Bridging the Gap

Dedicated Technology Transition Programs Accelerate Technology Adoption

Brad Pantuck

Dedicated technology transition programs can be highly effective and efficient at moving technologies across the "valley of death" from technology providers to acquisition. The programs that work best do this by facilitating alignment among the key stakeholders (developers, acquisition officials, resource sponsors, and users) and requiring a short timeline for completion, typically 2 or 3 years. By implementing these and a few other best

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practices, dedicated transition programs can produce high success rates that are essential for our nation to keep its technical edge and save operational costs during a period of constricting budgets.

Why Dedicated Transition Programs Are Needed

Three primary factors reinforce the need for dedicated transition programs. First, the multiyear acquisition planning process is inadequate for keeping our forces a step ahead of our adversaries; technology changes too quickly, and new threats emerge every day. While acquisition programs can and do integrate new technology, all too frequently the timelines and established processes of the acquisition system prevent new ideas that can improve capability or reduce operational costs from getting into the hands of the warfighters in a timely fashion.

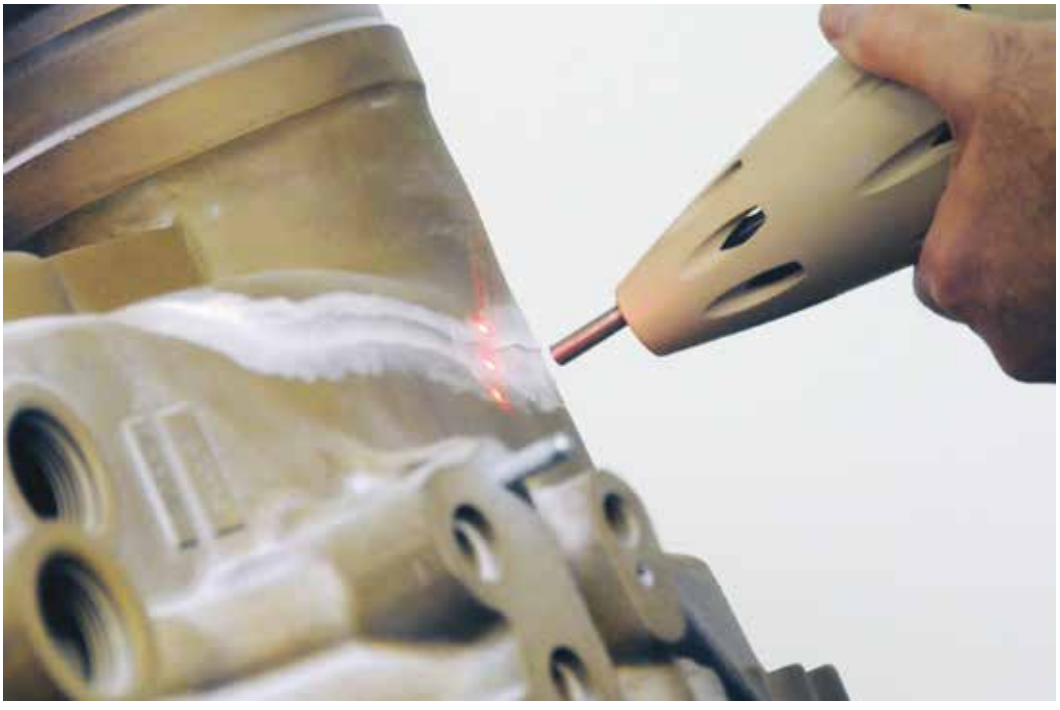
Another contributing factor addresses the "last hurdle" to adopting technology. Whether one is refining technology from military science and technology investments or adapting commercially available technology, some level of maturation, testing, certification and/or integration often is needed to transform technologies into useful military products and to ensure that the products successfully make it to operational users.

In addition to fielding technologies sooner, focused technology transition programs can be very cost efficient. First, a short time horizon (3 years or less) reduces the risks of requirement changes and technology obsolescence—increasing the likelihood that the technology will be fielded. Expeditious insertion also allows technologies intended to save money to achieve operational cost savings sooner. Lastly, because the funding for each effort in such programs is typically less than a few million dollars, the cost of failure is cheap. While success rates vary, in the best-managed dedicated technology transition programs more than 70 percent of the prototypes are in acquisition or fielded within 3 years of initial funding.

What Transition Programs Accomplish

Dedicated transition programs often are focused on either individual (stand-alone) devices or improving/replacing one piece of a larger platform or system. The output therefore is not a tank but an improved turret rotation motor; not an aircraft carrier but a high temperature-resistant coating for aircraft carriers' flight decks; not an F/A-18 but an onboard high-speed, large bandwidth network to connect an F/A-18's computer systems.

