"Socio-Semantic Web" applications: towards a methodology based on the Theory of the Communities of Action

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ABSTRACT: "Socio-Semantic Web"(S2W) applications, such as "Knowledge-Based MarketPlaces" (KBMs), lead to co-construct symbolic organizational artifacts including "maps" or others semantic instruments, bringing a visibility and a reflexivity of the knowledge and of the action in communities. In presenting and comparing examples of KBMs, we note that the creation and the whole lifecycle of such S2W applications mobilize the actors at an epistemic level, but also at socio-organizational and inter-personal levels. A methodology to accompany S2W applications must take in account all these aspects, and we suggest to base it on the Theory of Symbolic Communicational Transactions and Communities of Action (Zacklad 03b).

KEYWORDS: Socio-Semantic Web, Hypertopic, Communities of Action, Methodology, Co-construction.

1. Socio-Semantic Web and Communities of Action

Inside the Semantic Web field, the Socio-Semantic Web (S2W) appears as a promising field of research, tools and applications (Zacklad 03a). S2W doesn't imply a high level of "automation of the meaning" with formal ontologies processed by automated inferences. On the contrary S2W focuses situations where a semantic indeed needs support of Information Technologies, but with human beings highly required to stay in the loop, interacting during the whole lifecycle of applications, for both cognitive and cooperative reasons.

S2W deals with a very large spectrum of collective activities, especially in the context of the Communities of Action (Zacklad 03b), characterized by coordination mechanisms based on Symbolic Communicational Transactions. In this context, "Socio-Semantic" preoccupation emphasizes the symbolic level as an important coordination component. This theory differs from the theories of situated action (Suchman, 1987), of distributed cognition (Hutchins, 1995) and with the "Social Web" approach, which emphasize more tacit knowledge or more direct "awareness" mechanisms. It differs also from the approach of Coordination Mechanism, based on protocols and artefacts implementing models for the articulation of the cooperative work (Schmidt 96) (Simone 00).

S2W aims to support Communities needing to collectively elicit, in a continuous manner, a crucial part of the knowledge, especially of the "local" semantic structure underlying both the

business objects and the collective work. For the business objects it can arise through artifacts such as thesaurii, "topic maps", semi-formal ontologies, yellow pages or catalog directories, like in the cases focused by the KBM model (Cahier 2002). At the level of a Community (or of an inter-Community, e.g. associating Clients and Sellers), a "local" semantic is collectively and continuously "auto-constructed", often tacitly, *by* and *for* the actors in their activity, In such a process, "users" are not (not only) consumers of externally-designed semantic resources, but they are users *and* creators in a constructive manner of "local" semantic Resources managed at the Community (-ies) level. As a consequence, in the cases where there is a strong need to make explicit a part of the underlying semantic, it is a better solution – in many cases it is the only one – for semantic to be managed by the concerned people, according to the participative design principles of the S2W.

That involves especially the situations, where these underlying semantic resources to be elicited and maintained are very voluminous, evolutionary and even conflictual (e.g. metadatas of competitors together in a Marketplace). In such cases, the communities need S2W applications to organize themselves their activities of co-construction, i.e. adapt roles and internal services to bootstrap, build and maintain the semantic structures they need. In order to co-construct such artifacts in a continuous manner, in the flow of the activity, they have to be helped by well-adapted S2W tools and by accompanying methodologies, including the State-of-the-Art of CSCW tools especially in terms of roles flexibility ("malléablité", cf. Bourguin 01). So the users remain active co- builders during the whole lifecycle of the S2W application.

2. KBMs as examples of socio-semantic web

Since 2001, when we initiated the "Knowledge-Based MarketPlaces" concept (KBM) at the Tech-CICO Laboratory (Cahier 02), we studied several real-size KBM applications (Fig. 1).

