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On the Adaptation of an Agile Information Systems Development Method

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ABSTRACT

Little specific research has been conducted to date on the adaptation of agile information systems development (ISD) methods. This article presents the work practice in dealing with the adaptation of such a method in the ISD department of one of the leading financial institutes in Europe. Two forms of method adaptation, static adaptation and dynamic adaptation, are introduced and discussed in detail. We provide some insights plus an instrument that the ISD department studied uses to deal with the dynamic method adaptation. To enhance our understanding of the observed practice, we take into account two complementary perspectives: the engineering perspective and the socio-organizational perspective. Practical and theoretical implications of this study are discussed.

Keywords: agile method; information systems development; method adaptation; method engineering

INTRODUCTION

Despite the best endeavors in the area of information systems research and practice, the effective use of information systems development methods (ISDMs) remains an issue on both academics' and practitioners' agendas (Iivari, Hirschheim, & Klein, 2001). In the 1980s and 1990s, the rationales behind structured, brand-named ISDMs, the so-called conventional methods, were being questioned as being IT oriented, complex, rigid, and inappropriate for postmodern forms of organizations whose distinctive character was to be adaptable to continual change (Sauer & Lau, 1997). Recently, agile — denoting "having a quick resourceful and adaptable character" (*Merriam-Webster OnLine*, 2003) — ISDMs, or agile methods in short, have appeared as a solution to the long-standing problems related to conventional methods.

This article is mainly concerned with the adaptability of agile methods (i.e., the extent to

which a method is to be adapted to the project situation at hand or vice versa), yet points out the need for further research in order to understand other distinctive aspects of agile-systems development and to make sense out of the dispersed field of agile methods (Abrahamsson, Warsta, Siponen, & Ronkainen, 2003). As we shall see later on, many studies concerning the effective use of ISDMs adopt the notion of adaptation but use different terms or concepts in their theoretical constructs (see, for example, "method fragment adaptation" in Baskerville & Stage, 2001; "scenario use" in Offenbeek & Koopman, 1996; "method tailoring" in Fitzgerald, Russo, & O'Kane, 2000; "situational or situated method engineering" in Harmsen, Brinkkemper, & Oei, 1994; Slooten & Brinkkemper, 1993; "context-specific method engineering" in Rolland & Prakash, 1996; "method engineering" in Siau, 1999).

Two limitations with these studies have motivated us to carry out this research. First, the existing studies use different perspectives and provide countervailing arguments for the notion of adaptation. Second, the proposed models appear to be limited to theoretical arguments and need empirical findings to support their arguments. More precisely, as Fitzgerald, Russo, and O'Kane (2003, p. 66) state, "little research has been conducted to date on method tailoring specifically." This observation is particularly true for agile methods.

Our research addresses these two limitations and illustrates the working practices in a large-scale IT department dealing with the adaptation of an agile method, DSDM (dynamic systems development method), elaborated later on, in different project situations. Besides giving a description of the observed practice, this article argues the need for a multitheoretic lens — combining the engineering and the socio-organizational perspectives — and uses it to elaborate the notion of adaptation in agile-systems development. Similar to the research approach adopted by Fitzgerald et al. (2003), this article inductively draws lessons from agile-method adaptation in practice rather than testing hypotheses defined in advance. In doing so, the article provides valuable insights for both practitioners and academics concerning the effective use of agile methods in large-scale IT departments.

The structure of the article is as follows. First, the motivation behind the research has been outlined in this section. The remainder of the article consists of three key sections: (1) a review of related research, (2) the conduct of this research, and (3) discussions and conclusions of the research.

REVIEW OF RELATED RESEARCH

Given that the existing explanations concerning method adaptation are fragmented and countervailing, we need a framework in which to organize the previous research relevant to method adaptation. Such a framework will also help us indicate the focus of this article. Before introducing the framework, we will clarify our interpretation of "adaptation" and its usage in this article. The term adaptation simply implies "a modification according to changing circumstances" (*Merriam-Webster OnLine*, 2003). Since its significance might vary, for the purpose of this article, we further define "method adaptation" as a process or capability in which agents, through responsive changes in and dynamic interplays between contexts, intentions, and method fragments, determine a system development approach for a specific project situation. With this definition we aim to stay at an abstract level that will allow us to organize related research conducted previously. Before explaining the terms in the definition, two key perspectives concerning method adaptation are introduced.

As noted in Baskerville and Stage (2001), existing studies related to method adaptation follow one of two key perspectives: the engineering perspective representing the positivist views of natural science, and the socio-organizational perspective representing interpretative views of social science (see Table 1). The former is of interest to the school of method engineering, emphasizes the structural aspects of the method, and usually employs contingency-based models for method adaptation. The latter appears to be concerned with better understanding of how a method and its components

Table 1. Framework for organizing previous research relevant to method adaptation

Key perspectives on method adaptation / The constructs relevant to this research	The engineering perspective	The socio-organizational perspective
Agent	Method engineers as dominant actors	An interplay between people, including project managers, method engineers, developers, and end-users, involved in a project
Contexts	Factor-based characterization of context	Emerging context in ISD setting
Method fragment	Coherent and structured parts of a method	Innovated, unstructured fragments separated from a prescribed method
Process/intention	Static and dynamic use of factors mediated by an intention, often in terms of risk and success factors	An ill-structured, complex organizational phenomenon

are invented on the fly and are actually used in an emerging work setting, and is reflected in the body of knowledge contained in the socio-organizational literature (Baskerville & Stage, 2001).

