

3-D Program Management

Addressing the Full Range of Today's Complex Program Risks



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Rapid technology advancement, complex interdependencies among systems, expanding supply chains, multiplying stakeholder interests, and constrained budgets present a new set of risks threatening the success of major programs. Can program managers widen their focus and develop the necessary skills to prevail?

Today's program managers must cope with significant ambiguity and complexity across dimensions traditionally outside of their purview. Numerous stakeholders inside and outside the program office can impede progress by imposing unfunded, and often unrealistic, requirements and expectations throughout the program lifecycle. The rapid pace of technological change, along with the growing interdependencies among systems, exacerbates the complexity and management challenge. A volatile and increasingly global vendor base fuels uncertainty as entire companies can form, morph, and dissolve during the course of a program, creating unforeseen and possibly hidden supply chain risks. And a fickle budget environment characterized by budget sequesters and continuing resolutions can blind-side program officials with funding cuts that create sudden program instability. The difficulty of managing programs in this new twenty-first century environment is evidenced by the growing number of programs that have been restructured, scaled back, or terminated due to massive cost overruns and schedule delays.

In trying to improve their program management, program managers instinctively look inward to the program office and demand a more rigorous application of acquisition rules and processes, but this addresses only part of the problem. In many cases, the underlying cause is not insufficient allegiance to acquisition procedures but an inability to manage the new, complex challenges emanating from outside the traditional focus of program management processes and outside the traditional scope of program managers' training and skills. Thus, in addition to looking

inward to master existing acquisition processes and procedures, program managers should also look outward and take a 3-D view of the multi-dimensional acquisition landscape. Important questions to ask include:

- Who are all of the stakeholders in my program, including potential "special interests," and how can I manage their conflicting and competing expectations?
- How stable are the vendors and technologies upon which my program relies?
- What are the risks in the complementary programs upon which my program depends?

The rise of complex programs has expanded the program managers' scope of responsibilities, particularly the need to manage the expectations of an expanded contingency of stakeholders. Therefore, program managers must expand their management competencies beyond traditional Technical Management and Acquisition and Program Management to include a third-dimension, Stakeholder Management, which provides the broader set of leadership strategies, techniques, and capabilities needed to proactively address the full spectrum of variables that impact modern programs. The 3-D Program Management approach widens the management lens, enhancing each of these mutually reinforcing dimensions, to help program managers deliver complex programs on schedule, at cost, and to stakeholders' expectations.

The Challenge of Managing Complex Programs

The federal program manager's primary responsibility is the same today as it always has been: oversee and manage economic transactions between government users who want to "buy" a system or asset and vendors that want to "sell" their solutions. Acquisition processes and regulations were established to give order and coherence to complicated transactions,

