HEARING TO RECEIVE TESTIMONY ON MILITARY SPACE PROGRAMS IN REVIEW OF THE DEFENSE AUTHORIZATION REQUEST FOR FISCAL YEAR 2013 AND THE FUTURE YEARS DEFENSE PROGRAM

WEDNESDAY, MARCH 21, 2012

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

The subcommittee met, pursuant to notice, at 2:33 p.m. in room SR–222, Russell Senate Office Building, Senator E. Benjamin Nelson (chairman of the subcommittee) presiding.

Committee members present: Senators Nelson and Sessions.

Committee staff member present: Leah C. Brewer, nominations and hearings clerk.

Majority staff member present: Jonathan S. Epstein, counsel.

Minority staff member present: Daniel A. Lerner, professional staff member.

Staff assistants present: Hannah I. Lloyd.

Committee members' assistants present: Ryan Ehly, assistant to Senator Nelson; and Lenwood Landrum, assistant to Senator Sessions.

OPENING STATEMENT OF SENATOR E. BENJAMIN NELSON, CHAIRMAN

Senator NELSON. Senator Sessions is on the way, but we will go ahead and start and then when he gets here, obviously he will give his opening statement.

So let me today call our hearing to order.

The purpose of today's hearing is to receive testimony on the Department of Defense's fiscal year 2013 budget submission for its space activities.

First, let me thank today's witnesses for appearing before the subcommittee. I know you are all busy and this committee very much appreciates the time that you are taking to testify.

Let me note that sitting at the table and not behind me, as she once did, is Assistant Secretary Madelyn Creedon. Our committee misses you very much. Welcome back, Madelyn. It is good to have you. And congratulations again on your new position.

The President's fiscal year 2013 request for DOD space programs totals about $9.7 billion, down roughly 17 percent from fiscal year 2012. The decrease mainly represents the completion and launch of

several large satellites that were under development in prior years. So for the first time in many years, the Department has more satellites than launch capacity, indicating that we seem to be overcoming several major acquisition challenges in the Department of Defense's space programs. However, there are still several concerns that I have that I hope we can discuss to inform this subcommittee as we begin drafting our annual defense authorization bill.

First and foremost is the way forward with our Evolved Expendable Launch Vehicle, or EELV, program. Last fall, there was a critical GAO report on the program's costs growth and the ability to let in new and innovative launch providers for competition to drive down cost without sacrificing our mission assurance.

Second, while we are now launching satellites into space on a regular basis, we are failing to effectively utilize some of them here on earth.

The Space Based Infrared Satellite, or SBIRS, after many delays and cost overruns is delayed in implementing its ground system. The Navy's MUOS satellite does not have terminals that effectively use the satellite's new frequencies.

The Advanced Extremely High Frequency satellite, or AEHF, seems to win the price with a signal so advanced that it has caused the cancelation of the ground system that was to use it, the Family of Beyond Line of Sight Terminals, or FAB–T. This cancelation has in turn affected our Air Force strategic bombers' ability to have nuclear hardened, high data rate communications with the satellite. The AEHF's new waveform also caused a cancelation in the Air Force's ground element of their Minimum Essential Emergency Communications Network called MEECN, I suppose. I will be asking each of the witnesses and the GAO about this issue and what we might do in future programs to avoid it.

Third, I understand that somehow in this budget we managed to cancel two small but highly significant programs that have been paving the way forward on space innovation with low cost but responsive satellites.

The first program, the Space Test Program, was a $50 million a year effort that General Schriever himself, the father of DOD Space, established in 1967 to provide a means to launch innovative and high-risk satellites. This small program led to groundbreaking satellites such as the GPS system, our first secure communications system called MILSTAR, and finally our defense weather satellites. More importantly, it has served as the venue for students at our universities and military academies to launch and control innovative satellites. Many of these same students who got excited about space from this program are today's military space leaders.

The second program is the Operationally Responsive Space program whose purpose is to develop innovative low- cost and responsive satellites that are designed for tactical use by our battlefield commanders and, if necessary, to rapidly reconstitute our satellite system if it were to be disabled. I understand that ORS–1 was developed from start to finish in less than 3 years for a fraction of the cost of normal imagery payloads and is being tasked directly by CENTCOM rather than through the traditional tasking processes.

I would like to know how the Air Force came to this decision and whether they understand its full impact. I understand the Army has begun to experiment with small tactical payloads as well. So I look forward to their testimony here to compare and contrast what happened to these two programs.

The third issue is what is the DOD going to do about preserving its allocated radio frequency spectrum. We nearly lost a DOD block of spectrum as a pay-for in a recent tax bill and this committee worked very hard to avert what many in the Department saw as a crisis. And I would ask consent to enter into the record a letter on this issue from Secretary Carter.

[The letter of Secretary Carter follows:]

[SUBCOMMITTEE INSERT]

Senator NELSON. It details clearly the impact of losing portions of the frequency spectrum that the DOD currently uses. And I will be asking each of you about this topic to ensure its importance is known to our committee members.

Fourth and finally, I would like to learn about how we are coordinating space activities both within the U.S. and internationally. Madelyn, this is your area. I would like to know where we are with the code of conduct for space. There are concerns amongst some members that we are taking actions that resemble a treaty. I know treaties are the realm of the State Department, but the DOD must have views on the implications of this code of conduct on its space operations. It may not be a treaty, but as you well know, it will establish international norms amongst nations.

Within the United States, I would like to know what we are doing to coordinate our space efforts with the MDA, NASA, NOAA, and the intelligence community. I understand the MDA is proposing to launch and control up to 12 satellites to detect missile tracks in space. And how is this being coordinated and why is the MDA controlling a fleet of satellites? Past Department efforts with NOAA resulted in a failed weather satellite program. What did we learn here that will apply to any future interagency space efforts? It seems to me that the failure of past coordination has resulted either in failed programs or large cost increases to the DOD. So I would like your help for us to understand what is being done to avoid future problems in this area.

With that, it is my pleasure to turn the microphone over to my good friend and ranking member, Senator Sessions, for his opening statement. And let me say that we have had great cooperation and friendship in dealing with these issues in the past, and I know that we will continue to do that.

STATEMENT OF SENATOR JEFF SESSIONS

Senator SESSIONS. Absolutely. And thank you, Mr. Chairman, for the good statement. You raise a lot of issues. I will be brief.

And I thank all of you for being here and for the work that you do. And, Secretary Creedon, it is especially good to have you back to this committee room where you have harassed other witnesses. [Laughter.]

Senator SESSIONS. So maybe you deserve to get some harassment today or, at least, help us harass other people.

So I was pleased that the defense strategic guidance released in January recognized space as an area where the Department should prioritize and protect new capabilities and investments. It is a critical mission area. Our entire military depends on communication and observation from satellites that we just must have and be able to maintain even under hostile conditions.

Defense is not immune, however, to budget cuts in fiscal year 2013. The budget request makes a number of difficult choices, some of which I agree with and some of which cause me concern. The fiscal year 2013 budget proposes significant reductions to the Air Force budget which is the majority of space funding, General Shelton, we calculate as being down 22 percent. You and I have talked about that. You feel like that number may appear larger than it is based on some things that will not be needed by this year. But still, it is a pretty big number, Mr. Chairman. Given the magnitude of the reductions, I look forward to hearing from our witnesses about how we are doing for the future.

The defense space enterprise is benefitting today from investments in the past over a long period of years, as it shifts from a challenging period of development to what I hope is a more stable period of production. Avoiding the challenges of the past decade will again require continued smart investments for the future.

Over the course of the past few years, the Department has taken a number of important steps to address the rapidly growing costs of space, both out of necessity driven by budget pressures and NASA-related impacts on an already fragile industrial base, their reductions. The cost of developing, procuring, launching, and operating military space systems remains volatile. Affordability remains the central concern and despite some continuing instability, the fiscal year 2013 budget appropriately recognizes that significant strides must still be made to address the cost trends.

Mr. Chairman, you mentioned Operationally Responsive Space. I share your concerns there and maybe we can talk about that more.

I am also pleased to see that GAO is participating in the event today. Good to see you. In recent months, GAO has published a number of assessments on programs spanning the defense space enterprise. GAO serves as an invaluable resource to the committee, the Congress, and the American taxpayer taking into account some of GAO's recent recommendations on program improvement. I look forward to hearing from our DOD witnesses on what progress they have made in addressing these concerns.

Finally, during our last hearing, I raised concerns about the administration's support for joining a European Union code of conduct for space, as you mentioned, Mr. Chairman. But I am pleased and I believe I understand that since that hearing, the administration appears to have concluded that signing this code as originally drafted would not be in the National interest unless significant modifications were made. So I look forward to understanding the administration's plan moving forward and specifically how DOD intends to protect our National security interest in space.

There are other issues that I have concerns about, including some matters not appropriate for an open venue. I look forward to working with you to address those concerns. I know that you will be cooperative with our staff as Secretary Creedon used to benefit

from when she was staff over here. So I know you will work with us on those issues.

Thank you for joining us today, and I look forward to the testimony.

Senator NELSON. Thank you, Senator Sessions.

We will start with the testimony today, and we will start first with Secretary Creedon.