These two perspectives adopt different levels of abstraction for method adaptation (Iivari, 1989). The engineering perspective stays at a conceptual level where the main focus is on models of the "real or empirical world" rather than the real world itself (Harmsen, 1997). In comparison, the socio-organizational perspective looks into the empirical world and tries to understand method adaptation in practice, examining real, concrete development processes. The empirical study of Fitzgerald et al. (2003) presented how method adaptation had been carried out in the Motorola organization at various levels. They distinguished three adaptation levels: the industry, the organization, and the project. Our focus in this article is on method adaptation at the project level.

Prescribed vs. Emerging Context

The term context refers to a collection of relevant conditions and surrounding influences that make a project situation unique and comprehensible (Hasher & Zacks, 1984). Interested readers can see the elaborations of existing models or views characterizing the context in which an IS development takes place (Lyytinen, 1987). Both the perspectives discussed previously use various kinds of factors to understand the context. Even though the proposed list of factors in the domain of method engineering is supposed to be lengthy, it is apparent that social and organizational issues are not the focus of attention. The socio-organizational perspective, however, does put more emphasis on social and organizational elements of the context. In addition, this perspective considers context as an emerging ISD setting rather than as a prescribed project situation.

Structured vs. Innovated Method Fragments

Both perspectives use the concept of fragments. From the engineering perspective, a method fragment is a description of an ISDM, or any coherent part thereof. It is usually prescribed and is structured in terms of fragment properties (Harmsen, 1997). Conversely, the socio-organizational perspective gives more attention to those fragments that are distinct from a prescribed method. This perspective sees fragments as follows: "Under [this] concept, each systems development project is a moving pastiche of miscellaneous parts; bits of external methodologies, internal methods, innovative, unique

techniques invented on-the-fly, etc." (Baskerville & Stage, 2001, p.18). To differentiate between the two meanings of this concept, we consider there to be two types of fragments: We use the terms structured and unstructured fragments to refer to the meanings in the engineering and socio-organizational perspectives, respectively.

Fragments can be principles, fundamental concepts, products to be delivered, activities needing to be performed, job aids such as techniques, tools, hints, and tips to be used, and so forth. Some of them are essential to the ISD approach. The term ISD approach, and we adopt the definition of Iivari et al. (2001), refers to a high-level description of the method including the goals and guiding principles, and the beliefs, fundamental concepts, and principles of an ISD process.

Agents Leading Method Adaptation with an Intention

An agent is an actor with one role or more in a method adaptation process. The socio-organizational perspective does not specify any specific roles in that process, yet the emphasis is on the practical interplay between people at work. The socio-organizational perspective considers the method adaptation process as "an ill-structured, complex socio-organizational phenomenon" (Baskerville & Stage, 2001, p. 14). Anthropology is referred to as a potential reference discipline to study such a process, and Agar's (1986) practical ethnography and its four major units of analysis are used to explain how the process develops in practice.

The engineering perspective regards method engineers as the dominant actors in method adaptation. Their role is to carry out the process leading to a tailored method, that is, a method that is adapted to the project context at hand. Such a process usually employs contingency-based models. Offenbeek and Koopman (1996) discuss the limitations of 17 contingency-based models that have been proposed for determining an appropriate approach for an IS development project. As they note, the factors taken into account in these models can be numerous, or can be limited to certain IS views and used in a static manner. That is, these models ignore possible bilateral interactions between the context, characterized by the factors, and the approach, and further lack dynamic interactions among the factors. Offenbeek and Koopman propose the concept of a dynamic fit between context and approach as a solution to the static use of contextual factors, the approach, and the corresponding method fragments. They state (p. 257), "To a certain extent the dominant actors cannot only choose their approach but also their context, whether by definition or by intervention, that is by deliberately changing the context." It is important to note that both the context and the approach are subjects for adaptation, and a form of mediating construct is needed to facilitate this adaptation process. Such a construct is here called an intention and has been referred to using different terms in the various models proposed for method adaptation (see, for instance, "risk" in conventional contingency-based models as listed in Offenbeek & Koopman; "success" in Harmsen et al., 1994; "goal" in Baskerville and Stage, 2001; "mediating factors" in Slooten & Brinkkemper, 1993). We consider intention as an indication of what drives the agents while carrying out method adaptation.

THE CONDUCT OF THE STUDY

Research Objective

During our case-study investigation in an organization, we explored, described, and analyzed the work practices dealing with method adaptation without limiting ourselves to a specific perspective. To frame our research scope, we formulated our goal as to investigate how an agile method is adapted to different project contexts in a large-scale IT department. By using the constructs elaborated in the previous section, this goal statement could be formulated as to investigate the ways through which a method engineer and a project manager together adapt dynamically both structured and unstructured fragments of an agile method to different contexts at the project level. We especially looked into the early stages of the systems development process where the adaptation process appeared to be more essential and more transparent in the organization investigated.

