enterprise systems

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ENTERPRISE SYSTEMS DEFINITION

The● term "enterprise system" (ES) is often used synonymously with enterprise business applications or with the ●more restricted term enterprise resource planning (ERP) systems. In this article, we base the discussion on ERP systems, though the conclusions are equally valid for other types of ESs.

Given that businesses today must anticipate, respond, and react to the growing demands of the marketplace, or perish, they must turn to their installed base of software applications to meet these challenges. But systems, some more than 60 years old, were typically designed as single purpose solutions and were not initially intended to interact with other systems as not yet conceived or built. Over time organizations found that they had dozens or hundreds of increasingly important systems that did not talk to one another. Addressing this problem of the islands of independent operability and data has been the focus of research and development for four decades. A primary focus of this research has been the creation of truly interoperable and integrated systems that share data and support cross-functional organizational needs from an initial transaction and data capture through all subsequent uses. ESs are one of the IS solutions developed to address this problem and to enable companies to enhance their performance and reach and achieve organizational goals.

The term "enterprise systems" is a collective noun referring to portfolios of computer-based systems providing front-office and back-office IS that integrate and coordinate business processes across an organization. Also known as ERP systems, they are designed to enable a company to integrate the data used throughout its entire organization and manage core functions in a standardized way, often according to "industry best practices." ESs support a process-oriented view of business operations and support/enforce standardized business processes across the enterprise, thus helping the organization to meet its information needs and to improve organizational performance. The current generation of ES has been extended to add modules like business intelligence (BI), customer relationship management (CRM), supply chain management (SCM), product lifecycle management (PLM), and business process management (BPM) that serve an entire enterprise or specific functional departments.

In this article, we adapt the ●Shang and Seddon (2002) definition of ES as "*a large-scale organizational system built around packaged enterprise system software*" further adding that an ES:

- "is a set of packaged application software modules with an integrated architecture, which can be used by organizations as their primary engine for integrating data, processes, and information technology, in real time, across internal and external value chains;
- contains deep knowledge of business practices accumulated from vendor implementations in a wide range of client organizations;
- is a generic 'semi-finished' product with tables and parameters that user organizations and their implementation partners must configure, customize, and integrate with other computer based information systems to meet their business needs."

ESs are generally acquired from software vendors and implemented by consulting firms instead of being developed in house. The market for ESs has grown to be worth more than $24.9 billion and continues to expand according to the latest report from IT research firm ●Gartner (2012). This market is dominated by just a few global brands such as SAP, Oracle, Infor, and Microsoft (cf. Table 1). There are dozens of mid-market vendors as well. As the ES market for large enterprises is near saturation, ES vendors are focusing on the small and medium-sized enterprise (SME) sector for sales growth.

ES vendors face a new kind of challenge today. New players offering software as a service (SaaS[1]) and open source solutions (Table 1) are attempting to penetrate the ES market and to be considered as real alternative to traditional players. Until 2010, the ES segment was identified as the last bastion of resistance to SaaS. Conventional wisdom has said that there are

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Table 1 Enterprise system editors.

Proprietary editors	Open source editors	SaaS editors
SAP, Oracle, Microsoft, Infor, Sage	OpenERP, Compiere, ERP5, Sugar CRM	SAP Business ByDesign, NetSuite, Salesforce.com

some areas like ERP applications where there is a real difficulty to develop a serious open source or cloud solution capable of competing with SAP and other products. Today, the emergence of ERP open source as a viable market challenger to proprietary software products is real. Moreover, many organizations are looking to shift fixed up-front capital expenses to variable operational expenses and look to "on-demand" solutions and software functionality as a service. Accordingly, we are seeing more ERP vendors providing SaaS ERP as subscription-based solutions and "pay as you go" offerings. However, with the exception of CRM from salesforce.com, the ERP SaaS market has not received as much initial acceptance as SaaS CRM has experienced so far.

Even witnessing this changing mindset over the past 2 years, resistance from large firms remains because most of ERP SaaS capabilities are unproven at a large-corporation scale. Large firms have invested millions of dollars over many years in ERP systems now acting as central nervous systems for their global IS. It is therefore not surprising that a reexamination of their ERP investments and strategies is not at the top of their IT agendas.

Today, most large- to medium-sized organizations deploy at least some parts of ESs. But, to benefit from their cross-functional integration capabilities, ES users in different departments need to overcome the barriers represented by the specific languages, ways of thinking, and within-group behaviors. Organizational member must develop a greater understanding of the work done by other units and of how to interpret and use the newly shared data and cross-functional way of work. As such, cross-functional integration may also demand a collective organizational paradigm shift to transform the thinking to a collaborative sense of responsibility. As ESs may substantially alter workflows, reporting relationships, and even the existence of various organizational functions and personnel, serious attention to nontrivial change management efforts are required of firms newly adopting or upgrading to ES. This supposes that business units at the organizational level, which have experience in operating independently become aware of the impact of their actions on the work of others, and consequently adopt a more cooperative approach toward their peers.