To help new technologies cross the finish line, OSD and the various Services designate funds for technology transition. According to the Small Business Technology Council of the National Small Business Association, there are almost 50 technology transition funding programs within the Defense Department, with 20 of those programs oriented toward accelerating transition. Some of these programs are focused on transitioning technology originating in military S&T programs; others are focused on adapting commercial technology; a few are agnostic regarding the technology source. Regardless of the technology's origin, each program's desired outcome is that better and/or cost-saving technologies are quickly integrated into end users' operations—expeditious fielding of technologies addresses critical capability shortfalls that can result in loss of life and/or failed missions.



An operator demonstrates repair of an AH-1 helicopter combining gearbox housing using cold spray technology, which enables repairs closer to the field. This will save the Navy $39 million over the next 7 years.

One example of a successful Department of the Navy short-term transition effort is a gearbox repair technology for AH-1 helicopters (see photo). It was funded by the Navy's Technology Insertion Program for Savings in FY 2011 ($1.8 million) and fielded at the beginning of FY 2013. Before this new cold-spray technology was transitioned, abraded AH-1 combining gearbox housings would be transferred to the depot for repairs and at least 50 percent would end up scrapped. This technology now enables maintenance personnel to quickly and cheaply repair gearboxes

Figure 1. Transition Venues

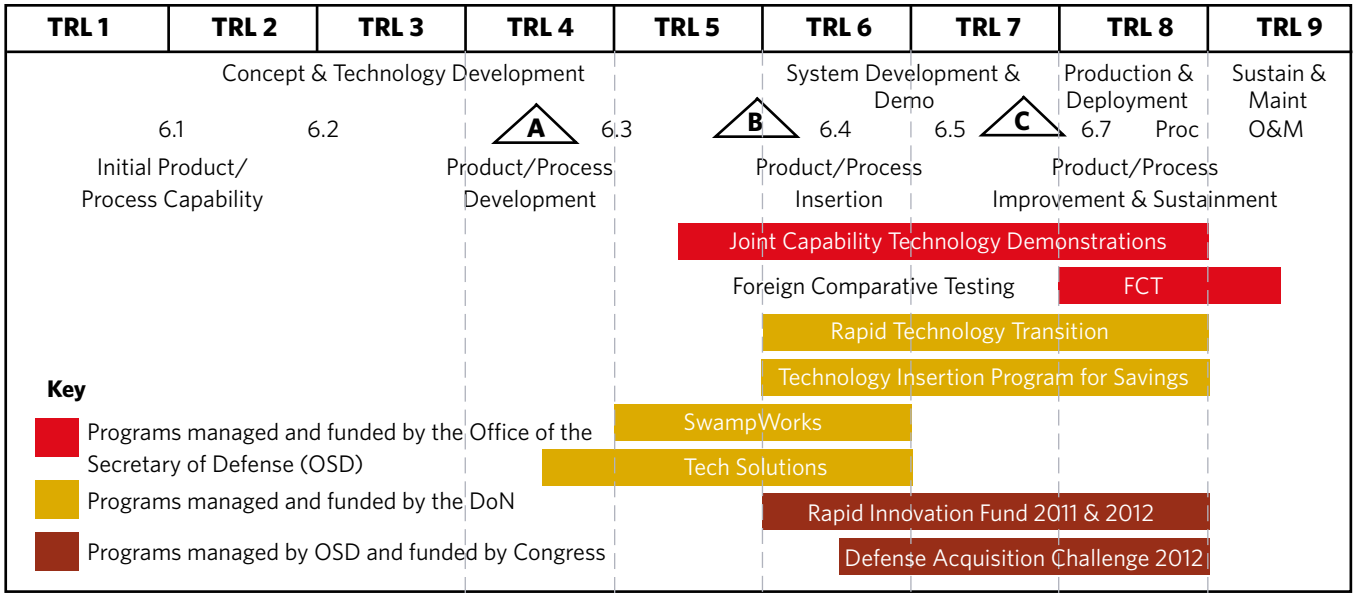


Figure 1 highlights some of the programs the Department of the Navy (DoN) uses to transition technology to operational users. These programs typically attempt to advance technology from a Technology Readiness Level (TRL) of 5 or 6 to a TRL of at least 7 or 8, a maturity level that, in general, presents acceptable technical risk for the acquisition community and is often achievable within 2 to 3 years.

closer to the field, decreasing scrap rates and increasing operational readiness. Originally anticipated to save the Navy $18 million, it is now projected to save $39 million over the next 7 years—a significant return on investment.

Another Navy transition project that targets an immediate problem is the Composite Patch Technology for Aluminum Structure Repair. The Navy faces substantial maintenance costs associated with stress-corrosion cracking in aluminum ship superstructures. The fiber-reinforced bonded patch that will be transitioned through this effort will seal cracks and provide structural support to resist further crack growth. When fully implemented, this technology is projected to reduce maintenance costs by $30 million across the CG-47 ship class within 5 years, compared to the crack welding approach currently used. The cost to transition this technology is $1.7 million.