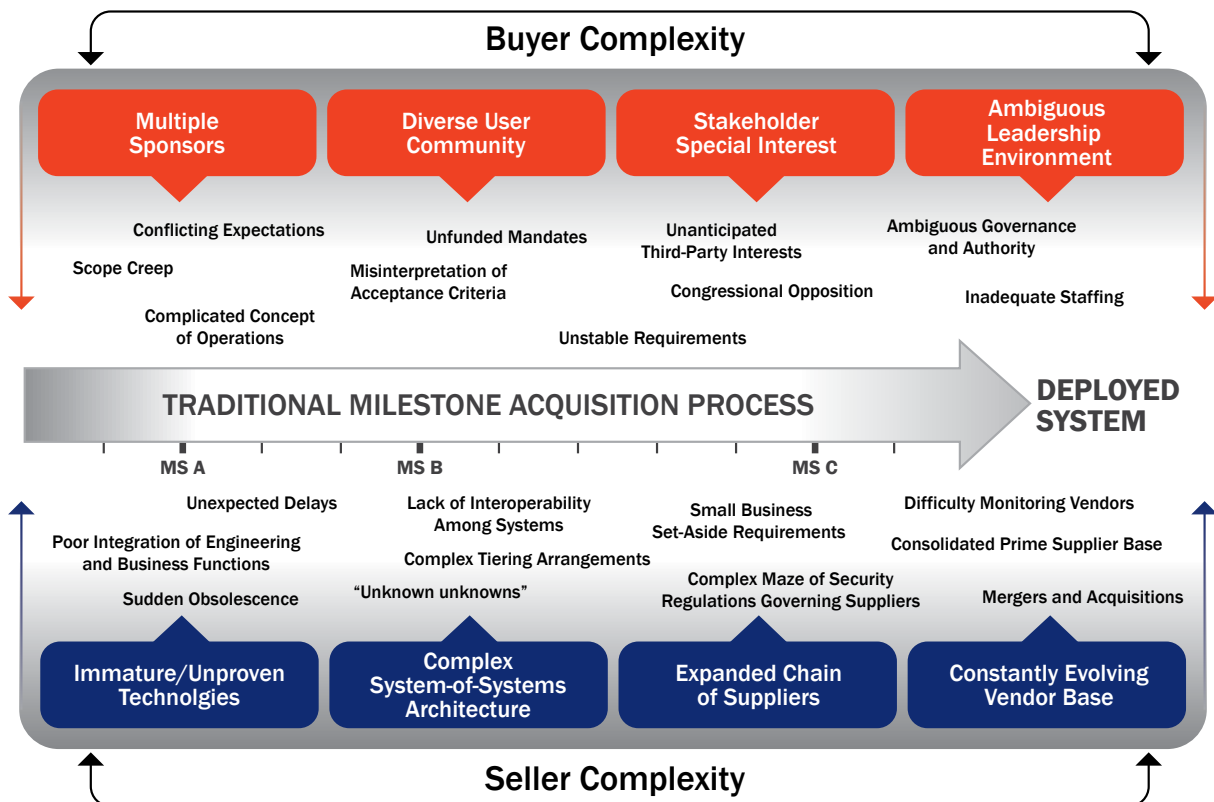
and program managers undergo specialized training for the needed skills to guide programs to successful completion. Federal program officials are among the elite in their profession. The acquisition process, particularly the acquisition of large-scale systems, has always been fraught with pitfalls and challenges, but in recent years the complexity of designing, developing, building, and fielding these systems often has overwhelmed even the most competent program managers, causing program restructurings, delays, and cancellations that have cost the government hundreds of millions and even billions of dollars in lost funds on a single program. As shown in Exhibit 1, the rise of complex programs has created numerous new

challenges and risks outside the traditional sphere of program management.

Among the hallmarks of complex programs are:

- **Multiple Sponsors.** Three or more sponsors, often from different jurisdictions, control funding streams. Each sponsor has its own requirements and, perhaps, conflicting expectations regarding the program's progress and goals.
- **Diverse User Community.** Multiple operators or users, perhaps geographically dispersed, will be using the platform or system for alternative (and often competing) mission needs.

Exhibit 1 | Complex Program Management: Problems and Challenges Come from All Directions



Source: Booz Allen Hamilton

- **Stakeholder Special Interests.** Powerful third-party interests, often without “legal” authority but having the ability to shape public opinion and program decisions, can impose unfunded mandates, requirements, or modifications on programs.
- **Ambiguous Leadership Environment.** The program manager lacks authority to obtain needed data or documents from the many sponsors or users, or to prevent requirements from expanding, regardless of the impact on design, funding, schedule, etc.
- **Immature/Unproven Technologies.** The program relies on high-risk software development, significant design invention, or emergent technologies that will continue to evolve—and perhaps even be supplanted by competing technologies—over the course of the program.
- **Complex System-of-Systems Architecture and Fused Networks.** Interdependent systems increase the complexity of managing technologies, suppliers, sponsors, and other program elements, and generate “unknown unknowns” that also increase risk.
- **Expanded Chain of Suppliers.** The multiplying tiers of small or foreign component suppliers increases risks, such as the capacity of vendors to perform throughout the program lifecycle and assure that the components comply with appropriate import, export, and security policies, regulations, and statutes.
- **Constantly Evolving Vendor Base.** Vendors rise and fall with the new technologies they create, and many of the successful start-up companies merge or are acquired for their technologies, skills, and contracts by larger competitors, making it difficult to monitor and manage the complex maze of solution providers.

