



May 10, 2016

“Not on My Watch”

Q&A with Stephanie O'Sullivan, Principal Deputy Director of National Intelligence
Kristin Quinn, Trajectory Magazine, 2016 Issue 2

Stephanie O'Sullivan became Principal Deputy Director of National Intelligence (PDDNI) in February 2011. As PDDNI, she focuses on the operations of the Office of the Director of National Intelligence (ODNI) and manages Intelligence Community (IC) coordination and information sharing.

Before this assignment, O'Sullivan served as the associate deputy director of the CIA since December 2009. Prior to becoming associate deputy director of the CIA, O'Sullivan for four years led the CIA's Directorate of Science and Technology (DSandT), which is responsible for developing and deploying innovative technology in support of intelligence collection and analysis.

Earlier in her career, O'Sullivan held various management positions with DSandT, where her responsibilities included systems acquisition and research and development in fields ranging from power sources to biotechnology. O'Sullivan joined CIA in 1995 after working for the Office of Naval Intelligence. She met with trajectory in March to discuss the foundational nature of GEOINT, the President's Daily Brief, new technology, and much more.

How did you get your start in the IC?

Sort of serendipity, a little bit of luck. I had just graduated from engineering school and I answered an ad for an ocean engineer. It turned out that it was a large company. I didn't know it at the time, but they were doing business for the Intelligence Community. The ad was really vaguely worded. It asked for an ocean engineer, I was an engineer. I lived on a boat at the time, so I figured I was qualified. I applied and found out it was really the IC, and I never looked back.

You lived on a boat?

I did. When my parents moved up here we'd always taken sailing vacations. They'd done their final move to live on a sailboat.

Based on your serendipitous path, what advice would you give to young intelligence professionals?

Well, you have to get up every day and like what you're doing, so seek work that's interesting, challenging, and motivates you. Look for people that you want to work with and you respect. I found both in my 35 years in the Intelligence Community.

Stephanie O'Sullivan in December 2015 visited Columbia Heights Educational Campus, a multicultural, multilingual public middle and high school located in downtown Washington, D.C. Photo by ODNI Public Affairs

Is there any particular advice you would give young women entering the IC?

PIAB Media Highlights

May 10, 2016

Recognize that being different is a strength. In the IC in particular, we can't afford to repeat patterns or fall into just doing the status quo and hitting repeat, so the people who bring different viewpoints or experiences are particularly valuable. It's why diversity of viewpoints and avoiding groupthink are really important. I often find myself being in a room—big tables these days—and I'm thinking, "I don't think like everybody else here." But that's a strength.

What are your roles and responsibilities as PDDNI? How would you describe your day-to-day tasks?

My No. 1 job is delivering on DNI Clapper's objectives, which is basically summed up in one word: integration. Integrating the Community, integrating our capabilities. The way he puts that into practice is largely by investing in the men and women of the IC. That's his motivating drive, so that drives what I do. My day-to-day job is unpredictable. It could be everything from administrative trivia—our parking garage, for example, is one of the main features of working here. We're always told on our climate surveys employees say they love working here, and when you peel into it, they love the parking. So it could be administrative trivia all the way to the incredibly profound. And you just don't know when you walk in every morning what it's going to be next. But if I'm lucky, my usual day starts with the President's Daily Brief (PDB). It's one of the privileges of my job and one of the most rewarding things I do every day because it is, in essence, the boiled down product of the entire Intelligence Community. You're seeing everything that everyone throughout the Community is striving to put together. It's the end results of what they do.

How does investing in the men and women of the IC help meet the goal of integration?

One of the primary signature initiatives we've had going since the stand-up of ODNI has been joint duty assignments. It's about getting the full capabilities of the IC instead of a bunch of, to use the old word, stovepipes. DNI Clapper is trying to demonstrate that we are so much more together than we are as separate pieces. It's a standard statement, but it's true. And I think it's our secret advantage for the IC in the United States—the ability to know what we know and work together.

