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A Socio-technical Approach Towards Alignment

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Abstract. In order to manage the complexity of the alignment problem we introduce the construct of *workpractices* as the main unit of analysis. A workpractice is a meaningful, goal oriented social entity where some actors produce a result that other actors need. The development of products or services provided by an organization is accomplished by coordinating the results of cooperating workpractices. Alignment is achieved by either adjusting the coordination between workpractices or adjusting internal workpractice elements such as processes and support systems. To make this approach operational, we suggest structuring a workpractice according to the Activity Domain Theory – a new theory for coordinating human activity. In this theory, particular emphasis is placed on the achievement of shared understanding among the actors. Some results from applying this approach in the Ericsson telecommunication company are discussed. The findings indicate that the proposed approach is a promising way towards achieving and maintaining alignment.

1 Introduction

The accelerated pace of change, increased complexity of products and a diversification of organizational functions pose immense challenges for aligning business strategies with business processes and business process support (BPS) systems (e.g. Earl, 1996; Opdahl, 1997; Hackney et al., 2000; Chan, 2002; Regev & Wegmann, 2003). Some of the difficulties are:

- Alignment, or fit, is an imprecise concept. According to Knoll & Jarvenpaa, alignment has several dimensions such as the number of components involved, external vs. internal alignment and static vs. dynamic alignment (Knoll & Jarvenpaa, 1994). In addition, Regev & Wegmann state that alignment is a point of view (Regev & Wegmann, 2004). Hence, people are likely to disagree on the meaning of alignment. This situation is further aggravated due to vagueness in central concepts like business goal, business structure, informal organization structure, etc. (Chan, 2002.)
- Two main strategies can be distinguished in alignment. The centralized strategy advocates a commonality regarding business processes and BPS systems. All organizational units are compelled to follow a common business process and use the same BPS system, for example SAP. The decentralized strategy, on the other hand,

advocates a certain freedom for each unit to choose their own processes and support systems based on a common understanding of goals, governing principles, etc. However, a large organization may be culturally and geographically diverse. In this case, a single strategy, whether centralized or decentralized, may not work well.

- With increased organizational dynamics such as outsourcing, alliances formation, etc., inter-organizational aspects need to be considered. Outsourcing, for example, implies that the control of alignment concerning the outsourced functions will be lost.
- Alignment spans not only technical issues but also social ones such as how to align different informal structures and organizational cultures (Chan, 2002).
- Theories are lacking that can provide an integrative, socio-technical view on alignment and at the same time are possible to operationalize (e.g. Martinsons & Davidson, 2003). By operationalization, we mean that the theory can be expressed in elements that can be manipulated, measured or observed in a particular situation in order to influence this situation.

In this paper we understand alignment in a broad sense as the efforts of an organization to balance different stakeholder needs in order to survive in a changing environment (Regev & Wegmann, 2004). In order to manage the complexity, we propose a socio-technical approach towards alignment that takes its point of departure in the *practice* construct. The practice has been suggested as a proper unit of analysis where social and technical aspects may be reconciled (Schatzki, 2001). Practices are understood as “embodied, materially mediated arrays of human activity centrally organized around shared practical understanding” (ibid:2). More specifically, we will take the *workpractice* as the main unit of analysis. A workpractice is a particular type of practice where some actors work together in order to produce a result that other actors need (Goldkuhl & Röstlinger, 2003). Examples of workpractices from everyday life are car repair shops, hairdressers, fire brigades, etc.

A workpractice is not the same as an organization although they may coincide. An organization has formal, legal and economical connotations that are not in focus in workpractices. The workpractice emphasizes the activity of humans. A workpractice has a motive; it fulfills some need. It develops historically and culturally into different forms. An organization may change while the workpractice remains as, for example, when outsourcing a certain function in the organization. The extent of a workpractice can, in principle, be anything from a few actors up to an entire organization.

From a workpractice point of view, the outcome of an organization is seen as the result of coordinating workpractices, regardless of whether these are intra or inter-organizational. This is illustrated in the example in Figure 1 below.