Research Method

The research approach adopted in this study is that of an interpretive field study. Many researchers, including Fitzgerald et al. (2000) and Sauer and Lau (1997), have also used this research approach for the study of method use in practice. It has been suggested as an appropriate research method for explorative and descriptive types of research and, according to Klein and Myers (1999, p. 69), "interpretive research does not predefine dependent and independent variables, but focuses on the complexity of human sense making as the situation emerges; it attempts to understand phenomena through the meanings that people assign to them."

The field research was conducted in the form of a research project in the organization and carried out by a research team consisting of people from both the university and the case organization. The appendix summarizes the characteristics of the research method applied, such as the use of multiple study stages, various sources of knowledge, an iterative process of data analysis (Walsham, 1995), a collaborative style of the research team involvement, engaged data gathering (Jones & Nandhakumar, 1993), and the use of different feedback mechanisms for the validity of the data analysis. One can see that the mentioned characteristics are indeed related to the principles of interpretive field research (Klein & Myers, 1999; due to a space limitation, we could not further articulate the relations between the characteristics and the principles, but as an example, notice that the use of various sources of knowledge is related to the principles of multiple interpretations, suspicion, and contextualization).

Introducing the Case Organization

The organization we investigated is one of the leading financial institutions in Europe and operates in a dynamic business environment. One of the global strategic business units, Consumer and Commercial Clients (C&CC), focuses exclusively on services to individual clients and small- to medium-sized businesses. The Netherlands Business Unit (BU) is one of the five BUs under C&CC. IT Development is one of the departments within the Netherlands BU and employs 2,000 people involved in systems development projects. Such a large IT department was chosen because it enabled us to investigate method adaptation in various project contexts.

It is worth noting that the organization has considerable experience in ISDM use. The organization's identity goes back 10 years to the merger of two organizations, both of which were used to using conventional methods. One of them had been using a method developed in house, and the other a brand-named method. Until the introduction of an agile method just two years ago, there had been a lot of effort put into achieving a standard method influenced heavily by previous development procedures, processes, and templates.

About the Agile Method: DSDM in a Nutshell

DSDM can be considered an agile method because it has the ability to be adaptable to a variety of development situations (Abrahamsson et al., 2003). In the UK and in Benelux countries, DSDM, which is supported by a consortium of over 600 organizations, has become the de facto market standard. The method strongly emphasizes the concepts of suitability and adaptability: DSDM will be, to a certain extent, suitable for a project or an organization, and is adaptable if not completely suitable.

For the purpose of this research, we have considered three components of DSDM: its underlying philosophy (captured in nine principles), its framework (stages, activities, products), and its essential techniques (Aydin & Harmsen, 2002). In practice, each of these components can be applied separately, and subsets of the components can also be applied on their own. The principles of the method are active user involvement, the frequent delivery of products, iterative and incremental development, an empowered team, fitness for business purposes, reversible changes, requirements at

a high level, testing throughout the life cycle, and a cooperative approach. The DSDM framework suggests a complete project approach that includes key phases, products, and roles that should be customized according to the project situation. Modeling techniques are not included in DSDM since they are often a part of modeling tool sets that are not themselves part of the method. In this way, DSDM is highly adaptable: It is possible to use fully fledged DSDM, but individual techniques or just the terminology is still valuable on its own. To this end, an instrument called a suitability filter is available in the manual (DSDM Consortium, 2003). The filter considers the critical success factors for DSDM and the characteristics of projects that will make DSDM especially effective. Each potential project should be judged individually using the filter. If the project provides a good match with the filter, then DSDM can be considered as a suitable method. If the criteria results are not satisfied, then the method can be modified.

Important DSDM techniques are time boxing, facilitated workshops, prioritization, and prototyping. Time boxing refers to setting a deadline by which a predefined objective must be met rather than describing when a task must be completed. To prioritize requirements of the system, the MoSCoW technique is used: MoSCoW is an abbreviation for must have, should have, could have, and want to have, but will not have this round. We assume that the concepts of facilitated workshops and prototyping are known. For more details of DSDM, one should refer to the DSDM Consortium (2003) document.

The Situation at Hand

Recently, DSDM has become the method of choice for all information systems development projects in the department. The main motivation for this decision was to ensure time-to-market systems development in order to achieve substantial product and process improvements, and to use one terminology in all projects. The DSDM implementation in the department focused on coaching project managers in adapting the method in the organization at project levels with the help of experts. The experts, known as coaches, had extensive project experience and were subject-matter experts in DSDM use. They coached project managers on how to make better decisions on the suitability of DSDM and on the degree of adaptation DSDM would require for each project. Basically, there were two essential roles in DSDM adaptation: the project coaching role and the project management role. The DSDM coaches assisted project managers in adapting DSDM to their project context, whereas project managers were fully responsible for the project execution. They were the final decision makers in terms of the use of DSDM fragments.

