



## **Chapter 9**

# **Constructive Design Environments: Implementing End-User Systems Development**

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*The philosophy of end user design proposes an approach to information systems provision where those involved in the human activity context are central to establishing the relevant requirements for their information systems. In this paper we develop the case for centering definitions and process flows on end users in their active situations. We examine the potential for basing integrated IS development upon the constructive and evolutionary processes in the client context. Provision of enterprise-wise IS design environments in which this approach becomes realistic implies a systemic reappraisal of the role of software engineering methods and their place in IS design. With reference to case studies we consider some organisational characteristics in which evolution of specific information systems can be achieved through provision of such design environments. Representative situations at the level of full application design and customisation, workflow definition and enterprise-wide development are considered.*

Implementing enterprise-wide end user development as an approach to information systems provision involves shifting the activities of information definition, processes and flows onto end users in their organisational situation. Although such an approach might at first seem to imply prohibitive

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training requirements, lack of quality or incompatibility with other enterprise information systems, this is not necessarily the case. Indeed, it is argued that such a requirement will become inevitable for many types of information systems. Rather than having intermediaries anticipate requirements for specific applications, the provision of design environments supporting end user development is suggested. Establishing the requirements for these environments, in which the evolution of specific information systems within organisations becomes possible, then becomes the emphasis of software engineering in conjunction with related management and cultural practices.

Various levels of systemic activity are involved in implementing information systems, and this is becoming increasingly recognised in computing science. Major systems theorists, such as Boulding (1956), and Checkland (1981) have provided classifications of systems relevant to comprehending organisational activity. Boulding's hierarchy recognises systems at nine increasingly complex levels, from the simply mechanical and deterministic, through biological, human and social, to transcendental. Each level has its proper sciences and forms of meaningful explanation. Checkland distinguishes natural, designed (physical or abstract) and human activity systems. Information systems, as commonly understood in the organisational computing literature are not classified neatly by these hierarchies, and this may be attributed to their essentially hybrid status. In their data (closed) aspect they may (appropriately) be rigorously modelled and objectivised, but once data becomes interpreted and contextualised by humans in unanticipated situations, its status changes to information, and becomes referenced to more open and complex systems with less certain or determinable operations. The art of information systems development lies in accommodating both sets of requirements: the integrity of the mechanical within the flexibility of the social, where both are required.

Classic lifecycle based models of IS development emphasise establishing agreed definitions and procedures at the outset of development, and performing translations or mappings from original specifications. Such approaches have frequently been criticised for failing fully to capture the intended user requirements, and for failing to deliver systems relevant to current user needs within time and budgetary constraints. Recently, Wegner (1995) has provided a mathematical proof of why the standard waterfall methodology is doomed to fail. This is because the process of software development is not a fully constrained, but an interactive system. Wegner's conclusion, however, is not surprising, and the history of numerous failures in computer based information systems development has been widely recognised and reported (e.g. Brooks, (1986), Fortune and Peters (1995),

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