STATEMENT OF HON. MADELYN R. CREEDON, ASSISTANT SECRETARY OF DEFENSE FOR GLOBAL STRATEGIC AFFAIRS

Ms. CREEDON. Chairman Nelson, Senator Sessions, it is a pleasure to be back here today, albeit a little bit strange to be at this side of the table and not in markup. But it surely is a pleasure, and thank you for the opportunity.

Just a year has passed since the release of the first-ever National Security Space Strategy, and I am pleased to be here to discuss its implementation and the defense space programs.

This past January, as you mentioned, DOD published new strategic guidance for the Department. This guidance was informed by the space strategy and reinforces the strategy's main tenets. Both documents stress the importance of operating effectively in space, promoting responsible behavior, operating when possible with allied and coalition forces, and increasing the resilience of our space-based capabilities.

The goals serve a critical objective of the Department: protecting the advantages we derive from a domain that is increasingly congested, contested, and competitive. I would like to explain briefly and expand briefly on three important aspects of our space strategy.

First, the National Security Space Strategy and the new defense guidance both stress the need for resilience in our space capabilities in response to emerging anti-access, area-denial challenges. Resilience strengthens deterrence of attacks on our space assets and enables us to continue vital missions in a degraded space environment. Resilience is not the property of a single system. Rather, it is the ability of a whole architecture to provide functional capabilities that are necessary for mission success despite environmental adversity or hostile action. Resilience can be achieved in a variety of ways, including hosted payloads, commercial augmentation, international cooperation, and backup capabilities in other domains.

A second key aspect of our strategy is promoting responsible behavior in space. In this area, the Department of Defense is playing a leadership role by providing countries and companies across the globe with warnings of potential collisions in space. In addition, DOD supports the State Department's efforts to work with the European Union and others to develop an international code of conduct for space activities. A widely subscribed code can encourage responsible space behavior and single out those who act otherwise while reducing the risks of misunderstanding and misconduct.

The EU's draft is a promising basis for an international code of conduct, but it is just that. It is just a starting point. It focuses on reducing the risk of creating debris and increasing the transparency of space operations. It is not legally binding, and it does

recognize the inherent right to self-defense. Further, this draft addresses behavior rather than unverifiable capabilities. Ultimately, it serves our interests much better than legally binding agreements, and it will not ban space weapons or any of the other capabilities that we have proposed.

DOD is committed to ensuring that a code advances our national security as we continue to support the development and adoption of such measures moving forward.

And third, the strategy emphasizes the need for a strong space industrial base. We can help energize the industrial base by allowing U.S. industry to compete internationally in sales of satellites and technologies that are already widely available. Last year, DOD and the State Department provided an interim assessment of space export controls which concluded that commercial communication satellites and related components with a few exceptions can be moved from the U.S. munitions list to the Commerce control list without posing an unacceptable security risk. Such a transition has dual benefits. It provides much needed support to the U.S. space industry while also focusing controls and enforcement on those technologies that are most sensitive and that are critical to national security.

The forthcoming report, which we hope to have to Congress in just a few weeks, will recommend the movement of additional items to the Commerce control list. This approach, higher fences around fewer items, will require new legislation, and your support will be needed.

Implementation of the National Security Space Strategy is ongoing, and I am pleased that the DOD's new strategic guidance reinforces our approach. The Department needs your continued support to deploy necessary capabilities, increase their resilience, and protect the industrial base that underpins the critical domain and that is so important to our National security.

Thank you very much, and I look forward to your questions.

[The prepared statement of Ms. Creedon follows:]

Senator NELSON. Thank you.

General Shelton?

STATEMENT OF GEN. WILLIAM L. SHELTON, USAF, COMMANDER, AIR FORCE SPACE COMMAND

General SHELTON. Mr. Chairman, Senator Sessions, it is an honor to appear before you today as the Commander of Air Force Space Command.

It is also my privilege to appear with these other colleagues in the national security space enterprise.

The recently released Department of Defense Strategic Guidance puts a premium on space and cyberspace capabilities, and in accordance with that guidance, the men and women of Air Force Space Command maintain a singular focus, providing vital space and cyberspace assets to the warfighter and to our Nation. Our assured access to space and cyberspace is foundational to today's military operations and to our ability to project power whenever and wherever needed across the planet.

Accordingly, the fiscal year 2013 President's budget invests in programs which enhance the effectiveness of our space capabilities,

namely missile warning, positioning navigation and timing, satellite communications, space situational awareness, and space launch. Admittedly, there is an overall reduction in funding levels in the space budget, but that is primarily due to fact-of-life programmatic changes rather than deep cuts in our programs.

First, several of our key satellite programs will ramp down development activity as they transition to procurement, and this is a good news story.

Second, the Congress funded two wideband global satellites in fiscal year 2012, so there was no need to fund a satellite in 2013.

And third, the defense weather satellite system was canceled in the fiscal year 2012 Defense Appropriations Act, so there is no longer funding required for that program in this year's President's budget.

In addition to these fact-of-life changes, we made some difficult space program budget reductions as a result of the $487 billion reduction mandated by the Budget Control Act. This led to relatively minor cuts in some modernization programs and a full restructuring of our approach to Operationally Responsive Space and space testing. We continue to pursue acquisition efficiencies through our efficient space procurement actions for the Advanced Extremely High Frequency Program and the Space Based Infrared System.

Finally, we are committed to working closely with our partners in the National Reconnaissance Office and the National Aeronautics and Space Administration to lower the cost and bring stability to our launch programs.

I thank the committee for your steadfast support of my command and the Department of Defense's space programs, and I look forward to your questions. Thank you, Mr. Chairman.

[The prepared statement of General Shelton follows:]

Senator NELSON. General Formica?

STATEMENT OF LTG RICHARD P. FORMICA, USA, COMMANDER, U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND/ARMY FORCES STRATEGIC COMMAND

General FORMICA. Good afternoon, Mr. Chairman, Ranking Member Sessions. It is my privilege as the Commander of Army Space and Missile Defense Command to appear before your committee again this year, and I thank you for your continued support of our soldiers, civilians, and families.

My intent today is to briefly outline for you the necessity of space-based capabilities to our Army, our Nation's force of decisive action.

In the 2012 posture statement, the Army focuses on three areas: support to Afghanistan, responsible stewardship, and the leaner Army. Inherent to these focus areas and the building of the Army of 2020 is an increasing reliance on space. The Army is the biggest user of space- based capabilities which are critical to the conduct of unified land operations. If the Army wants to shoot, move, or communicate, it needs space.

This reliance becomes more critical in an era of tight fiscal resources, smaller Army force structure, and potentially reduced forward presence. The Army works closely with the Air Force as the

executive agent space construction and other agencies to define requirements and ensure future warfighters have access to the essential space capabilities General Shelton has laid out.

As a partner of the joint space enterprise, the Army is also a provider of space-based capabilities. Let me summarize our command's contributions to the joint force through our three core tasks.

Our first core task is to provide trained and ready space forces and capabilities to support today's operations. Our forces, comprised of active, Guard and Reserve soldiers and civilians, conduct global space operations to include access to wideband satellite communications, missile warning, space control, friendly force tracking, and geospatial intelligence analysis. We support Army operations with our space support teams. These forward- deployed men and women provide access to joint and national capabilities in order to meet our warfighters? needs. Since September 11, more than 70 teams have deployed support operations in Afghanistan and Iraq.

Our second core task is to build the future space forces and capabilities for the Army of tomorrow. The development of operational concepts, adjustments to doctrine, conduct of analyses and studies, and improvements to our space training enable the Army to build and improve our future space forces.

And our final core task is to provide the warfighter with space-related technologies that enable dominant advantages to the battlefield for the day after tomorrow. We focus our science and technology efforts on capabilities that will bring maximum advances in our combat effectiveness. The Joint Capability Technology Demonstration, or JCTD program, enables us to find, demonstrate, transition, and transfer the best space operational concepts, technology solutions, and products. we have proposed three space-related JCTDs, two of which aim to provide economical nanosatellite capabilities to the tactical ground component warfighter. The third JCTD will develop a low-cost launch system for nanosatellites. These have been approved by OSD and we look forward to favorable consideration by Congress.

In conclusion, as we become a leaner Army, space capabilities will be critical enablers to our ability to conduct unified land operations. Assured access to space and well-trained, experienced space professionals reduce the fog, friction, and uncertainty of warfare. As a command, we will remain disciplined stewards of our Nation's resources. This committee's continued support is essential in enabling us to maintain and further improve our space capabilities and provide the best trained space professionals to combatant commanders.

I appreciate again the opportunity to speak on the value of space to our Army, and I look forward to answering any questions you may have. Army strong.

[The prepared statement of General Formica follows:]

Senator NELSON. Thank you, General.

Mr. Winokur?

STATEMENT OF ROBERT S. WINOKUR, DIRECTOR OF OCEANOGRAPHY, SPACE, AND MARITIME DOMAIN AWARENESS, DEPARTMENT OF THE NAVY

Mr. WINOKUR. Thank you, Mr. Chairman, Senator Sessions. I appreciate the opportunity to be here in my role as Acting Oceanographer for the Navy and Director of Oceanography, Space, and Maritime Domain Awareness.

Our Navy requires access to a combination of joint interagency, commercial, and international satellite systems for information dominance and synchronized safe operations. These space-based assets provide critical communication paths, positioning, navigation, and timing signals, environmental data, and intelligence surveillance and reconnaissance assets. Space capabilities enable effective command and control, responsiveness, and agility necessary for a globally engaged, superior naval force consistent with emphasis on forward operations and joint interoperability.

