

**STRATEGY  
RESEARCH  
PROJECT**

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**THE STRATEGIC ENTERPRISE MODEL FOR  
INFORMATION MANAGEMENT**

**BY**

**CAROL M. HUBER**

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USAWC STRATEGY RESEARCH PROJECT

**THE STRATEGIC ENTERPRISE MODEL FOR  
INFORMATION MANAGEMENT**

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## ABSTRACT

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Commercial off-the-shelf (COTS) software is a popular acronym among Department of Defense and private industry leaders because a seventy percent software solution can be delivered to the user without long and expensive development. However, there is concern that COTS will result in a piece-meal solution with maintenance problems, excessive maintenance costs and more importantly, effective system integration will be almost impossible to achieve. Seventy percent of the Fortune 1000 companies have now installed enterprise resource planning (ERP), a tightly integrated, ready-made software suite that covers all major business processes which can provide leaders with strategic information. This paper will show why enterprise resource planning is the desired strategic information management system for the U.S. military.



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## **Enterprise Resource Planning and the U.S. Military**

A tidal wave of change has hit information systems in the private sector. Enterprise resource planning (ERP), is a tightly integrated, ready-made software suite that covers the complete gamut of an organization's activities. Because all aspects of a company are recorded in the same software, maintenance and training are simplified. But, more importantly, it is easier for top management to get a bird's eye view of processes and to analyze performance in selected key areas. ERP makes strategic management possible; that is why seventy percent of the largest one thousand U.S. companies have already installed ERP.<sup>1</sup> Is ERP applicable to the U.S. military?

The Department of Defense (DoD) mandated that commercial-off-the-shelf (COTS) software is the preferred method of implementing information systems.<sup>2</sup> COTS minimizes the risks associated with long and expensive software development. However, it also produces the following negative effects: excessive maintenance costs, additional training, limited system integration and non-amalgamated strategic information. The disadvantages of COTS clearly outweigh the advantages.

ERP should be the information system solution for the U.S. military as it is in the private sector. A review of past software development methods shows why COTS evolved and COTS

weaknesses demonstrate why ERP has gained popularity. A brief synopsis of major ERP companies includes implementation examples applicable to the U.S. military. After exploring the advantages of ERP as well as analyzing concerns, factors related to DoD implementation are identified. This study concludes with a recommendation for a well-planned DoD ERP implementation.

### **Past Software Development Methods**

It is difficult to manage the creation of something that is invisible during development. It is also difficult to manage a highly technical commodity whose success depends on change. This invisible, highly technical commodity is software. The strategic management of DoD and private organizations depends on mature information systems—software.

We can easily see the great strides of progress in computer hardware during the last thirty years. Processing power and storage capacity have increased while size and costs have significantly decreased. Software, however, is a different story. Progress has been made in the software industry with better tools for developing software, but capturing, implementing and integrating the user's functional requirements are complex and remain a challenge.

Various methods have been tried to facilitate the development of functional requirements. Users have been asked to provide an analysis of their functional requirements and

often that effort has resulted in volumes of detail and only a few desired features. The average user does not have the training and experience of a seasoned systems analyst to do a comprehensive analysis.

CASE (computer-aided software engineering) tools were a popular theme for a while, but they were oversold and failed to meet expectations. Few companies were prepared for the discipline and demands CASE placed on every aspect of the organization. Good system design and programming are an art and cannot be replaced by a tool. We no longer hear much about CASE.<sup>3</sup>

Prototyping a new system is a concept that has been successful. Since it is difficult for the users to describe system features, they are given a prototype of a new system and can then react to screen features and reports. Instead of starting with a blank piece of paper, work commences with a tangible example. Prototyping became rapid prototyping as users demanded new and modified systems faster. Programmers quickly wrote a "shell" program where edits, reports and features were omitted or scaled back. Use of the prototype greatly enhanced the working relationship between the professional systems analyst and functional user.

A close relative of the prototype is spiral development, where the user is given a simple system and gradually features

are added as the user and systems analyst define additional requirements. Both the prototype and spiral development software methods put a new system in the user's hands faster than defining requirements from scratch.

Software development is expensive and time intensive. It is detailed work that requires skilled systems analysts to define requirements, programmers to code and test and then functional users to test functionality. The technical and functional testing processes require dedicated interaction between analysts, programmers and users. After successful testing, documentation for both technical program maintenance and user functionality must be written, and then the users must be trained. This whole process takes considerable time--months and sometimes years depending on the size and complexity of the system and the expertise of the personnel involved.