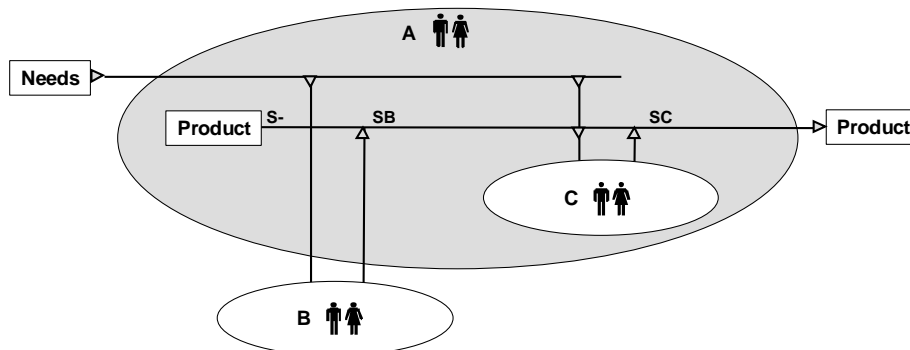


Figure 1. Product development as coordination of workpractices

A workpractice A, which may coincide with an organization, develops a certain product based on some needs. The refinement of the product is done using two other workpractices, B and C, where B is organizationally external to A. B and C change the state of the product from S- (the “raw material”) to SB and from SB to SC respectively. The coordination of B and C is done according to a process model in A¹.

The key point in introducing the workpractice is that it enables a “divide and conquer” strategy towards managing complexity while considering cultural issues. Alignment is achieved by manipulating either the coordination pattern of workpractices or the inner structure of each individual workpractice. We shall call these two types of alignment *external* and *internal* alignment respectively. In external alignment, the external context of a workpractice is emphasized while internal alignment emphasizes its internal context.

The workpractice approach enables different alignment strategies to be applied depending on the character of the workpractice. For example, a common business process may be enforced in some workpractices while other workpractices are allowed more freedom to construct their own processes. Thus, the workpractice provides a flexible approach where centralized and decentralized strategies can be balanced.

The rest of the paper is organized as follows. In the next section, we describe the theoretical background of the approach – the Activity Domain Theory (ADT) (Taxén, 2003; 2004). Next, we outline how the theoretical constructs in ADT can be transformed into operational workpractice elements. Examples of such elements are tangible ones such as processes, information structures, information systems, etc., but also more intangible elements such as workpractice specific languages, norms and traditions. Thus, business processes and BPS systems are considered as subordinate to the workpractice construct. All elements, whether tangible or intangible, are amalgamated in the workpractice into a coherent whole.

The workpractice approach has been applied at Ericsson, a major supplier of telecommunication systems worldwide. We report on some results from reconstructing the Ericsson product life-cycle management and the alignment of two workpractices developing exceptionally complex systems for the 3rd generation of mobile systems.

¹ In the proposed approach, processes are modeled as Information Flow Diagrams. For a detailed description of these, see Taxén & Svensson (2005). See also the example in Figure 3.

In the discussion that follows, we analyze these results. The main conclusion is that the proposed approach is capable of operationalizing internal alignment. The alignment of the entire organization has not been demonstrated so far. However, we argue that the results indicate that the workpractice approach is a promissory step towards managing the full complexity of alignment.

2 The Activity Domain Theory

The ADT is grounded in the notion of *praxis* (Kosik, 1976; Israel, 1979). The praxis perspective emphasizes certain qualities of human activity such as historicity, dialectical interaction, contradictions as the drivers of change, etc. In ADT, we strive to maintain these qualities while simultaneously giving praxis a structure that is suitable for analytical and constructive purposes. This is done by introducing the *workpractice* as a central element in the theory. A workpractice is seen as a particular view of praxis where *coordination* aspects are emphasized.

The actors in a workpractice are actively *constructing* the social reality in that workpractice (Searle, 1995). The construction is manifested in two realms: in the workpractice and in the mind of the actors. In the workpractice, the construction results in tangible elements such as tools, rules, methods, etc. This process is called *objectification* (Kosik, 1976). Correspondingly, a shared understanding about the objectified elements is constructed in the minds of the actors. This process is called *objectivation* (ibid.). Objectivation enables the actors to make sense of the world and to perform concerted, goal-oriented actions. These actions in turn influence the objectified elements in the workpractice.