The Navy depends on others within DOD to acquire sufficient wideband communication satellites to meet the variety of needs in these bands. However, as the executive agent for narrowband satellite communications, it is the Navy that supplies the necessary narrowband capabilities to meet joint force requirements.

The increasing demand for narrowband SATCOM access at ever-higher data rates requires moving beyond legacy UHF satellite capabilities. While the Mobile User Objective System, or MUOS, will carry a legacy UHF payload for near-term usage, most importantly, it will increase future user capacity by over 10 times through its wideband signal. MUOS will also connect users to the Defense Information Systems Network, resulting in worldwide tactical narrowband netted point to point and broadcast voice and data services in challenging environments.

The first of five MUOS satellites launched on February 24th is well on its way to meet its scheduled on-orbit capability in May. The second spacecraft is on track for a November 2012 delivery and has a tentative launch date of July 2013. Assembling and testing of the third spacecraft is nearly complete.

Additionally, the radio access facility in Hawaii and the Naval Satellite Operations Center in Point Magoo, California have received the necessary upgrades for initial operation of MUOS.

Navy optimized the UHF SATCOM constellation to ensure joint staff requirements are met in legacy UHF payload capacity, even in the event of an unplanned loss. Measures included enhancements in existing DOD systems, leases with commercial companies, and a memorandum of understanding with the Australian Ministry of Defense for use of channels on an Australian-hosted payload. Based on the improvements already employed, the recent successful launch of MUOS–1 and the statistical reliability analysis of the legacy UHF SATCOM constellation's lifespan, Navy does not foresee a need for additional legacy capacity.

The GPS is the Navy's primary source of precise positioning, navigation, and timing, or PNT, data for platforms, munitions, combat, and C4I systems. Last summer, Navy awarded a multiyear contract for its follow-on shipboard PNT distribution system. The new GPS PNT service will replace decades-old, legacy systems in-

corporating the latest security architecture, redundant clocks, and anti-jam antennas.

Space-based operations are an essential element to Navy's global atmospheric and ocean numerical models, relying on partnerships with the Air Force, civil, and international organizations to meet our space-based environmental sensing requirements. To this end, the Navy is engaged in defining requirements for the follow-on to the Defense Meteorological Satellite Program, DMSP.

By using a variety of space-based assets, we are providing greater maritime domain awareness, leading to more efficient defenses from threats to safety and commerce. Navy continues to engage the intelligence community as they explore future acquisitions and consider the capabilities of commercial vendors to meet Federal ISR needs.

In closing, I would like to reiterate that the Navy is heavily reliant upon space assets for success in the maritime domain. In the face of today's fiscal realities, this requires balancing investments and new acquisitions, training in the use of existing assets, and continued examination of alternatives to provide sound operations and acquisition options.

Mr. Chairman, we look forward to answering any questions you and the subcommittee may have. Thank you.

[The prepared joint statement of Mr. Winokur and Dr. Zangardi follows:]

Senator NELSON. Thank you.

Dr. Zangardi?

STATEMENT OF DR. JOHN A. ZANGARDI, DEPUTY ASSISTANT SECRETARY OF THE NAVY FOR COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, INTELLIGENCE, AND SPACE

Dr. ZANGARDI. Good afternoon. Mr. Chairman and Senator Sessions, thank you very much for this privilege to speak before you today. I will keep my opening comments very brief.

At last year's hearing, I was asked when the Navy believed the MUOS space vehicle number 1 would launch. I stated at that hearing that the Navy's projection was February of 2012. I am pleased to inform you that MUOS space vehicle number 1 was launched, Friday, February 24th, from Cape Canaveral, Florida. The satellite is currently in a geosynchronous orbit in its test slot over the Pacific.

Deployments of the solar arrays and mesh antenna are complete. Payload testing has commenced and is ongoing. Both the UHF legacy package, test signals, and KA band signals are being received by the ground station. The MUOS Government and contractor team continues to execute the plan and the satellite's health and performance are as expected.

After a 90-day on-orbit check, it will be handed over to Navy and be ready for legacy UHF SATCOM operations and the initial testing of the new wideband code division, multiple access capability, otherwise known as the MUOS waveform.

The second satellite is assembled undergoing spacecraft level testing. Currently it is in its TVAC chamber. The second satellite is on track for November 2012 delivery.

Space vehicle number 2 has been tentatively given a July 2013 launch slot. We expect that to firm up here soon.

The remaining three satellites are under a fixed-price incentive contract and are tracking both to cost and schedule at this time.

The Navy will continue to focus on the successful roll- out of MUOS constellation. We will also continue to monitor the health of the UFO constellation to ensure essential UHF satellite communication services are provided to the warfighter.

Sir, that ends my comments and I stand by to answer your questions. Thank you.

Senator NELSON. thank you.

Ms. Chaplain?

STATEMENT OF CRISTINA T. CHAPLAIN, DIRECTOR, ACQUISITION AND SOURCING MANAGEMENT, GOVERNMENT ACCOUNTABILITY OFFICE

Ms. CHAPLAIN. Chairman Nelson and Senator Sessions, thank you for asking us to share our views on the military space acquisition programs.

As I commented last year, the landscape for acquisitions in space has changed considerably over the past decade. If I were here 5 years ago, I would be talking about all the major programs having very large cost increases and schedule delays adding up to years. I would be talking about resistance to implementing best practices. I would also be talking about even a separate acquisition policy for space altogether. I would be talking about a lot of programs moving forward with a lot of technical and other kinds of unknowns, like requirements and cost. And I would be talking about lax oversight. And what we see today is that space programs do have some problems, but they are not to the same extent that we had a decade ago.

Some of the systems we have concerns about do include the GPS III program which had an 18 percent cost increase for the first two satellites. So that one is on our watch list. We have some concerns about newer programs such as the ground system that accompanies GPS III. And of course, we have some concerns about some of the user equipment programs that are lagging behind schedule like FAB–T.

On the other hand, we have seen some positive steps taken this year in programs like the JSPOC mission system where they saw an acquisition strategy that was not maybe as executable and oversight-friendly as it could be, and they took steps to revamp the strategy and make it more executable.

And in general, today I would say there are very different conditions that we saw 10 years ago. The best practices are being adopted. There is more of an emphasis on evolutionary development for systems. There is more of an emphasis on developing technologies before beginning programs. There is definitely more emphasis on instituting higher quality standards for programs and following them. And then there has also been a number of actions to strengthen and streamline leadership across the Department.

What we worry about today are some barriers to making all these things work together to the maximum extent possible, and

the barriers that we worry about are much like what you talked about in your opening statement.

First is the disconnects between ground equipment, particularly user equipment, and the satellites themselves. We are seeing too many programs that the user equipment is just arriving years later than the satellites. And you really have a situation where you are wasting expensive capability in space when that happens.

A second barrier is the rising cost of launch. There is no easy way to address this. In our report last year, what we stressed is the lack of good data on suppliers and costs. It just makes it more difficult to get your arms around the cost of launch and to reduce it.

A third barrier that we talk about in our statement is S&T planning. As you mentioned, two key programs have been proposed for termination, including the space test program and the ORS program. When you look at those being terminated and combined with some planning weaknesses that we reported earlier this year, it raises cause for concern about the way forward for S&T in space and how do we expect to make technological advancements in the future. We do not see enough coordination between DOD agencies and other agencies involved in space in terms of strategic planning for space science and technology.

And the last barrier kind of fits in the bucket of coordination and leadership. It is exactly what you were talking about in your opening statement about programs all over Government. There is a lot of opportunity to optimize investments and work together better. Instead, we still see a lot of stovepiping in terms of programs being started and not enough looking at things from a Government-wide perspective and a very strategic perspective to see how investments in things like launch acquisitions, for example, could be maximized.

And with that, I will conclude my statement. Our written statement is much more detailed. Thank you.

[The prepared statement of Ms. Chaplain follows:]

Senator NELSON. It will be recorded in the record.

Shall we begin with about 6-minute questions?

Senator SESSIONS. Fine.

Senator NELSON. Secretary Creedon, as we indicated—and in your testimony you made some reference to it as well—the administration is working to develop some multilateral understanding, starting with Europe, on how to conduct space operations, given the congestion in space, that we have to do something.

From the Department's view, are you satisfied that the current track does not hinder military operations in space?

Ms. CREEDON. Senator, the Department and the State Department in February announced that they were going to work together and seek a code of conduct. And the code of conduct is an opportunity, we think, to get all the space-faring nations together and look at how to address shared concerns, debris mitigation, RF interference, joint situational awareness, and work together in a way that benefits our National security interest.

We have just begun this journey. In fact, the very first meeting of experts will be in June, and from then on, we will go down this path and work on getting an agreement that really is in our best interest, sets norms for responsible behavior, and in some period of

time, hopefully, get a conduct that is in our National security interest.

This is not going to be a quick process. It is probably going to be at least a year, maybe 2. We think it is worth it in the long run to go down this road and try and obtain a voluntary agreement. It is not legally binding and it will not limit our ability to either develop systems or to defend ourselves.

Senator NELSON. Could you give us an idea, let us say, of just one aspect of the code of conduct that you would be working on?

