



The impact and management of cognitive gap in high performance product development organizations

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Abstract

The close alignment of applied research and development units with manufacturing operational structures can provide excellent opportunities for maintaining robust product pipelines and reducing product development cycle times. Within such an integrated organizational model (IOM), however, lies a potentially disruptive psychological mechanism that can lead to the dissolution of this delicate partnership if it is not handled properly. This mechanism is *cognitive gap*, which can take several basic forms: first, as differences between the nature and difficulty of the problem at hand and the cognitive resources of the problem solvers tasked with its solution; and second, as differences between the cognitive abilities and approaches of the problem solvers themselves. In this paper, we define and discuss cognitive gap within the context of Kirton's Adaption-Innovation theory, a useful framework for understanding problem solving (and problem solvers) in general. Specific implications (both favourable and potentially destructive) of cognitive gaps for high performance product development organizations are discussed, and suggestions for their effective management are offered.

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1. Introduction

At a fundamental level, the competitive advantage of a company can be linked to two key factors: (i) the ability to generate new intellectual property that offers superior value to customers

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(Adams et al., 1998; Carlile, 2002); and (ii) the ability to capitalize on it quickly (Romer, 2000; Fawcett and Myers, 2001). Companies utilize many different approaches to support these aims, including the integration of new technologies (e.g., CAD/CAM) and the reorganization of their product development and testing teams (Ancona and Caldwell, 1990). In addition, they search for organizational structures or *architectures* (Ancona and Caldwell, 1990; Nadler and Tushman, 1997) that will leverage their strengths and bolster their weaknesses, using the available human and physical capital to accomplish their stated missions. In this paper, we will explore one type of organizational structure – the Integrated Organizational Model (IOM) – and its paradoxical enabling and limiting qualities with respect to the generation of ideas and the subsequent implementation of those deemed best.

Within the IOM, the close integration of two organizational groups with essentially different problem solving functions – namely, applied research and development (R&D) and manufacturing – provides the diversity of knowledge, expertise, and problem solving style that enables an organization to solve complex problems successfully. However, this same diversity of ability and approach within and between the two groups of problem solvers can be limiting as well, creating challenges in communication and collaboration that may threaten their problem solving efforts. The greater such differences are, and the longer they are in effect, the more insightful is the effort needed in their management.

Our discussion will focus on the critical role of *cognitive gaps* within this collaborative problem solving process, where *cognitive gap* is defined as a psychological mechanism that can appear in two general forms (see Fig. 1): (i) as differences between the nature and difficulty of a specific problem and the cognitive resources of the problem solvers tasked with its solution (e.g., G_{1A} and G_{2A}); and (ii) as differences between the cognitive abilities and approaches of the problem solvers themselves (e.g., G_{12}). Cognitive gaps are key factors in ensuring the success (or precipitating the failure) of an integrated organization, and they must be managed wisely and well throughout the business cycle. This task is complicated and challenging, as the gaps that are necessary and potentially enabling (i.e., differences of ability and style among problem solvers) must be handled effectively in order to eliminate the gaps that limit but do not enable (i.e., differences between a problem's requirements and the cognitive resources available).

There are many possible ways to measure cognitive gaps and numerous contexts in which to consider them. In this paper, we will address the meaning and the management of cognitive gap in

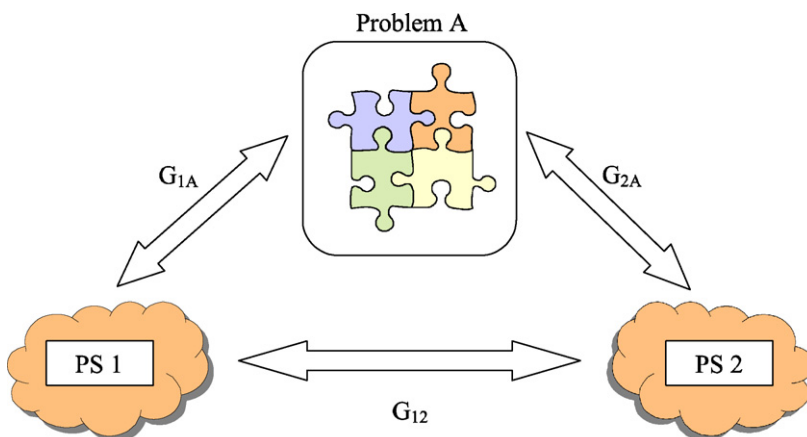


Fig. 1. Cognitive gaps: between problem and problem solver (G_{1A} and G_{2A}); between problem solvers (G_{12}).

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