Case	Socio-Semantic Web Tech-CICO experiment	Type of W2S generic model	Field of the experiment	language	status	Implementation	Type of Entitiy (ies)	Number of Points of View	Number of Topics	Number of Instances of Entities	Internal Community of Action ("sell side")	External Community ("buy side")
#1	"Training KBM"	KBM	Multi-competitors e-marketplace in the field of training in software skills (data source: "Guide de la formation / Le Monde Informatique")	F	demonstrator	elementary Topic Maps (Mondeca Tools)	1 type : training module	4	100	1500 (source), (100 demonstrator)	1500 societies (poten-tially)	open (B2C system)
#2	"AGORA-FT"	KBM	DIN France Telecom (2002), R&D projects "Electronic MarketPlace" at the FT group level	E&F	on line operational application	HyperTopic v0, "sur mesure" development	2 types: project, sub-product	7	2000	350	200	Extranet at the group level
#3	"Guide Adolescence"	KBM	A group of social workers, region of Aube / France (2003) - guide to advise adolescents with difficulties from multiple points of vue (health, school, money...) .	F	operational product (CD-Rom)	HyperTopic v1, AGORÆ generic toolbox	1 type : "social solution / aid resource"	8	400	500	15	Social practitioners (~300) in the region
#4	"Yellow Pages of Competences" in the engineering field	KBM	EADS-CCR (2003-2004), study for Airbus Engineering Division	E	on-line demonstrator (in real size for the ontology) - in evaluation	HyperTopic v1, AGORÆ generic toolbox	1 type: Engineer "(a person)	6	2500	5000 (poten-tially)	5000 or more in case of an extended perimeter (contrac-tors)	5000 (potentially)

Fig.1 – KBMs experiments at the Tech-CICO Laboratory

KBM applications link actors who are suppliers and buyers of resources, in the wide sense: "entities" classified in the systems could be products or services (case #1), projects (#2),

knowledge or human resources to solve problems (#3), skills (#4) (Cahier 2004a), etc. Actors use and construct the semantic structure as a pivot to manage and retrieve the information describing these resources. A KBM is a particular type of Socio-Semantic Web application, in which the semantic framework proposed (Points of View about Entities organizing a Topic Map) appears strongly "structuring" on a few generic Roles (in S2W systems, roles, objectives and representation models can be very various). KBMs are based on Symbolic Communicational Transaction presenting two types of possible modalities (decision-oriented and understanding-oriented) and can be analysed as an embedment of several Communities of Actions.

3. Roles and Communities of Action in a KBM

Tech-CICO has progressively developed a set of generic concepts adapted to S2W applications. They have been formalized in a generic model, called Hypertopic (Zacklad 03a), consisting of a threefold view (fig.2). Firstly, for the business objects, the model includes the concepts of Entity, of Point of View, of Topic, of Resource and of Association. Secondly, on the activity/organization versant, we re-use these concepts to express and define the notions of Role and Actor. Thirdly, the Activity versant (structured on the same manner by Entities, Points of View and Topics) plays a key role to organize the action at both argumentative and operational level.

