

SPACE C4ISR

SPACE SECURITY MISSION INTEGRATION

Paul Chi

Senior Vice President
chi_paul@bah.com

Dick Johnson

Vice President
johnson_dick@bah.com

RECOGNIZING SPACE SECURITY MISSION INTEGRATION TODAY FOR RESILIENCE TOMORROW

THE CHALLENGE

US reliance on space capabilities is more pervasive than ever before. It is at the heart of both civilian and military infrastructures. Today's civilian space assets deliver telecommunications, television broadcast, integrated mapping, and improved computer network timing - affording extraordinary economic advantage. National security space assets provide joint warfighters with strategic warning, assured communication, and precision positioning, navigation and timing - an unrivaled security advantage. However, assured access to these capabilities is increasingly in question.

As characterized in the National Space Policy (2010), the space domain is an increasingly congested, contested, and competitive operating environment. In addition to natural conditions, the number of man-made space objects to track and avoid is growing exponentially. More satellites and more electromagnetic and radio frequency interference is leading to more accidents and still more debris. At the same time, the ability of our foreign adversaries to degrade, compromise, or eliminate U.S. space capability appears to be on the rise. Recent successful demonstration of Chinese anti-satellite capability and the ability of Russian hackers to exploit commercial satellites and steal sensitive diplomatic and military data are just two of a myriad of other (classified) vulnerabilities. In addition, the increasing internal struggle for control over our own limited overhead assets and limited electromagnetic spectrum remains unclear.

In response to this variety of threats, the National Security Space Strategy (NSSS) (2011) declared that as the US invests in next generation space capabilities and fill gaps in current capabilities, "we will include resilience as a key criterion in evaluating alternative architectures.... We will develop the most feasible, mission-effective, and fiscally sound mix of these alternatives."¹ This has led to

a wide range of unique proposals including improved space situational awareness approaches, exploration of disaggregation of large satellites, aggregation of ground stations, increased consideration of small satellite constellations and outsourcing satellite launches, routine military communication links, and even some space-based surveillance operations to industry. While any one of these approaches may solve one issue, and therefore improve the protection of a single asset or class of assets or the effectiveness of a given agency's mission, the degree to which they affect the overall resilience of the ecosystem in which they operate remains unknown. And, therein lies the problem: Deputy Secretary of Defense Robert Work recently said, "To maintain our military dominance **we must consider all space assets, both classified and unclassified, as part of a single constellation.** And if an adversary tries to deny us the capability, we must be able to respond in an integrated, coordinated fashion."² Unfortunately, this is not how we operate now.

Today, no fewer than six major cabinet-level departments (DOD, IC, NASA, DOT, DOC, DOE) and numerous executive offices (OSTP, NSC, NSF, etc.) have a role in the U.S. space program and have been directed by the President to be a part of a collaborative, responsible, and constructive use of space. While some have very clear and limited objectives, emergent threats and federal responses are beginning to demonstrate areas of overlap for agencies responsible for the assurance and resilience of essential functions.

Further obscuring unity of command challenges is the realization that space security decision-making does not exist in a separate domain. If, as Air Force General Palikowski recently suggested, "We can no longer assume that we won't be engaged in protecting our capabilities in space against attempts to deny us those capabilities," a more varied set of actors and

contingencies must be considered that may result in action across multiple domains, especially cyber.³

In response to emergent threats, agencies with a space mission are increasingly working outside of traditional acquisition guidance, instead using rapid prototyping. Space security operations are turning toward more joint, interagency, international, and even commercial partners with whom they must share an increasing amount of information to achieve mission success.

