

7-11-2013

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EXPLORING THE WORLD'S LARGEST ERP IMPLEMENTATION: THE ROLE OF ERP IN STRATEGIC ALIGNMENT

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As one of the largest and most complex organizations in the world, the Department of Defense (DoD) faces many challenges in solving its well-documented financial and related business operations and system problems. The DoD is in the process of implementing modern multifunction enterprise resource planning (ERP) systems to replace many of its outdated legacy systems. This paper explores the ERP implementations of the DoD and seeks to determine the impact of the ERP implementations on the alignment of the DoD's business and IT strategy. A brief overview of the alignment literature and background on ERP are followed by case study analysis of the DoD ERP development and current implementation status. Lastly, the paper explores the current successes and failures of the ERP implementation and the impact on the DoD's goal of strategic alignment.

KEYWORDS

Enterprise Systems, ERP Implementation, Strategic alignment, Change management, Department of Defense

INTRODUCTION

The Department of Defense (DoD) is one of the largest and most complex organizations in the world. It faces many challenges in solving its well-documented financial and related business operations and system problems. The DoD is currently in the process of implementing modern multifunction enterprise resource planning (ERP) systems to replace many of its legacy systems. The principle driver for this effort is the Congressional requirement that the DoD have auditable financial statements by fiscal year 2017. The DoD has never had financially auditable statements.

In addition the auditability objective, the other expressed goals of the DoD ERP effort are to 1) reengineer its business and system processes resulting in, 2) better alignment between its Business and IT strategies. In order to research what the DoD is doing related these goals, we must first understand what is meant by strategic alignment and also what an ERP is and is not.

IT AND BUSINESS STRATEGIC ALIGNMENT

The Strategic Alignment Model (SAM) of Henderson and Venkatraman [25] continues to be widely used as the basis of Business/IT Alignment theories. The model is shown in figure 1 though the details of the model will not be explained here. See Papp 2001 [50] for a clear and comprehensive explanation of the model. The key message of this model, as well as that of many other studies, is that to become a successful company, one should make sure that the IT strategy is fully aligned with business strategy.

SAM and other alignment models continue to be developed and updated because traditional methods of developing business strategies have failed to take full advantage of technology. In the past, information technology (IT) was typically treated as a "cost center" or viewed as an "expense" rather than an enabler of business value. Strategic information systems shed new light on technology and its role in the development of business strategies. In today's increasingly "flat world" [17], it is no longer economically feasible to treat IT as a lower level support tool; failure to leverage IT may seriously hamper the firm's performance and viability in today's global, information-intensive

