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The Army's Future in Space

What the Army can do for Space

We want you to know
This Journal's for you

You might wonder what a 100-year-old comedian has in common with the high-tech world of Space and its future. One word: Tourists.

In 1988, that is what Bob Hope called these 2,000 soldiers gathered around his makeshift stage on that cool Monday morning in May not far from the Demilitarized Zone dividing the two Koreas. It was Warrior Base and the soldiers belonged to the 2nd Infantry Division. At the time, these soldiers were part of the Army's most forward deployed infantry division. The scene was similar to any of the hundreds shown in news clips commemorating Bob Hope's life; scenes of the man deadpanning to laughing, stressed-but-now-relaxed American soldiers in life-or-death locations around the world.

One thing missing in this South Korea setting with Bob Hope and his troops: There were no TV cameras or movie production crews. This production for these special soldiers would never be aired on national television. Clips of these moments would never make any of the specials highlighting Bob Hope's life or career. Yet right there in the grassy South Korean hillside, Bob Hope created the same connection between him and his soldiers that is obvious in all those video clips from 1941 and on.

What led to all this was that Bob Hope, Brooke Shields, Gloria Estefan and the Miami Sound Machine came to South Korea to film a Pre-Olympic Special as publicity for the 1988 Seoul Olympics. So, in Seoul the night before this impromptu event near the DMZ, Hope and his entourage performed for a huge crowd filling the Seoul Olympic Stadium. The show was taped for later production and broadcast. The plan — after weeks and months of planning — was for that Seoul show to be their only performance. Something changed in the night, though. After the planned show, Hope asked US Army leadership in Korea if he could visit troops on the DMZ before heading home. So, at six o'clock the next morning — the Seoul Show ended around midnight — five blackhawks lifted off from Yongsan and headed north with the Hope gang.

Let's just say that skirt-clad Brooke Shields and Gloria Estefan were immediate hits walking on the sandbag-lined walkways as they made their way with Bob Hope, passing the drab Army tents and bunkers. One or two soldiers were able to figure out how to get a rose to present to each of the ladies in the short time they had to prepare for the visit. Most just presented the two with the BDU shirts off their backs or BDU caps off their heads for autographs. But it was the then-85-year-old Bob Hope who climbed the wooden stage and made these soldiers laugh.

All this came to mind as we prepared the final layout for this latest edtion of the Army Space Journal. And the word "tourists" kept popping into my thoughts. Unsolicited, I received an email the day after Bob Hope passed away from MAJ Bob Zaza, a member of one of our Army Space Support Teams deployed. "News of Bob Hope's death was briefed at the CG's evening BUB (Battle Update Brief) here in Afghanistan. ... He started entertaining US soldiers before the United States's entry into World War II, when there was no money or prestige in doing such a thing (March Field Performance, May 6, 1941). Just a great man doing a good thing for American soldiers."

Even as I write now the only joke I remember him saying in South Korea, it doesn't sound funny. "Age doesn't mean a thing. It's how you feel about yourself. When I wake up in the morning, I don't feel my age, I feel like I've got to take a nap around noon." But it was funny. Maybe it was because he bridged gaps. Later and after my dad passed away, I watched a special on Bob Hope's life. He spoke of talking to Marines on Camaroon just before the 1st Marines with the Army's 81st Infantry Division in reserve attacked Pelelieu in April 1944. Teary-eyed, he recalled how most of those Marines who heard his jokes there later died in the attack. My dad was with those Marines on Camaroon and was one of those Army soldiers who survived following the Marines in the bloody fight for Pelelieu.

I will always remember Bob Hope opening his show with the "Warriors" of 2nd Infantry Division by telling them they were tourists in the area. I will always remember him closing with "Thanks for the Memories." Mostly, I keep seeing him take that bow at the very end and hearing him say, "Thank you, thank you, tourists."

Bob Hope represents the enduring human side of what we do in Space and throughout the Army.

— Managing Editor

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the Army Space Journal

Summer 2003 Edition

Contents

Tracking . . .

SMDC on track to provide full range of strategic, operational, and tactical space capabilities to future force

LTG Joseph M. Cosumano Jr., Commanding General, United States Army Space & Missile Defense Command

By LTG Joseph M. Cosumano Jr.

John Schaar, the futurist, once wrote, "The future is not a result of choices among alternative paths offered by the present, but a place that is created — created first in the mind and will, created next in activity. The future is not some place we are going to, but one we are creating. The paths are not to be found, but made, and the activity of making them, changes both the maker and the destination." Although this eloquent statement was not specifically written to describe the implications for the Army's future role in Space, it does have great relevance for what the future can be … one full of great challenge and excitement.

The Present is Prologue to the Future

Before turning to the Army's future in space, it is meaningful to briefly recap our recent accomplishments. During the past three years, the Space and Missile Defense Command has been instrumental to the Army's, and the Nation's, role in space. SMDC soldiers deployed overseas and here at home on the front lines of the global war on terrorism and Operation Iraqi Freedom. We activated the 1st Space Brigade (Provisional), the highest-level Army unit with the word space in its name. The Army Space Program Office has been transferred to the PEO — Air, Space and Missile Defense, whose name was expanded to include space to give the Army a focal point for space-related acquisitions. We have also taken great strides in implementing the president's vision regarding the Ballistic Missile Defense System (BMDS) and creating the architecture for effectively integrating theater and national missile defense, which because of its global nature, is highly dependent on space for its ultimate success.

And we are restructuring our headquarters functions to better execute the command's new role as the Army Service Component Command (ASCC) to U.S. Strategic Command (USSTRATCOM). As such, SMDC has been presented with significant opportunities in the planning and coordination of all Army support in the new unified command's mission areas of Space operations, global strike, global information operations, global integrated missile defense, and global C4ISR. As the Army service component, we will take the leading role in integrating space into all Army support to the combatant commanders and throughout the Army, as Space is part of the foundation for all these new global missions.

These accomplishments, only to cite a few, are clear testimony to the great relevance and contributions the Army has provided to the space effort. We will not, however, rest on our laurels.

Looking to the Near Future

Looking to the near future, we will very shortly activate a Ground-Based Mid-Course Missile Defense Brigade and Battalion (GMD). This unit will assume command and control of the new GMD segment of the overall BMDS, which will employ layers of boost, midcourse and terminal missile defenses to protect the continental United States from the threat of a limited missile attack. We will also soon convert our 1st Space Brigade and Battalion to the first MTOE space units in the Army. And we are restructuring our headquarters functions to better execute the command's new role as the Army Service Component Command to U.S. Strategic Command (USSTRATCOM). All of this is, of course, in addition to our continuing missions of providing space support and expertise to the warfighting commanders; and our combat and materiel development, experimentation, analysis, and research and development activities that have put so many new technologies and products into the hands of our soldiers. Working in conjunction with other members of the national security space community, SMDC is on track to provide the future force a full range of strategic, opera-

Enabling ground commanders to operate on their own terms, at the time, place, and method of their choosing, robustly supports the Future Force to see first, understand first, act first, and finish decisively. These capabilities have been vividly demonstrated during recent combat operations, and will be shown to an even greater degree in the future.

tional, and tactical space capabilities.

Roadmap to the Future

In April 2003, we sharpened our vision of what space must do for the warfighters of the Future Force, when the Army Space Policy was approved by the Secretary of the Army and Chief of Staff, Army. This updated policy articulates the vital contributions space systems provide to national security and military operations. It also expresses the future as "a seamless space-to-soldier continuum of sensors, networks and information [as] the signature characteristic of well-integrated space with land force and joint operations." The Army views space as a vertical extension of the battlefield and an integral part of the battlespace, truly the new high ground for military operations.

Integration of space force enhancements contributes to the ability to achieve the information superiority and full battlespace awareness necessary for full-spectrum dominance. Enabling ground commanders to operate on their own terms, at the time, place, and method of their choosing, robustly supports the Future Force to see first, understand first, act first, and finish decisively. These capabilities have been vividly demonstrated during recent combat operations, and will be shown to an even greater degree in the future. Clearly, the Future Force will provide combatant commanders with systems and capabilities far beyond those currently in use.

A few Predictions for the Future

While much is unknown about how we will leverage space in future wars, it is almost certain our reliance on space will grow considerably. Here are some predictions on how we will use Space in the future.

- Many current ISR capabilities on manned aircraft will move to Space, however, not as many as we once thought because I think many now will migrate instead to multifunctional UAVs that are cheaper to operate and maintain, and easier to directly control.
- Every soldier will have access to satellite communications.
- We will know "real-time" where our soldiers are and Blue Force Tracking via systems like Grenadier Brat will become the norm.
- Nearly all (if not all) of our missiles and bombs will be guided by GPS.
- All personnel will be trained in the basics of space.
- Potential adversaries, recognizing our dependence on space, will develop and deploy systems to attack our space assets, associated ground elements, and the links between them. Therefore, we will have to develop appropriate defenses.
- To ensure we control the new high ground of space — just as we currently control the airspace and the seas — we will develop and deploy numerous space-control systems.

Conclusion

In 1952, Dwight Eisenhower, the 34th President of the United States, said, "Neither a wise man nor a brave man lies down on the tracks of history to wait for the train of the future to run over him." Significant events overseas and here in the United States over the past three years have brought home the insightful meaning of President Eisenhower's words. From the days of being the first service in space, to becoming the first service in missile defense, and now taking on global responsibilities, SMDC is carrying on its tradition of providing trained and ready soldiers and "space age" technological advances. The men and women, soldiers, civilians and contractors of the SMDC family continue to lead the way and look forward to serving as the Army's premier space activity as we Secure the High Ground.

Newcomer's View

Space-based capabilities critical to warfighter's "seeing, understanding and acting first"

BG Robert P. Lennox, Deputy Commanding General for Operations, United States Army Space & Missile Defense Command

By BG Robert P. Lennox

When I arrived at Army Space Command two weeks ago (from the writing of this article), my experience with Space-based systems was as a user, not a provider. My Air Defense units depended on early warnings from Joint Tactical Ground Stations that rely on Space-based systems for their alerts and communications. My S2 (Intelligence) and S3 (operations and plans) depended on information and intelligence that was gathered through and disseminated by Space-based systems. I was like the man who when he turns on his computer, he expects it to work; he doesn't need nor necessarily want to know how it's put together or how it works. Space? Sure, I wanted what it produced, and I wanted the products when I needed them. In short, I think I was a typical Army officer. I don't say this with pride; it's just a fact.

After two weeks I have a much better appreciation for the vast capabilities and support Army Space operators bring to the fight. Now, I'm in a position where I want and need to know how the Space-based systems fit together, enhance each other, create synergies with other systems, and what each does to enable warfighting. Operation Iraqi Freedom has made it abundantly clear that for our joint warfighting doctrine to succeed and for our Army Objective Force to be effective, we will need to have assured Space-based capabilities. "Assured" is the operative word. As the biggest user of Space-based capabilities, the Army's future, not just one command's, but the entire Army's, is in vigorously pursuing assured Space access at every opportunity.

BG Rick Geraci, then U.S. Army Space and Missile Defense Command (SMDC) deputy commanding general for operations, and COL Glen Collins, Director, SMDC Force Development and Integration Center, laid out the Army's Space operations "high payoff areas" for GEN Eric K. Shinseki in January 2003 while he was the Army's Chief of Staff. SMDC believes these areas are essential to fully integrating Space operations into ground military operations: (not in order of priority) Space-smart leaders; ground-based Space control capabilities; integrated timely, accurate, responsive Space systems linked to tactical and operational forces; interoperable with United States, foreign, and commercial Space systems; Space support elements that are organic to divisions or units of action and units of employment; global, 24/7/365 communications; jam resistant position, navigation, and timing; and timely, accurate digital terrain products. While I don't have all the answers, I would like to share my initial thoughts on what the Army and this command need to do for the future of military Space operations by discussing just two of the "high payoff areas."

SPACE CONTROL — Assured Access

As I mentioned above, warfighters need assured access to Space-based capabilities if we expect our new fighting doctrine to win by "seeing, understanding, and acting first." Our Space systems are reliable, but we can no longer assume that the United States will maintain its Space superiority. Commercial companies and foreign governments can offer many of the same services and access to Space that were at one time available only to the United States and its military. At the same time, adversaries cannot help but observe our dependence on Space and the potential vulnerability it represents if they can somehow attack our Space systems. As a result, the Army will need to become more actively involved in Space control to assure us access to our Space systems and denial of the same to the adversary if needed. Because Space control can involve air, sea, and ground elements, and because Space is a joint arena, the Army will need to think about its Space control role as the ground component and how it integrates with the Air Force and Naval forces in joint warfighting.

How do we ensure Army Space equities and requirements are considered and honored?

Through education and experience, the number of warriors who understand more than how to "turn on their computer," or who turn to their Space operations officer, will grow. The increasing number of Space-smart leaders will demand that Army Space equities and requirements are presented, tested, and discussed in all forums.

Easier said than done, but we start with our basic Army task — land warfighting dominance. We have it, and we want to keep it. In theory, as long as we have more and better firepower on the ground than anyone else, we win. However, "in theory, there is no difference between theory and practice, but in practice, there is." In practice, our warfighting has already evolved to require that we dominate in Space to dominate on the ground. The Army must hoist its banner as a user and developer of Space. This is not new either in practice or in theory. Check our history — the Army has been involved in the contemporary development and use of Space since the beginning. In fact, military use of Space began right here in the U.S. Army. The need to develop Space-based capabilities for operations unique to land warfare is obvious, and should not be entrusted to any component less focused on land warfighting dominance than on their own kind of dominance. Terrestrial-based Space control for land warfighting dominance is in the Army domain, and should be an Army mission. The Army Space Policy signed this year certainly moves us that direction: "The Army's functions are expanded to include…Interdict enemy Space power through operations on or from land." Therefore, our starting place for ensuring that Army Space equities and requirements are honored is in establishing our legitimacy as Space users and developers. That has clearly been done.

Next, the nuts and bolts processes. No need to be dragged through the details of the joint and Army capabilities generation processes, but know they exist. We have a defined Space Planning Process which uses Army subject matter experts from appropriate areas of interest such as signal, maneuver, and military intelligence, as well as Space, to develop functional area analyses, needs analyses, solutions, and investment analyses. The results of this process will serve as the basis for Space inputs to the Army POM, and will be published in the Army Space Master Plan. Beyond that we go to the joint level where we use the Joint Capabilities Integration and Development System (JCIDS) to move our Space capability needs from ideas to firepower. In fact, we are currently at various stages of approval on JCIDS capabilities documents for the Counter Surveillance and Reconnaissance System, a Space electronic warfare system, a Space surveillance system, and Theater Missile Warning. Our equities and capability needs are considered and honored because we have legitimate Space issues, and because we use Army and joint institutional processes to pursue our cause. And our cause is land warfighting dominance — same as the Army's.

SPACE SMART LEADERS

To take us through that requirements process, we need Space-smart leaders, both military and civilian, at every level outside the traditional Space fields who know what Space-based assets can do for them and how to harness those capabilities to help them fulfill their missions. The Army also needs an expanded and developed Space cadre.

The January 2001 Commission to Assess United States National Security Space Management and Organization, a.k.a., "The Space Commission," recommended that the Army (as well as the other Services) develop a cadre of Space professionals. The Army had already recognized the need for Space-smart officers by launching Functional Area 40 in January 1998 with the implementation of Officer Personnel Management System XXI.

The Army is reaping great benefits from the relatively small number in our Space cadre: 1,700 in the Army (approximately 140 FA 40s and 1600 others) vs 43,000 in the Air Force, and 17,000 in the Navy.) Many of those 1700 are in key positions on the Army Staff and in joint positions where they can develop the Army's position and ensure that the Army's position is represented well. Others are in acqui-

(See Newcomer's View, page 53)

The View From (Army) Space

The International Competition and Space

By Terry Nelson

This edition of the ASJ looks at broader issues of Space and the Army that go well beyond the individual capabilities of soldiers and hardware and beyond the contributions of the Army Space community to joint and Army warfighting. As the anchor article notes, this issue is about what the Army should do for Space rather than what Space does for the Army. A very interesting concern for the Army in its approach to Space at this higher level is what it should do to shape Space development at the national and international levels. I am not writing from the standpoint of some kind of Space altruism, but from practical utility for the Army over the longer term. The point is that because the Army needs Space dominance to ensure land warfare dominance, it needs Space technological dominance. The Army, therefore, should do its part to ensure the development and success of Space technology efforts.

Space is now a vital U.S. economic interest on which the global economy depends. Worldwide economic foundations have changed from agricultural to industrial to information. Space is a foundational element in generating and moving that information. Countries can craft economic niches that leverage Space to great advantage. Successful commercial enterprises can be based on anything from building Space systems to providing support services such as launch and satellite control to providing Space-based services such as communications and intelligence, surveillance, and reconnaissance. Development of such strengths creates centers of expertise and excellence as professionals gather to form each nexus of Space development and operational capability. This simultaneously sets the stage for dependencies to be developed for all those who don't have a particular center of excellence, but need its product. "Centers of excellence" should be read as a strength, and "dependency" as weakness.

Of secondary but major importance, the complexity and cost of military Space is so great that it cannot be sustained for military-only purposes. It must be founded on a strong, independently profitable commercial Space sector. Therefore, it is critical that U.S. Space centers of excellence are prolific, if not dominant, in the global economy.

This should concern the Army in two vital ways. First, the United States will obviously not have the only centers of excellence in economic, technical, and production terms, so there will be a sorting process that determines which ones end up here. It is important to remember that these centers must be economically profitable and/or benefit from subsidies to remain dominant. The Army needs to exert its influence so that the technologies/products it is critically dependent upon are either U.S. assets or those of our most trustworthy allies. An implication is that the Army should avoid dependencies based on sources not predominated by U.S. efforts. Second, the Army must be careful to envision all that Space could portend for land warfare of 2020 and beyond and then actively pursue development of capabilities to ensure its dominance in that "competition among the armies of the world" as well as in the competition among the U.S. military services in their contribution to joint warfare in support of national objectives. Obviously, this means that the Army cannot view Space as somebody else's place and somebody else's mission. The Army cannot limit itself to gleaning Space benefits from the efforts of other nations, corporations, and military services. While Space is a large and fertile field, it is neither so large as to eliminate competition, nor so fertile that it will produce what is needed without diligent, focused effort.

While it is incumbent on the United States to promote development of Space technology, production, and services, it is imperative that the Army consistently invest in and stimulate those areas that can be expected to benefit from its continuing land warfare dominance. The ongoing transformation of the U.S. military continues to

Front row, MAJ Joseph D'costa, MAJ Mark T. Vande Hei, MAJ Alan Personius, CPT Mike Russell, COL David Shaffer, LTC James Woods, MAJ Chris Livingstone, MAJ Bill Beck; 2nd row, LTC Jeff Perkins, MAJ Leonard Draves, MAJ Guy M. Burrow, LTC Steve Schuler, LTC Mike Powers, LTC Mark Anderson, MAJ Michael Willis; back row, MAJ Charles Anderson, LTC Conrad Bonner, MAJ Rick Dow, LTC Jeff King, LTC Curt Stover, MAJ Jerry Shay

exchange mass and armor for precision and agility that are enabled by faster and better information. This is a challenge to nobody more than the Army. We like to remind everyone that it was the Army that was "first in Space" as it has been first in meeting many U.S. challenges. As we embrace and invest in Space properly, we can also be "first in transformation" by leading the change that ensures our continuing warfighting superiority. Watch us.

Twenty Army officers proved they had nothing to be superstitious about on Friday, June 13 this month as they began their instruction in the Functional Area 40 Space Operations Qualification Course offered by the Force Development & Integration Center-West.

This class is the fourth to take the intense eight-week instruction designed to build a corps of Space experts. Graduating officers will assist combatant commanders in using Space to support the warfighters.

They are a small class, but a very important one. Each graduating class has an impact far beyond its numbers.

The students have been asked to help in improving the course for the next class.

I told them, "Changes which effect this course are occurring every day. It's your job to let us know what direction we should be taking."

Course instruction for the students is divided into three segments beginning with classroom instruction.

Another segment involves off-site visits to places such as the National Reconnaissance Office and the National Imagery and Mapping Agency in Washington, D.C. This includes hands-on training with the Army Space Program Office, which developed the Tactical Exploitation of National Capabilities Space (TENCAP) support systems in use by Army warfighters.

The culmination of the course is found in a 30-hour command post exercise designed to test each student's proficiency in 22 individual critical tasks. After graduation, the new FA 40 officers are assigned to operational staffs and Space systems program offices.

Col. David Shaffer, commander of the 1st Space Brigade (Provisional), U.S. Army Space & Missile Defense Command, and an alumnus of the course, made opening remarks.

"This is a great opportunity for you as well as a terrific course."

"Wherever you are assigned — you will teach and sell Space. That's part of your mission."

Shaffer briefed the new students on a number of subjects to include the new Provisional Brigade structure within U.S. Army Space and Missile Defense Command, the official Army Space policy (signed in April), new U.S. Strategic Command priorities (Space being at the top of the list), and Ground-Based Midcourse Defense.

He concluded, "Finally, realize that 70 percent of the learning in this class depends on you. Talk to each other and understand what is being taught. Not all of what you need is in this course so talk to those in your next Command and then look for those extra pieces of information you will need."

"Remember, take advantage of your classmates' experiences."

Plans are under way for the next FA40 class — slated for August.

Peter B. Teets

Undersecretary of the Air Force

I'm enormously impressed with the Army's leadership in Blue Force Tracking from Space — some of the results that have been achieved have saved lives in Iraq already.

Peter B. Teets, Undersecretary of the Air Force, serves as the DoD executive agent for Space and is the Director of the National Reconnaissance Office. He has authority over all Defense Department and NRO Space programs, is the Air Force Acquisition executive for Space, and oversees and directs the National Security Space Architect. In April, he visited U.S. Army Space and Missile Defense Command's Colorado Springs offices to get his first hands-on overview of the Command. This included the Command's involvement in Operation Iraqi Freedom. During the visit, he talked with Army Space Journal's Michael Howard about the transforming force, and the role Space plays in that transformation.

From your perspective, what are the key aspects of the military's future in Space?

Well, clearly I think the national security Space assets give us a huge advantage over our adversaries in warfighting and also in the collection of intelligence information. I see us embarking on a course wherein we can maintain that advantage and even extend it. It's going to take resources and it's going to take dedicated people. Speaking of dedicated people, I can't tell you how pleased I was to be here at Army Space & Missile Defense Command today — to see just how the Army has stepped up to the challenge of developing a professional cadre.

With the Air Force being the lead agency for Space coming out of the Space commission, what do you see as the Army's role in Space? Why is there an Army Space?

