System Development Methodology Implementation: Perceived Aspects of Importance

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The implementation of a systems development methodology (SDM) is one of the more difficult paths that many organizational managers have been traversing without benefit of guidance. This research project contains the results of a survey of participants on actual SDM implementation projects using an instrument based on interviews of experts in SDM implementation. The data collected was analyzed, using factor analysis, which identified five factors to consider during SDM implementation: Understanding Methodology Specifics and Benefits, System Personnel Manager Involvement and Responsibility with Organizational SDM Transition, Use of Models, Functional Manager Involvement/Support, and External Support. By paying close attention to aspects of these five factors, organizational managers can help their organization through the major change management phases of: readiness, adoption, and institutionalization of the changes caused by SDM implementation.

An important issue facing managers of systems personnel has been the implementation of a comprehensive system development methodology (SDM). An SDM is an overall strategy for computer-based information system (IS) development that includes a flexible framework for the sequence of development tasks and techniques used to accomplish the design and implementation of the system (Martin, 1989; Veryard, 1987a). Many good reasons exist for using an SDM rather than an ad hoc, informal or intuitive methodology used by many company personnel (Veryard, 1987b). For example, Martin (1989) suggests that system personnel can use formal SDM’s to help reduce the risk of system development project failure, as opposed to development projects of previous eras wherein informal systems development methods contributed to project failure.

When implementing a formal SDM, system managers often find that they are navigating relatively uncharted waters. The few articles in the literature that provide SDM implementation guidance to these managers are informative expressions of the experiences of just the authors, and not reports of the results of methodologically rigorous research. A significant number of these articles are not generalizable because they are anecdotal reports of the implementation of a particular SDM. Additionally, other published studies are limited to a discussion of a specific tool supporting an SDM, such as computer aided software engineering (CASE) tools, rather than the implementation of an SDM (see Orlikowski 1993). The adoption of tools without a formal implementation of an SDM limits their effectiveness (Vessey et al., 1992). It seems more reasonable to isolate those factors that are important to implementing an SDM before attempting to identify the influences on the use of tools that support an SDM, as in the Orlikowski (1993) study. This research project took such an approach.
The Research Questions

This research sought to identify what were the main influences on implementing an SDM, without limiting the findings with respect to preconceived notions of SDM attributes. To fulfill this desire, the researchers gathered data from respondents who had been involved in implementing a number of the more prominent SDMs, including: Ernst & Young’s Navigator, Andersen Consulting’s Method/I, James Martin and Associates’ Information Engineering, Texas Instruments’ Information Engineering, and Knowledgeware’s Information Engineering. The data was collected to answer three main research questions.

• Do different types of participants (constituents) disagree on the items of importance for an SDM implementation?
• What organizational change factors do primary constituents involved in the process of SDM implementation believe to be critical to that process?
• What are the characteristics of these perceived factors of importance?

The responses of the persons involved in the research expressed what they believed was important in SDM implementation based on their experiences on actual SDM implementation projects.

Related Literature

The foundation of modern SDMs originated in the works of Dijkstra (1969), Yourdon and Constantine (1975), Gane and Sarson (1977), Dolan (1984), Martin (1989) and other methodologists of previous eras. Dijkstra (1969) advanced the basic concepts of structured programming methods on which modern procedure modeling methods of many current SDMs are based. Yourdon and Constantine (1975) originated the use of the structure chart (STC) modeling method to use in modeling structured programming procedures as part a number of current SDMs. Dolan (1984) formalized the use of the STC modeling method as the basis for modeling structured programming procedures. Martin (1989) provided a formal presentation of the action diagram method, another of the more prominent procedure modeling methods used in many modern SDMs.

The basic principles of organizational process modeling within many of today’s SDMs originated with the modeling method described in Yourdon and Constantine (1975). Yourdon and Constantine (1975) originated data flow diagrams (DFD), a modeling method of some SDMs used to create graphical models of organizational processes for analysis purposes. Gane and Sarson (1977) advanced the DFD modeling method principles to include organization process design. Dolan (1984) later provided a formal method of converting DFD process models into STC procedure models used in some modern SDMs.

Martin (1989) formalized strategic modeling methods and the resultant strategic model of organizational systems, as well as information engineering (IE) principles of many modern SDMs. For example, the IE principles of the SDM of Texas Instruments’ IEF were explicitly based on the Martin (1989) IE principles. These principles prescribed that the models of different modeling techniques be more integrated to consistently integrate organizational and system modeling.

A literature search failed to produce a study of what was required to implement an SDM. To this end, the constituencies involved in SDM implementation were polled to identify important implementation considerations. Constituents are individuals and groups not directly associated with the focal organization that can form evaluations about and/or influence the activities of the organization to some extent (Connolly et al. 1980). The multiple constituency approach helps assess organizational effectiveness from the perspectives of multiple strategic constituents (Cameron, 1980). The multiple constituency approach has been previously used in survey research (See Hamilton and Chervany, 1981; Watson et al., 1987; Rainer, 1989; and McGaughey, 1991).

An SDM implementation constitutes a major change for organizational personnel involved in system development, and should be consistent with the basic premises of change management. Modern change management literature originated in the Lewin (1951) model of unfreezing, moving, and refreezing. Barczak et al. (1987, p. 26) defined the key elements that helped with removing existing patterns to create new ones as follows:

1. Pattern Breaking: freeing the system from structures, processes or functions that are no longer effective or useful;
2. Experimenting: generating new patterns better suited to the present environment;
3. Visioning: choosing a new perspective around which a system can reorganize;
4. Bonding and attunement: harmonizing members to move the system toward new ways of doing, thinking and learning.

Armenakis et al. (1993) redefined the change management phases as readiness for change, adoption of change, and institutionalization of the change. The researchers chose to use this latter classification of change management phases and that aspects of the SDM implementation factors should be related to each of these three phases.

Research Methodology

This investigation constituted a theory-building exploratory study to identify factors that primary constituents be-
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