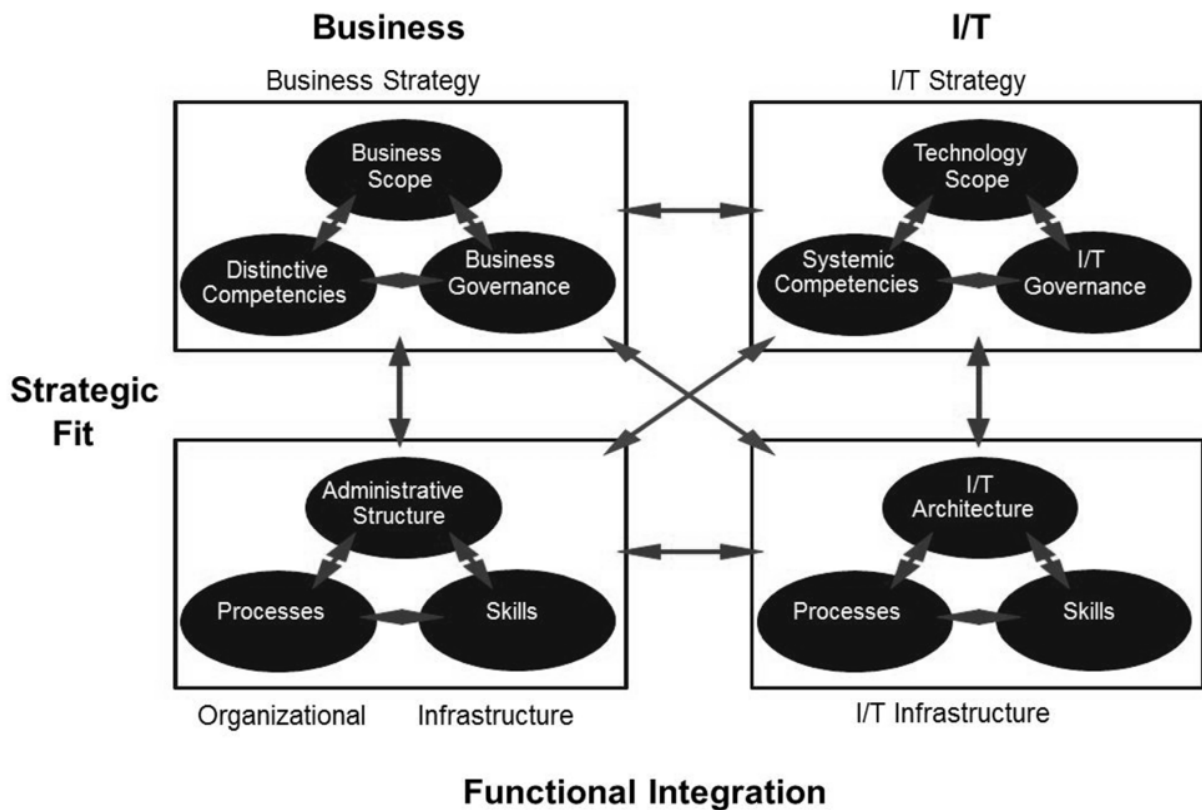


Figure 1. Strategic Alignment Model [25]

world. Alternatively, by understanding and leveraging the Business/IT partnership, organizations can concentrate on the application of IT to enable the business strategy [40, 48]. This harmony can be extended and applied throughout the organization as new opportunities are identified.

Over the past several decades, extremely large sums of money have been invested in information systems and technology. Nevertheless, organizations seem to find it difficult or impossible to harness the power of information technology for their own long-term benefit, even though there is worldwide evidence [12, 13, 42, 53, 34] that IT has the power to transform whole industries and markets. Strategic alignment, a method of applying IT in an appropriate and timely way, in harmony with business strategies, remains a key concern of business executives [34, 22, 23, 12, 13, 39, 37, 18, 36]. In fact, alignment's importance has been well known and documented for more than 30 years [43, 27, 44, 4, 89, 46, 12, 13]. This classification has continued as indicated via its persistent top ranking in the business press by executives. Alignment seems to grow in importance as companies strive to link technology and business in light of dynamic business strategies and continuously evolving technologies [48]. Importance aside, what is not clear is how to achieve this harmony between business and IT, and what the impact of misalignment might be on the firm [48]. The ability to achieve and maintain this synergistic relationship is anything but easy. For years, firms have been channeling billions of dollars into technology in an attempt to successfully incorporate technology into their processes and long-term plans. Many of these efforts have failed despite overwhelming evidence of IT's ability to transform both individual firms and entire industries.

The alignment of information technology (IT) and business strategy to leverage the capabilities of IT and to transform the business has increased in importance as firms strive for competitive advantage in a diverse and changing marketplace [15, 1, 5]. In light of this, there has been a great deal of research and insight into the linkages between Business and IT [6, 37, 13, 24], the role of partnerships between IT and business management [31, 29], as well as the need to understand the transformation of business strategies resulting from the competitive use of IT [3]. Firms have been able to change not only their business scope, but also their infrastructure as a result of innovation regarding IT [30, 16].

Simply put, aligning information technology with business strategy and plans means that a positive relationship between information technologies and the organization's accepted financial measures of performance exists [55]. In order to achieve alignment, an organization must first identify the sources of misalignment. Then, with the assistance of models discussed earlier in this paper, progress can be made toward a cohesive and consistent alignment of IT/IS strategy and the business strategy.

ENTERPRISE RESOURCE PLANNING SYSTEMS

An Enterprise Resource Planning (ERP) system is software designed to model and automate many of the basic processes of a company, from finance to the shop floor, with the goal of integrating information across the company and eliminating complex, expensive links between computer systems that were never meant to talk to each other [33, 14]. These systems offer online real-time information, which reduces processing time and frees managers and analysts from taking time to gather decision-making information.

