Keeping the Space Edge ...

Leveraging commercial Space technology for military uses

By Adam Aberle

Adam Aberle spent five years working at the U.S. Army Aviation and Missile Command developing laser systems and data processing techniques. In 2000 he transferred to the U.S. Army Space and Missile Defense Command where he specializes in infrared and hyper-spectral sensor systems. His interests include Space exploitation and near-real-time data processing.

The commercial Space industry is expanding at a rapid rate. Spending in the commercial Space industry between 1995 and 2010 will top $100 billion. This large commercial push for placing satellites in Space combined with the limited Department of Defense (DoD) Space budget makes it difficult for the military to keep pace with the latest and most advanced commercial capabilities. Rather than trying to go toe-to-toe and match commercial spending in Space, an alternative for the U.S. military is to leverage this incredible commercial investment. For example, DoD and the intelligence community increasingly rely on satellites for reconnaissance, surveillance, early warning of missile launches, weather forecasts, navigation, and communications. The increase in commercial Space capabilities is allowing DoD to carefully weigh which multibillion-dollar Space systems are affordable. Dedicated military Space systems are not likely to be procured when suitable commercial systems are available. Commercial placement of satellites in Space focus in four major areas: communications, remote sensing, imagery, and navigation. Each of these focus areas provides the military with a significant opportunity to leverage the commercial investment in Space.

Often called the first "Space war," the Persian Gulf War (1990-1991) is a perfect example of how these commercial Space capabilities are leveraged. Commercial sources such as INTELSAT (Inter-national Telecommunications Satellite Organization) provided more than 45 percent of all communications between the theater and the United States. LANDSAT (Land Remote Sensing Satellite), French SPOT (Satellite Pour L'Observation de la Terre), and advanced very high-resolution radiometer satellites provided much of the imagery information used to develop military plans. Space-based sensors furnished detailed battlefield information to commanders and staff.

Civilian communication satellites have been primarily a private sector activity since the passage of the 1962 Communications Satellite Act. In 1984, by passing the Land Remote Sensing Commercialization Act, Congress continued to facilitate the commercialization of land remote sensing satellites by privatizing the government's LANDSAT program. The Land Remote Sensing Policy Act of 1992 brought LANDSAT back under government supervision at the same time that it promoted the development of new systems by the private sector.

With strong, continuous congressional backing, several U.S. companies initiated programs to build remote sensing satellites and offer imagery on a commercial basis. The National Oceanic and Atmospheric Administration manages the operating licenses for these private remote-sensing endeavors. In September 1999, Space Imaging built and successfully launched the Ikonos 2, the first commercial imaging satellite.

But it's not our Satellite

The United States is not the only country with imagery satellites in orbit. Other countries with imagery capability include France, Russia, India, China, Israel, and the United Kingdom. This proliferation of imaging and other Space-based capabilities has caused tension between the military and commercial sectors. The military has concerns about the resolution and quality of commercially available Space products and their potential use by adversaries. The challenge is for the United States to maintain its decisive advantage in Space.

The military's strategic vision is set forth in Joint Vision 2010. Information superiority, one of the key enablers for full spectrum dominance, is summarized as "the capability to collect, process, and disseminate an uninterrupted flow of information." Commercial satellite systems will be essential for gaining and main-

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Beyond the technology prototype phase comes the real work (and funding driver): the Research, Development, Test, and Evaluation phase.

SMDC has an Army unfunded requirement for FY05 to advance the SISP beyond the technology prototype and will submit a robust cost estimate for the FY06-11 budgets. Architectural trades will be pursued to ensure that the SISP architecture is compliant with the Army future direction for Space systems.

Political or Nontechnical

The concept of a SISP to overlay the common air, ground, and maritime pictures has gained support to such an extent that several contractor and military organizations are proposing their own SISP development effort. The downside of this support is predictable when recalling all the years, dollars, and heartache (friendly fire) that have resulted from the various dissimilar development attempts toward a common, interoperable air picture. History will repeat itself as every organization rushes to "build their own" SISP-like capability and interoperability flies out the window. The only way to preclude this is for a knowledgeable person with sufficient financial and political clout to mandate that all SISP and SISP-like development attempts be jointly managed.

But this is merely one facet of the problem: others include contractors lobbying to ensure their business goals are not affected, organizations withholding vital information for constructing a SISP, organizational battles, etc. Perhaps the biggest hurdle is convincing users and battlefield commanders to pull the man-in-the-loop out of the analysis and decision-making process and let an automated SISP capability provide this capability.

Future

The SISP concept prototype has all the right ingredients to achieve true interoperability, provide Space surveillance and situational awareness to the Space operators and commanders, and provide a framework for execution of Space operations, testing, training, exercises, etc. Couple volumetric display technology with intuitive, user-friendly commands, throw in some immersion technologies, a sprinkle of biometrics, and the SISP is a recognizable achievement, akin to the one first used by Captain Kirk aboard the Enterprise.

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taining information superiority for all future activities from major theater wars to small-scale contingencies. The ability to collect and disseminate timely, relevant information to the Soldier on the ground will continue to be a determining factor in mission success.

Today the military relies on a wide variety of commercial Space products and services with the heaviest concentration in the imagery and communication areas. The military currently uses the commercial capabilities in both of these areas for training and operations. The resources used for training provide vital information and capabilities for conducting operational planning and military operations as directed by the President and Secretary of Defense. Since the military philosophy is to "train like you fight," the sudden loss of critical information to support war planning and execution would significantly diminish military effectiveness.

Space will be critical to providing fully capable operational forces of the future. We must be ready to operate in an environment with limited or non-existent communication infrastructure, in areas where little precision mapping has occurred, and in vast expanses where continuous overhead intelligence collection will be key to real-time situational awareness. These operational requirements will place a premium on commercial satellites to provide some to all of the communication, remote sensing, imagery, and navigation capabilities.

Unfortunately, the ability to leverage commercial capabilities for military benefit has both a positive and negative side. On the positive side, the commercial market allows the military to reduce costs by acquiring commercially available products instead of building separate satellite systems for the same purpose. On the negative side, the military must share the commercial satellites with commercial customers. Also, there are limited restrictions on commercial satellite company customers. It is now possible for our adversaries to have access to similar information and capabilities as our own, thereby decreasing our advantage. Additionally, commercial satellites can be more vulnerable because they do not have the same level of protective measures as military satellites.

The military increasingly relies on satellites for the conduct of training and operations. As the availability of commercial Space products increases, the military reliance on commercial products for communication, remote sensing, imagery, and navigation capabilities will only continue to grow. Simultaneously, the military must also strive to ensure that the quality and durability of the information meets military requirements and warfighter expectations. In the long run, however, the real challenge will be for the military to maintain its Space edge with the proliferation of commercially available Space products to all potential adversaries.

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