Case Study Procedure

The field research consisted of three stages: the preliminary study stage, the actual research stage, and the posterior study stage (see Table 2).

We conducted the research in cooperation with a sponsor and a method engineer from the case organization. The sources of knowledge were, in this empirical setting, informants, direct observations, and documents. Since the information needed was partially available in the organization, the team concluded that several rounds of formal and informal interviews, direct observations in the form of attending meetings, and in-depth documentary analysis were the most appropriate ways to collect data. Essentially, three rounds of interviews were conducted, each at a different level of detail in different forms with different informants (i.e., embedding different levels and roles). In some interviews, a list of questions was used to ensure that all the important subjects were covered, but at the same time, room was left for emerging issues (see the appendix for the interview questions and other details of the research method used).

In this interpretive case research approach, we preferred engaged data-gathering methods to distant ones as they allowed us to gain rich insights into method adaptation (Jones & Nandhakumar, 1993). However, some limitations of this approach have been identified. One of the problems, as frequently cited in the IS

Table 2. Summary of the case study procedure

Time	Stage	Event/activity	Objectives	Involved people
Jan 2002	Preparation	Field-study preparation	–Uncovering all aspects of the phenomena that has been studied so far in the literature regarding two theoretical views –A high-level description of the research method is to be used	Academics (one primary investigator, three senior researchers [professor, asst. prof., subject-matter expert])
Feb	Preliminary study	Conducting, codifying, analyzing, reporting interviews	Explained in the appendix	Explained in the research method section
May		Discussion of the reflection of interview results within the organization		All research team members and method engineers
May		Determining research scope determination and research design variables	Explained in the appendix	Research team members
June	Actual study	– Second-round interviews – Third-round interviews – Direct observation – Artefacts analysis (route maps, instruments [ESRL], advice documents, etc.) See appendix for other activities	Explained in the appendix	Explained in the appendix
June, July, Sept		Three checkpoint meetings	–Validation of findings –To agree on the level of abstraction and the degree of generalization –To agree on the depth and breath of the research scope	Explained in the appendix
July, Sept		A number of discussion meetings with a broad audience	Explained in the appendix	Explained in the appendix
Nov		Closing up and writing a draft version of case protocol	To document findings in a scientific way	Academics
Dec 2002-March 2003	Posterior study	Several iterations for the case protocol	Quality improvement by peer reviews	Academics (internal and external)
Dec 2002-June 2003		Follow-up communications with the organization	Explained in the appendix	Explained in the appendix
Sept 2003		Informal meetings	Monitor the evolving practice specific to method adaptation	Explained in the appendix

literature (e.g., Klein & Myers, 1999), was the difficulty in controlling the interactions between the researchers and the subjects, especially in a large IT-development department. Another problem was the level of abstraction needed and the degree of generalization achieved. To assess these problems, the research team members organized three checkpoint meetings in which up-to-date research findings were discussed and the scope of the future stages of the research was determined. In these meetings, the depth and breadth of the research scope was elaborated and found to be satisfactory for all the parties involved in this research. Another type of feedback mechanism, used to check the validity of the analysis, was to present and discuss the research findings with other interested parties in the case organization. This involved 12 method engineers, six project managers, one change manager, one chief domain architect, and two quality-assurance leaders. The feedback from such a broad audience was useful to justify our findings.

Major Findings

We identified static and dynamic method adaptations as two distinct ways of carrying out method adaptation in the department. In subsequent paragraphs we describe each of them separately.

Static Method Adaptation

Static method adaptation refers to selecting and assembling structured fragments based on a predefined set of criteria. In the case organization, we found that the type of development or target environment (i.e., the technical infrastructure or the platform an application will be designed and built upon) and the nature of the solution (i.e., a packaged or a custom-made application for business change) (Gibson, 2003) were two of the dominant factors used in static adaptation. Static method adaptation resulted in several route maps. A route map is an established plan prescribing which structured fragments should be used in a project. Examples of route maps are packaged solutions and component-based development (CBD; Dahanayake, Sol, & Stojanovic, 2003). These route maps have some similarities in the form of a process landscape as described in Backlund, Hallenborg, and Hallgrimsson (2003). In the event of choosing a route map for a project, the project manager could see only the relevant structured fragments, including stages, activities, products, techniques, and modeling tools for that project. It was interesting to note that the relevance of principles and essential DSDM techniques were not specified as part of these route maps. This point encouraged us to investigate how unspecified fragments have been adapted in practice, and so we needed to look at the second adaptation level.

Dynamic Method Adaptation

The second way for method adaptation, which we refer to as dynamic method adaptation, takes place during the process of developing an agile system. In this way, the role of the coaches is essential in order to adapt both structured and unstructured fragments to the contexts or vice versa. In practice, the coaches in the department were facilitating project managers to choose, modify, or innovate fragments for each project. As a consequence, we decided to focus on coaching activities and studied the means used in method adaptation. Figure 1 summarizes the key activities performed by the coaches. Two decisions had to be made in this coaching activity diagram: whether to use DSDM or not (in the suitability analysis), and whether to adapt or directly use parts of DSDM (in the adaptation analysis). Note that the output of characterizing the project was used with both decision points. Next, we discuss the ways and means that can be used to characterize a project.

