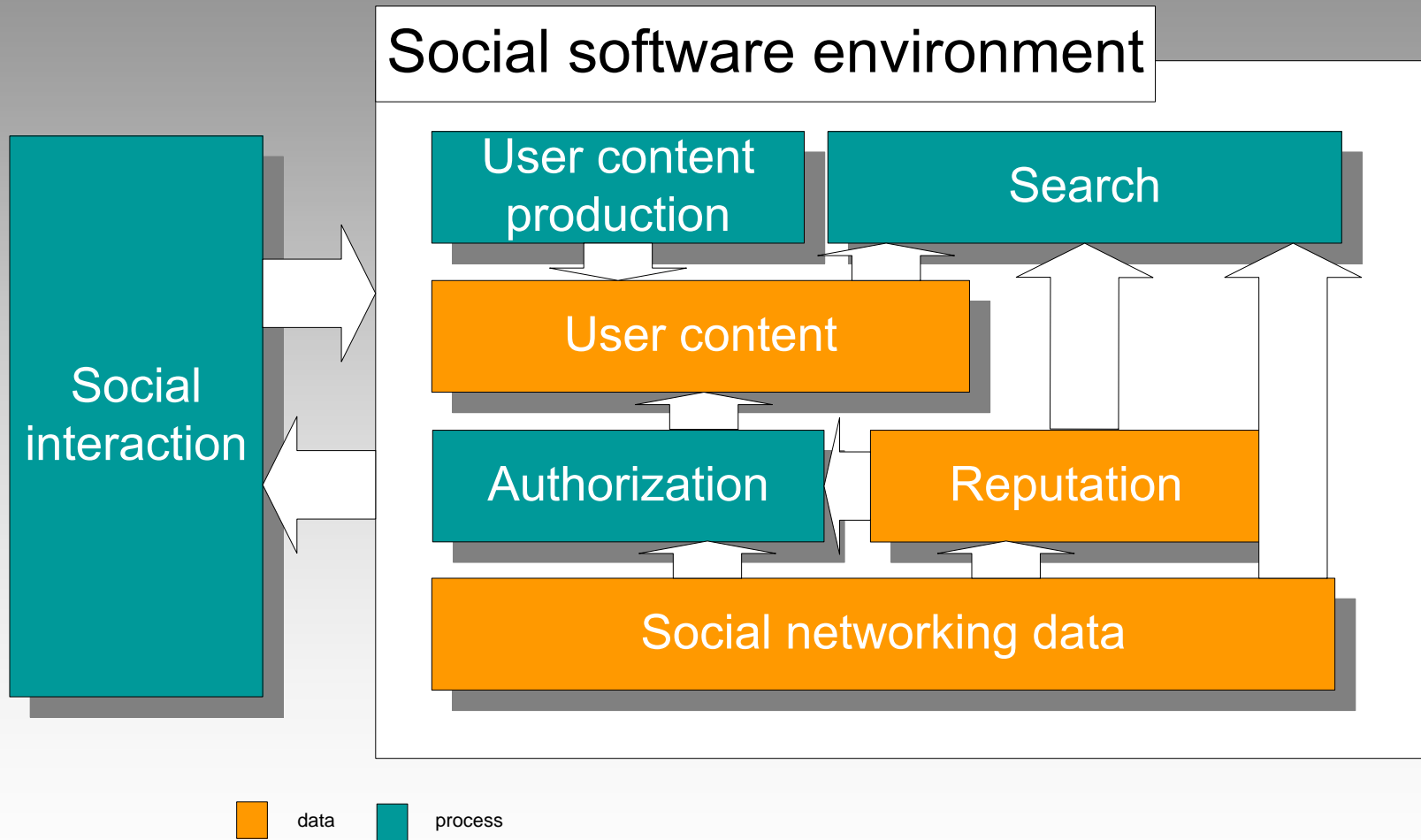
- Platforms : e.g. IBM, Microsoft, Oracle
- Users : e.g. Mastercard, Cisco

Evolutions in social software

- Open Social : open widget
- Data portability :
 - Transcending walled gardens
 - Microformats, Single sign on,...

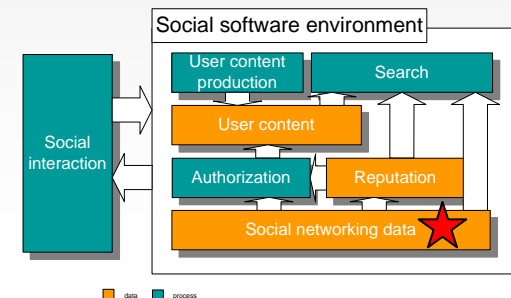
An integrated social software architecture

Social software architecture



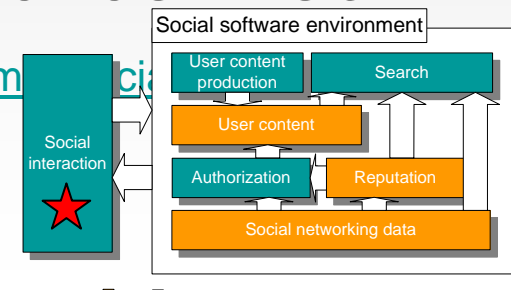
Social software architecture— Social networking data

- Social networking data can originate from multiple SNS if data portability is implemented (e.g. using FOAF or XFN)
- Semantics of human relationships and personal attributes
- Constitutes a social graph
- Will be a fundamental enabler for semantics in social software



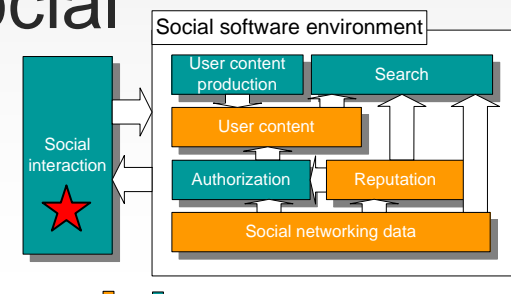
Social software architecture— Social interaction

- Can be either online or offline
- Creates social contacts
- Social network expansion is in part driven by foci (Feld 1981), e.g. :
 - School
 - Work
- The concept of focus-driven sociality also lives in the blogosphere as object centred sociality (http://zengestrom.com/blog/2005/04/why_som



