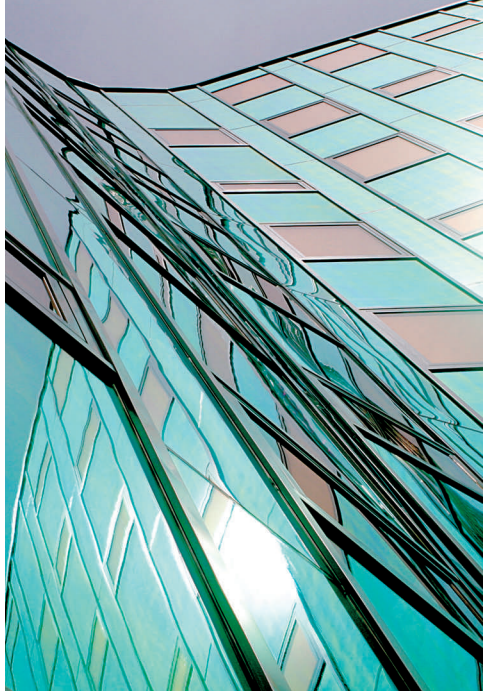

Client organizations that choose to outsource their IT services must change the focus of their enterprise architecture from operational, technical, and other IT-system lifecycle-management activites to business management, with particular focus on contract administration and supporting competencies.

Neil Hamlett

IT Outsourcing Impacts on Enterprise Architecture

IT outsourcing, because of the breadth of its impact on client organizations, should only be undertaken after thorough planning. Nonetheless, the trend toward IT outsourcing is difficult to ignore. The Gartner Group estimates that the global IT services industry, valued at $624 billion in 2005, will grow 5.5 percent annually from 2006 to 2010 (R. De Sousa et al, "Forecast: IT Services, Worldwide, 2006-2010 (Update)," Gartner Research Report ID no. G00141806, Nov. 2005). Some business theorists assert that the broader practice of business-process outsourcing is an inevitable consequence of the maturation of economies and industries (T.H. Davenport, "The Coming Commoditization of Business Process," *Harvard Business Rev.*, June 2005, pp. 100-108; C.M. Christensen, E.A. Roth, and S.D. Anthony, *Seeing What's Next: Using Theories of Innovation to Predict Industry Change*, Harvard Business School Press, 2004). Enterprises outsource IT for many reasons, such as reducing costs, shedding of overhead functions that divert management attention away from the core business, and obtaining services from industry leaders specializing in the associated competencies (S. Balaji and S.A. Brown, "Strategic IS Sourcing and Dynamic Capabilities: Bridging the Gap," *Proc. 38th Ann. Hawaii Int'l Conf. System Sciences*, IEEE CS Press, 2005, p. 260.2).

In 2003, Gartner also cautioned that "half of IT-outsourcing projects will fail because they have not delivered their expected value. Poor communication between client and vendor, the lack of a plan to manage the relationship between these, and the constant change in business plans and technology are cited as the main causes of customer dissatisfaction" (J. Lui, "Advice to Outsourcers: It's Good to Talk," *CNET News*, 31 Mar. 2003, http://news.com.com/2100-1011-994771.html).

Organizations manage IT and its complex interactions with other organizational components using enterprise architecture. EA consists of "the main components of the organization, its information systems, the ways in which these components work together in order to achieve business objectives, and the way in which information systems support the business processes of the organization" (S.H. Kaisler, F. Armour, and M. Valivullah, "Enterprise Architecting: Critical Problems," *Proc. 38th Ann. Hawaii Int'l Conf. System Sciences*, IEEE CS Press, 2005, p. 224b). EA differs from technical architecture. In addition to technology, EA spans such domains as staff, business-process, financial, and other resources. It provides a powerful toolset for optimally aligning activities and equities from all of an organization's management domains.

