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July 2008

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UNDERSTANDING THE RATIONALE BEHIND TACTICAL SYSTEMS INTEGRATION PROJECT INITIATIONS AND PATTERNS IN THEIR IMPLEMENTATION APPROACHES

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Abstract

Although the importance of adopting a strategic approach for integration of various internal and external systems in an enterprise has been well advocated, several organizations have been adopting tactical approaches that focus on short-term solutions to integrate relatively a small set of systems. This paper presents the details of an exploratory study aimed at investigating the drivers of such tactical systems integration approaches; expected benefits as perceived by senior IT executives involved in those integration projects; and commonly employed implementation approaches. Data, collected from structured interviews, related to 42 systems integration projects in 12 organizations in Hong Kong was analyzed in this study. Findings from this analysis highlight three different types of implementation foci that link systems integration initiatives with anticipated benefits. These findings are expected to contribute to a better understanding of the rationale behind small-scale tactical systems integration project initiations and the associated patterns in approaches to systems integration project implementations.

Keywords: Systems integration, Project initiations, Integration drivers and benefits.

1 INTRODUCTION

Information systems integration helps in realizing capabilities and performance that cannot be realized from independent systems. Systems integration costs can be substantial both from a financial standpoint and from organizational disruptions involved in the process (Bass and Lee, 2002). Although the importance of adopting a strategic approach for enterprise systems integration has been well advocated, several organizations have been adopting tactical approaches that focus on short-term integration solutions (Lam, 2007; Gold-Bernstien and Ruh, 2004).

Enterprise application integration (EAI) addresses the integration problem as a strategic approach to establish necessary linkages among various internal and external systems in an organization. On the contrary, several systems integration efforts typically address short-term need for integration among a small group of information systems. Such tactical approaches to systems integration are commonly employed by many organizations due to the technical and organizational challenges and costs involved in enterprise-wide systems integration. It is expected that the rationale, expected benefits and implementation mechanisms differ significantly for integration projects of this nature.

This exploratory study attempts to identify specific drivers, anticipated benefits and possible implementation choices for systems integration projects based on a survey of several integration projects selected for implementation in 12 organizations. A brief review of EAI and systems integration focussing on challenges and approaches is presented in section 2. Following a description of the method in Section 3, findings from analyzing data related to 42 integration projects are detailed in Section 4. Finally, section 5 summarizes the findings of this study.

2 BACKGROUND

In many information technology (IT) departments, systems integration is an important activity and it consumes as much as 30% of IT departmental budgets. Although enterprise resource planning systems based approaches historically aimed at solving difficult systems integration problems, it was also observed that during ERP implementations most companies face serious integration problems and ERP technologies amplify the need for systems integration rather than solving it (Themistocleous et al, 2001). While smaller and newer organizations have been handling information systems integration by investing in integrated systems environments, large and established companies find systems integration a challenging and resource intensive activity due to the integration effort required for integrating their legacy systems with newly acquired systems in order to maximize reuse of existing systems (Markus ,2000).

EAI aims to achieve unrestricted sharing of data and processes among connected applications and data sources in the enterprise (Linthicum, 2000). EAI tools offer a wide range of choices for connecting application systems in various topologies such as point-to-point, hub, bus, pipeline and network (Lee et al, 2003). Integrating applications systems by establishing and maintaining traditional point-to-point links is often tedious, expensive and inflexible (Sutherland and van den Heuvel, 2002). Certain types of EAI middleware (e.g., message brokers and enterprise service bus) eliminate or minimize the need for point-to-point integrations.

Lam (2005) elaborates on the differences between EAI projects and traditional information systems development projects and identifies critical success factors for such projects. In recent years, organizations are embarking on service-oriented architectures, event-driven architectures and business process management to implement flexible EAI solutions. While SOA are best suited for real-time request-reply exchanges and composite applications, EDA support long-running asynchronous processes by disconnecting posters of events from the processors (Natis, 2003).

3 METHOD

This exploratory study attempts to identify any patterns in rationale in adopting tactical approaches to systems integration problems and associated implementation choices. For this purpose, data related to several recently completed 42 systems integration projects from 12 organizations in Hong Kong has been analyzed. These organizations belong to banking & finance, insurance, trading, and insurance sectors. While the number of employees in these organizations ranged between 150 and 10,000, the IT department sizes varied between 6 and 600. IT budgets of these companies were between 0.5% and 13% of their annual revenues. A total of 42 systems integration projects of varying sizes and complexities from these companies were analyzed in this research.