Well, the Army, in its own words, defines itself as being the largest user of Space assets. And from the point of view of the numbers of people, it clearly is. I think it is vitally important that the Army understands Space, participates in our national security Space program development, be at the point where it can provide meaningful input into requirements flow and participate with us in acquisition. It's an enormously important function to the Army, and therefore participation is very much warranted and welcome.

Is transformation occurring?

What has happened is that the Air Force has been designated as the DoD's executive agent to Space. I see myself in that role as facilitating cooperation among the various military components, but also the intelligence community as well. All of us that are involved in warfighting activity or collection of intelligence information can benefit from these national security Space assets.

So this new definition of how it's going is going well?

I think it's going extremely well, and I'm very genuine when I say my visit today really has impressed me positively, because the Army is clearly stepping up to the role that we've just talked about.

Could you detail a couple of those things you saw today that impressed you?

I'm enormously impressed with the Army's leadership in Blue Force Tracking from Space — some of the results that have been achieved have saved lives in Iraq already. I'm impressed by the fact that the Army is

actually operating the control segment for the Defense Space Communication System Program and is making certain that those secure communication links are available not only to Army users, but Navy and Air Force users as well.

You mentioned BFT, but when that was being briefed to you today, you commented at the end that this is so important to you because you're talking about lives. Isn't that really the bottom line of what we're talking about with all of the capabilities we are bringing from Space?

It certainly is. The assets that we've employed in Space now and are using from Space really have changed the way we fight wars. This whole idea of precision weapons delivery is enabled by our Global Positioning Satellite system. Think about how many Army soldiers are equipped with GPS receivers and know immediately where they are and what their geo-location is and where the geo-locations of their targets are. They know that from radio frequency communications from Space.

Are there any other examples from the current operations in Iraq that you are seeing, from the muddy boot side of Space, that you can mention?

We have the advantage of collecting important intelligence information from Space. That information, while I can't discuss specifics of it, is being used on a wide front in Iraq and very much to our advantage.

One phrase that graphically describes our Army is that it's transforming, and another is that we are also an Army at war. We've talked about some of the operations in Iraq. Do you see these operations contributing to or solidifying a critical role of Space not just in the Army, but also across the whole military?

Very definitely so. If you look at today's systems such as GPS, there could be no more transformational kind of a system. If you look at what we have on the drawing board, so to speak, a couple of the National Security Space programs that are inherently transformational will be Space-based radar, where from Space we'll be able to determine ground mobile target information. We also will be able to take synthetic aperture radar imagery, that is to say, pictures from the radar satellite constellation. It will transform the way we can track and target, and understand movements of our adversaries. Secondly, we are very much involved, and the Army's playing an important role in it in transformational communications. We will have a transformed communications system, which will really eliminate bandwidth as a constraint and it will eliminate access as a constraint. All those thousands of Army users will be able to have access to high bandwidth communications.

Another aspect of this is that a lot of which you speak is very technical and highly classified. Have you seen a grander understanding at your level, of what it is that we can bring to the warfighter? Do the warfighters understand our capabilities in Space?

More so now than ever before. I don't want to say that we have a perfect system now, but I can tell you that I think we are better connected now in a network sense than we have ever been. I think the war in Iraq is demonstrating just how well connected we are. We are learning lessons all at the same time. When this conflict ends, and hopefully that will be soon, we very clearly need to go back and do an overview or review and learn from our experiences in Iraq. Those lessons learned will help us get even better connected than we are today. Space assets will provide a vitally important element of that connection capability.

So — this platform of understanding of where we are today, is it going to help us to where we're going to go tomorrow?

No doubt about it.

In what ways?

Well, I think some of the things we are learning right now from the experience in Iraq is that we have connection capability of information flow across the battlefield that is better than it has been in any past engagement, but it can still get better. We can remove some of the obstacles that prevent free flow of information to blue forces that are on the ground or at sea or in the air.

Are there any other thoughts that you have about this overall topic of the role of Space in the future?

I think that one of the most important things we need to do is build the cadre of Space professional talent. We need to focus attention and we need to focus resources on that. I'm very impressed with what Rick Geraci is doing here at Army Space &Missile Defense Command and I've been very pleased to work with Joe Cosumano back in Washington. I also had a pleasant engagement with Les Brownley Undersecretary of the Army. I must say that if we can build the proper Space cadre made up of talented Army people, talented Air Force people, talented Navy and Marine Corps folks as well as intelligence community people, we will have really positioned ourselves to maximize the advantage that Space can give us. Space *is* the ultimate high ground.

And when you talk about the Space cadre, you are speaking of the Space officers or the people in the military who go out and populate the general….

Absolutely. Who are the operators, who are the acquirers, who are the people involved in defining what the requirements are for our National Security Space efforts.

That all contributes to the overall understanding of the capabilities.

It surely does.

Space Force Application

Between the Idea and the Reality, Between the Motion and the Act, Falls the Shadow

-T.S. Eliot, The Hollow Men

By LTC Greg Palka

To all the many theorists, tacticians, and warfighters who are blindly overlooking the coming requirement for the Army to fight **through, from,** and **to** Space, read on. To all of those mired in the comfort of 20th century land domain warfare doctrine and the spirit of the bayonet, listen closely. **As an Army, we can no longer afford to exclusively prosecute land domain warfare simply as a function of land domain forces operating in the confines of terra firma.** The vision of the Objective Force to see first, understand first, act first, and finish decisively speaks to the critical need for our unit of action (UA) forces to leverage non-line-of-sight lethal and nonlethal effects of the air, sea, and Space domains to achieve overmatch and only when prepared to close with and destroy the enemy in direct combat. Beginning with the Stryker Brigade Combat Teams, our Army begins its transition from the 63 tons of twisted steel and heavy force appeal to a mobile, hostile, and agile force that will fight in a very different way. Army Space forces are a critical part of that new mobile, hostile, and agile force and will bring the kinds of non-line-of-sight combat power through Space force application necessary to prosecute 21st century warfare.

For those brothers and sisters in the profession of arms who have no idea what the definition of Space force application is but know the meaning of "lazin' and blazin'," "hurling rockets," and "shakin' and bakin'," fear not. You are well on your way to understanding how lethal and nonlethal effects will be brought to the enemy through, from, and to Space. I am certain that even my brothers on the gunline and those poking through the top end of turrets would have by now perceived that Space force application is the bringing of combat power against terrestrial and celestial-based targets by military weapons systems operating through, from, and to Space. The force application mission area also includes ballistic missile defense and force projection. While there are no force application assets operating in Space today, we must begin to plan and develop the concepts of employment now as we move toward the concepts of "global strike" and "counter anti-access." We must re-evaluate the use of legacy weapon systems and through concept development and experimentation determine the requirements for future weapon systems that give future joint, interagency, and multinational forces the ability to project force and conduct operations through, from, and to Space.

Applying Effects Through Space

Creative minds through the centuries have done the important work of adapting past gains to an ever-changing present, a work which we must continue. — Thomas A. Harris

An example of a legacy weapon system that could provide future conventional lethal and non-lethal Space force application capability is the nation's intercontinental ballistic missile (ICBM) force. Nuclear-tipped ICBMs represent a strategic global strike capability designed to be the ultimate kinetic effect weapon to defend our nation from the threat of nuclear holocaust. ICBMs are the first of the family of Space force application capabilities because they launch from Earth, travel through Space, and re-enter the atmosphere to strike terrestrial targets. ICBMs have several desirable characteristics we should consider regarding future warfare. They are launched under force protection from secured facilities at standoff ranges, are capable of reaching any target within minutes, and are difficult to defend against. A conventionally armed ICBM or conventional ballistic missile will provide part of the future global strike, inter-theater strike capability, and precision lethal and non-lethal effects to the Joint Force commander. These weapons would be particularly effective in counter-anti-access operations. Army Forces could provide a conventionally armed future hybrid of legacy Army tac-

Overcoming inertia to fight battles of the future

Military theorists for centuries have done a great job describing the effectiveness and efficiencies of the "last war." Very few have been able to see into the future and convince those mired in the comfort of past doctrine and scope of capability that warfare has changed.

Space force application is another area where a lack of education and historical inertia will need to be overcome. It is critical for our Army to recognize the significance of this new form of warfare and to begin developing the requirements for the Army's contribution to Space warfare.

tical, theater high altitude air defense, or Tomahawk land attack missile systems to enable global strike and inter-theater strike capability. These systems would resource the future combatant commanders with options to provide lethal and non-lethal effects from standoff ranges and provide the kinetic punch or non-lethal effect to set the conditions for follow-on forces in land domain combat. We are seeing the first forms of a quasi-inter-theater Space force application mission being conducted today in Operation Iraqi Freedom. Tomahawk land attack missiles launched from the U.S. European Command's area of responsibility (AOR) struck targets in the U. S. Central Command's AOR. This type of capability will only improve and provide our future Force commanders with the agility and flexibility to strike the adversary at will.

Applying Effects from Space

As our nation develops the transformed Joint Force of the 2015 timeframe, we must look to the construct of multipurpose near-Space and Space-based lethal and non-lethal effects weapon systems. These new systems represent our nation's ability to prosecute warfare from Space into the mid-21st century. Near-Space (stratospheric-ionospheric) systems like the SR-71 Blackbird and on-orbit satellite assets have been providing critical information to commanders at all levels of warfare for more than 50 years. As we look to the timeframe of 2015 and beyond, systems that operate in the near-Space and Space domain will become more than information centric systems. They will become integral multipurpose nodes that can see and assist in understanding first and that provide critical ways and means for the unit of employment (UE) commander to act first. Systems like a high altitude airship or geostationary stratospheric-ionospheric satellite (GSIS) could provide not only a platform for advanced sensors and communication systems but a deployment and employment platform for lethal and non-lethal inter-theater and global strike effect weapons. A GSIS could deploy medium-range missile systems, high-powered microwave, radio frequency, and directed energy systems or a legion of microswarming unmanned aerial vehicles representing a commander's first fighter capability to deny, disrupt, degrade, or destroy an adversary's counter-anti-access capability. On-orbit assets provide the Joint Force commander or UE commander to quickly deploy lethal and non-lethal effect systems to the AOR (hours and minutes in some cases based on orbitology). Again, on-orbit assets could provide unique capabilities to prosecute global strike and counter-anti-access warfare. Fighting from near-Space and Space is a critical capability that our nation must experiment with today to be ready for future conflicts. Near-Space and Space-based capabilities will represent not only a key enabler to achieve decision superiority but a multifunction effects platform able to prosecute strike operations early in the conflict to shape the land domain fight. As an aside, we must assume that near-peer competitors of the 2015 timeframe will recognize the incredible capability that our nation's near-Space and Space-based systems represent and design methods

(See Application, page 53)

The Army's Future in Space

Because this issue provides a speculative platform to expand the technological horizon, it is a natural follow-on to the last issue. A fine line separates the theme of this issue from the previous one: "The Role of Space in Army Transformation." As we consider the theme of this new issue, we should not lose sight of the five essential Space operations tasks introduced in the Transformation issue:

- Support increased deployability and reduced theater footprint.
- Achieve situational understanding "off the ramp" during entry operations.
- Support precision maneuver, fires, sustainment, and information.
- Enable continuous information and decision superiority.
- Protect the force during all phases of the operation.

These are as relevant as we look at the Army's future in Space, as they were when we looked at Transformation. This edition, however, moves from what Space does for the Army to what the Army ought to do for Space.

We begin by considering the "big picture," a net assessment of the effect of our growth in Space on the competition between nations for success and dominance. We continue this discussion with an article detailing Space's role as a vital national interest and economic center of gravity for the United States and other nations. Then we bring the argument to the Department of Defense level with a notional description of combat support from Space in 2030. When we think of the increasing number of users and uses that have been made of the Internet over the past decade, we can begin to appreciate how difficult it is to accurately predict all the directions in which technological advances can lead. But a look at the possibilities after 30 ideal years of Space combat development will provide an instructive backdrop.

We want to develop a "Service lanes" approach based on the particular utility of Space to the Services. The Army is the primary DoD user of Space capabilities, with heavy reliance on force enhancement functions to provide combat support. It will be interesting to look beyond Service support to the utility and possibility of using Space-based kinetic and directed energy systems to help win land battles. We also explore the need to aggressively target the adversary's terrestrial Space assets. This could be an Army job, where appropriate, but certainly a high interest item for the Army because of implications for the land battle.

Then, lest anyone believe we are advocating unconstrained use of Space, we deliver a "voice of reason" warning against over-crediting Space that should simultaneously clarify the limits of Space power while reinforcing its importance. We also present a thoughtful argument for developing military Space with an eye toward turning warfare away from Space if at all possible.

Army, Space, the future

The overall intent is to move beyond thinking about what Space does for the Army and to grapple with what the Army ought to do for Space.

The issue's theme ends with a trio of articles wrapping up what the Army's role in Space ought to be. First, we examine current Service roles and missions and the process that is used to make assignments in order to propose future changes in how Army responsibility in Space should be defined.

The second article calls for the aggressive participation of the Army in defining Space architecture to support land warfare in the National Security Space Architecture. Finally, we review the concept and method of general, large-scale innovation in warfare (such as aircraft carriers and tanks) and ask if the Army is being innovative enough as Space continues to increase its impact on land force dominance.

Experiments

Three findings for the Army Space tribe from the Objective Force Unit of Action Battle Command Experiment No. 1

By John Graham

In February 2003 I had a unique experience with an Army Objective Force Experiment conducted by the Battle Command Battle Laboratory (BCBL)-Leavenworth. Instead of serving as a player or a controller, I served as a data collector. My sole responsibility was to observe the experiment, collect data against a number of predetermined dependent variable constructs, and submit my findings.

As I write this article, the BCBL is collecting and condensing the formal experimental findings into an official report. What follows are my insights about the experiment from a Space operation officer's perspective. As such, these comments are unofficial and certainly biased by my Space operations background. I think, however, that they are relevant to debate within the Army Space community and could be discussed at the next Army Space Symposium.

The Unit of Action Battle Command Experiment No. 1

The focus of this first of many future experiments was on the organization and operation of the unit of action (UA). The experiment followed closely on the heels of the unit of employment exercise conducted at Fort Knox, Ky. The experiment examined a new UA level staff structure conducting multiple operations while using a new decision-making process, the recognitional planning model (RPM). The RPM is a commander-driven, execution-based process designed to support UA commanders operating in a time-constrained environment where full military decision-making process (MDMP) application is not practical.

The experiment blended training sessions for the RPM, multiple simulated battle runs to stress the UA staff, and multiple, detailed after action reports (AARs). Data collectors studied the commander's and staff's ability to plan and execute simultaneous operations in comparison with our current staff structure and MDMP. The experiment was intended to provide insights into the core functions of battle command and investigate key enablers for battle command in the Objective Force.

The BCBL's intent for this first experiment, however, was not resolution of all questions facing the Objective Force unit of action, but to determine which questions were resolved and which questions still needed resolution through future experiments. The experimental CPX-type design addressed the key questions in Table 1.

Personal Observations

Finding One: In the year 2015, you don't want to be a Career Field (CF) S-3 Air.

One goal of the Objective Force UA design is dramatic reduction of the command and control footprint of a brigade-sized force. The greatest savings in manpower will be realized through automation of routine and rule-base driven activities. Expert systems are already under development that can find problems, conduct coordination, and deconflict problems with a mission order such as control measures, asset overtasking, and logistics. Armed with the work we as leaders and trainers put into codifying the task, condition, and standard for staff work, Army scientists, university researchers, and military contractors are now programming prototype systems. The more a staff task has been codified in today's brigade staff, the more likely it will be automated in the UA staff.

The title of this first finding may be explained by imagining that a career field or branch has been created called Tactical S-3 Air. If we estimate that 40 to 70 percent of the tasks of a CF S-3 Air involve deconfliction, coordination, and integration into an existing plan, this imaginary career field would be heading to the chopping block in the Objective Force. Because the most common product of the S-3 Air is a one-sheet matrix developed from and based upon a set of routine heuristics or "rules of thumb," it is an

easy target for automation. If one more brigade staff position can be found that is 40 to 70 percent automatable, the Objective Force staff can combine two positions into one and reduce its footprint. The single combined position would then perform the military "art" portions of the tasks that could not be automated.

Where does that leave the FA 40 Space operations officer? My experiences as a Space operations trainer and as a leader on deployment with the 1st Space Battalion tell me that we are far to the right in the military art end of the spectrum (see Figure 1). I cannot count the number of times that I was asked for a one-page "smart sheet" that a leader could use as heuristics for employing or understanding Space capabilities. After gathering my team together and calling in expertise from the battalion and brigade staff, we would inevitably have a one-page sheet with a four- to-eight-page addendum explaining the "it depends" criteria.

Simply put, the nature of Space operations is more art than operationalized guides. The Space operations staff officer is faced with numerous hurdles that make our task more military art than a set of solutions. The need to apply a large measure of military art to Space operations is due to the fact that many support requirements are just not intuitive. Very intelligent leaders that tell us to "move that satellite" offer a common example of this challenge. The military art requirement is further exacerbated by every friendly, gray, and enemy satellite being one of a kind, by complicated levels of classification and compartmentalization that regulate current Space operations, and by incomplete, still-forming scientific understanding of Space.

This is not to say that the S-3 Air position is now an unimportant function in the Legacy Force brigade staff. I selected the S-3 Air position for discussion purposes only. It is to say that, after years of very intelligent officers seeking to achieve consistency in a difficult and complex task, the result is reams of codified heuristics, representational methods, and look-up tables. When a set of tasks has reached this level of maturity, there is a good chance that many of the tasks can be automated. If 40 percent of the tasks of the two positions can be automated, then I offer that they can be combined into a single position for the Objective Force staff.

Advice to Space operators — gleaned from observations of the Unit of Action experiment

- **Use caution in creating one-page battle book cheat sheets. You may be doing a disservice in oversimplifying the very complex data that a leader needs for decision-making. Your Space knowledge and the military art of application is your true value to the force.**
- **Learn your leader's decision process and figure out when to "push" the right information at the right time. With the expanded role of Army Space in current operations, you are already familiar with this requirement.**
- **If you have the opportunity to affect UA knowledge object construction, take the time to envision where Space operations capabilities will be in 2015.**

Finding Two: Redefine Decision-Making Success

When the Army studies decision-making, one critical measurement is the "relevant information collection time." Because of this metric, the Transformation Force focused on methods to put information at "the finger tips" to be readily accessible to the commander. As a result, we talk about extensive databases with terminals that can rapidly access and present the information in a usable form.

This measurement, however, is not relevant to Objective Force battle command. For the UA commander, information that is readily accessible is information that is too late for the decision at hand. Rapid decisive operations in a dynamic environment change the entire tempo of decision-making. If an operation is dynamic, then, by definition, the ground truth could be reliable only for periods of time as short as 10 minutes and be significantly different 10 minutes

(See Experiments, page 56)

Table 1

UA Experiment Goals
(Battle Command Battle Laboratory)

+ Determine core functions of Battle Command by echelon
+ Determine the appropriate decision-making processes
+ Investigate key enablers to facilitate Battle Command
  - Distributed and networked staff
  - Distributed planning
  - Decentralized execution within command's intent
  - Characteristics of collaboration tools for the commander

Goals addressed by current and future Fort Leavenworth Battle Command Battle Laboratory Unit of Action experiment series.

Start Line

Targeting an Adversary's Space Capabilities Begins with the Terrestrial Segment

By LTC Dean Taylor and CW4 Daniel Rupp

Negating our enemy's ability to take advantage of Space-based capabilities is a basic objective in our Space control doctrine. The need to maintain the friendly use of Space while denying its use to our opponents will clearly be critical to Army Objective Force successes on the future battlefield. Understanding how and why our adversary uses Space is an important aspect of the Space portion of our intelligence preparation of the battlespace (IPB) doctrine. Using that IPB to determine how to most effectively take that capability away from our enemy is the desired end-state. The satellite, the on-orbit segment of the Space system, seems to get most of the attention when we consider an adversary's use of a Space-based capability. But it is the terrestrial segments of the Space system that control and task the satellite and deliver the product or service to the user that are, for virtually every Space-based capability in use today, the most vulnerable parts of that Space system. Accordingly, the ground-based part of an adversary's Space system deserves the most detailed scrutiny in the IPB and targeting processes.

Adversary's access to and use of Space capabilities

Space-based capabilities allow a threat actor to instantly overcome numerous and significant military disadvantages. Even a third-world adversary can inexpensively leap forward technologically and field a more lethal and agile military force by making use of available commercial Space capabilities. These services allow our opponents to close the gaps in our technology lead without having to establish huge developmental programs that take years and require considerable monetary resources. An excellent example is the worldwide availability of commercial satellite imagery. Countries are obtaining photographic intelligence that as recently as three years ago, was the exclusive preserve of the Central Intelligence Agency and the Pentagon. The resolution quality of commercial imagery is good enough to monitor the massing of troops or artillery and to identify the state of preparedness of military facilities, and it is improving every year. Today a few thousand dollars can access what was once the exclusive domain of the superpowers. For less than a hundred dollars, archived imagery, which is good enough to make military plans, can be purchased and delivered from the Internet. A growing number of countries and commercial consortia are building and operating satellite imagery systems simply because of the demand and profitability.

Commercially available Space-based communications are even more readily available. Mobile satellite telephone services are now available almost worldwide, are very reliable and the technology (for the user) is easy to operate. This service is reliable, inexpensive, and increasingly more secure from "eavesdropping" due to extremely sophisticated encryption technology. Mobile, secure satellite communications (SATCOM) give an adversarial commander immediate command and control capability, without the need for bulky and vulnerable terrestrial communication equipment. Military forces with 1960-era tanks and personnel carriers are carrying global positioning system receivers, satellite phones, and maps that were made from commercial imagery. These technological advances require us to be even better at IPB and associated Space analysis and presage the future need for sophisticated means to find and kill terrestrial Space targets.

An adversary desires to gain intelligence on a U.S. troop buildup in the region. Since he is a thinking adversary, his IPB has helped him determine potential enemy staging and assembly areas in the region. For several years he has consistently imaged these locations to verify his IPB analysis and to build a database to assist in determining changes that would indicate actions or a possible buildup for an attack. He augments his IPB with high-resolution imagery, which helps with detailed target planning. The target folders are then put in the hands of small teams that finalize plans for sabotage attacks against his adversary's most critical nodes

The threat's use of Space

Space-based capabilities are increasingly integral to our adversary's security and operational doctrine. Capabilities such as high-bandwidth communications, satellite-generated intelligence of our dispositions and movements, and precision navigation and weather data can provide invaluable combat advantages to a threat nation. Access to Space and the advantages derived from operating in Space are being affected by technological progress throughout the world. Recent trends in the availability of Space technology and the directions of its development clearly suggest that the military community needs to aggressively identify and pursue the best techniques and procedures to target the adversary's use of Space. The Army Space Support Team is uniquely qualified and properly positioned at the tactical and operational levels to help take away an adversary's use of Space. The place to start the process is in the evaluation of the terrestrial segment.

