

Association for Information Systems
AIS Electronic Library (AISeL)

AMCIS 2001 Proceedings

Americas Conference on Information Systems
(AMCIS)

December 2001

A Framework for Enterprise Resource Planning Maintenance and Upgrade Decisions

Celeste See Pui Ng

Queensland University of Technology

Follow this and additional works at: <http://aisel.aisnet.org/amcis2001>

Recommended Citation

See Pui Ng, Celeste, "A Framework for Enterprise Resource Planning Maintenance and Upgrade Decisions" (2001). *AMCIS 2001 Proceedings*. 198.

<http://aisel.aisnet.org/amcis2001/198>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 2001 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

A FRAMEWORK FOR ENTERPRISE RESOURCE PLANNING MAINTENANCE AND UPGRADE DECISIONS

Celeste See Pui Ng
Information Systems Management Research Centre
Queensland University of Technology
ngc@fit.qut.edu.au

Abstract

The objective of this paper is to identify the fundamental factors driving, and that must be considered in making ERP maintenance and upgrade decisions. This is accomplished by: reviewing the existing literature on ERP maintenance and upgrade decision-factors and synthesizing a framework based on the literature; validating the framework with the findings from a case firm with practical ERP maintenance and upgrade decision-experiences; and extending the framework as necessary.

Introduction

Over the last decade, it is observed that many large organizations are shifting from developing their Information System (IS) system to buying commercial-off-the-shelf software, i.e. the Enterprise Resource Planning (ERP) package software.

AMR Research suggests that in the past decade, approximately \$300 billion has been invested in ERP worldwide (Carlino et al. 2000a). Trade press reports indicate that there are tens of thousands of organizations using ERP and millions of licensed users (Girard 2000). Many ERP-using organizations now have several years experience of maintaining their ERP systems and are facing their first ERP upgrades. Glass and Vessey (1999) found that annual ERP maintenance costs average approximately 25% of the initial ERP investment (Glass and Vessey 1999). AMR Research suggests that ERP upgrade costs approximate a further 25-33% of the initial investment (Carlino et al. 2000b), see also (Ohlson 2000). These literatures highlight that ERP maintenance and upgrade are costly decisions to be made. However, little has been written on the ERP maintenance and upgrade decisions. The meager trade presses on ERP upgrade policies (400-Group 1998b; 400-Group 1998a; Collins 1999) provide mostly anecdotal evidence of practitioners' experiences, pitfalls to avoid, and factors to consider prior to upgrading. However, there is lack of research specifically endeavoring to develop a framework capturing and aggregating the essential decision-factors for ERP maintenance and upgrade. In order to bridge this gap, this paper critically reviews the existing ERP maintenance and upgrade decision-drivers, synthesizes a framework based on the literature, and extends the framework as necessary.

In this study, ERP maintenance decision is defined as the amount of system-user maintenance-requests and/or vendor-introduced patches to implement. Upgrade decision is related to the timing to replace an installed ERP system with a new and readily available version. Maintenance and upgrade (or simply MU) decisions will be used together because they are inextricably inter-related, as the upgrade can be postponed by continuing to maintain the existing system. The framework proposed is limited to judgement based on a cost-benefit analysis. Discussion in this paper focuses mainly on the ERP-client perspectives. The organization of this paper is as follows. In section two, background information is presented on factors influencing ERP maintenance and upgrade decisions. Section three describes the case firm studied, and data collection and analysis. In section four, findings from the case firm are discussed in lights of the fundamental factors such as: ERP maintenance, availability of new version upgrade, and benefit-realization. In the last section, conclusions and future research are provided.

Literature Review

It is argued in the trade press reports that ERP vendors drive much of the clients' ERP maintenance and upgrade activities. Vendors originate two main types of maintenance: Legal Change Packs (LCP's) to the installed version; and new versions of the ERP system for upgrades. Both LCP's and new version upgrades are supplied by the vendor and implemented by the clients in order to fix bugs, enhance existing functionality, and/or add new functionality to the installed ERP systems.

ERP systems and industry solutions are generic solutions as compared with the unique business processes and software functionality specific to the needs of particular businesses. More than often, modifications¹ are required during the implementation of the ERP system (Soh et al. 2000). The amount of modifications is dependent on the degree of fit between the ERP package and the organization's existing business processes, and the willingness of the organization to adapt its way of doing business to the package (Brehm et al. 2001). Anecdotal evidence suggests that the more modifications are done to the system at implementation time, the higher will be the billable hours or cost per maintenance job (400-Group 1998b). This is because more effort is required to conduct impact analysis to verify the effects of each LCP on the previous modifications. Sometimes, re-application and re-testing of the previous modifications are required if they have been overwritten by an LCP. On the other hand, for user-enhancement maintenance-request, it is argued that the amount of effort required depends on the types of tailoring options (e.g. configurations, modifications, etc.) (Brehm et al. 2001).