In both the private and government sectors, there have been many unsuccessful software development efforts. The result of inaccurate time and cost estimates and ineffective quality control have caused the majority of large software projects to run late, exceed budget and sometimes be cancelled without ever reaching completion.<sup>4</sup> During the long software gestation period, an organization's non-technical leaders and managers cannot monitor the progress of something invisible. Sometimes it is not evident until major deadlines are missed or a complete

system is implemented that the user's functional requirements are not met. And, sometimes the development period is so long that the original functional requirements are no longer valid at delivery time. Turnover in personnel lengthens development time and increases risk.

### **Commercial-off-the-Shelf Software**

The need to shorten system development time and reduce risk grew in importance as leaders and managers began to depend more on software as an effective management tool and in many cases, to provide a competitive edge. Instead of accepting the long wait and risk associated with software development, the purchase of existing software, known as commercial off-the-shelf (COTS) software, became an attractive option. While there is value in using COTS, it is a technical buzzword susceptible to being misunderstood, over praised and mismanaged.

The decision to use COTS is often made by analyzing three parameters: requirements, cost and time, but integration, maintenance and training must also be considered. COTS must meet enough of the functional requirements to be a viable solution. DoD directed that COTS be used in system development<sup>5</sup> provided it meets at least seventy percent of the functional requirements. In some cases a seventy percent solution is acceptable and a welcomed replacement over a manual or

antiquated process. In other cases, a final seventy percent solution is just as unacceptable as a vehicle with three wheels.

The cost of purchasing COTS must be compared to the software development cost. Even if COTS costs more than custom developed software, there is a significant advantage in being able to install, train and use the software immediately and not risk software development failure or obsolescence due to changing functional requirements. If the cost of COTS is considerably higher than homegrown software, the cost must be weighed against immediacy.

Close to one-third of the average corporation's information technology (IT) budget is spent on integrating applications so that they can share information.<sup>6</sup> However, even after resources are spent writing interfaces between COTS and legacy systems, total system integration will not be achieved. Because COTS modules were not written with other COTS software or legacy systems in mind, the potential exists for data standardization and currency problems; often there is no backbone system to integrate data from varying sources. Thus, it is difficult to meet the information reporting goals of senior leaders.

Careful attention must be directed to maintenance during evaluation of COTS. The COTS vendor must be willing to modify the software when user requirements, operating systems or security features change. A maintenance contract with the

original vendor is not necessarily a guarantee for timely and accurate modifications. Software firms change management, dissolve and are absorbed by other companies; and this dynamic environment involves turnover of personnel and a large learning curve for new programmers. Software does and will increasingly control major portions of government operations. It is unacceptable that management will not be able to control software maintenance. Yet, the DoD advocates the use of COTS.

Commercial firms use and maintain COTS on different terms than the federal sector. If a commercial software house wants to deliver an accounting system quickly and does not have a tax module, they will purchase tax software from another company outright and maybe even hire the supporting programmers. Another option is to purchase the entire company. The tax software is then owned, and can be modified when appropriate without unnecessary overhead for maintenance. If functional requirements are not initially met, the software can be modified much faster than writing a complete tax package. Thus, the private sector can proceed with confidence in using COTS whereas the option of purchasing a software company is just not feasible for the federal government.

Another aspect of maintenance is cost. One company owns the software, so there is no competition for maintenance. Most software has a limited life and a software company is in

business to make a profit while their product is in demand. There is a significant risk if a reasonable maintenance contract cannot be signed with a reputable software firm. System implementation without maintenance provisions invites failure.

A potential pitfall of COTS mania is the training challenge presented by a large system composed of government in-house developed software and COTS modules from different companies. It is possible to write interfaces and attempt to create a seamless effect for the end user; but depending on when and how the COTS software was written, graphical user interfaces (GUI) could look similar or vastly different. Uniformity of screens, commands, icons and reports among modules in a system will shorten the learning curve and save training resources.

Before dismissing the COTS patchwork quilt solution because of maintenance, integration and training concerns, and focusing on a strategic software solution, COTS can be a valuable tool in the design of a new software application when used as a prototype. A demonstration of COTS will allow the user to window shop and create a wish list of desired features.

### **Enterprise Resource Planning**

The strategic software solution that commercial corporations are installing is enterprise resource planning. Software companies realized the redundancy in writing almost the same software application for various customers, and they also

saw the need to integrate applications. So, generic applications were created, integrated and then modified for the unique needs of a company. Human resources, payroll, accounting, logistics, marketing, and electronic commerce are examples of business processes ERP applications cover.<sup>7</sup> ERP applications or modules can be purchased as a standalone system, but more importantly, they can be purchased as an integrated package with selected modules. The need is obvious for accounting and payroll systems to interface as well as for human resources and payroll systems, and there are numerous other functional inter-relations.

