Bridging the Gap between Technical and Pedagogical Project-Partners' Perspectives on the Modelling of Communities of Practice

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Abstract

During the modelling process in multidisciplinary context, the points of view of the actors can be a barrier to efficiently achieve the process. In this paper, we relate the experience we have been confronted to in the context of the Palette IST project[1]. In this project, computer scientists and educational scientists aim at developing services for communities of practice (CoPs). The common work following a participatory design methodology allow us to produce some interesting results for the CoPs, but require to bridge the gap between our perspectives and objectives.

Keywords

Modelling; Communities of Practice; Knowledge management, IT services, development; Multidisciplinary design.

Introduction

In this paper, we address the issue of bridging the gap between different perspectives on the modelling of Communities of Practice (CoPs) between partners of a joint project, the partners coming from different disciplines. We are confronted to this issue in the European Palette project, where Technical partners (or *Ts*, acting as Technical-services developers) and Pedagogical partners (or *Ps*, acting as CoP observers and Educational-services developers) have to model CoPs. Our aim is to explicit how Ps and Ts make converge their two initially different modelling perspectives, which show through their initial goals:

- Ps' initial goal was to *understand* the life of a CoP (its organisation and its practices): to achieve this goal, Ps attempted to produce *abstract* models that try to cover as much as possible aspects of a CoP life.
- Ts' initial goal was to *develop* tools and services that help CoPs improve their practices: to achieve this goal, Ts attempted to produce *concrete* models of CoPs, i.e. models materialised in a tool or service.

This issue can be illustrated by different cases in the Palette project. We will focus on one of them: the modelling of "*CoPs activities*". First we will report and compare *different* activity models proposed by Ts and Ps. Then we will present and discuss some strategies used, or which could be used, by Ts and Ps to bridge the gap between the perspectives and resulting models.

Characterizing the gap of perspectives between Ps and Ts

To characterize the gap of perspectives between Ps and Ts, the method we adopted was to:

(1) to analyse the Ps and Ts perspectives respectively, by mining various Palette documents (deliverables, meetings notes, slides, etc.);

(2) to compare the perspectives (by identifying their differences, and the causes and consequences of these differences).

1 Http://palette.ercim.org

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Ps' perspectives and their corresponding activity models

We will describe Ps' perspectives in terms of *activity models production*—by reporting the goals of the modelling task, the "source models" which frame the modelling task, and the oucome of the modelling task, i.e. the activity models, or "target models".

Perspective: (1) Modelling goals

Target models are elaborated by Ps for some purpose or goal. As mentioned in the introduction, the initial purpose was "To understand the CoPs'activities". This purpose presupposes to have achieved the goal "To analyse CoPs' activities" and, more specifically, the goal "To analyse the learning process in CoPs", etc. These purposes are rather theoretical. More applicative goals are also pursued by Ps. One of these purposes is "To design conceptual instruments for self-analysis and development (organisational and learning instruments)" or "To design Pedagogic services". The purpose of target models elaborated by Ps is indirectly "To design Technical services"—in other words, "To help Ts design Technical services".

Perspective: (2) The source models used as modelling frames

Source models are models used as grids or as inspiration sources for elaborating target models. Among the source models used by Ps, one of the most important, and maybe the predominant one, is:

- *The model of "Activity levels" in Activity Theory* . (Leontiev, 1981; see also Engeström, 1987). A synthetic representation of this model is given in Table 1. It is worth noticing that this kind of model includes some psychological or mental components (see, e.g., column 2 of Table 1), and that these components are said to be inseparable of the tools or artefacts used by actors in their activities. This "inseparability" is illustrated, e.g., by the Béguin and Rabardel's (2000) notion of an "instrument", i.e. a combination of both an artefact and the corresponding psychological structure or "scheme" that an actor implements when manipulating the artefact in a situated activity.

Table 1: The model of "Activity levels" in Activity Theory (From Bertelsen and Bødker, 2003)

Level of activity	Mental representation	Realizes	Level of description	Analytical question
Activity	Motive (need)—not necessarily conscious but may become conscious	Personality	The social and personal meaning of activity, its relation to motives and needs	Why?
Action	Goal—conscious	Activities (systems of actions organized to achieve goals)	Possible goals, critical goals, particularly relevant subgoals	What?
Operation	Condition of actions (structure of activity)—normally not conscious, only limited possibilities of consciousness	Actions (chains of operations organised by goals and concrete conditions)	The concrete way of executing an action in accordance with the specific conditions surrounding the goal	How?