ERP systems are becoming ubiquitous in the corporate world. They also continue to penetrate the small- and medium-sized company as firms like SAP and Oracle go after these large markets. Although the benefits of these systems are many, businesses today seem to be moving toward this technology primarily because the systems are considered to be a source of competitive advantage or at least a way to keep up with the competition. However, these systems bring with them their share of problems. Implementing these systems usually involves a significant amount of process change and often dictates changes in organizational structure. In fact, many ERP implementations are used as a means for re-engineering the firm. Management has a big role in the success and acceptance of these systems. As with the other technologies mentioned, the business process redesign inherent in ERP implementations requires major technical, organizational, and cultural change. The biggest associated challenge is fostering a new culture and managing the changes with consistency and coordination [57, 7].

When implementing information systems, there are usually two paths to take: adapting the inherent process to the people, or the people to the process. The former view stresses people as a firm's fundamental resource, while the latter view emphasizes consistency and coordination of corporate-wide information. Neither path has been proven better, however. More frequently today, these large ERP systems, which are designed around best practices, are being used as a facilitator of change in companies. This point is supported by Dwight Klappich, vice president of industry marketing at Ross Systems Inc of Atlanta: "The key thing when you look at the success or failure of software implementation is whether the client is implementing software or are they implementing change within their business [56].

In addition, client-server ERP systems feature many advantages over their mainframe counterparts. Most importantly, they can transfer data in real-time between locations worldwide. They can also support multiple currencies and multiple languages so they can be used at various global locations. The move to these systems has been fostered in a large part because they are industry standard compliant, giving many companies the ability to avoid the costly conversion processes of their legacy systems associated with these events.

ERP Impact

Recognizing the firm-wide impact of these systems, ERP market leader SAP started the trend of selling information systems to CEOs. Other technology companies are following this same strategy as they have also realized that IT is having a greater impact on strategic capabilities and the bottom line. This strategy also protects against two of the key components of failure for IT projects; namely, lack of congruence between a company's business strategy and its IT goals and lack of upper management support [33, 7].

The name of the game in today's business environment is speed and flexibility. Companies in every industry are constantly under pressure to perform their service or production faster and tailored to the needs of the customer. To accomplish this, companies need to streamline operations from the time an order is placed to its delivery. ERP enables this.

ERP Problems

ERP systems do present many problems for companies, however. The first has to do with the fact that they are usually part of a larger re-engineering effort. Therefore, the costs and time expectations of implementation are usually exceeded. Secondly, many companies purchase ERP systems to satisfy what they perceive will be a single integrated solution to all their data processing needs. ERP systems are not IT silver bullets. ERP systems are not good at everything and cannot perform all the processes that a firm may already have in place. This requires firms to either change processes or use additional applications, the idea of which runs counter to a single-solution philosophy.

No ROI

Early ERP implementation projects ran into the problem of not providing an easy means for determining the project's return on investment. Since the typical ERP implementation costs can be anywhere from \$30 to \$100 million, managers were very concerned with a means to measure their investment. However, today these projects are not being viewed as measurable purely by traditional financial analysis. Rather, intangibles are often being used to measure their success. Commenting on SAP, John Donovan, chairman of Cambridge Technology Group, says, "There is no return on these projects. Everyone is looking at this investment the wrong way and doing the wrong analysis, calculating the replacement of one system for another. SAP is the infrastructure. What is my return on putting electricity in this building? There is none; I just have to do it," [2]. Examples of some of the intangible measurement criteria being used include customer satisfaction, employee morale, and employee turnover. These factors are all difficult to link directly into an IT project and are difficult to measure. Revenue improvement goals are a commonly used financial target.

METHODOLOGY

Each DOD ERP system effort is extensive, as discussed in the next section. The purpose of this research is to glean understanding and insight from the current successes and failures of the ERP implementations. Rather than wait until they are all considered "completed," (which may never occur) and do a large systematic case study, this research seeks to explore the current status and evaluation of the DOD ERPs at whatever state of completion they are in (see Table 1 later in this paper) at this point in time. As such, a slightly unusual methodology of combining aspects of both descriptive and explanatory case study/analysis approaches has been applied.

WORLD'S LARGEST ERP PROJECT: US DEPARTMENT OF DEFENSE

DoD Financial Audit Mandate

The Department of Defense (DoD) has recently undertaken the world's largest ERP effort in order to transform their operations through business systems modernization. This massive and costly undertaking is in response to the Financial Improvement and Audit Readiness (FIAR) plan which claims to be the DoD roadmap to fix internal controls, correct processes, and obtain an unqualified audit opinion (Inspector General, 2012). The plan is part of a larger effort intended to make the DoD's financial statements ready for audit by fiscal year (FY) 2017. Further, it calls on the respective military branches to modernize their business and financial systems environment, specifically, implementation of ERP systems and the retirement of legacy systems. In order to adequately address the impediments, the plan suggested the entities implementing the ERP systems should map known processes and control weaknesses to verify that the systems will adequately address the impediments [28]. The FIAR plan, however, does not specifically align ERP implementation with achieving audit readiness.

