

Foreword

Information Modeling Techniques are used during information systems analysis and design, and are important kinds of techniques, which are part of Information Systems Development Methodologies. An optimal information modeling technique may be defined as an information modeling technique that is most appropriate to be applied in a specific situation indicated by certain contingency factors.

After the early experiences with relatively primitive methods and techniques during the fifties and sixties of the last century, more successful methods and techniques were further developed and became information systems development methods, or so-called methodologies, during the seventies. During the eighties, many information systems development methodologies have been improved and newly developed, which shifted the attention to the selection, evaluation, and comparison of methods. It was concluded that there is no method best in all situations (Malouin and Landry, 1983). In the meantime, different approaches trying to solve this problem have been proposed:

- *Tool-Kit Approaches.* A number of “complementary” methods are combined into a single tool-kit. The set of methods and techniques is available to the analyst, who then chooses the set needed for the particular circumstances. One example is the Multi-View method of Woodharper, Antill, and Avison (1985). Another example is the Unified Modeling Language initiated by Booch, Jacobson, and Rumbaugh, and further defined by the Object Management Group. The last set of techniques, collected under the umbrella of UML, is very popular in the field of object-oriented analysis and design. However, the nature of contingencies influencing the selection of techniques and tools is not addressed, and the adequacy or necessity of the set of aspects of modeling, covered by the tool-kit, is not guaranteed. Furthermore, to strengthen the semantics of UML information modeling, other techniques may be necessary (Halpin, 2001).
- *Software Factory.* The term Software Factory refers to an approach to software development, which aims to improve the productivity of the

development process and the quality of the software product. The introduction of 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. However it may be not excluded that future research in situated method engineering (Van Slooten, 1996) and the application of principles from logistics will enforce a new incentive for designing a more flexible software factory.

- *Context-Based Selection of a Method.* An appropriate method is selected from a repertoire of available methods based on an analysis of the context. This means that methods are not divided into method fragments, which may be selected from different methods. Always a complete method will be selected based on some context factors. Kumar and Welke (1992) mention two fundamental problems with this approach. It is unlikely that a single method will match all relevant aspects of the problem situation, and the adoption of this approach could be expensive in terms of money and time.
- *Determining a Foundation of Information Systems Concepts.* Another approach to solving the problems of information systems development, is the development of a sound and widely accepted foundation of basic information systems concepts and methods and techniques based on these concepts (Falkenberg et al., 1989, 1992, 1998). Research on methods and basic concepts is very important and will support all approaches to information systems development, because improved and better techniques will become available through this kind of research. The outcome of this research so far is available for research and educational purposes on the Internet: <ftp://ftp.leidenuniv.nl/pub/rul/fri-full.zip> and is called the FRISCO report, which means a Framework of Information System Concepts. This research was started, because there was a growing concern within IFIP WG 8.1 about the situation, where too many fuzzy or ill-defined concepts are used in the information system area.
- *Situated Method Engineering.* Olle et al. (1983) said already: “Design of methodologies and of application systems are very comparable exercises in human endeavour.” Designing methodologies may be supported by a meta-method. Situated method engineering is a meta-method for designing Information Systems Development Methodologies. The assumption is that organizations have to change their information systems development methods due to changing situations. Kumar and Welke (1992) state that method engineering must

happen situation-specific and rely on the accumulated wisdom of the past, which emphasizes the situatedness and the evolutionary nature of the process. Van Slooten and Brinkkemper (1993) define method engineering as follows: “The process of configuring a project scenario for information systems development using existing methods, or fragments thereof, to satisfy the factors that define the project context.” Scenario configuration consists of the following stages: 1) The project characterization is determined by assigning values and weights to contingency factors; 2) Based on the project characterization, the method engineer determines the relevant modeling aspects (e.g. information modeling), relevant abstraction levels, relevant development strategy, and existing constraints; 3) A first project scenario is composed by selecting appropriate fragments (e.g., information modeling techniques); and 4) The actual project performance is started using the scenario as guideline. The scenario may change during project performance in case of unforeseen contingencies. All knowledge related to a project scenario is stored in a method base, which may be used by other projects.