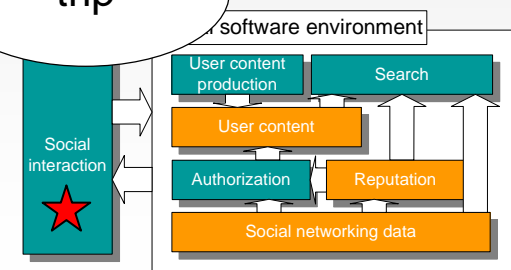
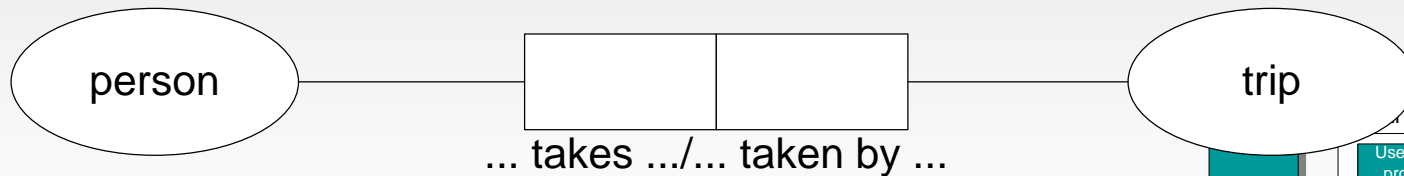
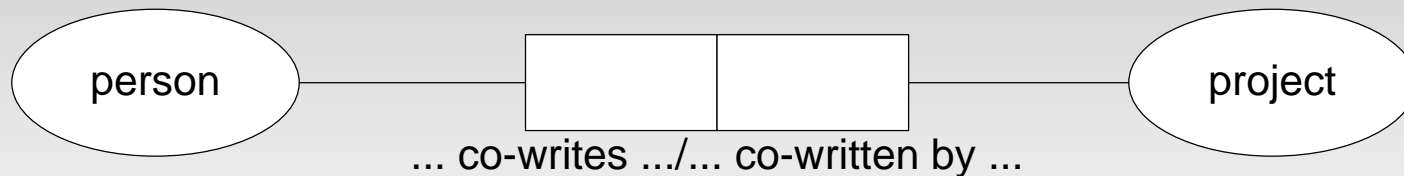
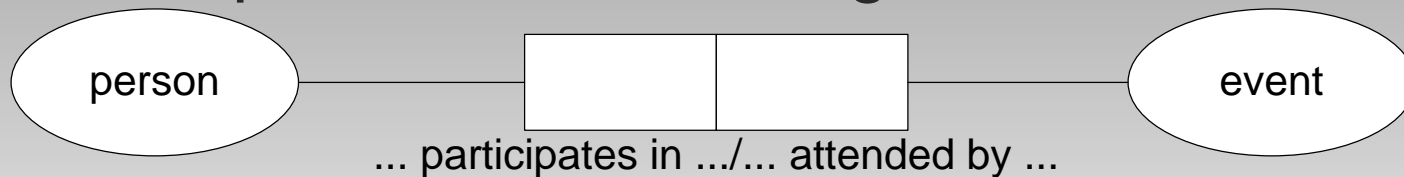
Social software architecture— Social interaction

- Foci are increasingly becoming digital, e.g. :
 - Online communities
 - Discussions in forums
 - Fotos on flickr
 - Bookmarks on del.icio.us
 - Travel itineraries on dopplr
- As social dynamics are in part driven by such foci, it would be useful to include them in the online semantic representation of social structure



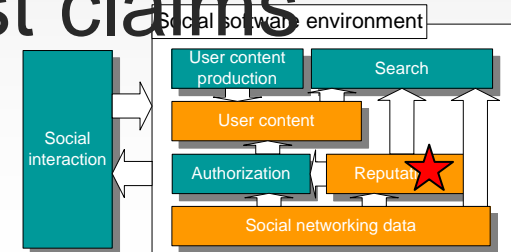
Social software architecture— Social interaction

The social graph can be expanded to include foci.
This implies semantics, e.g. :

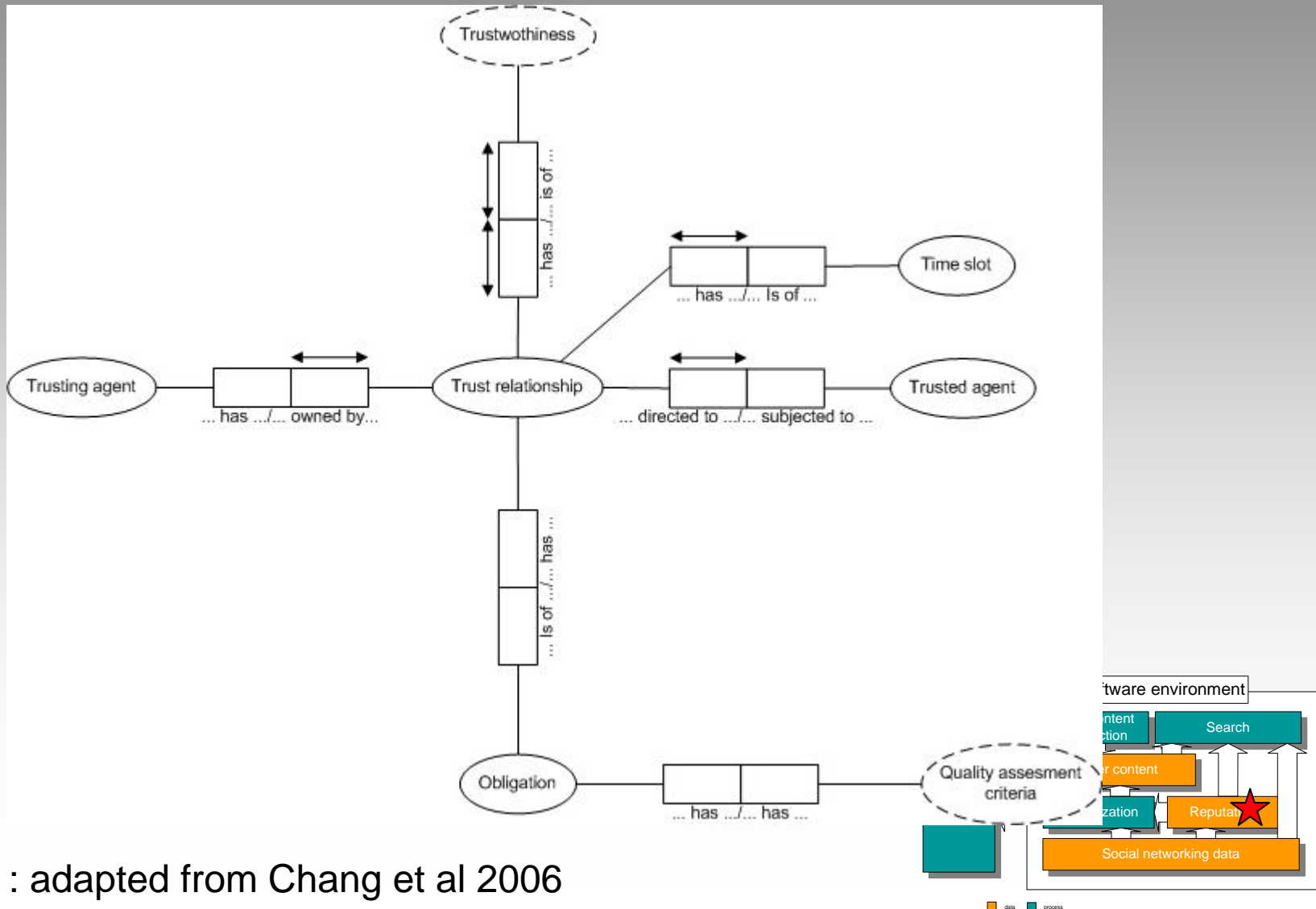


Social software architecture— Reputation

- Reputation is an important enabler for the self-organisation of collaboration (Axelrod 1985)
- A number of online reputation systems (e.g. ebay) already exist online, but they are seldom implemented in social software
- New OASIS technical committee on Open Reputation Management Systems : query, store, aggregate, and verify trust claims between systems and people



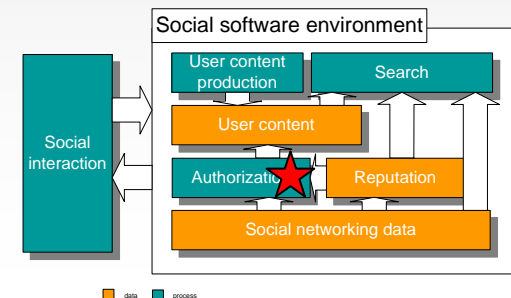
Social software architecture— Reputation