The dialectical objectification – objectivation process proceeds along certain orthogonal, interrelated dimensions, which are called *activity modalities*². The significance of these modalities is grounded in practical experiences from coordinating complex development tasks (Taxén, 2003). Based on these experiences, the following activity modalities are conjectured as particularly relevant for the coordination of human activity:

- *Stabilization*: This modality constitutes an ideology in the workpractice. By ideology, we simply understand any wide-ranging systems of beliefs or ways of thought. Examples of stabilization elements are habits, norms, traditions, rules, routines, procedures, strategies, workpractice specific languages, etc.
- *Spatialization*: This modality constitutes elements that provide spatial orientation to the actors in the workpractice. Spatial orientation concerns which phenomena actors perceive as relevant, how these are related and in what state or condition they are. Examples of spatialization elements are product models, data models, business models, organizational charts, conceptual maps, etc.
- *Temporalization*: This modality constitutes elements that provide temporal orientation to the actors in the workpractice. Temporal orientation concerns the dependen-

² Modality: “a modal relation or quality; a mode or point of view under which an object presents itself to the mind” (Webster’s 1913 Dictionary).

cies between the activities in the workpractice. Examples of temporalization elements are process models, schedules, interaction diagrams, event diagrams, etc.

- *Transition*: This modality constitutes elements that enable workpractices to interact with each other in any constellation of workpractices. The result of one workpractice may be the prerequisite of other workpractices. Since the stabilization brings about different workpractice ideologies, the result may be characterized differently in different workpractices. If so, there is a need for a translation and interpretation of the results in the transition between workpractices. Examples of transition elements are dictionaries, currency converters, interface specifications, etc.
- *Communication*: This modality constitutes elements emanating from various communicative acts such as agreements, commitments, responsibilities (Habermas, 1984). Examples of communication elements are contracts, assignment specifications, requirement specifications, etc.
- *Instrumentation*: This modality constitutes elements that mediate actions. Such elements can be essentially material or symbolic in character. Examples of instrumentation elements are tools, money, information systems, IT infrastructures, etc.

The theoretical grounding of the activity modalities comes from different areas such as cognitive sciences (e.g. Gärdenfors, 2000), linguistics (e.g. Vološinov, 1929/1986), speech act theory (e.g. Austin, 1962; Searle, 1969), etc.

The ADT shares its action perspective with a number of other theories such as Activity Theory (e.g. Engeström, 1999), Actor Network theory (e.g. Latour, 1991), Structuration theory (Giddens, 1984) and Language Action Theory (e.g. Winograd & Flores, 1986; Dietz, 1994). Ontologically and epistemologically, these theories take a middle position between positivism and anti-positivism as expressed by the pragmatist philosophy (Dewey, 1931; Wicks & Freeman, 1998; Goldkuhl, 2004).

2.1 Operationalizing the theory

According to ADT, the activity modalities are constituted both as tangible elements in the workpractice and as shared understanding about these elements among the actors in the workpractice. Both these aspects must be considered in the operationalization of the theory. First, the theoretical constructs in the ADT must be mapped to elements that can be manipulated, measured or observed in a particular situation. Second, the construction process resulting in shared understanding must be made operational.

Element mapping

Taxén has suggested a framework in which the following operational elements characterize a workpractice (Taxén, 2003):

- A *workpractice core* operationalizing the stabilization modality. The workpractice core may be expressed by documents describing routines, rules, standards, etc.
- A *context model* operationalizing the spatialization modality. This model signifies the context of the workpractice by identifying relevant phenomena, characterizing them and relating them to each other. Context models are expressed, for example, by OMT diagram (Object Modeling Technique, e.g. Rumbaugh et al., 1991). In or-

der to alleviate the construction of shared understanding, the nomenclature in the context model should be easily comprehended by the actors.

- A *coordination model* operationalizing the temporalization modality. This model signifies the dependencies between the activities in the workpractice. It corresponds to the definition of coordination according to Malone & Crowston (1994:90). Business processes are examples of coordination models. In the framework, coordination models are expressed by Information Flow Diagrams (Taxén & Svensson, 2005).
- A *transition model* operationalizing the transition modality. Transition models are expressed by an elaboration of the Specification Based Data Model suggested by Gandhi & Robertsson (1992).
- *Communicative* elements operationalizing the communication modality. Such elements may be documents formalizing the commitments between actors.
- *Information systems, CAD-tools, etc.*, operationalizing the instrumentation modality, for example, IT-based BPS systems.