The resulting activity models (or Target models)

Given a perspective (i.e., given a modelling goal and a modelling frame), Ps elaborated various target activity models, e.g.:

- *The model of the activity "Signaling/detecting problems of comprehension about a course"* as observed in one the Palette CoP (Daele, Erpicum et al, 2006). This model, described with the MOT+ representation language (see Figure 2), is representative of the CoP-specific models of activity elaborated in Palette. This kind of representation first appeared in the syntheses of CoPs'interviews.
- *The model of the "Five groups of CoPs activities"* (Künzel, Charlier & Daele, 2007): project-activities, short term domain activities, organisational activities, social activities, and coordinated metacognition or reflection (see Figure 1a). This model is intended to help distinguish CoPs from the point of view of their development. Activity analysis vectors allow to detect the direction of development of CoPs. For example, Figure 1b shows that a low satisfaction and a low degree of activity but a high importance given to the activity may refer to a development potential. The model of the five groups of CoPs activities is representative of the CoP-generic models developed in Palette.

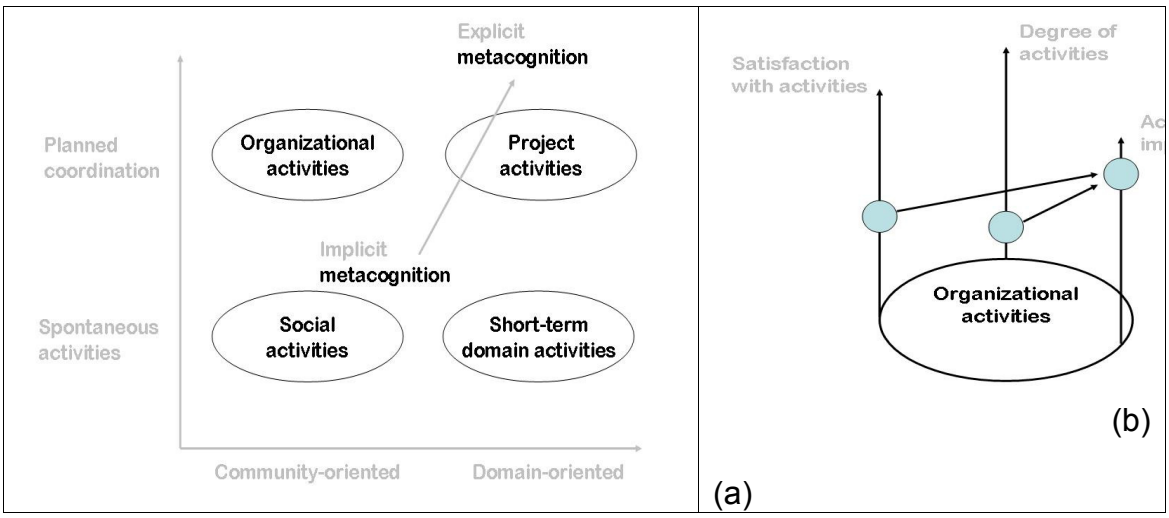

Figure 1: (a) The model of the "Five groups of CoPs activities"; (b) The activity analysis vectors (Adapted from Künzel, Charlier & Daele, 2007)