The five largest ERP providers, SAP, Oracle, PeopleSoft, Baan and J.D. Edwards, account for sixty-three percent of the enterprise wide applications market. The oldest and largest firm, SAP, AG of Germany, controls thirty percent of the ERP market.<sup>8</sup> While SAP supports nearly nine thousand customers in over ninety countries, approximately thirty-five percent of its sales are in the United States. SAP's ERP solution, R/3, integrates user selected functional modules to give managers control over their business processes.<sup>9</sup>

Oracle, a database company, has been selling ERP applications since 1987 and is second in market shares with ten percent of the ERP market. Both SAP and Oracle compete for the same customers—big manufacturers and consumer-goods companies.<sup>10</sup>

Oracle is in a unique situation where it not only is an ERP developer, but simultaneously produces a database which is enormously popular with ERP providers and users. In 1997, more than fifty-two percent of database license revenues within the ERP market went to Oracle.<sup>11</sup> So, Oracle is in a position to understand customers from both the data storage as well as the application standpoint.

PeopleSoft was and still is a world-class developer of human resource software which subsequently added manufacturing, supply chain, financial and project management applications for ERP integration.<sup>12</sup> PeopleSoft has seven percent of the ERP market<sup>13</sup> and supplies software to seven of the top ten global Fortune 500 companies.<sup>14</sup> Sales in 1997 were \$816 million compared to \$3.4 billion for SAP.<sup>15</sup>

Baan, a nineteen-year old Dutch company, started with financial applications, added software for the building industry and then covered numerous other functional applications. Baan was one of the first companies to adopt the Unix operating system as it would allow Baan software to be independent of any computer platform. Baan strengthened its product suite since 1996 through acquisition and partnerships adding modules for sales, supply chain and financials. When the Baan Series appeared in 1998, Baan no longer offered new versions of its complete product package. Instead, only components are updated,

allowing customers to modernize their software without a major conversion effecting the entire organization.<sup>16</sup>

J.D. Edwards was founded in 1977 and originally provided software-computing solutions for midrange computers. By the mid 1980s, the company was recognized as a leading supplier of application software for the highly successful IBM AS/400 computer. Today, J.D. Edwards has more than 4,700 customers in over one-hundred countries and employs more than 4,200 employees in forty-eight offices worldwide.<sup>17</sup> J.D. Edwards' success as a major ERP vendor is based on its component-based architecture, its ability to mask technical complexity and an intuitive user interface which minimizes the need for training.<sup>18</sup>

### **Best-of-Breed Versus Single Source Integration**

ERP providers have different approaches to integration. Oracle, PeopleSoft, Baan and J.D. Edwards focus on best-of-breed solutions that use the best available applications for a business practice, and then interface the vertical application to the core ERP package. Best-of-breed strategy helps ERP companies remain competitive as they can quickly market a more diverse ERP suite by interfacing with external software applications. However, best-of-breed ERP solutions provide integration challenges, and the external company providing the software might not remain the market leader in a specific functional area. PeopleSoft's strategy includes exclusive

partnering and vertical acquisitions which allow quick diversification across varied functional applications, but the exclusive partnering can inhibit the finding and use of best-of-breed applications.<sup>19</sup>

In contrast, SAP prides itself as being a single-source ERP provider and is the sole developer and integrator of the entire system. This approach allows SAP to perform all maintenance and not experience the volatility associated with acquisitions, partnerships and interfaces.<sup>20</sup> Colgate-Palmolive moved away from best-of-breed software packages that more than adequately solved a department's business needs and selected all ERP components from SAP. This prevented the IT department from dealing with integration problems, inconsistent data, exorbitant software maintenance costs and the resulting staffing issues.<sup>21</sup>

### **ERP Impact on Leading Software Companies**

Any new successful technical concept, including ERP, cannot make a financial and technical splash without Microsoft getting involved. ERP is not a product Microsoft directly produces, yet Microsoft will benefit from ERP proliferation. The purpose behind ERP is to provide information to every level of an organization, and that means using a distributed environment. While ERP applications run on the Unix operating system, a less costly solution is to use the Microsoft NT operating system and the Microsoft SQL Server database. Both SAP and Baan have sent

employees to work at Microsoft headquarters to optimize their ERP applications on Microsoft products. Bill Gates claimed that SAP influenced Microsoft product development more than any other company Microsoft works with.<sup>22</sup> Microsoft is not subtle about getting its core technologies established as the de facto foundations for ERP systems. In 1998 Microsoft spent \$30 million to help ERP developers market products that run on Microsoft platforms. In addition, Microsoft quietly assembled a six hundred-man business unit, the Application Developers Customer Unit, to persuade ERP vendors to design their products around Microsoft core technologies.<sup>23</sup> Microsoft not only believes in supporting ERP, but is actually using it to run its business. Microsoft installed a \$25 million ERP system by SAP for common worldwide procurement that could save \$12 million a year in early-payment discounts.<sup>24</sup>