The data for this analysis has been originally collected by the students of a graduate course on systems integration as part of their coursework requirement. These students, enrolled in part-time taught masters programme at City University of Hong Kong, are IT professionals with an average working experience of about 5 years in systems development, maintenance and support activities. The term papers, prepared by these students detailing integration projects in their organization, included interview reports on the drivers for integration, expected benefits and integration approaches employed were used for this study.

Senior IT executives responsible for the integration projects were interviewed by these students, who are also working in the respective organization, as part of their coursework requirement. All the interviewers have used a structured interview questionnaire for collecting data related to integration projects. This questionnaire sought information about 3 or 4 recently completed integration projects in terms of the systems involved, integration requirements, requirement initiator, expected benefits, realized benefits and integration project implementation details. Term papers prepared and submitted

based on the data collected have been used for analysis.

4 FINDINGS

Analysis of various systems integration projects revealed that the key drivers belong to three distinct categories: technology related, data related and process related. Figure 1 depicts the key drivers identified in this study with a prefix to indicate the category of each driver.

4.1 Drivers for Systems Integration

About 40% of systems integration projects were initiated for technology related reasons such as modernization of existing IT infrastructure, enhancing IT infrastructure flexibility, and reuse of existing resources. Interestingly, the opportunity for reuse of existing resources, often cited as one of the important drivers for integration, was observed only in 5% of the cases.

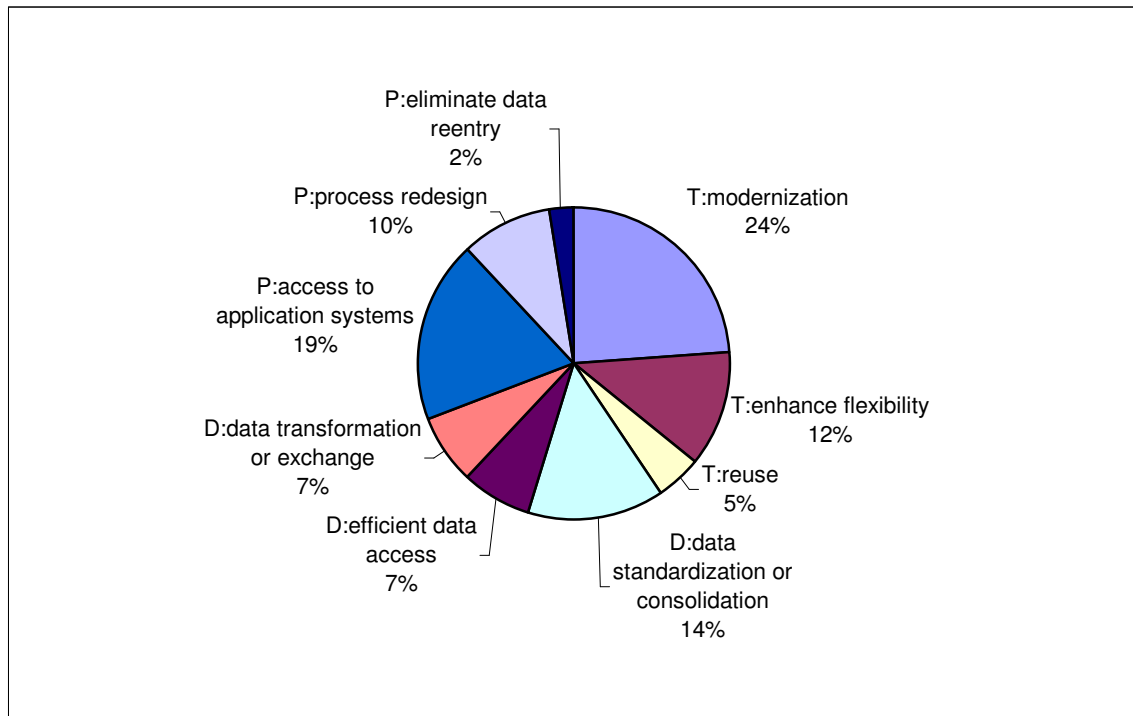


Figure 1: Key Drivers for Initiating Integration Projects

Modernization of IT infrastructure, among these drivers, captures a broad range of activities such as replacing outdated ERP systems with new systems offering both new functionality and flexibility to integrate with other existing systems, replacing numerous point-to-point interfaces with enterprise application integration platforms, and developing browser-based user interfaces to applications. Although many of these activities could also result in enhanced flexibility for integration, a number of projects (12%) were initiated solely for enhancing the IT infrastructure flexibility, agility, and ease of integration.