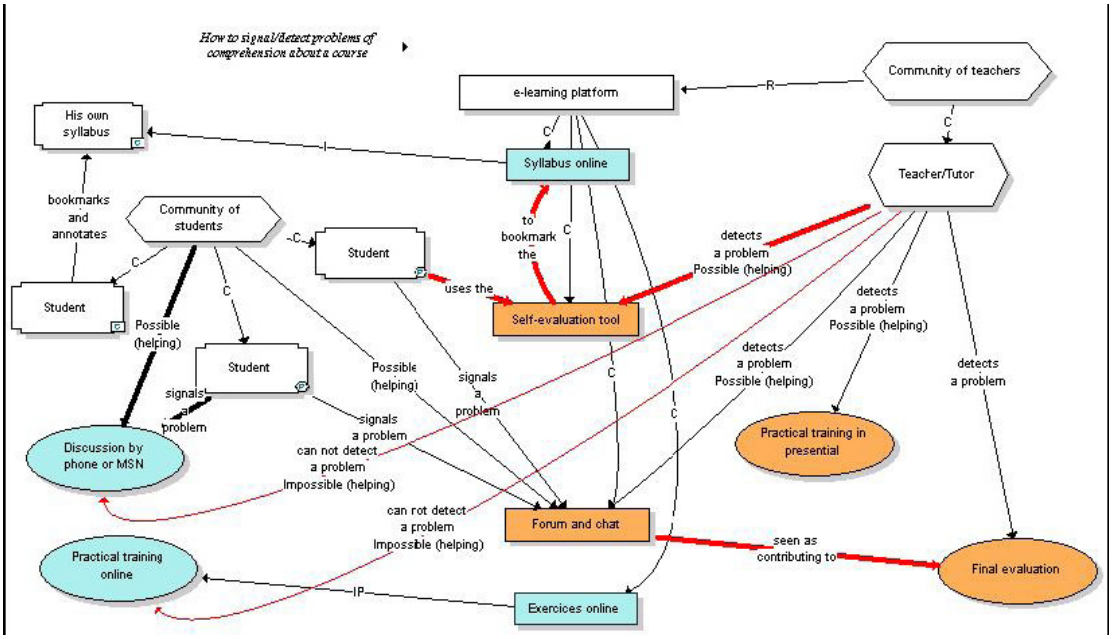

Figure 2: The model of the activity "Signaling/detecting problems of comprehension about a course" as observed in one the Palette CoP—modelled with MOT+ (From Daele, Erpicum et al, 2006)

Ts' perspectives and their corresponding activity models

Ts produced many models for representing CoPs' activities, practically one model for each kind of Palette services and tools, e.g.: (i) the activity model included in the *O'CoP* ontology, an ontology supporting for example the *SweetWiki* Knowledge Management tool; (ii) the activity model underlying the *e-Logbook* Information tool, and (iii) the activity model underlying the *CoPe_It!* Mediation/Collaboration tool.

- *The activity model included in O'CoP:* The role of the O'CoP ontology (Tifous et al 2007) is to annotate the resources of a CoP, thus the modelling of activity in O'CoP (Vidou et al 2006) mainly considers its impact on the resources and on the actors involved in the activity (see Figure 3a). The

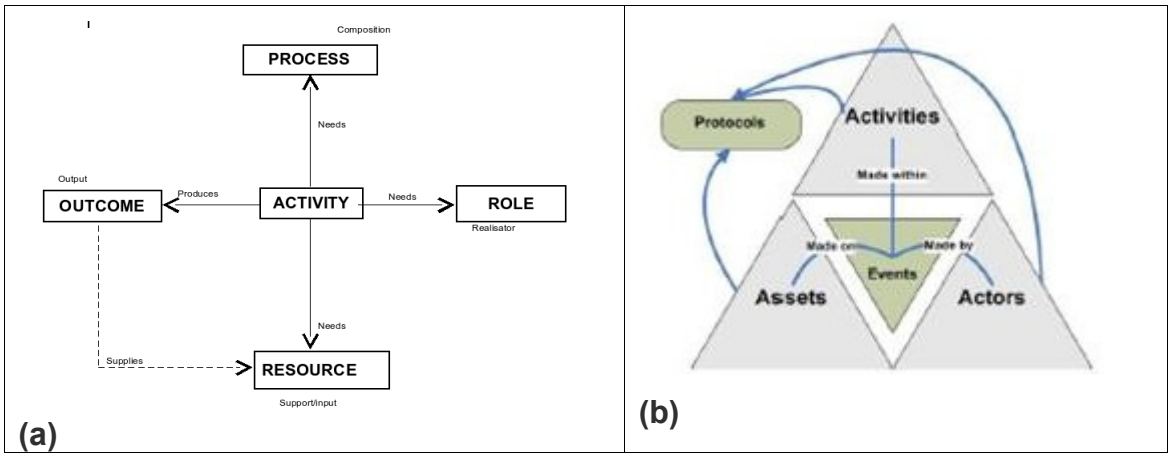

Figure 3: (a) The activity meta-model included in O'CoP; (b) The e-LogBook activity model.

activities described in the models are: *Communication* (transmitting information), *Interaction* (exchanging and sharing), *Negotiation* (agreeing on ideas, reaching a consensus) and *Learning* (acquiring new knowledge).