The alignment process

We assume that the alignment process proceeds from a situation where the organization is not yet conceived of in terms of workpractices. Thus, the first step is to analyze the organization from a workpractice point of view. Potential workpractices are identified by focusing on the work objects that are being refined. As in all structuring endeavors, there is no single “correct” solution to this problem (Bowker & Star, 1999). However, some guidelines can be given:

- There must be a motive for the workpractice, i.e. there must be a reason for its existence.
- There must be a work object in the workpractice.
- There must be actors in the workpractices working on the object.
- Someone shall benefit from the result of the workpractice.
- The workpractice should be distinguishable from other workpractices with respect to motive, work object, etc.
- The workpractice should have an ideology of its own, which cannot be straightforwardly mapped on other workpractices. This means that the workpractice is, to a certain extent, unique.

Once the workpractices have been identified, internal and external alignment must be operationalized. To this end, a *workpractice construction strategy* based on *experiential learning* (Kolb, 1984) is suggested in the framework. This gist of the strategy is an ongoing iteration between reflection and action. It is carried out in three phases – elaboration, trust boosting and expansion. In the first two phases, the focus is on establishing the workpractice as a “bridgehead” among a small number of actors before expanding it to other actors in an ongoing alignment process. The construction strategy is explained in detail in Taxén (2004b; 2005).

Depending on the motive of the workpractice, one or several workpractice elements are constantly modified to achieve alignment. For example, in a workpractice with requirement management as its motive, a requirement context model and a re-

quirement management system may be the main elements to be manipulated. The alignment proceeds from a preliminary version of the context model, possibly based on established ways of working. The model is implemented in a requirement management system and tried out in practice. If the outcome is not satisfactory, the model is refined, implemented anew and tried out again.

In this way, a shared understanding is gradually established among the actors. The objectification – objectivation process is ongoing as long as the workpractice exists. The elements in the workpractice, including the information systems, will never be “finalized”. This suggests that the information system development process should be conceived of as a continuous redevelopment process. A similar approach has been suggested by Truex et al. (1999).

3 Results

In this section, we report on some results from applying the workpractice approach at Ericsson. The empirical data were gathered by the author in his role as an employee at Ericsson and part time researcher. In addition, other sources within Ericsson such as documents, minutes, presentations, etc., have been used. As a participant the author had unlimited access to the empirical data. The publication of the results has been agreed with Ericsson and no significant results have been withheld other than company sensitive economical information. The data collection period stretches between 1999 and 2003 approximately. A detailed account of the research design is given in Taxén (2003).

3.1 Product life-cycle management as coordination of workpractices

During the late 1990s, it became increasingly evident that Ericsson could not be treated as a homogenous organization. Due to aggravating problems in promoting common business processes, product structures and information systems, a project was launched in 2002 with the purpose of suggesting an alternative platform for managing product life cycles. In this project, the ADT was used as a guiding theoretical perspective. As a result, Ericsson was conceived of as a main workpractice that coordinates four other workpractices (Taxén & Svensson, 2005):

- *Research & Development*: The motive of this workpractice is to develop products. This is done at product development units worldwide. Each product is sold on many markets, produced by many supply units and serviced by many service units.
- *Marketing & Sales*: The motive of this workpractice is to market and sell total telecommunication solutions to customers. This is done at market units worldwide. There are many markets, and each market unit works with many products and many supply and service units.
- *Supply & Implementation*: The motive of this workpractice is to produce and install total solutions at customer sites. This is done by so called Flow Control Centers worldwide. Each centre services many products and markets.

- *In Service Support*: The motive of this workpractice is to service and upgrade installed solutions at customer sites. This is done by service units worldwide. Each service unit supports many products and is active on many markets.

This is illustrated in Figure 2 below, where also the work object of each workpractice is pointed out.

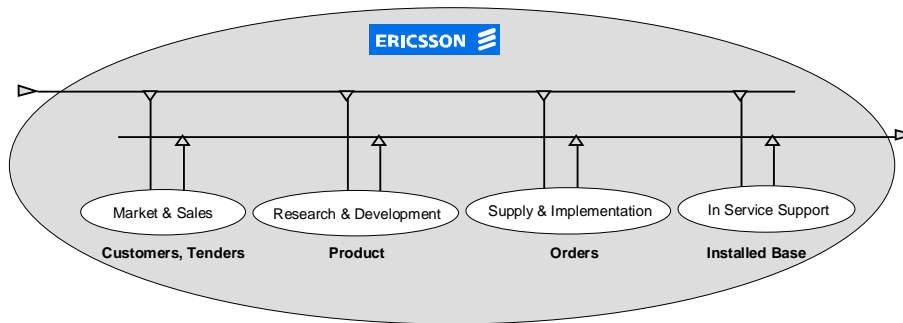


Figure 2. Ericsson seen as workpractices.