Ms. CREEDON. One of the most important is probably debris mitigation. So one of the elements that we would expect to be in a final code of conduct would be setting norms for debris mitigation. So it would establish the requirement that as countries launch satellites, as they do any sort of experimentation, that they minimize the amount of debris created. And this was very important as we all discovered when the Chinese conducted their ASAT test and made a substantial amount of debris. So debris creation hurts everybody, and so this is probably one of the main focuses of this agreement.

Senator NELSON. So there would be some sort of protocol for disintegration of out-of-date, out-of-service units within space. Is that one of the things that would be included? Is that how you would say that?

Ms. CREEDON. That would be one of the norms that a country makes sure that a satellite that has died does not stay in orbit. One of it would be as you launch satellites, that you minimize the amount of debris that is created. Even a coordinated space situational awareness would help because then it would allow advanced opportunities to maneuver satellites so you did have collisions like the Iridium satellite that occurred several years ago collision with the Russian space satellite.

Senator NELSON. Moving on the spectrum issue, Madam Secretary, in February the Department almost lost a block of spectrum through a legislated auction to pay for a tax offset. Can you explain the importance of DOD spectrum in general and how any movement from it should be paid for and coordinated?

Ms. CREEDON. Yes, sir. Spectrum is essential to almost everything that DOD does, intelligence surveillance, reconnaissance, communications, command and control, navigation. It goes on and on and on. DOD needs spectrum to function. Making sure that spectrum is available is absolutely essential. So as we look at supporting the efforts to utilize spectrum more efficiently if the Department is going to move out of different areas of spectrum, it is going to take a while to understand exactly what other areas are available. Are these other areas technically compatible with requirements? What is the cost to move, and what is the timeframe to move? So in some instances, there might be some systems that would never be able to move. So in any sort of an auction, they would have to be allowed to stay.

Senator NELSON. In any event, we have got it under control where this is not going to happen again, as far as we know.

Ms. CREEDON. Well, we certainly hope not. The Department is also right now looking at a long-term strategy for spectrum allocation that should help in terms of both understanding the requirements and understanding where we can move.

Senator NELSON. In your statement, you stress the importance of resiliency and the ability to rapidly reconstitute critical satellite capacity if hostile action or a collision would occur. It sounds like you might want me to tee up a question here on why this is so important. Did DOD propose in the fiscal year 2013 budget to cancel the Operationally Responsive Space program? And if so, do you agree with that decision?

Ms. CREEDON. The Department did propose to cancel the office. On the other hand, the Department does recognize the successes of the office, both the ORS–1 SAT, the TacSat-3, and it is those successes that have enabled the Department to say now is the time to take the idea of operationally responsive space, normalize it across all programs, and then move the capability to the Air Force primarily, to have the Air Force then work with all the services to make sure that all space programs have this notion of resiliency and redundancy built into them.

Senator NELSON. Being able to bounce back from some sort of a lights-out situation is critically important. Do you think that we have got it adequately handled right now?

Ms. CREEDON. Not yet, but it is certainly something that is on the radar, if you will, and it is certainly something that the Department is working very hard to accomplish. I might, at some point, turn over the answer to General Shelton as the programmatic person to really address more of the specifics of how the satellites themselves are looking more at how to build in this concept of resiliency and redundancy into future space programs.

Senator NELSON. Even though my time has expired, General Shelton, anything you would like to add to that?

General SHELTON. Mr. Chairman, I would completely agree on spreading the operationally responsive space concepts across all of our programs. And in fact, a lot of the activities at Kirtland Air Force Base that occurred with a dedicated office will continue because there were organizations in place that supported the ORS office there. There are also offices at the Space and Missile Systems Center in Los Angeles that will continue to provide that kind of support. So I am confident that that concept will continue.

As far as resiliency across all of our programs, we just completed all this research and development work, and we are in the production phase of many of our foundational capabilities. However, we are looking at alternative architectures for the future, and I believe those alternative architectures will produce some of the resilience that we would like to have. The question is when can you afford to implement those, and that will be a hard decision we will face in the coming years.

Senator NELSON. Thank you.

Senator Sessions.

Senator SESSIONS. Thank you very much.

Well, General Shelton, with regard to operationally responsive space and the need, as Secretary Creedon mentioned, for resiliency, for the record is it not true that we do not plan to have—currently we do not plan to have any satellites in Reserve that could be immediately launched if one of our satellites is disabled for some reason?

General SHELTON. Senator, that is true. We do not build satellites as spares and store them on the ground. If we have capability that is in storage, it is because we have had good fortune in a satellite lasting longer or we did not have the launch ready at the time we had the satellite ready, by and large.

Senator SESSIONS. Well, I guess my question—I am not sure what we thought as operationally responsive space development. But one of the things that we understood was that we would be able to launch a capable, maybe not highly sophisticated, satellite that would meet our basic needs in pretty short order if one were disabled, recognizing that there are quite a number of countries, would you not agree, that have the capability to disable a U.S. satellite?

General SHELTON. Senator, there are quite a few.

Senator SESSIONS. And more will probably come along in the future. Was that originally part of the idea, to your knowledge?

General SHELTON. Well, it was part of the concept that we would develop rapid launch capability, rapid assembly of satellite capability. But the idea that we would have a stock, a storage of satellites and boosters waiting—that decision had not been made. So there was conceptual work to be done as part of ORS, but no decision on how to actually develop a concept of operations to take advantage of what might have been developed.

Senator SESSIONS. Well, I think it is a matter worthy of thinking about whether we need that capability. I do not know. You may could use every satellite that you have got, and you might as well put them in space would be one argument. But also, if there was a danger of a satellite that just failed for one reason or another in a critical area, we might need immediate response.

General Formica, the Space and Missile Defense Command is an important part of our defense system. first, thank you for your leadership, and second, how do you see your budget this year? The Air Force space budget is pretty substantially reduced. What about SMD?

General FORMICA. Mr. Senator, thank you. I appreciate it. It is an honor to serve at Space and Missile Defense Command.

Our budget in fiscal year 2013 right now is holding its own, about the same as we had in fiscal year 2012. We have got sufficient budget to be able to provide our operational capability, to do capability development, and to do the material development functions that we have. And if funded, we will benefit from the JCD program which will be funding not directly given to SMDCRSTRAT.

Senator SESSIONS. Well, the GAO representative mentioned terminated programs and sort of asked the question how do we advance without science and technology. Some of the S&T programs have been reduced. Maybe, General Shelton, General Formica, do you have any comment about that? Does that concern you?

General SHELTON. Senator, it does.

Senator SESSIONS. First, let me just say that I know that you support the budget request that you have been given. You have had a chance to review it. But I know that it was clear to both of you that there is a limited amount of money. And so I am asking you do you have concerns or are their worries to tell us honestly

what they might be with regard to science and technology because what the experts tell us—experts or the old hands or whatever you call them—when budgets get cut, S&T is one of he first casualties, and we do not want to go too far in that regard. So would you give us your best judgment about what kind of risk we may be taking there?

General SHELTON. Yes, sir. First, a couple of statistics. The S&T budget space-related for Air Force Research Lab is going to be $242 million in fiscal year 2013. The budget for DARPA for space-related S&T, roughly $160 million. In the Navy, roughly $27 million. In the Army, roughly $22 million. There is still substantial space-related S&T despite the cancelation of the space test program.

Senator SESSIONS. All right. How much would you say it has been reduced? You mentioned those numbers, but is that a reduction from current expenditures, any of those accounts?

General SHELTON. We had roughly $50 million in the space test program in fiscal year 2012. We have got $10 million in fiscal year 2013 remaining, largely to conduct the launch of STP–2 as one of our new entrants into the EELV program. So it is not totally decimated, but by the same token, to be honest with you, that $10 million is really only for that launch.

Senator SESSIONS. So you do not have more for other launches that might occur. But the space test you mentioned—is that included in your $240 million?

General SHELTON. It is all space-related S&T.

Now, how we develop the priorities for that is important. We meet every year with AFRL, my leadership, AFRL's leadership. We establish 174 technology needs across the entire enterprise. We do the same thing with DARPA, establish priorities that we want them to work on. So we get a voice in how that money is spent. It is not the same as having the space test program directly under me, but we certainly have a voice.

Senator SESSIONS. Would you say that we may be cutting it close here, or are you just perfectly happy with where we are?

General SHELTON. Senator, I wish we could spend more money on it. I truly do. But again, the Budget Control Act called for reductions. That is one of the places where we felt like we could take reductions.

Senator SESSIONS. Well, I understand the choices you make. Every defense agency, every congressional group that sits, and every President has a responsibility to the future, as well as to the immediate Defense Department. And if we do not spend our money now to perhaps develop the systems that are serving us so well now for the future, then we fail too. So I hope that you will be candid with us if you see threats in that area of our budget.

I guess I could ask the Navy and the Army too. Maybe GAO. Ms. Chaplain, do you have any comment on that? You expressed some concern about it.

Ms. CHAPLAIN. Yes. I have a couple comments. I do acknowledge that there is still funding going to some of these labs, and it is a good amount of funding. But what we have not seen is very robust strategic planning about what are our goals for technology advances and how are we going to achieve them and how are we

going to optimize these investments because they will probably have more budget pressure over time.