Effectively targeting an adversary's ability to obtain imagery may very well get "inside his decision-making cycle" as well as reduce his ability to support his forces in the field.

in the marshalling area. The adversary does not need to get continuous high-resolution imagery to receive early warning or build the target folder. For more of a time sensitive "key read," a quick phone call from his imagery analyst at a downlink site may be all that is needed. While many analysts are fixated on how the enemy decision-maker will receive the actual image, a simple phone call or text report has told him all he needs to know about U.S. troops approaching his border. He also augments his own imagery satellites with open market commercial imagery sales that will fill holes in his planning, targeting and basic situational awareness. Our adversary is using this imagery system to help him trigger when to launch a massive ballistic missile attack on our forward tactical assembly areas in order to disrupt our operations.

Preventing the above scenario requires a thorough understanding of that satellite imagery system that delivered the key piece of information including understanding the imagery satellite's capability (resolution, coverage area, slew angle off nadir, etc.). Our intelligence analysts must be able to conduct nodal analysis to examine the entire tasking, processing, exploitation and dissemination (TPED) of the satellite imagery system. The analyst needs to know when the collection requests are ordered, how the image is sent to the processing facility, the level and expertise of the analysts conducting the exploitation, and the dissemination paths of the actual digital image. Within these links and nodes there are sufficient opportunities to deny or delay the adversary's ability to gain timely intelligence from his imagery. A satellite imagery system clearly includes the satellite, along with command and control, ground control operations, satellite ground stations, analysis and processing facilities, and telecommunications nodes. The adversary's terrestrial Space assets include: telecommunications centers (radio and television); radio relay facilities; fiber optic networks, nodes, and repeater stations; microwave transmission networks and nodes; SATCOM links; and fixed and mobile national command, control, communications, and intelligence centers. The elements of the satellite ground station component can include the antenna apertures, power generation, operations area, communications links, or digital storage systems. The TPED components of the Space system are critical to understanding how we can target to achieve the desired effects.

IPB to Target Development

Once targeteers have identified the enemy activity they need to disrupt or deny, they can determine the key target systems, components, or elements that should be attacked, degraded, or exploited to produce the desired effects. Effectively targeting an adversary's ability to obtain imagery may very well get "inside his decision-making cycle" as well as reduce his ability to support his forces in the field. Targets can be neutralized by a variety of means, including nonlethal fires generated by the commander's information operations (IO) campaign. Effective non-lethal fires against a Space system node could well become the preferred method of attack, but this requires extremely detailed nodal analysis and Space IPB. Another non-lethal IO capability available to the targeting process is electronic warfare (EW). In our terrestrial Space asset example, an EW attack might be the perfect approach. Jamming overpowers the right SATCOM dish signal, which causes the imagery report to be disrupted and never delivered to the intended user. Simply adding a terrestrial Space segment to the comman-

(See Targeting Adversaries, page 46)

National Power

The role of Space in economic and military instruments of power strategically places Space to leap forward

By COL Frank Todd

It is increasingly clear that Space is becoming critically important to how the United States employs several key instruments of national power. Prior to 1990 among the political, economic, military, and informational instruments of power, Space exerted its major influence in the economic arena. By the end of the decade, however, there was a dramatic shift in the way Space capabilities were used as instruments of national military power. Looking into the future, Space's role increases exponentially, especially when reviewing the role it is projected to play in the ongoing transformational efforts within the Department of Defense.

A decade ago Space was seen as a vital component in the nation's economic power. Global markets depended on satellites to link nations on every continent to the economic capitals of the world. As the global information age developed, Space provided the most efficient and fastest means to interconnect. To become competitive and stay competitive, corporations from around the world realized the necessity to participate in this global revolution. Throughout the decade this pressure intensified and drove an explosive growth of the Space industry to develop, build, and launch satellites that facilitated the gathering, transmission, and sharing of information. Space was looked upon as a growth industry with a wide range of countries expanding or entering the commercial marketplace (i.e., Russia, France, Japan, India, etc.). High expectations for growth ensued, driven by the Internet and telecommunications applications. Late in the decade, however, and quite unexpectedly, the high growth rate did not continue. Future projections of information-based companies fell far short of anticipated levels. Costs to do business in and through Space were much higher than projected. Risks to get satellites into orbit also grew, driven by several launch vehicle and satellite failures. Additionally, the proliferation and reduced cost of fiber optic cable put a major dent into the business model for the use of Space. Where fiber optics had once been extremely costly, it now came in line with the cost of laying copper and had the advantage of reduced requirements for fiber versus copper cabling because of fiber's much higher bandwidth capacity. These pressures led to the demise or significant reduction of several notable companies such as Iridium, Globalstar, Astrolink, ICO Global Communications, Orbcomm, Teledesic and numerous others.

While a viable argument could have been made 10 years ago that Space would become a key component for employing the nation's economic power — that is not the case today. Instead of becoming the backbone for the globe's information age, the Space industry has carved a niche for products and services that can be provided most efficiently from Space. The demand for Space-based products has affected the health and viability of several support industries as well. The infrastructure that supports launch is one of these. The number of launch pads worldwide has declined precipitously, which impacts quantity and frequency of launches. The decline of the U.S. Space industry has not gone unnoticed by DoD. Guidance from the Secretary of Defense on down has addressed the need for DoD to focus efforts and initiatives to ensure the entire industry remains viable to produce the systems needed for national defense.

During the same decade that Space declined as an economic element of national power, a significant rise in its importance to the military element took hold. From the Gulf War onward, its key roles in command and control, communications, intelligence, surveillance, and reconnaissance has dominated military commanders and planners in their preparation and conduct of operations. Whether it is linking commanders from the strategic to the tactical level, accurately maneuvering units on and over the battlespace, targeting enemy units or positions, analyzing environmental conditions in the area of operations,

obtaining missile warning or receiving, seeing, and understanding the enemy's capabilities and intent, Space is bringing these capabilities to the fight today.

Could the nation prosecute today's wars without Space? The answer is arguably, "no," unless we accept increased friendly casualties, widespread infrastructure destruction and much higher civilian casualties. Space capabilities are what allow precision and that is the mandate and expectation of the American people, the government and international opinion on how the U.S. military is to fight. The preparation for future conflicts clearly establishes Space as the cornerstone of the U.S. military's ability to conduct operations. The Army's Objective Force vision demonstrates this reliance by adding information as a fifth component of combat power. Although the future potential of Space to do more is only limited by one's imagination, it is true that today its primary function is to collect and disseminate information. But information is what infocentric warfare is all about. It is a component that must be employed and integrated into mission operations starting at deployment, used in protecting the force, incorporated into precision maneuver and fires, and used as an enabler for situational understanding during all phases of an operation. {Once published, suggest reading TRADOC Pamphlet 525-3-14, The United States Army Concept for Space Operations in Support of the Objective Force.} Although not inclusive, that situational awareness requirement includes friendly force disposition, enemy force disposition, detailed targeting, terrestrial environmental analysis, ballistic missile threat warning, enemy capability and intent analysis, and commanding and controlling forces at all levels.

This is not to say that reliance on Space forces is not fraught with risks. Joint doctrine for Space operations recognizes that the increased dependence of the U.S. military on Space capabilities can be viewed as vulnerability. If we see that Space is becoming a center of gravity for how the United States uses its military, so can our enemies. In developing future operating concepts, vulnerabilities must be taken into consideration, both in the design and doctrinal employment of these assets.

Its role in both the economic and military instruments of national power has placed Space on the agenda for increased analysis and funding to maintain the Space industry's economic viability and to push for a significant leap in the technological capability of future programs. Although its importance has evolved from the economic to the military component, the strategic direction of the use of Space assets is clear. In every conceivable military scenario, Space plays a vital role in achieving the nation's objectives. This reliance is driving the Services to adjust their doctrine of how we fight and, more importantly, to adjust their vision of what may be possible in future warfare.

Space vital to achieving the nation's objective

Space is becoming critically important to how the United States employs several key instruments of national power. Prior to 1990 among the political, economic, military and informational instruments of power, Space exerted its major influence in the economic arena. By the end of the decade, however, there was a dramatic shift in the way Space capabilities were used as instruments of national military power. Looking into the future, Space's role increases exponentially, especially when reviewing the role it is projected to play in the ongoing transformational efforts within the Department of Defense.

The transformation of the military will rely on the increased use of Space capabilities. When future conflicts take place in areas with little or no infrastructure or in areas with denied access, Space is the only means by which operations using transformational forces can be employed and pursued.

Some argue that nonSpace platforms can provide similar capabilities, but that does not take into consideration every level of conflict. In a forced entry scenario, air superiority cannot be assured, therefore, airborne platforms would be at too great a risk to be employed. Space platforms, however, are not affected by this limitation. To provide needed requirements to the warfighters, both air and Space capabilities would need to be integrated. Space forces allow commanders to consistently succeed in their ability to operate through every level of conflict — whether it's conducting humanitarian assistance, non-combatant operations, or the various levels of combat operations.

In every conceivable military scenario, Space plays a vital role in achieving the nation's objectives. This reliance is driving the Services to adjust their doctrine of how we fight and, more importantly, to adjust their vision of what may be possible in future warfare.

The High Ground

We Have It!
We Like It!
Can We Keep It?

As we begin to develop the required capabilities for the Objective Force's success, it is tempting after our run of past successes to assume that Space superiority is our birthright and a fixed reality. But is it?

By Tomás A. Pagán

War is perhaps the ultimate competition — a competition in which not only the lives of individual men and women are at stake, but also a competition where the fate of nations and the future of cherished principles hang in the balance. As in all competitions, future success depends heavily on the outcome of a continuous series of smaller, less obvious competitions. Our experience over the last decade has convinced us that our success in one of those competitions — providing access to Space-based assets for ground forces — was a key element in our success on the battlefield. Our assessment that it will be even more of an essential ingredient in the future has led to the catch phrase: Secure the high ground.

Our vision of the importance of Space to the Objective Force is clear.

The Objective Force aims for a quantum leap in strategic and tactical mobility in combination with the lethality and survivability equivalent to today's modern heavy force. In particular, the Objective Force will require tactical communications that support significantly increased data rates while on the move between highly mobile elements that are habitually out of line-of-sight with each other. These same forces will also need increased reach-back for support from non-organic fires and intelligence. These increased communications must be provided in an austere support environment without significantly burdening either strategic or tactical mobility. It should be expected that over-the-horizon targeting and situational awareness will be a significant contributor to Force survivability. For example, the Objective Force could use maneuver enabled by superior knowledge of both the friendly and enemy situations in place of physical armor. In a similar way, the Objective Force could benefit significantly from engaging targets before physical line-of-sight obtains.

As we begin to develop the required capabilities for the Objective Force's success, it is tempting after our run of past successes to assume that Space superiority is our birthright and a fixed reality. But is it? Who is the competition today? What have been the ingredients in our success to date? Determining the ingredients of our past successes may give guidance to the future choices we make in providing Space capabilities to the Objective Force.

Possibility One. No amount of prior planning will ever replace dumb luck.

Whether we wish to admit it or not, there is an element of luck in almost every major undertaking even if it is just having the right people in the right place at the right time. Two of the most prominent Army Space accomplishments fall squarely in this category.

The Army Tactical Exploitation of National Capabilities (TENCAP) program has been (and continues to be) arguably one of the most significant successes of Army Space. The value added to the Army has been enormous; the cost has been very small in typical modernization terms — a few well-placed, dedicated men and women at the Army Space Program Office who developed a very smart way of doing business on a shoestring budget. But even the most ardent supporters of Army TENCAP use the phrase "picking the low-hanging fruit" to describe this effort. Those same supporters have been frustrated more than once when the Army has been reluctant to push hard for a new capability when faced with the prospect of substantial new investments. We would all agree that picking the low-hanging fruit is a smart way of doing business, but it then becomes a matter of chancing that others plant the right trees.

Another of our noted successes is the global positioning system (GPS). GPS receivers were indispensable to the rapid maneuver employed in the featureless desert during Operation Desert Storm and many would argue that this was the true origin of the Army's recognition of the value of Space support. Again, the availability of the small, lightweight ground receiver was due to a few dedicated men and women — this time at what was to become Army Space

Building the Space support segment

If we are to truly provide the necessary Space support to the Objective Force, perhaps the most difficult challenge may come in the synchronization of fielding. ... (we could) experiment with different techniques before deciding what to build and the quantities that are needed. The upfront investment is small; the payback is immediate. If the Objective Force is to truly rely on Space support for critical battlefield functions, then we have to be able to define how we will do that now — while the future combat system (FCS) is still being created. We have to be able to build and deploy the Space segment while the FCS is being developed and deployed. We have to define the ground equipment in time for it to be built into the FCS. Otherwise, Space is always going to be an add-on.

Command — and another shoestring.

While one should always be prepared to take advantage of a good break, it is not wise to rely on it if the outcome is critical to success. Most agree that the whole Army, as opposed to small pockets within the Army, did not share the view that Space was critical to success on the battlefield prior to Desert Storm. Fortunately, neither did our opponents. Winning the competition for Space superiority in Desert Storm would have required only a small investment in the right places by our opponents. One reconnaissance satellite and a few GPS jammers might not have determined victory, but even that small an investment would have made it much more difficult for our forces. We were very lucky that the competition folded.

Possibility Two. The good news is: It is a replay of the Tortoise and the Hare. The bad news is: This time we are the Hare!

We should recall that the United States played catch-up in the first few Space events. In spite of the pioneering efforts of Robert Goddard, we obtained much of our initial rocket expertise from the Germans after World War II and the first satellite and first man in Space were not American, but Soviet. The Army has always taken some pride in helping rescue the national reputation when, two months after Sputnik, America's first orbiting satellite (Explorer 1) was launched on an Army Redstone rocket after several failures to launch the Vanguard satellite with the Navy's Vanguard rocket.

And it isn't over by any means. Although we may be very comfortable with our current position, it isn't a one-horse race. The Soviets always were a competitor in terms of launch capability. Now the Russians and Chinese both are significant players in the international launch business, joining Arianespace and the European Space Agency as real challengers. In spite of the rough start with Ariane V, we cannot take the international launch dollar as a U.S. possession.

It is very clear now that the Chinese are moving toward manned Space flight. With the successful recovery of Shenzhou IV ("Divine Vessel' IV) after a week in orbit, we expect a manned launch before the end of the year. In fact, with the inevitable hold on U.S. manned launches required by the traumatic loss of the Shuttle Columbia, we may face a period in which the only two operating manned launch systems will be the Chinese Shenzhou and the Russian Soyuz.

We all recognize that it is harder to hold a lead than it is to make one up; the bigger the lead, the easier it is to be convinced there really isn't any competition. The guy in the back has the advantage of a clearly defined path and a clear example to emulate — both good and bad. The guy in front has to make choices about the direction of the road ahead; choices that are often difficult and controversial.

An old quotable phrase says that making choices is easy; living with the results of those choices is hard. We are all too aware today as we face difficult transformation decisions of just how hard modernization is when there is an existing infrastructure to support. The current state of our Space assets has those same types of issues. As an example, most of us were surprised when one of the first of the Space Architect studies of our Space communications indi-

(See High Ground, page 47)

Army Space on Target in Iraqi Freedom with Command-wide Effort

By MAJ Laura Kenney

COLORADO SPRINGS, Colo. — Sandstorms, heat, insects, worry about the war, personal hygiene, homesickness … All these things affected Army Space soldiers serving in Operation Iraqi Freedom — just as they affected the troops waging direct war — but, like their infantry brethren, Army Space soldiers, professionals all, persevered, and were an essential part of the war effort.

Every element of the command was fully engaged, from the Army Space soldiers working hand in hand with combatant commanders in the desert, to the Space and Missile Defense Command Operations Center here tracking movement of soldiers and providing reach-back support for all deployed Space teams.

Speaking of deployed Space teams, a total of five were deployed and directly involved in Iraqi Freedom. Since the beginning of Operation Enduring Freedom, Army Space has deployed 10 Space support teams to the U.S. Central Command region. Teams served in Iraq, Oman, Kuwait, and elsewhere in the CENTCOM area of operations. They provided Space capabilities, expertise, and products in support of theater commanders.

SGT Sabrina Bannister of the 1st Space Battalion's Army Space Support Team 5 stands in front of a sign near the border of Iraq. Bannister's team deployed to support the 1st Marine Expeditionary Force during Operation Iraqi Freedom. Photo courtesy of Combat Camera

The teams moved with those combatant commanders, sharing the same dangers and hardships, while providing up to the minute Space force enhancement, including satellite communications health and welfare status and analysis; global positioning system accuracy predictions; strategic and theater ballistic missile early warning; weather terrain and environmental monitoring awareness; and intelligence, reconnaissance, and surveillance products.

MAJ Daniel Cockerham, Team Leader of Army Space Support Team 5, traveled with the Marine Expeditionary Force 1 as they took Baghdad. Prior to entering the city, he e-mailed his unit.

"We're fully integrated with the Marines of the IMEF, and are treated as family since we've been living and operating with them from the beginning. Our soldiers pull duty with them in addition to performing our mission. We haven't had showers in weeks and are filthy, but, hey, we're on the outskirts of Baghdad! We're all very proud to be part of this effort," said Cockerham.

A Joint Tactical Ground Station — which provides direct downlinked, in-theater, early warning of missile launches — was deployed to the Central Command region. Together with its European based sister units, the JTAGS provided an encompassing, 24 hour continuous in-theater processing of missile alerting and early warning on tactical ballistic missiles and other infrared events.

The JTAGS monitored infrared signatures coming from hot spots within Iraq to provide critical information to maneuver commanders regarding the timing and operational employment of their units.

One specific incident illustrates the value of early warning. JTAGS operators presented early warning of hostile aircraft approaching a Predator surveillance mission. Thanks to the timely warning, commanders were able to divert the mission, thereby averting potential loss of the vehicle, and maintaining the secrecy of the mission.

LTC Scott Netherland, 1st Space Bn. commander, commented "Many people consider the first Gulf War as the first Space war. Our ability to exploit Space capabilities for communications, navigation, and precision guided munitions, detection of relevant

infrared events, imagery products, blue force tracking, and weather all give the U.S. warfighter a tremendous advantage over our adversaries. Our experiences with Operation Enduring Freedom and Operation Iraqi Freedom have revalidated the need to continue close integration of Space forces and capabilities with the warfighter.

The Spectral Operations Resource Center was also a key player. An element of the SORC was forward deployed to CENTCOM, and in tandem with home base, produced more than 300 products in support of Iraqi Freedom.

The SORC (Forward) produced imagery that provided spectral analysis of vegetative areas and rugged terrain to eliminate unsuitable sites for airborne assault operations during the planning process. Standard image maps were created to conduct standard mission planning.

Working in tandem with ARSSTs, SORC rear and forward provided detailed change detection assessments to identify potential enemy locations. Archived satellite imagery was merged with more recent spectral imagery to identify changes. The noted changes were passed on to combatant commanders, identifying potential hidden enemy assets, and assisting in the targeting process. The technology also assisted with locating enemy mine fields.

Bo Dunaway, chief, Remote Sensing Branch, said, "This is the first time that we've been able to put all the pieces together and deliver spectral products from start to finish in a timely relevant manner. From units forward requesting products to downlinking unclassified imagery via Eagle Vision I and delivering digital products within 24 hours is a significant milestone for the commercial imagery arena. The use of SORC (Forward) ensured continuity and mission focus for all Army Space elements using commercial imagery products."

Another vital piece of the Army Space effort could be found in the 1st Satellite Control Battalion. Although not forward deployed, the SATCON companies were as integral a part of Iraqi Freedom as their desert-located sister units.

The 1st SATCON supported the ground units involved in Iraqi Freedom since they first entered theater. SATCON units enabled satellite communications, connectivity, voice, and video teleconference capability to the combatant commanders of CENTCOM, V Corps, 3rd Infantry Division, 1st Marine Expeditionary Force, Special Operations Command, and other deployed forces.

The two primary units involved in this support were B Co., Fort Meade, Va., and C Co., Landstuhl, Germany. They controlled the satellite links for tactical and strategic warfighter communications networks.

Together, they supported more than 140 terminals and

(See Army Space on Target, page 46)

Army Space Support Team prepares for Post-war Iraq

By LTC Michael Yowell

PETERSON AIR FORCE BASE, Colo. — Historical. That was the overarching feeling as Army Space Command formally bade farewell to its latest Army Space Support Team, commonly referred to as an ARSST, during a departure ceremony March 31.

ARSSTs allow today's warfighters to accomplish their missions using Space-based assets. Capabilities are enhanced by satellites such as: communications; position, navigation, and timing; intelligence, surveillance, and reconnaissance; weather, terrain, and environmental monitoring; and missile warning.

"All that is happening right now in the Southwest Asia area of operations in Afghanistan and Kuwait," said BG Richard V. Geraci, deputy commanding general for Army Space Command.

Unlike every other team that is supporting the warfighter, this team went to support the humanitarian aid and reconstruction of Iraq after the war. The Office of Reconstruction and Humanitarian Assistance (ORHA) will work the relationships with all those involved in the humanitarian and reconstruction activities: the United Nations, nongovernmental agencies and various expatriate Iraqi groups. Team ORHA will provide Space expertise and access to Space assets to help bring peace and stability to the Iraqi people.

"We truly are an 'Army of One,'" remarked MAJ Richard Brence, ARSST ORHA team leader. "Half of us are mobilized National Guard and half regular Army but you couldn't ask for a better team makeup."

Since early January the team trained together six days a week and were certified fully mission capable. Right away they were providing Space-based products on a twenty-four hours a day, seven days a week schedule.

"This really helped me learn my mission," said CPT Mike Daniels, the team's intelligence officer. "We put into real life what we've learned in the classroom. Our customer liked what we did and they asked for more," he added.

This team and mission truly are blazing new ground for Army Space Command.

LTC Michael Yowell is a mobilized Colorado National Guardsman currently serving as the Commander of the 193rd Space Battalion in support of Operation Enduring Freedom. He served ten years Active Duty as a Field Artillery Officer in Alaska and Okla., and as a Public Affairs Officer in Germany. As a full-time Colorado Guardsman he has served in several assignments prior to his selection as the battalion's first commander in June 2001.

Ceremony Marks Activation of 1st Space Brigade (Provisional)

By MAJ Laura Kenney

PETERSON AIR FORCE BASE, Colo. — A significant milestone in the history of Army Space Command took place April 11, with the activation of the 1st Space Brigade (Provisional) in a ceremony held at the Command headquarters here.

The ceremony marked the creation of the Army's first and only Space Brigade.

