Situated Method Engineering

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Organizations have to change their systems development methods due to changing situations. Situated methods take into account the contingencies of a systems development project improving the effectiveness of systems development. Situated method engineering must be implemented as a learning process supported by situation-specific development strategies and integrating method fragments from different methods. Field studies show the need for and the feasibility of situated method engineering. Several method engineering instruments are available and have been explored during the field studies.

Boehm (1988) had already stated the need in practice for new models of the process of information systems development. Subsequently he developed his well-known spiral model. New approaches, and ones which are more effective than the traditional waterfall model of the systems life-cycle, including approaches handling prototyping and software reuse, should be available for systems development. In this context, systems development depends on the situation in which it takes place. Prototyping, for instance, will be applied particularly if the information need of the users cannot be sufficiently specified. Various researchers (e.g. Naumann, 1980; Davis, 1982; Burns and Dennis, 1985; Louadi et al., 1991) have developed contingency frameworks determining the relationship between situational factors and the best fitting development strategy. The need, depending on the circumstances, to construct a situation-specific systems development method through integrating appropriate methods, techniques, and tools has already been stated by Necco (1987). The concept of Methodology Engineering has been an attempt of Kumar and Welke (1992) to define the next level of evolution of methodologies. They discuss the need to customize methodologies to meet the requirements of the development context, and state:

“... we need a formal (as opposed to ad-hoc) and efficient (as opposed to resource and time efficient) methodology for developing ISDMs which are situation appropriate (as opposed to universal) and complete (as opposed to partial), and at the same time rely upon the accumulated experience and wisdom of the past (as opposed to built from scratch).”

Because methodologies are not universal, not complete, and sometimes not appropriate, it is often better to adapt the methodology to match the project context. Every time a systems development project is running, knowledge and experience must be collected concerning less or more successful
approaches to developing information systems. Approach in this context has the same meaning as methodology or situated method. A situated method is an integrated methodology consisting of route map fragments and method fragments. The complete route map of a systems development project defines all activities of the project including their sequence and their products, but not the methods, techniques, and tools supporting the activities. A route map fragment is a coherent part of the complete route map. Route map fragments may refer to strategies, activities, or products concerning systems development as well as project management. For example, a route map fragment may be a selected delivery strategy (delivery at once, incremental delivery, evolutionary delivery) or a selected development strategy (linear, iterative, outsourcing). A method fragment is a coherent part of a method or tool supporting the activities of a systems development project. Method fragments are linked to the activities of a route map. For example, a route map may specify an activity such as data modelling and the selected method fragment to support data modelling may be Chen's entity-relationship modelling technique. A situation-specific composition of route map fragments, including selected method fragments, is called a situation-specific approach to systems development or a situated method. The situated method is constructed taking into account the situational factors (contingency factors, constraints or policies) of a systems development project. Such a way of working is called situated method engineering.

The general method engineering process is described by Section 2, after which Section 3 and 4 show a few instruments supporting the selection of route map and method fragments. Section 5 highlights some field research in situated method engineering. Furthermore, some conclusions and further research topics can be found in Section 6.

The Method Engineering Approach

Contrasting Approaches

During the 1970s several methods and techniques were developed, which became so-called Information Systems Development Methodologies (ISDMs) (Bubenko, 1986). Subsequently, many ISDMs have been improved and newly developed. It was concluded that no method is best in all situations (Malouin and Landry, 1983). Meanwhile, several approaches solving this have been proposed:

- **Context-based selection.** An appropriate method is selected from a repertoire of available methods based on an analysis of the context. (Kumar and Welke (1992) mention two important problems. A single method will not match all relevant aspects of the problem situation, and this approach could be expensive in terms of money and time.
- **Tool-kit approach.** A number of “complementary” methods are combined into a tool-kit. An important example of this approach is the Multi-View method of Wood-Harper et al. (1985). However, the nature of contingencies influencing the selection of tools is not addressed, and the adequacy of the aspects covered by the tool-kit is not guaranteed.
- **Situated method engineering.** This approach is adopted by this research. Situated method engineering is a meta-method for designing ISDMs, which is elaborated by our research. Kumar and Welke (1992) state that method engineering must happen situation-specific and rely on the accumulated wisdom of the past. Included are methods for eliciting relevant contingencies and for supporting method construction and selection (Van Slooten and Brinkkemper, 1993; Van Slooten, 1995b; Van Slooten and Schoonhoven, 1994). Furthermore, attention must be paid to the organization structure supporting situated method engineering (Van Slooten et al, 1994).
- **Foundation of IS concepts.** Another approach to solving the problems of systems development, not mentioned by Kumar and Welke, is the development of a sound and widely accepted foundation of basic concepts and methods (Falkenberg et al, 1992). This research is important for method engineering because better method fragments will become available.
- **Software factory.** The Software Factory was successful in Japan contrary to the United States (Cusumano, 1989). It is based on the standardization of procedures for design and implementation, and the availability of an integrated set of tools, but it does not address the situation-specific nature of the development process.

The Method Engineering Process

Method engineering is performed by configuring a project scenario or situated method for systems development, utilizing route map and method fragments of existing approaches to serve the project in context. Figure 1 is a simplified representation of the situated method engineering approach.

The project context includes the existing systems devel-
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