A NEW PERSPECTIVE

Historically, government entities were established to address a unique requirement or unmet need. Their missions were narrowly focused and their operations closely contained within that unique requirement. Today, however, the integration of missions within the federal government (and beyond) provides a potential solution vector. This hypothesis is supported by a number of observations:

- Missions are characterized by greater integration and inter-dependency among a diverse set of players with unique resources
- Lines that traditionally defined roles and responsibilities between federal agencies and with outside entities (states, businesses, NGOs) are increasingly blurred
- The expectation of speedy action has fundamentally altered how decisions are made
- Our clients are operating in more open, distributed, and collaborative environments

Government entities charged with a space security mission now challenged to respond in an “integrated and coordinated fashion” must begin to embrace this broader, dynamic view, recognizing their role in a vast network environment and the effect of their

Federal leaders recognize that a shared mission perspective is the best strategy for tackling modern day problems.

decision-making within it. The challenges associated with improving resilience in space systems is simply too large and too complex for a government agency to manage on its own. Booz Allen Hamilton believes that issues at this scale call for an approach that involves active collaboration among multiple actors at multiple levels of government. We help many agencies today that rely on a diverse set of partners to accomplish their mission goals in areas such as health, homeland security, emergency preparedness, diplomacy, and stability operations. No agency is an island unto itself in the face of these complex issues. Federal leaders recognize that a shared mission is the best strategy for tackling modern-day problems; and yet, despite some visible examples of success, many agencies and their employees are struggling to collaborate and integrate effectively with their mission partners. Why? Because under this new model of shared responsibilities, no single entity can dictate solutions or exercise complete decision-making authority. No organization has control of the information or the levers of power. Consequently, the traditional command-and-control, executive agent style of governance has limited effectiveness. It may even exacerbate problems. To work effectively in a complex and interdependent world of space systems (with its overlapping roles and responsibilities) government agencies require modified governance structures, updated bureaucratic policies and processes, tailored technologies, and new leadership models that support

collaboration, cooperation, information sharing, and synchronized collective action—all characteristics of what we refer to as **Mission Integration**.

OUR APPROACH

For today's multi-dimensional space security mission this means seeing beyond the investment in a single solution—whether enhanced SSA, disaggregation of large satellites, aggregation of ground stations, increasing investment in small satellites, expanded commercial launch programs, or standing up a new joint operations center—to understand the broader impact and assessing success in the context of a shared mission challenge. How? From our perspective, success requires a holistic, integrated, consistent, and systematic approach that integrates *policy, operations, people, engineering and management*.

By aligning these five key areas, Booz Allen Hamilton's unique **Mission Integration Framework** combines strategy expertise and technical prowess to inform decision-making and strengthen resilience across the board.

Policy. Policy is integral to leverage resources, reduce conflict and redundancy, and work toward long-term space security goals. Comprehensive policy informs the entire space community, laying out what needs to be done and who has the authority to do it. **Booz Allen helps clients establish policy guidance to provide direction and perspective, and devise strategy to explore various options to accomplish the policy ends.** Next, we help you leverage doctrine to translate the strategy into an overarching operating model, illustrating how various people, process, and technology functions fit together to accomplish the mission. At the same time, governance delivers a coherent and consistent decision-making structure, clarifying decision rights and a model that avoids decision ambiguity and “paralysis by analysis.”

Operations. Traditional space security operations models aimed at protecting assets are inadequate against today's threats. Organizations must be able to anticipate

new threats, not just react after attacks, and look beyond asset management to achieve a broader view to achieve resilience. The key to enterprise risk management is to build multiple layers of defense within an organization and with partners across the space security ecosystem. These layers of defense must be broader than just technology alone, as vulnerabilities may exist across people, policy, process, and management areas as well. **Booz Allen's approach strengthens operations to be proactive, dynamic, and adaptive.** We help organizations evolve space security from an issue of protecting assets and data to an effective enterprise-wide approach that considers all areas of risk. With increasing reliance on digital technologies to carry out daily functions and support missions, effective space security operations must consider a holistic view to defend the enterprise. Our process integrates several key activities: threat awareness to identify vulnerabilities; rapid response to an attack to facilitate recovery and mitigate impact; and evolutionary response to develop remediation strategies and build on lessons learned. By layering defenses through policy, people, technology, and management processes, your organization will be ready to react to attacks because it has been proactive in anticipating and preparing for them.