The difficulty of managing complex programs using traditional approaches is evidenced by the accelerating growth in cost overruns and delays. The Government Accountability Office (GAO) reported in March 2013 that 86 of the Pentagon’s largest weapons systems were more than \$400 billion over their original cost

Yucca Mountain

The complexity of modern acquisition programs, particularly the complexity of stakeholder management, is illustrated by the Yucca Mountain underground storage project for radioactive nuclear waste in Nevada. The project engineers considered neither technology nor safety a problem. However, the project has been cancelled primarily because program managers failed to consider or mitigate the reactions of stakeholders in the states where the trains carrying the radioactive waste would travel through to get to the site. Although project engineers met design requirements, local citizens and environmentalists rebelled against the waste transport plans and questioned the safety specifications for 10 million years of storage. Consequently, the Yucca Mountain storage site remains unused, and the project is mired in ongoing litigation and political opposition despite having spent hundreds of millions of taxpayers’ dollars.² Granted, the technology of the Yucca Mountain waste repository was complicated, but it was the unwillingness and/or inability to anticipate and manage stakeholders’ expectations that ultimately led to its perceived failure.

estimates for research and development, procurement, and other acquisition costs—a total cost overrun of about 38 percent.¹ The programs also projected an average delay of 27 months in delivering initial operating capability. The GAO reported similar findings in a July 2013 report looking at information technology projects across the federal government, stating, “IT projects too frequently incur cost overruns and schedule slippages, and result in duplicate systems while contributing little to mission-related outcomes. Additionally, projects sometimes fail or

¹ *Defense Acquisitions: Assessments of Selected Weapons Systems*, March 2013, pp. 6, 169.

² GAO-11-731T Testimony Before the Subcommittee on Environment and the Economy, Committee on Energy and Commerce, House of Representatives, “Nuclear Waste—Disposal Challenges and Lesson Learned for Yucca Mountain,” June 1, 2011.

³ “Information Technology: OMB and Agencies Need to More Effectively Implement Major Initiatives to Save Billions of Dollars,” *GAO Highlights*, July 25, 2013.

operate inefficiently, at the cost of billions of dollars.”³ These conclusions have been echoed in independent research and academic studies, which estimate that 60 to 80 percent of all acquisitions in recent years have delivered late, exceeded cost, failed to deliver what they were supposed to, or didn’t deliver anything.⁴ In their efforts to improve oversight of complex programs, agencies have vacillated between performing their own systems engineering and systems integration, having the original equipment manufacturer (OEM) perform this work, or outsourcing these functions to a lead systems integrator (LSI) contractor. But traditional program management approaches have typically experienced the same problems—higher costs and diminished mission capabilities—regardless of who has performed the systems engineering and integration functions.

Reducing Ambiguity and Risk with 3-D Program Management

How can program officials effectively manage the multiplying challenges and risks surrounding today’s programs? It starts with an approach we call 3-D Program Management. 3-D Program Management goes beyond a set of tools to provide program managers with a new perspective that expands their field of vision to encompass the broad spectrum of issues created by complex programs. This wider perspective enables them to better assess all of the potential challenges and the tools required to achieve success in their specific programs.

At a simple level, 3-D Program Management incorporates three major dimensions: Stakeholder Management, Technical Management, and Acquisition & Program Management. These interrelated functions are managed together by strategic leadership that recognizes the interdependencies among the variables contained within and among the dimensions. For example, the Acquisition & Program Management functions that secure and manage budgets recognize that many stakeholders—in the Administration, Congress, adjoining agencies, and local communities—can influence funding; therefore, they must work

with the Stakeholder Management function to develop strategies for monitoring and managing the expectations of all relevant stakeholders. Similarly, the Technical Management functions that identify and decompose user requirements must work with Stakeholder Management functions to deconflict “unauthorized” requirements stemming from various third parties—such as operator organizations, trade unions, environmentalists, research centers, and staff oversight organizations. Their unauthorized requirements can impact the technical design and capabilities, as well as cause cost increases and delays. The intersecting responsibilities of Technical Management and Acquisition & Program Management also remind the program manager to remain vigilant regarding traditional management activities and goals. Achieving integrated baselines for cost, schedule, and performance requires continuous monitoring and forecasting for the unexpected, timely analysis of imperfect data, and expeditious decision-making on innumerable tactical adjustments throughout the program life cycle, and not just at pre-planned review events.