Other major technical companies are following suit. IBM is also installing a SAP ERP system to replace a hodgepodge of homespun internal software and eventually up to eighty percent of IBM's core business activities will run on ERP systems.<sup>25</sup> IBM and Microsoft are the world's two largest software companies, and large portions of their businesses run on software they did not develop.

The support and use of ERP by the technology leaders is evidence that ERP is not a passing fad, but an information

technology and business solution that will endure. The total ERP market is forecast to reach \$52 billion by 2002, up thirty-seven percent a year over the next three years. The growth of both the Internet and Microsoft Windows NT will fuel ERP expansion,<sup>26</sup> as will the continued demand for flexible, cost-effective, enterprise-wide application integration solutions that are business process oriented and not dependent upon a specific technology.<sup>27</sup>

### **ERP Examples Applicable to the U.S. Military**

The DoD Technical Architecture Framework for Information Management (TAFIM) describes the current state of DoD systems as largely single-purpose stovepiped, inflexible with limited interoperability and costly to maintain.<sup>28</sup> This gloomy description of DoD information systems is contrasted against two large successful ERP implementations in the commercial world with applicability to the U.S. military as shown.

PeopleSoft installed ERP software for human resources, payroll, asset management, budget, projects, purchasing, order management and receivables for Sears, the fifth largest private employer. Prior to the PeopleSoft ERP system, Sears had a mishmash of legacy systems used primarily for transaction processing. PeopleSoft was chosen because of its ability to tailor programs to specific business functions and because its implementation was less complicated and thus, completed in a

shorter timeframe. The ERP system enables Sears to direct capital for the most profitable return because of the software's analytical capabilities.<sup>29</sup> The integration concept used in the Sears ERP implementation is described in the Information Technology Management Reform Act of 1996,<sup>30</sup> the DoD Technical Architecture Framework for Information Management<sup>31</sup> and DoD Directive 5000.2-R,<sup>32</sup> yet the functional areas implemented in the Sears ERP system are covered by standalone legacy systems in the DoD. The U.S. military has described integrated systems and now must build them. The Sears ERP system cannot be simply transplanted to the DoD because government and military rules and operating procedures differ from the private world. The PeopleSoft system would need to be modified to fit DoD unique features as it was modified to fit Sears unique features. A major highlight of the Sears system that would benefit the DoD is the analytical capabilities. Senior DoD managers would be able to spot bottlenecks across multiple functional areas.

Another large commercial ERP implementation is Boeing. Baan claims the largest ERP installation with the nineteen parts fabrication plants and over eighteen thousand users in the Boeing Commercial Airplane Group. Boeing's goal was to find simpler, more efficient ways of configuring and building airplanes. Prior to using the Baan ERP software, Boeing's processes differed from plant to plant, as the information have

systems differed. Now, all parts plants are using the same methodology, a standard system and common information. End users are able to work together, and business units have more current information about the demand stream. Since processes been standardized through the software, job roles between plants are more consistent. Hence, management has more flexibility in using the workforce when people need to be moved between plants. A clear picture of the workflow allows managers to plan around bottlenecks to minimize delays. Since Boeing employees have fewer information tools to use, training is simplified and users are able to access data outside their own department. Another benefit is that every plant is up-to-date with order information, which allows people to plan accordingly.<sup>33</sup> The benefits of the large Boeing ERP example would greatly enhance DoD productivity. The standardized processes allow information to be accessed by multiple units, training is simplified and it is easier for management to interchange workers across departments. The strategic view of operations allows managers to plan instead of react.