The main emphasis of various drivers in the process related category was on process improvement which was expected to be achieved through activities such as enabling end users to access directly to multiple applications from a single user interface, standardizing processes by eliminating or minimizing variations, and redesigning processes using functionality available in workflow automation systems.

In the data related category, drivers such as efficient access to real-time or near real-time data, data exchange between or among existing applications, and data standardization and/or consolidation were frequently observed. While some of the cases of data exchange included data transformation, most cases of data standardization and consolidation were for the purpose of providing integrated view of data that was distributed across multiple data sources.

4.2 Anticipated Benefits

While the key drivers for initiating systems integration projects were mostly related to technology, the expected benefits were found specific to both business and technology areas (Table 1).

Benefits related to process improvement were due to a wide range of possible changes such as data capture at source (e.g., customers entering their orders), shorter cycle times, reduction in number of data entry errors, streamlined processes, improved workflow due to automation, reduction in training costs due to uniformity in user interface, and extending application access to new groups of users. Enhancements in data provision were due to two distinct reasons – improved data quality and integrated data – which are expected to enhanced services and to assist in the decision making. About 30% of the projects were expected to help organizations in attaining strategic advantage due to enhanced business opportunities (e.g., new business channels), improved agility (e.g., widening the range of products/services offered, new business initiatives, keeping up with competition), and better opportunities for integrating with business partners, suppliers and customers.

Benefit		# of projects	% of projects
Business specific	Process improvement	22	52.38
	Enhanced data provision	20	47.62
	Strategic advantage	12	28.57
Technology specific	Improved IT infrastructure	24	57.14
	Operational efficiency (IT Dept)	20	47.62
	Reuse of existing resources	9	21.43

Table 1: Anticipated Benefits from Systems Integration

Technology related benefits were mostly from the perspective of IT groups providing development, deployment, maintenance and support services. Almost all the integration projects (41 out of 42 projects) were expected to contribute either to improved IT infrastructure or to IT operational efficiency or both. Improvements in the IT infrastructure were seen as consequences of standardization and modernization, and they included citations such as improved flexibility to support extensions and future developments, reduced infrastructure complexity, and reduced cost of ownership of browser based clients. Improvements in operational efficiency were results of reduced monitoring, maintenance and deployment effort, and better automation (e.g., batch job elimination or automation, report distribution). Lastly, the opportunities for reuse of existing resources (expected in about one-fifth of the projects) were often due to making use functionality in legacy systems by enabling access through application servers as Web services or components.

4.3 Implementation Focus

Most systems integration projects analyzed in this study included implementation details and analysis of these implementations resulted in identifying three major areas of focus: reuse, platform revamping, and data integration. Although these areas are overlapping to certain extent (e.g., various approach of platform revamping also contained data integration and reuse of existing functionality), the actual

description of the implementation given by interviewees was used to categorize each implementation into one of the three groups.

- a) Reuse focused approaches included implementations at different levels of complexity aimed to exploit functionality in existing application systems. Making use of existing, but unused, application program interfaces (API) in the application systems was on the side of simplest implementation mechanism. On the other extreme, approaches such as rebuilding user interfaces (e.g., web-based) to existing applications, making use of workflow automation tools to link existing functionality have been found. In the middle, there were approaches such as developing API, exposing existing functionality as Web services, and building component interfaces.
- b) Platform revamping focused approaches covered a wider spectrum of implementations such as introducing powerful integration platforms, replacing ERP systems, and upgrading existing application servers. In all these approaches, a common pattern of making use of built-in functionality in the newly introduced tools or development environments (such as adapters, Web service publishing, portal building features) was noticed for implementing multiple integrations.
- c) Data integration focused approaches were found to be relatively less complex, compared to the two above categories, and they included data export/import with data mapping (some with transformation), data consolidation (into either a data warehouse or another database), data synchronization, and access to data sources using database middleware based on Java database connectivity (JDBC) or open database connectivity (ODBC) technologies.