We noted that coaches were using an instrument, the so-called Extended Suitability and Risk List (ESRL), for characterizing projects. During the early stages of DSDM use in the department, the coaches had used the questions in the original DSDM suitability filter (DSDM Consortium, 2003). Later, as they gained experience with them, some questions were extended and clarified, and furthermore, for each question, working instructions, measures, useful hints, and tips were added (Table 3).

The ESRL became an instrument that provided a baseline for the written advice to be produced for each project. In our interviews with both the coaches and the project managers, participants emphasized the significance of using the ESRL in method adaptation. They commented on the high relevance of the factors in the ESRL for better understanding the project situation at hand. In the ESRL, the applicability factors are closely related the preconditions and principles that need to be taken into account for the effective use of the method. These, in fact, reflect most of the success or risk factors that are often cited in IS literature (Schmidt, Lyytinen, Keil, & Cule, 2001). To clarify the meaning of each factor, the instrument includes further explanations with some follow-up questions and examples (see the "Explanation" column in Table 3). The instrument basically accepts the following assumption: that the inapplicability of the factors to the context at hand can cause a discord between the preconditions for effective use of the method and the project context. To mitigate the discord and related issues, suggestions are provided in the form of preventive and corrective measures in the instrument (see the "Management measure" column in Table 3). These measures

Figure 1. Overall coaching activities regarding method adoption

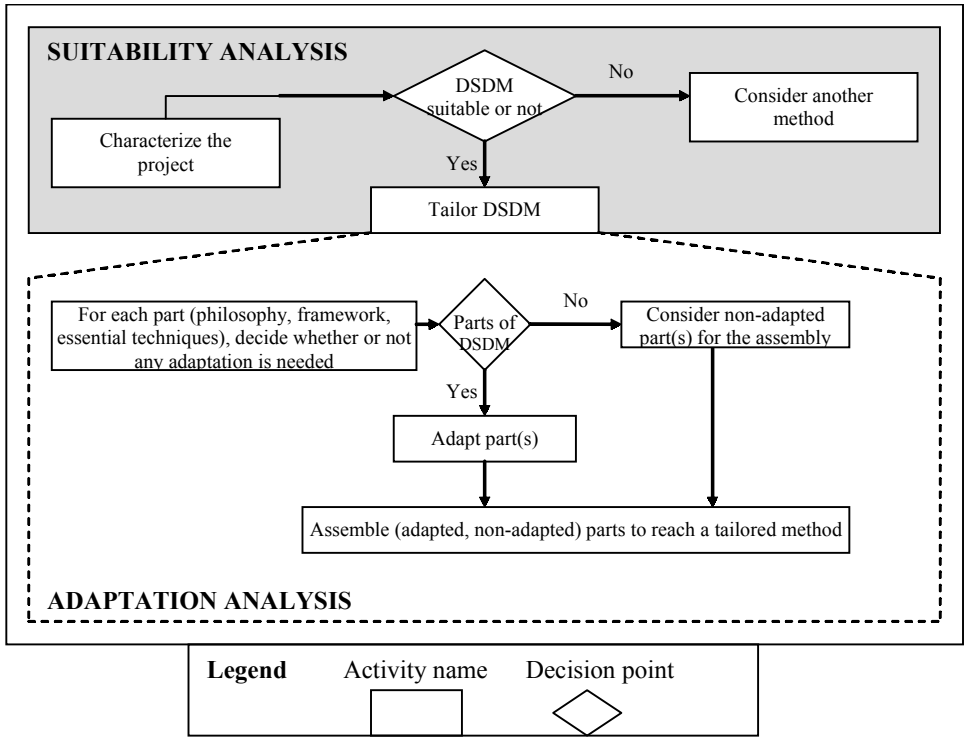

Table 3. The extraction from the ESRL

Applicability factor	**Suitability (Y/N)**	**Explanation**	**Management measure (P = preventive, C = corrective)**
Problem ownership: the identity of the problem holder, or customer for the project, is clear		Is a champion (proponent/leader) present and able to ensure that resources are released?	P1. Do not start project. P2. Determine who actually holds the purse strings and who ultimately makes decisions and carries the responsibility. Who will have problems if the system is not built? C1. Look one level higher in the hierarchy.
The end users with the delegated authority to make decisions are capable of making decisions.		End users may have the required authority, but may fail to use it. Essential characteristics of the iterative approach must be present so that the process can proceed with the necessary speed.	P1. Tell the users in advance that they have the authority to make decisions within the specified boundaries and that they must indeed make these decisions. P2. If the decision-making authority is not delegated to users, management must also participate in the team. C1. Make agreements with management regarding availability, e.g., questions submitted by the teams must be answered within *x* days, *x* hours, or the manager must keep a half an hour free every morning for questions (e.g., 8:30-9:00).