People. The human dimension of space security is critical, encompassing everything from technical and leadership skills to organizational culture and communications. Organizations must be able to identify, recruit, develop, and retain a workforce that can understand and adapt to the full range of space security threats. Part of the challenge is to ensure the right skill set for network operators and defenders, intelligence analysts, leaders, even front-line employees. But it also requires the right mindset: a collaborative culture that can detect and respond to threats that span organizational and geographic boundaries. **Booz Allen consultants work with clients to maximize the human factor.** We help clients develop a comprehensive approach to human capital, from competency modeling and workforce planning to specific recruiting and retention

strategies. We also help clients train and develop talent, so that security professionals and leaders have the requisite state-of-the-art skills. And we help clients engage key internal and external organizational stakeholders, to keep them aware and informed of the threat, to optimize the organization's internal climate and culture, and to build and sustain the external relationships necessary to effectively anticipate and overcome space events.

Engineering. While point solutions such as enhanced SSA, disaggregation of large satellites, aggregation of ground stations, increasing investment in small satellites, and expanded commercial launch programs may all help improve space security, true space control requires a holistic approach to engineering and technology. **From understanding current requirements and the impact of changes in technology capabilities to implementing appropriate solutions, our engineering approach is aimed at realizing your competitive edge and staying ahead of fast-moving threats.** This vital work falls into three primary areas: strategic innovation, research, and development. These three areas address ongoing awareness and integration of emerging technologies to understand their benefits and impact, and to stay a step ahead of space attackers. Requirements development looks at business needs across all sectors of the organization to ensure technology systems will be reliable and resilient and will support the mission of the organization. Finally, it is about implementing solutions that are modular, interoperable, scalable, and can be integrated in a cost-efficient manner.

Management. Managing security and space capabilities across the enterprise takes more than technology. With ever changing threats and increasingly sophisticated attacks on the rise, the vigilant enterprise must respond with an integrated management strategy that addresses technology, policy, people, and operations. These interdependent elements are critical to managing risks, monitoring assets and supply chains, training employees, providing for resiliency recovery, and ensuring program oversight and performance of business-critical functions. **Our integrated management approach provides**

the discipline to prioritize investments and resources based on their value to the organization's business and mission, and the flexibility to quickly deploy new technologies or support a surge in operations. This helps organizations build a layered defense against space security threats and enables them to better recognize vulnerabilities, respond to and limit attacks that do get through, and evolve from lessons learned and compliance requirements. For many leaders, the challenge of space security management lies in staying focused on the big picture rather than the end solution. Management that aligns its resources with the organization's strategy and goals can reduce risks and damage from attacks, develop a culture where employees are knowledgeable and mindful about security policies, and protect high-impact assets and investments. Multidimensional space security challenges demand a comprehensive approach to ensure control and continuity of critical functions and requirements.

BOOZ ALLEN: YOUR ESSENTIAL PARTNER IN SPACE SECURITY MISSION INTEGRATION

Booz Allen is your essential partner in (space) mission integration. The NSSS identifies resilience as a key criteria for evaluating alternative investments in space capability but falls short in charting a path for how to do that in an integrated, coordinated fashion. Booz Allen is uniquely positioned to help organizations entrusted with enhancing our space advantage better understand the impacts of their actions in a shared mission, networked environment. For decades Booz Allen has explored, analyzed, and addressed shared mission challenges with U.S. government agencies.

Future Capabilities Development. For more than fifty years, Booz Allen Hamilton has applied wargaming and exercises to help clients solve the world's toughest government and business challenges. More than brainstorming, wargaming is an innovative way to fuse collective wisdom, analyze alternatives and develop a shared vision. Over the last 5 years Booz Allen has partnered with the Pentagon's "think tank," the Office of the

Secretary of Defense's Office of Net Assessment, to lead a future space wargame series to examine the emerging space competition between the U.S. and near-peers. The series brought together experts from across the operations, acquisition, intelligence, scientific, and commercial communities – building a small but diverse cadre – and examined all aspects of the competition, to include space capabilities, weaponry, strategy, deterrence. The resulting Final Report enabled OSD/NA to explore space power across all mission areas, including space control.

Cybersecurity. Like space security, Booz Allen understands that cybersecurity is no longer just about protecting assets. It's about enabling organizations to take full advantage of the vast opportunities that the ecosystem of cyberspace now offers for business, government, and virtually every aspect of our society. Those opportunities can be threatened, however, by a growing number of hackers, organized crime, nation-states and terrorists. We have helped clients in government and business understand the full spectrum of threats and system vulnerabilities and address them effectively and efficiently. Our Mission Integration Framework has helped clients "think bigger" to address the real issues and develop cyber strategies that keep pace with our fast-changing world.

