

COL Kurt S. Story

Deputy Commander for Operations
U.S. Army Space and Missile Defense Command/
Army Forces Strategic Command



Human Understanding Necessary in Technology Equation

I am very excited to be stationed back with the SMDC/ARSTRAT team. I want to make a difference working with the entire team supporting the warfighter in the current fight and evolving Space and missile defense operations for the future fight.

In 1988, aeroscout weapons teams from the 11th Armored Cavalry Regiment flew along the interzonal border separating East and West Germany. The pilots used folding laminated maps in their laps for navigation. They employed line-of-sight FM radios to provide position reports to the Regimental Border Operations Center – blue stickers were manually placed on a map in order to provide situational awareness. No one wanted to inadvertently cross the border and create an international incident.

GPS sure would have been nice.

Fast forward 20 years to 2008 – we no longer have analog cockpits, but digital “glass” cockpits with moving map displays, GPS navigation, blue force tracking, digital burst spot reps, and non-line-of-sight satellite communications. Advances in technology are a marvelous thing. What an improvement.

As you read this edition of the Journal and articles in other publications on technological advances, I would like you to consider the following ideas.

- Technology will never replace the human brain and the art of war;
- Don’t oversell what Space-based technology can deliver
- Never stop looking for technical solutions that have a tangible benefit to the warfighter.

T echnology enables decision making, but technology does not make the decision!

No Replacement for the Human Brain and the Art of War

Technology enables all we do, but it can't replace the human brain's ability to adapt and react. This idea was highlighted in COL H. R. McMaster's 2003 U.S. Army War College Student Issue Paper. He writes: "Flushed with victory and impressed with American technological superiority, many believed that new technologies in the areas of surveillance, communications, long-range precision weaponry, and stealth made possible a new way of waging war. An emerging thesis of future war depended on the unfounded yet widely accepted belief that sensors, communications, and information technologies would generate near-certainty in armed conflict."

While he lauds information technologies and robust communications that allow collaborative planning, joint integration, common operating pictures, extensive intelligence preparation of the battlespace, and decentralized execution, he says that no technology or computer simulations can "remove or even reduce . . . principal sources of uncertainty in war." As you know, in Iraq and Afghanistan, coalition forces have encountered an innovative and ever-adapting adversary that continually frustrates the desire for certainty.

Many factors interact to set the conditions of war. It is impossible to achieve certainty or guarantee outcomes based solely on technology.

I don't I think I could put it any better than Marine GEN J. N. Mattis, U.S. Joint Forces Command commander, did in his memorandum to his staff on "Assessment of Effects-based Operations," dated Aug. 14, 2008. In that memo, he writes: "Technology and training are key enablers to gain advantages over our adversaries, but no amount of technology or training will enable us to accurately predict the reactions of complex systems. The enemy's free will, manifested by courage, imagination, resolve and other human factors deny predictability in most aspects of war. We must use focused training and technology-enabled solution or problem solving techniques to enhance initiative, pattern recognition and decentralized decision-making."

Stated simply: Technology enables decision making, but technology does not make the decision!

As Space professionals we need to recognize that all the technological capabilities we bring to the battlefield cannot entirely remove the uncertainty and fog of war. We need then to train ourselves well in our warrior tasks and the art of war, be prepared to adapt, and to use the technology to support the commander.

What? Don't promise what you can't deliver.

Don't oversell/overpromise what technology can do at this moment in time. A corollary to this is the old axiom: "If it sounds too good to be true, it probably is."



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One of the problems plaguing our troops in Iraq is the Improvised Explosive Device. We want to conquer this threat and acknowledge that our desire to find a solution might lead us to believe in a technological promise that can't deliver. One idea to counter the Improvised Explosive Device threat is that unmanned aerial vehicles can patrol roads that are susceptible to being mined. Sound good? What if the unmanned aerial vehicle can't fly because of weather or lack of good GPS signals? The enemy just needs to wait until conditions prevent the drone from flying. So we need either a different solution or a backup plan. If we believed that the unmanned aerial vehicle was the only solution to the exclusion of others, we'd put our people at unnecessary risk.

Because so much is at risk – like the lives of our people and success in battle – we need to layer capabilities, plan options and continually look for solutions,

Keep Looking for Capabilities with Tangible Benefit to the Warfighter

Keep looking for technical solutions with tangible benefits to the warfighter. Let me close with a story that John Marrs told at his retirement ceremony that, for me, goes to the heart of technological developments.