What are your thoughts on the future of GEOINT?

The golden age of GEOINT is in front of us, not behind us. I know it's a well-established fact that GEOINT is foundational, is the starting point for much of what we do in the Community. Even when I worked at CIA, we'd be talking about some operation and the first thing you'd see come out is imagery. There's a lot more that we could get out of GEOINT than we are today. There are new sources, new analytic techniques, new kinds of capabilities that we can put in orbit, and we can better leverage that which we already have. For instance, training our overhead architecture as an architecture instead of a bunch of single-point satellites.

Being that GEOINT is foundational, how does the discipline help facilitate integration?

GEOINT is probably the most common capability across military, the IC, and the U.S. government. You think of things like FEMA after a disaster. It's almost the common denominator that all of us, despite all of our different missions, use and turn to more than any other capability. GEOINT is like the common lingua franca across the IC.

What would you consider three of the greatest challenges the IC currently faces?

Well, I was in the Community on 9/11, so not on my watch, I don't want to see that happen again. The pervasive instability you see around the world. Dealing with the huge scope of change and turmoil in the Middle East. Changes that Russia's driving and where Europe is going. And big data analytics, both as a threat and an opportunity.

How is Big Data analytics a threat as well as an opportunity?

PIAB Media Highlights

May 10, 2016

It's all about finding patterns in massive amounts of data. We have to worry about things like cover. For our operations, the same techniques could be used against our activities.

What about these challenges keeps you awake at night?

I spend too much time awake at night, I actually have this formula—about 80 percent of the time it's worrying about something I might have missed. Whether it's a factor I didn't think of, or an opportunity I've overlooked. That's why I value people who think differently. I know what I think. I want to hear from someone who comes from a different perspective that might help me not miss something key. The other 20 percent is worrying that I got something wrong. The business of intelligence is ambiguity, so you're always trying to discern insight from scattered pieces of data. You're always worrying you missed a key piece or you assembled the pieces you had into the wrong picture.

USGIF sits at the intersection of government, academia, and industry. How can industry and academia help the IC take on some of those challenges?

It's a little simple, but I think academia has new ideas, like strategic opportunities. New technology, new concepts. They also drive new policy thinking, think tanks. I think of academia as new idea possibilities. Industry I think of as new capabilities. Academia produces ideas; industry turns ideas into capabilities—things you can use—at capacity. And then government is about putting those things to use. Now, the government also has requirements to generate new ideas and capabilities, but we can't do that on our own.

Of all the positions you've held, what has been your favorite and why?

Well it kind of changed over time, which is a good thing. It means I'm not regretting that the best job I had was 20 years ago. When I started out, I wanted to be an engineer because I wanted to build things. I had an uncle who built bridges over the Mississippi and I thought it was so cool. It connected two sides of the river and there was something real there. That's why I was attracted to engineering. And I did that for the first decade or so. And then after a while, I found myself getting pulled into positions where I was building teams or putting together teams of people so they could build things. The last part of my career has been more about building organizations, or in the case of ODNI, community. So it seems like a continuum. You're trying to do the same thing all the time, create something that will leave a lasting mark. That mark was really easy to see when you're building things, but then I started realizing that when you hire someone and we bring a new officer into the organization, they could be here for 30 years. I've built a lot of cool stuff, but it might have a life of 15 or 20 years. The bigger impact you're having—the longer term, lasting legacy—is probably in developing those officers. They're the ones who will carry on and that's a long-term decision. And then you think about organizations. ODNI is now at 10 years, and hopefully we've laid the foundation for something that will go on and help the Community be integrated, connected, and everything it can be for much longer.

What are some things you've championed?

The Intelligence Community Information Technology Enterprise (IC ITE), and that's integration writ large across our IT enterprises. It's enabling all the ways that we work together, that we can share information, that we can be more closely integrated. Next is the integration we're trying to do around things like activity-based intelligence (ABI) and our satellite architecture. Allowing our satellites to tip and cue each other, that's part of what ABI does. And that's why I believe we're at the cusp of the golden age of GEOINT, not looking back at it. Then there are things like our new Cyber Threat Integration Center where we're trying to take all of the cyber intelligence we have and figure out how to share that most widely with our policymakers and customers across government.

What is a book you recommend to intelligence professionals?

PIAB Media Highlights

May 10, 2016

The President's Book of Secrets by David Priess. I have been waiting and downloaded it last night. I've made it to the second chapter. President George H. W. Bush wrote the foreword. The book is sort of a compendium on the presidents' and senior policymakers' experiences getting the PDB every day. Which I said in the beginning, to me, that's the coolest part of the day, where you open that book and see some great collection or some NGA imagery. Or you hear about some assets reporting or an assessment an analyst did. That's the Community in microcosm and this book is about the history of that. Presidents talk about how they used the PDB and what it meant to them.

So if you're an intelligence professional that book could help you better realize the fruits of your labor?

Yes, and the sweep of history. That's sort of the privilege we have being in this business. You're at the front row watching history happen and helping to inform our policymakers. As intelligence professionals, part of our tradecraft is we don't do policy. So when I brief the President, we try to give him the most straight-up set of facts and insight we can and then we leave the room and they talk policy. The policy part is their job and you can't really get sucked into it because then you start cheering from one side. You want their policy to work, but you need to be separate from it. It's great hearing the presidents' voices from the past talk about what it meant to them and how they used information. I don't really see that right now.

I leave and I don't hear them debating how that piece of information I just told them will inform some choice they're making. It's fascinating to hear the presidents talking about how they used all this information.

That's some powerful perspective.

It's sobering. It's a huge responsibility. Which is why I worry about getting it wrong. After I brief, for the next three weeks I'm picking up traffic every day and I'm going, "Thank God I got that right." You're watching how things play out and I had told the President, "this is what to look for, this is what might happen," and then I'm going, "Thank goodness I was right."

Where do you see the IC in about five years?

I hope I see them doing something new, something different that I never thought of. Because another truism of the intelligence business is that if you're standing still or repeating patterns, you're becoming obsolete, you're becoming irrelevant because the world doesn't stand still. I really hope they won't have forgotten all the reasons we got to where we are today, the lessons about integration, the lessons about working together, that mission focus, but you don't have mission without people. I hope they don't forget any of that, but I really hope they aren't doing exactly what they are doing when I leave next January, or Director Clapper leaves next January. If they do, we will have failed. Because you really have to believe that you've brought along the team that's going to inherit the organization, to be able to respond and adapt and think, not just hit repeat, to whatever new situations they're going to get, because there are going to be new situations. Things that I never dreamt of when I started are facing us today, so they'll have their own set of challenges. Anyway, I hope they surprise me.

What are some emerging trends that are going to lead the IC into the future?

Well that stability problem is going to drive change. You just don't know where you might be looking at a crisis tomorrow. That's going to be driving the business of intelligence, which is both about trying to be strategic and move forward, but also being at the mercy of the crisis of the day and trying to provide information on it.

The other thing is technology. One of my favorite things to do around here is to champion the researchers and the STEM people because I think they're cool and they create things. But technology is changing, it's

PIAB Media Highlights

May 10, 2016

a truism, it's changing so fast that the world you will be living and working in 20 years from now, you couldn't imagine today. That's both threat and opportunity and the IC is going to have to adapt.

Are there any other topics you'd like to discuss?

Some of the things that I'll miss most. I'll miss reading the PDB. The ops guys are great. The analysts are wonderful. I'll miss those tech and research guys. They can create a new future. You know the analyst takes all of those bits and pieces of information and gives you insight from it, the ops guy responds to the opportunity to recruit the greatest agent ever, but the tech guy or a researcher, you can tell them a problem and they can invent something that changes you. Like cellphones—think about when we didn't have cellphones. Somebody invented that and it changed everything about how we work.

