Chapter XVI
An Overview of Models and Standards of Processes in the SE, SwE, and IS Disciplines

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ABSTRACT

This chapter develops a descriptive-conceptual overview of the main models and standards of processes formulated in the systems engineering (SE), software engineering (SwE) and information systems (IS) disciplines. Given the myriad of models and standards reported, the convergence suggested for the SE and SwE models and standards and the increasing complexity of the modern information systems, we argue that these ones become relevant in the information systems discipline. Firstly, we report the rationale for having models and standards of processes in SE, SwE and IS. Secondly, we review their main characteristics. Thirdly, based on the identified aims and principles, we report and posit the concepts of process, system and service as conceptual building blocks for describing such models and standards. Finally, initial theoretical and practical implications for the information systems discipline of such models and standards are discussed, as well as recommendations for further research are suggested.

... in the current marketplace, there are maturity models, standards, methodologies, and guidelines that can help an organization improve the way it does business. However, most available improvement approaches focus on a specific part of the business and do not take a systemic approach to the problems that most organizations are facing. (SEI, 2006, p. 3)

INTRODUCTION

The manufacturing of products and the provision of services in the modern world has increased process engineering (including manufacturing or provision) and process managerial complexity (Boehm & Lane, 2006). The engineering complexity has been raised because of the variety of design, manufacturing or provision process, machines and tools, materials and system-component designs, as well as for the high-quality, cost-efficiency relationships, and value expectations demanded from the competitive worldwide markets. The process managerial complexity has increased because of disparate business internal and external process must be coordinated. To meet the time to market, competitive prices, market sharing, distribution scope and environmental and ethical organizational objectives, among others financial and strategic organizational objectives contribute to increased organizational pressures and organizational complexity (Farr & Buede, 2003).

Such process engineering and/or managerial complexity is manifested in: (1) the critical failures of enterprises information systems implementations (CIO UK, 2007; Ewusi, 1997; Standish Group, 2003), (2) the unexpected appearance of large batches of defective products that have had a proved high-quality image for decades, and (3) the increasing of system downtimes and/or low efficiency and effectiveness in critical services such: electricity, nuclear plants, health services and governmental services (Bar-Yam, 2003).

Organizations with global and large-scale operations have fostered the exchange of the best organizational practices (Arnold & Lawson, 2004). The purpose is to improve business processes and avoid critical failures in the manufacturing of products and provision of services. Best practices have been documented (via a deep redesign, analysis, discussion, evaluation, authorization, and updating of organizational activities) through models and/or standards of process by international organizations for the disciplines of systems engineering (SE), software engineering (SwE) and information systems (IS). Some models and standards come from organizations with a global scope, like the International Organization for Standardization (ISO) but others limit their influences in some countries or regions, like the US-based Software Engineering Institute (SEI). Whilst both types of organizations can differ in their geographic scopes, both keep a similar efficacy purpose: to make available a set of generic process (technical, managerial, support and enterprise) that come from the best international practices to correct and improve their organizational process, with the expected outcome being improved quality, value and cost-efficiency issues with respect to the software products and services generated.

However, because of the myriad of models and standards reported in the three disciplines, the convergence suggested for SE and SwE engineering process, models and/or standards (Boehm 2000; Hecht, 1999; ISO, 2006c; ISO, in press; Sommerville, 1998; Thayer, 1997) and the increasing complexity of the modern information systems (Mora et al, 2008), we argue that these models and standards of processes become relevant in the Information Systems discipline. Then, in this chapter we develop a conceptual description (Glass, Armes & Vessey, 2004; Mora, 2004) of the main models and standards of processes formulated in the SE, SwE and IS disciplines with the general purpose to identify aims, purposes, characteristics, and core building-block concepts. Firstly, we report