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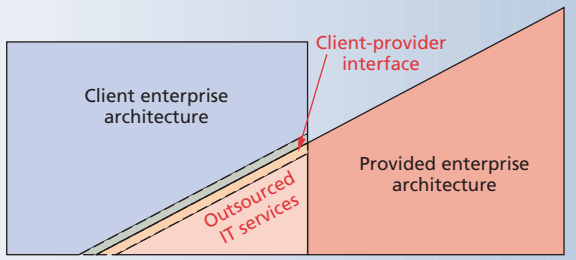
IT outsourcing profoundly impacts the client organization's EA. In an outsourcing scenario, IT services—a key component of the client's EA—come from an external service provider. Moreover, the client and vendor interact through an interorganizational interface containing operational, technical, and business components (M. Li and Z. Peng, "Interface Management in Enterprises," *Proc. Int'l Conf. Services Systems and Services Management*, IEEE Press, 2005, pp. 344-346), as Figure 1 illustrates. This interface involves two major modes of interaction: delivery of the IT services and the service- management framework. The interface describes all of the processes, procedures, and protocols that the client and provider use to interact. Because EAs are unique to organizations, designing this interface might involve customization. For a large, complex client enterprise, bringing the business, operational, and technical components of the interface into alignment is often a nontrivial challenge.

Figure 1. The interface between client and service-provider enterprise architectures resulting from IT-outsourcing management.



IT AND THE ENTERPRISE

At a high level, four primary factors drive the client–provider relationship in an IT-outsourcing scenario:

- IT's impact on enterprises is as varied as the enterprises themselves.
- Different enterprises use different governance frameworks.
- Enterprises differ in their rationale for outsourcing.
- IT service contracts largely define the interface between the client and service-provider organizations.

IT's strategic impact

Two strategic issues characterize IT's impact on an organization's EA (R. Nolan and F.W. McFarlan, "Information Technology and the Board of Directors" *Harvard Business Rev.*, Oct. 2005, pp. 96-106). First, operational reliability involves the extent to which service interruptions immediately impact critical business. Second, technology-based innovation pertains to the degree in which IT enables competitive differentiation in the marketplace. Based on the relative importance of operational reliability and technology-based innovation to their missions, enterprises can be characterized as operating in one of four strategic modes.

Support-mode enterprises assign importance neither to operational reliability nor to technology-based innovation. *Factory-mode* enterprises, in contrast, require operational reliability, but not technology-based innovation. IT doesn't substantially contribute to competitive advantage for organizations in either of these modes. Hence, IT services are likely to be commodities, such as Internet, Web-hosting, and office-automation services. In support-mode enterprises, interruptions of moderate duration won't negatively impact the business. For factory-mode organizations, however, IT service interruptions immediately affect the core mission (by losing business, for example).

Enterprises operating in the *turnaround mode* place a premium on technology-based innovation, but can compromise on operational reliability. As the title suggests, turnaround-mode organizations are operating in a temporary condition in which they aggressively attempt to alter their competitive position in their markets. Finally, *strategic-mode* enterprises require both operational reliability and technology-based innovation. Technology is likely to be central to their core missions, and they occur in industries with short-lived, first-mover advantages, often because of a rapid pace of technological change (F. Suarez Gianvito Lanzolla, "The Half-Truth of First-Mover Advantage," *Harvard Business Rev.*, Apr. 2005, pp. 121-127.).

IT governance models

Governance is an essential component of EA. Researchers have identified four approaches to IT governance, ranging from highly centralized to highly decentralized (P. Weill and J. Ross, "A Matrixed Approach to Designing IT Governance," *MIT-Sloan Management Rev.*, Winter 2005, pp. 26-34):

- A *monarchy* exists when senior executives, or their agents, make most or all of the key IT-related decisions for the enterprise.
- In a *federal system*, executives and business-unit representatives make IT decisions jointly.
- In a *feudal system*, business units can make decisions that optimally suit their own objectives.
- Finally, *anarchy* occurs when each individual user or small group of users operates independently.

In that any of these modes might be optimum for a given organization, their titles are descriptive and not pejorative.

Governance provides the framework for making key decisions about distinct components of IT:

- The IT *architecture* is distinct from IT principles.
- IT *principles* include enterprise-level policies about the strategic use of IT in the business. The IT architecture defines how the enterprise will integrate technology, operations, and human resources to achieve strategic objectives.
- The IT *infrastructure* consists of common systems and services that are shared throughout the enterprise, or within distinct business units or geographic regions.
- *Business applications* are IT subsystems encapsulating processes and procedures that are usually specialized to specific business units or management domains.
- IT *capital planning* pertains to deciding how much and where to invest in IT across the enterprise.

The client-provider interface becomes a critical EA component when IT is outsourced.