The Business Value of Enterprise Systems

Companies expect to gain operational and strategic value from the implementation and use of ESs. But, the potential benefits of those systems depend on the way they are used to improve the business processes. When they are well implemented, many effective benefits could be materialized – technical, operational, and strategic – from ES investments by both small and large organizations. Academic and professional publications have detailed benefits that have been acquired through ES implementation. These multidimensional business benefits range from operational improvements through decision-making enhancement (improved quality, productivity, and profitability) to support for strategic goals (increased competitiveness with integrated business processes, accelerated time to market, improved business scenario management) (cf. Table 2).

ES implementation is expensive and risky for any business. These are complex systems and implementation costs can range from tens to hundreds of millions of dollars. The potential for delays and unexpected expenses lurk around every corner. Commitment to the ERP is long term and the total cost of ownership with licensing and maintenance costs is in perpetuity. The literature includes many documented cases of ES implementations failing to deliver

Table 2 Enterprise system benefits in different dimensions ●Shang and Seddon (2002).

ES benefits	Measures	Link with business benefits
Operational benefits	Tangible with measurable figures	Direct link with end-results in operations : *cost reduction, cycle time reduction, productivity improvement, and quality improvement*
Managerial benefits	Intangible	Reflected through the use of information and consequent benefits: *better resource management, improved decision-making and planning, performance improvement in a variety of ways in all levels of the organizations*
Strategic benefits	Intangible	Direct link with business expansion and with product and marketing competition: *support business growth, support business alliance, building business innovation, building cost leadership, generating product differentiation, enabling worldwide expansion, generating, or sustaining competitiveness*
IT Infrastructure benefits	Tangible in IT cost	Indirect support for all kinds of business changes: *building business flexibility, IT cost reduction, and increase IT infrastructure capability*
Organizational benefits	Intangible in IT capability	Indirectly driving positive outcomes in various parts of the business: *changing work pattern with shifted focus, facilitating business learning and broaden employee skills, empowerment, building common visions, shifting work focus, increased employee morale, and satisfaction*

the expected improvements, and in some cases being a cause of firm bankruptcy. Such failures are often due to poor upfront planning and understanding of the challenges being undertaken in the implementation, as well as to poor project management. Thus, for an organization to reap the benefits of ERP, it must first develop a plan for success that is, in itself, a substantial task. As such, making a commitment to ES is not to be taken lightly. If this is true in large firms, it is still more challenging for SMEs which have particular characteristics. It is generally recognized that SMEs are not only different from large companies in terms of size, and in particular,

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they are not just *small versions* of large companies (●Rowe, Bidan, and Truex, 2012). Although SMEs also desire systemic interoperability and integration, they have relatively fewer specific technical competencies and deployable resources to implement ES and often turn to other solutions.

ENTERPRISE SYSTEM AND ORGANIZATIONAL FIT

ES, although improving, is relatively less expensive and pervasive in the modern organization but continues to offer significant challenges to organizations. There is a need to find a "best fit" between an ES's best practices and the values and structures, which make the firm unique and form the basis of the organization's strengths and core competencies. Probably, the most critical factor in ES failure is that the organization's business processes often do not match those modeled on the ERP. Indeed, some of the biggest ES implementation failures occur because the new software's capabilities and needs are mismatched with the organization's existing business processes and procedures.

One of the elements strongly influencing ES implementation is the linking of the ES development project with enterprise strategy. Thus, the role of management in achieving proper organizational "fit" and alignment with ES is strategic. Companies that implement ES have the opportunity to redesign their business practices and make them visible to users. The adoption of a process-oriented perspective during the implementation process is required to make process integration more visible. Past experience from the adopting firms suggests that ES enabled them to have a holistic view of their organizations that they had never previously realized. As verified by many firms, if managers decide to install an ES without first having a clear understanding of the business implications, the dream of integration can quickly turn into a nightmare.

Moreover, organizations should be willing to change the business to fit the software with minimal configuration. This technical process is largely a matter of making compromises by balancing the way the managers want to work with the way the system lets them work. In that way, ES should not be modified as much as possible. Modifications should be avoided to reduce errors and to easily Segway and take advantage of newer versions and releases●. In conjunction with configuration, a large amount of reengineering should take place iteratively to take advantage of improvements from the new system.

ENTERPRISE SYSTEM AND BI

When many organizations began the implementation of ERP systems, they did not expect to have to invest in future BI solutions to leverage their ERP investments. However, in reality, BI is taking a more important position in organizations. Thus, BI is frequently tightly coupled with the ERP systems integration upon, or shortly after, the ERP implementation.