Integrated Intelligence. Booz Allen has supported the Army's Distributed Common Ground System-Army (DCGS-A) program for more than a decade. In the last few years, we have helped develop the Standard Cloud program which operates in an open architecture

environment with inter-system interfaces. As a result, DCGS-A integrates 13 different US Army ISR programs into one virtual, interoperable system. Vendors develop systems for "plug and play" within the broader DCGS-A infrastructure, and they use the Army's System Integration Labs for vendors to test their systems to ensure interoperability before fielding. In addition, the labs enable operators to test and shape new technologies to enhance their usability and mission capabilities. As a result, the Army has improved integration, strengthened its analytic capabilities, and streamlined the process of getting intelligence and analysis to commanders and warfighters, while also reducing the overall costs to support DCGS-A. The DCGS-A Standard Cloud is accredited, deployed, and fully operational in Afghanistan.

CONCLUSION

*"Space is too important to the national security of our nation for us not to adapt until after change is upon us."*⁴

We believe that resilience is more than complying with a set of requirements or implementing one-off solutions. In order for organizations with a space security responsibility to respond in an integrated, coordinated fashion they must first recognize the ecosystem in which they are operating. By focusing on the success of shared-mission outcomes, each organization can bring their capabilities and resources to the fore to sustain our space advantage and more effectively and efficiently protect our nation's warfighters, citizens and economy.

NOTES

1. *National Security Space Strategy (Unclassified Summary)*, 2011, p11
2. Robert Work, *Would Spies Command in a Space War?*, *Breaking Defense*, July, 22, 2015
3. Ellen Palikowski, General USAF, *US Commits \$5B in New \$\$ to Countering Space Threats*, *Breaking Defense*, April 22, 2015
4. Ellen Pawlikowski, Lieutenant General, USAF Doug Loverro, DISES, USAF Tom Cristler, Colonel, USAF, *Retired Space: Disruptive Challenges and New Opportunities*; *Strategic Studies Quarterly* – Spring 2012

ABOUT OUR AUTHORS

Paul Chi, *Senior Vice President*

Paul Chi is a Booz Allen Hamilton Senior Vice President at the firm's Herndon, Virginia office. He partners with intelligence and commercial clients to develop Cyber, Identities, Communications, Advanced Data and Rapid Prototyping solutions.

Specifically, Mr. Chi leads engagements that build solutions and support efforts in identities/Biometrics, Cyber and Innovative Commercial Solutions by prototyping new engineering approaches and leveraging advanced data analytic techniques. Previously, he partnered with the Intelligence Community (IC), Department of Defense (DoD), and Commercial clients to develop solutions for signals intelligence analysis, all-source research and analysis, information security and data analytics.

Mr. Chi has a BS in Electrical Engineering from the University of Michigan.

Dick Johnson, *Vice President*

Dick Johnson is a Booz Allen Hamilton Vice President and a leader in the firm's Air Force business, specializing in systems engineering and integration (SE&I) of C4ISR systems. Mr. Johnson has 25 years of experience in engineering and integration of complex space and communications systems.

Mr. Johnson holds a B.S. degree in electrical engineering and computer science from The Johns Hopkins University and an M.S. degree in electrical engineering from the Georgia Institute of Technology.



About Booz Allen

Booz Allen Hamilton has been at the forefront of strategy and technology for more than 100 years. Today, the firm provides management and technology consulting and engineering services to leading *Fortune* 500 corporations, governments, and not-for-profits across the globe. Booz Allen partners with public and private sector clients to solve their most difficult challenges through a combination of consulting, analytics, mission operations, technology, systems delivery, cybersecurity, engineering, and innovation expertise.

With international headquarters in McLean, Virginia, the firm employs more than 22,600 people globally and had revenue of \$5.41 billion for the 12 months ended March 31, 2016. To learn more, visit BoozAllen.com. (NYSE: BAH)