In constructing a framework for IT governance, you could use hybrid approaches in which different IT components are subject to distinct governance modes. For example, economy of scale might drive a large enterprise to centrally manage its IT infrastructure through a monarchic or federal approach. The same enterprise might use a feudal approach to manage business applications. In general, the most effective governance framework will result from a skillful tradeoff between commonality and standardization on one hand, and flexibility for lower-level business units on the other.

Strategic IT outsourcing objectives

In addition to the IT components I've identified, governance must also address sourcing—that is, whether to produce a capability internally or obtain it from an external market. Anthony DiRomualdo and Vijay Gurbaxani describe three strategic rationale for obtaining IT services from external sources (DiRomualdo and Gurbaxani, "Strategic Intent for IT Outsourcing," *MIT Sloan Management Rev.*, Summer 1998, pp. 67-79).

First is the improvement of IT services. A vendor specializing in IT services tends to possess a superior ability to assemble a critical mass of talent and to realize economies of scale. Such services often yield higher value than those produced internally. Most services obtained under this rationale are basic commodities.

The second rationale seeks to improve IT's contribution to enterprise performance within existing business lines. The scope of the outsourcing includes, for example, process management assistance focused on achieving clearly quantified business effects. Examples include improving alignment of IT with the enterprise or the performance of IT-intensive business processes. This rationale might drive an outsourcing decision for a turnaround-mode or strategic-mode enterprise. In these cases, the client-vendor relationship might begin to resemble a business-process outsourcing instance.

Finally, commercial exploitation of IT-based capabilities can lead to new business lines. An outsourcing scenario might occur when an enterprise has developed a unique capability but lacks the IT capacity or capability to deliver it to an external customer base. For example, American Airlines' commercialization of a business-management capability led to the Sabre airline-reservation system. To deploy Sabre, the airline contracted with Electronic Data Systems. In such scenarios, the vendor–client relationship might more closely resemble a strategic business alliance than a buyer–seller arrangement.

IT outsourcing contracts

This article's central premise is that the client-provider interface becomes a critical EA component when IT is outsourced. The contract between the client and the service provider is the legal mechanism that largely defines this interface. Obviously, the parties should carefully consider the factors I've described when designing the contract. Additional key factors include the services' market conformity, the framework for transitioning to another supplier, and the contract's incompleteness (E. Beulen and P. Ribbers, "IT Outsourcing Contracts: Practical Implications of Incomplete Contract Theory," *Proc. 36th Ann. Hawaii Int'l Conf. System Sciences*, IEEE CS Press, 2003).

IT services' market conformity pertains to the degree to which their price, technological currency, and other characteristics are consistent with the prevailing market conditions. When cost is the most important consideration, conformity through contract provisions for periodic pricing adjustments or incentive plans can keep costs low. Technological conformity—achieved by avoiding proprietary solutions, obsolescence, and premature adoption of emerging technologies—shifts the balance of power toward the client enterprise when transitioning to a new supplier.

Changing providers is another essential aspect of an outsourcing contract. Essentially all contracts have finite duration. Moreover, client firms might terminate an outsourcing arrangement for a variety of reasons. Consequently, the contract should focus substantial attention on the framework for transitioning the service to another provider.

In EA terms, changing IT service providers entails replacing one component with another that is functionally similar, but not necessarily identical. Extricating the old component and installing the new occur most smoothly when the functions and interface characteristics of both are well documented and clearly understood. The role of the

provider's intellectual property deserves particular attention. Additionally, defining procedures in advance avoids risks arising from real-time improvisation when dismantling a client–provider relationship. Obviously, skillful client EA management is indispensable.

Contract incompleteness pertains to the extent to which the contract "fails to specify performance obligations for the parties in all states of nature, or fails to specify the nature of the performance itself" (B. Aubert et al., "Characteristics of IT-Outsourcing Contracts," *Proc. 36th Ann. Hawaii Int'l Conf. System Sciences*, IEEE CS Press, 2003). In the broadest sense, a complete contract comprehensively and unambiguously defines the interface between the client and vendor organizations. This interface is ideally constructed from clearly documented, well-understood EAs for both organizations. Fixed-price payment schemes and precise service-level agreements are examples of provisions leading to complete contracts.

For a specific outsourcing scenario, selecting the optimum degree of contract completeness isn't a straightforward decision.