Table 4. The extraction from the sample advice

About the project context	About the appropriate DSDM development strategy
"If we know that the requirements are almost clear, stable, and that it is hardly possible to prioritize them, that there is no clear user interface, that there is high computational complexity, that the timeline is not clear, and that the resource availability (in terms of developers, end user) is not known, yet the total resources can be fixed, then we would like to know which development strategy is most appropriate and what kind of consequences we may anticipate in the later DSDM phases."	"It *seems* that a hybrid development strategy is more appropriate than the other options. The reason is the following: even though all requirements are 'must haves', we can still partly prioritize them and for those requirements that are stable we may plan one increment for the DSDM phases covered in a more linear way (i.e. no iteration for this increment). For the rest of the requirements we may plan other increments for which many iterations will be needed."
	About some issues related to two techniques of DSDM and related risks
	"…as the case indicates, the MoSCoW (a DSDM technique) appears not to be very suitable for this situation due to the difficulty of prioritizing requirements. The same holds for timeboxing, for which there must be a fixed date for the project, or for an increment, or for an iteration. For both anticipated issues there may be some opportunities to use these two techniques in different ways. Indeed, DSDM coaches have had some experience with such ways and they successfully use the philosophies behind MoSCoW and Timeboxing in real projects situations."

indicate the preconditions for the effective use of the method and relate them to the fragments of the method. We noted that the coaches considered the measures as suggestions rather than as directives for method adaptation. They had discussed the appropriateness and applicability of the measures with project managers. The coaches and project managers had discussed the implications of method adaptation in terms of conformance to time, budget (i.e., the degree to which the desired functionality could be realized within an agreed time or budget), and customer satisfaction (the degree to which the project outcomes would fulfill the expectations of the sponsor and users).

Once the coaches had used the ESRL and discussed the implications of method adaptation with project managers, they would write down their advice on how best to use the method for a successful system development in the perceived project context. To give a flavor of such advice, we have provided Table 4; with this we will illuminate the notion of structured and unstructured fragments.

Let us first focus on the advice about the appropriate DSDM development strategy. The recommendation given is closely related to the principle of iterative and incremental development, which simply states that "many increments with iterations is an ideal development strategy for agile systems development" (DSDM Consortium, 2003). Using increments means that a solution can be split into components that are based on prioritized requirements (Slooten & Hodes, 1996). More formally, an increment is a part of the system that is delivered to, and used by, a user before the total system is operational. However, having iterations means that some stages and corresponding activities need to be repeated through incorporating continuous feedback from the user. Such an iterative aspect of a development strategy contributes to the achievement of fitness for business purpose, which is another principle of the method.

The hybrid development process recommended in the sample advice shows how the principle of iterative and incremental development can be adapted to the project context described in Table 4. It suggests that a project manager should realize some increments in an iterative manner and achieve the rest without iterations (i.e., by applying a linear or "waterfall" systems development strategy). The term hybrid underscores the mixture of typical DSDM development strategy (iterative and incremental systems development) and a linear development strategy in such a project context.

Table 5. Characteristics of the static and dynamic adaptations for an agile method in the case organization

The constructs relevant to this research	The static adaptation	The dynamic adaptation
Key perspectives applied	The engineering perspective	Both the engineering and socio-organizational perspectives
Levels of abstraction	The conceptual level	The empirical level
Agent	Only coaches or other method engineers	The coaches and project managers
Contexts	Factor-based characterization of context, characterized by the nature of a solution and the type of development or target environment	Emerging context in an ISD setting, characterized by a set of factors in an instrument
Method fragment	Only the structured fragments (stages, activities, modeling tools)	Both structured and innovated (unstructured) fragments
Process/intention	Only adapting the method to the context. Static use of factors with an intention to adhere to the method	Adapting the method to the context or vice versa, with an intention to adhere to time and budget, and achieve customer satisfaction

The other part of the advice, about issues related to two techniques of DSDM and related risks, on the one hand addresses structural parts of the method — that is, two techniques, MoSCoW and time boxing — and on the other points out an unstructured innovative fragment by noting that "…DSDM coaches have already experienced such ways and they have successfully used the ideas behind MoSCoW and Timeboxing in such a project context." The innovative fragment here is to use time boxing in a different way from that prescribed in a given project context. One coach explained how to use time boxing in a different way: "It is true that you usually use timeboxing when the deadline of a project is known and then you can split a fixed timeline into 'boxes', but you can also do it by using budget as a criterion. Namely, if the human resources to be used in your project are known, you can calculate total available human resources in terms of man-hours and then you can convert this into a fixed budget and apply the idea of timeboxing as "budgetboxing."

In fact, we identified many such structured fragments that needed to be adapted, and these resulted in innovative fragments in the case organization. However, given the space limitation in this article, we have simply presented a few examples of such fragments in this section, and we will discuss their implications in the next section.

DISCUSSION AND CONCLUSION

The findings presented in the previous section show that the two perspectives are complementary and may even be necessary rather than conflicting if one considers adapting both structured and unstructured method fragments for two distinct approaches to method adaptation in a large-scale IT department (see Table 5). In the following, we shall explain this complementary aspect of the two perspectives.

