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; Österle, 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)
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 manage-
ment of application architecture aim at minimizing
integration costs. For achieving this goal, develop-
ment-time integration costs as well as run-time
integration costs have to be considered.

After this introduction, conceptual consider-
ations on the optimal level of application integra-
tion 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 in-
terdependencies are examined qualitatively next.
Finally, this analysis results in a set of hypothes-
oses 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 aggre-
gation 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 cre-
ated 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 applica-
tions, 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 applica-
tion 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 nec-
essary 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 contribu-
tions, but also practitioner papers regarding the
success factors mentioned. Table 1 summarizes
the results. The following success factors were
mentioned most often: