

On The Edge

Wayne Turk



When you're living on the bleeding edge, don't be surprised when you do, in fact, bleed.

While it had probably been around a while, the first time I heard the term “bleeding edge of technology” was about 25 years ago, when Lt. Gen. James Stansberry, the commander of what was then the Electronic Systems Division at Hanscom Air Force Base, used the term to describe some of the Air Force programs and projects being developed and tested there. It seemed very apropos at the time. The use of the phrase still brings a knowing chuckle. In our community, we know of too many times when we've stepped over the leading edge onto the bleeding edge and suffered for it. Sometimes we forget some of the breakthroughs and successes.

Bleeding edge refers to technology so new that it hasn't been sufficiently tested, so using it involves significant risks. It also refers to the fact that the latest technology is extremely expensive.

More Terminology

We'll get back to bleeding edge in a moment, but first let's look at some related terms.

Leading-edge (or cutting-edge) technology is usually the latest and greatest, but it is proven. We're reasonably sure we can count on it to work.

Trailing-edge technology is also proven technology, but it's been around for a while and has been surpassed by

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something else. Trailing edge can become inadequate and outmoded very quickly, if it isn't already.

Pleading-edge technology has been around so long that it is hard to get parts or support for it. You have to beg and plead for the help that you need. In today's terms, it would be technology at the end of the life cycle.

Bleeding-edge technology implies a great degree of risk. A technology may be considered bleeding edge under the following conditions:

- Lack of consensus—Competing ways of doing some new thing exist, and no one really knows for sure which way will turn out to be the best in the end.
- Lack of knowledge—Trying to implement a new technology or product that the trade journals haven't even started talking about yet.
- Some or all of the research could be classified.
- Industry (or government) resistance to change—Trade journals and industry/government leaders have spoken out against a new technology or product, but some organizations are trying to implement it anyway because they are convinced it's technically superior.

Pros and Cons of Early Adoption

The rewards for successful early adoption of new technologies can be great. From a DoD perspective, it can lead to weapons, sensors, software, or other technological advances that could save lives or increase our capabilities over our enemies or potential enemies. Some successful examples of using what was, at the outset, bleeding-edge technology: stealth technology, reconnaissance satellites, battlefield integration of information, the SR-71, and smart bombs.

Unfortunately, the penalties for betting on the wrong horse or choosing the wrong technology can be equally great. Whenever a program takes a chance on bleeding-edge technology, there is a possibility of being stuck with a current equivalent of the Betamax videotape recording format (for the young folks, that was the format that lost to VHS before VHS lost to DVD, which is now losing to TiVo and other digital technologies).

On the downside, bleeding edge technology can lead to failure, bad publicity, ill feelings, ruined careers, and wasted resources that could have been better used elsewhere. At the risk of stepping on some toes, here—*based on public perception*—are some examples of non-successes (I won't say failures): "Star Wars," NPOESS [National Polar-orbiting Operational Environmental Satellite System] Weather Satellite program, untold numbers of software programs, and the Navy's ill-fated A-12 combat aircraft. Some of these are still viable programs and may be great successes in the end, but the A-12 and many of the software programs are already in the

grave. There are others that have some perception of failure in the public eye even though they are fielded and functioning. Among them are the F-22 Raptor and the V-22 Osprey.

Now that many readers are aggravated and have quit reading this altogether or are already penning letters to the editor, we will move on.

When to Consider Bleeding Edge

Beth Cohen, in a January 2004 *SmallBusiness Computing.com* article, "Emerging Technology and the IT Lifecycle," came up with a set of questions for companies looking at the bleeding edge. I have adapted her questions and added more to fit DoD and the government acquisition community. Even so, they are just the start of the questions that have to be asked.

- Is there a significant problem that new technology has the potential to solve?
- How long will it take to develop? How long *could* it take?
- Do you have a clear and full understanding of how the emerging technology will work?
- Has it progressed far enough to justify the risk and the expense?
- Do the organizational cultures of the program office, the Services, and the eventual users support the use of this emerging technology?
- Do you have the qualified staff to plan and implement the project?
- Do you have access to staff with the skills required, or can you contract for them easily?
- How much will it cost? How much will it *really* cost?
- Will you be able to get the funding?
- What is the tolerance for failure?
- What is the tolerance for rapid change?
- What is the backup plan if the new technology doesn't work?