### **ERP Advantages**

ERP has significant advantages over COTS for reasons of maintenance, contracting, training, competitive edge and strategic management. See Table 1. When existing ERP modules are updated or new modules are added, the ERP firm is

	COTS	ERP
Maintenance		+
Contracting		+
Training		+
Competitive edge		+
Strategic management		++
Simplicity	+	
Installation	+	
Support		+
Cost	NA	NA

**Table 1: COTS - ERP Comparison**

responsible for interface modifications. ERP companies realize that some customers will seek best-of-breed solutions and have developed interfaces to facilitate

integration. Baan is building connectors to easily integrate its sales and service suite with SAP's manufacturing and financial applications. And, Oracle is planning on integrating its sales and service modules with SAP's manufacturing suite.<sup>34</sup> The user will not have to deal with multiple companies, coordinate timing, modify contracts and then just hope a consolidated effort will result in seamless changes. Dealing with only one company decreases integration risk, but the selected company must have a proven track record. In a COTS environment, system integrity might depend on the skill of government contracting personnel.

Training for an ERP system is much easier than a patchwork system with varying graphical user interfaces. Because users in all departments are using the same standards when accessing different application screens, data and reports all have the same feel. But, training for an ERP system must begin early and if considerable business process re-engineering is involved, the initial training will be lengthy for both users and consultants.

The efficiency of an operation depends on the quick and accurate flow of information across the complete organization and rich functionality within each department. A powerful information system needs to be available for senior management to view operations and to analyze performance. The goal of private enterprise is to make money and ERP has been promoted and used as the tool to provide a competitive edge. The goal of DoD is to preserve and defend the United States. This mandates effective spending and use of scarce resources, and is what DoD's Revolution in Business Affairs (RBA) is all about.<sup>35</sup> ERP can be an effective tool to implement RBA.

While maintenance, contracting, training and a competitive edge are valid reasons to choose ERP over COTS, strategic management is by far the most important reason. The days of automating manual tasks or just replacing an outdated system are gone. Integration and strategic management are now the focus of senior managers. Even the traditional ERP suite of just a few years ago did not have the strategic functionality, and users did not ask for it. Instead, they only provided requirements that were similar to their current environment. Business re-engineering, increased competition and new corporate strategies such as faster order fulfillment or new workgroups paved the way for strategic information requirements. Cost savings can be realized through excess supply reduction and quicker payments,

but additional savings can be achieved by spotting bottlenecks and meaningful analysis of mountains of transactional data. Decision support and data-warehousing features are now being put into ERP products.<sup>36</sup> Both Oracle and PeopleSoft have announced new applications to add strategic business analysis to their ERP products. The goal is to allow users to do analyzing and less scrubbing of the data.<sup>37</sup> Of course, strategic information is only of value if managers know how to use it and actually use it.

### **ERP Concerns**

The concerns involved in ERP implementation center on complexity of customization, lengthy installation, support and cost. Baan claims its biggest problem is complexity and not competition from market leader SAP. Baan's solution is no more complex than the other ERP leaders, but Baan is willing to admit complexity is an inherent part of ERP. No information system, be it ERP or a traditional system, can cover a multitude of business functions and remain simple. Most major ERP vendors provide the capability to tailor their product and offer software to allow the user to select options. An ERP system can be customized up to a point, but specific, grand-scale customization is costly and most users try to avoid it by submitting to the software vendor's way of doing business. Because DoD's legal and operational requirements differ from the

commercial sector, customization would be necessary. Some of the major ERP providers are eager to capture the federal market and have already started tailoring software to cover government unique functional requirements.<sup>38</sup>

ERP vendors are aware that long implementation times have created bad press, so they developed customization and implementation tools. SAP developed Accelerated-SAP (ASAP) which includes a phased methodology that walks the customer through the implementation steps and facilitates a smoother and more rapid implementation.<sup>39</sup> Baan offers Dynamic Enterprise Modeling (DEM) to help companies implement quicker, gain a high-level overview of critical business processes and to change software components and business processes at any time without disrupting operations.<sup>40</sup> Baan announced agreements with both Microsoft and IBM to shrink-wrap ERP to speed the installation process. Microsoft agreed to bundle Baan ERP software with network server products. IBM agreed to form three worldwide implementation factories, and also announced the general availability of Baan ERP on two different IBM hardware platforms. The Baan Microsoft and IBM links not only help speed software deployment, but lower the cost of entry and ownership into the ERP world.<sup>41</sup> Implementation time can be minimized by providing intuitive screens for customization and ensuring training is effective. Yet, a major ERP implementation will

probably take close to one year because, in addition to installing software, new business skills must be learned, resistance must be softened and the status of employees will change.<sup>42</sup>

A major concern of ERP installation is that the customer is then dependent on an external source for a strategic part of the organization. Care must be taken to select a reputable ERP provider who will remain in business and be reliable in performing maintenance. A small company might be able to offer an attractive purchase price, but an ERP provider who has a major portion of the market share is the better choice for long-term support. A detailed and tight contract is important. It is also important to have employees well trained on both the technical and functional aspects of the ERP system and to closely monitor changes in vendor and/or consultant support. The user is better off relying on one ERP company for support versus multiple COTS companies provided the one company is reputable.