Currently, elements of the Brigade's three battalions are deployed in Iraq and the surrounding theater in support of Marine Expeditionary Force 1, V Corps, and Central Command.

"This activation represents a huge step forward in the normalization of Space," said LTG Joseph M. Cosumano, Jr., commanding general, U.S. Space and Missile Defense Command. "And what better time to do it, than during these historic times we find ourselves in, with Army Space forces deployed on critical missions, supporting the warfighters of Iraqi Freedom.

Above, COL David Shaffer, left, is charged with command of the 1st Space Brigade (Provisional) by U.S. Army Space and Missile Defense Command Commanding General, LTG Joseph M. Cosumano Jr. at the brigade's activation ceremony April 11. Observing the momentous event is CSM Reginald Ficklin, the command sergeant major of the brigade.

Opposite page, top, COL David Shaffer addresses the attendees at the activation ceremony of the 1st Space Brigade (Provisional).

Opposite page, bottom, LTG Joseph M. Cosumano Jr. and COL David Shaffer raise a saber as they prepare to cut the ceremonial cake during the reception to celebrate the brigade's activation. Photos by Dennis Plummer

"The new 1st Space Brigade (Provisional) is the first and only Space Brigade in the Army. Army Space Command just marked its 15th birthday, although the history of the Army in Space is much longer than that. We've postponed celebrating that anniversary while our soldiers are in harm's way, but, this is still a great time to stand up the new brigade."

The ceremony began with the symbolic uncasing and unfurling of the Army field flag, marking the activation of a provisional unit. Colors for the 1st Space Brigade will be authorized once the brigade's status is made permanent. The Army field flag was then posted in the waiting empty stand, already flanked by the Army Space Command and three battalion flags. Then, while the official activation orders were read, Cosumano passed the formal, framed copy of the order to the Brigade Commander, COL David Shaffer.

The mission of the 1st Space Brigade, as detailed in the order, is to "conduct continuous, global Space support, Space control and Space force enhancement operations in support of U.S. Strategic Command and Supported Combatant Commanders enabling the delivery of decisive combat power."

Army Space Command officially came into being April 7, 1988. Its three battalions — the 1st Satellite Control Battalion, the 1st Space Bn., and the 193rd Space Bn., Colorado National Guard — provide satellite communications, force enhancement, and early missile warning to the warfighter.

Shaffer insisted that the honors of the day belonged not to him, as first commander of the first ever Space Brigade, but to that brigade's deployed soldiers, whom he and Brigade CSM Reginald Ficklin could only represent.

"Our soldiers are over there, as we speak, doing tremendous things. This ceremony is for them, as they sweat and work around the clock, helping the combatant commanders achieve the spectacular success they have," said Shaffer.

Cosumano extended a special welcome to another general officer attending the event, Air Force MG Mason C. Whitney, adjutant general for Colorado's Army and Air National Guard.

"We couldn't be doing the tremendous job we're doing, supporting the warfighter in current operations, without his people. Case in point, the 193rd Space Battalion, activated just before Sept. 11. What a great asset they have been. They, as well as their sister battalions, have been doing a magnificent job in supporting the warfighter, wherever he is deployed.

He continued, "It's taken us 15 long years to get here, and I for one appreciate the symbolism of having this ceremony here in our new building. We have former commanders present, who represent the blood, sweat, and tears it took to get us to this point, as we celebrate quietly, while our nation is at war.

"And make no mistake, we are a crucial part of that war effort. We've got Army Space Support Teams and Joint Tactical Ground Station sections, and a host of other elements providing communications, early missile warning — everything we have in terms of operational capability is involved in current operations.

"In Operation Desert Storm, we'd just begun offering the benefits of the Global Positioning System. Today, we're providing force enhancement and force protection. We've come a long way in 15 years, and the stand-up of this brigade today is an indicator of all the challenges we'll meet in the future," concluded Cosumano.

Shaffer addressed those future challenges.

"Today's activation as a provisional unit is a major step in the process to becoming a permanent Army unit. The great thing about today is that it opens the door to expansion. By increasing the size of the brigade, we increase the support we give to the warfighter. This ceremony, unlike that of a change of command which is all about welcoming a new commander and saying farewell to the outgoing, this ceremony is about the unit, about its soldiers, past, present and future," said Shaffer.

The present day commander of the 1st Space Bn., LTC Scott Netherland, has been in Army Space Command for much of its lifespan. As a captain in Operations Desert Shield and Storm, he demonstrated the benefits of the Global Positioning System to that conflict's warfighters.

"GPS got our foot in the door, showing what Space had to offer. We've come a long long way since then. Today's brigade activation marks the increase of our investment in Space — and it's a great day for Army Space Command and the warfighter," said Netherland.

Another long time member of the command, John Marrs, director of Technical Support, said, "I've been with the command since 1990. The command has grown to its present size and mission completely in keeping with the vision held at its inception, that of providing the best Space has to offer the warfighter. Standing up the brigade will allow us to continue doing that, and growth is necessary to meet the increasing demand for Space capabilities. It's a fabulous day for Army Space."

The ceremony ended with a ritual cutting of a celebratory cake with a saber held jointly by Cosumano and Shaffer.

Under Army Regulation, a provisional unit may be organized and designated by the commander of an Army field command. Provisional units may be organized for a limited period of time, not to exceed two years. At the end of the two-year period, the commander will make a recommendation whether or not to permanently organize the unit.

Fireman's Challenge in Oman pairs up Army Space with Air Force

Above, 2LT Keith Woodburn, of the 193rd Space Battalion goes for the gusto during the Fireman's Competition held in the Sultanate of Oman. Woodburn, dressed in helmet and a life pack, is saddled with 50 feet of S-rolled hose on his shoulder while dragging another 250 feet of hose as he is cheered on by teammates Senior Airman Heather Shields and fellow Space soldier, SSG Kent Brandsted. Opposite page, top, Cheered on by Senior Airman Heather Shields (in Army tee-shirt) — 2LT Keith Woodburn pounds a railroad tie three feet with his sledgehammer. Team Army-Air Force poses with their prizes after finishing in fourth place out of nine teams that competed in the Fireman's Challenge. Army Space Command Photos

By LTC Michael Yowell

OMAN — "GO ARMY AIR FORCE!!!!" That was the cheer of the interservice team during the 405th Air Expeditionary Wing's first Fireman's Challenge in the Sultanate of Oman. On a sunny 90-degree Sunday afternoon, three members of the Army Space Command's Test and Evaluation unit joined with three Air Force Medical Group members for a series of challenging events. Team composition was simple, a six-person team with at least one female member. While eight other Air Force teams were formed five men to one woman, the Army-Air Force went fifty-fifty.

Air Force Capt. Alicia Wright, a Life Skills social worker with the base Medical Group, spearheaded the team's true equal flavor and recruitment. Staff Sgt. Melissa Buss and Senior Airman Heather Shields were with Wright on the same flight to the base in January and quickly joined her. Their challenge came when balancing the team makeup.

"We went to this event with the sole intention of having a good time instead of being hell-bent on winning," said Wright. "We didn't even know what we were going to do beforehand other than the requirement to be able to carry a 125-pound dummy." Having recently arrived, Wright saw the Army Space soldiers and decided to ask them to join in. "Most people do not even realize that there are Army soldiers on base," added Buss.

Being on a base of nearly 2,000 airman makes the six soldiers from the 193rd Space Battalion, Colorado Army National Guard, quite invisible but 2LT Keith Woodburn, SSG Kent Brandsted and SGT Michael

Hurley eagerly accepted Wright's offer. Each member had to compete in two events during the challenge and all six had to take part in the last event. In true team spirit, all Air Force members sported Army T-shirts.

Starting off the six events, Hurley had to race a three-inch fully charged fire hose 100 feet, then shoot water through a window until the bucket inside filled — striving for the speediest completion time. Buss then took her turn with the best of the two times counting for the team. "The hose knocked the wind out of me as soon as I turned it on. I'm glad that someone from base fire was standing behind me," said Buss. The team started off well with the best time of all the teams.

Having watched the other teams in the first event, team "Army-Air Force" strategized that the key to the Fireman's Challenge was not so much speed and agility but rather thinking about what you were doing before doing it. With that in mind — and no rest breaks between events — they started off on the second event of rolling out three 50-foot sections of hose and connecting them before the entire team had to race to the end to shout "Fighting Fire" three times. They then had to reverse the process by dropping the hose, disconnecting it, and s-rolling the hose before dashing across the finish line.

Dressed in a fireman's helmet and bunker gear, Woodburn negotiated a traffic cone course with 50 feet of hose on his shoulder before dragging a roped truck tire 50 feet. Lastly he used a sledgehammer to drive a railroad tie three feet. Tagging his similarly dressed partner, Brandsted dragged a fire hose and had to shoot at two windows — filling two buckets — before hefting a 125-pound dummy and carrying it 100 feet.

Following the combined event, Hurley had to move a dummy 50 feet, drop it and drag another dummy back before tagging Buss to repeat the process.

One of the hardest events found Woodburn dressed again in helmet and a life pack, saddled with 50 feet of s-rolled hose on his shoulder and dragging another 250 feet of hose all the way until it was fully stretched. Then Woodburn had to run it back while Wright and Shields s-rolled the hose back up.

Finally the entire team raced with canvas buckets to douse a roof designed to drain into a 55-gallon drum.

The team quickly realized that it had to pace the water flow onto the roof since too much at once would overshoot the drain and waste time. Quickly they had it filled to the second ring on the barrel, and their challenge was complete.

"It was hard work," reflected Woodburn. "It was a good thing to break up the monotony of the day-in day-out work schedule here."

Competition was very tight throughout the challenge and team "Army-Air Force" took fourth place. Prizes for the team included 405th AEW T-shirts, mugs, coffee cups and key lanyards. The Fireman's Challenge was so popular that it will be a monthly base event. No doubt Team Army-Air Force will aim to improve its standing.

SATCON Volunteers give Boost to Sister Battalion

By Sharon L. Hartman

COLORADO SPRINGS, Colo. — "Hooah" is written all over the faces of PFC Corey Wilson, SPC Chad Duncan, and SPC Daniel Alvarez, soldiers from the 1st Satellite Control Battalion. These fine soldiers didn't wait for the call or the "hey-you roster," instead, they volunteered to deploy in support of their sister battalion, the 1st Space Battalion.

Alvarez, from SATCON Battalion's Delta Company, left in March to join the Test and Evaluation Unit deployed to Oman. A co-worker, SPC Jarrod Mantz, said about him, "He is dedicated to what he does and always tries to better himself at everything, and this deployment is just another example of that can-do attitude."

Wilson, Alpha Company, and Duncan, Bravo Company, trained with Army Space Support Team (ARSST) 14 for several weeks before leaving. Duncan deployed with Team 14, and Wilson went to Bagram Air Base in Afghanistan to plus up Team 3 already on the ground. The three young soldiers heard of the need for volunteers through their respective chains of command and jumped at the opportunity.

"It really came down to whoever was working that day," said Duncan who is a native of Colorado. "They asked 'who wants to leave on Monday?' That was on Thursday afternoon.

"We were told, 'You won't know where you're going. You won't know what you're doing. You won't know whom you're going to be with. You won't know how long you will be gone.'"

Such uncertainties might leave others less eager to volunteer, but not Duncan and Wilson.

Above, PFC Corey Wilson and SPC Chad Duncan of 1st Satellite Control Battalion train-up for their volunteer deployments with their sister battalion, the 1st Space Battalion. Photo by Sharon L. Hartman

Opposite page, top, although he deployed with the 1st Space Battalion, SPC Daniel Alvarez holds up a 1st Satellite Control Battalion banner showing his allegiance to his unit. Photo by SFC Robert Kelley.

Opposite page, bottom, SPC Chad Duncan, far left, one of three volunteer soldiers from the 1st Satellite Control Battalion poses with members of his temporary Army Space Support Team. Photos, U.S. Army Space & Missile Defense Command

"It excited me. To switch battalions, get assigned to 1st Space, learn a completely different job, that's really a once in a lifetime thing. I've never heard of anyone ever doing it," said Duncan.

"Getting to go do something like this — getting a combat patch when he's an E3 and I'm an E4 — that just doesn't happen. It doesn't ever happen and being on a team with three officers right now is not something many guys in our shoes get to do."

Wilson — originally from Arizona — had just arrived at the Operations Center at Fort Meade, Md. when the need for volunteers arose.

"My first sergeant and company commander brought it up to me and asked me if I wanted to go. I came into the Army with pretty much the same intentions and goals as SPC Duncan. Ready to learn, ready to go and do Army things. To do things soldiers do," said Wilson.

"I've been in the Army for three years, straight out of high school. I did my basic training at Fort Knox, Ky., Advanced Individual Training at Fort Gordon, Ga., went to Korea for one year, and came back to do the Satellite Network 1 Charlie course. Like I said, I'm new to the Operation Center and jumped at the chance to go."

Army Space Support Company 1SG Scott Ballard remarked on the challenges Wilson and Duncan endured in preparation for their deployment.

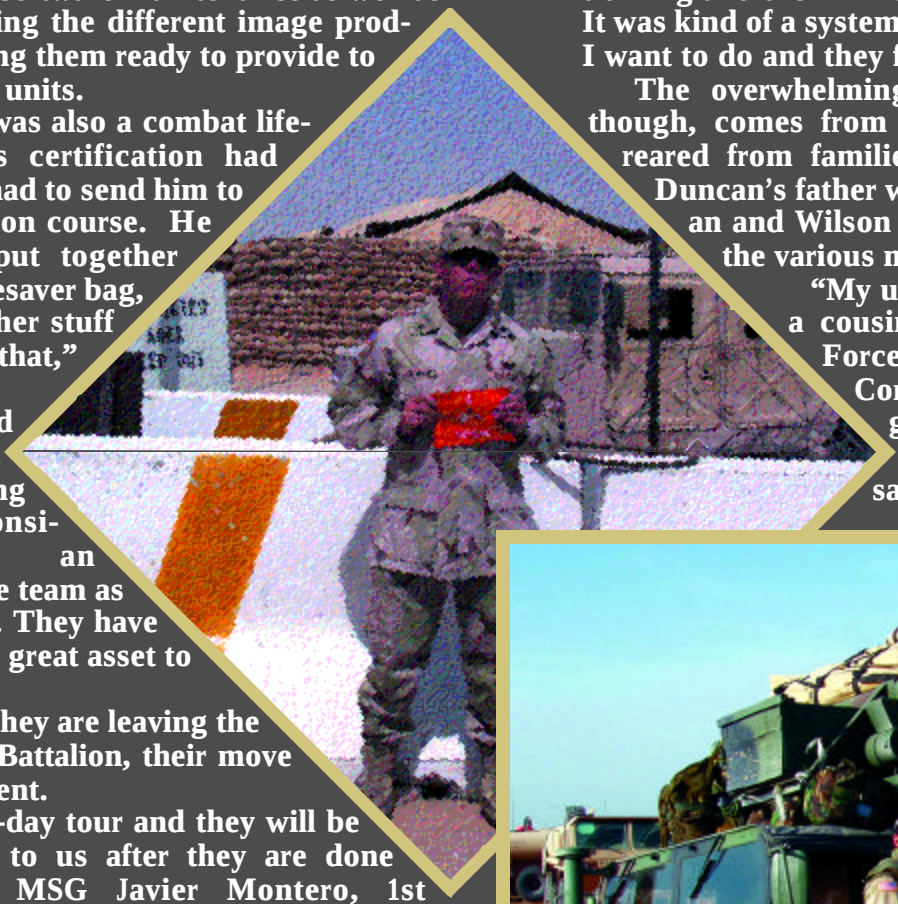
"They arrived March 3 for a six-and-a-half week training process which includes two situational training exercises. Then, in addition to all the certification training for team support, they have had to step

up to the plate and be prepared with weapons qualifications and NBC training.

"They've been really training to work the imagery aspect of being team members. They are learning hardware and software maintenance as well as actually utilizing the different image products and getting them ready to provide to the supported units.

"Duncan was also a combat lifesaver but his certification had lapsed so we had to send him to a re-certification course. He has already put together his combat lifesaver bag, and all the other stuff he needs for that," said Ballard.

"I'm glad to have them. They are taking on the responsibilities of an NCOIC for the team as an E3 and E4. They have proven to be a great asset to our effort."



Although they are leaving the 1st SATCON Battalion, their move is not permanent.

"It's a 179-day tour and they will be coming back to us after they are done there," said MSG Javier Montero, 1st SATCON's operations NCOIC. "We pulled them out of the Operation Centers so they could supplement the ARSST teams the command were putting together to support Central Command.

"As far as our mission is concerned, the Satellite Control companies will miss them, but we'll carry on. We have enough folks to cover the workload."

But, for these young men, this truly unique opportunity puts them closer to the line of fire than soldiers in their military occupation specialty have ever been in. When asked if there was any anxiety about going into the field, both replied with an immediate "no."

"There's the inherent amount of fear that always comes with getting ready to go someplace you've never been before," said Duncan.

"I've never left the country before. Wilson has been to Korea, so he's been abroad, he's been a foreigner, so he knows a little about that, but I think we are probably the most anxious people in the state right now. We're ready to rock and roll and we have a lot of support from our families.

"I called my mom one week from Maryland, and told her everything was fine, then two days later, I tell her I'm coming home for a few weeks to do some training and then I'm deploying to who knows where. It was kind of a system shock, but they know it's what I want to do and they fully support me."

The overwhelming understanding and support though, comes from the fact that both men were reared from families with military backgrounds. Duncan's father was an Air Force Vietnam veteran and Wilson has family members who span the various military branches.

"My uncle is retired Air Force, I have a cousin currently serving in the Air Force, another cousin in the Marine Corps and my sister is planning to go into the Navy following after me in service to our nation," said Wilson.

Everyone serving in today's military all-volunteer force is, by definition, serving of their own free will, and thus a volunteer. The three soldiers now deployed to dangerous areas of the world have taken that one step further, to the benefit of their unit and their country.

Sharon L. Hartman, is a DoD contractor with COLSA Corporation, and has served in the Army Space &Missile Defense Command Colorado Springs Public Affairs Office for three and a half years. She is a computer graphics designer, journalist, and photographer, and is the graphics editor for the Army Space Journal.

Soul Survivor Challenge met by SATCON Soldiers

By CW2 Garth Hahn

COLORADO SPRINGS, Colo. — Sunrise found the soldiers hiking a trail, a slight breeze cooling the sweat on their brows. Moving up the hill in teams of four and five, their NCOs pushing them to haul their 40-pound packs just a little faster, the soldiers gave it their all. The goal they strove for was more than just making the top of the hill — the real prize was the honor of being known as "Best Crew."

In the second quarter of 2003, the 1st Satellite Control Battalion received a tasking from higher headquarters requiring a Best Crew competition.

Members of Headquarters and Head-quarters Company, 1st SATCON Bn. took this to heart and executed a comprehensive competition called the "Soul Survivor Challenge" involving leadership skills, and operational and common task training.

The Best Crew competition for HHC consisted of five events: an operational crew certification, ruck march, global positioning system road rally, obstacle course, Jeopardy! game, Class A inspection, and scores from the most recent Army physical fitness test and M16/M9 Ranges. This evaluation allowed a variety of events, thoroughly testing the soldierly abilities of the three crews vying for top honors.

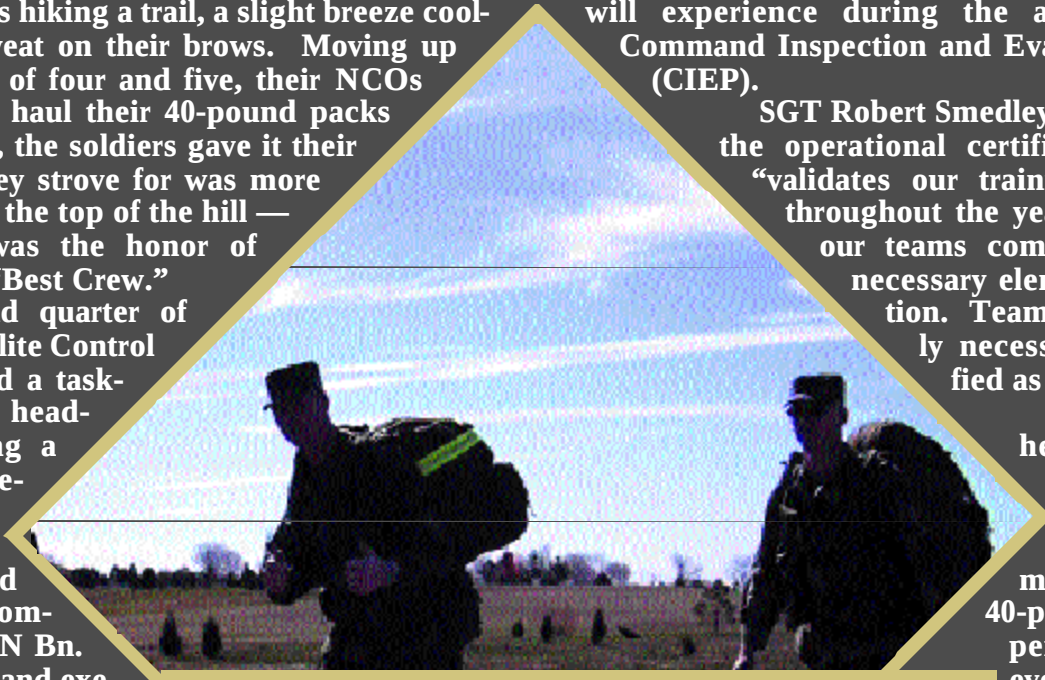
The operational crew certification is a weeklong evaluation of a crew's ability to accomplish a variety of crew tasks. The tasks required a range of skills from operation of one of the operational subsystems to deployment to off-site locations. This particular week constitutes the operational meat of the best crew competition, and is similar to what the crews will experience during the annual Battalion Command Inspection and Evaluation Program (CIEP).

SGT Robert Smedley, contestant, said the operational certification of crews "validates our training efforts from throughout the year, and enhances our teams communication as a necessary element of certification. Teamwork is absolutely necessary to get certified as a crew."

The ruck march, held on Fort Carson, challenged the soldiers to an eight-mile course with 40-pound packs. The personal best of every soldier was all that could be demanded, and the troops of HHC responded with a hearty effort and a close finish.

Wearing a pack nearly half her own weight, SPC Jennifer Swift said, "The teamwork was the most important part of the event. The march was physically challenging, and we had to motivate each other to finish."

The GPS road rally was a test in navigation and Precision Lightweight GPS Receiver (PLGR) use skills. Each crew was given a PLGR and a list of 10-digit grid coordinates for points around Colorado Springs. The teams had three hours to go out and find the points — with the team locating the most points winning.