For a specific outsourcing scenario, selecting the optimum degree of contract completeness isn't a straightforward decision. A relatively complete contract requires more skill to design and negotiate, but less skill and cost to administer. On the other hand, it exposes both the client and provider enterprises to risk. For example, failure to deliver services within planned costs can jeopardize a supplier's profitability. If the client's requirements change or aren't fully encapsulated in the contract, subsequent renegotiation—in which the balance of power favors the supplier—might become necessary.

DESCRIBING EA

The Department of Defense Architecture Framework (DoDAF), a system for constructing and documenting EA, is based on three general view types (*DoDAF*, vol. 2, Feb. 2004, http://www.dod.mil/cio-nii/docs/DoDAF_v1_Volume_II.pdf). Various *operational views* represent distinct aspects of business and operational processes, including activities, information flows, operational nodes and their connectivity, organizational relationships, and sequences of events. In other words, operational views show a business or operational framework's who, what, where, when, and why. *System views* represent the how by describing the material and technology components of the frameworks depicted by the operational views. Finally, *technical standards views* contain technical details of key component interfaces.

AN OUTSOURCING CASE STUDY

To demonstrate the theoretical framework, I apply it to a specific IT outsourcing case study, the Navy Marine Corps intranet (NMCI).

Outsourcing case analysis

The NMCI provides enterprise IT services for the US Department of the Navy (DoN) at shore activities within the continental US and at selected overseas locations. In October 2001, the DoN awarded a multiyear contract to a single provider, Electronic Data Systems. Its planned scale included as many as 400,000 desktops and 800,000 users at thousands of locations. The contract period of performance included seven base years with a three-year option. The NMCI provides the DoN with a turn-key solution in which the service provider owns and operates the network. Additionally, The NMCI must comply with stringent security requirements mandated by Department of Defense and DoN policies (*Information Assurance (IA) Implementation*, DoD Instruction 8500.2, Feb. 2003, http://www.dtic.mil/whs/directives/corres/pdf/i85002_020603/i85002p.pdf).

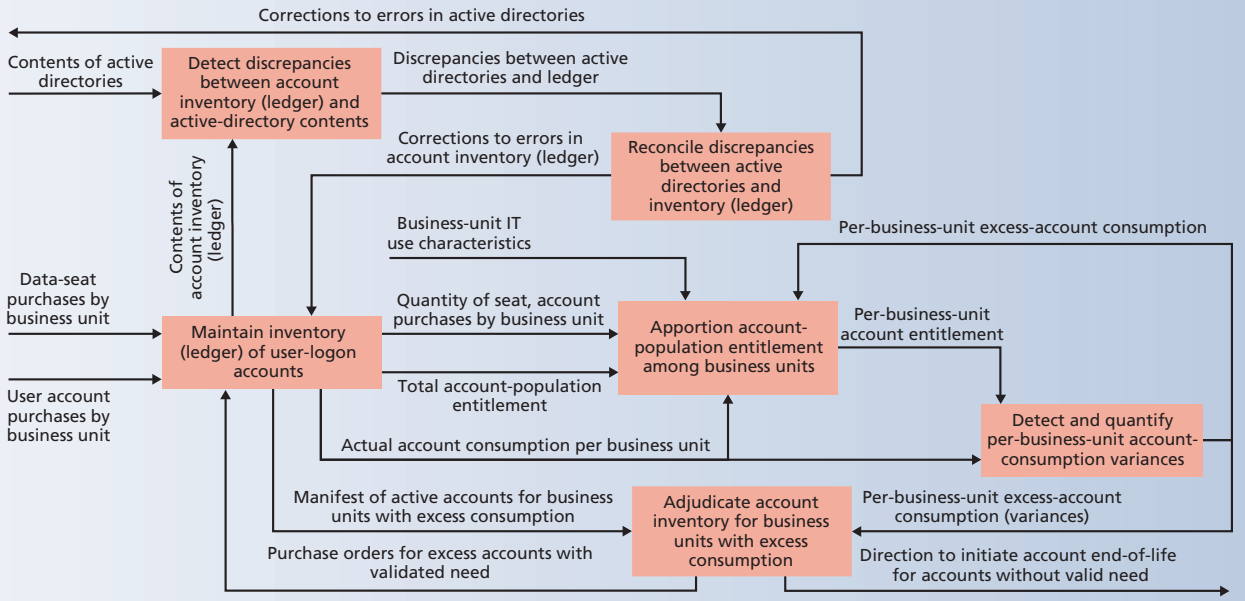
IT services provided by the NMCI are largely factory mode, but the infrastructure also hosts several strategic-mode business applications. Its scope contains commodity infrastructural services including, but not limited to, client desktops (data seats), user-account services, data-storage services, and application hosting.