Implementing 3-D Program Management

Adopting a 3-D Program Management perspective requires a number of changes in activities, skills, and thinking. It won’t happen overnight. But our experience working with numerous federal programs shows that by taking just a few key actions, both tactical and strategic, program managers can begin the necessary organizational and cultural changes and, in the process, generate positive results for their programs. Among the tactical actions federal program managers can take to successfully address some of their complex challenges:

- **Stakeholder Management.** To avoid problems that may arise due to ambiguous governance authorities or multiple sponsors with divergent expectations, program managers should develop charters that detail specific authorities and decision rights, along with relationship maps with the sponsors, at the beginning of the acquisition cycle. To ensure

⁴ Cole, Jeffery, P., Kimberly Kirkpatrick, and Robert R. Voldish, Booz Allen Hamilton, *Why Major Systems Acquisitions Fail to Meet Expectations—A Primer*, p. 2.

the required staffing will be available, program managers can create agreements that clearly define the matrixed or outsourced resources they will receive. Program managers can mitigate problems that often arise during the acceptance and transfer of the new systems by creating mechanisms to involve users throughout the acquisition life cycle.

- **Technical Management.** To avoid problems caused by unproven or risky technologies, program managers should identify their critical technology dependencies, and then establish a “knowledge point” approach that conducts demonstrations and simulations of the new technologies to uncover flaws, anticipate potential problems, and devise contingency solutions. This should be done early in the program to avoid massive downstream costs. In addition, issues that often cause requirements creep, such as the inordinate influence of third-party interests, can often be addressed by strengthening the program’s governance and authority posture. This will yield far greater returns than reforming systems engineering competencies.

The adoption of rapid prototyping, agile development, and similar techniques can help program managers address and resolve issues arising from emerging technologies during the acquisition process. In addition, these techniques can help speed the deployment of mission-critical systems, while also preventing heavy investment in systems that become outdated even before they are deployed. Module designs and “block” development strategies can enable programs to incorporate eleventh-hour requirements. None of these techniques is new; however, they are not widely used by federal agencies.

To address the complexity of multiple systems within a particular program or across several related programs, agencies can adopt an enterprise, system-of-systems approach to acquisition. In this approach, an “Enterprise Integrator” serves as the government’s agent to ensure an open architecture that maximizes interoperability among systems



and the ability to source systems functionally from multiple technology providers. Among its benefits, the Enterprise Integrator approach enables the government to maintain ownership over design artifacts, thus eliminating technology dependence and vendor lock-in, while also ensuring that technology investments and capabilities are aligned with mission needs.

- **Acquisition & Program Management.** Program managers could strengthen the contracts staff working on their programs by providing program resources to help contracts officers carry out their responsibilities. Program managers could also use information technology to expedite the development and consistency of acquisition plans and documentation. For example, federal program managers rely on largely manual, paper-based processes to create the acquisition documents for managing major acquisition programs. The data is often inconsistent or incomplete. If these documents were digitized and standardized to eliminate duplication and enable sharing, this would not only save time and money, but it also would provide program officials with a wealth of up-to-date,



reliable data that could be analyzed to anticipate and mitigate program risks.

As program managers take tactical steps to target specific issues and challenges, they can also put in place strategic plans that have a deeper impact across all dimensions. Most critical to success is launching a strategic campaign that establishes effective two-way communication between the program and its many stakeholders, and ensures stakeholders' buy-in and support throughout the program life cycle. The strategic campaign would identify and prioritize first-, second-, and third-tier advocates, detractors, and influencers; determine individualized strategies and tactics to manage their expectations; and most importantly, ensure the program speaks with a single voice and remains committed to achieving the performance objectives, cost goals, and delivery schedule.

An important tool for designing an effective strategic campaign is wargaming (or simulation). The wargame brings together representatives of the program's sponsors, users, contractors, and other stakeholder groups to address key issues and challenges facing

the program. Such exercises can identify unforeseen problems or unknown stakeholders, and identify solutions and options for overcoming challenges. They can provide program officials with valuable insights, such as which sponsors and funding sources have the greatest authority and influence among competing expectations, or which stakeholders might impose special interest requirements that can inhibit progress. The exercises could also help program officials discern which users' requirements are sacrosanct and which operators' "needs" are really nice-to-have "wants." Overall, the wargame facilitates open communication between the program office and its stakeholders, and it gives stakeholders a better understanding of the trade-offs that must be made among the competing requirements and interests. Many offered solutions will be their own. This helps create genuine buy-in and support among stakeholders.

The Growing Importance of Strategic Leadership and Stakeholder Management

It is clear that new and expanded skill sets are needed to deliver complex programs. Following Booz Allen's research of the underlying causes of program issues, we also conducted an exhaustive examination of the capabilities that contribute to a program's success.⁵ One of the emerging themes from this study is that successful 3-D Program Management requires not just management capabilities, but also strong and mature leadership. For example:

- To establish the program's governance structure and leadership environment, agency leaders should acquire certain skills found in the world of corporate mergers and acquisitions, such as deal-making competencies.
- To manage stakeholder expectations, program managers require the coalition building skills found in campaign strategists.
- Beyond mechanically executing regulatory processes, acquisition and contracting functions

⁵ Booz Allen's research in the Integrated Acquisition Capabilities and the 2009 study, *Why Major System Acquisitions Fail to Meet Expectations—A Primer*, identified more than 40 key management capabilities directly attributed to program success.

need heightened levels of business acumen and deal-making abilities to craft and consummate today's complex contracts.

- The program manager's perspective must shift from oversight into insight, so they use techniques such as earned value management for proactive intervention (rather than for generating reactive outputs).
- Program managers must evolve from professional planners to skilled leaders who can make timely decisions with imperfect data.

Strategic leadership sits at the heart of 3-D Program Management because, above all, the program manager must devise and execute a comprehensive plan that addresses all of the dimensions of complex programs, particularly for managing the requirements and expectations of program sponsors, users, elected officials, and other influential stakeholders.

Conclusion

US civilian and defense agencies design, build, and deploy many of the world's most sophisticated systems. Federal program managers are among the best trained and prepared in the entire world, but the increasing complexity of government programs has multiplied the challenges and risks. As a result, even the most talented program officials often struggle to keep their programs on track.

The expanding, multi-dimensional nature of today's challenges requires program managers to adopt a new, 3-D Program Management perspective that brings the entire acquisition landscape into management focus. Doing so helps program managers see not only the wider range of problems, but also the wider range of tools and solutions that can be applied. It also helps them see the full set of interested stakeholders and devise a plan for forging collaborative relationships, soliciting innovative solutions, and directing a campaign that manages their expectations of the program more realistically. Finally, this new perspective

enables them to see the governing authorities and competencies they will need, which will be unique for each program. Consequently, as program managers execute traditional processes to manage cost, schedule, and performance baselines, they should also open a wider aperture on their management lens to ensure they achieve their ultimate goal: consummating an economic transaction between the buyer and seller that delivers products and services that meet stakeholders' expectations. A 3-D Program Management perspective can help program managers achieve that goal.

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Frank Koester is a Booz Allen Hamilton Principal. He is a leader in the firm's Strategic Innovation Group and the Rapid Prototyping and Platform Integration (RPPI) initiative that was chartered to expand the firm's business in hardware and software prototyping for Communications, Command, Control, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) solutions, additionally expanding the entrée into classified and commercial markets. Frank has more than 33 years of experience in the space industry, including a wealth of knowledge in operations, program management, engineering, and new product development.

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missions—as evidenced by the firm's many client relationships that span decades. Booz Allen helps shape thinking and prepare for future developments in areas of national importance, including cybersecurity, homeland security, healthcare, and information technology.

Booz Allen's cross-disciplinary expertise in program management includes systems integration, technology, strategic planning, stakeholder analysis and management, wargaming, and other capabilities for implementing 3-D Program Management to help US government agencies successfully manage and deliver complex programs.

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