Chapter II
Success Factors and
Performance Indicators for
Enterprise Application
Integration

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ABSTRACT

The effectiveness and efficiency of information systems are closely related to the degree of integration between applications. In order to support the management of application integration, five success factors are analyzed. For each success factor, appropriate performance indicators are proposed. Since the analysis indicates that the success factors are closely interrelated, these dependencies are discussed and hypotheses are derived.

INTRODUCTION

Design and management issues of information systems architecture are discussed from a practitioner’s perspective (e.g., by Zachman, 1987) as well as from a scientific perspective (e.g., by Krcmar, 1990; Østerle, Brenner, & Hilbers, 1992). Architecture models help us to understand and communicate enterprise architecture. They also support architecture design decisions.

Recently, some approaches have integrated the design and management of IS architecture with other architectures in an enterprise (e.g., Malhotra, 1996; Martin & Robertson, 2000; McDavid, 1999; Youngs, Redmond-Pyle, Spass, & Kahan, 1999). Some of these approaches focus on technologies, while others connect IS architecture to business requirements. This chapter addresses application architecture, one specific component of IS architecture. A company’s application architecture describes applications (or application domains)...
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and their relations (or interfaces) on a conceptual level (Winter, 2003b). Application architecture is designed and managed from a business rather than technical point of view. The design and management of application architecture aim at minimizing integration costs. For achieving this goal, development-time integration costs as well as run-time integration costs have to be considered.

After this introduction, conceptual considerations on the optimal level of application integration are used to identify general success factors. A broad literature review helps to identify specific success factors for application integration. Then, for every success factor, respective performance indicators are proposed. As some of the success factors seem to be closely interrelated, their interdependencies are examined qualitatively next. Finally, this analysis results in a set of hypotheses for successful application integration that have to be validated quantitatively in further research.

APPLICATION INTEGRATION

In contrast to their technical interpretation as containers of software artifacts (e.g., modules and/or data structures), applications represent tightly interrelated aggregates of functionalities from a business perspective. While tight couplings between certain functionalities lead to their aggregation into the same application construct, loose couplings are represented by interfaces between applications. The number of application constructs depends on the definition of tight coupling. If a small number of (monolithic) applications are created in application design, only a few interfaces have to be implemented. As a consequence, costs for running and maintaining interfaces are low, while the total costs for running and maintaining applications are high due to more difficult change management and higher complexity. If many small applications are created in application design, much more interfaces are needed, which implies higher operations and maintenance costs. On the other hand, the total application development and maintenance costs are significantly lower due to less application complexity. The question is how to find an optimal balance between the number of interfaces and the number of applications in order to reduce the total costs of operations and maintenance. These comprise (a) costs for developing, maintaining, and running applications, and (b) costs for developing, maintaining, and running interfaces. Figure 1 (Winter, 2006) illustrates this trade-off. Due to network effects, we expect a nonlinear growth of the costs for applications and interfaces.

In real-life situations, the optimal degree of integration cannot be determined analytically because the costs are not constant and often cannot be assigned directly to certain applications or interfaces. Therefore, instruments are needed that control and manage the evolution of an application architecture toward an approximated optimal degree of integration. An evolutionary approach (i.e., a bundle of IS projects that improve the degree of integration successively) is needed because normally a revolutionary redesign of application architecture is not feasible due to immense costs. In order to measure the contribution of proposed projects toward the degree of integration, it is necessary to define objectives and derive performance indicators. In the next section, success factors for application integration are analyzed.

SUCCESS FACTORS FOR APPLICATION INTEGRATION

Numerous approaches to application integration can be found in the literature, many of them in the field of enterprise application integration (EAI). We analyzed not only scientific contributions, but also practitioner papers regarding the success factors mentioned. Table 1 summarizes the results. The following success factors were mentioned most often:
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