During HHC, 1st SATCON's Best Crew competition, SSG Nathan Daniell and SSG Steven Cato (above left) take part in the rucksack march and contestants SPC Chaun Frink and SGT Keith Barnhart (above l-r) attempt to cross a rope obstacle. Photo by CW2 Garth Hahn

(See Soul Survivor, page 55)

COMMAND in BRIEF

Family Readiness Group Buttressing Space Battalion Warriors

By SPC Aaron Evans & Sharon L. Hartman

COLORADO SPRINGS, Colo. — Of paramount importance to our soldiers abroad is the need for contact with those they hold dear back on the home front. There's a good percentage of the population that, in the spirit of patriotism, wish to support our soldiers by mailing care packages and letters of encouragement to them to uphold their morale.

With many soldiers from the 1st Space Battalion deployed in support of Operation Iraqi Freedom, the battalion's Family Readiness Group (FRG) held a meeting to discuss ways in which they could continue to support the soldiers from afar, and their families close by.

"We conduct monthly battalion FRG meetings, and provide childcare to allow maximum participation," said Bettina Bailem, wife of the battalion CSM Lester Bailem.

"During our last meeting, we elected to take part in a bratwurst lunch fund-raiser and use the monies raised to finance a massive care package that would be distributed amongst the various deployed teams.

SFC Edward Breeden and SGT Richard Provinzano of the 1st Space Battalion put together care packages to be sent to members of the various teams from the battalion that are deployed in support of Iraqi Freedom. Photo by Sharon L. Hartman

"We also provided materials at the meeting for the children to make homemade Easter cards for the soldiers, and family members from Army Space Support Team 1 put together Easter goody bags for all of the teams."

The luncheon brought in $470 and helped offset the cost of the fundraiser, as well as allowed the FRG to purchase items for the care package such as coffee, lip balm, wet wipes, soap and other necessities.

Due primarily to security issues and the delayed mailing system, supporting soldiers via mail has become increasingly difficult.

"Packages can only be sent to an individual soldier, so we are sending it to one person and they will distribute it to the other members of the teams," said Jackie Netherland, wife of the battalion commander LTC Scott Netherland.

In addition to supporting the deployed soldiers with the care packages, the FRG additionally accepted the responsibility to show that same support for the family members left behind.

"We were also able to set some money aside for our Easter egg hunt," added Mrs. Bailem.

"On Easter Sunday we conducted an Easter egg hunt for the children at the park on Peterson Air Force Base. We wanted to still be able to get the families together and do this for the children because many of them have a parent that is deployed."

While the traditional letter or package has been the modus operandi for as long as many people can recollect, there has also been the mass mailings (i.e. form letter campaigns) to soldiers that show them that civilians at home support their efforts.

But, with the heightened concern for security, the U.S. Postal Service put firm restrictions on mailings to soldiers overseas.

Fortunately, a number of organizations have offered alternatives so that the flow of support can continue at a steady pace.

Operation Dear Abby began as a way for individuals to send messages via e-mail to personnel. The message can be anything from a holiday greeting, to a message stating how important their job is to the future of our nation. Individuals with Internet access can send messages to service members by accessing www.OperationDearAbbey.net.

Other avenues one might explore would be donating a calling card, signing on to a virtual thank you card; sending personal messages through the "Stars and Stripes" overseas newspaper, or simply making a donation to relief agencies like the Red Cross, Army Emergency Relief, or Air Force Aid Society.

These are simply a few of the many ways in which we at home can continue to show our personnel abroad that they are remembered and cared for.

Army Space Forces Inaugurates Quarterly Prayer Breakfast

By Sharon L. Hartman

PETERSON AIR FORCE BASE, Colo. — With times as they are in the world — many servicemen and servicewomen fighting a dangerous and unpredictable war far from home — timing was impeccable for the 1st Space

Brigade's first quarterly prayer breakfast. The event, planned well before the outbreak of the war, allowed attendees from the brigade and Army Space Command, time to reflect and to pray for the situation that has put many of their own in harm's way.

Hosted by the 1st Satellite Control Battalion's Headquarters and Headquarters Company, the inaugural event was conducted in Army Space Command's new headquarters building on Peterson Air Force Base, and commenced appropriately with the invocation, given by the command's chaplain, MAJ Allen M. Stahl from Fort Carson.

LTC Mearen Bethea, the battalion commander, followed by providing a bit of history regarding the purpose behind the occasion.

"The first prayer breakfast was held in 1953 by President Dwight D. Eisenhower to encourage Americans to seek divine guidance for national leadership and proclaim their dependence on God and faith in Him."

Bethea then introduced the guest speaker, COL John Bauer, post chaplain for Fort Carson, who proceeded to speak on what the word SOLDIER really represents.

"'S' stands for Selfless service," began Bauer.

"The word 'Self' yields other words, selfishness, self-centeredness, but it is a mark of maturity that, as we grow older, we begin to reach beyond ourselves."

Bauer then followed with examples of the other letters of the acronym, "Obedience, Loyalty, Discipline, Integrity, Empathy and Religious faith."

As Bauer continued, participants enjoyed an array of food, from homespun pancakes and eggs to biscuits with gravy, all prepared by the soldiers and families of HHC 1st SATCON Battalion.

SSG John Ciesiolka, NCOIC of the team that coordinated the breakfast, commented on the dedication of the soldiers and families of the battalion:

"Some of the wives pre-cooked muffins and other baked items. I also had soldiers come in the evening before to help set-up, then they were in the next day at 6:30 in the morning on their days off from shift work to start cooking, and remained after to clean up."

COL David Shaffer, commander of the 1st Space Brigade, noted that this event was proof positive that the newly formed brigade was making great strides into becoming a fully functional brigade.

"I thought it was really great. It was our very first effort and I thought it went really, really well," Shaffer said.

"I've been around the Army for a long time and know that this is something that should be done as a brigade, and I think it is just one more step in progressing toward becoming a fully operational brigade.

"We had a good turnout, and a great speaker who had very inspirational words. It was also very opportune that we had a chance to do this prayer breakfast as the real world operations were kicking off. We can't take credit for the timing as it was not planned, but it was good to try to take a moment and put everything that is going on around the world into perspective."

To end the breakfast, participants joined in singing "God Bless America" and "The Army Song" prior to Stahl giving the benediction. Many attendees also brought their families to the event to show their support and faith in prayer.

"Coming from a Christian upbringing, it was nice to have something like this going on while my mother was here visiting because she was able to attend and see that the Army really does take Christianity into consideration," said SSG Megan Fowler, battalion training NCO for the 1st SATCON Battalion.

Team Army Space Marches for the Tiniest Soldier

By Sharon L. Hartman

COLORADO SPRINGS, Colo. — What began as two ladies desiring an outing with their children, quickly turned into 17 command members and their families teaming up for the smallest member of the ranks.

Anjoleen Baca, electronics engineer and Cassandra Shigley, a telecomm specialist with the Wideband Gapfiller Satellite - SATCOM System Expert section of the G-6, had decided to participate in the March of Dimes annual WalkAmerica as a chance to do something together with their children. They had just decided to invite other members of their section when LTC Robert King, the command chief of Operations Division, asked them if they would open it up to the entire command, and coordinate a team effort.

Baca, a volunteer with the Ronald McDonald house, and no stranger to charity fund-raising, took on the mission.

"The March of Dimes is an organization that focuses on prenatal, premature and Neonatal Intensive Care Unit (NICU) programs. As a team, we needed to sponsor an Ambassador Family," said Baca.

"We looked first within the command to see if we could sponsor one of our own as our Ambassador family. Unfortunately, in the only one that we could find, the father was deployed, so the family had left the area to be with other family members.

"Since I volunteer with the Ronald McDonald House, I knew we would be able to find a family there, and that is how we found our Ambassador family, the Umdens."

The Umden baby thus became that smallest member mentioned.

After an emergency Caesarian section, William Umden was born nine-weeks early to Emily and Gerry Umden of Pueblo, Colo. He was taken to Memorial Hospital in Colorado Springs where he stayed for nearly a month in the NICU.

Unable to make the daily drive while recuperating from the Caesarian section and unsure of how to afford

the expense of staying in Colorado Springs, the Umden's turned to the Ronald McDonald House, and that's where Baca found them.

With the Ambassador family selected, Baca started the process of recruiting members of the command to participate. Each participant had to find people who would sponsor him or her with a donation. In addition to that, Baca sold candy bars and extra team ARSPACE T-shirts to be added to the overall donation.

"We had never done this before, so we didn't know what to expect, but set a goal of 10 walkers and $1,000," said Baca.

"I was also informed, that in the 33 years they have done the walk in Colorado Springs, this is the first year that the Army has had a team."

In the end, 17 walkers, both soldiers and civilians, plus many family members, took on the challenge of either the 2.5 mile or the 5 mile walk with the Army Space Headquarters and Headquarters Company guide leading the way.

A total of $1,144 was raised for the March of Dimes.

Soldiers, civilians and family members of Army Space Command pose for a team photo under the WalkAmerica Banner for the March of Dimes fund-raising event. Monies raised by the team went to help a child who was born prematurely. Photo courtesy of March of Dimes

Unfortunately, little William and his parents were unable to make it to the walk, because William ended up back in the hospital the night before with a fever.

On a good note, the littlest "soldier" was only battling a new tooth this time, but the money raised by the Army Space team will assist him in the bigger battles he has yet to face.

SATCON soldiers take temp jobs at DISA-EUR

By SSG Franklin Barrett

LANDSTUHL, Germany — In an effort to improve Space-based communications support for Operation Enduring Freedom and Operation Iraqi Freedom, C Company, 1st Satellite Control Battalion, Landstuhl, Germany, recently assigned its Satellite Network Control NCO and a soldier to temporary positions at the Defense Information Systems Agency-Europe Headquarters in Stuttgart, Germany. SGT Jeremy Landuyt and SPC Shawn Michaud started the 90-day temporary duty on April 1. They have been working side-by-side with U.S. Navy and other Army personnel permanently assigned to the Regional Network Operations Security Center (RNOSC).

The RNOSC plays a large role in communications support for the European and Middle-Eastern Theaters of Operations. A major element in the overall mission of the RNOSC is Space-based communications, or satellite communications, and this is precisely where Landuyt and Michaud provide their support and knowledge.

On a day-to-day basis, the RNOSCs from all Theaters of Operations (continental U.S., Europe, and Pacific) work together with the Defense Satellite Communications System Operations Centers (DSCSOCs) in coordinating, managing, monitoring, and maintaining the satellite communications network known as DSCS. C Co., 1st SATCON, is the DSCSOC for the European, Middle Eastern, and Indian Ocean theaters. The DSCSOC at Landstuhl and the RNOSC at Stuttgart work together to maintain a constantly updated database for all the DSCS satellite networks in the region. These databases are highly dynamic and the accuracy of the information contained within them is imperative.

The role that Landuyt and Michaud play at the RNOSC mirrors the database management role at the DSCSOC itself. Most of the personnel assigned to the RNOSC are not as proficient at utilizing the DSCS Network Planning Software (DNPS) as the soldiers and NCOs assigned to the DSCSOCs. DNPS is the tool that the network planners at the RNOSC and the Regional Space Support Centers (RSSCs) utilize to develop and maintain the databases associated with DSCS. DNPS is also utilized by the DSCSOCs to configure their network monitoring tools according to the databases provided by the RNOSCs. While on duty, Landuyt and Michaud assist the RNOSC personnel in creating new databases, updating existing databases, and disseminating databases as necessary.

The unique opportunity has enabled these satellite network controllers to gain a new perspective on how their normal day-to-day business at the DSCSOC fits into the broad spectrum of satellite communications. Landuyt said, "I think it is something that all the NCOs in the 1st SATCON should be given a chance to do. It gives you a better understanding of the big picture."

That "big picture" is often overlooked in world media. Most notable news sources reporting from the front lines are showing the world the challenges faced by the war fighters, leaving the public to overlook the importance of our support units, especially communications.

For these two 1st SATCON soldiers, the importance of communications, primarily Space-based communications, is not overlooked. Landuyt and Michaud serve as part of the voice of command that still sounds off in the deserts of the Middle East, and around the world.

Past, Present, Future

Satellites become "high ground of Space" over last 30 years

By Bill Furr

Over the past three decades, satellite systems have been developed into vital combat enablers of the Army's warfighting capability. Occupying the "high ground of Space," satellites now provide unprecedented "battlespace awareness" that helps reduce the "fog, friction, and uncertainty of warfare." Space has, indeed, changed the way military force is applied and created opportunities to redefine the Army's role in developing its uses.

Space capabilities are a cornerstone of the Army's Transformation Force. Critical operations such as communications, imagery, reconnaissance, navigation, and warning have migrated from a total dependence on terrestrial systems to an integrated architecture of ground-, air-, and Space-based technologies that are systems unencumbered by the terrestrial limitations of topography and distance. To achieve the Objective Force requirement for information superiority for advanced full spectrum operations, Space must be seamlessly integrated into land-force operations. Seamless integration is not about improvements to individual platforms, weapons, sensors, or decision tools, but about the complete integration of land- and Space-based capabilities across the full battlespace. Achieving information superiority requires the Army to define what it wants from Space and position itself to get it.

A Historical Perspective of the Army's Role in Space

From a historical perspective, the Army has had an important role in the development and use of Space systems. In the early stages of the U.S. Space program, the Army was instrumental in the development of rockets and satellites. The first U.S. satellite was launched into orbit by an Army Redstone rocket. Subsequently, presidential decisions in 1958 transferred Army rockets and missiles to NASA.

The Sixties

In 1961, DoD assigned the mission of managing and operating U.S. military Space launch vehicles and satellites to the Air Force. In the early 1960s, the Defense Communications Agency was formed and assumed the role as the developer of communications payloads in satellite systems. In 1962, the U.S. Army Satellite Communications Agency was created with the responsibility for ground terminal and ground support development of satellite systems. The Army continues to perform this mission today, most prominently in ground mobile force terminals for the Defense Satellite Communications System and military strategic and tactical relay system.

The Seventies

In the early 1970s, national satellite systems were providing essential strategic, national-level capabilities. At the operational and tactical level, however, users were not receiving products and services from these systems in a timely manner. In 1973, the Army took the lead in DoD by establishing the Army Space Program Office to execute the Army Tactical Exploitation of National Capabilities Program (TENCAP), serve as the unique technical and fiscal interface with the national program offices, and manage the TENCAP materiel acquisition. The TENCAP program is based on exploiting current and future tactical potential of national capabilities and integrating those capabilities into the tactical decision-making process as rapidly as possible. This approach was so successful that Congress ordered all services to establish a TENCAP program based on the Army's model in 1977.

The Eighties

In the mid-1980s, the Army continued to solidify and exploit Space within the Army. In 1983, the Army Space

The Theater Missile Warning Company fields and supports the operation of Joint Tactical Ground Stations that provide early warning of missile launches to our deployed forces wherever the threat of ballistic missiles exists. The JTAGS systems provide direct down-linked, in-theater, early warning of missile launches. The five existing JTAGS systems are operated by joint Army/Navy crews and are a part of the U.S. Strategic Command's Tactical Event System (TES).

Army's role in developing Space systems critical

Army responsibilities among Department of Defense roles and missions must include active investment in and development of Space for Army purposes. As the Army contributes to joint warfighting and maintains dominance in land warfare, it may not be able to depend solely on Space capabilities developed by other services. Space systems, especially Space force enhancement user equipment and terrestrial-based Space control systems, will need to provide capabilities specifically for soldiers to continue land dominance. The Army role in developing Space systems must be active.

Council was formed and consisted of designated general officers who had the responsibility to coordinate actions, approve proposals and provide guidance on Army involvement in and use of Space. In 1985, the Army Training and Doctrine Command (TRADOC) established a Space Directorate at the Combined Arms Combat Developments Activity with the responsibility for the development of concepts, doctrine, and operational requirements for Space. The Space Directorate published the initial operational concept for Space, "Army Space Operations," in 1985. In August 1986, the Army Space Planning Group, the Army element assigned to the newly formed U.S. Space Command, was redesignated as the Army Space Agency. The agency was the Army component to the U.S. Space Command and a field-operating agency of Headquarters, Department of the Army. On April 7, 1988, the U.S. Army Space Command was activated and organized to support the field Army. It absorbed the planning and support functions of the Army Space Agency and assumed operational Space missions.

In the early to mid-1980s, our national Space policies began to reflect a transition from peaceful use of Space for science, technology, and commercial activities, to policies reflecting Space systems as force enablers critical to national survival. Policies reflecting Space as a warfighting medium began to take shape. By dovetailing national and DoD Space policies, the Army published an Army Space Policy in 1985 that established Space capabilities as a priority for integration into future Army operational doctrine and warfighter requirements. The 1985 Army Space Policy embodied tenets that were underscored through subsequent Army Space policies (1994, 2003):

- Support to the warfighter.
- Contribute to successful execution of Army missions.
- Contribute to Army modernization objectives.
- Enhance Army Space expertise.
- Exploit and use Space capabilities.

The Nineties

In August 1992, the U.S. Army Space Command became a major subordinate element of the newly formed U.S. Army Space and Strategic Defense Command (SSDC). In March 1998, SSDC was redesignated U.S. Army Space and Missile Defense Command (SMDC) to act as the specified proponent for Space and as the principal adviser to the Army Staff for all matters pertaining to the research and development of Space.

2000

It was the Desert Shield/Desert Storm conflict that brought Space into the spotlight. Kuwait and Iraq operations presented a different scenario than the traditional Cold War European scenario. Our forces were faced with limited national infrastructures, great expanses of

(See Army's Role, page 48)

Is it Enough?

Army Innovation in Its Use of Space going into the 21st Century

By John Marrs

One question that has arisen in considering the relevance of Space activities to the transformation of the Army is whether the Army is being innovative enough (some would say proactive enough) in using and driving the development of future Space capabilities. This is important since the development of information superiority, situational awareness, reduced forward footprints, enhanced precision attack, and force protection are in large part enabled by a robust Space capability supporting the transformed Force.

Innovation

What is innovation? Webster's defines innovation as "something newly introduced; new method, custom, device, etc.; change in the way of doing things." Space is a place. What we are really asking is how can we use this new place to better do battle with our enemies?

Do we need to use, promote, or create innovation in Space capabilities that support the transformation of the Force well into the 21st century? Let's begin by examining some of the profound developments in technology that impacted military operations in the past.

Black Powder

Black powder (a compound of sulfur, charcoal, and potassium nitrate) was developed in China sometime before the 8th century. Writings reference its use to throw arrows and stones. Several hundred years were required for it to become known and used in the Western World. Roger Bacon, an internationally known scientist, wrote a treatise on its preparation in 1242. Its first documented use was in the form of "bombs" at the battle of Al-Mansura in 1250. Innovation in quality, production and "spin-off" products continued well into the 19th century. Innovations in other materials allowed the development of cannon and ultimately the artillery we know today. Major innovation spanned centuries.

Tanks

The first rudimentary "tanks" were inspired by putting armor on ordinary trucks. Technologists quickly reasoned that the same could be done with a vehicle that could go "cross country" and also carry a cannon as well as machine guns. As is frequently the case, the technologist's "viewgraphs" outstripped the ability of engineers to actually build the device. Military leaders were reluctant to use the new weapon, but the terrible loss of life on the Western Front provided a compelling warfighter need. Tanks were the hope to break the trench warfare stalemate. They were first used on Sept. 15, 1916, at the Battle of the Somme and subsequently with some success. Between the world wars, Germany became the home of the principal innovators in the development of tanks and the doctrine/tactics by which they would be used in World War II. Generals Eisenhower and Patton kept the idea of the tank alive in the United States, but we entered World War II as technical, doctrinal, and tactical inferiors to the Germans. By the end of World War II, the tank had reached the level of premier weapon system in the U.S. Army. Technical improvements since that time, while profound, have been incremental in nature. Major innovations spanned half a century.

Aircraft Carriers

The innovative marriage of aircraft and a ship occurred with the commissioning of the Langley (CV-1) on March 20, 1922. The first flight was launched from her decks on Oct. 17, 1922. Doctrine and tactics for the use of aircraft carriers developed slowly between the world wars. Development was slow due to lack of funding and little confidence by the senior leadership of the Navy that the carrier would have much of a role in a battle that was expected to be between lines of battleships. Development proceeded despite this and, unlike tanks, the United States maintained technical parity with Japan, our

Army's creative use of Space integral to obejctive force

The Army does not view Space activities as a core competency and this has been solidified at the national level by designating the Air Force as the executive agent for Space. Thus, the Army (from the point of view of a Space advocate) has limited resources and authority to influence the development of Space capabilities. The Army's role, however, has been (and is likely to continue to be) one of pushing for user equipment that exploits Space. There is ample opportunity for the Army to be creative and innovative in development of capabilities integral to the Objective Force.

The Army has a vested interest in helping to control the high ground, which means that air defense concepts already expanded to missile defense must be expanded to control of Space.

principal naval opponent. Two other technical advances — jet engine aircraft and nuclear power systems — have driven innovations since World War II. Major innovations spanned half a century.

Space

The United States launched a satellite into Space in 1958 and the Army led the way. The Army did much of the developmental work on missiles as well as communication, navigation, and imaging satellites that were the foundation for the nation's Space programs. By the early 1960s, the Army's work in satellites (done principally by what is now the Army Communications-Electronics Command) migrated to NASA, the U.S. Air Force or the National Reconnaissance Office. The Army and national leadership did not view "Space" as a core competence of the Army. While this was arguably a mistake, Army leadership did recognize that the medium of Space provided the "high ground." Possession of the high ground has always enhanced and supported the Army's ability to accomplish its missions. With respect to launch operations, fundamental innovations spanned only a couple of decades although recent activity by both NASA and the Air Force gives hope for future advances. Meanwhile, fundamental innovations in satellites continue into the foreseeable future.

Tactical Exploitation of National Capabilities

The Tactical Exploitation of National Capabilities (TENCAP) program seeks to integrate current and emerging national capabilities into the tactical decision-making process. In 1973, the Army took the lead in the Department of Defense by establishing the Army Space Program Office (ASPO) to execute the Army TENCAP program, serve as the unique technical and fiscal interface with the national program offices and manage the TENCAP materiel acquisition. ASPO has an outstanding record in rapidly exploiting national capabilities and integrating these capabilities into the Army's (and sometime other services') tactical decision-making process. This approach was so successful that Congress ordered all services to establish a TENCAP program based on the Army's model in 1977. Innovations continue to roll out the door at ASPO. Individual innovations occur on timelines of less than a decade.