Figure 2 presents the Department of Defense Management Structure. According to the Inspector General Report (2012), The Deputy Chief Management Officer (DCMO) is the Principal Staff Assistant and advisor to the Secretary of Defense and Deputy Secretary of Defense for matters relating to the management and improvement of integrated DoD business operations. Further, the DCMO is responsible for aligning business operations of the DoD with the war fighting mission. Chief Management Officers (CMOs) of the military departments report to the DCMO issues they've identified in business operations within and among their respective departments [28]. Furthermore, each CMO is tasked with developing a comprehensive business transformation plan capable of providing accurate and timely information in support of business decisions of the military department [28]. Moreover, the determination of

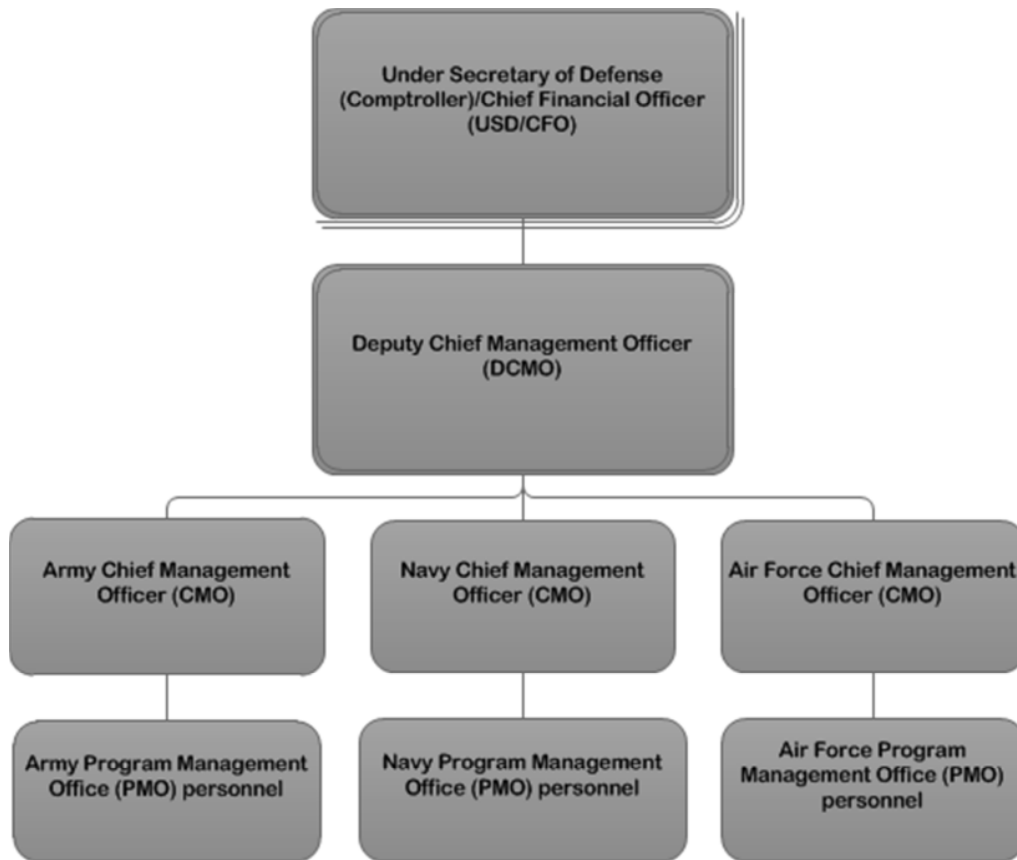


Figure 2. Department of Defense (DoD) Management Structure

appropriate BPR efforts in order to align business processes with business system modernization (ERP implementation) is the responsibility of the DoD DCMO and the Military Department CMOs. Business process modernization, therefore, can be restructured or terminated altogether if BPR requirements are not satisfied.