In depth analysis of a subset of integration projects initiated due to one of the three frequently cited initiatives was conducted to identify possible relationships among initiatives, implementation focus, and anticipated benefits. Figure 2 illustrates some of the interesting patterns identified in this analysis. These patterns combined with related implications are described below:

- All the integration projects with any of the three frequently cited initiatives were expected to result in business benefit related process improvement. In other words, independent of integration approach and IT department size, process improvement is a commonly expected benefit.
- Projects that were initiated based on the need for providing access to application systems belonged to organizations having large IT teams. Key focus of implementation for these projects was reuse. Interestingly, all these projects have an expectation of improving operational efficiency of IT teams by offloading or automating some of the processes required as part of IT support to end users.
- Projects initiated with the objective of modernization of IT infrastructure were expecting improved infrastructure as a common benefit which will result in achieving long-term objectives related to flexibility and extensibility of the implemented infrastructure.
- Many organizations with smaller IT teams have adopted various forms of data integration approaches. Most of these implementations are relatively simpler and short-term solutions satisfying immediate data provision needs.

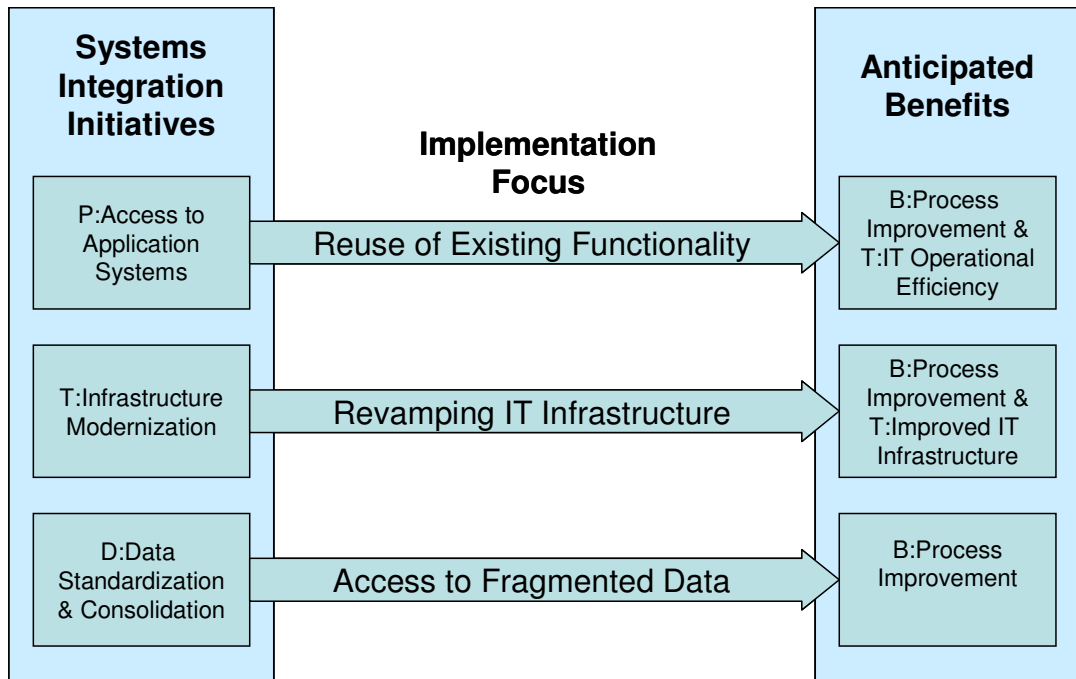


Figure 2: Relationships among Initiatives, Implementation Focus & Anticipated Benefits

5 CONCLUSIONS

Findings from an exploratory study aimed at understanding the drivers of systems integration, expected benefits, and commonly employed implementation approaches are presented in this paper. As indicated above, the main emphasis of this study is on systems integration projects that have been implemented following tactical approach rather than strategic approach to systems integration. It is interesting to note that the expected benefits are related to both business and technology aspects of organizations. Although reuse of existing resources appears to be neither an important driver nor among the major benefits expected, it was implicit in implementation approaches. These findings are expected to contribute to a better understanding of the rationale behind systems integration project initiations, and to assist IT executives in making decisions (e.g., selecting a suitable systems integration approach based on the anticipated benefits) related to systems integration project implementations.

Despite the limitation of relatively smaller sample of organization used in this study, the results indicate that the main drivers in selecting tactical systems integration projects for implementation are very much related to technology, and identify three categories of implementation focus that links systems integration initiatives with anticipated benefits. Further research in this area is required to develop concrete set of guidelines for organizations following such tactical approaches to systems integration.

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