



Chapter XIV

21st Century Organizations and the Basis for Achieving Optimal Cross-Functional Integration in New Product Development

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ABSTRACT

The theoretical basis for achieving optimal levels of cross-functional integration in new product development and the management of large scale engineering projects is developed in this chapter. Sources of environmental uncertainty and their effects on integration requirements are identified based on the literature. Structural modes of integration are discussed and presented in a theoretical framework based on degree of integration required, progressive combined information processing capacity, and cost.

INTRODUCTION

In any complex, new product development project or large-scale engineering project, the effective integration of diverse inputs from cross-functional groups is of critical importance to meeting schedule and budget requirements and is often critical to the success of the new product or system. In the case of incremental innovations, smaller scale projects, or larger projects where integration is not complex, the organization can utilize small, dedicated teams with lower cross-functional integration requirements. However, with larger scale projects with interdependent subsystems and coordination required across functional areas and across organizations (i.e., contractors or suppliers), the issues of integration become more crucial.

BASIS FOR INTEGRATION REQUIREMENTS

Integration requirements can be partially understood through an analysis of technological and environmental uncertainty (Thompson, 1967; Lawrence & Lorsch, 1967) or through the analysis of the information processing requirements of the new product development effort (Galbraith, 1973; Moenaert & Souder, 1990b). With greater levels of uncertainty associated with a new technology or project, greater amounts of information must be processed between decision makers during development (Moenaert & Souder, 1996). If the technology and the market are well understood, then planning will be less uncertain. However, if these are not well understood, then information must be acquired during the development effort, which may necessitate ongoing changes in priorities, schedules, resource allocations, staffing requirements, etc. Therefore, a greater amount of information must be processed among decision makers during product development (Galbraith, 1973, 1977).

Uncertainty can be conceptualized as the difference between the amount of information required to complete a task and the amount of information previously possessed by the organization (Soudier, Sherman, & Davies-Cooper, 1998). With generally increased levels of uncertainty, integration is affected because planning and decision-making are subject to ongoing modification. This increases information processing demands across the organization. This has implications for both management information systems design and organizational design.

Specific sources of uncertainty include customer uncertainty, competitive uncertainty, resource uncertainty, and technological uncertainty. Customer or consumer uncertainty refers to unrealized user requirements (Moenaert & Souder, 1990a, 1990b). Competitive uncertainty is a function of the absence of information regarding the activities of competitors (Clark, 1985; Duncan, 1972; Souder & Sherman, 1993). Technological uncertainty refers to the lack of

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