BRIDGING THE TECHNOLOGY TRANSITION GAP

By Michael R. Riley

Whenever you look back in time and consider how new technology has played a critical role in providing our Navy a decisive edge helping to deter aggression or win battles, you may ask yourself, how did the developers do it? Our brave sailors and marines deserved the best, therefore new capabilities were developed for them such as shipboard gun sights, fire control systems, sonar, nuclear power, the integration of ships and airplanes, guided missiles, miniature systems, advanced materials, and stealth technology just to name a few. Our Warfighters had a need, and the need was met. It must have been easy, right?

The answer then must have been the same as the answer now: no, it is not easy. In fact, it can be very challenging even though it could be argued that it should be simple. The uncertainty and difficulties of technology transition have led to phrases like "the fog of transition," or the "Valley of Death" between Science and Technology (S&T) and acquisition programs. Private industry, academia, and government sponsored labs play important roles in new technology development, and organizations, like the Office of Naval Research (ONR), manage and direct technology development and transition with specific funding appropriated by Congress. However, the engineering design, integration, and procurement of warfighting systems are accomplished under different funding appropriations managed by Program Executive Offices and Systems Commands. This organizational divide and the different funding appropriations introduce challenges that bring to mind the valley of death illustration. If funding is not planned and approved for the transition of a new capability, the new product may languish in the "valley of (funding) death."

Yes, it is possible to transition new technology. Our current generation of ships, submarines, and aircraft stand proof enough. But at times, the fog of uncertainty and the need for organizational as well as individual teamwork challenges all who work in the industry. The obstacles that technology transition represents are sufficiently well known that on the national level, numerous books have been written about the strategic management of innovation and technology transition. S&T managers' guides have been prepared within the Department of Defense (DoD) to explain processes, identify organizational roles and responsibilities, and offer best management practices. In addition, focused programs have been established within DoD sponsoring the final development and validation of new systems ready to be transitioned to our forces. These combined resources provide a foundation that bridges the gap between relatively mature technology development to final acceptance for acquisition. Are the bridges easy to cross? Sometimes it may be a relatively easy process to transition a critical new technology, but more often than not, the bridges that have been built are still very challenging to cross. Knowing where program bridges are located is one step towards successful technology transition; understanding that these bridges were meant for teams of people to cross is another important step. Identifying several key transition elements can help make the crossing smoother. It is important to note that technical expertise and good communication skills are prerequisites to cross a transition bridge. Without these characteristics, the "fog of transition" becomes more like an iron curtain.

Element one is "critical need." Daily

newspapers remind us of critical needs such as the protection against Improvised Explosive Devices (IEDs). The more critical the need, the more likely a new technology will be transitioned. Often the word "critical" is used in a broad sense to infer a capability that provides a decisive military edge or reduces major cost drivers. Whether it is critical or not-so-critical, a military need is documented as a "requirement" that specifies a capability to achieve an end result. It answers the "why transition" question. Technology transitions, such as the ones intended to fill an unrealized requirement, are often referred to as a *technology pull*. To understand technology pull, one must be familiar with terms like, concept of operations, required operational capabilities, and top maintenance issues. If a new technology is not linked to a capability requirement, it is often referred to as a *technology push* and the valley of death illustration comes to mind. The challenge is then to communicate the projected new capability (the "what to transition" question) and seek a champion who can help identify a need met by the new capability. Persistence and fortitude are "technology push" allies in the requirements generation process.

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Another challenge adding to the fog of uncertainty is related to the "checks and balances" processes that regulate critical military need versus cost. More often than not, there are more critical needs than a prudent budget would allow. Some critical needs can be met, while other, perhaps less critical ones, must wait with the hope of a more favorable priority decision. This often conflicts with another dimension of the transition equation: time. Vital new technology must be transitioned more rapidly to keep pace with today's technological explosion in private industry.

Collaboration is the second key element in technology transition. When a new technology has been linked to a known capability gap, at least three-to-four willing champions must be identified, and they must be molded into a technology transition team. As key decision makers, a four member team brings to the table top-level decision authority in requirements generation and approval, budget approval processes, acquisition processes, and implementation by the end user. The top-level transition team typically relies on many other individuals to support the transition process. Depending upon the complexity of the new capability, the final team may include individuals from private industry and government with expertise in research and development, systems integration, acquisition, sustainment, test and evaluation, financial management, and security, just to name a few. It would be ideal to say that a high-level authority directs key decision makers to form a transition team to deliver a critical need. Although this can occur to meet critical battle front needs, technology transition often involves several champions that collaborate to form the transition team over time. Under these circumstances, the ability to explain, empathize, persuade, negotiate, collaborate, and adjust are crucial to success. The challenge is to identify the need and/or the benefit, as well as the right people needed to accomplish the transition, and to pursue the goal with passion and perseverance. The mantra in the real estate industry is location, location, location. In technology transition, the mantra is communication, communication, communication.

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WHO FORMS THE TRANSITION TEAM?

- Requirements Expert
- Budget Expert
- Acquisition Expert
- Validator
- End User
- Developer(s)
- Integrator

How do you implement technology transition? It helps to have knowledge of sponsored programs or technology transition venues that help bridge the transition from S&T to acquisition. A good source of information for several of these resource programs can be found on internet sites. Regardless of the need or the end goal, criteria for sponsorship under most of these venues focus on requirements and collaborative efforts between numerous stakeholder organizations. Most technology transition venues were not designed to be one-person foot bridges; by necessity, in a complex organization with diverse priorities, the bridges were built for groups of people to cross.

Another transition challenge is related to the maturity of the new technology. Mature technologies may transition quickly. For example, transition could be a relatively simple process for a new capability involving night operations, or transition of a new material for improved personnel protection. Successful prototype demonstrations and existing manufacturing capability could result in a very rapid transition. On the other hand, a good idea for a new capability not yet proven faces time and resource challenges to mature the product. Technology readiness levels (TRLs) have been defined as a best practice to facilitate resource allocation and transition planning. They address the 'when to transition' question. The size and complexity of the new capability may also be factors. A hand-held portable device that delivers an edge over an adversary may be easier to transition than a complex integrated system.

In the end, regardless of the process complexity or the size of the team, the speed of transition is always an important factor. Our sailors and marines deserve the very best delivered as soon as practicable. We must continue to focus on delivering advanced capabilities to them, so maybe the original question is irrelevant. "It must have been easy, right?" Perhaps it is good that it is not too easy. From the Warfighter's perspective, the "valley of death" serves as a natural selection process where only the best may transition. We should forget about foggy images and valleys of death, and simply focus on the end user. Maybe the original question should have been "It must have met a critical need, right?"

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