DoN governance is a hybrid of monarchic, federated, and feudal modes. IT principles, particularly those related to security, are largely the product of a monarchic framework. the NMCI's deployment caused the IT infrastructure and key aspects of IT architecture to transition from a feudal to a monarchic mode. IT capital planning is the product of a federal mode, in which subsidiary business units submit requirements to a central authority for validation and prioritization. Financial-expenditure authority is, in turn, delegated back to the business units. Service consumption, including purchasing quantities and types of NMCI services, is mostly regulated via a feudal mode. At the time of this writing, lifecycle management of business applications is transitioning from a feudal to a federal governance framework. Many such applications are hosted on the NMCI infrastructure.

Improving multiple characteristics of IT service was the DoN's primary motivation for embarking on the NMCI. Visibility into and control of IT costs are key objectives. Improving enterprise-wide, service-level consistency and interoperability is also important. Additionally, achieving a uniform, high level of compliance with DoD security policies is essential.

In pursuit of these goals, the DoN intended the NMCI contract to prescribe services with a relatively high level of completeness. The most frequently purchased services are orderable on a fixed-price-per-instance basis. Service-

Figure 2. Operational activities diagram for user account inventory-management framework.



level agreements specify key service characteristics. However, the contract was relatively incomplete in addressing the service-management framework and life-cycle management of the provider-owned network. The primary rationale for this approach was to give the service provider the flexibility to apply best industry practices. The NMCI implemented distinct incentive schemes to motivate the service provider to address specific client objectives such as security and end-user satisfaction.

Client-provider interface

For the NMCI, distinct components of the client-provider interface are easy to identify. When NMCI users operate their data seats or seek assistance from the help desk, they're using the provider's infrastructure or interacting with the provider's staff. Additionally, naval network operators can, within the contract's scope, issue operational direction to the provider's network-operations centers. DoN operational authorities also assert some technical authority in validating provider solutions' compliance with security policies. Finally, business units order, take delivery of, and terminate NMCI services through a jointly developed service-management framework.

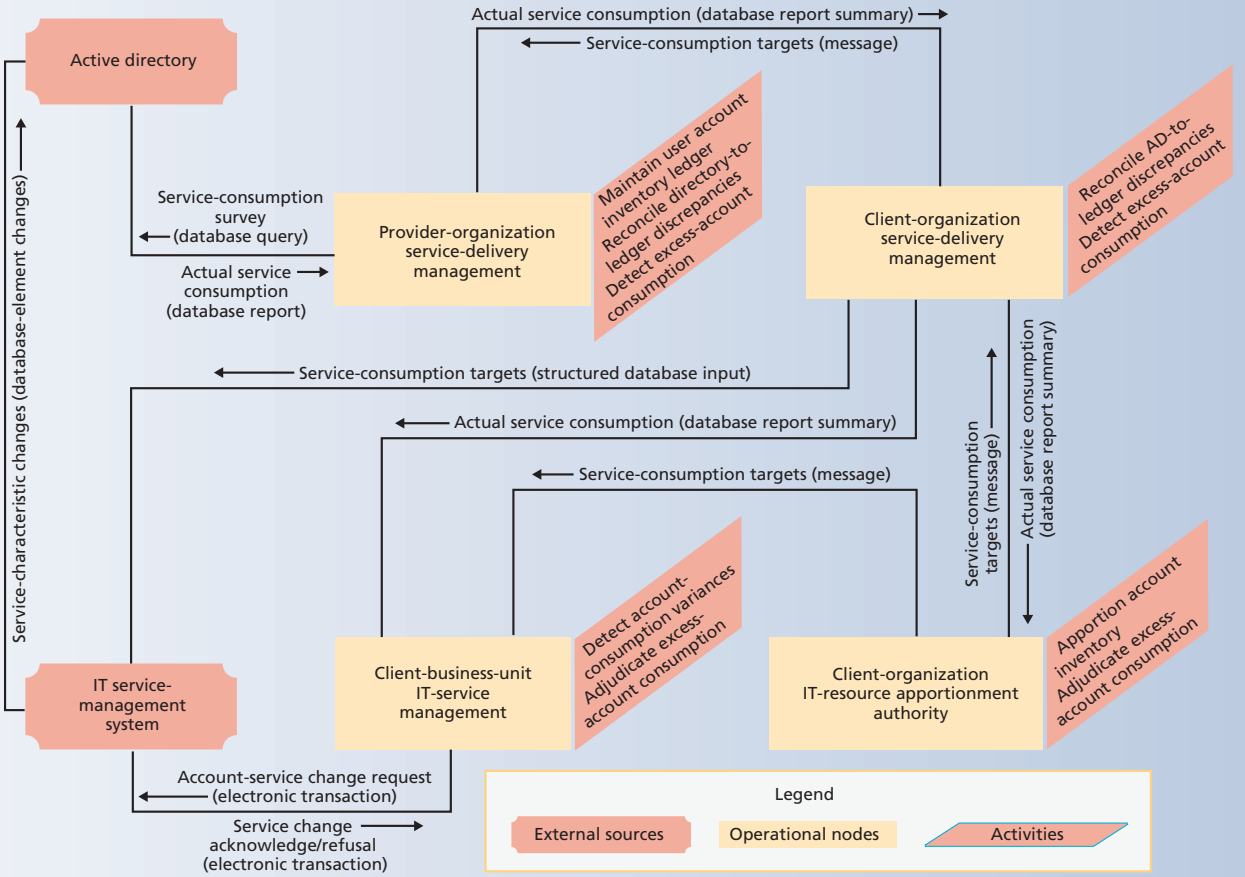
Because of its relative complexity, user account management represents a particularly interesting interface-component example. A federal framework manages distribution of the finite population of accounts to which the client organization is entitled. Network security, cost control, and cost transparency are essential business objectives. Monitoring service quantities consumed by each business unit provides visibility into the distribution of IT consumption across the enterprise. Cost control includes ensuring that the service consumption doesn't exceed purchased quantities and obtaining the best value from service quantities purchased.