ERP systems are expensive and the software alone is not at fault. The first ERP customers were large companies and implementations in Fortune 1000 firms often exceeded \$100 million, by the time training and consultants were factored in. The most expensive part of ERP is the consultant, who is not necessarily a technical guru, but a functional expert with

system experience. ERP consultants can command up to \$250 an hour because there are a limited number.<sup>43</sup> The average ERP implementation cost today is approximately \$4,000 per desktop.<sup>44</sup> Initially, COTS software systems may appear to cost less than ERP, but the comparison must be carefully qualified. COTS modules only automate select portions of the organization and integration is limited, whereas ERP systems offer rich functionality and integration. It is justifiable for a comprehensive automation system to cost more than limited modules, so cost is a non-rated factor in Table 1.

### **Return on Investment**

In both federal and private organizations IT departments must justify expenditures and compete for resources. Traditionally, return-on-investment (ROI) has been a management tool used in determining whether an automation system should be implemented. Today, most business processes are already automated and implementing a new information system is life cycle replacement. It does not make sense to attempt to measure less-tangible benefits such as re-automating, more user friendly systems, and reductions in interface maintenance and contracting work.

Plans to implement SAP in Hewlett-Packard Company's Medical Products group originally included an ROI study, but because the ERP system is so big and covers so much functionality, it was

difficult to realize what the ROI was going to be and the ROI study was terminated. Another company that skipped ROI analysis is Hydro Agris North America, Inc., an agricultural products producer. Even several years after Hydro Agris started using ERP software, they couldn't quantify ROI, but fell back to quasi-technical justifications such as replacing dying legacy systems, year 2000 problems and inventory control needs. However, the compelling reason to install ERP was the idea of running the entire company on an integrated software system.<sup>45</sup>

Metrics studies are not necessary. The purchase of an integrated package from one company eliminates the need for the user to modify interfaces every time software is changed; system integration gives management better tools; and dealing with only one company minimizes contracting work and complexity. These factors are obvious and do not need to be measured. Common sense and experience are more important than metrics. The chief executive officer (CEO) and chief information officer (CIO) must have a gut feeling that implementing ERP is the right thing to do to be competitive and to prepare for the future. Today's CEO must be automation savvy or have the right expertise within the organization and know who to listen to. According to SAP, most SAP purchase decisions are made by CEOs, chief financial officers (CFO), and boards of directors—few of whom are

qualified to judge software integration and implementation issues.<sup>46</sup>

## **Recommendation**

Recommending ERP for the DoD as an information system nirvana is frightening. ERP cannot become another highly touted, yet misunderstood acronym. The DoD and the federal government must start planning for ERP immediately, but with great caution, and recognize that some operating changes are in order as the following five recommendations indicate.

First of all, some DoD applications are unique to the military and should not be handed off to an ERP vendor. Systems like SIDPERS (Standard Installation Division Personnel System), GCCS (Global Command Control System) and SATS (Standard Army Training System) cannot be exempt from total integration and providing strategic information to senior management. SIDPERS, GCCS and SATS are in fact working seamless integration schemes and must glean successful concepts from the commercial ERP sector. These and other purely military systems should develop interfaces in the future to easily integrate with ERP systems, to include commercial systems as DoD continues to favor outsourcing and privatization.

Second, implementing ERP will initially cost, not save money, because of training and cut over expenses. But, ERP will allow the organization to operate more efficiently and

effectively over the long term. As already stated, it is difficult to determine the dollar savings on the value gained from systems integration and providing leaders with the appropriate data for strategic management. The cost of ERP can be reduced by sharing applications and expenses among DoD and federal government organizations.

Third, the DoD and federal government must analyze business processes and streamline operations before investing in information technology as mandated by the Clinger-Cohen Act of 1996.<sup>47</sup> Although required by law, many organizations proceed with technology procurement without business process redesign. In the interest of saving money, the changes should align as close as possible to private sector business practices. Thus, government organizations would be able to use ERP systems from major vendors and minimize costly modifications.

Fourth, there is always risk associated with implementing an information system, be it ERP or just an ordinary system. Senior leaders must understand what ERP is and commit to supporting the entire implementation. The planning must be comprehensive to include contracting, design, testing, training, maintenance, and expectations. But, perhaps the single most important element in mitigating risk is to put an experienced systems analyst in charge of the project. The systems analyst must have extensive experience with software development and

must also be familiar with the specific functional application. Software development is an art and a science, and there is no substitute for experience.