First, someone has to have an idea and a mechanism has to exist to develop and test it, and two, it has to show a “tangible benefit to the warfighter.” John Marrs had 33 years of Federal Service culminating as the Technical Director for Army Space Command; and finally as a member of the Office of the Chief Scientist, SMDC/ARSTRAT. His

story related to his involvement in one early accomplishment: the development of the Small, Light-weight GPS Receiver (SLGR). As you know, this is the device that let 7th Corps complete the “left hook” through the trackless desert into Iraq in March 1991. He said that in 1987, some funds provided to the NAVSTAR/GPS Program Office had been designated to “do something by encouraging commercialization” with this new positioning capability. But the element that had the funds didn't really have an idea of how the military might use it or benefit from such an effort.

The capability could have died right there, except that the staff at the Army Space Institute thought they had an idea of how Soldiers could benefit. With the active encouragement of COL Ronan I. Ellis, the Army Space Institute commandant, the Institute got the funds, worked with the developer to come up with something that could tell the Soldier where he was and was light and small enough for a Soldier to carry in his battle dress uniform thigh pants pocket.

John said that he wasn't sure they actually accomplished the latter specification, but the new device (built to commercial standards) was workable enough that Army Space Institute and Army Space Command began field training demonstrations testing it out in 1988-89 as part of the Army Space Exploitation and Demonstration Program. The SLGR proved so useful in those demonstrations that even before units were notified in late 1990 that they might deploy for Desert Storm, everyone from sergeant tank commanders to division commanders were

calling Army Space Command to get their hands on them. Eventually the Command provided 800 SLGRs to deployed units and orchestrated the urgent purchase of 10,000 off-the-shelf commercial GPS receivers which were then allocated across the deploying forces by the Deputy Commander, 18th Airborne Corps.

Someone had an idea, others saw potential for the capability and were willing to take it on and test it out to determine whether or not it had “tangible benefits for the warfighter.” FA40s can be the “point men and women” spotting, advocating, and testing that technological something that may become the next advance that will enable warriors like the SLGR did.

Conclusion

Technological advances can make our lives easier and enable the success of our missions. Think of global ballistic missile defense sensor integration, fusion of blue force tracking data from multiple systems into a common operating picture, portable phones shrunk from 5 pound boxes to light-weight pocket-sized cell phones with classified capabilities, computer drives with gigabytes of storage Space; and systems that are more user-friendly such as e-mail and intranet collaborations, just to name a few. None of us want to return to the days of horse-drawn artillery or laminated maps in our cockpits.

As we embrace these advances and recognize that all technology has its limitations, we remember that it is a tool for us to use and is no substitute for human decision making abilities. Too, we need to understand the limitations so that we don't oversell what today's technology can do. And someday as we keep looking at new ideas and inventions, we may discover the solution for that limitation and it will significantly benefit our warriors. 

to develop the concepts and technologies to support Operationally Responsive Space. Presently Space systems' development and acquisition is a painfully slow process that often takes a decade or more from initiation to an operational system on orbit. The current processes are slow to the point of being unresponsive to the nation's rapidly evolving military operational needs. The Operationally Responsive Space concept is a fundamental change in thinking about how to best use and exploit Space technology for military operations. The goal of the Operationally Responsive Space project is to rapidly develop and deploy Space capabilities in a timely manner so that operational commanders' requirements will be met. Furthermore, SMDC/ARSTRAT is working within the Army and Joint Space Community to develop new capabilities for Theater Missile Warning, Battle Space Characterization and Space Force Enhancement. Changes in technology offer the opportunity to significantly enhance our present capabilities in these critical mission areas. SMDC/ARSTRAT's goal remains to continue to develop, refine, and integrate new Space and missile defense technologies into our Army in order that our Soldiers and forces are able to exploit our nation's Space and missile defense capabilities to the fullest.

Whether or not technology and its ever increasing rapid advance are good or bad is subject to debate. What is clear and not open to debate is the fact that rapidly changing technology is affecting our lives, our institutions and in particular the Army. The Army cannot afford to ignore changes in technology but must effectively integrate them into the force in a holistic manner. As you read this issue of the Army Space Journal, please take note of the technological advances and issues highlighted within that are impacting our Army. Also take note of the unique role that SMDC/ARSTRAT has in developing, expanding, and integrating Space technologies for both the Army and Joint Force. 

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