Prepare for Profound Change

Q&A with Catherine Johnston, DIA's Director of Digital Transformation and Operationalizing IC ITE
Kristin Quinn, Trajectory Magazine, 2016 Issue 2

Cathy Johnston is the Defense Intelligence Agency's (DIA) director of digital transformation and operationalizing IC ITE as well as co-chair of the IC ITE Mission User Group. Prior to this position, Johnston was appointed DIA director for analysis in October 2012, during which time she led DIA's all-source analytic effort. From January 2011 to September 2012, Johnston served as National Intelligence Manager–East Asia with the Office of the Director of National Intelligence (ODNI), where she led the Intelligence Community's efforts on East Asia. Prior to assuming her position at ODNI, Johnston was Asia mission manager in the Directorate for Science and Technology (DSandT) at the CIA.

Johnston met with trajectory in February to discuss intelligence integration, what lies ahead for the Intelligence Community, how the GEOINT discipline is leading the way with its embrace of open-source information, and much more.

How did you get your start in the IC?

I had the huge benefit in grad school of working for Ken Lieberthal and Mike Oksenberg, who were both National Security Council advisers. During the summer, as grad school was wrapping up, they made a number of calls and introduced me to a variety of intelligence communities. I had spent my time in grad school studying the Chinese military and this was back in the day when absolutely nobody cared about the Chinese military. It was a very different environment. When I started applying to IC jobs, because my focus was on the military, there was a lot of interest in DIA in my field. I applied and got into DIA first. I started in April 1990. My whole point was to do Chinese military analysis. I thought I was going to do Chinese leadership and I ended up doing ground order of battle. And while I was in baby analyst training class, Desert Shield happened. Saddam Hussein invaded Kuwait. And I ended up doing Iraq chemical biological warfare, nuclear missiles, absolutely everything I knew nothing about, and so that started my intelligence career.

How does it feel to be back at DIA following your positions with CIA and ODNI?

It's awesome. Part of having my time away was also time away from analysis. So it gave me experience in a variety of collection disciplines, into the business of doing intelligence and IC-wide intelligence integration. That really gives you a very different color when you come back and look at the analytic business and the operations and how we should be changing it.

What does your new role as Director of Digital Transformation and Operationalizing IC ITE mean to you? What are your main objectives for the future of DIA?

Let's start with the digital transformation part. It is all about helping DIA adapt to the 21st century information environment and the 21st century environment writ large. There are a huge amount of

PIAB Media Highlights

May 10, 2016

changes that have happened in the last 15 years in the commercial world and industry. In the outside world, all of us are living in a very different way than we did 15 years ago when we sent information by fax machines. A lot of government, and particularly the IC, missed out on much of that revolution. Since we have not adapted to it to date, we are now faced with challenges that require us to rethink a number of our assumptions, operating models, business processes, and tradecraft. The most immediate thing impacting the IC right now in that sphere is the Intelligence Community Information Technology Enterprise (IC ITE). While all of these things have a technical dimension they're really not about the technology. It's digital transformation, but digital with a really tiny D. It's really about operating model adaptation and changing the way we do business and interact. The benefit of IC ITE is that it will remove legacy stovepipes by putting the IC into a single platform. That has profound implications for the IT world, but those implications frankly pale in comparison to how it will enable mission. It will tear down the barriers that prevent the kind of integration we all want to achieve. It will be an evolution to get there. It's not like we're going to turn on a switch and have a completely reinvented world.

The way we look at data is closely tied to IC ITE. We need to look at data and treat it as a national asset—at a minimum as an agency asset, as an IC asset. That's a really major culture change. Yes, there are technical implications. But it has much more to do with the way we handle data sharing policies and the way we cooperate and collaborate with each other.