Since the concept of workpractices was new at Ericsson, much effort was spent in constructing a shared understanding about this concept among the project members. This was mainly done through workshops, discussions and scenarios where the life cycle of a product was simulated. As the workpractice concept became more familiar, various elements in the Ericsson organization were analyzed from the workpractice point of view. For example, the main business process was re-conceptualized using the Information Flow Diagrams notation (see Figure 3).

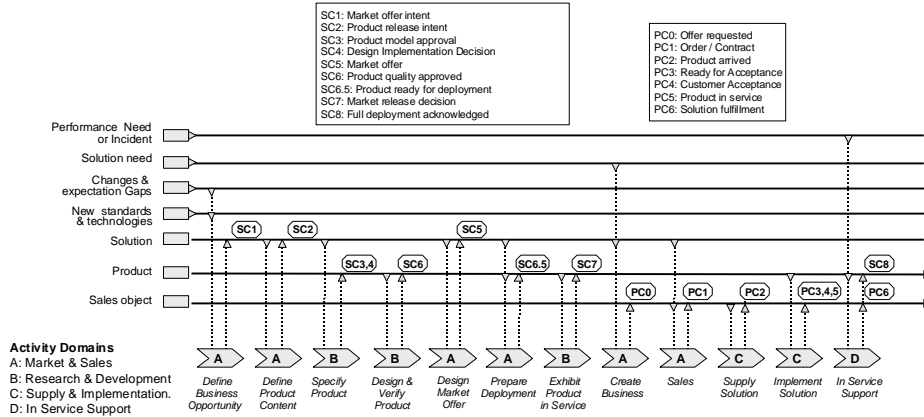


Figure 3. The main business process of Ericsson.

Several inconsistencies were discovered in the existing process. Moreover, it became evident that the transitions from the Ericsson workpractice to the internal of the contributing workpractices were not properly defined. For example, the product states SC3, SC4, SC6 (see Figure 3) used in Ericsson workpractice were not explicitly

mapped to corresponding product states used internally in the Research & Development workpractice. Additional results are reported in Taxén & Svensson (2005).

From an alignment point of view, the project was taking the first step in the alignment process – identifying workpractices. The conception of Ericsson in terms of workpractices became established in the project groups and among stakeholders around this group. Moreover, the re-construction of the business process can be seen as a first step towards defining the Ericsson workpractice. These results were however not taken up by other projects working with business processes and BPS systems such as SAP. Such an initiative would have to modify the business process further alongside with a modification of the corresponding context model and the BPS system. In summary, only the very first steps towards aligning the main Ericsson workpractice were taken. However, the basis was laid for relating this workpractice to other workpractices. In the next section, we shall describe the alignment of two such workpractices in the Research & Development workpractice.

3.2 Coordinating 3G development projects

During the late 1990s, the telecom industry was in transition from the second to the third generation of mobile systems. The challenges in taking this step were enormous. Some nodes in the 3G network were among the most complex Ericsson had ever developed.

The goal of the Ericsson workpractice was to deliver a 3G system to the customers, which in this case were operators running the 3G network. The 'Market & Sales' workpractice negotiated requirements from the operators. These were forwarded to a workpractice referred to as the A-domain (situated in Aachen, Germany), which developed the system according to the requirements. In order to do so, the A-domain coordinated the results from several other workpractices. One such workpractice was called the S-domain (situated in Stockholm, Sweden). The developed system was produced and installed at the customer by the 'Supply & implementation' workpractice. Finally, the system was serviced and upgraded by the 'In Service Support' workpractice. In Figure 4 the coordination of this development is illustrated.