The Future of Transition Programs

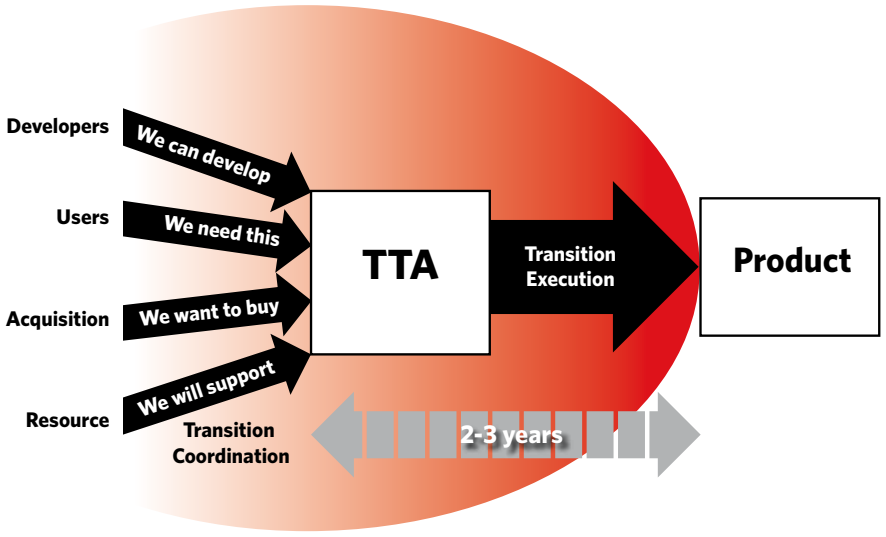
Recent appropriations decisions indicate a renewed focus on transition. For example, Congress, through the National Defense Authorization Act for FY 2011, created the Rapid Innovation Program (known within DoD as "Rapid Innovation Fund"), which focuses on transitioning technologies from industry into military systems within 2 years. The National Defense Authorization Act of 2012 contains provisions intended to increase the number of Small Business Innovation Research (SBIR) Phase III contracts issued, the final phase of the SBIR program which leads to transition. The emphasis on transition is not constrained to the military; the civilian sector recently adopted similar initiatives aimed at fielding technology sooner. In the past few years, Department of Homeland Security's (DHS) Science and Technology Directorate (S&T) has emphasized its Apex program, which aims to quickly transition high-impact technologies to DHS Components.

Given current environmental factors, there likely will be some changes to transition programs. With the wars in Iraq and Afghanistan drawing down, some programs may take a longer-term view, focusing on fewer technologies with a larger, longer-term impact. Given the need to cut overall costs, some transition programs may emphasize cost-savings technologies over those that increase capability. Because private sector developments outpace those of the government in areas such as consumer electronics, cyber-security technologies, and information technology, some transition programs may focus more on adapting technology originated outside of the government. Nevertheless, dedicated transition programs will continue to play a key role in fielding technologies.

Elements of a Successful Transition Program

The biggest challenge in technology transition is stakeholder alignment. The key partners in any technology transition effort—developers, acquisition officials, and users—have different cultures and incentives. Developers are incentivized toward optimism and risk taking, while acquisition officials are less risk tolerant and are driven by cost, performance, and schedule objectives. Developers tend to think in long time horizons, while acquirers have firm deadlines. Users are much more interested in practical utility than in technical sophistication and are concerned with having sufficient units available for deployment in the near term. "Wonderful" technology in some

Figure 2. Stakeholder Alignment



Transition Coordinators align the stakeholders to quickly produce a fielded product.

distant future has less value to the warfighter than "good" technology today.