The thing with the space test program I would like to emphasize is that it provided an avenue for different kinds of players to test technologies, universities, small businesses, sort of those who do not really get to be able to participate in some of these bigger programs all the time. And so you might be losing that opportunity.

And then the third thing is that the Department would like to go on sort of a multiyear approach to some of its bigger programs like AEHF and SBIRS–High. And there is an assertion there that whatever savings are gained from that will be reinvested in S&T, but we have not really seen a robust plan there for the path forward. Where do we go after programs like AEHF and SBIRS? We have not seen that path yet and how are we going to get there because you have to start now especially given the budget situation.

Senator SESSIONS. Well, I think that is a good challenge. I think we do need a good plan.

Thank you, Mr. Chairman. My time is up.

Senator NELSON. Thank you, Senator Sessions.

Secretary Creedon, does the Department have in place a policy for coordination of space activities within the interagency structure?

Ms. CREEDON. Yes, sir. There is a White House-led process called—it is an interagency process. And all of the entities that have any interest in space participate in this process. It gets together to meet periodically depending on when there are issues. For instance, one of the meetings was in January and February about dealing with the space code of conduct, and that is where the interagency got together and said, yes, this is something that is important and we are going to go work on. So it is there. It exists and it is pretty good.

Senator NELSON. Is it? So it is at least somewhat successful in breaking down the stovepipe approach to get cross-fertilization and cross-cooperation within the interagency system?

Ms. CREEDON. It is and it is also a good forum if there are issues that need specific resolution or specific input or guidance. It serves that function as well.

Senator NELSON. Does it function pretty much automatically or does it have to be enforced?

Ms. CREEDON. Well, because it is run by the White House, enforcement generally is not an issue. You know, when the White House calls a meeting, everybody shows up.

Senator NELSON. So there is some force behind it then when that occurs that way.

General Shelton, I understand that you effectively canceled the space test program and the Operationally Responsive Space program due to lack of funding. I think we both feel that there ought to be some sort of backup system in place, and I wonder if the information we have is accurate.

General SHELTON. That is part of the fiscal year 2013 President's budget, Senator. It was after 5 years of ORS, we felt like we had taken away quite a few lessons learned, and it was time to mainstream those concepts throughout all of our programs but yet continue things like hosted payload opportunities, further resiliency

concepts, those kinds of things. So we will centralize the intellectual capital, if you will, in the Space and Missile Systems Center long-range planning staff. We will continue to have the kind of support we have at Kirtland today out of the Space and Missile Systems Center. So we will continue the conceptual work. It does not end.

Senator NELSON. You are making do with what you have, but if you had your druthers and if you had the additional funding, would you prefer to have kept the programs going?

General SHELTON. Senator, that is a tough question. We wish we had fiscal year 2012 level funding across the board to tell you the truth.

Senator NELSON. I suspect that there are opportunities to give up those things that you would like and those things that you would want, but it is a tough choice when it is something you need.

General SHELTON. It does make for very difficult decisions. We did protect the foundational space capability, missile warning, GPS, satellite communications, all those things that are foundational for our brothers and sisters in all services that we highly depend on not only for warfighting capability, but for national capability as well. All of that was protected. Hard choices had to be made.

Senator NELSON. In terms of just missile warning, what is your biggest concern in strategic missile warning right now, General?

General SHELTON. Senator, in strategic missile warning, we are not in the place where we would like to be and being able to take full advantage of our latest satellite, SBIRS GEO–1. It has two sensors. It has a scanning sensor and a staring sensor. The scanning sensor we can take advantage of today. The staring sensor, which provides a wonderful capability and our testing has been fantastic. In fact we are seeing probably a 25 percent or more sensitivity, better sensitivity than we had expected out of that satellite. What that allows you to do, of course, is much dimmer targets, lower classes of missiles, lots of things that infrared capability will give you. We are not able to take full advantage of that in real time.

Now, we are taking advantage of that in the intelligence agencies by shipping the data out to them, but that is a reactive kind of thing instead of being able to see it in real time.

Senator NELSON. General Formica, I understand that SMDC completed a successful test of the Advanced Hypersonic Weapon which is one of the several designs under development as part of STRATCOM's conventional prompt global strike requirement. Obviously, congratulations are in order.

Can you explain this successful test and how it was coordinated with other Army functions at Redstone and perhaps elsewhere?

General FORMICA. Mr. Chairman, thank you. Of course, we are very proud of the success of the AHW test, and I am very proud of the civilians and the military personnel that worked hard to bring that test to successful completion.

The technology for the AHW test really began with the work at Sandia Laboratory and then was matured at Redstone Arsenal in technology development with AMRDEC, the Aviation and Missile Research, Development, and Engineering Center and

SMDCRSTRAT engineers. And that brought for successful technology. And as you know, the AMRDEC's contribution was really the development of the thermal protection system which was fundamental to the success of the technology.

The test itself took the efforts of the Navy as AHW was launched from the PMRF in Hawaii. It landed at the Army's Reagan Test Site, Kwajalein Atoll, having traveled 2,100 nautical miles, and took advantage of Army, Navy, and MDA test assets. So it required the collaboration both in technology development and in test operations of several organizations, many of them Redstone-based. It took the leadership of the Office of the Secretary of Defense and prompt global strike, and it would require the same kind of cooperation and collaboration as we move forward.

Senator NELSON. Well, it is nice when you get this kind of cooperation to get the result that you have had. Share the congratulations with the other participants as well. Thank you.

General FORMICA. Thank you, Mr. Chairman.

Senator NELSON. Senator Sessions?

Senator SESSIONS. Thank you.

Ms. Creedon, in your statement you talk about the code of conduct with the Europeans over space as just the beginning, which is a bit troubling to me because it does have treaty-type implications. And I would like to be confident that the United States Government, Department of Defense is not making commitments with regard to what we plan to do that will bind us and maybe make it impossible for us to effectively maintain our space and missile defense capability that we need because we need to be able to dominate space really.

So can you give me some reassurance on that? And what is the nature of the beginnings and where do you see it going?

Ms. CREEDON. Well, Senator, we are just beginning the discussions that we hope will lead to a voluntary code of conduct.

Senator SESSIONS. Is this mainly driven by the debris question?

Ms. CREEDON. Debris is a major aspect of this. We are also looking at making sure that there is not radio frequency interference with satellites. There are a number of responsible behaviors that we hope this code will identify and then set what would be the norms for which responsible space-faring nations would conform their conduct.

Senator SESSIONS. One of the things that seems to concern itself with is an arms race. As one wise observer at one of our hearings said when asked, well, are we going to have war in space, he said, well, we have had war on the land. We have had war on the water. We have had war in the air, and I suspect we will have war in space one day. I think it is hard to write a piece of paper that says we are not going to defend our assets or utilize capabilities we have to save lives and defend America's sovereignty and security.

So I guess there is some emphasis, I understand, in the talks about preventing an arms race in space. Is that involved in this, and if so, we need to be very careful about it.

Ms. CREEDON. Sir, one of the fundamental tenets of this discussion of the code of conduct would be the inherent right of self-defense Reserved to every country that would be a voluntary participant in this code. So that is also one of our major goals. If we are

not successful as we go through the discussions over the course of the next year or so in negotiating a code of conduct that is in our National security interest, then frankly we would not sign it. It is not about limiting capabilities. It is about responsible behavior. So it is not a treaty. It is not an arms control treaty. It is not any sort of a legally binding undertaking. It would be a voluntary code of conduct trying to get other space-faring nations to, in many respects, adapt the behavior that frankly we have in terms of being a responsible space-faring nation.

Senator SESSIONS. Well, I would hope we would all be responsible utilizers of space, and I think pressure should be put on nations to behave in responsible ways. So I certainly do not think there is anything wrong with that, but I am not sure you always gain a lot by formalizing written agreements that can be turned around and be used against the United States since we are the premier space utilizer.

A Defense Department Joint Staff analysis provided to the House Armed Services Committee states that if the United States, quote, were to make a good faith effort at implementing the requirements of the draft code, close quote, it could likely have an adverse impact on military operations. Have you recognized that statement, and is what you are doing designed to make sure that we do not adversely impact our operations?

Ms. CREEDON. Yes, sir. One of the decisions that we made when we decided to go for the code of conduct was informed by the analysis that was tasked by the Office of the Secretary of Defense about a year ago to the Joint Staff and to the Strategic Command to look at this underlying document that the European Union had put together and to provide guidance to us as to what needed to be modified, changed, eliminated, added so that it would, in time, be a document that would be in our National security interest. So we have used the work of the Joint Staff to begin these negotiations which will kick off at a fairly low level, but will kick off for the first time in June.

Senator SESSIONS. Well, I have doubts about whether it is that wise or not. So you are contemplating that we would actually sign a document.

Ms. CREEDON. Well, that would be the goal.

Senator SESSIONS. ?We? who? Would it be the Department of Defense, the State Department, or the President, or who?

Ms. CREEDON. It would be the United States, and the goal would be to sign an agreement at some point if it is in our National security interest to do so. If it is not, we will not.

Senator SESSIONS. Would you consult Congress before you were to sign such an agreement?

Ms. CREEDON. Of course. Between meetings and some briefings and discussions, already I think we have had on the order of about six or seven discussions with various committees now, and we would absolutely keep the Congress informed—all the committees—as to where we are in the progress and if we are making progress or if we are not.