Static Adaptation

As summarized in Table 5, the engineering perspective, embedding the dynamic-fit concept of the contingency paradigm, provides a sound basis to illuminate static adaptation.

Indeed, method engineers have been primarily responsible for characterizing a project context and determining which fragments are needed for a project. The chosen fragments, which result in various route maps, are good examples of the models created at the conceptual level. It is rather easy to see that a high degree of method adherence was driving the process for static adaptation. It is also clear in this process that the direction of adaptation is from method to context, that is, method is adapted to context. Static adaptation helps project managers start with an appropriate route map for a particular project. But it has some limitations on the way to characterize the context in which the project runs. Namely, as we pointed out before, such adaptation employs a prescribed view of the context by using foreseen and salient contextual factors. This implies that static adaptation at best leads to a kind of prescribed method by incorporating a priori project-specific characteristics. As we have seen from the present case, a project manager has needed dynamic adaptation to be able to adapt method fragments and context to each other in the course of a project.

Dynamic Adaptation

Similar to static adaptation, dynamic adaptation helps a project manager to adapt the chosen fragments to the context in the project execution. In this adaptation, depending on what the context requires and what the intention is, project managers need to further modify the structured fragments or even innovate new fragments. We shall now consider two types of fragments to illuminate the modification and innovation of fragments.

For the former, consider our finding about how the time-boxing technique (setting a deadline by which a predefined objective must be met), which is one of the essential techniques of the method, has been used in some projects. This technique is essential in that it can be used as a means to achieve some of the principles of the method, such as frequent delivery of the system or its parts, or quick incorporation of feedback from the project stakeholders to the system to be delivered. We have showed that even though the technique (a structured chosen fragment), at first glance, was not suitable for the project context, the agents strove to accommodate this technique in a special project context (no timeline was set for a project) and found an alternative way (budget boxing) to apply the essence of this technique. It was clear that the intention behind this adaptation was partly due to the desire to adhere to the method, and partly to adhere to the philosophy behind the technique.

For the latter, consider our finding about how the principle of iterative and incremental (a structured fragment) development was changed to a hybrid approach (an innovated fragment). We have showed that the hybrid approach was recommended as an appropriate development strategy to the project context as described in Table 4. This means that, in this occasion, the context forced agents (project managers and coaches) to find out an alternative way of using the principles of iteration and increments.

In contrast to static adaptation, dynamic adaptation allows a project manager to adapt the project context to method fragments in the course of a project (adaptation at the empirical level). To explicate this point, we can refer to the "Management Measure" component of the ESRL tool. This contains some suggestions concerning the ways to change the context. For instance, the inapplicability of a factor related to the user, as presented in Table 3, may require some management measures. These measures in fact indicate how the context might be changed to mitigate the issues possibly to be faced in order to realize the fragments of the method, which are mainly related to the philosophy component of the method. In this event, the reaction of the agents can be to change the context and/or the fragment. We have seen that the intention that drove the behavior of the agents was closely related to the desire to conform to time and budget, or customer satisfaction.

Even though agents do their utmost to mitigate risks and related issues, a project is not risk free and the agents might be faced with some emerging breakdowns resulting from a

discord between the method and the context. These breakdowns may eventually result in risks for the project. Such breakdowns need to be resolved, possibly by innovating new fragments or substantially changing the existing fragments. The socio-organizational perspective helps to illuminate such fragments, pinpoint the root causes of breakdowns, and describe methodical and nonmethodical aspects of the breakdowns (Truex, Baskerville, & Travis, 2000). In addition, this perspective facilitates an understanding of the emerging context in which the resolutions have to be achieved and the fragments invented. In this sense, the ESRL on the one hand employs the engineering perspective and helps agents to characterize and adapt the context and fragments. On the other hand, the ESRL accommodates the socio-organizational perspective and helps project managers to make sense of what the emerging context is about and what fragments are being innovated in such a context.

Implications

Practical implications of this study are manifold. First, we can argue that two approaches to adaptation, static and dynamic, could be applicable and useful in a large-scale IT department. We especially focus on the dynamic adaptation rather than the static adaptation and emphasize that for the dynamic adaptation, the role of coaches is found to be essential in supporting project managers to make appropriate decisions on the use of method fragments in a specific project context with an intention. This article details how such support was achieved in the case organization. Second, it is our contention that an instrument similar to the ESRL, but incorporating "up-and-working" experiences derived from real projects, might be useful in supporting the agents (the method engineers and project managers) in dynamic method adaptation. This study shows the feasibility, applicability, and usefulness of such an instrument in the context of agile systems development in one of the leading financial institutes in Europe.