Open-source information is another aspect of digital transformation. The amount of data that is publicly available rivals our classified holdings. Commercial imagery is a really good beta case for this where you see how much information is available and how much you can do using commercial imagery. It causes you to rethink our culture, what we've valued in the past, our tradecraft, how we characterize different standards—all of that. Open source is going to change even more dramatically in the next five to 10 years.

We're also looking at over-the-horizon, disruptive events. The Internet of Things, the move to mobility in the commercial sector. We do not have a particularly mobile framework and the fact that industry innovation is moving to mobile first will present a challenge to us and we will need to rethink some of our assumptions. We're also identifying new trends in biotechnology and identity intelligence and detection. All of these things present great opportunities but also great challenges to us.

What's your day-to-day like?

About 30 to 40 percent of my day is reading mostly unclassified papers from industry and some from academia on new, disruptive trends. So block chain technology, just a wide variety of things. Many of them have a technical underpinning, but all of them are about changing business models. Some of them are new industry concepts on how to have effective, agile, organized teams. Some of them have nothing to do with technology; they're all about how to get things done. I also read *Wired* and *Fast Company* religiously.

I spend another major chunk of my time dealing with what I call "ants." Things that seem very little but are massive irritants and prevent forward progress for some of our pilots. Things like data-sharing policies. In most cases, it's not the policy, it's an interpretation of how the policy is being implemented—so really breaking through the "no barrier" when you're trying to do something new and innovative. If it hasn't been done before, it's easy to find a voice that will prevent you from making forward progress; but in almost all cases, those voices are doing a standard interpretation of the way we've always done things and there's usually a reasonable workaround.

In this new environment, we're looking for unprecedented agility in the way government responds, and this requires that all of our enabling capabilities likewise have unprecedented agility, including our acquisition systems. So I dig into what those options are, learn from a lot of the civil agencies such as the Department of Health and Human Services that have been able to figure out agile acquisition, and try to make sure we can learn from their experiences and build a similar system. Things like that are not sexy,

PIAB Media Highlights

May 10, 2016

they are not a lot of fun, but they are totally necessary to build an environment that allows for the kind of innovation we need.

What's your team like?

I have a broad team made up of all parts of the agency. We also have service representation and people who have experience with the combatant commands. The core of the team is heavily represented by mission, and we have some high-powered representation from the CIO—in large part because there's a heavy technical play, but the technology is the easiest part. The implications for operations and technology collection tradecraft are pretty amazing when you look at some of the innovations happening in the commercial world. We have a number of analysts who are on the team, some of whom have experience in the cyber dimension, in future analysis on where the threats are going to be. We have acquisition specialists. We've said to them, "We at DIA are good at predicting what the world and the adversary is going to look like in the future. We need you to look at how DIA will need to operate in the future."

What is the role and significance of geospatial intelligence to the DIA mission?

As an all-source agency, GEOINT is a component of every single problem we look at. As a warfighting agency, GEOINT has a special place in the DoD warfighting requirement set. Probably the tightest partnership that we had when I was director of analysis was with my counterparts at NGA—NGA and NSA—but especially my counterparts at NGA because so much of what we do is to meet the foundational intelligence requires that both NGA and DIA have. When you look at the digital transformation space, the poster child for the intelligence discipline that is changing the most dramatically, in my opinion, is imagery. The advent of commercial imagery, the advent of data analytics tied to those data layers, the rethinking of data, the way NGOs are rethinking data layers and combining them with geospatial analysis is just a prototype. It's at the vanguard of where all the rest of us are going to be.

Would you say DIA is watching NGA for lessons learned?

My belief is within five to 10 years the majority of the information we're going to be processing will be open source just because of the explosion in that sphere. NGA is seeing it first because of what is available and open in commercial imagery. We are starting to see it, but we're all investing in trying to understand those big data analytic methodologies, trying to understand the implications for our tradecraft—things like how to assess reliability for some of these new data sources. They're just too new. We don't understand them well enough yet to be able to apply standard tradecraft to them. It is a huge field of exploration for all of us, and NGA and the GEOINT sphere is at the forefront of redefining that.