Senator SESSIONS. Well, you know, Europeans ceded their sovereignty to Brussels. They do not worry about those things too much. But most Americans do and they want to maintain our le-

gitimate range of actions, and we have burdens around the world that the Europeans do not feel and do not carry and we need capabilities that are not so important to them that could be for us. And I would just urge you to be very cautious before you sign agreements that could in any way complicate our ability in the future to take reasonable actions for our National interest or to support our allies in that fashion. So it will be something, I think, Congress will be interested in and watching.

Thank you, Mr. Chairman.

Senator NELSON. Thank you, Senator.

General Shelton, I think we are all so painfully aware of the lack of competition in space launch and the recent critical GAO report on the use of a single vendor. I understand now that the Air Force has issued a, quote/unquote, new entrant criteria based on Air Force mission assurance standards. Can you describe what efforts you are currently undertaking to bring new launch entrants to the Air Force, what payloads you are providing for launch to the new entrants, and what would be the timeframe for something to materialize to create this kind of a potential competition?

General SHELTON. Senator, we have done two things. We came up with a new entrant strategy and a new entrant guide, certification guide, both in October of last year, and that is a fundamental part of our reacquisition of EELV capability that is in the very near future here. Those new entrants—their maturity really is going to drive the rapidity that we can bring them on board.

We have Reserved two missions that we will not compete with the EELV contractor, Discover-2 and STP–2. Those two missions will be set aside. They will be competed. Any new entrant will be able to compete, and if they show that they have the maturity, they have the technical capability to launch those missions, we will go on contract with them. That will be a step along the path toward certification for any new entrant.

But again, for a national security payload, something that is a national treasure, we will be very cautious as we bring them on board and we launch a national security payload on top of a new entrant.

Senator NELSON. This is essentially the same question I asked Madelyn to General Shelton. Can you explain the importance of Air Force spectrum in general and how any movement from it should be paid for and coordinated so that there are not unfortunate implications to your budget?

General SHELTON. Secretary Creedon said it very well, that we are heavily dependent on the RF spectrum for almost every operation. In the case of the part of the spectrum that is being talked about now in terms of repurposing, we have satellite operations in that part of the spectrum and are very concerned that vacating that part of the spectrum would be both long-term and expensive, anywhere from somewhere around the neighborhood of $240 million all the way up to $2 billion depending on which option you chose. So we are watching this very closely and are very concerned.

And there are three things that we are concerned about that would have to come together simultaneously to make this work. First is finding alternative comparable spectrum. Second is having enough time to plan for vacating that part of the spectrum. And

third, having the resources, either through the auction or appropriations. I could not pay for it today. If somebody came to me with a $2 billion bill to vacate part of the spectrum, I could not pay it.

Senator NELSON. I understand.

And, General Formica, the same question of you.

General FORMICA. Yes, Mr. Chairman. As Secretary Creedon and General Shelton have said, the spectrum is obviously a requirement for Army operations. The area of the spectrum that we are talking about principally would affect radar and satellite communications for the Army, and it is our interest in this that we would continue to have the spectrum capabilities that would enable us to do military operations without an increased cost to the Army.

Senator NELSON. So all of you agree it is not a very good pay-for for some other program that is not otherwise paid for.

General SHELTON. Certainly the promise of the auction would produce quite a bit of money if the projections are right, but it is how that money then gets rolled back into repurposing.

Senator NELSON. General Formica, unlike the ORS cancelation, I understand you continue to invest in small tactical satellites that can be rapidly fielded. Do you see a future in small rapidly responsive satellites for our Army's soldiers, and if so, what is your vision for such a program?

General FORMICA. Mr. Chairman, we are absolutely trying to move forward with technology demonstration for nanosatellites. We have demonstrated nanosatellite capability for digital communications relay in what we call SMDC–1, which had its initial test flight last year. And we are developing nanosatellite capability for imagery in what we call Kestrel Eye. Those two programs, which would be an augmentation to the National and joint space capabilities that are already provided to our soldiers, would be envisioned to provide rapidly responsive satellite capability at the tactical level. And that is why this joint technology demonstration program is so important to us.

We are encouraged that they have received support at OSD, and again, we look forward to favorable consideration by the Congress in funding those.

Senator NELSON. And I understand that you operate the wideband global satellite. Are you experiencing problems with bandwidth based on the use of more unmanned systems, and as that continues, will that make matters even more challenging?

General FORMICA. Mr. Chairman, we do operate five wideband satellite operation centers around the globe. And by the way, I am very proud of the soldiers that operate those centers 24 hours a day, 7 days a week to bring capabilities to our warfighters.

Managing bandwidth is always a challenge in the wideband satellite operation centers.

With respect to unmanned systems, we do not currently manage the bandwidth that allows the unmanned systems to transmit down to the ground station, but we do manage the bandwidth for the dissemination of that data, processed data, once it leaves the ground station and go out to Army users.

Future capabilities in the wideband satellite system, WGS, will in fact enable us to manage bandwidth for the direct downlink to the ground station.

Senator NELSON. Thank you.

Senator Sessions.

Senator SESSIONS. General Shelton, an unclassified excerpt from the executive summary of a Joint Staff operations assessment dealing with the draft EU code says, quote, if the United States were to make a good faith effort at implementing the requirements of the draft code, there could be operations impact on U.S. military space operations in several areas.

Has that been communicated in detail to the negotiators who are working on this?

General SHELTON. Absolutely, Senator. We are in lock step with Secretary Creedon's office, with U.S. Strategic Command and others in making our views heard as well.

Senator SESSIONS. Now, could you explain why there would be operational impacts on the military and intelligence community and under what authority DOD and the intelligence community would express those restrictions?

General SHELTON. I do not know that I quite follow the question, Senator.

Senator SESSIONS. Can you tell us in this session some of the operational impacts that might occur based on some of the drafts that have been floated out there?

General SHELTON. Just as an example, if somebody were to prescribe distances from satellites, that might be something that would be tough to live with. If someone were to say absolutely zero debris, that might be something that would be tough to live with. So those kinds of restrictions we would want to watch very closely. We are all about minimizing debris. I mean, it does not take a very big object in space moving at orbital velocities to destroy a fragile satellite. But we want to preserve our freedom of action in space through any kind of code of conduct, and I know that is exactly where the Office of the Secretary of Defense is on this as well.

Senator SESSIONS. Have we ever had a situation in which a satellite has been damaged by debris?

General SHELTON. We have.

Senator SESSIONS. How many times?

General SHELTON. We know of a couple of times. It is very difficult to do the forensics. It might be a small enough piece of debris that it was not even in our satellite catalog. So you have to kind of go backwards and try to figure out is that exactly what happened.

I mean, a very famous case is a paint chip that got embedded in the windshield of the Space Shuttle. So it can be a very hazardous environment.

Senator SESSIONS. I remember this from high school I think, this science fiction novel, and everybody on the earth had been killed and these people had plotted and they had this rocket that they were going to fly to Mars or somewhere. Everybody that made it on the rocket was going to survive. And they took off and ran into a Sputnik and all were killed. [Laughter.]

So that is typical science fiction.

But I guess it is possible that we can have those kind of events, but it is a big space up there, I mean, a lot of space in space. We cannot alter everything we do based on that.

And we do a pretty good job of tracking that so you can avoid those areas. Is that not correct, General Shelton?

General SHELTON. To the best of our ability. We can get down now to about an object the size of 10 centimeters or so. We are going to get better. We will get down to about a baseball-sized object with some capability we have got planned.

Senator SESSIONS. All right, good.

Well, thank you all for your work. We know, as the chairman and I both have learned, just how critical your work is to the men and women who are at risk on the ground in Iraq and Afghanistan, on ships and airplanes. They need these capabilities. We are reaching a point where a determined hostile power could neutralize a considerable portion of it, I would think. In the scheme of all the expenditures we make, we do not need to be in a position where we are not able to respond to that and maintain that advantage. So I hope that our research, science, technology, testing, and your thinking about the future will not put us in a position where we have overlooked some danger to our capabilities and comprises our security.

So thank you for what you do.

I would have to say, for the most part, what has been achieved by space science, on missile defense exceeds what most people thought was possible 25 years ago. It is just unbelievable the capabilities that we have now achieved. And as that science improves, there are probably ways to neutralize those capabilities by hostile powers.

So thank you for what you do.

Thank you, Mr. Chairman, for your leadership.

Senator NELSON. Well, thank you, Senator.

Madam Secretary, is it fair to say that the agreement that we are looking for is one of developing stewardship over space, recognizing that there are those who still discard paper or trash or something without regard to the implications for the environment, let alone for aesthetics? But we are not dealing with aesthetics here. We are dealing with the reality of people just not necessarily caring or not being encouraged to care for space the same way we want to encourage it and take care of our environment on earth. Is that a fair way of saying it? And it is dangerous as well.

Ms. CREEDON. Yes, sir. That is a large part of it. There are other aspects that we hope could be achieved in the code as well, things that would say improve the ability to understand other activities and other actions. So if someone was going to move a satellite, there would be an understanding of why that satellite was moved. So part of this is to reduce the risks of not only mishaps but mistrust and misconduct, misperceptions. So just improve the overall understanding in situational space as well.

Senator NELSON. There are some that are better actors than others. Is that fair to say?

Ms. CREEDON. That would be a true statement.