In order to align the implementation of ERP systems with DoD's auditability goals, business process reengineering practices are critical to the success of the project. In addition, strong oversight is needed to identify the sources of misalignment. However, recent audit work by the DoD OIG and GAO has determined the DoD DCMO and the CMOs of the military departments did not verify that business processes were streamlined and efficient. Further, they did not review the business processes nor did they determine the reliability of the Program Management Office (PMO) submissions. According to the Inspector General Report [28], the PMOs did not properly reference the BPR assessment form which contained questions as to whether the business process maps generated by the PMOs identified how business system modernization will address identified inefficiencies.

DoD ERP Systems

As discussed in the previous section, the DoD was given a mandate to be "audit ready" by FY 2017. In order to accomplish this tremendous challenge, the DoD determined to undertake six ERP efforts as the major driver for meeting the mandate. The six ERP systems are shown in figure 3 and apply to the Navy, Army (GFEBS and LMP), Air Force (DEAMS), and DoD in general (EBS and DAI).

While the details of what is included in each of the DoD ERP systems are beyond the scope of this paper, implementation efforts have been ongoing since 2003 (for details on each of the systems, see [32]). The original cost estimate for these systems is shown below in Table 1 and totals a little over \$7 billion. In addition, the table



Figure 3. DoD ERP Systems

	Initial deployment date	Current number of users	Planned number of users	Current users as % of planned	Original life-cycle cost estimate (millions)	Current life-cycle cost estimate (millions)	Difference (millions)
GFEBs	2008	46,000	53,000	86.79%	\$1,353.90	\$1,425.30	\$71.40
LMP	2003	21,000	21,000	100.00%	\$420.00	\$4,359.70	\$3,939.70
Navy ERP	2007	40,000	66,000	60.61%	1,632.90	\$2,237.30	\$604.40
DEAMS	2007	1,200	30,000	4.00%	\$419.90	\$2,158.90	\$1,739.00
DAI	2008	8,000	94,000	8.51%	\$209.20	\$266	\$56.80
EBS-EC	2011	unknown	700	n/a	\$2,850.70*	\$4,026.50*	\$1,175.80*
EBS-EProcurement	2010	1,500	4,000	37.50%	\$360.60	\$774.40	\$413.80

*includes cost of EBS Core, which supports ESB-EC and EBS-EProcurement.
 Source: DoD DODIG-2012-111 / Image:FierceGovernmentIT

Table 1. Status of Key DoD ERP Systems as of February 2012 [51]

shows the planned number of users for each system, the current actual number of users, as well as the updated cost estimate for each system. The final column calculates the budget difference (projected final cost overrun) in millions of dollars. Projected cost overruns (as of Feb 2012) for each ERP is from \$56.8 million to \$3.94 billion.

Table 2 gives some additional detail as to when each system was to be fully deployed, when it is currently estimated to be fully deployed, and the difference between the two estimates. Data shows that the time delay for each ERP system ranges from 1.5 years to 12.5 years.

System Name	Original Full Deployment	Current Full Deployment	Difference
Army			
GFEBs	December 2009	July 2012	2.5 years
LMP	June 2004	September 2016	12.5 years
Navy			
Navy ERP	June 2011	August 2013	2.0 years
Air-Force			
DEAMS	October 2009	April 2017	7.5 years
DoD			
DAI	October 2011	January 2016	4.5 years
EBS-Core	October 2005	July 2007	2.0 years
EBS-EC	October 2012	June 2014	1.5 years
EBS-EProcurement	October 2011	September 2013	2.0 years

Table 2. Schedule Status of Key DoD ERP Systems as of May 2012 [28]

DoD ERP Implementation Evaluation

Overall, the ERP implementations have not gone well [32, 51, 9]. As shown in Tables 1 and 2, the projects have been nearly \$8 billion over budget, delayed by an average of over four years, and currently servicing less than half of the intended users. An independent assessment of Defense Department ERP projects casts heavy doubts on the likelihood of their eventual success. The report (see [52]) doesn't only question the execution of ERPs, it questions the ERP strategy itself. It recommends that the Pentagon curtail further deployment of the systems, pending a review of key elements including a "clear definition of the problem the ERP is attempting to solve" [52].

Among other things, the report points out that achieving auditability may also be a challenge because military services are counting on ERP implementation to force changes within their organizations, whereas an organization's willingness to change behavior and processes is a prerequisite for ERP success. This is a key point in the evaluation process; can an ERP force change or can it only be a major tool in supporting change?