What are some of the greatest challenges facing the defense intelligence community? How can industry help take them on?

The lack of adequate experience across the disciplines leads to a lack of creativity and inventiveness in thinking about what our business process should be in five years. For example, today we have inventive analysts who can improve upon the business processes they know using the tools they know. But in the architecture of the future, where we have a common IC platform, each of us bringing our existing production processes to that common platform will sub-optimize an integrated response. Because we don't have enough familiarity with each other's work processes, because we are still very discipline- and agency-specific, it's hard to develop what we know we need to achieve in five years. It is helpful that the IC has joint-duty assignments where we seed people throughout other agencies to start to learn those processes, but we haven't been doing it for long enough.

Generally, if you started off at NGA, you are an imagery analyst and you have stayed an imagery analyst for most of your career. It is a rare analyst who will go from being an imagery analyst to a SIGINT analyst, for example. We don't have many officers that can understand the production systems within the

PIAB Media Highlights

May 10, 2016

stovepipes such that they can imagine what a truly integrated system would look like. And that's what we need to be building. Right now. We need to imagine what that world needs to look like, but because of the lack of exposure, there are few people who can imagine it. That's what we need a lot more ideation on. We'll get better as we get more exposure and start doing more real-time collaboration as opposed to working a project first in the GEOINT discipline then sending it to the SIGINT guys to iterate on. With real-time collaboration, I think imagineering will happen and that creativity will be there.

Stovepipes remain our most consistent challenge. Many people say our fiscal environment is, but I actually think that's not so much a challenge as a benefit. It is a challenge in the near term, no question. But because we're all feeling the pinch, it's causing us to look to each other to collaborate.

What has been your favorite job? Why?

I have had so many great jobs. It's hard to pick. So I'd go with the job that was the most different, the one that took me farthest from my comfort zone. The farthest out of my comfort zone was working at DSandT which took me from being an analyst where I had spent my entire career doing analysis on Asia mostly and all of a sudden getting exposed to every conceivable collection discipline and understanding what all of the other agencies could bring to bear and what their limitations were. The learning curve was immense. When I look back on the job that probably influenced me the most, it would be that one. And it also set me up in great stead to then go work at ODNI and then come back to DIA with a very different perspective of defense analysis.

What advice would you give to young intelligence professionals? Is there any particular advice you would give to young women entering the workforce?

I would advise young professionals to take risks, to take on new challenges, and to constantly be learning and growing. If they are in a position where they are not learning and growing, it's time to look around. The wonderful thing about the IC is there are so many different kinds of jobs. There are so many opportunities. You should never be bored.

I have a multiple part answer for women. Women especially should take risks because women have a tendency not to take risks. I have a "4-A" strategy for women: ask, act, advocate, and apply. Women don't ask for challenges, they wait to be identified, to be tapped on the shoulder. It's called "head down, pencil up syndrome." You need to ask to go, ask for the challenges, seek them out. Act. If you wait to be told something, you will miss your opportunity. Take the initiative and act. Make a decision, do something. Advocate for yourself. Again, women are not terribly good about advocating for themselves and have a tendency to undervalue what they have accomplished and what they are capable of. I have made a habit of calling both men and women when I have a senior position available and asked officers of all sorts to apply. In 100 percent of the cases, I called a woman and asked her to apply for a stretch assignment she said, "I would never have presumed to think that I was qualified for this job." And I'd say, "Well, I wouldn't have called you if I didn't think you were qualified for the job and I don't expect that anybody will be perfect at a position the day that they take it." If there are 10 requirements, women have a tendency to want to see themselves as qualified in all 10 of those areas, and men will apply if they see themselves as qualified for one in 10—and these are all generalities. So women need to put themselves out there more and they need to understand they are capable of so much more than they give themselves credit for.