Senator NELSON. Mr. Winokur, the Navy is proposing to develop a radar altimeter with NOAA to place on a European Space Agency satellite as a means to save on the cost of developing a standalone satellite. What are your plans with the fiscal year to develop this

system, and what will happen if it is not developed in time for the satellite launch? Will it be a day late and maybe a dollar short?

Mr. WINOKUR. Thank you, Mr. Chairman. Yes, we definitely will be a day late and a dollar short.

The Navy had plans to launch its own radar altimeter satellite which measures sea surface height which, in turn, supports our tactical anti-submarine warfare operations. Unfortunately, due to fiscal pressures, we terminated or deferred those plans for what we call GFO–2.

Our mitigation strategy was to work with our civilian colleagues at NOAA and, in turn, their colleagues and, in fact, U.S. allies and some of the European space agencies to see if we can partner and leverage what is called Jason-3. So the Navy plan is actually to use, frankly, residual dollars in a one-time only funding transfer to NOAA to help keep Jason-3 on schedule. We are very concerned about the potential for an altimeter gap, and without the Navy funding, it is likely that Jason-3 will slip a minimum of a year. It has already slipped, frankly.

So our goal is to work for a calendar year 2014 launch. And working with NOAA, we have had serious conversations with them if maybe funds become available, and that would give the Navy a voice at the table and a say, actually an assured access to the data. So we think this is a reasonable mitigation plan for the Navy to get what we need at a minimum cost.

Senator NELSON. Mr. Zangardi, I am going to ask you the same question that was asked of Secretary Creedon. Can you explain the importance of preserving your operating spectrum in general and how any movement from it should be paid for and coordinated from your perspective, the Navy's?

Dr. ZANGARDI. Yes, sir. Secretary Creedon answered the question quite well, and I would echo her comments and General Shelton's and General Formica's comments.

Both the Navy and the Marine Corps use spectrum for land, air, and space operations with communications systems, sensors, radars, navigation, and guidance systems. So spectrum access is critically important to the Navy and Marine Corps warfighter. So further erosion will reduce operational capabilities and endanger possibly military personnel. We see, as we move forward into the future, a greater reliance upon spectrum.

Coming from the acquisition side of the Department of the Navy, I tend to look at it in terms of cost, schedule, and performance. So in terms of schedule, we need time to assess any impact of a spectrum move. In terms of cost, well, we have to understand the cost. What will it cost to move it? And there is a performance piece here. So if you move the system, what is the impact to the performance of that particular system?

Senator NELSON. Well, I think everybody can see what we are clearly doing. We are setting the record so that we do not have to go through this unexpectedly at some time in the future without having the backup testimony available to explain why somebody cannot just pull the spectrum away and think it is okay.

On commercially hosted payloads, Mr. Winokur, your testimony describes the work that you are undertaking with the commercial sector for intelligence, surveillance, and reconnaissance. Are you

able to describe your activities in these areas? For example, are you utilizing hosted payloads on a commercial satellite?

Mr. WINOKUR. No. At this point, the Navy is not planning on using a specific hosted payload for ISR purposes. What we are doing is leveraging the funding that is available through the National Geospatial Agency for access to some of the commercial data that is provided through synthetic aperture radar providers and some of the electro-optical systems. So our goal actually is to leverage available commercial systems and develop unique Navy-specific applications from the available data and leveraging NGA resources to the maximum extent possible.

Senator NELSON. Dr. Zangardi, congratulations is coming your way as well on launching MUOS last month, and I am happy the system is finally being fielded. I understand the next one will be in 2013 to make the system operational at that time.

My question to you is when will we have ground terminals deployed that can use the advanced signal of the system. The GAO indicates that it could be as late as 2014. Do you agree with that? Do you have another point of view?

Dr. ZANGARDI. Yes, sir. I have been around both the JTRS program which is developing the radio or terminal that will port this waveform and around the MUOS program for many years.

Over the past year, I think we have made a significant amount of progress in synchronizing the MUOS SATCOM program with the waveform development. So the waveform development portion of it is inherent in the JTRS JPEO program and the SATCOM program is inherent within the MUOS program. The JTRS manpack terminal integration by establishing one lead MUOS program manager will work among the Navy, Army, and JTRS JPEO to coordinate the actions necessary to get the satellite on orbit, develop the waveform, and then port the waveform into the radio. So we project that the MUOS waveform will be certified for porting into the HMS manpack radio by September of 2012, so in a few months.

JTRS manpack terminal appliques will start rolling off the production line in late 2013. That being said, we expect to have our over-the-air certification test or multi- service operational test and evaluation conducted in early calendar 2014 from MUOS, and that will require 50 Navy JTRS manpack radios.

The MOT&E requires two MUOS satellites plus the ground stations. So we are dependent upon launching the next MUOS satellite in July of 2013 for it to be operational by our MOT&E. Following a successful MOT&E, we will continue delivery of the manpack terminals across all the services, and we anticipate using more of the advanced signal of MUOS as we move to 2014.

Also inherent within the MUOS satellite is a legacy UHF package, similar to the UFO satellites that are currently flying. That package provides a graceful transition period between the existing USSATCOM capability and our future MUOS capability.

Senator NELSON. Thank you.

Senator Sessions.

Senator SESSIONS. Thank you, Mr. Chairman.

The chairman will be back in just a minute, and I have another meeting that I have got to attend.

So I want to thank all of you for your presentation. This is something I take very seriously. I hope that you will cooperate with our staff. We want to be sure that we are frugal and we do not waste a dime because we do not have a dime to waste. This is really so, really so.

And there will be demands for expenditure cuts time and time again, and all of you want to be good DOD members. But I would just urge you to stand your ground when something is really important, and if we ask about it here, you will have to tell us even if it requires you to be somewhat at odds with somebody's superior because that is the deal. Right? You come here. You have to tell us your best judgment. We are asking your best judgment.

But it is not going to be a pretty sight because we are, indeed, borrowing about 40 cents of every dollar we spend. The trends do not get better. They actually get worse, and the budget that the House has put forward would eliminate the sequester on the Defense Department, the one they announced yesterday, and maybe even reduce some of the cuts you were looking at already. But regardless, they would not go forward with the next sequester, and they would yet have the same savings, but they find them across the whole budget and not targeting the Defense Department as the sequester now does.

I could ask you what the impact of the sequester would be, but I know, General Shelton, you told me what I am hearing from everyone, including Secretary Panetta, and that is that you think you can sustain the cuts that have been required, $480-something billion, but another $500 billion would be devastating to many of the programs that we now depend on.

So that is our challenge. Keep looking for ways to maintain our capabilities at less cost. I know you will do that, and if something is critically important and does not need to be eliminated, you will have to tell us and maybe we in the Congress can say, well, some other program ought to pay a little bit more price and maybe we can save this critical program. So that is what I would like to share with you.

The chairman will be back in a few moments, and thank you for standing by. [Pause.]

Senator NELSON. Dr. Zangardi, the Director of Operational Test and Evaluation reported that in 2011, the Navy recently experienced a mean time between failures of 892 hours instead of the required 1,400 hours of the NMT system. What actions are you taking to remedy this situation, and when do you expect to have the full rate of production at the terminals? I think you can sense that we are concerned about making certain that there is a connection with the terminals for full utilization.

Dr. ZANGARDI. Yes, sir. We pay very close attention to NMT.

So first off, the demand signal from the fleet for the Navy multiman terminal is high. They want it now. The current antennas, the Whiskey-6, for example, requires significant maintenance. We recently conducted a gate review or it was just a general in-depth review of the program in January, and as part of that, we—myself and the program manager—came over and briefed each of the four defense committee staffs on the program and it was exactly on this point here.

So the Director of Operational Test and Evaluation found that NMT is operationally effective, but that it is not operationally suitable. The systems reliability tested below threshold, and the key reasons included operational availability for shore and long lead times for system maintenance. So the maintenance drivers were basically failure diagnosis timelines and logistics delays of spare parts.

So let me give you a brief example. We also believe we have solutions in place for these.

On one of the shore facilities, the power supply for a fan failed during the test. The system continued to work. However, it was logged as a failure of the system because there was a part failure. So that counted against it. The system operated. Communications continued, but it was a failure. Most of the failures that occurred during this operational test and evaluation were like this.

So we believe we have corrected the issues, and for all the systems that are being procured in the future and all of those that are coming off the assembly line, the contractor will be putting in place the fixes at no cost to the Department.

So the lessons learned for failure diagnosis are being incorporated into the on-board diagnostic tools and technical documentation, as well as updating all the training curriculum. Naval Supply is working to optimize sparing levels, and we expect to see continued improvements in this area, in other words, get the parts out there in time. So part of the new program is really what happens when you have outed so you can anticipate and optimize the sparing levels.

So we believe that NMT is currently on track to conduct a follow-on operational test and evaluation event in June of this year. We anticipate that the full rate production decision will be in the fall of this year. Currently the program is in a low-rate initial production.

Senator NELSON. I understand that TacSat-4 is proving to be a success meeting warfighter requirements for a small, rapidly fieldable satellite that can communicate in urban and mountain terrain. I understand that the Operational Responsive Space Office helped launch this satellite.

Do you think these satellites are proving their utility for the investment that has been made so far?