Upgrading to a new version is part of the ERP maintenance activities. In contrast to LCP-maintenance, organizations typically upgrade to a new ERP version in order to realize the benefits of substantial new functionality (Stein 1999), and new technologies or business opportunities (such as enterprise portal, and business intelligence). On the other hand, sometimes organizations feel compelled to upgrade, as the vendor withdraws support for old versions (Collins 1999). A supported version of ERP system is eligible for help desk supports, and LCP-supports. However, most of the trade presses has cited that cost is prohibitive in considering an upgrade in ERP system (Carlino et al. 2000b). Upgrade costs² consist of and are driven by the software cost, hardware cost (Jakovljevic 2000b), user training cost (Ohlson 2000), consultant fees (Wee 1999), and the upgrade implementation costs (Jakovljevic 2001).

The third driver influencing an ERP MU decision is benefit-realization from the installed ERP system. It is reported that most organizations implement and re-invest in the ERP systems because of the potential benefits that these organizations can realize from the enterprise systems. Some of the most recognized benefits from these systems are best business practices (Hammer and Champy 1996; Bingi et al. 1999), competitive position (Davenport 1998) globalization (Jakovljevic 2000a), integrated system (Markus 2000), and ongoing support from the vendor (Markus 2001). These are delivered to their clients in the forms of LCP, and new versions upgrade. While maintaining all the LCP's (or implementing upgrades) costs money to the ERP-using organizations, delaying the LCP's maintenance or postponing new version upgrades will hinder benefit-realizations from their systems. This will incur some user opportunity costs to these organizations (Nellemann 1993).

Research Method

The Case Firm -- In order to gain first-hand insights into ERP maintenance activities and upgrade issues, a case study was conducted (Yin 1994). The case firm involved is a Government Agency (GA) in Australia. GA is a corporate services provider to other Queensland Government Departments, all of whom use the SAP R/3 ERP system. GA has several years experience in managing and maintaining the SAP Financials and Human Resources modules.

Data collection and analysis -- There are three main sources of data collection: documentations such as the GA Upgrade Business Case, and SAP R/3 Upgrade Planning Resources; semi-structured interviews with the General Manager, Systems Development Manager, and Systems Operations Manager; and GA's maintenance database. There are two major steps involved in data analysis: i) reviewing the documentations and interview-transcripts, and analyzing the GA's Maintenance Database using SPSS statistical analysis software. They are used to validate the ERP MU framework synthesized from the existing literature; and ii) extending the ERP MU decision framework as necessary.

Findings

Maintenance support -- Interviews with GA's Systems Development Manager has validated that the number of modifications done to the standard ERP code is the main driver of LCP-maintenance effort. It is found that besides vendor-imposed maintenance, users of the ERP system are also major players in ERP maintenance activities. They make requests for bug fixes and enhancements to the ERP. However, these costs are borne by the client-organization. An observation from the GA is that in addressing the user-maintenance request, this organization will usually try to fulfill the request within the standard ERP code. All corrective maintenance, besides those associated with errors in the system parameters and bugs in the modified SAP code, will be reported back to SAP and the relevant LCP will then be applied. On the other hand, user-enhancements are done by setting

¹Modifications refer to the changes made to the standard ERP code.

²It includes both technical and functional upgrade.

system parameters via SAP's own interface or using user (or customer) exits³ provided by vendor. However, if this could not be achieved but the user-enhancements are important to the business requirements, custom code will be written. The preliminary data analysis using GA's maintenance database indicates that maintenance effort in user-request is depended on the types of requests (e.g. corrective, and enhancement), and object involved in the maintenance job (e.g. ABAP/4 code, system parameter, business process, and etc.).

Availability of new version upgrade -- GA is a good example of an organization that upgrades its ERP system due to the withdrawal of the vendor supports for its current version of 3.1H. In analyzing the GA's SAP Upgrade Options Paper and Business Case, it is found to consider all the cost-factors indicated in the literature in its upgrade project cost-estimations. While the previous user-enhancements that were set by system parameters, customer-objects or customer exits will not be affected by the upgrade process (similar to the LCP implementation) because they adhere to SAP's strict naming conventions, user-enhancements done by modifying SAP code will be overwritten.⁴ Depending on the new functionality in the new version, some of the overwritten modifications may need to be re-applied. Re-testing will entail after re-enter the previous modifications. Upgrade costs increase with the amount of these endeavors. Hence, there is an impact of the new functionality in the new version upgrade on the number of modifications required after the upgrade process

Benefit-realization -- Consistent with the reports from trade press, GA maintains LCP and/or upgrade to a new version of ERP mainly aimed at realizing benefits from the system. Delaying the implementations of LCP, user maintenance-requests, or new version upgrade will also cost ERP organizations user opportunity costs.