- *The e-Logbook activity model:* The so-called e-Logbook *3A model* (see Figure 3b), puts a lot of emphasis on activities since the e-Logbook tool serves to manage them. The model considers the *Activities* and their relations with the *Actors* and the *Assets* (i.e., the resources managed in the tool). The activities described in the model are: *open*, *close* and *private* activities.
- *The CoPe_It! activity model:* This model implements a process of incremental formalization of knowledge that describes a key activity in CoPs. It includes a temporal dimension, taking into account the evolution of knowledge during an activity (Karacapilidis & Tzagarakis 2007). The activities described in the model are mainly argumentation activities.

Comparison of Ps and Ts' perspectives (identifying the nature of the gap)

Let us now compare Ps and Ts' perspectives, and their resulting models, to have a more concrete idea of the gap (differences) between them[2]. We will also mention some causes and consequences of this gap (or differences).

2 In this paper, we limit ourselves to consider the gap between Ps and Ts' perspectives—or *inter-disciplinary gap*. Indeed, *intra-disciplinary gap* also exist (to a lesser extent), and we can see it also in Palette. For example, some Ps used the Actor-Network Theory (ANT) as a modelling frame instead of Activity Theory to analyse the activities of certain CoPs. Note that ANT was in fact mainly used to analyse and model the participatory design activities of the Palette project (see Esnault et al., 2006).

Nature of the gap between Ps and Ts' perspectives and activity models

There is evidence in the Palette project that Ps and Ts initially proposed rather *different models* to account for CoPs activities. As partially illustrated by the sample of models reported above: *(a)* Ps' models are relatively richer, more complex and exhaustive, than Ts' models. Ps' models try in general to cover most aspects present in the Ts' models, but also add many other dimensions concerning activities (e.g., social and psychological ones, as mentioned earlier). *(b)* Ps' models are also more often specific (describing the activities of each CoP), as opposed to the more often generic Ts' models (see; e.g. the meta-models and the ontologies). *(c)* Ps' models are rather descriptive, compared to Ts' models, which are *implementable* (i.e., they are embedded in tools, and allows computation). *(d)* Ps and Ts' models also differ in the language used to modelize. Ps priviledged the MOT+ language, whereas Ts privileged standard computational languages with a sound and computable semantic such as RDF/S or OWL.

There is also evidence in Palette that Ps and Ts took *different perspectives*. A clear difference developed above is between the goals of the models (shortly speaking, "Understanding CoPs" for Ps, and "Implementing services" for Ts).

Causes and consequences of the gap

Some causes of the differences between Ps and Ts models rest indeed on the perspectives taken by Ps and Ts respectively, especially on the goals Ps and Ts are pursuing. An obvious cause of the differences between perspectives is the disciplinary background of Ps and Ts. Another cause is Ps and Ts' respective disciplinary requirements.

Several consequences of the gap can be identified. Let's illustrate two of them: (a) *Misunderstanding due to the polysemy of the word "activity" for Ps and Ts:* see the following P's comment about the use of this term in the phrase "activity-oriented (SOAP)": "Activity is confusing, because in the other side of the Project we use the term "activity": user's activity, CoP's activity". (b) *Rejection by Ts of a source model adopted by Ps:* this was the case of the Engeström's version of the Activity Theory, which was rejected by Ts for elaborating the meta-model of activity used to build the O'CoP ontology.

Bridging the gap of perspectives between Ps and Ts: strategies

To bridge the gap, Ps and Ts implemented different strategies. If some of them failed (e.g., the attempt to impose MOT+ to the whole Palette project community, including Ps and Ts, as the common representation language for modelling CoPs' activities), other ones succeeded. The more successful strategies can be referred to as appropriate "coordination mechanisms" Schmidt & Simone, 2000).

