



# The Information Technology Program Manager's Dilemma

Rapidly Evolving Technology and  
Stagnant Processes

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## Report Documentation Page

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ince inception, the Department of Defense's development of acquisition policies and guidance has been focused on the creation and deployment of traditional weapons systems—such as planes, ground vehicles, and ships—in support of the warfighter. Some may see

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### **Information Technology Acquisition Challenge**

By far, the biggest challenge to IT programs is the rate at which technology changes. Ray Kurzweil, in his essay “The Law of Accelerating Returns,” builds on Moore’s Law (exponential growth in the number of transistors per integrated circuit) to describe what he calls the exponential rate of technological change. In fact, Kurzweil goes on to suggest that the rate of technological growth is itself growing exponentially. That is clearly demonstrated when one considers the Internet. Until the early 1990s, the Internet didn’t exist in its current form. Since that time, there have been tremendous improvements in technologies and capabilities for the Internet.

As IT develops in the commercial market, new capabilities are generated in a matter of months. DoD is not isolated from this changing environment, as the department is heavily reliant on commercially available software and hardware. As a result, there are challenges in maintaining support for older software and hardware products, obstacles to overcome with the procurement of new products, and the subsequent integration into defense systems. Most of the time, those are not insignificant or superfluous enhancements to performance. As new technology emerges, older technology becomes obsolete, seemingly overnight, and users usually want the latest technology, either due to an increase in functionality or as a requirement to patch a discovered vulnerability, cyber threat, or incompatibility created by other emerging capabilities.

For example, *The Wall Street Journal* reported recently that insurgents were able to gain access to video feeds provided by U.S. military unmanned aerial vehicles using a software package that was publicly available. That presented an emerging threat as the insurgents were able to use the technology to their advantage and gain access to critical information. As a result of that threat, users initiated a new requirement to secure the transmission of data. This single example demonstrates that the rate of change to technology and its availability become forces of change in many defense programs.

The rapid rate of changes in technology further complicates an already complex acquisition process from the very first step—the definition of requirements. DoDI 5000.02 requires a fixed set of requirements prior to proceeding through the process. Those fixed requirements feed into the acquisition process—a process that typically takes a long time to develop into a system. As already noted, once a requirement has been defined, it is only a short matter of time before that requirement becomes obsolete either because of advancement in technology or a discovered vulnerability that requires it to be replaced or modified. Under DoDI 5000.02, that leads to unplanned costs, requirements growth, and systemic issues associated with modifying requirements during the acquisition process.

the existing DoD process for acquiring those systems as complex; however, the current procedures, as outlined in DoD Instruction 5000.02, offer a more defined approach for weapons systems acquisition than for the acquisition of information technology systems. The current DoDI 5000.02 leaves IT project and program managers wondering how the current process applies to them, as the guidance is fairly rigid and does not allow for the flexibility required to appropriately manage IT programs.

Until very recently, in comparison to the development of a traditional weapons system, IT programs seemed to have been viewed as a utility or service instead of a critical component to national security. Perhaps that is because data passing through cables cannot be observed with the naked senses and therefore an “out of sight, out of mind” philosophy is applied when it comes to policy and guidance. It seems as though managers and decision makers who are not familiar with IT take the stance of “I don’t understand it, just make it work.”

At a recent conference, military leaders admitted that they did not completely understand the role of IT in operations; however, with so much attention being brought to the issue, that may be changing. Operational commanders are now realizing that they have a real need to understand IT as it affects operations and the decisions regarding IT that are being made by others. As with weapons systems, the solution for IT acquisition program managers is to tailor the DoDI 5000.02 to their perspective programs. That does not, however, address the three major issues associated with information technology programs: the rate of technological improvements in capability, the processes for both acquiring and fielding new IT components, and funding for IT programs.

Obsolescence is an issue that is problematic for weapons systems as well; however, replacing a few obsolete components on a weapons system is very different from having an entire system that is made up of components that face repetitive obsolescence. That is one reason requirements tend to remain in a state of fluctuation in many IT-intensive programs.

Taking a stance of demanding firm, fixed requirements that stay relatively static over a two-to-five year period is unrealistic with IT-intensive programs. Thus, a change in mindset along with an acquisition process that anticipates that there will be ever changing requirements is needed.

### **Rapid Change and Undefined Processes**

Development, deployment, and operational processes surrounding IT programs need to be considered given the dynamic nature of technology. A lack of defined processes supporting an IT program at the program, component, or Service level can lead to challenges for a program manager, resulting in significant delays, cost overruns, and performance problems in the program.

Beginning with the most fundamental function of contracting, rapid and frequent changes require that a well-written contract be in place for those types of programs. If the program's contract is not well written, most improvements in capability will be deemed new requirements and have to undergo a contract modification process. A modification process can be problematic, as the negotiations for a bilateral modification can take a great deal of time. Furthermore, by the time negotiations are completed, the product or capability being acquired can be obsolete due to emerging technological developments. Contracts for IT need to be well written to accommodate the rapid rate of technological advancements, and contracting modification processes need to be flexible and streamlined so as to not impede the timeliness in which the new technology can be implemented. For example, identify those things that are likely to change rapidly and have a predetermined method of getting them on the contract. That can be done via a contract line item number that encompasses peripheral devices, for instance, where the contract line item number doesn't change but the devices do change with upgrades to them.

Another process that needs to be considered is the systems engineering process. As described earlier, obsolescence of software and hardware becomes a challenging issue. Frequent updates in technology require a mechanism to simultaneously support multiple baselines until updates can be completed as well as support the upgrading or updating process itself.