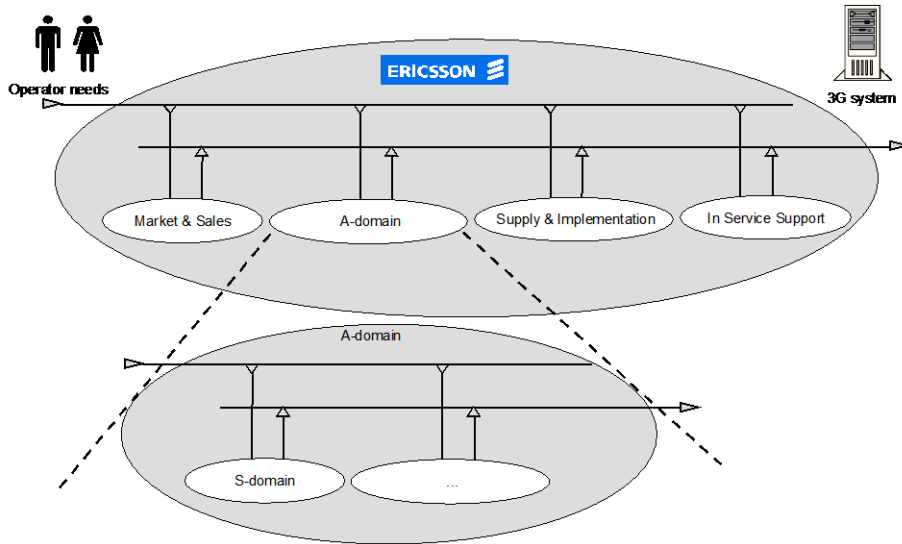


Figure 4. The coordination of workpractices in the 3G development.

An indication of the complexity is shown in Figure 5. The figure, which is called an “integration plan”, shows how different development tasks called “workpackages” are integrated gradually in a project developing a certain node in a 3G system.

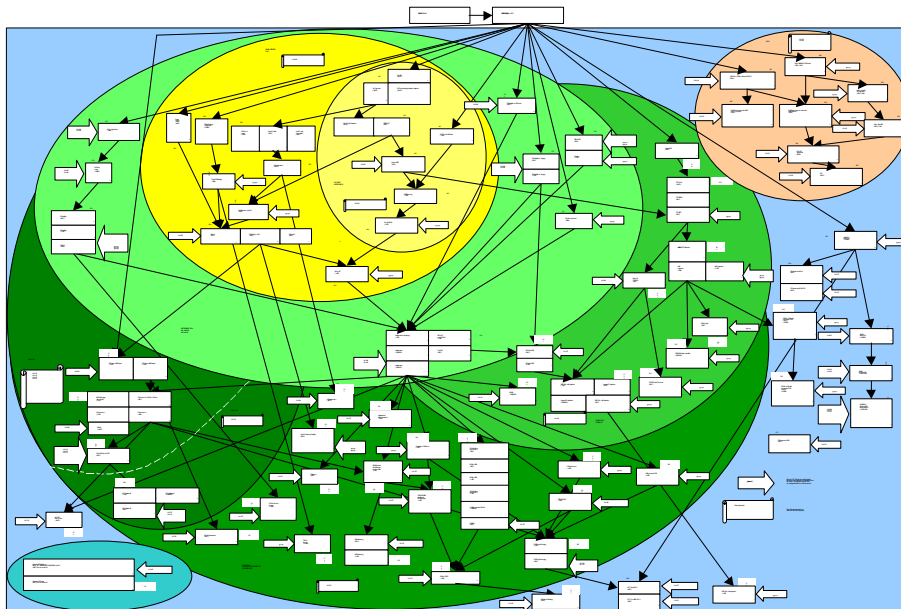


Figure 5. An integration plan of a node in the 3rd generation of mobile systems

The functionality progresses from the top of the figure towards the bottom, where the node becomes fully operational. Each workpackage, indicated by white squares in the figure, had to deliver a specific functionality to system integration at a particular date. The workpackages, which can be characterized as small projects of their own, were distributed to units worldwide.

The complexity inherent in the 3G venture enforced quite new ways of working. This included a new, integration based development method supported by advanced information systems. A major challenge was to arrive at shared understanding about the meaning of coordination, which comprised a multitude of items such as workpackages, products, product related documents, requirements, engineering change orders, baselines, milestones, etc. These items had to be characterized in terms of what attributes they had, what states they could pass through during their life cycle, how they were related to each other, etc. Thus, an overwhelming number of phenomena had to be defined by the actors, hence the difficulties in achieving a shared understanding.

Based on earlier experiences from applying the principles in the ADT in other tasks, it was decided to use the workpractice approach in the 3G development. This meant that both the A and S domain had to be aligned internally to their respective goals, which was to deliver functionally tested workpackages to integration.