Source : adapted from Chang et al 2006

Social software architecture— Authorization

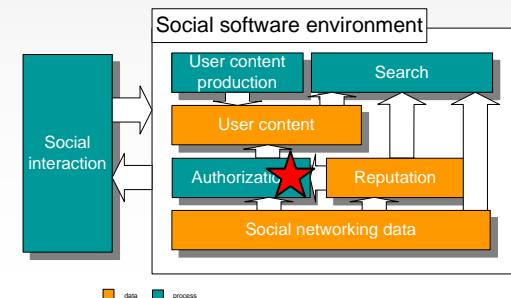
- Content can be authorized for access according to the relationships one has with the author of the content : e.g. all people who are my collaborators on project XYZ may view this movie clip
- Social network semantics can be made to operate on authorization mechanisms



Social software architecture— Authorization

Combine social networking formats and trust metrics with authentication and authorisation formats

- Could be an enabler for self-organisation of collaboration : “if my reputation goes down, I may not be able to access this content any more !”
- need for a combined semantics



Social software architecture— Content and content production

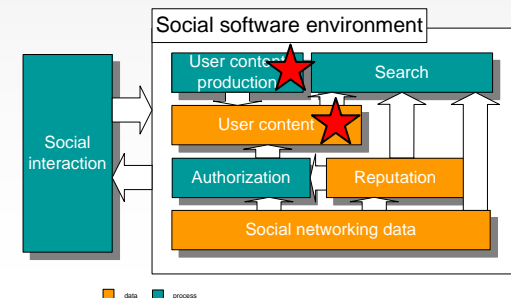
Large increase in types of content :

– Previously :

- Text
- Audio
- Program code

– Now :

- Photos
- Video
- Maps
- Tags



Social software architecture— Content and content production

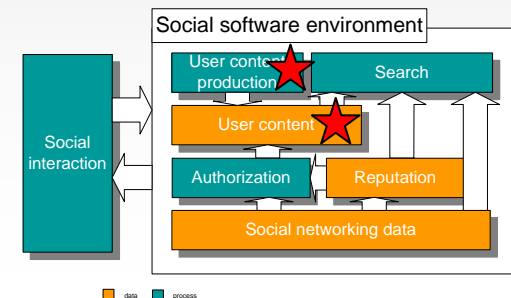
Types of content production :

– Individual production :

- Blogs
- Websites

– Collective production :

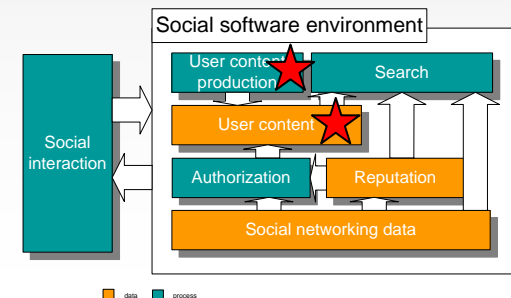
- Wikis
- Google docs
- Commenting



Social software architecture— Content and content production

Relevance of collective content production:

- Collaborative writing enables orchestrated collective action, increasing quality (encyclopedia Britannica vs wikipedia study)
- Distributed knowledge sharing enables creativity, innovation and problem solving



Social software architecture— Content and content production

Locus of production :

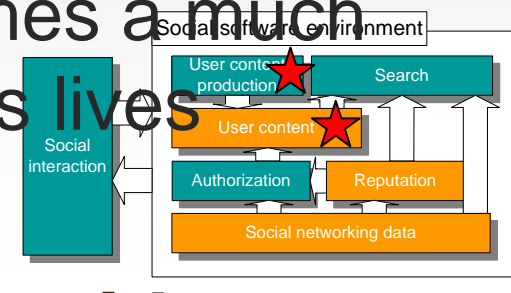
– Previously :

- On a computer, using a html-editor

– Now :

- Platform of content production becomes increasingly mobile
- E.g. microblogging using mobile phones (twitter, jaiku)

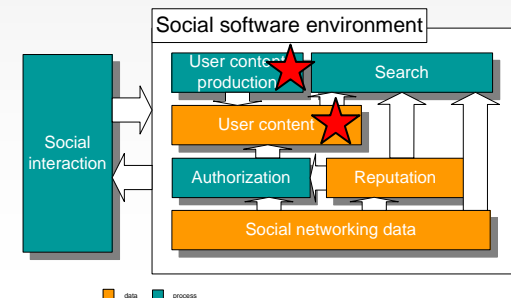
=> online content production becomes a much more pervasive activity in people's lives



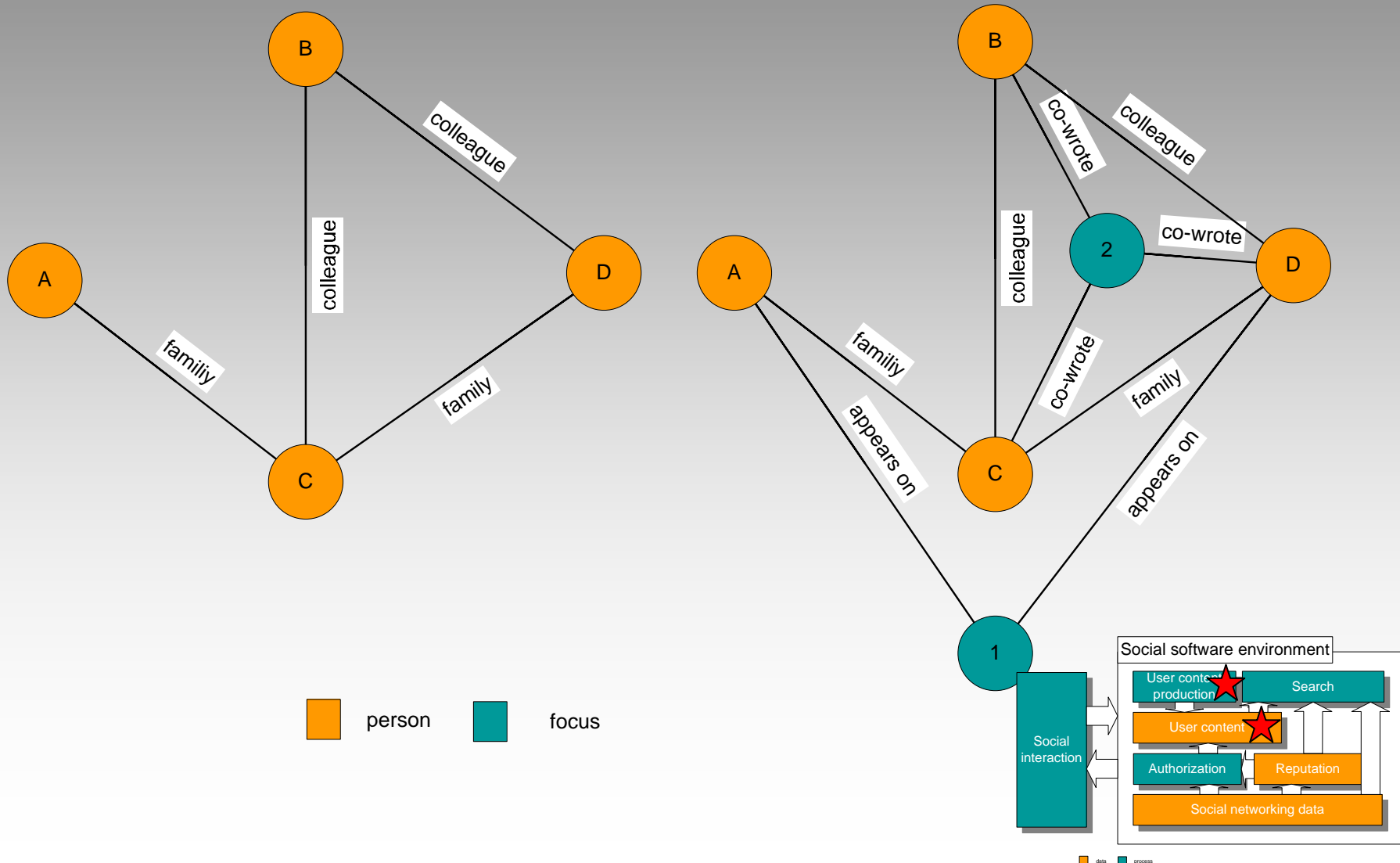
Social software architecture— Content and content production

Semantic challenge : Connect all the new resources into an extended graph, which takes into account the focus-driven nature of sociality :

- Locations
- Projects
- Photos
- Documents
- ...