Grenadier Beyond Line-Of-Sight Range and Tracking System (BRAT)

One of ASPO's most recent innovations, Grenadier BRAT combines a small user device containing a global positioning system with a transmitter. It produces a signal captured by a satellite system, which is processed through various nodes, including the U.S. Army Space and Missile Defense Command's (SMDC's) Space-Based Blue Force Tracking Mission Management Center (MMC). The information then passes on to numerous military users. The whole process is fast enough to give very good situational awareness of the location of friendly units. Grenadier BRAT came about quietly. National capabilities to receive certain low probability of intercept/detect signals (highly classified at the time) were made known to ASPO and the U.S. Army Space and Strategic Defense Command (now SMDC) leadership in the early 1990s. By 1993, the first "lab" models were being developed to prove the technical feasibility. By 1994, the Army Training and Doctrine Command's (TRADOC's) Battle Command

(See Innovation, page 51)

Transformation

The Warfighter's Perspective

Do I think an adversary will need to think twice about invading his neighbor? You bet.

By Col. Kurt Dittmer, USAF

For people who place themselves in harm's way, it is easy to recognize a "transformational" capability. If you are going to fly a combat sortie into Country X, you analyze everything this adversary can throw at you and assess whether you can/will survive. If he has a lethal capability, like an SA-20, you have to ask, "What system (capability) do I need in order to survive and be combat effective?" If the answers aren't satisfactory from a system perspective for either survival or combat effectiveness, you can then assess your concept of operations to see if there is any way you can increase your odds or effectiveness. If it still looks bad, you start checking for a sinus block or a maintenance nondelivery, or begin the process of groveling to your commander to cancel the mission because failure is imminent!

Fortunately, in our recent history, we've not had to grovel to our leaders to beg out of combat sorties, and U.S. systems have proven combat effective. So let's change perspectives and evaluate the United States from an adversary's viewpoint. Our adversaries have had to make some difficult choices over the last century when they assessed whether to attack the United States or invade their neighbor (a U.S. ally) and risk U.S. retaliation. So what questions might they ask?

"What capability/system do I need to face the U.S. Armed Forces and its fill in the weapon system?" In the last century, Soviet leaders constantly asked that question of themselves. The North Atlantic Treaty Organization (NATO) probably never matched the overall combat power of the Soviet Union's forces available for a war in Central Europe. Yet NATO did field conventional capabilities to deny the Soviets the potential for an easy victory in a conventional battle. Innovative weapons and concepts, such as precision-guided munitions, antitank guided missiles, superior frontline fighters, and stealth weighed heavily in the Soviets' assessments for success of either their systems or their operational concepts.

Concerning the risks they could encounter, our current adversaries might ask themselves, "What capability/system do I need to face the U.S. Armed Forces and their F-15s or F-16s?" Adversaries are beginning to find viable answers to this question and are starting to field aircraft that are better than ours. Those without the resources to train pilots to beat U.S. pilots can invest in Integrated Air Defense Systems with double-digit surface-to-air missiles (SAM) that effectively counter current U.S. aircraft. However, neutralizing U.S. F-15, F-16, and F/A-18 fighter aircraft does not guarantee air dominance because the United States may be able to field either transformational defensive systems that neutralize adversary SAMs for survivability or transformational weapons that allow standoff precision engagement of critical target sets. Another strategy adversaries might choose involves re-establishing dominance over potential foes. Here too, superior training or concepts of operations can continue to give U.S. pilots the edge. If the United States does not continue to retain the technological lead and field new capabilities, at some point in time, we may see adversaries who determine that they can challenge us in a conventional war and will make engagement decisions based on that assessment.

So what do we do? We can field a standoff weapon for the fleet like the Joint Air to Surface Standoff Missile (JASSM) or JASSM-ER (extended range), thus forcing our adversaries to go back into their decision cycle because these weapons may be transformational. If they can't afford the investment necessary to shoot down a JASSM or the launching aircraft or if no technological solution enables this engagement, then they must assess the risk that JASSM presents. "Can it penetrate my hard and deeply buried targets that I hold dear?" "Has the United States bought enough of them?" If the answers to these questions come up in

Part of the Advanced Concept Technology Demonstration, the Tactical High Energy Laser (THEL) at the High Energy Laser Systems Test Facility (HEL-STF) has successfully demonstrated the Army's ability to intercept rockets and artillery pieces. On June 6, 2000, the THEL intercepted its first Katyusha rocket. Since then, testing in November 2002 has illustrated the THEL's increased abilities with intercepts of smaller and faster moving artillery pieces.

About the next transformation system

Which transformational system is going to change the way an enemy will fight his next war or perhaps deter him from ever crossing the border in anger? Space-based missile defense? The Airborne Laser? The Crusader? The CV-22? The answer is an important one. I just hope someone is asking the question. A RAND analyst captured one of my greatest concerns when he said, "Cost matters, of course, but too often the most 'cost-effective' system is the one that will allow our forces to lose the war at least cost."[1]

favor of the United States, then they may think twice about invading their neighbor and facing the full brunt of U.S. combat capability.

Let's try this new analysis on a new and somewhat controversial system — the F/A-22. I recently spent quite a bit of time helping put together a study on this aircraft directed by Defense Planning Guidance, so I can reasonably assess its capabilities. If I represented Country X and were contemplating going to war against F/A-22s, this would be my take: "What capability/system do I need to face the U.S. Armed Forces and their F/A-22s?" I would turn to my air force commander and get the "Air Staff salute" because no aircraft produced in any country, now or for the foreseeable future, can match the aerodynamic performance of that airplane. Furthermore, the fact that it has integrated avionics, an Active Electronically Scanned Array radar, and eight air-to-air missiles means that your pilots will face the most lethal weapon system ever built. Therefore, an adversary who wants to counter the F/A-22 in the air will have to make significant investments requiring research and development and lots of time (unless another hot spot in the world is occupying our entire F/A-22 fleet because we didn't buy enough of them).

I would ask my ground force, air defense commander to assess what capability he or she has that measures up to the capabilities the F/A-22 will bring to the fight, and again I'll get the Air Staff salute. The commander can't answer the question because no one knows what the first engagement will even look like.

Instead of equipment, I decide I have to invade my neighbor now or never and ask my commanders to look at tactics, training, and procedures to counter the F/A-22's capabilities. I tell them to start a training program to prepare for imminent combat, which would look something like this: "Today you SAM operators will need to practice against a weapon system that has the radar cross section of a golf ball. It will be flying above 40,000 feet at Mach 1.5. Okay, got that picture? Good! These F/A-22s will be throwing Joint Direct Attack Munitions or small-diameter bombs at you outside your shot range! Now, in order to practice this profile, I would provide you something that can fly this profile, but we don't have anything even remotely close, so . . . any questions?"

Similarly, for the pilots: "Today, your adversary will be a two-ship formation of Raptors. To simulate what you will be seeing, I want you to take your four-ship out and place your radars on 10-mile scope, turn your radar-warning receivers off, and plan to start your defensive maneuvers outside your maximum weapons envelope. Plan on 'kill removal' eliminating a couple of members of your flight prior to the merge. For those who do merge, you will be facing AIM-9X and AIM-120 missiles from the most maneuverable fighter ever built. If you elect to run, a valid separation must exceed Mach 2.0. Any questions?"

"Sir, I think my sinuses . . ."

Do I think the Raptor is transformational? Yes. Do I think an adversary will need to think twice about invading his neighbor? You bet. In fact, what systems would

(See Warfighter's Perspective, page 52)

Wild Card

How Information Flows from the Modern Battlefield

By John W. Davis

Imagine the horror of death by friendly fire. See the faces of a mother and father at the moment they are told their son or daughter was killed by American fire. Today, far more than bullets can cause this horrific scene. This is a new age and there are new threats.

Information warfare is the latest theme to capture the imagination of the U.S. Army. The Objective Force, the technological army with the narrow soldier base, depends on the rapid and accurate flow of information to fuel its highly technical killing power. To protect its classified information, this army can depend on traditional security elements. This new army, however, also generates a massive amount of unclassified material that is overlooked by traditional security measures. Could this material reveal the secrets the Army hopes to protect? In the information revolution, "open source" information is the wild card of the modern battlefield. It is a form of friendly fire. The Army must protect this vulnerability through operations security.

Information — its access, use, analysis, and control — is clearly a military matter. Classified information is protected by an array of security measures that are well known and practiced. But what about the literally millions of bits of unclassified personnel, logistical, operational, and supply documents that the Objective Force is generating? What can this information reveal and who will watch over it? What will protect this information that spews out over unsecured faxes, e-mail messages and telephone networks?

"The General is skillful in attack whose opponent does not know what to defend, and he is skillful in defense whose opponent does not know what to attack."

— Sun Tsu 400-321 B.C

In the furor over recent revelations of Chinese espionage, who has asked how much they gathered from totally legal, totally open sources? What country will risk a major espionage recruitment when the same materials could be collected from an uncontrolled, open military Web site? Was it not Mao Tse Tung himself who counseled that, "The commander applies all possible and necessary methods of reconnaissance and ponders on the information gathered, eliminating the false and retaining the true, proceeding from one to the other, from the outside to the inside…?" Does this not suggest collecting the unclassified until one can interpolate the secret?

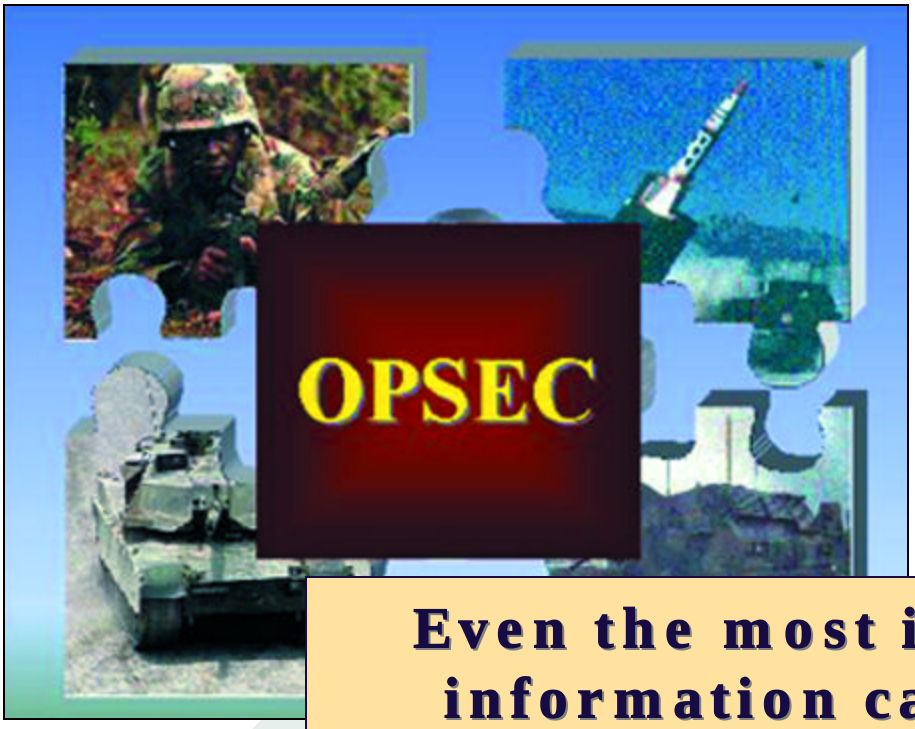
The Army must face this modern problem. Can the flow of information necessary to conduct operations hurt the Service? What if the unclassified material is so voluminous, so comprehensive that it reveals the essential secrets the Army is otherwise so careful to protect?

At the beginning of World War II, some 300 British engineers died because they could not defuse the new electrical bombs dropped by the Germans over England. It took trial and error and the chance discovery of intact electrical bombs on a downed German aircraft before the technology was defeated.

Eight years earlier, in 1932, the technology for such bombs had been entered into the public records of the British patent office, yet none of the engineers knew about this open source of information.

Three hundred men died while the answer they sought gathered dust in an unlikely place. Those who built the bombs that killed these men had found the information first and laid claim to it legally and openly. Had they known this, it would have been easy to convince the British people of the value of open source awareness.

A shop-worn story of yesteryear? Are hired workers on NATO compounds in the Balkans pacing off mortar ranges, as did the Vietnamese before them? Was it not the Belgian resistance fighter who said that people who experience occupation know the adversary better than he knows himself?



Even the most innocuous information can, in the wrong hands, kill

The arms race fuels the West's ever expanding market and the information-rich marketing ethic that advertises it. The military must create policies that protect all its information — even the unclassified — because, in this new world, information that kills soldiers is a commodity available for sale.

Operations security, a process of securing this unclassified information, can protect the Objective Force. The security process is simple. Each element of the Army must ask itself, "What is it that I must protect, or else I'll fail in my mission?" The answer is that critical information must be protected. Not everything that can compromise a mission is classified.

An earlier example involves the Maxim gun. When asked in 1884 why Western nations had colonized almost the entire known world, the English writer Hilaire Belloc said that it was not because of their advanced civilization, greater universities, or cultural advances.

No, he quipped, "Whatever happens, we have got the Maxim gun, and they have not!" Of course, the technology for this early machine gun and other technological information was routinely shared and sold in open contracts between "civilized" countries. In World War I this exchange of information resulted in the slaughter of an entire generation; by then all nations had access to the Maxim gun.

These stories show how open source, openly available information works. What is routinely, even inadvertently given away today could kill someone tomorrow. Information that is not tracked could later surprise the Army on the battlefield. These stories about open source information end in bloodshed. Is it inappropriate to say that the victims died from friendly fire?

Information is the lifeblood of the high-technology Objective Force. An array of information will deploy with the Objective Force wherever it goes, whoever the adversary is. Unlike most of the adversaries of the United States, whose technological developments are not shared openly, much of the information about the Objective Forces' development is available to the entire world. For example, the Associated Press reported on a Pentagon armaments display showing soldiers with heat-sensitive night-vision sight, lightweight body armor, and computer backpacks. They reported concepts about laser warplanes, seagoing missiles, and more. Today there are many armaments magazines, defense sites on the Internet, and newspapers reporting the business of warfare. These open sources of information are cheap, readily accessible, and accurate.

Through the eyes of a Western analyst, the publications are what they seem: military trade journals that cover market share, sales opportunities, competitive and joint ventures, and national acquisition goals. They are straightforward.

Graphs and computer-generated art enhance the stories and illustrate the concepts. In the photographs used, sleek missiles fly, spotless armored vehicles roll, and wholesome, clean soldiers pose with the latest weaponry in pleasant pastures. There is no blood.

Consider now the reader of this same information from poorer, less industrialized, embargoed, or otherwise ostracized nations. Consider also the people of paranations, the ethnic clans, narcotics traffickers, and terrorists. They see the same information in terms of life or

(See Wild Card, page 54)

The Limits of Space Power

Terrestrial Superiority still Requires Terrestrial Power, but Space makes Winning it Efficient

By Ed Zehner

A time-honored battle of ideas is being waged among and within the military Services. Over the centuries the relative importance of sea power, land power, and more recently air power have been debated and then proven in various wartime and battlefield venues. Over the last 50 years, and particularly in the last 15, Space has become an additional topic of the debate. Born into DoD by the Army, now shepherded mainly by the Air Force but heavily used by all the Services, Space holds a prominent place in the battle of ideas. As Space capabilities and importance grows, we find several historical lessons from the development of airpower that teach us to get as much from Space as possible — and to stop right there. To prevent expecting the unreasonable, a carefully directed development approach is required. I believe the right approach is to use architectures.

Space is a domain, like sea, land, and air, but unlike them it is not heavily populated and not even heavily trafficked, relatively speaking. It has therefore been treated mostly as a mission, rather than a domain or place. Either way, its topography is as important as its terrestrial counterparts in that it is what has been termed "the ultimate high ground." The value of Space can hardly be summarized in this short article, but our knowledgeable readership already knows it provides a high and, when properly protected, relatively safe vantage point for communications transponders, navigation, and timing signal transmitters, ISR sensors, environmental monitoring sensors, and missile warning sensors. These force enhancement capabilities provided by Space-based equipment are the basis, along with miniaturization of computer electronics, for the ongoing revolutionary transformation of modern warfare. We are moving quickly from dependence upon armor and mass to decisive use of information and precision facilitated by effective use of Space.

MG Michael Hamel, the commander of 14th Air Force — operational headquarters responsible for bringing Air Force Space capabilities to their warfighters — said the immediate role of Space is that it sets the conditions under which terrestrial combat is waged. Hamel makes this statement in part to emphasize the need to continue to build Space smartly and to protect the capabilities we have as well as to provide the ability to negate adversary Space capabilities and prevent adversaries from using our own Space capabilities. In other words, he emphasizes the need to do Space control. Clearly, however, his statement is also a reminder of the limitations of Space. Space ultimately does not win the terrestrial battle although it can make winning much more efficient. The point is, winning and holding a land mass requires a land force, establishing sea and air superiority requires sea and air power. All benefit greatly from wise use of Space, but terrestrial superiority requires terrestrial power, and even in this age of transformation, we must never forget it.

While it is simply irresponsible not to get the most we can from Space power, we should keep its limitations in mind. In "The Limits of Airpower," Mark Clodfelter draws similar lessons from the American bombing of North Vietnam. For the airpower case he writes of the consequences of capitalizing on the "tremendous rush of technology" which has resulted in astounding U.S. military airpower but is also applicable to other modern American weaponry.

Clodfelter warns "What [technology] has done … is to create a modern vision of air power that focuses on the lethality of its weaponry rather than on that weaponry's effectiveness as a political instrument." In the Vietnam case "They never fully realized that air power's political efficacy varies according to many diverse elements … " Space capabilities will grow ever more powerful, and as they do, we need to keep in frank perspective their real impact and potential.

This does not mean the right approach is to relegate

Space is a domain, like sea, land, and air, but unlike them it is not heavily populated and not even heavily trafficked, relatively speaking. It has therefore been treated mostly as a mission, rather than a domain or place.

Space to an unaggressive minor role. The maturing of airpower offers another lesson built on the Vietnam heritage. The Honorable Peter B. Teets, Undersecretary of the Air Force and Director of the National Reconnaissance Office, cites the decisive influence of air power in the Kosovo campaign to support "the principle of applying the capabilities of a new medium — not only integration into other existing forms of warfare, but also development of entirely new ones conceivably capable of winning wars on their own." The lesson is to drive Space power into every military endeavor it can support. We need to be creative, forceful, and open-minded about new ways to employ Space, to eventually include potentially lethal and even decisive Space power.

While it will certainly be some time before Space force application could reach the level of lethality that Clodfelter and Teets are discussing, as lethality enters the lexicon of Space weaponry, we should shape our thinking of Space in terms of "apply[ing] capabilities of the new medium to all conceivable forms of war fighting" and in terms of its "effectiveness as a political instrument." Space has not had a particularly strong start along these lines, but it is quickly gaining momentum. DoD should pay close attention to getting the most from Space capabilities and potential capabilities, without creating unrealistic expectations. Fortunately, we have a trustworthy method to do this: architectures.

Architectures are very effective means to describe systems and relationships, and they are being institutionalized in DoD system development, acquisition, and operation. According to a definition based on IEEE STD 610.12, an architecture is the structure of components, their relationships, and the principles and guidelines governing their design and evolution over time. Architectures are not to be arbitrarily structured. To this end, a DoD Architecture Framework directive is nearing approval and specifically describes required structure and content of DoD architectures.

Architectures provide needed structure, balance

Architectures carefully developed and thoughtfully implemented, can guide DoD and national agencies to strike the right balance between applications of Space power in all possible venues, and using it toward the maximum national security and political advantage. Architectures provide the structure to steer Space zealots and their corporate Services and agencies toward maximizing what we can get out of Space while maintaining the maxim that winning terrestrial wars requires terrestrial power.

Systems in the architecture are functionally derived; they are needed capabilities fully compatible with the other capabilities in the architecture. New systems should be built only if they occupy a defined role in the architecture. Developing and integrating this architecture across DoD and IC Space mission areas is the National Security Space Architect mission. The NSSA Space architecture reflects the appropriate balance of Space systems within the system-of-systems, and since the architecture is responsive to OSD, the IC, JCS, and the Services, it is integrated with the larger system-of-systems they develop. In other words, a balanced approach is developed, driven by the National Security SpaceAarchitecture, which is in turn driven by DoD and national guidance. The new CJCSI 3170.01C describes Functional Capabilities Boards which will "Ensure that the integrated architecture(s) (when available) is updated as required and accurately reflects the operational, systems, and technical attributes of the functional area across the range of military operations and through time." We encourage the use of architectures for all functional areas and an overarching architecture specifically developed to describe structure, inter-relationships, and principles and guidelines for development and evolution of functional areas.

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der's target list may be sufficient in many instances to negate certain adversary uses. However, against an enemy's Space capabilities, we are clearly now in an era where collateral damage must be carefully considered in every operation. Reversible effects may be a critical goal.

While many Space system nodes are fixed facilities or sites, many also are mobile and present another dimension to the targeting process. Under the best conditions, the requirement to find and fix the enemy's movers, shooters, and emitters is a challenge. Our enemies know that mobile terrestrial Space system targets present unique challenges to intelligence collection. Our enemy also knows that fixed sites are very vulnerable to many forms of attack. He knows that although he may give up some capability (mobile systems also have unique weaknesses, such as radio frequency power capability), highly mobile nodes remain difficult to find, fix, and destroy. An example of a time sensitive terrestrial Space target would be the mobile long-range cordless phone system or a telecommunications relay van used to disseminate the imagery report to the field commander. Such targets are important to us now and will continue to be through the Objective Force timeframe. They will, however, change and become more difficult to find, target, and kill. We will see lower signal strengths, more low probability of intercept/low probability of detection signals, more active deception, and more physical and electronic hardening. Since the information these enemy signals carry is of critical importance in land warfare, the Army should be at the leading edge in developing combat capability to attack these small, mobile, and hardened nodes.

How the ARSST Can Help

Army Space Support Teams (ARSSTs) fcan provide the supported commander with a unique capability to enhance the targeting process. The ARSST is trained to understand all aspects of Space systems. The intelligence officer assigned to the ARSST is specifically trained to perform IPB on the threat's use of Space. The ARSST will contribute to the G-2's overall IPaB effort by trying to determine the enemy's Space system vulnerabilities, especially his most critical link or node in a particular targeting situation. By integrating itself into the targeting process, the ARSST is properly positioned to nominate the right piece of the threat's Space system for disruption or destruction. For relatively limited ordnance or nonlethal weapon expenditure, the payoff of taking away the adversary's use of Space will likely have a huge effect. This is especially true if the enemy relies on Space for intelligence, surveillance and reconnaissance, and command and control.

The training and positioning of the ARSST makes it an inevitable asset in the effort to deny an adversary's use of Space.

LTC Dean Taylor is the SMDC Deputy G2 for Operations. Previous to this assignment, he served three years as the J2 Collection Manager for USSPACECOM and NORAD. He served a year in Bosnia in the 1st Armored Division G2 and MI Battalion S3 as part of IFOR. He has also served in several tactical intelligence assignments with armor, infantry, and Special Forces units.