In the ES arena, the convergence of ERP and BI systems is considered crucial. ERP systems are identified as "transactional systems" dealing with information for everyday operations, but not for management decisions, performance improvements, and business analytics that give the company an edge. Indeed, while ES offers enterprise-wide data integration and promises quantum improvements in performance by transforming business processes, BI describes a set of concepts and methods to support and improve managerial decision-making by using fact-based support systems useable by all levels of management. BI systems promise to deliver quantum gains by transforming organizational decision-making processes.

Today, BI● tools and offers have reached a level of maturity, which can elevate executives from the depth of the details, bringing them to a higher operating level where they can add strategic value to the organization. Many solutions exist in the market (SAP Business Objects, Oracle Hyperion, SAS, IBM Cognos, and MicroStrategy). If a company opts for getting BI from its ERP vendor, it can avoid the time-consuming and expensive data prep ●work of integrating BI with ERP. So, when evaluating BI options, one of the first considerations should be whether a company's ERP vendor can fill the need for BI. If unable to, the likeliest alternative is a niche or "best of breed" BI vendor.

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ENTERPRISE SYSTEM COMPETENCY CENTER

By investing in ES, companies want to rely on integrated and high-quality systems as well as on a current and context-rich organizational competency. But, year after year, ES is reaching more and more constituents inside and outside organizations. Information demands, data volumes, and audience populations are growing and will continue to grow exponentially. Once ERP and BI systems have been implemented, unless proper organizational governance and technical support structures are in place, firms may only see limited benefits from these systems. How can companies consistently drive value from their ES? To overcome common issues and provide enduring value, more and more companies are forming a "competency center (CC)."

A CC is a team of people that, in its most fully realized form, is responsible for managing all aspects of an organization's ES strategy, projects, and systems. This includes developing an ES strategy, implementing ES tools and applications, and then training and supporting the business users who rely on them. It is the CC's responsibility to oversee back-end data management tasks such as process and data integration, process and data governance, and the issues of data quality.

The primary objective of the CC is to ensure that ESs are successfully integrated into the firm to guarantee smooth running and follow-up over time (configuration, maintenance, upgrading, data migration, etc.). A feature of this evolution has been increased focus on BI and its integration with ERP and other ES. Another core value the CC brings is the continuous adaptation of ES to changes in the organization, thereby assuring that the evolution of business systems matches the evolution of the firm. Establishing a CC is a key strategy to fostering enterprise-wide deployments, helping organizations transform their process, structure, and data into business value for company-wide competitive advantage.

An effective CC helps establish best practices for ES integration by bringing together people from various divisions including IT and business operations, capitalizing on various backgrounds and areas of expertise. The goal is to bring the most highly-skilled workers who specialize in all of these systems into a single group or "competency center" to share skills and knowledge as well as tips and tricks, create a common language and data dictionary, and determine standards for programming, reporting, and analysis.

The positioning and organization of the CC are decisive as to its ability to energize the ES and ensure consistency. The CC can be a business unit with a dedicated team, a division of an existing business unit, or a "virtual competency center" made up of people from departments in different corporate units and/or companies. Based on a study among 23 firms having set up a structured CC, ●Sarfati (2004) shows that half (50%) of those having adopted SAP have a centralized CC attached to the CIO●. In the other half, we note a structure where responsibility is split between the CIO and core business (37%), whereas in only 13% are the CC attached exclusively to core business.

Centralizing a firm's know-how around a duality of professional and technical expertise forms a pool of technical and functional skills. It, therefore, fosters the collective capitalization of knowledge and global expertise around ERP, making it possible to extract best practices and reusable know-how. In this case, the CC plays a key role in keeping experts in a firm and in increasing their functional and technical skills, which significantly reduces the need of external consultants. We also know that, in an ES environment, management of IS integration is strategic for guaranteeing a stable organization. Developments may result from a professional request, regulatory changes, or technological progress. To support these developments alongside transformations in the firm, the CC acts in this regard as an advisor to the core departments, and particularly decides on the different requests for specific developments that could considerably hamper assimilation of the ERP by users. It, thus, becomes the main contact point for the different partners of IS projects. The CC is able to ensure that the changes take place smoothly, thereby significantly reducing friction and resistance within the organization. In the long term, the ability to make use of both functional and technical skills for analysis and implementation develops a stabilizing "memory" effect for the organization.

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ENDNOTES

[1] Gartner defines SaaS as "software that is owned, delivered and managed remotely by one or more providers. If the vendor requires user organizations to install software on-premises using their infrastructures, then the application isn't SaaS. SaaS delivery requires a vendor to provide remote, outsourced access to the application, as well as maintenance and upgrade services for it. The infrastructure and IT operations supporting the applications must also be outsourced to the vendor or another provider. The provider delivers an application based on a single set of common code and data definitions, which are consumed in a one-to-many model by all contracted customers at any time. Customers may be able to extend the data model by using configuration tools supplied by the provider, but without altering the source code."

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Q8.   Can we modify "BI tools and offers" as "offers of BI and tools"?

Q9.   Can the word "prep" be replaced with "preparation"?

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