Finally, the federal government needs to have an information systems integrator solely for software systems. Some organizations would like to integrate their systems with other organizations or at least exchange data, but they are in no position politically to make it happen nor are tight timelines and lean budgets conducive to doing the best thing for all government information systems. Per the 1996 Clinger-Cohen Act, each major federal agency must have a CIO, but the CIO cannot directly effect an ERP revolution for three reasons. First, the CIO does not have the time to intimately know major system details. Unless subordinates bring integration needs to the attention of the CIO, nothing will happen. Second, in less than three years, the turnover rate among CIOs in federal agencies exceeds fifty percent. Information system issues are complex and a new CIO is not going to push for major renovation prior to learning the job. And, third, some federal agencies assigned the CIO title to the chief financial officer (CFO) or another encumbered position.<sup>48</sup> The tenured individual does not have experience nor the time to even think about information systems. If someone at a higher level had the knowledge and authority to consolidate and integrate, the DoD and the federal

government would have better information systems, and resources would be more efficiently spent.

## **Conclusion**

There is a striking difference between DoD information systems and those in the commercial sector. As previously stated, the DoD still has numerous standalone systems and the DoD TAFIM states that the vision for information management emphasizes integration, interoperability, flexibility and efficiency.<sup>49</sup> The commercial sector has already implemented its vision of integrated information systems in enterprise resource planning. The White House has indicated that it would like to see the private sector take the lead in the advancement of technology, and the private sector has indeed been shown to be a leader with the ERP market now a \$15 billion a year industry.<sup>50</sup> Jack Welch, CEO of General Electric said that if the change inside your business is slower than the rate of change outside your business, then the end is near.<sup>51</sup> Direction of change must accompany the rate of change. COTS is the wrong direction and ERP is the right direction for the U.S. military.

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## ENDNOTES

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<sup>3</sup> Charles B. Wang, Techno Vision II, (New York: McGraw Hill, 1997), 194-95.

<sup>4</sup> Caper Jones, "Software Project Management in the 21<sup>st</sup> Century," February 1998, available from <http://www.spr.com/html/american-programmer.htm>; Internet; accessed 9 January 1999.

<sup>5</sup> Department of Defense, Directive 5000.2-R, Ibid.

<sup>6</sup> Anne Knowles, "Implementing ERP; Can We Talk?" ; available from <http://www.datamation.com/PlugIn/erp/stories/talk.htm>; Internet; accessed 31 October 1998.

<sup>7</sup> David Caruso, "Moving Up the Supply Chain," available from <http://www.iemagazine.com/9810/erp.shtml>; Internet; accessed 8 January 1999.

<sup>8</sup> Constance Loizos, "ERP: Is It the Ultimate Software Solution?" 7 September 1998, Industry Week, 33-39.

<sup>9</sup> "European Software: SAP's Rising in New York," available from, <http://www.economist.com/archive/view.cgi...th=01&startyear=95&endmonth=01&endyear=99>; Internet; accessed 15 January 1999.

<sup>10</sup> Loizos, Ibid.

<sup>11</sup> "Oracle Increases Windows NT Database Market Share, Widens Gap over Microsoft," 13 October 1998, available from <http://www.uk.oracle.com/info/news/oct98dbshare.html>; Internet; accessed 17 January 1999.

<sup>12</sup> Business Wire, "IBM and PeopleSoft Announce Human Resources and Payroll Solution," available from <<http://www.aol.com>>; Internet; accessed 14 December 1998.

<sup>13</sup> Loizos, Ibid.

<sup>14</sup> "Whither PeopleSoft; Part One: A Brief History and Market Overview," available from <<http://www.softwarejobs.com/erparch/e980911.html>>; Internet; accessed 10 January 1999.

<sup>15</sup> Eryn Brown, "PeopleSoft: Tech's Latest Publicly Traded Cult," 25 May 1998, Fortune, 155-156.

<sup>16</sup> "Ongoing Innovation; The Way We Built Baan," available from <<http://www1.baan.com/common/contenttagged/1998Jul/Baan-history.pdf>>; Internet; accessed 12 January 1999.

<sup>17</sup> "The History of J.D. Edwards," available from <<http://www.jdedwards.com/company/history.asp>>; Internet; accessed 13 January 1999.

<sup>18</sup> "J.D. Edwards and the Business Case for Flexible ERP Applications," available from <<http://www.jdedwards.com/ideatoaction/announcement/jde%5Factivera.htm>>; Internet; accessed 13 January 1999.