The alignment of the A and S-domains was carried out by a small group of actors in each domain. These actors represented various stakeholders in the project such as project managers, requirement managers, configuration managers, etc. Other actors were application developers from the vendor of the information system platform used. At Ericsson, this platform was the commercial Product Data Management system Matrix from Matrix-One, Inc. Thus, the same information system platform was used to implement the BPS system in both the A and S domain.

The main elements manipulated in the alignment were the context model and the information system. These were constantly modified according to the experiential learning strategy suggested by the ADT. The modifications were sometimes carried out in a "daily build" manner. For example, during 1999 several hundreds of modifications of the information system implementation were performed in the S-domain. As it turned out, the alignment of the A and S domains followed quite different trajectories. In Figure 6, the context model of the A-domain around 2001 is depicted:

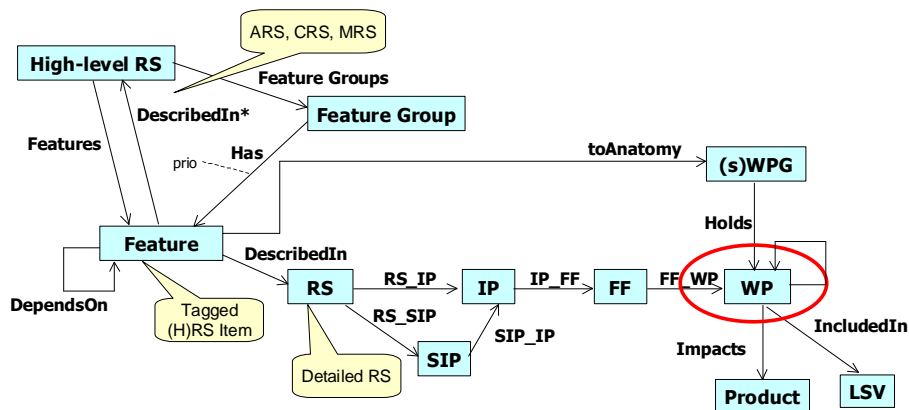


Figure 6. The context model in the A-domain (2001)

The phenomena shown in the model signify various items, which the actors in the A-domain found to be relevant. For example, “WP” signifies the workpackage. The integration plan in Figure 5 can be seen as an instantiation of this model.

In Figure 7, the context model of the S-domain at the same time is illustrated:

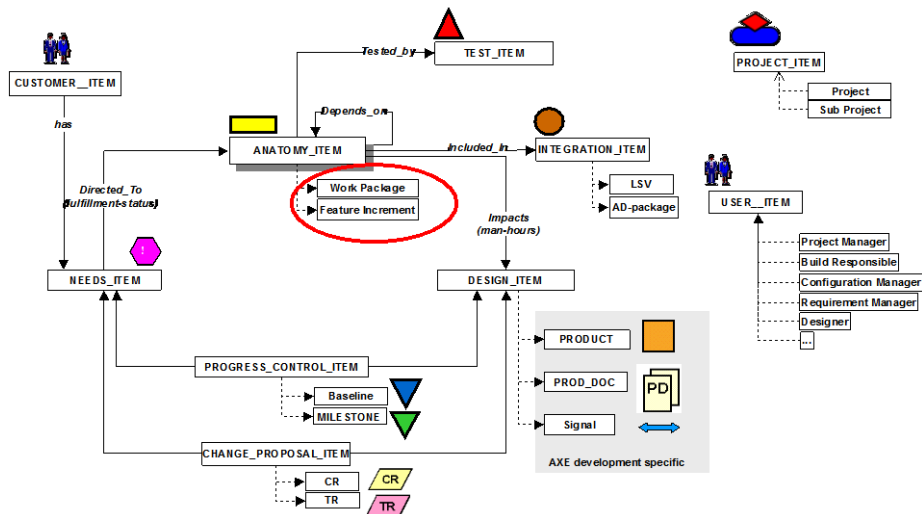


Figure 7. The context model in the S-domain (2001)

As can be seen, the A and S domains were constructed very differently. However, each practice was quite successful in providing coordination, including information system support, to the projects. A project manager expressed this as follows:

“Especially for the execution part I think we would not have been able to run this project without the tool. I think if you simply look at the

number of workpackages, the number of products that we have delivered, the number of deliveries that we have had, if we would have had to maintain that manually, that would have been a sheer disaster. [...] we had some, only in my part of the project, some 200 workpackages or workpackages groups or whatever you want to call them, deliveries, on the average 2-5 subprojects within them 5-10 blocks being delivered, just keeping track of that [...] would have been a hell of a job.”