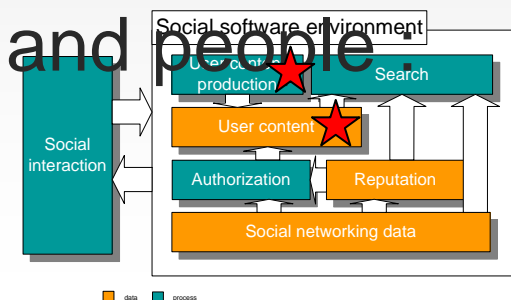
Social software architecture— Content and content production



Social software architecture— Content and content production

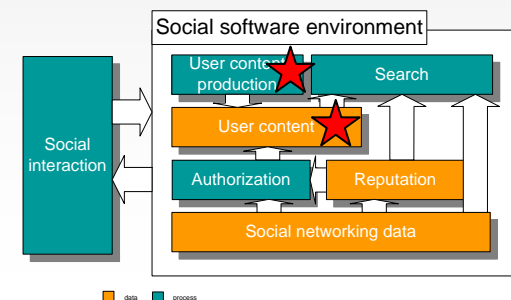
Obvious applications of focus-enriched social graph :

- Inference of social relations : people on a family photograph could be family members of each other
- Inference of semantic attributes : A person who wrote an executive document for an organisation might himself be an executive
- Recommendation of both objects and people using graph-theoretic algorithms
- Federated search

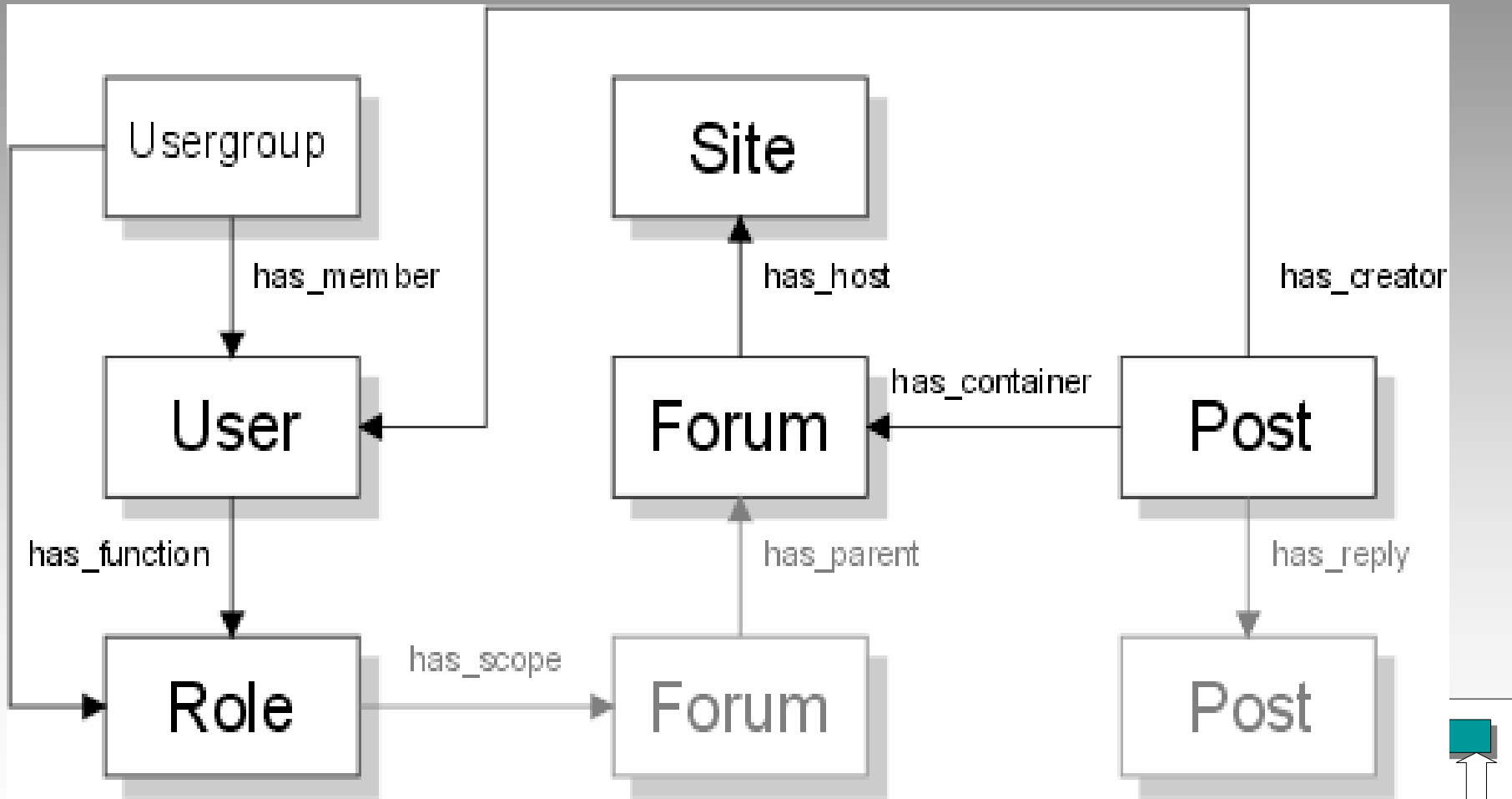


Social software architecture— Content and content production

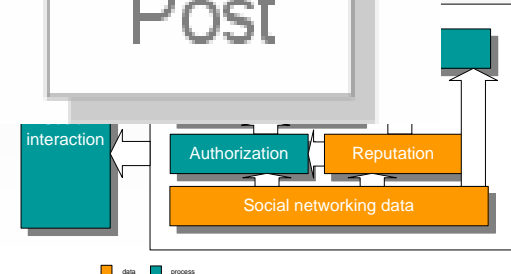
- Add relationships between content that has been posted on different community platforms
- This can be done by adding semantics to community content
- e.g. Semantically linked online communities (SIOC)



Social software architecture— Content and content production



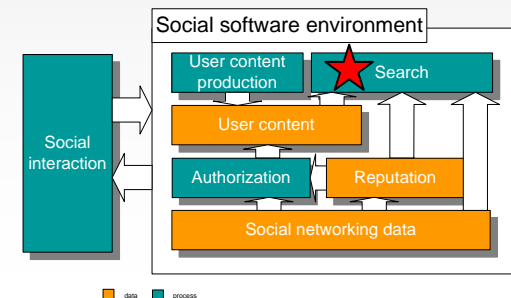
Source : <http://sioc-project.org/ontology>



Social software architecture— Search

Web search can be extended to take into account :

- Focus-enriched semantic data
- Reputation data
- Semantically annotated content across community platforms



Knowledge sharing between communities

An assumption underlying my approach to KM

Constructivism : knowledge is constructed and does not necessarily reflect any external realities. Instead, it is contingent on cognitive and social influences (Fosnot 1996)

=> Knowledge management from a constructivist perspective is about managing these cognitive and social elements

Social capital

- Social capital = the advantages which you derive from your social network
- These advantages can be material (eg. money) or immaterial (eg. emotional support)