<sup>19</sup> "Whither PeopleSoft; Part One: A Brief History and Market Overview," Ibid.

<sup>20</sup> Caruso, Ibid.

<sup>21</sup> Larry Marion, "Enterprise Insights: Best of Breed Reborn," April 1998; available from <<http://www.datamation.com/PlugIn/issues/1998/april/04erp.html>>; Internet; accessed 10 June 1998.

<sup>22</sup> Eryn Brown, "The Best Software Business Bill Gates Doesn't Own," 29 December 1997, Fortune, 242-250.

<sup>23</sup> Jeff Moad and Mark Hammond, "Microsoft Seeks ERP Sweet Spot," PC Week, 23 November 1998, Volume 15, No. 47.

<sup>24</sup> Michael Martin, "An ERP Strategy," 2 February 1998, Fortune, 149-151.

<sup>25</sup> Martin, Ibid.

<sup>26</sup> Loizos, Ibid.

<sup>27</sup> "Enterprise Application Integration: Advanced Technologies and a Sense of Process," available from <[http://www.aberdeen.com/ab\\_company/hottopics/eai/eai.htm](http://www.aberdeen.com/ab_company/hottopics/eai/eai.htm)>; Internet; accessed 10 January 1999.

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<sup>29</sup> PeopleSoft, available from <http://Checkers/peoplesoft.com/ourcust.nsf/17ca6clce2b0c0d788256666007c9bcb/32965d8e4ba824648825665d000c0cd7?OpenDocument>>; Internet; accessed 30 January 1999.

<sup>30</sup> "Summary: Information Technology Management Reform Act of 1996," available from <<http://www.npr.gov/library/misc/itref.html>>; Internet; accessed 21 March 1999.

<sup>31</sup> TAFIM, Ibid.

<sup>32</sup> Department of Defense, Directive 5000.2-R, Ibid.

<sup>33</sup> "Airborne: Boeing ReEngineers with Baan Software," available from <<http://www.baan.com/>>; Internet; accessed 30 January 1999.

<sup>34</sup> Stannie Holt, "Baan Builds Fornt-office Bridge to SAP," 21 December 1998, available from <<http://www.infoworld.com/cgibin/display/Archive.pl?/98/51/t16-51.20.htm>>; Internet; accessed 10 January 1999.

<sup>35</sup> Department of Defense, Report of the Quadrennial Defense Review (Washington, D.C.: U.S. Department of Defense, May 1997), 15.

<sup>36</sup> Steve Bonadio, "Closing the Loop," available from <<http://www.iemagazine.com/9810.news.shtml>>; Internet; accessed 9 January 1999.

<sup>37</sup> Mark Hammond, "Building Analysis into ERP," PC Week, 25 January 1999, 45.

<sup>38</sup> General Accounting Office, Defense IRM: Alternative Should Be Considered in Developing the New Civilian Personnel System (Washington, D.C.: U.S. General Accounting Office, January 1999), 18.

<sup>39</sup> David S. Linthieum, "Integrating Enterprise Applications," March 1998, available from <<http://www.dbmsmag.com/9803d13.html>>; Internet; accessed 10 June 1998.

<sup>40</sup> "Creating a Flexible Response for the Future," available from <[http://www1.baan.com/cgibin/bvisapi.dll?BV\\_ServiceName=Baan&BV\\_Operation=Byn\\_BaanMenulitem](http://www1.baan.com/cgibin/bvisapi.dll?BV_ServiceName=Baan&BV_Operation=Byn_BaanMenulitem)>; Internet; accessed 13 January 1999.

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<sup>42</sup> "SAP in a Microwave," available from <<http://sapsource.com/wp3.htm>>; Internet; accessed 16 June 1998.

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<sup>44</sup> Patrick Thibodeau, "Baan Reports Troubled Finances," 12 October 1998; available from <<http://www.computerworld.com/home/news.nsf/all/9810121baan>>; Internet; accessed 31 October 1998.

<sup>45</sup> Randy Westor and Craig Stedman, "Forget ROI - just install it," 13 April 1998, available from <<http://www.computerworld.com/8525658400720fb8/69747ca2461>>; Internet; accessed 9 January 1999.

<sup>46</sup> "Bridging the Application Divide," September 1998; available from <<http://www.softwaremag.com/sept98/sm098f3.!htm>>; Internet; accessed 9 January 1999.

<sup>47</sup> General Accounting Office, Ibid, 14.

<sup>48</sup> Nancy Ferris, "CIOs on the GO," Government Executive, March 1999, 18.

<sup>49</sup> TAFIM, Ibid.

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