Essential Criteria for Selecting Contract Writing COTS Software

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Executive summary

"Commercial Off-the-Shelf" or COTS software promises substantial savings and reduced risk for large IT programs, but often falls short in meeting the unique and complex requirements of the Department of Defense (DoD). Success depends on DoD's ability to assess how solution providers can completely address emerging, complex requirements.

Several essential criteria—functionality, flexibility, auditability and sustainability—must be considered to ensure the right solution is selected and implemented successfully. These criteria are highly interrelated and can have a significant impact on the overall cost and risk of the program.

DoD will benefit most from a COTS solution that has sophisticated, out-of-the-box capabilities along with the ability of the COTS software provider to accommodate, and ideally incorporate and maintain as enhancements, DoD's unique requirements within the core product. This will enable DoD to avoid untenable, costly customizations and workarounds and maintain core auditing best practices.

Accurately assessing these criteria requires an in-depth, "fly-off" of COTS solutions, requiring each provider to demonstrate not only out-of-the-box capabilities, but also how they would accommodate complex, unmet requirements.

Realizing the promise of COTS

DoD increasingly is choosing COTS software rather than developing custom systems to support its complex, mission-critical functions. With out-of-the-box functionality, pre-defined business processes and management reports, COTS software promises substantial savings and reduced risk for large IT programs.

Unfortunately, many DoD COTS-based programs have experienced significant budget overruns, delayed deployment schedules, and unmet system performance requirements.

For example, DoD's experience with COTS-based enterprise resource planning (ERP) solutions has been reported as particularly troublesome.[1] In 2012, the DoD Inspector General (IG) reported that six of eight DoD ERP programs had exceeded their original cost estimates by more than 27%; all eight programs had experienced schedule delays ranging from 1.5 to 12.5 years; and two other notable ERP programs cost nearly $2 billion and two decades of development effort before they were ultimately cancelled. DoD is committed to applying the lessons learned from these programs as it embarks on future initiatives.

Key challenges

DoD, as measured by scale, mission, scope, and nature of activity, is unique among organizations in the U.S. and globally. And while measures have been taken to try to adapt business processes to better leverage out-of-the- box COTS functionality, these often fall short in meeting DoD's unique and complex requirements.

This will be particularly true as DoD embarks on the replacement of the Standard Procurement System (SPS). Legal and regulatory requirements (e.g., the Federal Acquisition Regulations) demand that COTS software be designed specifically for federal contract writing. Additional regulations, such as the Defense Federal Acquisition Regulation Supplement (DFARS) and unique business requirements, such as the acquisition of major weapon systems, make DoD's contract writing requirements even more complex.

Many COTS-based programs in the federal government have failed to live up to the promises of accelerated schedules, cost savings or reduced risk.

The unique, complex requirements of the Department of Defense introduce additional challenges for COTS-based programs, particularly for Contract Writing Systems.

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[1] Inspector General, Department of Def ense, Report No. DODIG-2012-111, July 13, 2012 and Inspector General, Department of Def ense, Report No. DODIG-2013-111, August 1, 2013

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The success of this program is dependent on the ability of DoD and its partners—including software, systems integration and consulting services providers—to adequately and cost-effectively meet both existing and emerging, complex requirements of the organization. While baseline software provides a strong foundation, there are several other critical considerations to ensure the right solution is selected and implemented successfully.

In this paper, we explore four essential criteria that DoD should use to evaluate any COTS software platform to meet its unique requirements.

Four essential criteria for evaluating COTS software for complex requirements

FUNCTIONALITY
What can it do already, "out-of-the-box"?

FLEXIBILITY
How easily can it be changed?

AUDITABILITY
Can it prove it's doing what it's supposed to?

SUSTAINABILITY
Can it be maintained at a reasonable cost?

The four evaluation criteria—functionality, flexibility, auditability and sustainability—are closely interrelated and must be evaluated together to reduce risk to the program's budgeted cost and planned schedule, and more importantly, to the program's overall sustainability and affordability beyond the full operational capability (FOC).

Four essential criteria for COTS software evaluation

1 FUNCTIONALITY
What can it do already, "out of the box"?

A typical evaluation of COTS software includes a significant investment in defining the functional and technical requirements of the mission-critical function. These requirements typically are folded into matrices (e.g., self-certifications) where vendors evaluate their capabilities against the identified requirements, enabling organizations such as DoD to easily assess the viability of a solution based on the percentage of requirements met out-of-the-box.

This exercise provides a critical set of data from which to compare software products, but fails to provide a complete measure of a software's ability to meet requirements. The inevitable difference in interpretations and the range of complexity of DoD requirements leads to a risk that a requirement may not fully be met by out-of-the-box functionality.

SPS was estimated to meet 60-75% functionality, but a DoD IG report[2] found that SPS was only meeting 45% of the required functionality. This is largely due to the range of complexity for a single requirement across the different types of contracts. The way in which a COTS system can handle a requirement for commercial items may differ from how it can handle major weapon systems. For example, it might be capable of searching contract documentation out-of-the-box, but be unable to scale to meet that requirement if the documentation runs thousands of pages long.