CW4 Daniel Rupp is an All Source Intelligence Technician assigned to Army Space G2. Prior to this assignment, he spent three years as an analyst at Joint Task Force Full Accounting on the POW/MIA mission from the war in Southeast Asia. He also has served on the Joint Contingency Operations Team - Battle Command Training Program; Headquarters V Corps; and Headquarters 3rd Armored Cavalry Regiment, as well as assignments at 2nd Infantry Division, 4th Infantry Division; 24th Psychological Operations Company (USAR) Control Group, and U.S. Army Intelligence Center and School.

more than 50 tactical missions. These missions allow combatant commanders to maneuver their units without breaks in communications.

MAJ Stephen Elle, Executive Officer, 1st SATCON, said, "We are extremely proud of the responsive and proactive support our units gave to forces on the ground. With the rapid pace of the war, and the rapid movement of ground forces, maintaining communications was absolutely essential. Our units enabled them to do that."

The Space Based Blue Force Tracking Mission Management Center enhanced the tactical commander's ability to maintain visibility of his deployed forces. The SB-BFT MMC worked closely with Special Operations Forces in theater to monitor their aircraft and ground forces, especially in emergency situations.

And at the logical, if not geographic, center of all this energy and accomplishment, functioned the SMDC Operations Center.

As of this writing, the SMDC OC has processed over 96 Requests for Information that were then routed and monitored for deployed units. Requests for SORC imagery were sent to the forward elements. Questions about maintenance and operational support of communications equipment were answered, after the SMDC-OC researched the problem.

The Officer in Charge of the SMDC-OC, LTC Steve Dreiling, said, "Even though the OC was a quiet element in the war effort, our soldiers were nonetheless very important. Our job is to function as a 24/7 conduit for information from the front to the command elements. Each and every soldier who manned a consol in the OC is an outstanding individual who really deserves a pat on the back for a job well done."

Army Space Command presently has over 100 soldiers, civilians and contractors deployed overseas in support of current operations. As they come home, Army Space will gather their personal stories about the missions described above, to share with all.

MAJ Laura Kenney is a mobilized reservist serving in the Army Space Command Public Affairs Office in support of Operation Enduring Freedom. She served five years Active Duty as an enlisted journalist with Air Defense Command in Germany. As a commissioned Reserve officer, she performed in Public Affairs in the Gulf War theater, and served as deputy public affairs officer for the American sector in Kosovo in 2001.

cated that about half of our investment was in ground terminals. It was one thing to advocate that the Air Force spend the money to modernize the Space segment; it was quite another to find an equivalent amount of scarce Army dollars to replace the ground segment. The result of such dilemmas is that we are often forced to take something other than the optimum path. A competitor, new to the scene, may not be burdened with such considerations. They will likely find it easier to proceed straight to a superior technical goal than we will. Short cuts can make the playing field more level for the competition.

Commercial success is another way of generating a shortcut. The Wideband Gapfiller is considered by some to be an excellent example of this success. Commercial success in geosynchronous, long-haul communications enabled us to get far more capability for the dollar than we could have obtained following the traditional development path that had served us so well in prior military systems. An opponent today can obtain that same bandwidth in a direct, commercial transaction. The same commercial shortcut is now available in low-Earth imaging satellites. The shortcuts get easier, they work to the advantage of the tortoise.

Possibility Three. Future challenges and dangers will remain unpredictable.

After four decades of Space development, the fielding of Space systems is still not routine. Recent problems with two of our major Space developments, the future imagery architecture (FIA) and the Space-based infrared system, have required a major infusion of scarce Space dollars to repair the programs. Even though both programs were thought to be natural extensions of previous efforts and not cases of dealing with the unknown, system development still has not progressed as planned.

Compounding the development problems is our lack of progress in developing the tools and procedures to understand how effectiveness on the battlefield depends on the specific technical capabilities of Space assets. The Army's combat simulations still do not contain an adequate representation of Space, whether it is reconnaissance or communications. As a consequence, we cannot quantify the contribution that these Space assets could make. The inevitable tradeoffs between spending more or less for capability on orbit always go for less because we cannot demonstrate the penalty for less capability.

Commercial success is also spotty. A decade ago commercial Space communications were predicted to be so numerous and capable by 2005 that some thought that dedicated military satellite communications systems would be a thing of the past. And while certain sectors continue to do well, Space Daily recently indicated "… satellite operators face numerous challenges that threaten to obstruct their path to greater profitability. Optimistic demand growth projections that led many operators to launch new transponders failed to materialize, leaving them with excess capacity and compelling them to reduce lease rates."

All is not well in the launch business either. The dramatic decrease in cost-to-orbit that was predicted a decade ago has not yet materialized, partly because of our unfulfilled technical optimism and partly because the launch market has sagged. In 2001, 39 launches worldwide generated nearly $3.3 billion in revenues according to one estimate. While this is not to be ignored, launch rates of more than 100 per year were predicted for the early 2000s as recently as a decade ago.

Additionally, the national competition for scarce Space dollars is going to get more intense. There are clearly competing military, intelligence, and civilian priorities. Some are mixed such as GPS modernization, which has both significant military requirements to increase the anti-jam margin and significant civilian needs such as a second civilian frequency, increased accuracy and proven reliability. As the war on terrorism becomes better defined, we are likely to see the need arise for new and different types of Space sensors that stress the monitoring of less traditional types of targets.

If the Objective Force is to truly rely on Space support for critical battlefield functions, then we have to be able to define how we will do that now — while the future combat system (FCS) is still being created. We have to be able to build and deploy the Space segment while the FCS is being developed and deployed. We have to define the ground equipment in time for it to be built into the FCS. Otherwise, Space is always going to be an add-on.

Even the most optimistic Space advocate among us should be wary of claiming that we know how to do this. We have more questions than we have answers. How do we guarantee the synchronization needed to support the fielding of the Objective Force? How do we support training? Is the Space segment all in Space or do we need a mix of satellites and high-altitude, long-endurance unmanned aerial vehicles (UAVs)? Can we — or anyone — afford the Space segment needed to provide the on-call, 24/7, priority support that the warfighter must have? How do we replace failures? [Launch-on-demand? Airships? UAVs?]

Could it be that the real competition is in answering these questions? Or, to paraphrase Pogo: "I have met the competition and they are us." Given the magnitude of the problem, it will take at least a few dedicated men and women to bring this off. But then that is where Army Space started. Now where did we put that shoestring?

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desert to command and control, and limited knowledge of the terrain or obstacles in which the Iraqi forces would deploy. Space systems that traditionally supported strategic missions were realigned to support operational and tactical level missions. Military satellite communications (MILSATCOM) systems were soon overtaxed, requiring repositioning of satellites and reallocation of channels and bandwidth from strategic to tactical use. Imagery, both national and commercial, became critical for the development of maps, terrain analysis, and intelligence. Processing facilities often were halfway around the world — yet our troops required near-real-time dissemination. The vast desert expanses with no key terrain features presented a problem of precise navigation that was solved by using the newly orbited global positioning system (GPS) constellation and rushing demonstration small lightweight GPS receivers into theater. The Iraqi SCUD missile presented a formidable threat not only to coalition forces but also to Saudi Arabia and Israel. Detection of missile launches was accomplished by altering the strategic missile warning system and emplacing ad hoc warning to theater from the continental United States. Clearly, the need for satellite systems to support tactical operations surged in importance during this conflict.

Service Roles and Responsibilities

Decisions on Space responsibilities forged throughout the last three decades have charted lanes in the road for the Services that still exist today. Each military Service has the responsibility to train, equip and provide forces for unique Service Space operations and for joint operations. This recognizes both the unique requirements of each Service and the joint responsibilities established by Title 10, United States Code. DoD Directive (DODD) 5100.1 further delineates the responsibility of the military Services to coordinate the development of doctrine, procedures, and equipment employed in the conduct of Space operations. Space control is included in the intent of this directive. The Army and Navy develop and train forces to conduct Space control missions from the surface of the Earth. The Air Force functions specifically call for defense of the United States against Space attack, Space supremacy and defeat of Space forces. Launch and Space support for DoD is assigned to the Air Force. These Space control Service responsibilities originate from the Service roles and responsibilities established throughout the development of military Space. The emphasis over the years has changed from solely single Service missions to joint development and cooperation in Space and Space-associated missions.

The Air Force was assigned responsibility for development, production, and deployment of Space systems for warning and surveillance, military satellite communications, navigation, and launch vehicles, including launch and orbital support operations. As a result of DSCS, the Army was assigned responsibility for ground terminal development and acquisition and payload control. In the TENCAP program, each of the Services was responsible for the development of its own TENCAP capabilities. The Navy was designated the responsible Service for sea-launch capability and for Service-unique capability that supports its operational needs, such as ultra high frequency communications. When a Space capability crosses multiservice requirements, a joint program office is usually established (e.g., NAVSTAR GPS, global broadcast and joint tactical ground stations) to represent the multiservice requirements and interests.

The Changing Road

The roles, missions, and relationships for current Space capabilities are firmly and clearly established. There are a number of factors, however, that may influence or change the present missions and relationships.

First, the Commission to Assess United States National Security Space Management and Organization presented a number of recommendations to the Secretary of Defense, many of which are in the process of being implemented (amplification of Service functions have been incorporated in DoDD 5100.1). The recommendations satisfied the Secretary of Defense's intent to consolidate management of Space programs and to gain visibility for programming and budgeting of Space capabilities. The accepted recommendations of the Space Commission are considered to be extremely positive to the organization and management of Space at this time. There are three recommendations, however, that could have an effect on how the Army approaches and influences Space in the future: (1) The designation of the Department of the Air Force as the Executive Agent for Space with planning, programming, and acquisition of Space systems; (2) the establishment of a "virtual" major force program for Space to increase the visibility into the resources allocated for Space activities; and (3) the assignment of the National Security Space Architect (NSSA) to the Under Secretary of the Air Force. The NSSA will report on the consistency of the implementation of the defense and intelligence Space programs with policy, planning guidance, and architectural decisions. Most importantly, from an Army perspective, the NSSA will assess trades between Space and non-Space solutions and integration of Space with land, sea, and air forces. These changes place a great deal of authority and power over the future of Space and the budgetary means for the development of future Space with the Air Force.

The second major factor is the merger of U.S. Space Command (USSPACECOM) and U.S. Strategic Command (USSTRATCOM) as USSTRATCOM and the assignment of new missions in the Unified Command Plan (UCP). Since Desert Shield/Desert Storm, the importance of Space to military operations has been recognized. Far-sighted leadership at USSPACECOM pushed the envelope in highlighting the importance of Space to national security and warfighting success. USSPACECOM's showcase planning document, the Long-range Plan, provided a comprehensive Joint plan for Space that

integrated Service capabilities and requirements through participation and support of its components. USSPACECOM supported and advocated the roles of the Services in support of Space operations through integration of its Joint Space Forces in military operations. USSPACECOM clearly saw the role and contributions each Service provided to Joint Space operations and accordingly advocated for or directly assigned missions. The success of Army support was evident in Space support teams, missile warning, payload control, and Space-based Blue Force Tracking. Now with the merger of the two commands and the revision of the UCP that assigned the new missions of global strike and command, control, communications, computers, intelligence, surveillance, and reconnaissance, along with the original missions of Space and integrated missile defense, USSTRATCOM will face a strategic challenge in maintaining the focus and advocacy for the Service roles in Space. Faced with an immense portfolio of missions, USSTRATCOM may look to its primary Service component command for Space, Air Force Space Command, to be the voice and advocate for Space and Space programs.

The third factor is the proposed change from the Requirements Generation System (RGS) (CJCSI 3170.01A) to Joint Capabilities Integration and Development System (JCIDS) (CJCSI 3170.01C), which is in draft. The JCIDS is a new and different concept that establishes the structure and defines how new capabilities will be developed and validated within DoD. The major difference between the old RGS and JCIDS is that JCIDS is top-down driven based on "national defense policy and centered in the common Joint warfighting construct." From the beginning, future capabilities will be developed in an integrated fashion and will be "born Joint." Capabilities will be developed to support an overarching Joint concept of operations through Joint operating concepts and Joint functional concepts. Supporting the concepts will be integrated architectures that develop operational, system and technical views for a functional area. Within the JCIDS structure, the focal point for organization, analysis and prioritization of warfighting capabilities is the Functional Capabilities Board (FCB). The FCB is a body that would be permanently established by the Joint Requirements Oversight Council. The current concept is for FCBs to align to functional areas such as "gathering information, producing information, preventing effects, causing effects, and focused logistics." We might expect that Space, as a whole, or subsets of Space (e.g., Space control, MILSATCOM, etc.) would be considered in the FCBs, but there would not be a specific FCB for Space. The FCB is responsible for the development and maintenance of functional concepts and integrated architectures, and the coordination, integration, and deconfliction of DoD component efforts within the functional area. FCB efforts are focused on the development of the entire range of doctrine, organization, training, materiel, leadership, personnel, and facilities (DOTMLPF) solutions. JCIDS documentation will be forwarded to the Joint Requirements Oversight Council for decision after evaluation and analysis by the FCB to ensure concept and architectural compliance. The FCB is the clearinghouse for warfighting requirements and the proponent of ultimate solutions.

The Army Path

With the acceptance of the Space Commission Report in 2001, the ongoing changes to the management and organization of Space including the merger of USSPACECOM and USSTRATCOM, and the pending publication of JCIDS, the centers of gravity have changed for Space and the Army must change with them. It is expected that these roles will continue into the near future; however, it is the evolving future of Space the Army needs to be concerned about. The designation of the Air Force as the Executive Agent for Space could allow the Air Force to prosecute its role in Space over those of the other Services. The challenge faced by the Executive Agent for Space will be to balance the strategic, operational, and tactical needs of all users and lessen the concern that the Air Force will dominate certain Space programs to the exclusion of the other Services. Although the Air Force may not intentionally exclude the other Services, the cultural differences between the Air Force Space Forces and the ground warfighter may make the understanding of warfighter needs and the priority of those needs open to different interpretations. To overcome the cultural differences, the Army needs to work with the Air Force in organizations such as NSS and the Air Force Space Command to develop their understanding of the ground warfighter perspective for Space support. This will require more active Army solicitation and participation at all levels of future development of Space capabilities within the Air Force Space structure.

The results of the merger of USSPACECOM and USSTRATCOM roles and missions under USSTRATCOM should be of some concern to the Army Space community. The broad roles and missions now assigned to USSTRATCOM lead to the certainty that Space will no longer have the pre-eminent hold it enjoyed under USSPACECOM. As the USSPACECOM Army component, Army Space advocated the Army warfighter needs — and USSPACECOM listened. The Army must work closely with the USSTRATCOM staff in advocating the Army's role in Space, solidifying Army missions and emphasizing a ground warfighter focus. As a unified command, USSTRATCOM's

The Army has had a prominent historical role in the development and use of Space capabilities. Many changes to Space organization and management have been proposed over the past few years, some of which are now being implemented.

cultural focus is on current capabilities and operations, leaving future planning for Space to other organizations within DoD.

The proposed change from the current Requirements Generation System to the Joint Capabilities Integration and Development System may be the greatest opportunity for the Army to solidify its future roles and missions in Space. The Army's transformation development to the Objective Force should be a leading precept in the development of the Joint operating concept that describes how the Joint Force commander deploys, employs, and sustains a Joint Force.

Correspondingly, a Joint functional concept should, in part, reflect the objectives of TRADOC Pamphlet 525-60, Concept for Space Operations in Support of the Objective Force. The issue then becomes: are the Army concepts, as written now, relevant to the Joint concept of operations to be developed, given the change in current military operations over the past two years? To maintain relevancy, the Army will have to adapt its transformational and Space concepts to the national requirements. To be able to influence future Space, the Army will have to develop a stronger comprehensive concept for Space operations in support of the Objective Force along with a supporting architecture. That architecture must be forward looking with operational, system and technical perspectives that truly support the ground warfighter. In the past, the Army has had limited success in telling a convincing story that led to development of future Space capabilities. Current efforts within the Force Development and Integration Center of SMDC to establish a Space Planning Process to augment and structure the current Space Integrated Concept Team will provide the rigor and analysis necessary to build the Army concepts and architecture across all functional Space mission areas. Through this effort the Army should be able to present a comprehensive road map for Space, embodied in the Army Space Master Plan, that can be used to develop Joint concepts and architectures. The Army's participation in and support of the FCBs may prove crucial to its future influence over Space. Defining needed Army Space capabilities in support of the Objective Force and applying them to the FCBs may be the only way future Army Space capabilities will be recognized. This will require that the Army "cadre of Space experts" participate in the development of Joint functional concepts and integrated architectures by identifying supporting Space capabilities to the warfighter.

Conclusion

The Army has had a prominent historical role in the development and use of Space capabilities. Many changes to Space organization and management have been proposed over the past few years, some of which are now being implemented. While these changes, for the most part, are beneficial, they are not without challenges and should be closely watched through their implementation. It can be expected that as the nature of warfare continues to change as it has in the last couple of years, we can expect that the reliance on Space capabilities will significantly rise. As this occurs we will see changing emphasis, new operational concepts, and differing organizational structures that will be needed to meet the changes of the future. The Army has not only a vested interest in the future of Space and Space management, but also a moral obligation to its warfighters to ensure that Space continues to evolve and meet its operational needs. To meet this obligation, the Army must know where it wants to go in Space, develop the road ahead, and advocate its concepts in every Space forum. This will require "out-of-the-box thinking" on the part of our Space cadre and acceptance of new ideas and concepts in the various elements of our Space community. The most important aspect to successfully meet the challenges of the future is to have a holistic approach to Space throughout the Army. The challenge now facing the Army is to not regress into the development of stove-piped capabilities, but to support and participate in all facets of Space development to ensure future capabilities are relevant to warfighter needs. Army concepts and architectures must be integrated and reflect the relevance that the Army brings to the Space mission area.

Bill Furr serves as the plans director, G3, SMDC-West. His professional experience includes a degree in Geography and Environmental Science and an extensive background in Tactical and Strategic level Intelligence. He served on active duty (Army) for seven years before being assigned to Director of Intelligence, Cheyenne Mountain Air Station, where he served as the chief of Analysis. He still holds a Reserve Commission and supports the NORAD and NORTHCOM J2, Deliberate Plans Division.

The Army did much of the developmental work on missiles as well as communication, navigation and imaging satellites that were the foundation for the nation's Space programs.

Innovation ... from Page 39

Battle Lab (BCBL) joined the effort and obtained general TRADOC consensus on the need by February 1997. At the end of the 1990s, lingering technical issues were resolved by ASPO. With the assistance of the BCBL and the Space and Missile Defense Battle Laboratory (SMDBL), a warfighter's rapid acquisition program was initiated to obtain the first operational units (although limited prototypes were already in use). It became apparent that operational use of Grenadier BRAT would require a Mission to smoothly connect the national technical capability with users in the field. The U.S. Space Command assigned that mission to SMDC (Army Space Command) in March 2001. Subsequent to Sept. 11, 2001, the planned future operational capability of the Mission Management Center was accelerated and around-the-clock operations began in January 2002. ASPO has continued to field additional devices and provide new training equipment worldwide. Through evaluations from Operations Enduring Freedom and Iraqi Freedom, the role of Grenadier BRAT and related devices will be shown to be vital to the overall effort. Innovation spanned less than a decade.

Space Innovation in the Near Term out to 2030

Innovation in Space is progressing at a quickening tempo with respect to satellites. This is partly because the same advances in materiel, electronic, and computing technologies that are driving changes in the rest of modern society are driving the Space business. The one disappointing area is the ability to launch "things" into Space. That remains a costly, risky business with no transformational improvements on the horizon. The Army is a leader in pushing requirements for future satellite innovations including Space-based radar, Space-based infrared system, transformal communications and improved position/navigation capabilities. These systems will greatly benefit the warfighter and the transformation of the force.

Army's Role

The Army has a vested interest in helping to control the high ground, which means that air defense concepts already expanded to missile defense must be expanded to control of Space. As the examples we see from TENCAP and from the SMDBL's Army Space Exploitation Demonstration Program (a white world version of TENCAP) prove, the Army can and does benefit from what the Air Force and others build in the way of Space systems.

Beyond 2030

Ray Kurzweil (a well known futurist) says that the rate of technology acceleration is itself accelerating. For instance, what took 100 years to develop between 1800-1900, we could now accomplish in 50 years at today's rate of progress, but, because the rate of progress is doubling every decade, we will see 100 years of progress, at today's rate, in only 25 calendar years. This could have dramatic effects on Space innovation. The pessimistic view of the launch problem (cost, risk) may be gone by 2030. With that constraint removed, Space will be populated by everything from coffins to grandmother's "motor home" to military systems. If this happens, the high ground will be accessible to the Army and Army systems will operate as freely there as they do on the ground today. The distinction between the Air Force and the Army could be blurred and, who knows, we could even see an entirely different type of combined service force.

Summary

The Army has chosen a role that focuses its resources on exploiting Space capabilities. It gets a relative bargain in the process since others bear the research and capital costs in developing the Space segment of these capabilities. Despite what we Space advocates might desire, it is a smart role for the Army and one that is not likely to change.

John Marrs for many years served as the Technical Director of Army Space Command. Under the new SMDC organization, he is part of the Office of the Chief Scientist. His wide-ranging duties and functions have included the Army Space Exploitation Demonstration Program, design of the ARSST and 1st Space Bn., Chair of the SMDC Spectral Imaging IPT, and participation in many studies done by OSD, NSSA, JFCOM, and the Army Science Board. Over his career he has worked for TRADOC, AMC, and FORSCOM (National Training Center Science Advisor).

Warfighter's Perspective ... from Page 41

Country X need to develop in order to counter this transformational weapon system, and how much would this cost? Can any adversary afford to bankrupt his country to facilitate an invasion of his neighbor? Or does he wait? Hmmm.

With such a compelling case for a transformational capability on a weapon system, I am amazed that we have to fight for the Raptor's very existence. Unfortunately, when I've been asked about the aircraft's transformational capabilities, it is usually to compare them with an equally transformational F-35! Why? Because the office with the aviation expertise analyzes aviation while the office that looks at directed energy or land forces looks at directed energy or land forces — it's what they know best, and it's what their analysis tools are optimized for.

Can someone in the Defense Department assess weapon systems from the adversary's perspective? It's probably not fair for the Services to take on that task, so we can only write papers or editorials and rhetorically ask the question. However, since we taxpayers want to get the best investment for our hard-earned tax dollars, I have to ask the hard questions. How is something like the unmanned combat air vehicle (UCAV) considered transformational because it doesn't have a human in it? From the adversary's perspective, I will ask, "What capability/system do I need to face the U.S. Armed Forces and their UCAVs?" It may very well be transformational because the United States is willing to fly UCAVs aggressively into harm's way because no U.S. pilots will be at risk. Or, if I can figure out the control-mechanism frequency and can force the entire fleet to crash without firing a shot, then maybe it isn't transformational. The adversary will assess the UCAV's range, payload, and survivability to determine whether his centers of gravity are placed at risk by this "transformational" weapon system, and he will determine whether or not the UCAV is transformational.

