Improving Information Management: Software System Deployment Practices

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In response to a request by the United States Army Program Executive Office for Standard Army Management Information Systems (PEO STAMIS), the Logistics Management Institute (LMI) assisted in a study to improve the deployment of software-intensive systems. We conducted structured interviews internal to PEO STAMIS and with PEO STAMIS customers to survey current practices. We also surveyed several commercial organizations and identified a number of best practices, 16 of which were applicable to PEO STAMIS. Eight of these practices already existed within the PEO; PEO STAMIS product managers had also created internal best practices well tailored to their environment. The problem was not lack of best practices inside or outside the PEO, but the lack of sharing and replication of best practices across product offices. The methodology developed as part of the study should be of use to other organizations dealing with similar problems.

Background

The PEO STAMIS vision was to be the warfighter's choice for leading edge, integrated, global information solutions across the operational spectrum. The perception of the PEO and its customers was that processes within PEO STAMIS for deploying hardware, software, and training and sustaining them once deployed were interfering with the realization of the PEO STAMIS vision. Each product manager used product-specific processes for hardware and software fielding, system training, and sustainment. The end result was often customer dissatisfaction—much of which was attributable to inconsistent and sometimes ineffective deployment practices.

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Methodology

To provide a consistent framework against which to compare the various PEO STAMIS offices' and commercial firms' practices, we created a three-stage (initial, intermediate, and advanced) deployment process model. It comprised 16 general areas (such as computer hardware, software, architecture, and training), nine of which are further broken down into sub-areas, comprising a total of 32 categories. Many, but not all, areas have sub-areas. Three levels of ability (initial, intermediate, and advanced) further characterized each area and sub-area. A listing of areas and sub-areas is provided in Table 1 (see page 18). We obtained information using interview questionnaires key to the deployment process model.

In our deployment process model, the initial level is characterized by ad hoc practices. Very little planning is done, and situations are addressed as they arise. Also, little or no consideration is given to identifying potential risks and implementing practices to avoid them. The intermediate level is characterized by some degree of planning, although a number of activities are still addressed informally. Organizations functioning at this level in a specific area are getting by, but their
While Table 2 illustrates what a sub-area looks like. The complete model can be viewed at the CrossTalk Web site <www.stsc.hill.af.mil/crosstalk/2003/06/forbes.html>.

Participating companies included a biotech firm, a systems integrator, an oil company, and a major producer of commercial software products. For commercial firms, our interview technique was to ask the respondent one question for each area or sub-area. For each area and each level within the process model, we asked the respondent to describe practices followed by a typical organization within their industry. Our intent was not to make the questions specific to the company, but to have the respondents characterize what they believe the model would look like based on common practices within their segment of the industry. This was done for two reasons:

- We wanted to validate our model concept.
- We wanted to ensure the respondent would answer all the questions and not opt out because a response could or would reveal proprietary practices.

**Results**

The results indicated that the deployment model the LMI constructed reasonably represented the various levels of maturity - or capability - indicated by our model. Some changes were made to the model during the interview process. The bulk of these changes resulted from additional characterizations of the levels proposed by the interviewees.

The interview process identified 16 commercial best practices, all of which were applicable to PEO STAMIS. However their relative merit was not clear. As an aid in implementation, and in conjunction with the PEO STAMIS staff, we evaluated the best practices against the factors contained in each of the seven major areas of the deployment model and then integrated the results to create a prioritized list of best practices. (Evaluation was based on the multi-attribute utility method, i.e., we assigned scores to indicate the importance of each practice to each factor.) We also confirmed that eight of these practices already existed within the PEO. However they were not widely shared or replicated from one product to another.

It should also be noted that although all best practices are in use by commercial firms no one firm used them all. In some cases, a given best practice was identified as being used by some of the respondents, while others indicated a desire that their organizations use a similar practice. Consequently, one of the results of the study was to develop a list of best deployment practices useful in industry. Table 3 lists these best practices.

**Recommendations**

The LMI recommended that PEO STAMIS implement a process improve-
ment effort that emphasized replication of best practices. We identified and evaluated five potential strategies. We also recommended implementation of a collaborative process improvement strategy that had at its foundation the best practices identified by this study and the deployment process model created by this study. The deployment process model can provide a uniform groundwork for product manager self-assessment, an essential element of improvement.

A collaborative strategy meant its execution included product managers, PEO STAMIS headquarters staff, developers, and users. The product managers were closest to the customers and in the best position to understand real-world problems that needed to be solved. The headquarters, on the other hand, was in the best position to see across products and facilitate replication of best practices. Developers had the best information on functionality embedded in applications. Involvement of user representatives was essential so users could understand what was being attempted, how it was being approached, and how it was expected to effectively address their needs.

We recognized that the PEO could not attempt to fix everything at once; organizations can absorb only so much change at one time, and not all changes are equally beneficial. The working group the LMI supported identified four initiatives that appeared to lend themselves to early implementation and momentum building. These recommendations included best practices that were very comparable to some of the best practices used by commercial organizations:

- Use of one particular product as a pilot vehicle to develop a template for replication of best practices. This product was early in its life cycle and was controlled by one of the PEO STAMIS directorates, minimizing the lateral coordination that would be needed.
- Replication of the Systems Extension and Acceptance Team (SEAT) fielding practice for other products. This was a PEO STAMIS best practice. The SEAT concept is essentially a team that is responsible for planning and implementing the deployment of systems, but was only used for a limited number of systems. Users specifically recommended expanding the use of the SEAT methodology.
- Expanded use of an existing test laboratory for retail-level systems. This is a practice consistent with the use of test beds by commercial organizations to ensure the compatibility of system interfaces. Broader use of this laboratory would facilitate a common approach to testing.
- Replication of the three-tier help-desk architecture vision of the Global Combat Support System-Army across additional products. This architecture had the preferred modern features of an excellent help-desk capability.

Deployment of operational or production information systems is a process that many organizations do not always perform well, whether or not we are talking about governmental or commercial organizations. Hopefully, such organizations can benefit from the results of this study. We believe the deployment process model and the interview guides – because they were intentionally constructed to span government and commercial practices rather than those specifically within the sphere of PEO STAMIS – can be valuable to enterprises other than PEO STAMIS. The same is true of the best practices we identified: One result of this study was the determination of a set of good deployment practices that have been applied not only to military information systems, but also to the commercial world.

**Table 3: Commercial Organization Best Practices**

<table>
<thead>
<tr>
<th>Best Practice</th>
<th>General Area</th>
<th>Sub-Area</th>
<th>No. of Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>An asset management system exists, documenting in detail what hardware and software are deployed, who is using it, and what problems exist in order to know whose hardware to replace. A change control system is utilized with the capability to back out of previous changes, if needed be. Testing, staging, and burning in of parts are performed. They collect and use system utilization statistics, do performance monitoring, document process flows, and do capacity planning.</td>
<td>Computer Hardware</td>
<td>All</td>
<td>3</td>
</tr>
<tr>
<td>COTS Software</td>
<td>Application Software</td>
<td>Assessment of Impact</td>
<td>3</td>
</tr>
<tr>
<td>Installation Policy</td>
<td>All</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Note

1. PEO STAMIS has since been re-designated as the United States Army Program Executive Office for Enterprise Information Systems. In this article, we retain the designation in use at the time of the study.

**On-Line Article**

The on-line version of this article also contains a table of the complete Deployment Maturity Model and an Interview Questions/Response Form.
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