

## Chapter 10

# A Conceptual Descriptive– Comparative Study of Models and Standards of Processes in SE, SwE, and IT Disciplines Using the Theory of Systems

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### ABSTRACT

*The increasing design, manufacturing, and provision complexity of high-quality, cost-efficient and trustworthy products and services has demanded the exchange of best organizational practices in worldwide organizations. While that such a realization has been available to organizations via models and standards of processes, the myriad of them and their heavy conceptual density has obscured their comprehension and practitioners are confused in their correct organizational selection, evaluation, and deployment tasks. Thus, with the ultimate aim to improve the task understanding of such schemes by reducing its business process understanding complexity, in this article we use a conceptual systemic*

*model of a generic business organization derived from the theory of systems to describe and compare two main models (CMMI/SE/SwE, 2002; ITIL V.3, 2007) and four main standards (ISO/IEC 15288, 2002; ISO/IEC 12207, 1995; ISO/IEC 15504, 2005; ISO/IEC 20000, 2006) of processes. Description and comparison are realized through a mapping of them onto the systemic model.*

## INTRODUCTION

Competitive market pressures in worldwide business firms, because of an accelerated scientific, technological, and human-development progress<sup>1</sup> (Bar-Yam et al., 2004) have fostered the consumer' demands for better and cheaper products and services (e.g., designed with more functional capabilities and offered in more market competitive prices). Consequently, in order to design and manufacture, as well as provision and operate competitive high-quality technical, cost-efficient and trustworthy products and services, worldwide business firms are faced with the intra and inter organizational need to integrate multiple engineering and managerial systems and business processes (Sage & Cupan, 2001).

Such a demanded intra and inter business process integration, in turn, has introduced an engineering and managerial *business process performance complexity* in organizations (but experimented by technical and business managers), and an engineering and managerial *business process understanding complexity* in practitioners (experimented by technical and business managers as well as business process consultants). A *business process performance complexity* in this context is defined as the structural<sup>2</sup> and/or dynamic system's complexity (Stermann, 1999) that confronts technical and business managers to achieve the system organizational performance goals (e.g., efficiency, efficacy, and effectiveness organizational metrics). In similar mode, a *business process understanding complexity* is defined as the structural and/or dynamic system's complexity that confronts technical and business managers (and business consultants) to acquire

a holistic view of such a system under a learning focus.

Manifestations of such raising *business process performance* and *business process understanding complexities* are: (i) critical failures (by cancellations, interruptions, partial use, or early disposal) of enterprises information systems implementations (Standish Group, 2003; CIO UK, 2007); (ii) the apparition (and necessary retirement in the market) of defective products<sup>3</sup> (as tires, toys, software); and (iii) system downtimes and/or low efficiency and effectiveness in critical services such as electricity, nuclear plants, health services, and governmental services (Bar-Yam, 2003).

Consequently, some researchers have proposed the notion of complex system of systems (SoS) (Manthorpe, 1996; Carlock & Fenton, 2001; Sage & Cuppan, 2001) and others have helped to organize such a novel construct (Keating et al., 2003; Bar-Yam et al., 2004), as a conceptual tool to cope with that we call a *business process performance complexity* and a *business process understanding complexity*. Worldwide business firms, then, can be considered SoS and, as such, are comprised of a large variety of self-purposeful internal and external system components and forward and backward system interactions that generate unexpected emergent behaviors in multiple scales. Also, as SoS, the design/engineering and manufacturing/provision complexity of products/services is manifested by the variety of processes, machines/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. In turn, managerial process complexity is manifested by the disparate business internal

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