2 FLEXIBILITY
How easily can it be changed?

The percentage of requirements met by out-of-the-box functionality is only one dimension of viability. A solution may satisfy 90% of the requirements out-of-the-box, but how it addresses the remaining 10% is equally, if not more, important. That 10% typically is a primary contributor to delays and budget overruns. An important element in a COTS software evaluation is flexibility—how easily can the software accommodate initially unmet or future requirements.

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[2] Audit Report No. 99-166, Initial Implementation of the Standard Procurement System, May 26, 1999

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Key considerations to measuring a software product's flexibility are the ease and type of configuration it offers, the lead time required to satisfy new requirements, and the cost of developing and maintaining new capabilities as customizations or as part of the core code.

There typically are four ways to accommodate requirements that are unmet by out-of-the-box functionality: configuration, customizations, workarounds and enhancements.

1   **Out-of-the-box configuration** allows for business users or administrators to define and easily adjust basic system parameters, such as spending limits or access rights. A highly configurable system often is the easiest and least expensive option, but also is limited in meeting more complex requirements.

2   **Code customizations** typically involve unsupported core code changes specific to a single organization's requirements. Since these are custom one-offs, they are inherently costly and risky. They require specialized knowledge to build, tend to complicate upgrades, and also require specific knowledge to maintain throughout the program's lifecycle.

3   **Workarounds** leverage outside applications or require manual activities to address the requirements. Workarounds are equally risky as they must be maintained in perpetuity and evaluated for impact with each future system upgrade—not only adding cost to maintain the solution, but also perpetuating the organization's likely dissatisfaction in having to implement a less than ideal business process.

4   **Enhancements** are core code changes built into the software product, and thus are incorporated into future product releases. A provider's willingness to use enhancements to address complex requirements can save an organization significant costs and risk in future upgrades.

COTS software that is highly configurable is preferred, as there will be requirements that demand more tailored solutions. Customizations and workarounds increase overall program costs and risks because the organization must build and maintain these new capabilities, acquire additional tools or applications, or fit customizations into future upgrades.

Complex requirements that are treated as enhancements provide the most benefit to the customer at the lowest cost and risk. As an enhancement, requirements are built into the core product, available in future product releases, and maintained by the product vendor, thus reducing the overall cost, complexity and risk of implementing upgrades and improving the next criteria—auditability.

3 AUDITABILITY
Can it prove it's doing what it's supposed to?

Each of the services and agencies within DoD have dedicated significant time and resources to achieving auditability by mandated deadlines. The introduction of a new system represents a significant risk to DoD's audit readiness efforts. Therefore, DoD must ensure not only that potential COTS solutions have passed the rigors of an audit, but also that the design, development and integration of the solution support the goal of auditability.

The way in which complex requirements are accommodated in COTS software has a significant impact on auditability. For example, code customizations and workarounds typically are not supported by the systems integrator or the COTS software vendor, requiring the DoD to maintain a record of the changes, understand and evaluate compatibility each time the solution is upgraded, and pass the knowledge of the customization or workaround from employee to employee to ensure its existence is not lost as time goes on. The guarantee of out-of-the-box auditability is lost when custom code and workarounds are introduced into the system.

4 SUSTAINABILITY
Can it be maintained at a reasonable cost?

The first three COTS evaluation criteria are highly interrelated, and have a significant impact on the sustainability of the solution. For example, a solution may have high functionality out-of-the-box, but if it requires significant customizations adversely impacting audit capabilities, the complexity to maintain and upgrade the system increases, as does the cost. As ongoing maintenance or upgrade costs increase, the affordability of implementing new, value-added features and functions decreases, limiting user productivity, and thus increasing costs.

RECOMMENDATIONS

Model what a future upgrade might look like for each provider, based on the proposed combination of tactics to meet requirements.

RECOMMENDATION

Place emphasis on understanding how customizations and audit processes of a given solution may impact the ability to upgrade to future releases.

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BOTTOM LINE

DoD will benefit most from a COTS solution that has substantial out-of-the-box capability, but more importantly, one that is highly configurable, with the ability to incorporate unique, unmet requirements into the core product maintained by the software vendor.

To assess this, DoD should consider an in-depth "fly-off" of potential COTS solutions, where both out-of-the-box functionality and complex requirements are demonstrated.

The value of an in-depth "fly-off"

When COTS products are evaluated, it is tempting to assess solutions on the basis of the percentage of existing requirements that are met out of the box. Higher percentages imply better solution fit to the organization's overall requirements. But, selecting the right solution to meet a program's long-term sustainment and affordability requirements demands a rigorous approach where evaluators can observe competing solutions performing across requirements and demonstrating the required characteristics over a significant period of time. It is difficult to assess this in an RFP response or in a few hours of demonstrations and presentations.

Therefore, as the DoD embarks on the evaluation of COTS solutions for its SPS replacement initiatives, they should strongly consider a "fly-off" activity where solution providers would stand-up their respective solutions to demonstrate out-of-the-box functionality. From there, each provider's solution would be evaluated on the actual coverage of their out-of-the-box capabilities (functionality), the ease and ability of configuring their solution to the organization's needs (flexibility), and the process for addressing unmet or emerging requirements (e.g., customization, workarounds, or product enhancements).

While such an approach might lengthen the evaluation process in the near-term, it would provide DoD with greater insights into each solution's full lifecycle cost and program risk, and ultimately enable the true benefits of a COTS-based solution to be realized.

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