One of the implications of this study for academics is that the constructs drawn from relevant research and summarized in Table 1 can provide a solid theoretical ground for future research regarding method adaptation. Notice that in this study, we have articulated these constructs and used them to explore the adaptation of an agile method to different project situations in a large-scale IT department (Table 5). For future research, there is the opportunity that by using these constructs, one can investigate other agile methods in different organizational settings to further discern the role of the key constructs described in the framework. Another research opportunity related to the proposed constructs is to study the relations between these constructs. Such a study might propose and possibly test a number of hypothetical relations between the constructs for static adaptation and/or dynamic adaptation. Notice that in this study we just give some indications of how these constructs might be related for the two types of method adaptation.

Comparison with Other Studies

Regarding the comparison of our findings with relevant studies, we shall comment on the following subjects. First, in regard to the use of a multitheoretic lens on method adaptation, it seems that such an approach is novel in academic circles, although the complementary aspect of the two perspectives has already been mentioned as a future research topic by Baskerville and Stage (2001). Second, most of the findings about method adaptation, including the Motorola case presented by Fitzgerald et al. (2003) and the cases of Ericsson ERA/RNC and Volvo IT presented by Backlund et al. (2003), are similar to those presented here, but their analyses either stay at the organizational level or focus on only the static adaptation of other methods. Our work covers both the static and dynamic adaptation of an agile method (DSDM). This study considers DSDM as an example of an agile method and shows empirical evidence on the situational appropriateness of DSDM at the project level, which is found to be a missing point in literature (Abrahamsson et al., 2003). A final comment can be made about the distinction between DSDM and other agile methods on method adaptation. Even though other ag-

ile methods claim to support method adaptation at the project level, most of them lack a clear guidance on how to do this. DSDM includes an instrument aiming at guiding project managers in realizing method adaptation. We have emphasized that such an instrument provided the case organization a good starting point to work on relating the content of the instrument to its own project situation. That is why instead of going into details about the content of the instrument the organization had used, we have especially focused on its dimensions and the way it had been used in method adaptation.

However, this research also has some limitations. Even though DSDM is an excellent example of an agile method, one has to take into account the limitations of the findings since they are specific to one method and one case organization. Consequently, we have discussed the findings from two perspectives in order to draw lessons inductively rather than generalize them and test previously defined hypotheses.

Conclusion

Based on our experience, we hope that this article will encourage other academics to employ the two perspectives when investigating agile methods. To realize static and dynamic adaptations as two distinct ways of carrying method adaptation, organizations can benefit from using a coaching service and instrument as described in this study. We especially emphasize how dynamic adaptation incorporates the two perspectives, which has been realized by the help of the coaching service and the instrument used in the case organization. However, while we try to draw the attention of academics to the use of the two perspectives in method adaptation, we cannot ignore the fact that the engineering perspective has had a privileged position in the history of conventional methods. As a consequence, we need to especially increase our knowledge on the use of the socio-organizational perspective in gaining a better understanding of agile-method adaptation.

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APPENDIX.

About the Research Method Applied

Research stages	The preliminary study stage	The actual study stage		The posterior study stage
The sources of knowledge and the techniques used to interact with participants	*Informants:* Six method engineers First round of interviews in the form of semi-open formal interviews	*Documentary analysis:* The organization-wide development method; the existing route maps and related fragments; an instrument (the ESRL) used for method adaptation; templates and actual project documents, including advice documents, project proposals, systems development plans *Direct observations:* Attending daily meetings of method engineers		*Informants*: The head of coaching group and some method engineers
		First round of interviews in the form of open-ended and semi-open (formal and informal) interviews	Second round of interviews in the form of open-ended and semi-open (formal and informal) interviews	
		Informants: 12 method engineers	*Informants:* 12 method engineers, 6 project managers, 2 portfolio managers, 1 change manager, 2 quality-assurance leaders, 1 chief domain architect	
Main research focus	- Determining relevant context(s) for the ways in which an agile method is adapted - Gathering perceptions and opinions of method engineers on method adaptation in general	- Identifying and studying the prescribed forms (route maps) of the method - Identifying tailoring drivers behind the prescribed forms - Studying the formulation of structured and unstructured fragments - Exploring, describing, and analyzing working practices and the means that the department uses to deal with static and dynamic adaptations - Studying the practice for dynamic adaptation in detail		Being up-to-date on the subject matter
Sample questions	What do you think about the adaptability of the method (DSDM) to a project situation? What about previous and current practices on method tailoring? How do you go about tailoring it for a specific project? How do you support project managers on this matter? What kind of information do you exchange with project managers?	What do you think about the coaching support (provided or received) for a project? What do you look for and take into account when tailoring the method for a specific project situation? Could you explain the activities and knowledge used while coaching a project manager? How do you determine the suitability of the method to a project? What do you use for it? What do you do if the prescribed parts of the method do not fit the project context? Do you use any means to characterize a project? What do you think about the instrument (the ESRL)? What about the contextual factors and measures in the instrument? How do you use them? How do you write down your advice on how best to use the method for the project? How do you use the advice in your project? What about the relevance of the instrument and its parts (contextual factors, measures) to the task concerning method adaptation? Are the factors and measures meaningful, comprehensible, and useful for method adaptation?		What have been changed in method adaptation practice so far? Any change regarding coaching support, other working practices, the means, and so forth?

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