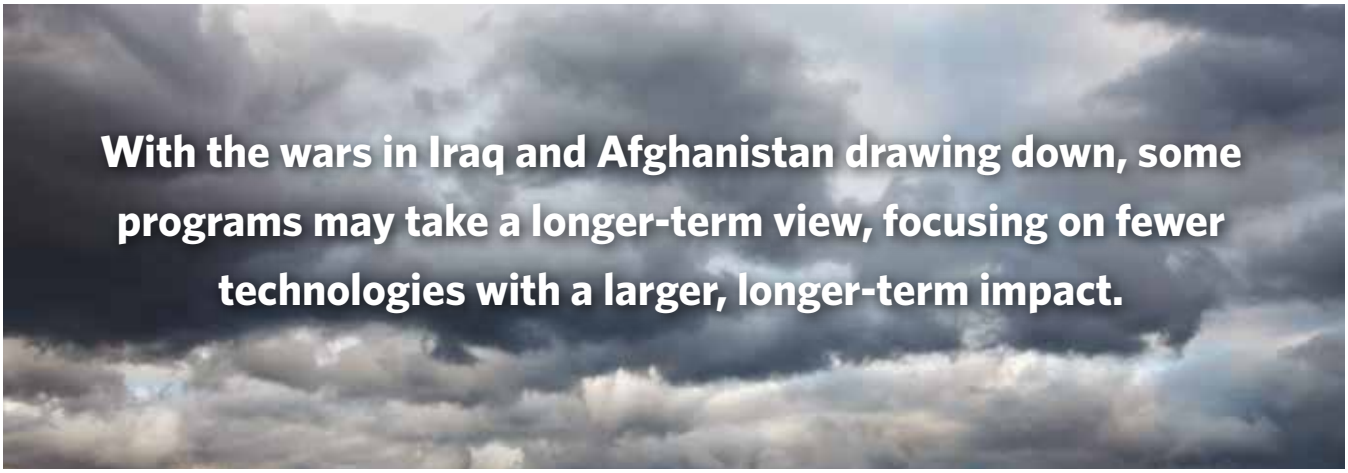
Successful technology transition organizations address this cultural diversity through a variety of "best practices." One of the most useful is to employ an independent team of coordinators who facilitate communications and reconcile differences among the disparate stakeholder communities. In such a coordinator or "relationship manager" model, these individuals guide the movement of technology from the development phase into the acquisition and production phase. At the beginning of the process, they work with developers to articulate a technology's business case, just as venture capitalists do with entrepreneur principals in startups. Then, they conduct the necessary technical, business, and programmatic due diligence to raise acquisition customer confidence and reduce risks to transition. Transition coordinators also establish resource sponsor and user buy-in, and facilitate and document agreements among the stakeholders, creating cohesion and accountability (see Figure 2).

Another best practice is to spend time and resources aligning the stakeholders early in the process. From the start, it should be clear that warfighters need the new technology, the acquisition community wants to buy it, the resource sponsor has the funds to pay for it, and the engineers/vendors can build it. Proper coordination at the early stages of transition helps developers avoid successfully demonstrating a technology only to find that neither the acquisition nor user communities are prepared to accept it.

Stakeholder engagement should culminate in a technology transition agreement (TTA), signed prior to the project's funding. The TTA describes the transition path and codifies the partners' agreements, binding them together for a common purpose. It typically includes the following components:

Technology Opportunity and Business Case: A description of the technology to be transitioned, including the scientific basis, the maturity of the technology, and how the technology will fit into any larger system. The business case presents the reasons for the acquisition, resource, and user communities' compelling interest in obtaining the technology, often by describing the comparative benefits of the technology in reference to alternate or emerging technologies in the same area. Focusing on one technical goal per agreement is an important way to minimize technical risk.

Scope of Work and Risks: A detailed list of the tasks to be performed, along with the attendant roles and responsibilities.



A composite patch repairs a CG-47 class ship's cracked aluminum superstructure. If successful, it will save $30 million over 5 years.

This ensures that a complete solution is achieved and supports resource project planning and management. Identification of the risks (technical, business, and programmatic) educates the acquisition and resource decision makers and provides a basis for risk mitigation plan development.

Recipient and Acquisition Cost: The organization and individuals that will receive the technology and their out-year integration and sustainment funding costs once the technology is transitioned. This allows the customer to plan ahead and budget for receiving the technology.

Milestones: Key events and dates that are identified to align the stakeholders and to provide for accountability and "off ramps" during the course of the project.

Seminal Transition Event and Metrics: A clear end point for the engineers who develop, integrate, and test the technology. Making the acceptance criteria transparent from the start reduces the risk that the approval authority will change its mind midstream.

Signatures from the Partner Organizations: A TTA signed by senior decision makers who are able to make commitments on behalf of their organizations. The TTA's goal is not to hold the organization legally accountable, but to drive awareness and commitment. If any one of the partners (developers, users, acquisition official, and resource sponsors) waivers in commitment, the agreement provides a basis for reengagement.

Once the TTA is signed, successful transition programs apply resources to monitoring. Transition coordinators identify and mitigate risks and obstacles (before they become roadblocks) on the path toward acceptance by the acquisition community and adoption by the user community. If milestones are missed or the receiving program's plans change such that the transition cannot be completed on time, the transition program can pull back remaining funds and reassign them to a project that will transition.

Conclusion

Successful transition programs align the key stakeholders to accelerate the adoption of new or cost-savings technologies. By increasing the speed and efficiency with which science and technology investments are exploited, they make maximum use of limited funding, a quality all the more important to our warfighters and nation at a time when resources are more constrained and every dollar must count.

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