In terms of top management support for the ERP effort, at the military service level, the only leaders with the authority and accountability to implement the necessary amount of change in an ERP implementation are the Secretary of Defense and the service chief and their immediate deputies. This level of leadership is required to initiate, facilitate and complete the ERP effort as well as manage the inevitable disagreements between parties. Moreover, the Secretary and the Service Chief would have to be personally engaged in the process since delegating authority has been shown not to work [52].

Failures, or "challenges," in the ongoing ERP implementations are spread across all branches of the DoD. For example, Khan [32] documents the following difficulties in attempting to achieve financial auditability (the primary goal of the ERP efforts):

- the **Navy's and the Air Force's** premature assertions of audit readiness and missed interim milestones;
- the **Army's** inability to locate and provide supporting documentation for its military pay;
- the **Navy's and Marine Corps'** inability to reconcile their Fund Balance with Treasury (FBWT) accounts;
- the **Marine Corps'** inability to receive an opinion on both its fiscal years 2010 and 2011 SBRs because it could not provide supporting documentation in a timely manner, and support for transactions was missing or incomplete.

On the other hand, there are reasons for the DoD to remain optimistic about business system modernization. One of DoD's highest-profile ERPs, the Army's General Fund Enterprise Business System (GFEBS), has been fully fielded across the Army. In an interview with FCW, Kristyn Jones, GFEBS director of financial information management, said, "We're on a good path to meet the goals. The Army is the only one of the services that has deployed their new financial system across the entire service, so that's a big step for us" [9].

IMPACT OF DOD ERP ON STRATEGIC ALIGNMENT

According to Strassman [55], "All project plans are subject to change. Approval of a proposed investment is only the starting point for a continually widening gap between the stated objective and the capacity to deliver results." The success of the Army in implementing GFEBS is a perfect example of how to deliver results while remaining flexible. Further, the Army's approach has been incremental – rolling out GFEBS in "waves" and sharing best practices along the way. Kristyn Jones expanded on the process, saying, "We've used a crawl-walk-run approach...It's made each follow-on wave easier. We also engage with other offices a lot. It's been useful, as the services rolling out their [separate] systems, to talk to each other, sharing lessons learned and capabilities" [9]. Moreover, the Army recognizes that alignment between business system modernization and the stated objectives must remain updated as the organization evolves.

Ultimately, alignment must not take place through IT push, but through operational pull [55]. According to the Institute for Defense Analyses (2011) report, military services are counting on their ERP implementations to force changes within their organizations. The institute asserts, however, that the organization's willingness to change behavior and processes must already be established prior to an ERP implementation if it is to be successful. Of all the DoD ERP projects, the Army's "crawl-walk-run" approach most effectively addressed the establishment of a willingness to change. By implementing GFEBS in this manner, the Army is able to demand what, how, and when IT shall deliver results. While the Army has been relatively successful in implementing GFEBS, it remains to be seen whether DoD's ERP initiatives will have the desired effect of achieving audit readiness.

"Before one tries to prescribe solutions to problems, one must necessarily understand and interpret the problems correctly" [55]. There are obvious, and likely some avoidable, difficulties that have arisen because of the failure to identify the sources of misalignment. The DCMO and CMOs are indirectly responsible for many of the issues and schedule delays that have occurred. Business system modernization efforts, although, have not been in vain and the prescription for success, in part, can be found in the Army's "crawl-walk-run" approach. Those reporting entities responsible for implementing the remaining five ERPs should take a standards-based approach similar to that of the Army's GFEBS.

CONCLUSION

Aligning information technology with business strategy means that a positive relationship between information technologies and the organization's accepted financial measures of performance exists. It is undoubtedly difficult to achieve and maintain a synergistic relationship between the two strategies. It is particularly so in DoD's case, given this is the world's largest implementation of ERP systems to date in terms of cost, scope, and complexity. However, the recognition on the part of the DoD that sustainability hinges on synchronizing radical technological and process changes is significant in any organizational setting; this critical realization, plus the successful prospects exemplified by the Army's implementation of GFEBS, warrant optimism for the future.

The question remains whether DoD's stated objective of achieving audit readiness is an appropriate foundation for the implementation of ERPs. In terms of alignment, DoD should be careful not to confuse audit readiness goals with the sustainability and efficiency by which the military may be capable of operating as a result of ERP implementation. The DoD has proven to be an excellent testing ground for assessing whether an ERP can drive change and a stronger strategic alignment.

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