As an example, consider the number of computers in DoD that currently operate using the latest version of the Microsoft® operating system. Now imagine that Microsoft decides to no longer support the existing version of its operating

system—this frequently happens because the driving force behind Microsoft's profitability is the commercial market. With every new release of operating system, patch, etc. ... all of the computers in DoD will need to be upgraded with the latest product available exclusively from Microsoft. In large IT programs, that could mean upgrading hundreds of thousands of computers within a specified timeline. Upgrading a single component or piece of software can cause unforeseen compatibility and interoperability problems in the system and with its legacy systems. In order to prevent those problems, it is necessary to have a sound systems engineering and testing process before a change of this magnitude is implemented.

Users are also impacted by technology refresh as it can be very disruptive to their normal work routine. Users have to learn how to use the new technology and possibly change how they previously performed their tasks. Therefore, technology refresh can be considered a taxing event for everyone involved. Also, if the users are all co-located at an operational command, the upgrade may negatively impact a command's ability to perform its mission. Thinking ahead about the program's strategy, having a good systems engineering process, developing a well-thought-out technology refresh process, and obtaining stakeholder support for the process are critical for success.

Of course, one has to discuss the impacts of information assurance when discussing an IT-intensive program or project. This is yet another process area that requires a very thorough strategy and plan and stakeholder support. The personnel involved in approving the system's security and authority to operate—like the Service-specific designated approval authorities—are typically not part of the program or project, and that creates a very time-consuming process with limited resources.

There are many things that can be done to streamline the approval process, some of which have been successfully implemented in other major automated information systems

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programs. For example, prior to seeing the actual authority to connect a request, the designated approval authority can ensure that one of its stakeholders is present during testing of the system, upgrade, or patch, ensuring that the representative understands what the device is and its vulnerabilities. Embarking on the development and fielding of an IT-intensive system without early coordination and cooperation of those representatives has the potential to delay the program's objectives for months.

In some instances the lack of defined processes is beyond the program or project manager's control. For example, an IT system may need to be compatible with other applications being developed by other program offices. In such instances, coordination between agencies is required at the Service level.

### **Funding for Constant Change**

DoD's planning, programming, budgeting, and execution (PPBE) process is another element that does not function well with the rapid pace of technology advancements. Because the rapid pace of technology improvements cannot be forecasted or planned, IT program managers are left with the problem of identifying funds to implement necessary information technology changes. To quote Deputy Secretary of Defense William Lynn during an interview with *Government Executive Magazine* and noted in a Nov. 12, 2009, nextgov.com article, "The iPhone was developed in less time than it takes for DoD to budget for an IT program." Also, funding upgrades created because of a newly discovered vulnerability or hacker attacks are impossible to predict two to five years in the future. With no management reserves allowed in DoD, that poses a significant challenge for those responsible for managing IT programs—how does one budget for the unknown requirements? Currently, the only possible answer is to continually miss budget targets and escalate costs to higher levels within the government and for Congress to provide additional funds as needed. That is not the most desirable approach and can be time consuming. The government budgeting process requires a fundamental shift to be more flexible and responsive in order to accommodate fast-moving programs.

In the area of process and governance, DoD could learn from the private sector, or perhaps it needs to rely on industry to bring their expertise to the government. There are governance models for IT such as Control Objectives for Information and related Technology (COBIT) and the Information Technology Infrastructure Library (ITIL), both of which recognize the need for flexibility. Also, corporations are in business to make a profit, and in the past decade or so, they have realized the important role that IT plays in their ability to remain competitive in the marketplace. Corporations also have concerns about technology changes, hackers stealing corporate sensitive information, budgets, and planning capital investments. Corporations tend to have an IT strategy that is in alignment with their goals and objectives.

### **Change Requires Change**

Managing the rapid rate of advancement in technology in IT-intensive programs presents many new situations that have never been encountered. The examples cited in this article are only a small set of the challenges associated with the acquisition of IT and can be difficult to convey to senior managers, approval authorities, and policymakers who lack familiarity with those challenges and IT in general.

A vision for IT is needed at the DoD enterprise level that translates to a Service perspective and moves down to the individual program office. Working toward a common vision, a new acquisition process needs to be flexible enough to anticipate change. Those changes lead to adjustments in requirements and require that well-thought-out processes be in place prior to starting an IT-intensive program. Early on before contract award, consideration for how the changes will be managed, tested, and implemented need to be taken into account, and the program office must also identify key stakeholders who need to participate in the decision-making process at the working level. All of those things require that the program manager have support at the component and DoD levels to help coordinate and establish those processes that may be outside of his or her control.

The PPBE process is no exception to the need for a more responsive process. Response to rapid change requires flexibility in programming and budgeting. Perhaps a different PPBE process or a capital investment budgeting process needs to be in place to help fund the changes. An example may be to use the private sector model where the budgeting process is in alignment with an overall corporate IT objective. Objectives are budgeted for and funded by annually updated capital spending plans. Because the PPBE process is not more accommodating to change, it will continue to create challenges for IT acquisition programs and they will remain unresponsive to change and vulnerable to widely available emerging threats.

Once an acquisition process has been developed, then IT-acquisition-specific training should be developed and provided. Program managers currently must attend Defense Acquisition University courses for level III certification in program management. Given that more and more systems are becoming IT intensive, additional coverage for managing those programs should be part of that training.

Most important, treating IT programs in an "out of sight, out of mind" manner with no real dedication of time and attention to the problems is not the answer in the face of changing technology and adversity. What is needed now is dedication by senior government officials who recognize the issues being caused by the current processes and can affect the needed change in those processes.

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