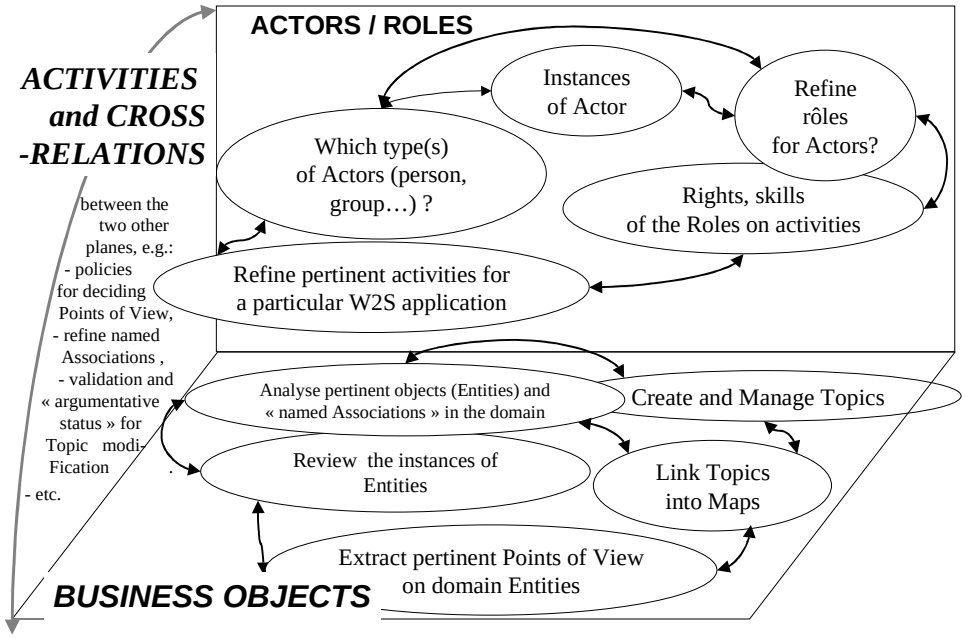

Fig. 2 – S2W supports a threefold analysis

In the case of KBMs, the actors/organization versant presents five typical generic "KBM Roles" ("Designer", "Administrator", "Semantic Editor", "Contributor", "Client"). But beyond this skeleton of roles, each KBM application presents specific organizational distribution and refinement of the roles. This is one of the numerous reasons for what we have built S2W as a more detailed methodology, in order to accompany the complex techno-organizational challenge of a KBM

For example, designers can choose to refine or divide the "client" role, i.e. according to specific attributes (rights, skills, age…) of the actors. If topics are completed with definitions

or, in multilingual KBMs, with translations, that could lead to better specify the Role "semantic editor" ("simple editor", "expert", "editor/translator", etc.), in refining skills and responsibilities. For these reasons, it is necessary to extend the malleability (Bourguin, 2001) of the underlying CSCW tools to facilitate this refining of the roles by the Community itself.

In comparing the experiments, we also establish the existence in a KBM of several levels of Communities (with possibility for an actor to belong to many). These communities can be advantageously analyzed in terms of Communities of Action, according to the PEPI model (Zacklad 3b). According to an e-commerce metaphor, schematically, the thirst level of community (role "Client") represents the "buy-side" of a KBM, while another community deals with the "sell-side"(roles of Contributor of content, Semantic editor, Administrator and Designer). In other terms, if we consider the semantic co-construction as a socio-technical system, the "sell-side" refers to a "system" level., while the «buy-side" refers to a outside or "non-system" level. Note that inside the sell-side Community itself, we can eventually consider for certain roles an embedment of other Communities, if the KBM roles tally with the "service goals" of smaller or "transverse" Communities (for example if groups of experts apply their skill to certain parts of the business domain).

Globally, the "sell-side" Community of Action carries out *service goals*, because it furnish a particular service in building an informational and semantic structure - a common "work" - proposed to the larger circle of users (the "clients"). These service goals, by which the Community presents itself as a "service " of informational, documentary, "ontological" and even "topographical" resources, implies practical and epistemic activities. But on the internal versant, the community has also to achieve its own *integration goals*, to construct the semantic as a part of the common "self" of the group. That implies to decide the policies and business rules, to refine and organize the internal roles according to the particular integration goals (for example, all Contributors can be - or not - Semantic Editors). Theory of the Symbolic Communicational Transactions are here double useful, firstly because the transactions aims to realize the service *and* to permit social integration, secondly because the associated activities permit to institute certain knowledge directed towards the service (the "business objects") and towards the integration (roles, rights, skills of actors).

4. Agenda

We intent in the Workshop to present examples, in order to compare them and detail further these methodological issues. A stake of this work, which takes place in a PhD thesis (Cahier 2005), is to study the Socio-Semantic Web as a frame supporting more elaborated symbolic transactions, allowing a Community using it to get a better reflexibility, on both action and knowledge, towards both service and integration goals. Thus the Theory of Communities of Action propose a conceptual grid to organize the thought of complex social and semantic activities, which could be useful in the perspective of the Socio-Semantic Web.

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