Palette "coordination mechanisms"

By *coordination mechanisms*, Schmidt and Simone (2000) mean "dyads of coordinative protocols and artefacts"[3]. Four coordinative artefacts, and their related protocols, were particularly appropriate in Palette to go towards perspective harmonisation. These artefacts are a kind of, or include, activity models. These artefacts are (by chronological order of apparition in the Palette project): (1) *Use cases*, i.e., … (Ps and Ts elaborated them by using, among other resources, the syntheses of CoPs' interviews). (2) *CoP-specific scenarios*, i.e., scenarios describing each CoP's set of activities performed using the envisioned Palette tools/services. (3) *CoP-generic scenarios*, i.e., "chains of operations and associated functions of Palette services as well as the way they interact to answer a generic CoP need or activity (intention)". (4) *S-F/C-A correspondence tables*, ie, simplified tables of correspondence between Services-Functions and CoPs-Activities.

3 We prefer the notion of "coordination mechanisms" to the notion of "boundary objects" because it is more specific..

Ps and Ts searching for and finding a balance between their perspectives

At the beginning of Palette, Ps and Ts elaborated rather independently activity-models, and, generally speaking, activity-related artefacts: it was typically the case of the elaboration of the syntheses of CoPs' interviews. Progressively, driven by the Participatory Design methodology, Ps and Ts tried to collaboratively elaborate the activity-related design artefacts, and produced truly co-elaborated artefacts (use cases, CoP-specific scenarios, CoP-generic scenarios, S-F/C-A tables). If we analyse the co-elaborated artefacts in terms of balance between perspectives (i.e., evaluating the more or less great part taken by the one and the other perspectives in the elaboration of the artefact), we can see that the balance between the perspectives increase as the project progresses (see Figure 4).

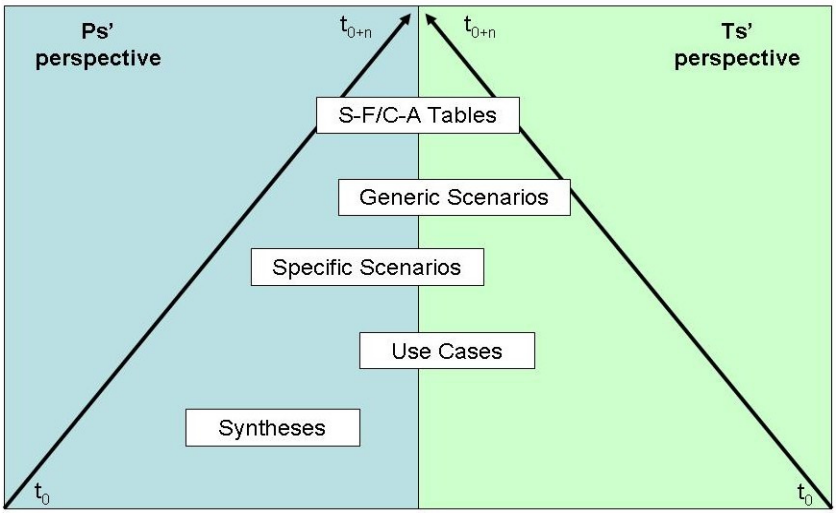

Figure 4: Evolution of the balance between Ps and Ts' perspectives in the building of activity-related design artefacts.

An enlightening case of a bridging strategy: the co-elaboration of the S-F/C-A correspondence tables

Table 2 gives an excerpt of a table of correspondence between Services-Functions and CoPs-Activities. The co-elaboration of such tables was initiated during a Palette Steering Committee where generic scenarios were discussed (Lyon, December 2007). The co-elaboration of tables follows the construction of a method for elaborating generic scenarios, a method which has been summarized as follows: "Ps and Ts collaboratively build scenarios by performing a cognitive analysis (selecting activities; decomposing them into actions, and operations), and a functional analysis (identify functions), and by connecting them."