All that being said, we have limited resources and must use them wisely to ensure that every dollar spent brings the greatest return. A gun that shoots an extra two miles may be transformational when compared with other shorter-range guns, but will that extra two miles change the investment and engagement decisions of our potential adversaries? If we can get our arms around that analysis, then perhaps we will be on the path toward getting the best bang for the buck. A truly transformational weapon system for our warfighters would be one that instills so much fear in our enemies that we can win the next war without ever firing a shot. If we use that logic, perhaps the F/A-22 is truly transformational.

Courtesy of the Air & Space Power Journal. The articles have undergone security and policy content review and have been approved for public release IAW AFI 35-101.

sition, research and development positions bringing state-of-the-art technology to Army Space Support Teams and to warfighters. And, for the first time, it is great to see "Space veterans" returning for their second or third assignment in the Space field. However, this small number can only begin to represent the Army's need in the joint community and to meet Army commanders' requirements.

The Army must expand its definition of "Space cadre" to include warrant officers, enlisted soldiers, and civilians. This is a complex task that will demand that we identify positions that require knowledge of Space systems and demand that we figure out how the Army is going to educate and train those who fill the positions — one-week course? 12-week course? Army, AF, or Joint course? What is the right approach for the new Intermediate Level Education (ILE) Course? This is not an easy project nor one that will be implemented soon, but it is one we are convinced we need to get right.

Not only should the Army's number of Space cadre increase, but the number of soldiers, from E6 through 0-10, who have more than a cursory understanding of Space-based capabilities can and must grow. To do this, the Army must invest platform time in its school houses, build Space play into its simulations and training exercises, and actively participate in joint Space exercises. Through education and experience, the number of warriors who understand more than how to "turn on their computer," or who turn to their Space operations officer will grow. The increasing number of Space-smart leaders will demand that Army Space equities and requirements are presented, tested, and discussed in all forums.

Perhaps the most effective way is through being exposed to rabid professionals — Space warriors — who by their expertise and performance "sell" Space every day. We did this in Operations Noble Eagle and Enduring Freedom. We did this in Operation Iraqi Freedom. We are out there, wherever soldiers are deployed, doing it every day.

Using Space-based assets to protect our nation and to win its wars is reality now, not something that might happen in the future. The Army's future is in assuring we have better access to those assets than our adversaries to theirs through involvement of Space-smart leaders who know more than how to "turn on their computers" in the development and employment of Space systems that support warfighters.

Army Space-smart leaders and Army Space control capabilities are indeed high payoff areas which combine to make Space a substantial current and future contributor to overall Army land warfighting dominance. You can tell I like the word "Army." And don't forget "dominance."

of negating this combat power overmatch. We must have the ability to repopulate the near-Space and Space-based systems on demand to ensure decision superiority and dynamic, tailorable strike capability.

Applying Effects to Space

In the years beyond 2025, our nation faces the real possibility of prosecuting a future "major combat operation" in Space. This will be a new form of warfare that future generations of Army soldier-leaders will need to study and develop tactics, techniques, and procedures to fight air, land, sea, and Space systems against a foe in Space to seize and hold "key-terrain" or mass our collective joint combat power against an enemy's capability to threaten our way of life and security. Space, like other physical domains, has key terrain that is essential for our Space systems to operate. Certain orbits and specific orbit locations are key to our freedom of maneuver in Space. Lagrange points (places of zero gravity near our Earth and Moon) are key future pre-positioning areas for Space and terrestrial forces apportioned/allocated for actions in terrestrial operations as well as operations in celestial campaigns. Deployment of Space and terrestrial forces from zero gravity points would take hours rather than days and would represent a key capability from a nontraditional line of communication that many future adversaries would be unable to defend. Future adversaries could deploy Space-based weapon systems that would be able to deny, degrade, disrupt, and destroy U.S. or coalition Space-based capabilities. Our nation must develop ground-, air-, sea-, and Space-based weapon systems that can protect our Space-based systems and defeat those of the enemy. The future battlefield management, information, and command control systems must consider not just using Space-based systems to enable terrestrial operations, but consider the requirements to conduct Space warfare.

The more extensive a man's knowledge of what has been done, the greater will be his power of knowing what to do.

— Benjamin Disraeli

Of utmost importance is the future education of young Army officers on the coming concepts of Space warfare and how they as commanders will have to plan and execute lethal and non-lethal effects through, from, and to the Space domain. The time to begin is now.

LTC Greg Palka is assigned as the Chief of Concepts and Initiatives, Space Directorate, SMDC Battle Lab in Colorado Springs, Colorado. His Space experience includes: V Corp Space Support Team Chief, Army Space G3; information operations division chief, Space control chief, STO Chief, and current operations division chief.

death choices. They cannot afford technical research or development, and they cannot "comparison shop." They know they must choose wisely the first time because there may not be a second choice. For them, the only collection method may be what they can learn from open publications. The more sophisticated groups can build on information from open sources and confirm their conclusions with traditional collection methods. Their interest is far from abstract.

Several truisms must be accepted in this new world of half-wars against nontraditional adversaries. Poorer nations want to survive. In order to do so they are offered the Hobson's choice of spending what wealth they have on arms or relying on a guardian nation to arm their people. They are not interested in future sales, in market share, or in the bottom line. If they do not choose correctly from the arms necessary to protect themselves, they will cease to exist, or worse, be enslaved. Obviously, they see the world from a dramatically different perspective.

The West views military technology as a chess game. One player creates this, the opponent creates that to counter it, and so on. In this rational game of give and take, no one dies and the game goes on. Some call this the arms race, but nobody dies in a race. Such a sterile view of the industry misses the point.

Analysts of arms markets from non-Western countries or para-nations see the armaments industry differently and arguably more clearly than Western nations do. They, like the United States, will determine their needs and do all within their power and budget to acquire those necessities. Unlike the United States, they see their existence as often nasty, brutish, and short. They often feel they must confront the killer at the door, rather than the economic competitor in the pinstriped suit. It is not surprising that poorer countries decided to buy machine guns as soon as they could afford them, once they saw what happened to those who did not.

The callousness of the Western businessman who commented about a recent technology theft, "Who cares, we'll just build a counter-measure," would be incomprehensible to his counterparts in a poorer country who bet their very existence on successfully using proven technology in the near term.

Those of poorer countries have a vested interest in what is available on the arms market today, and in knowing how their potential adversary will fight. What if their potential adversary is the United States?

These poorer countries want to know, simply put, how to beat the United States in battle. To be able to surprise the U.S. military, they will try to learn more about it than the military knows about itself. They do not have the wherewithal to conduct massive technical research, so they will take any shortcut. All open sources will be exploited. Why spend the money on research and development if the final product is going to be for sale or is explained on the Internet? Why test weapons if the answers nations seek are printed in publications that cost only a few dollars each? Comparison tests will be done by those governments that see weaponry more as a commodity to be marketed than as a means of killing people.

Western powers think of long-term strategies while poorer nations wonder how to stop the immediate threat. They know they are dead if they make the wrong choices, so they research information thoroughly. If they can piece together information about the true intentions of an adversary from what they can collect on the open source market, they will do so. It may be the only source they have. These are the types of adversaries the U.S. military will confront tomorrow.

These differing perceptions of the world — one by rich nations, the other by poor — must be better understood. A poor man does not care about higher technology tomorrow if his weapon will surprise his enemy today. To achieve this he may act in a way contrary to what the West considers being in his best, rational interest. Westerners must see the world with new eyes — their potential adversary's eyes. History offers many examples.

In the 1920s, for instance, a beaten Germany, penned in by the Treaty of Versailles, entered joint ventures with Bofors Corp. of neutral Sweden. The Germans had studied the published armament policies of other European nations and had observed the soldiers occupying their country. They had studied what would win on a future battlefield, then set out to get it any way they could.

Before World War II, Germany illegally trained its army on the land of its arch-rival, the Soviet Union. Despite open reports of Germany's illicit training, other nations were too complacent to challenge this threat. The West was thinking about long-term, rational arms races. Germany was thinking about a blitzkrieg.

In a later example, the United States was shocked when it was revealed that the Vietnamese communists had routinely spliced into U.S. telephone lines. Open communications were compromised. These were simple farmers who should not have had the capability, the United States complained. The nation did not see the world through its adversary's eyes.

Today, are the Afghani or Iraqi government troops trained by the U.S. going to rest assured that the West will protect them? Did the Serbs or Muslims rely on the United States or NATO to take action against a vengeful adversary, or did they take their own measures? Does anyone doubt, however, that they are devouring every statement and operational move we make in our many deployments?

Every document, every communication made by the U.S. military's soldiers is subject to collection. Seemingly innocent communications could confirm or deny the fears of the many groups involved in Afghanistan, Iraq, Kosovo or Bosnia. How many American soldiers realize that a TDY order, supply form, or logistical document could betray the military's true intentions? Open source information takes this operational release of information even farther.

Westerners may see no great loss when technology is compromised because they may never see the battlefield result of their work. They may think abstractly of their product as a funded program, not as something that kills someone. Their counterparts in another, less powerful country would face imprisonment or execution if they

compromised hard-gathered information.

Westerners must "publish or perish." They have a "right to know" and a free and inquisitive press. Non-Western counterparts do not.

Next, the collection threat to this critical information must be studied. Soldiers must consider who wants what they have. Here, the intelligence community can provide assistance. The collection capability could be a highly sophisticated process or a hacker who can read the Army's e-mail. In weighing the threat to the critical information, the answer to the next question, "Is the Army vulnerable?" may be surprising. Even units with 100 percent traditional security of their classified information have been compromised by a hemorrhage of unclassified data. Unit leaders did not tell their soldiers what was critical to protect, and soldiers did not control bar talk, telephone talk, or what went out over the wire, much less what went into the trash. After the risks are weighed, such as collection capabilities and reaction times, countermeasures must be decided on.

The Army must communicate to accomplish any mission, but it has to remain aware of the unseen listener. Soldiers must know what an adversary can do. To survive, other countries will read everything the Army writes and listen to any conversation they can. The Army has to see itself as others see it.

Once they learned that the Viet Cong had made tiny mines from discarded C-ration cans, soldiers stopped leaving cans uncontrolled. Now, the Army should do no less with its open source information.

John W. Davis, a retired U.S. Army MAJ, teaches the threat portions of the Department of the Army's Operations Security course at the Space and Missile Defense Command, Huntsville, AL.

Soul Survivor ... from Page 32

SPC Chaun Frink, a member of Crew 3, said this event was "adventurous and made us use teamwork to drive, navigate and find the points."

This task was best accomplished using waypoints on the PLGR. In the end, Crew 3 turned out to be the team finding the most points.

The day after the road rally, HHC held the obstacle course and Jeopardy contest. The obstacle course was conducted at the Air Force Academy's Jack's Valley Training Complex, and required the teams to surmount 17 obstacles over the one-mile course.

Each team took on obstacles such as rope swings, water traverses and belly busters in a timed circuit. Teamwork was encouraged, and in some cases absolutely necessary. All the soldiers learned something about themselves as they pushed through the difficult course.

The Jeopardy! Competition was a mental challenge that followed the tough physical workout of the obstacle course. Done in the Jeopardy model, answers were given under 12 categories in two rounds, and the team with the highest score in the end won. This game was complete with "Daily Doubles" and a Final Jeopardy question.

The categories covered military history, leadership, and a slew of operational inquiries that challenged the teams with both Army and mission related questions. Crew 2 answered the most questions correctly.

The next day, a Class A uniform inspection was held to determine the best prepared team. This event evaluated the preparation of the uniform and personal appearance, and Crew 1 came out best in this "dress right, dress" event. As the final event in the Soul Survivor Challenge, the Class A inspection wrapped up three weeks of good-natured, competition.

Each of the teams did very well, excelling in one or more of the events, but the team that ended up with the highest overall score, winning the competition and becoming HHC's Best Crew was Crew 3, led by SSG Steven Cato.

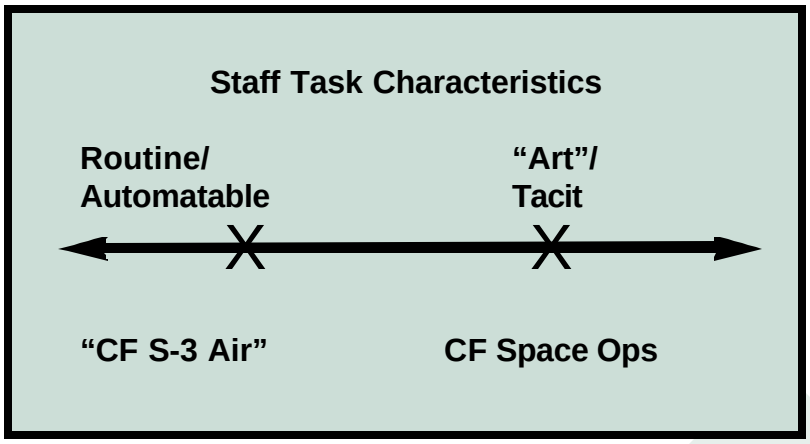
Cato said, "We all enjoyed the competition, it was a fun change of pace, and the variety of areas tested really challenged the team."

Cato's crew will compete for the 2003 Best Crew title with the Best Crews from the other five companies in the 1st Satellite Control Battalion.

The Soul Survivor challenge resulted in one Best Crew being chosen at HHC, but all crews shared the benefits of stronger, more cohesive teams as a result of the intense efforts required by the competition.

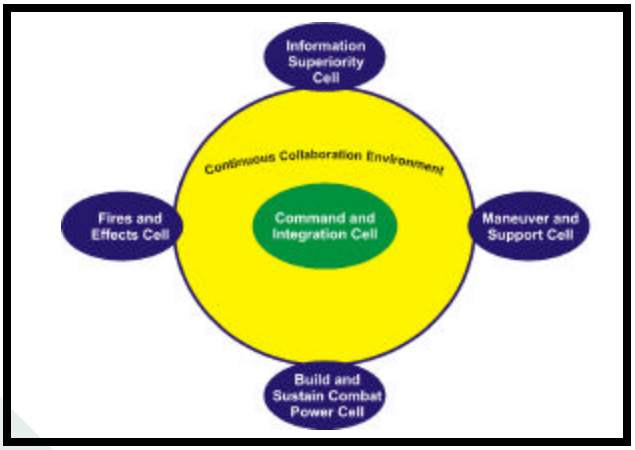
CW2 Garth Hahn serves as the Operations Officer for HHC, 1st Satellite Control Battalion. He served two tours in Kosovo performing voice and data switching and wide-area network management. During his 12-year tenure as an enlisted satellite systems operator-maintainer, he held various staff and operations positions in tactical and strategic satellite stations. He also serves as unit reporter.

Figure 1



The tasks of the notional Career Field S-3 Air are defined by a high proportion of heuristics, while the tasks of the Career Field Space Operations are defined by a high proportion of tacit knowledge and "art."

Figure 2



Cell structure resulting from initial knowledge object distribution workshop conducted at the Fort Leavenworth BCBL. The location of Space operations expertise will depend on the knowledge object identification and distribution.

Experiments ... from Page 17

from now. Waiting to make a decision only forces a further search and reconfirmation of information. Therefore, all the information a UA commander needs to make a decision must already have been presented and understood — before the requirement for a decision has emerged!

Interestingly, the very mini-culture we have developed among the Space operations officer corps makes the FA 40 a solid match to the rapid decisive operational construct. How many of us have had to push our Space operations knowledge into the cognition of the commander? I am reminded of the last line of the article by our senior FA 40 in a previous issue of the ASJ (Vol. 1, No. 4) that stated that Space officers need to "advertise, advertise, advertise." It is implicit in the FA 40 culture to translate very technical data into knowledge, to know when the commander's decision process can benefit from that knowledge, and to "push" that knowledge without waiting for a "pull."

Finding Three: The Location of Space Expertise in the Unit of Action Staff

The first experimental unit of action (brigade-size) staff was organized into five cells. The cell structure was an outcome of a knowledge object workshop held at the Fort Leavenworth BCBL . The workshop developed 246 knowledge objects, a number of which are Space focused. That list may need to be revisited numerous times over the course of the BCBL series of experiments. (I would suggest that Space is currently underrepresented in the knowledge object list.) These knowledge objects were then divided into the roles and responsibilities of the five cells. There were numerous objects considered to be shared, overlapping, and specific to cells.

An initial take on the cell divisions would indicate that the Space operations expertise should reside in the information operations cell. I would argue, however, that Space operations expertise must reside in the Fires and Effects Cell. For those not familiar with effects-based operations, refer to the article by GEN B.B. Bell in ASJ Vol. 1, No. 3 (Fall 2002). The trained Space operations officer knows the pillars of military Space and how to produce a desired effect on the battlefield. It does not take a leap of the imagination to understand how, in 2015, a Space officer in the Effects Coordination Cell would react to an effects task order that stated: "Enemy scouts must be neither able to alert their main body of our approach nor bring precision long-range indirect fires to bear on our forces penetrating their battle zone."

What's Next?

The Fort Leavenworth Battle Command Battle Laboratory Experiment series will continue until the design of the UA staff is resolved and refined. The next experiment is tentatively scheduled for Fall '03. FA 40 officers are maintaining an experienced presence, via FDIC and the SMDC-BL, to ensure our proponency role in UA staff design decisions. In terms of influencing the list of knowledge objects essential to the Objective Force UA staff, our O6 population will participate in studies at the Army War College as well as complete a pending online survey with their recommendations.

Final Thoughts

I will be personally involved in future experiments as well as a revisit to the knowledge object identification and distribution. I believe it is clear that stakeholder participation in the knowledge object process will define the Objective Force roles in the operation and information career field. The further opening of the debate to Army Space professionals operating at the tip of the "sphere" will, in my opinion, ensure we provide the best support possible to the Objective Force.

MAJ John Graham is assigned to the Carnegie Mellon University- Department of Computer Science and is conducting research on the UA Battle Command. His Space assignments include: OIC, Space Control Electronic Warfare Detachment, U.S Army Space and Missile Defense Command; Director, Space Intelligence & Operations Courses; and Missile Officer/Command Center Instructor, North American Aerospace Defense Command.

“There are some spectacular examples from Operation Iraqi Freedom, where we have been able to achieve objectives that five years ago ... would have seemed impossible.”

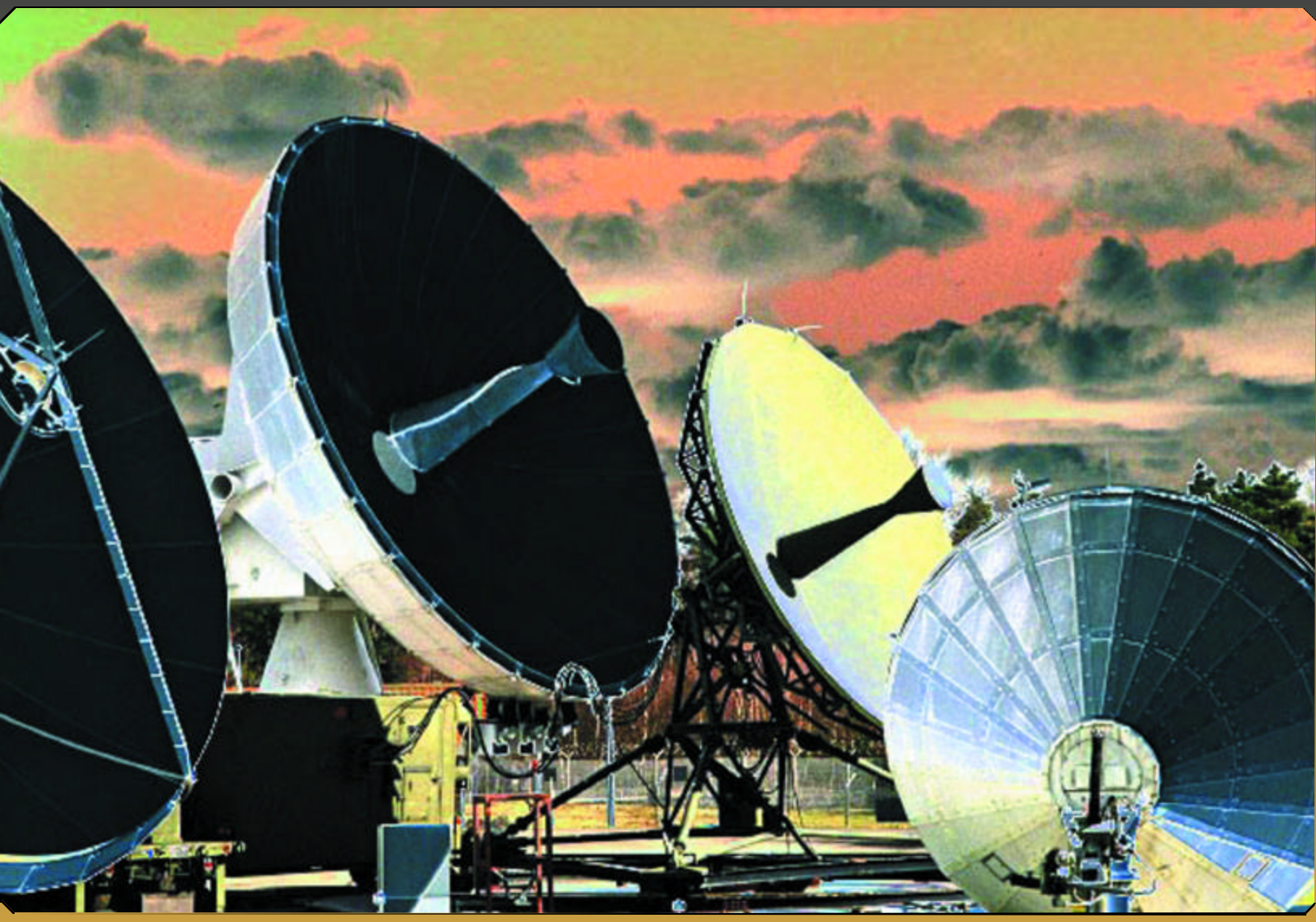
— Roberta Lenczowski,
NIMA Executive Director

“The synergy with air, land and sea forces and our ability to control the battle space and seize the high ground is devastating.”

— Air Force MG Franklin J. "Judd" Blaisdell,
director of space operations and integration.

"If you ask what was the difference between Iraq's army and America's army, the big difference was satellites, and its technology you don't even notice."

— John Pike, defense analyst
GlobalSecurity.org



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