Describe where you see the Intelligence Community in five years. What trends emerging today will help make this future a reality?

Five years from now, I think we will be so much more integrated—that a number of the impediments that prevent us from having seamless collaboration across the agencies and the disciplines will have evaporated. The majority of our work processes will be informed by big data analytics that will allow us to process far more information than we can even imagine processing today when things are still mostly manually curated. We will be achieving what is today unimaginable effectiveness in terms of mission

PIAB Media Highlights

May 10, 2016

delivery. We will have a more customizable delivery mechanism for our knowledge. Our customers will be able to extract content the way they want it in a timeframe that is much faster than they are currently able to gain it. And probably most importantly, we will be operating with much more open-source information than we've ever operated with. Open-source data and insights from industry, academia, and the open world will become the bread and butter. So that entire relationship between the IC and industry and academia will start to change.

A fight to protect 'the most valuable real estate in space'

Christian Davenport, Washington Post, 10 May 2016, Page A1

The first salvo was a missile launch by the Chinese in 2007 that blew up a dead satellite and littered space with thousands of pieces of debris. But it was another Chinese launch three years ago that made the Pentagon really snap to attention, opening up the possibility that outer space would become a new front in modern warfare.

This time, the rocket reached close to a far more distant orbit — one that's more than 22,000 miles away — and just happens to be where the United States parks its most sensitive national security satellites, used for tasks such as guiding precision bombs and spying on adversaries.

The flyby served as a wake-up call and prompted the Defense Department and intelligence agencies to begin spending billions of dollars to protect what Air Force Gen. John Hyten in an interview called the "most valuable real estate in space."

Faced with the prospect of hostilities there, defense officials are developing ways to protect exposed satellites floating in orbit and to keep apprised of what an enemy is doing hundreds, if not thousands, of miles above Earth's surface. They are making satellites more resilient, enabling them to withstand jamming efforts.

And instead of relying only on large and expensive systems, defense officials plan to send swarms of small satellites into orbit that are much more difficult to target.

At the same time, the Pentagon has designated the Air Force secretary a "principal space adviser," with authority to coordinate actions in space across the Defense Department. Agencies have begun participating in war-game scenarios involving space combat at the recently activated Joint Interagency Combined Space Operations Center.

The flurry of activity raises the specter of a new technological arms race, this one in space, as nations jockey for advantage. The Pentagon is even developing what is known as the "Space Fence," which would allow it to better track debris in space.

National security officials are not only concerned that missiles could take out their satellites but also that a craft's equipment could be easily jammed. Potential enemies could "dazzle" sensors, temporarily blinding them, or deploy tiny "parasitic satellites" that attach to host satellites and do their worst. That could lead to soldiers stranded on the battlefield with little means of communication or missiles that would not be able to find their targets.

"We have considered space a sanctuary for quite some time. And therefore a lot of our systems are big, expensive, enormously capable, but enormously vulnerable," said Deputy Defense Secretary Robert O. Work.

Perhaps most striking is how openly Pentagon officials are talking about their efforts to fight in space — especially because much of the work remains highly classified.

PIAB Media Highlights

May 10, 2016

While the United States has been bogged down in counter-terrorism operations in Iraq and Afghanistan, Pentagon officials say that Russia and China have been developing the capability to attack the United States in space.

“Every military operation that takes place in the world today is critically dependent on space in one way or another,” said Hyten, commander of the Air Force Space Command. “Whether our own people in the United States are fully cognizant of the dependence on space or not, the rest of the world has been watching us very closely.”

Since the 1991 Persian Gulf War, the United States has become increasingly reliant on space for how it fights. Its satellites are used to snap images of the enemy, provide communications in remote areas, and guide ships, drones and even bombs via GPS. That same navigation technology also has become embedded into everyday life for Americans, who rely on satellites for driving directions, television signals and more. Even the banking system uses GPS to time transactions.