Table 2: Excerpt of an S-F/C-A correspondence table

Service	Function	CoP	Activity
DocReuse	Structuring	Did@ctic	Reification
SweetWiki	Document production	Learn-Nett	Reification
…	…	…	…
CoPe_it!	~~Debate~~ Argumentative collaboration	Adira	Group animation

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The purpose of the S-F/C-A correspondence tables was to get an overview of which Services and Functions for which CoPs and which Activities would be implemented during the last phase of the Palette project. S-F/C-A correspondence tables (the artefacts and their corresponding protocols) turn out to be very powerful coordination mechanisms. Being very synthetic, and equally shared, they compel Ps and Ts to closely co-negotiate their contents. Here are two examples of this: (1) During the filling of the initial correspondence table in Lyon, a P (mediator of a CoP) suggested adding the columns "Actions" and "Operations" to the table (anticipating her task of specifying the actions and operations of her CoP), but the suggestion was rejected because it would prevent Ps and Ts from rapidly getting a consensual correspondence table. (2) During the same discussion, some participant proposed the label "Debate" for a function of a Palette service, but one of the developers of this service (a T) replied: *"Debate is not the right name of the CoPe_it! tool function. Argumentative collaboration is the right name."* So the label "Debate" was cancelled, and replaced by the label "Argumentative collaboration" (see Table 2).
Briefly said, the coordination power of S-F/C-A correspondence tables is to make Ps and Ts co-participate to the construction of really shared artefacts: Ps and Ts can both manipulate Ps and Ts' elements of the tables, or see and control the manipulation of these elements by the others.

More about bridging strategies

A thorough analysis would give us a detailed account of the bridging strategies that Ps and Ts used, and could use, in the Palette project. In this paper, we can only give a sample of the observed strategies[4]:

- *Providing definitions of terms.*—When the same term (e.g., "activity") doesn't mean the same thing for Ps and Ts, definitions can be provided. Example: To the P who informed him that his use of the word "activity" in the phrase "activity-oriented SOAP" was confusing for a P, the T a T gave the following definition: *"In SOAP, activity is a technical term; it deals with protocols."*
- *Using a common representation language.*— To understand each other when depicting CoPs' activities and tools functionalities, a common language can be suggested. However this language must be based on a consensus (see the MOT+ language, which was suggested, but not accepted by all partners).
- *Enriching Ts models with notions from Ps ones.* The models included in the tools/services are validated by users (CoPs members) through their use of the tools/services. Tools/services are intended to meet some CoP need, users' feedbacks allow Ts to reconsider their models (in general, by enriching them), the theoretical studies of Ps serve then as valuable sources to enhance Ts models.
- *Validating parts of the Ps models* can take place during the use of tools/services by observing the behaviour of users (Béguin 2003).
- *Meta-strategies* like reflective discussions or metacognitive schemas, are another way of bridging the perspective gap. Example: the P's, schema expliciting the differences between Ps and Ts' approaches to the co-design of tools and use cases.

Conclusion and further work

This paper is a first attempt to explicit the strategies implemented by Ps and Ts to bridge the initial gap that existed between Ps and Ts' respective perspectives. So doing, we illustrated how the Participatory Design Methodology used in the Palette project allowed and encouraged reconciling Ps and Ts' perspectives and might lead to make the resulting activity models and artefacts acceptable by both Ps and Ts. However, our analysis was restricted to activity models and activity-related artefacts, and to the perspectives of Ps and Ts. Also we do not differentiate between the different categories of Ps and Ts (including teams constituted of Ps and Ts).
Further work is needed: (a) to extend the analysis to other kinds of models and artefacts, and to CoPs' members, who are the other participants to participatory design, and who have their own perspective; (b)

4 As we made a distinction between *inter-disciplinary gap*. and *intra-disciplinary gap , we can also make a distinction between interdisciplinary bridging strategies and intradisciplinary bridging strategies.* An example of the later is a strategy used by Ts who, learning some lessons from the use of their tools/services by CoPs and from the interactions between these tools/services, become aware of the necessity of making their own models compatible, even integrated, in order to meet CoPs' needs.

to differentiate the different categories of Ps and Ts, and of CoPs' members; and (c) to take into account the different Palette subgroups (e.g., the Palette WP5 teams) in which Ps, Ts, and CoPs'members actually contribute, and to identify the strategies used within these groups to bridge the gap between perspectives. Such a bridging strategy was observed during a training to the Palette tools Amaya and SweetWiki. It was realised by one of the Ps who provided the training. The strategy consisted in elaborating and communicating a map of the "Palette Universe" (encompassing the zone of the Palette project partners and the zone of CoPs, and the relations between them).

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