If you have good answers to most of those questions and others related to them, then you might consider bleeding-edge technology. If not, stick with more mature and proven technologies. The project can still go leading edge, just not over the line to bleeding edge.

DARPA as a Source

DoD has led the way in many areas of technology for years. In fact, the Defense Advanced Research Projects Agency was established in 1958 to look at just that kind of bleeding-edge technology. DARPA's mission has been to assure that the United States maintains a lead in applying state-of-the-art technology for military capabilities and to avert technological surprises from adversaries. DARPA looks at state-of-the-art before it actually is. Strong support from the senior DoD management has always been essential, since DARPA was designed to be different from our conventional military and research and development

structure and, in fact, to be a deliberate challenge to traditional thinking and approaches.

They've been pretty successful, too. Early in its history, DARPA developed ARPANET, the precursor to the Internet, and led research in the artificial intelligence fields of speech recognition and signal processing. DARPA funded much of the early development of virtual reality. Through their funding and direct work, they were in the vanguard of research and development of standoff weapons, much of today's C4I, many tactical armor and anti-armor programs, infrared sensing for space-based surveillance, high-energy laser technology for space-based missile defense, much of our antisubmarine warfare capabilities, advanced cruise missiles, many of the advanced aircraft designs, and defense applications of advanced computing. They continue to be a good source of tomorrow's technology. However, funding has decreased, so DARPA as a source may be somewhat limited.

DARPA has been the primary source for much, but not all, of the bleeding-edge technology for DoD in the past. Other sources include the Services, academia, and contractors. As long as someone can see how the new technology will benefit the warfighter, and as long as there are champions to fight for its use and people to make it practical, DoD will continue to be at the forefront of bleeding-edge technology use.

Bleed or Succeed

Going with bleeding-edge technology is—pun intended—a double-edged sword. You could be leading the charge to the future and reaping benefits for the users, or you could be wasting time on technology that will never happen. As that famous engineer and creator of apt quotes, Anon, said, "When you're living on the bleeding edge, don't be surprised when you do, in fact, bleed." Remember quadraphonic sound, a technology that was going to replace stereo but never did, dying a slow death in the late 1970s?

Bleeding-edge technology has great potential, but the risks are high. It can be a huge waste of time, effort, and money. But if it is successful, the benefits can be just as great or greater. Weigh the risks carefully. Consider what will happen to the end users, to the program, and to the people involved if it is unsuccessful. Are the benefits and costs worth it? Be realistic in the considerations. Wishes are not reality! If the benefits are worth it, move forward, but also try to keep a backup plan. With bleeding-edge projects, there will always be some failures. But there will also be some pretty spectacular home runs.

In fiscal 2006, the Navy reduced its DFAS processing fees by over \$9 million by realizing the electronic processing rate and stood to save an additional \$11 million for those invoices that were eligible but not processed through WAWF.

WAWF also provides reduced prompt payment interest penalties through improved cycle times. The ability to pay contractors within the specified payment terms (typically net 30 days) significantly reduces the interest penalties incurred. The interest paid for Navy invoices processed manually is more than \$300 per million. For invoices processed through WAWF, the interest incurred to date is 12 times less, at just under \$25 per million.

On the Horizon

Beyond the cost and time savings, WAWF has transformed the way the DoD tracks and manages inventory. Contractors have the ability to input RFID and UID information when creating shipping documents, which allows the Navy to track an entire shipment or even to locate a specific item within a shipment as it travels to its destination. Government-furnished property can also be managed using WAWF, allowing the DoD to locate and account for its own property as it is transferred between different contracts or locations. WAWF allows the DoD to continue its transformation to just-in-time inventory management (a system in common use in the private sector), allowing for significant savings in inventory storage and handling costs.

The WAWF program is continuously looking ahead to improve on system functionality and to enhance benefits. For the Navy, this could mean future automated acceptance and asset visibility even further into the supply chain, facilitating better support for the warfighter where most needed—on the frontlines. The increased transparency of accounting processes facilitated by WAWF is also an integral part of the Navy's financial improvement plan. The standard data, transaction sets, and interfaces on which it is built help drive the DoD Business Transformation Agency's objective to deliver enterprise-level capabilities aligning with the warfighters' needs.

As WAWF is implemented across the Navy, the goal of achieving a more standardized Navy accounting system for all transactions is becoming a reality as the Navy targets its goal of 100 percent WAWF usage by the end of fiscal year 2008. The successes to date indicate that the Navy is more than up to meeting this challenge head on.

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