Figure 2 shows an operational activities diagram for a user account inventory-management framework. One of several DoDAF operational views, this diagram depicts management activities and the information flows coupling them together. In other words, it represents the what of the business framework.

It's worth noting that the diagram in Figure 2 doesn't describe technical solutions. The figure references external system components, such as the active directory. It strongly suggests a data architecture, the details of which are articulated in system views and technical standards views. It also refers to an account ledger, which is a business application. In addition, the framework contains a mixture of activities. Some activities, such as quantifying service consumption and detecting discrepancies and variances, appear to be good candidates for automation using a database system. Others—such as distributing capacity, validating inventories, and correcting data discrepancies—are more likely to be knowledge work performed by human beings. In short, the operational activities diagram says little about the instantiation of the functions it describes. A well-constructed diagram, however, speaks volumes about the ultimate solution's architecture.

I derived Figure 3, a node-and-connectivity description, by aggregating the activities from Figure 2 into virtual

Figure 3. Operational-node connectivity description for user account inventory-management framework.



nodes. Additionally, I associated each of the information flows in Figure 2 with one or more need lines representing the information exchanges between the nodes. The connectivity description represents the operational framework's where. Its virtual nodes might not coincide with physical locations.

Finally, Figure 3 leads to other operational views not presented here. An information-exchange matrix documents essential characteristics (format, volume, latency, periodicity, and so on) for information on each of the need lines in Figure 3. Additionally, Figure 3 suggests an organizational relationship diagram, which associates activities and their virtual locations with organizational entities. Finally, a sequence-and-timing description depicts the activities' timing.

This example illustrates the preliminary steps in designing a management framework component, tailored to a specific enterprise's governance structure and business objectives. The operational views collectively represent the business operations architecture of one service-management component of the client–vendor interface.

Conscientious application of EA yields two important benefits:

- It forces the various enterprise equities—including business and technical, client and provider, governance and execution—into alignment.
- The resultant operational architecture provides a solid point of departure for constructing the technical architecture and deriving specifications for enabling business systems.

IT outsourcing fundamentally entails replacing an internally produced EA component with one provided by an external source. The outsourced functions and services remain EA components irrespective of their source. If internally provided IT functions and services aren't well aligned with the rest of the enterprise, out-

sourcing is unlikely to improve things, unless the contract explicitly addresses such issues. In the end, an outsourcing organization's success in controlling its IT destiny is likely to be highly correlated with the effectiveness of its EA management.

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