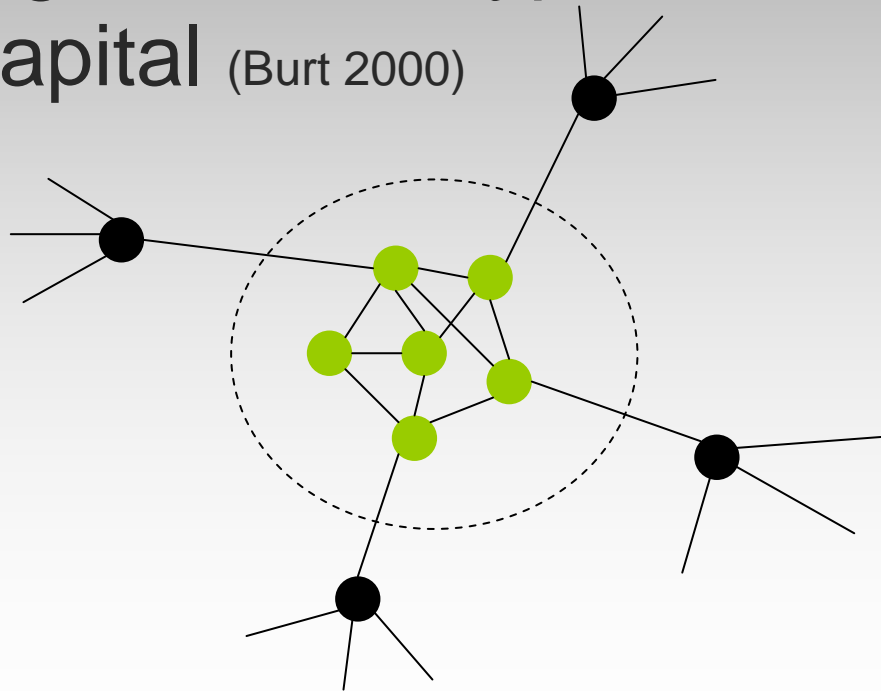
Social capital

Sources of social capital (Putnam 2000) :

- Bridging : advantages derive from being able to link to various areas in the social network => “open” social structure
- Bonding : advantages derive from being part of a dense area in the social network

Social capital

A group should combine bridging and bonding social capital, to leverage the advantages of both types of structural social capital (Burt 2000)



Social capital

The advantage of bonding social capital derives from

- the norms and trust which develop among the members of the cluster
- the speed at which knowledge travels in the cluster

Social capital

The advantage of bridging social capital derives from the diversity of the information which is extracted from the various parts of the social network with which a person has contacts => this influences creativity, innovation and problem solving

Related business notions

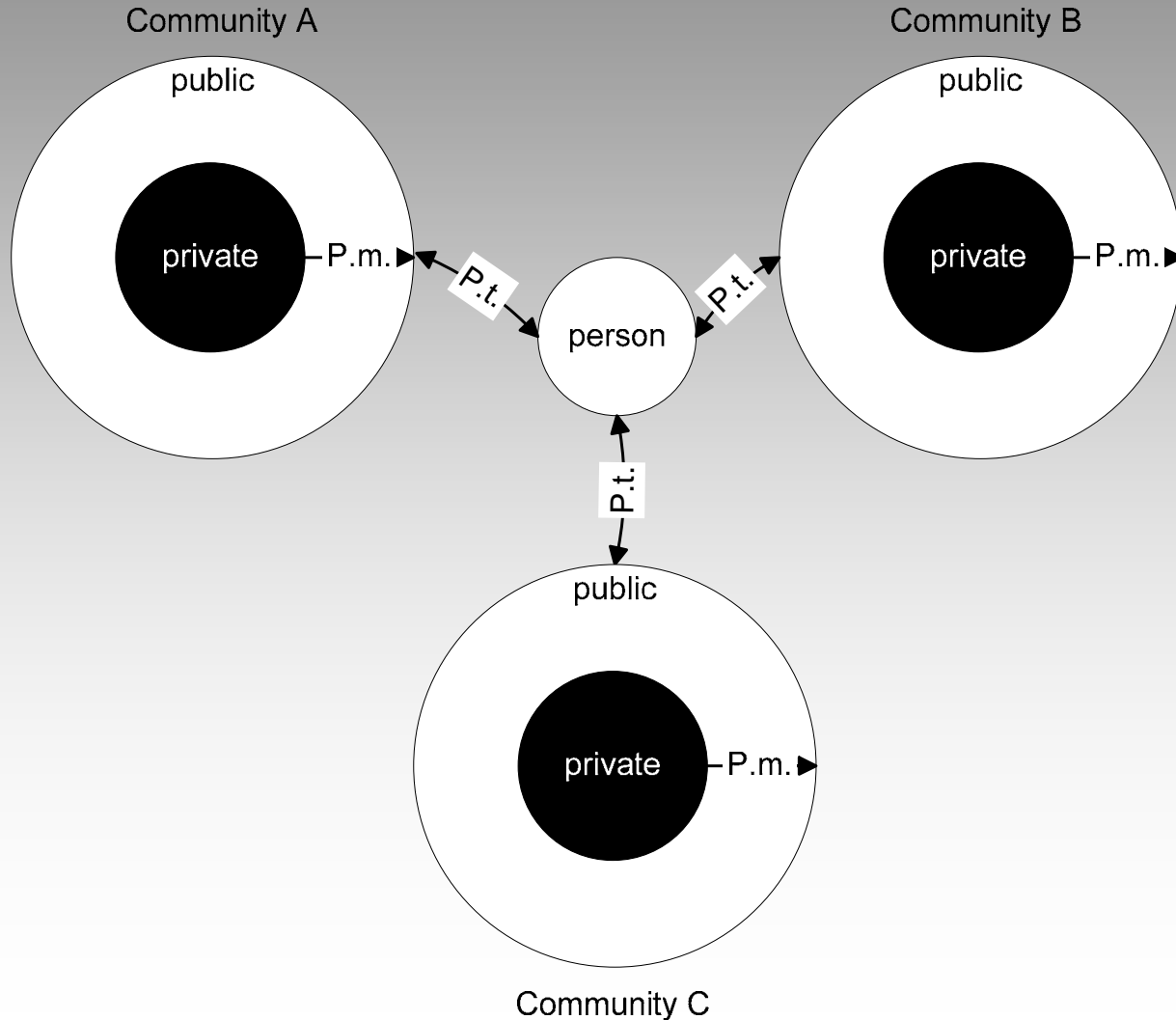
- Open innovation (Chesborough 2003)
- The world is flat (Friedman 2005)
- Digital business ecosystems

=>all these notions underline the importance of knowledge sharing between heterogenous knowledge communities, which each have their socially constructed knowledge set