However, the A and S domains were less successful in establishing a shared understanding about what was necessary in order to coordinate between them. This would have required at least the workpackage to be defined in the same way in both domains (the encircled items in Figure 6 and Figure 7). Some initiatives were taken to achieve this but no real progress was made. The necessary interaction between the domains had to be improvised on a personal basis by e-mail, personal interaction, etc. A full account of the results from the 3G coordination is given in Taxén (2003).

From an alignment point of view, the results can be expressed as follows. The application of the principles in the ADT enabled the internal alignment of two workpractices: the A and S domains respectively. However, the external alignment between these two workpractices was not achieved.

4 Discussion

The results show that internal alignment is possible to achieve using the approach based on the ADT. In particular, this approach is capable of constructing a shared understanding about the social reality in the workpractice. This requires that the workpractice can be demarcated in such a way that a clear motive and work object can be identified. The necessary external alignment between the A and S domains could have been achieved by an imperative control of the definition of the workpackage item. However, the power structure to achieve this was not in place in the organization during the progress of the 3G project.

Furthermore, the transition between the Ericsson workpractice and the A and S domains was never elaborated. One reason for this is that neither of the two initiatives reported had that as a target in their assignments. Moreover, before the introduction of the ADT as a guiding framework, the importance of the transition between workpractices was not recognized in the organizational discourse. Thus, no organizational structure was in place to attend to this issue.

The different outcomes with respect to external and internal alignment indicate that internal alignment is easier to address since this concerns the actors own “back yard” and deals with imminent, concrete issues. External alignment is, as the term indicates, considered as someone else’s problem. However, what is external from some workpractices point of view is internal from another workpractice point of view, which in this case would have been the Ericsson main workpractice. Unless this workpractice pays full attention to alignment from the outset, the necessary coordination tasks will most likely turn into a patchwork.

A further implication of the results is that alignment of large, culturally and geographically diverse organizations is hard to achieve if the unit of analysis is the organization only. Some intermediate construct, like the workpractice, is needed in order to capture significant differences between organizational units. Slogans like “one company – one process” may, in spite of its attractive simplicity, be an oversimplification that causes more problems than it solves. The workpractice approach enables a balanced strategy where common, imperative business processes and BPS systems may live side by side with local processes and support systems that acknowledge the uniqueness of each workpractice.

Furthermore, the results suggest that all modalities need to be considered in alignment. Aligning business process and BPS systems is necessary but not enough. Information structures, rules, workpractice ideologies, etc., also have to be included. Moreover, the interdependencies between these modalities must be managed.

Concerning the development of alignment, this is often staged in a creation and maintenance phase. However, such a distinction is problematic (see, for example, Regev & Wegmann, 2004; Dietz, 2004). This observation is also supported by the results. The workpractices and their elements develop constantly, and it is hard to discern a borderline between creation and maintenance. We claim that the phases of elaboration, trust boosting and expansion are more appropriate for alignment according to the workpractice approach (Taxén, 2004b; 2005).

The workpractice approach towards alignment must overcome some substantial obstacles in order to make a persistent impact in an organization. First, the workpractice construct must gain acceptance as a viable way of conceiving organizations. The formal organization structure is important but inadequate a basis for alignment. Second, a structure of cooperating workpractice must be identified. It is not always clear what should be considered as a workpractice in a particular organization. In line with the pragmatist epistemology in the ADT, this is something that must ultimately be worked out in praxis. Third, it must be realized that the fully centralized and decentralized strategies towards alignment are not the only options towards alignment. It is possible to balance the imperative and the optional.

The suggested approach has so far been applied only in the Ericsson organization. Thus, its transferability to other settings remains to be verified. However, Ericsson can be seen as a paradigmatic example of the turbulent circumstances many organization face today. Thus, it is reasonable to conjecture that the approach is transferable to other organizations, especially if they are subject to less demanding conditions than Ericsson is.

5 Conclusions

We have introduced the Activity Domain Theory as a theoretical framework for managing the complexity in alignment. This theory is based on the workpractice as the main unit of analysis, thus enabling the alignment problem to be framed recursively as internal and external alignment of workpractices. The results show that internal alignment is possible for extremely complex coordination tasks, including the construction of shared understanding. The feasibility of the external alignment has not

been demonstrated so far. However, we claim that the results are encouraging enough to continue research along this line.

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