Those high-tech capabilities have given the U.S. military an extraordinary advantage over its adversaries, and over the years, the military has launched dozens of satellites into space.

Now, as Russia, China and others develop technology that could take out the national security infrastructure the United States has built in space, Pentagon officials fear its satellites could be sitting ducks. Navy Adm. Cecil Haney, commander of the U.S. Strategic Command, said recently that North Korea has successfully jammed GPS satellites, that Iran was busy building a space program and that “violent extremist organizations” were able to access space-based technologies to help them encrypt communications, among other things.

“We must recognize that despite our efforts, a future conflict may start, or extend, into space,” he said.

Although Hyten and others had long been concerned about the mounting arms race in space, it was only after the 2013 launch by the Chinese that the Pentagon acted with a new sense of urgency.

As adversaries began targeting space, “there was a level of frustration ” in the space community, Hyten said. “We just needed someone to say go.”

The “go” came in 2014, when top Pentagon officials, including Work, the deputy defense secretary, made space a priority, saying at a meeting that “if, God forbid, someday a conflict does extend from the Earth to space, what are you going to do about it?” Hyten recalled.

The Pentagon spends \$22 billion on space programs and is investing an additional \$5 billion in space efforts this year, including \$2 billion for what is known as “space control,” which includes its highly classified offensive programs. Hyten declined to discuss the ways in which the United States is preparing to attack other countries in space. But the United States has had the capability to blow up satellites since 1985, when an F-15 fighter pilot fired a missile into space that took out an old military observation satellite.

The Pentagon is moving in the right direction, said Elbridge Colby, a senior fellow at the Center for a New American Security, because if the United States was to get into a conflict with Russia or China, “we should count on them going into space because it’s so important to us, and it’s quite vulnerable.”

The new space operations center has been up and running for just more than six months. It had what Hyten called “a very slow start because we just hadn’t thought about it.” But officials have begun running through scenarios and identifying weaknesses in defense, which help officials tear down the walls between different fiefdoms, he said, so communication and planning can improve.

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Most of all, there has been a culture change, he said. Where Pentagon officials who focused on space once operated in what was a peaceful environment, they have had to think of themselves — and space — differently.

“They are warriors,” Hyten said. “And they need to recognize that they are war fighters.”

Not that the Pentagon is inviting war. Its preparations are to deter conflicts, not incite them, officials said.

During a recent speech, Frank Rose, the assistant secretary of state for arms control, verification and compliance, said he was “concerned about the continued development by Russia and China of anti-satellite weapons.” But he said the United States “is committed to preventing conflict from extending into space, and our diplomatic strategy supports this goal. The possibility of conflict in space is in no one’s interest.”

Part of that is speaking out publicly about a highly sensitive subject.

“The fact that the Pentagon is being so vocal, consistent and in some sense you could say dramatic is an indication of how serious the problem is,” Colby said.

When China flew its missile to near what’s known as geo-stationary orbit — the orbit where the Pentagon has many of its satellites — that “appears to have scared the crap out of people,” said Brian Weeden, a technical adviser for Secure World Foundation.

At the time, Chinese officials said they had tested a land-based missile interceptor and denied that the weapon was designed to destroy satellites.

Russia also got the Pentagon’s attention when one of its satellites, launched in 2014, flew between two commercial Intelsat communications satellites and then sidled up to a third.

“It did not pose a collision risk, but it was uncomfortably close,” Weeden said.

The Russian Embassy in Washington did not respond to a request for comment.

Without space, the United States would be forced to revert to “industrial age warfare,” Hyten said.

“It’s Vietnam, Korea and World War II,” he said. No more precision missiles and smart bombs. “Which means casualties are higher, collateral damage is higher. . . . We don’t want to fight that way because that’s not the American way of war today.”