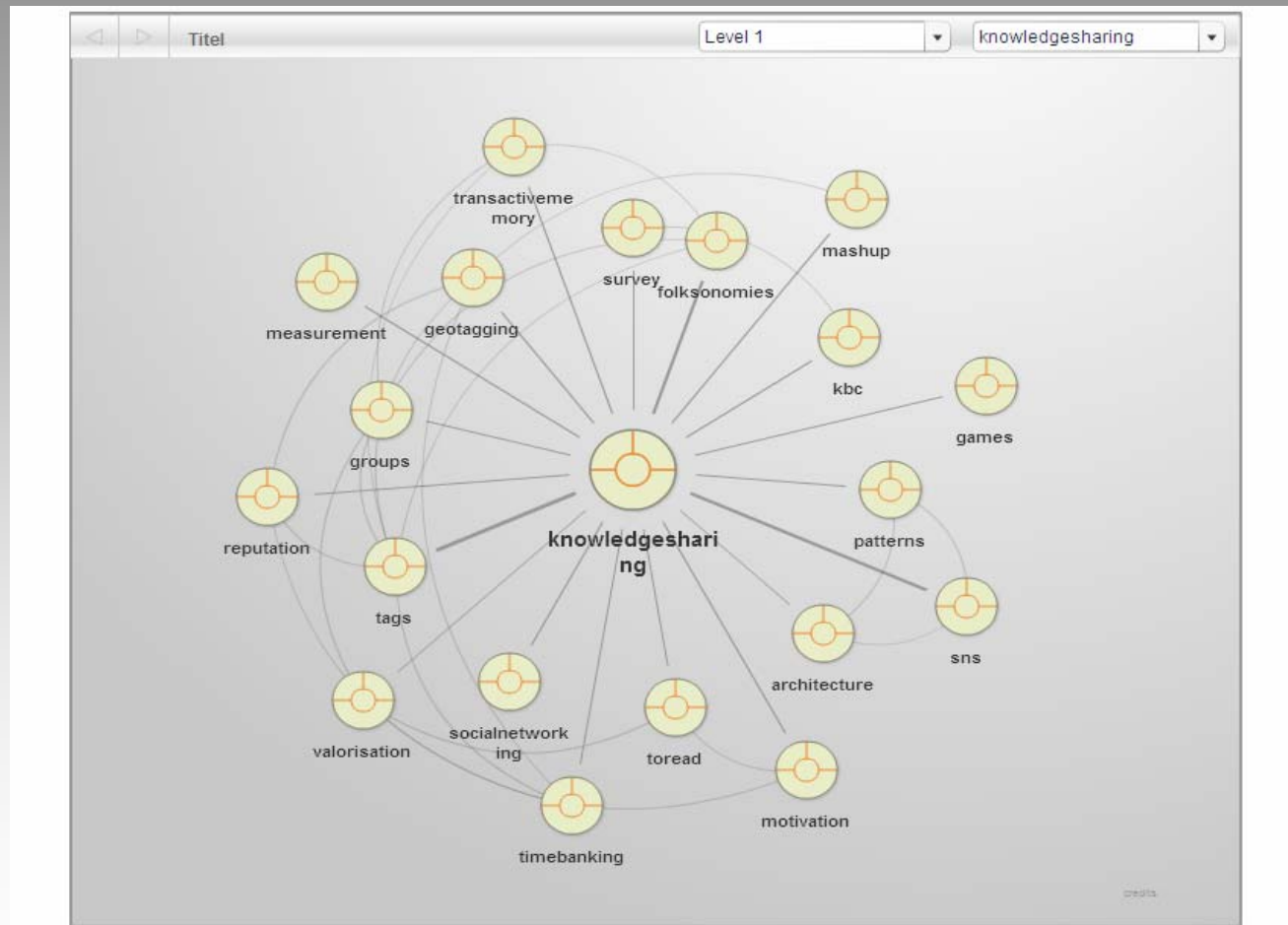
Internalize knowledge from different communities

- A semantic challenge is to create semantic boundary objects which represent the perspective of the community (Boland & Tenkasi 1995)
- Characteristics of effective boundary objects (Carlile 2002) :
 - establish a shared syntax or language for individuals to represent their knowledge
 - provide a means for individuals to specify and learn about their differences and dependencies across a given semantic boundary
 - facilitate a process where individuals can jointly transform their knowledge

Internalize knowledge from different communities



Internalize knowledge from different communities



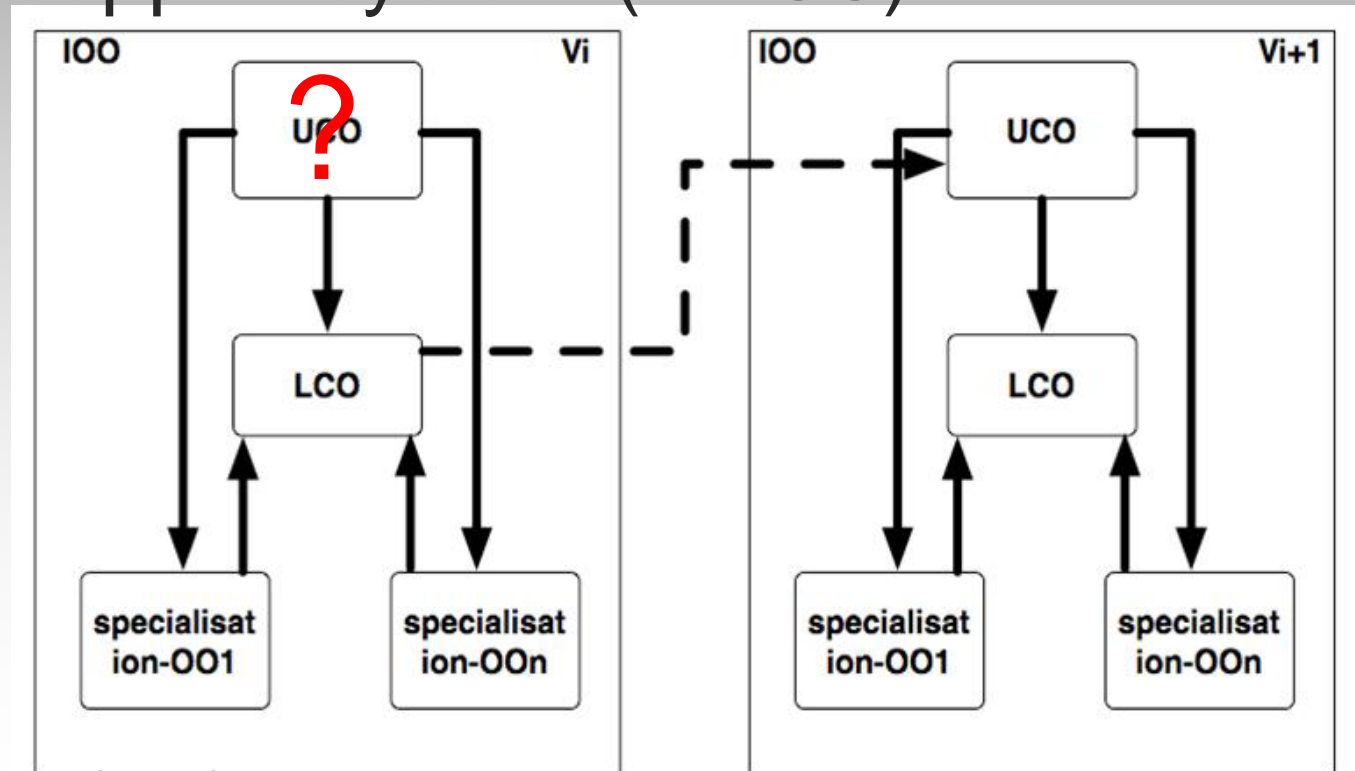
Source : www.knosos.be

Community-driven ontology evolution

- Constructivism => Ontology-engineering is a social, community-driven process and should be approached as such
- Challenges in terms of community-driven ontology evolution :
 - How to create ontologies in a distributed, community-driven way?
 - How to use social science analysis techniques to make community-driven ontology production more effective ?
 - How to make evolving community-driven ontologies?