Concluding Remarks

The existing trade press reports have effectively captured the fundamental decision-factors for ERP maintenance and upgrade (MU) but generally they have overlooked some details as discussed in the findings section. Hence, the synthesized ERP MU framework has been extended. This study concludes by suggesting that in making an ERP MU decision, an organization is at best to take into account for three fundamental factors: maintenance cost; upgrade cost; and user opportunity cost.

The contribution in this study for practice is that the proposed framework can be used as a guideline for ERP managers to justify the cost and benefit of choosing the decision-alternatives; and referenced as the critical success factors (CSFs) in order to reduce the total ERP software cost. However, the proposed framework represents a simplistic model of the ERP MU decision domain. This framework may not be complete. It deals with the basic ERP MU decision-factors only. It requires further validations and testing in other ERP-using organizations from different industries. This framework also poses further questions as follows: i) to what extends and how will the user opportunity cost be evaluated in ERP MU context; and ii) how do the these ERP MU decisions be quantified.

Acknowledgement

The author would like to thank the participating Government Agency as well as reviewers for their helpful comments.

References

- 400-Group "Boston Beer Co. Minimizes Coding Changes, Foregoes to Keep SAP Running Smoothly", *I/S Analyzer*, (37: 4),1998a, pp. 13-15.
- 400-Group "Mitsubishi Electric Outlaws Internal SAP Customization Endeavors After Struggling Early", *I/S Analyzer*, (37: 4),1998b, pp. 2-6.
- Bingi, P., Sharma, M. K. and Godla, J. K. "Critical Issues Affecting an ERP Implementation", *Information Systems Management*, (16: 5),1999, pp. 7-14.
- Brehm, L., Heinzl, A. and Markus, M. L. "A Spectrum of Choices and Their Implications", in Hawaii International Conference on Systems Sciences, Hawaii, USA, 2001.
- Carlino, J., Nelson, S. and Smith, N., "AMR Research Predicts Enterprise Applications Market Will Reach \$78 Billion by 2004", AMR Research, 2000a.

³It is the SAP R/3 Enhancement Concept that allows clients to add their own functionality to SAP without modifying the standard code. There are four basic types of customer exits: menu exits, screen exits, function module exits, and keyword exits.

⁴This is usually signaled in a form of warning/error messages to inform the client-organization of these changes.

- Carlino, J., Nelson, S. and Smith, N., "AMR Research Study Reveals SAP R/3 Upgrade Cost Users 25-to 33 Percent-of Initial Investment", AMR Research, 2000b.
- Collins, K. "Strategy and Execution of ERP Upgrades", *Government Finance Review*, (15: 4),1999, pp. 43-47.
- Davenport, T. H. "Putting the Enterprise into the Enterprise System", *Harvard Business Review*, (76: 4),1998, pp. 121-131.
- Girard, K. "Back-office Rebirth", *Business 2.0*,2000.
- Glass, R. L. and Vessey, I. "Enterprise Resource Planning Systems: Can They Handle the Enhancement Changes Most Enterprises Require?", *The Software Practitioner*, (9: 5),1999, pp. 1-12.
- Hammer, M. and Champy, J. *Reengineering the Corporation : A Manifesto for Business Revolution*, Allen & Unwin, St Leonards, N.S.W., 1996.
- Jakovljevic, P. J., "The Essential ERP - It's Genesis and Future", Technology Evaluation Center, 2000a.
- Jakovljevic, P. J., "Essential ERP - Its Underpinning Technology", TechnologyEvaluation.Com, 2000b.
- Jakovljevic, P. J. "ERP Beginner's Guide In So Many Words", *TechnologyEvaluation.Com*, (2: 249),2001.
- Markus, M. L. "Enterprise Systems--The Trajectory of Business, Systems, and Technology Market Change", *Financial Times Mastering Information Management*,2000.
- Markus, M. L. "Reflections on the Systems Integration Enterprise", *Business Process Management Journal, Special Issue on ERP*,2001, pp.
- Nellemann, D. O. In *Enterprise Information Exchange: A Roadmap for Electronic Data Interchange for the Manufacturing Company*(Ed, Muglia, V. O.) Computer and Automated Systems Association of the Society of Manufacturing Engineers, Michigan, 1993, pp. 163-171.
- Ohlson, K., "Study: R/3 Users Face High Costs for Upgrades", *Computerworld*, 2000.
- Soh, C., Sia, S. K. and Tay-Yap, J. "Cultural Fits and Misfits: Is ERP A Universal Solution?", *Communications of the ACM*, (43: 4),2000, pp. 47-51.
- Stein, T. "ERP Overhaul for Lawson -- Strategic Ledger Among New Features", *Information Week*, (726),1999.
- Wee, S. "Juggling Toward ERP Success: Keep Key Factors High", *ERP News*,1999.
- Yin, R. K. *Case Study Research: Design and Methods*, Sage Publication, California, 1994.