- *Web-enabled Methodologies.* The web may be a perfect facilitator for situated method engineering, the web in the role of the method base. Problems with paper versions of information systems development methods are: the extremely bulky task of maintenance; methods are dynamic and become often extensive; access to methods becomes more and more complicated; and paper versions rarely fit the situation of a specific project. A web-based method could be electronically available to everyone connected to the Intranet or the Extranet and could facilitate situation-specific navigation through the recorded method including guidelines and decision rules, selecting those method fragments relevant for the particular situation depending on the project-specific contingency factors. Configuration management and version management could be realized more easily.

Situation-specific information modeling may be appropriate for most application areas, e.g., modeling aiming at the implementation of enterprise-wide systems, modeling organizational memory information systems, business modeling for electronic commerce applications, etc. There is much work to do to elicit the specific organizational situations, and to know what are appropriate methods and techniques for analyzing and modeling these situations. Contingency theory is a theoretical and rational approach to organizations. Nowadays, contingency theory has also been applied at the level of subsystems of organizations, e.g., projects preparing the implementation of enterprise-wide information systems. Several contingency factors have been proposed (Van Slooten and Hodes, 1996). Applying reference models of enterprise-wide systems, e.g., SAP, may affect these

factors in a positive or negative way. Several instruments supporting the way of business analysis and modeling have been published (Essink, 1986; Wijers, 1989; Kumar and Welke, 1992; Van Slooten and Brinkkemper, 1993).

REFERENCES

- Cusumano, M.A. (1989), The Software Factory: A Historical Interpretation. In: *IEEE Software*, March.
- Essink, L.J.B. (1986), A Modeling Approach to Information System Development. In Olle, T.W. et al., *Information Systems Design Methodologies: Improving the Practice*, IFIP WG 8.1, North-Holland.
- Falkenberg, E.D., and Lindgreen, P. (Eds.) (1989). *Information System Concepts: An In-Depth Analysis*. IFIP WG 8.1, Task Group FRISCO, Elsevier Science Publishers (North-Holland).
- Falkenberg, E.D., Rolland, C., and El-Sayed, E.N. (Eds.) (1992). *Information System Concepts: Improving the Understanding*. IFIP WG 8.1, Task Group FRISCO, Elsevier Science Publishers (North-Holland).
- Falkenberg, E.D. et al. (1998). *A Framework of Information System Concepts (Web edition)*. International Federation for Information Processing, ISBN 3-901882-01-4.
- Halpin, T. (2001). Integrating Fact-oriented Modeling with Object-oriented Modeling. In Rossi, M. and Siau, K. (Eds.), *Information Modeling in the New Millennium*, Idea Group Publishing.
- Kumar, K., and Welke, R.J. (1992). Methodology Engineering: A Proposal for Situation-Specific Methodology Construction. In: *Challenges and Strategies for Research in Systems Development*, Wiley & Sons Ltd.
- Malouin, J.L., and Landry, M. (1983). The Mirage of Universal Methods in Systems Design. In: *Journal of Applied Systems Analysis*, 10, 47-62.
- Olle, T.W. et al. (Eds.) (1983). *Information System Design Methodologies: A Feature Analysis*, Elsevier Science Publishers (North-Holland).
- Van Slooten, C. (1996). Situated Method Engineering. In: *Information Resources Management Journal*, Summer, Idea Group Publishing.
- Van Slooten, C., and Brinkkemper, S. (1993). A Method Engineering Approach to Information Systems Development. In Prakash, N. et al. (Eds.), *Information System Development Process*, IFIP WG 8.1, Elsevier Science Publishers (North-Holland).
- Van Slooten, C., and Hodes, B. (1996). Characterizing IS Development Projects. In Brinkkemper, S. et al. (Eds.), *Method Engineering, Principles of Method Construction and Tool Support*, IFIP WG 8.1/8.2, Chapman & Hall.

Wijers, G.M. et al. (1989). Analyzing the Structure of IS Development Methods: A Framework for Understanding. In *Proceedings of the First Dutch Conference on Information Systems*, November.

Wood-Harper, A.T. et al. (1985). *Information Systems Definition: The Multi-View Approach*, Backwell, Oxford.

Dr. Kees van Slooten
Technology & Management
Department of Business Information Systems
University of Twente
The Netherlands