Community-driven ontology evolution

How to create ontologies in a distributed, community-drive way => Meaning evolution support system (MESS)

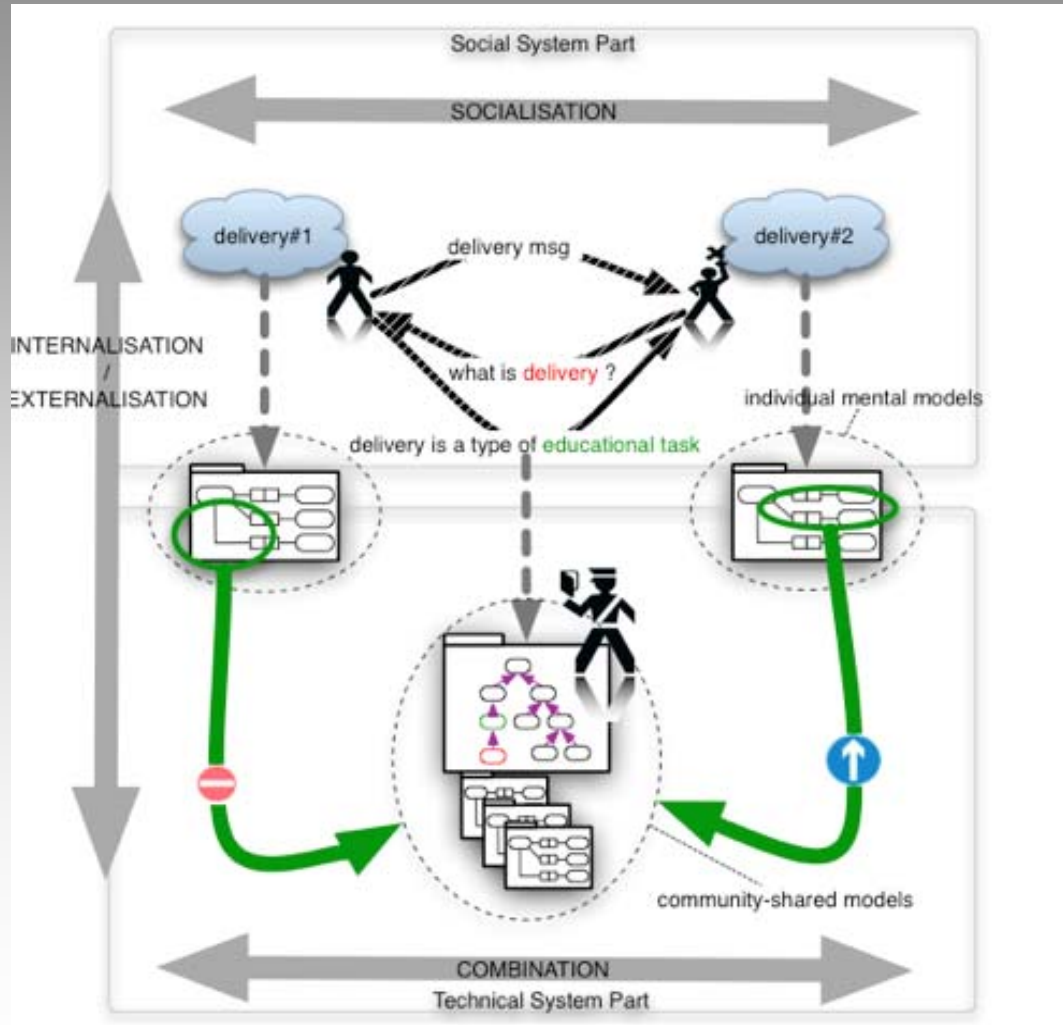


Community-driven ontology evolution

Interesting question : how to bootstrap a methodology like MESS ?

- Scoping & text analysis
- Lightweight ontologies using semantic boundary objects

Community-driven ontology evolution



Source : Pieter de Leenheer & Stijn Christaens

Community-driven ontology evolution

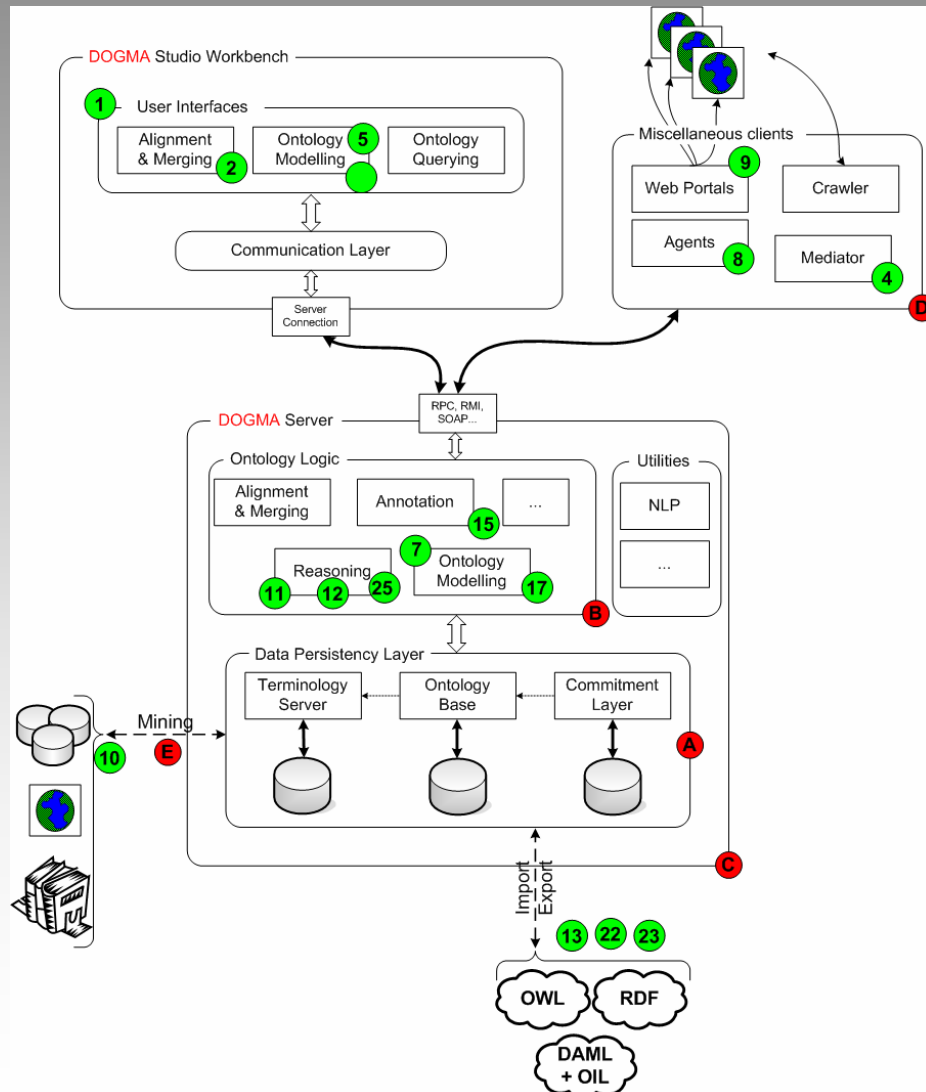
How to use social science analysis techniques to make community-driven ontology production more effective ?

- Social networking analysis : what people can perform what task in an community-driven ontology creation process ?
- Investigate the norms of a community to make sure that the ontology creation process takes place within the normative setting of the community

Community-driven ontology evolution

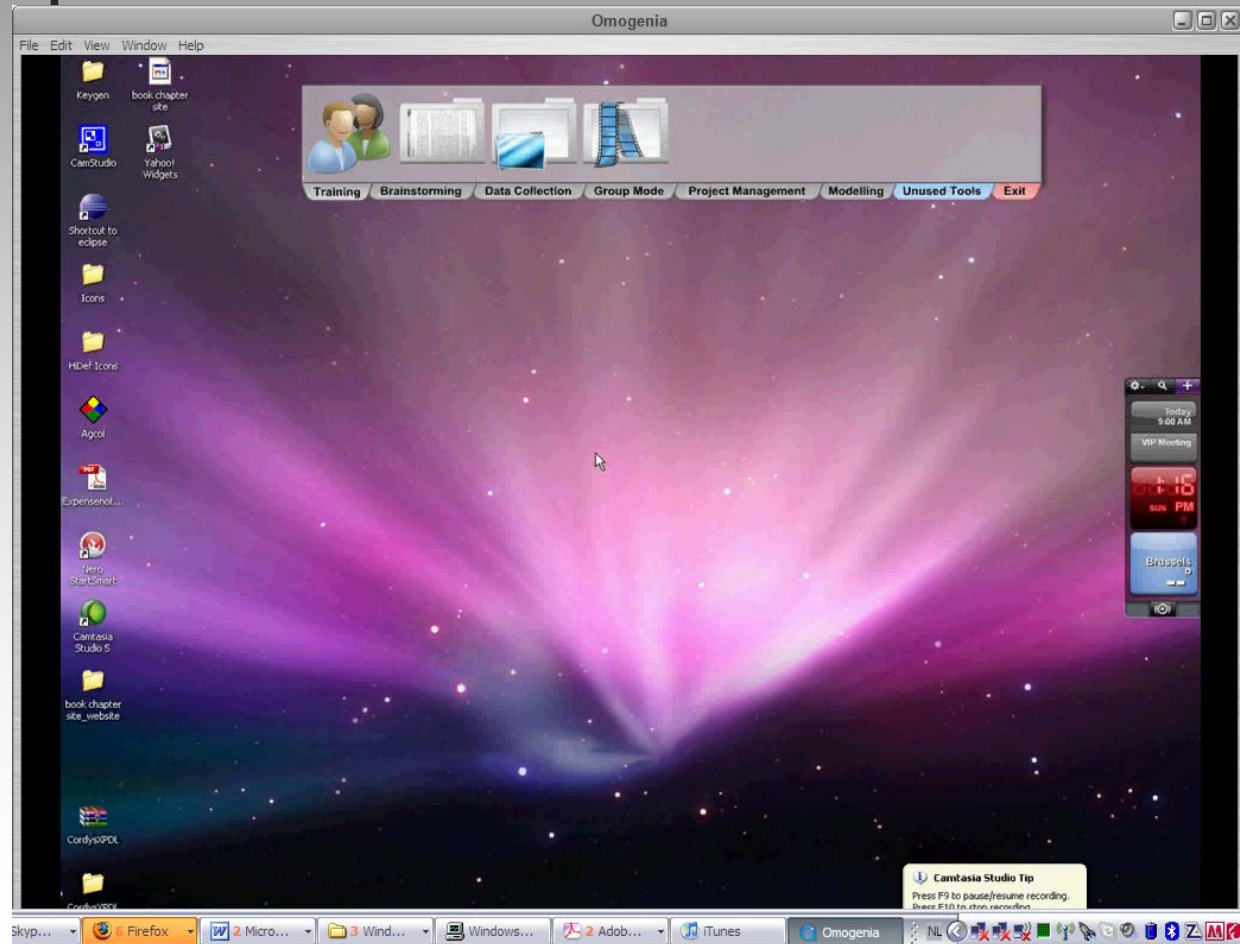
- How to make *evolving* community-driven ontologies?
- STAR Lab (Robert Meersman):
 - DOGMA-Workbench
 - Omogenia platform

Community-driven ontology evolution



Community-driven ontology evolution

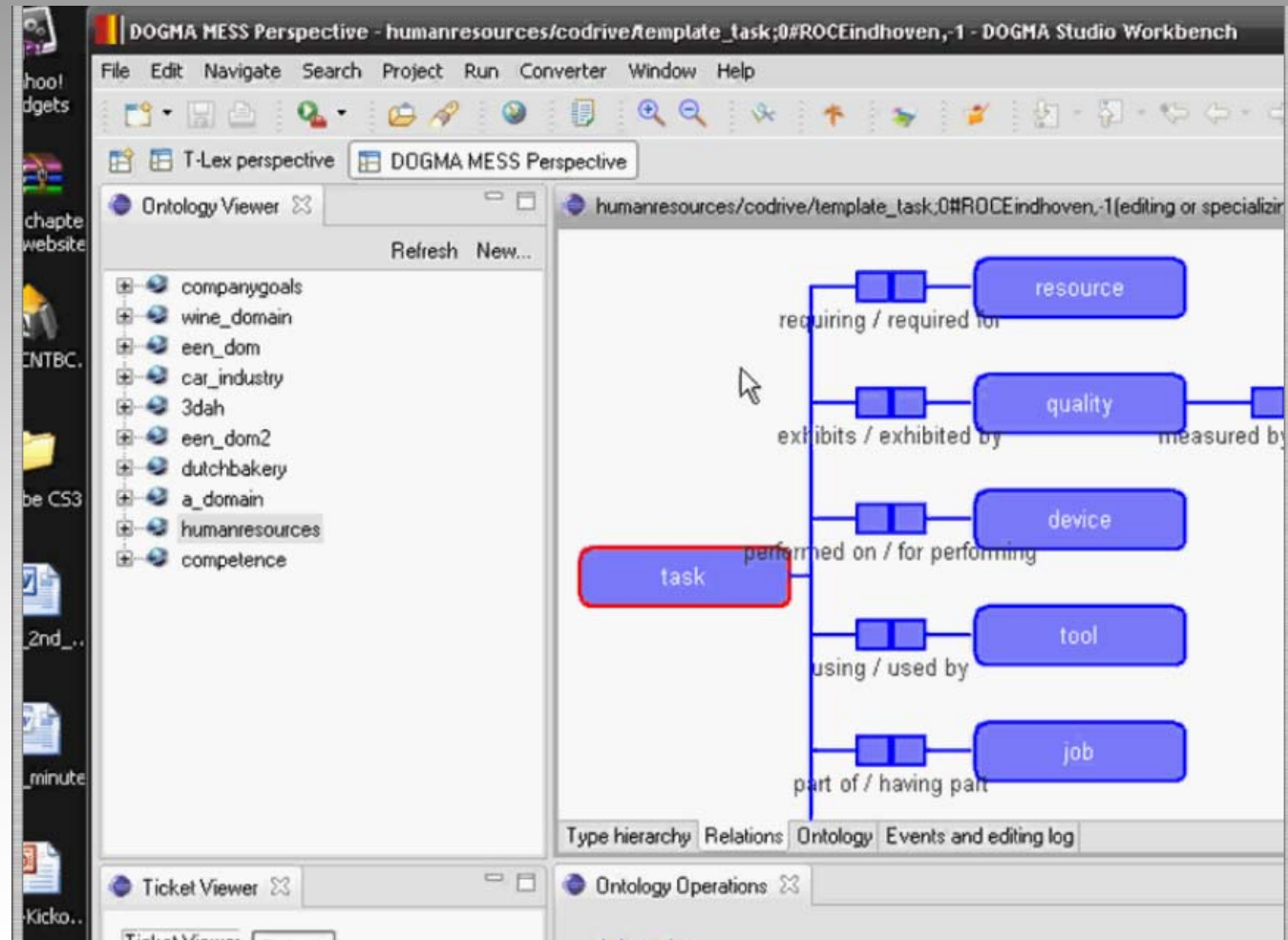
The Omogenia platform



Source : Aggelos Liapidis

Community-driven ontology evolution

DOGMA Workbench



Source : Christophe Debruyne , Damien Trog , Stijn Christiaens

Conclusion

- Semantics often addressed through ontologies
- What can ontologies be used for :
 - Communication
 - Computational inference
 - Reuse of knowledge

(Gruninger & Lee 2002)

Conclusion

	Communication	Inference	Knowledge reuse
Community-driven ontology evolution	X		X
Focus-enriched graph	X	X	X
Semantic boundary objects	X		X
Semantic authorization	X		X

References

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Thank you