Dr. ZANGARDI. Yes, sir. I would like to hold off on providing you assessment on that until the joint military utility assessment is completed later this year, and we can provide you formal feedback from the Department as to whether it is or it is not operationally effective or useful.

Senator NELSON. Okay. Thank you.

Ms. Chaplain, we seem to be finally putting satellites in orbit, but it seems that talking to them on the ground is now a challenge. And so my understanding is that we are delayed in the ground terminals, as we have just heard a little bit here, terminals for GPS III, MUOS, SBIRS, and AEHF. The problem is so bad with AEHF that the contract for its ground terminal, called the Family of Beyond Line of Sight terminals, or FAB–T, is being restructured, leaving the B–52 and B–2, our nuclear bombers, with only a very

low frequency capacity. I understand that we may have a Nunn-McCurdy breach on the FAB–T program.

If you would, please provide us with your overall recommendation for remedying this DOD-wide problem, and can you give the committee legislative drafting assistance to avoid it from happening in the future?

Ms. CHAPLAIN. Yes. Of course, we love providing assistance where you guys need it on writing legislation.

We have done work in this area, even on this problem in particular, and we had a number of recommendations. And DOD has been taking actions, but I think a couple things are still outstanding.

One is making sure that the ground programs and the user programs do adopt best practices and, most importantly, understand the complexity of what they are trying to achieve when they set out to do it. I think with JTRS and FAB–T that understanding was not quite there.

The second thing is having good insight into the synchronizing between user ground systems and satellites throughout the life of a program, and that would include activities within DOD but also insight on your part. And I know DOD has started some of the activities on their part, but the more they can conduct enterprise-level reviews on this issue, the better.

On your part, if the Congress could require some reporting that kind of illustrates the status of these programs, the ones that are linked together, on a regular basis, you would have insight, and then when you see the disconnects coming down the road, you can do something about it. Too often it just appears as a surprise when it is already too late. We have launched a satellite and everyone is happy, and then everybody realizes, oh, it is not going to be fully utilized for a couple years. So having that kind of insight is very important really early on.

Senator NELSON. Thank you.

And I am going to ask you the same question about preserving the operating spectrum in general and how any movement should be paid for and coordinated from your vantage point from the GAO.

Ms. CHAPLAIN. Okay. I think it is hard to even understand the cost without knowing where you would move to. That is the first question that has to be answered.

Another thing I think that has not been discussed today is really how difficult it would be to get satellites to move to a new spectrum. All the satellites that are out there cannot just get a simple fix to move to spectrum, and you just cannot simply replace them all. That would just be a tremendous, tremendous cost. And even with ongoing programs like GPS III, to go into that program now and change the requirement for spectrum would create a lot of disruption and a lot of cost increases and schedule delays, and that is not a program where we want to see more of that.

Also, when we talk about the word ?resilience? in terms of space policy, I look at it as very applicable in this situation because the particular spectrum that they rely on for satellite control networks is one of the optimum pieces of spectrum for maintaining resiliency. When satellites have trouble and they are kind of spinning out of orbit, the wideness of the spectrum allows DOD to kind of

correct satellites that are having issues. So it is important to remember that these certain types of spectrum that are being used for satellite control is there for a reason.

Senator NELSON. Thank you.

And I think lurking in the background of this whole hearing is how the DOD can be innovative in the design, cost, and launch of satellites. The Operationally Responsive Space program was supposed to be the competition in DOD like DARPA to do that. In your opinion, was the business case or model for ORS working? And if Congress could fund it, would you concur that it should be funded?

Ms. CHAPLAIN. Yes. We try not to be advocates for programs, but we certainly have always endorsed the goals of the ORS program. And I think some of them have not really been brought out today. In addition to developing smaller and more responsive satellites, there were other goals in that program: to lower the cost of launch, to standardize design methods, and to standardize satellite buses. So while maybe you would not have a whole barn full of satellites ready to, you might have a barn full of pieces that you could put together in rapid order.

In moving forward, if the program is canceled, I just do not see yet the way forward for how lessons learned are going to be incorporated elsewhere in the Department. There had been resistance to that program and what it was doing, and we did not see the big programs kind of making progress to adopting these kind of philosophies. So I would like to just see a formal plan for how ORS is going to be evolving in other places in the Department if it is going to be canceled.

Senator NELSON. Thank you.

And just a general overall question. What do you see today as the largest single acquisition challenge to space systems?

Ms. CHAPLAIN. I think it is something we have been talking a lot about today, and that is affordability. It creates a lot of good challenges because it makes you find ways to do things more efficiently. It incentivizes you to adopt things like best practices, but at the same time, it has raised a lot of questions about where are we going next and how are we going to pay for it. And when you look across the portfolio of defense space systems, there really are not many that you would say should be cut. They all provide very, very important capabilities.

And so when you make these kind of decisions, they really do need to be made with a Government-wide perspective and with the idea that agencies are going to coordinate more to optimize the investments they do have. And we do not see enough of that kind of strategic thinking across Government and that coordination that is really focused on optimizing investments. There is coordination. It happens here and there, but we just do not see it in a concerted way when it relates to the issue of affordability.

Senator NELSON. Thank you.

We have asked a number of questions and gotten a number of answers, but are there questions that have not been asked that you would have answers to that if you had been asked, you would offer as answers? In other words, what have we not touched on today that perhaps we should or something that we should know that we have not explored? Anything in particular? Or do you think we

have done just enough? If there is something else that you would like to offer, we certainly want to give you the opportunity.

General SHELTON. Senator, we have kind of touched on this, and I said this privately to you earlier. But there is undoubtedly a foundational level of space capability that regardless of force structure size in the Department, regardless of almost anything else that is made from—any other decisions made from a budget perspective, that space capability has to continue. If we are going to continue to fight wars the way we fight wars today and in this era of information-enabled warfare, there is such a heavy dependence on space capabilities that I think that foundational layer just has to continue.

Senator NELSON. General Formica, anything you would like to add?

General FORMICA. Mr. Chairman, I would obviously echo General Shelton's comments. They are very consistent with what I said in my opening statement and consistent with the approach we bring. We are reliant on space. There is no going back. And if we are going to shoot, move, and communicate, we require space systems. And so I would absolutely endorse General Shelton's foundational basis.

And I do appreciate the opportunity to appear today, sir.

Senator NELSON. And this is more than parity for us. We have to stay ahead of the game. We cannot just be catching up or trying to stay at par with the rest of the world or otherwise our defenses are down. Is that fair to say?

General SHELTON. I would agree with that, and that is exactly what we try to do. Even though we talk about going from the R&D to the production phase, those capabilities are very, very good.

General FORMICA. And Mr. Chairman, I would just add those are the critical enablers that will allow us to get better. Especially as we look at force reductions and other efficiencies, it is those critical space enablers that will make a difference.

Senator NELSON. Well, we cannot state definitively that it is always just about money because it is about other matters as well. But adequate funding is going to be important to our progress as well. That is why I think it is important to get the funding right. But in the process, we need to be sure, and I know GAO and Ms. Chaplain is interested, as we all are, in making sure that we get it right, for whatever dollar we spend, that we get the result that we are seeking or otherwise we are not maximizing or optimizing what opportunities we have.

Mr. Winokur, any comments that you might like to add?

Mr. WINOKUR. I think the only thing I would add, Senator, is actually picking on one of the comments you made in your introductory remarks. So if you allow me to wear my Oceanographer for the Navy hat, we are very concerned about affordable, next-generation weather satellites. We in the Navy are very dependent on the civil community and the Air Force since we do not fly our own weather environmental satellites. So from our perspective and from a national perspective, I think affordable, next-generation weather satellites become very critical not only from a DOD perspective, but from a national perspective as well. So I think that would be the one thing I would add.

And we in the Navy are working very closely with the Air Force, as I mentioned in my introductory remarks about defining our needs, and we are working closely with NOAA as well and defining our needs to them so we can leverage their capability and planning.

Thank you.

Senator NELSON. Dr. Zangardi?

Dr. ZANGARDI. Yes, sir. Thank you for this opportunity to give you a last remark.

We are clearly heavily reliant on space, and given the current budget environment, it is becoming increasingly important to focus our efforts on delivering our space programs on time on budget. And I think we have made great strides over the past few years to move the Department of the Navy programs in that direction.

I would like to say that since I have been in this role, I have seen great cooperation among the services. I find that we work very well together in trying to bring these future capabilities to bear for the warfighter.

Thank you, sir.

Senator NELSON. And last but not least, Madam Secretary?

Ms. CREEDON. Thank you, Senator Nelson.

One of the things that I have really gotten to participate in and I think has gotten better since I went to the Department—and nothing to do with me. It is just it is getting better. The Department about 18 months ago stood up the Defense Space Council, and it is chaired by the Secretary of the Air Force. And he is chairing this in his role as the executive agent for space for the Department. And the Defense Space Council brings together all of the various aspects of the Department together, so all of the services, the Comptroller's Office. It brings together the intelligence side, so NRO, and the policy, the General Counsel's Office. It brings everybody together to work on and to stay focused on the space systems, space budget, space architectures.

And I have to say I have been very impressed with how this group, which meets notionally monthly, 4 to 5 weeks, something like that, really has taken on some pretty difficult issues and is looking at a lot of the space issues in a very holistic manner. So right now, the Space Council is undertaking two very large architecture studies to look at how you coordinate across the various services for various requirements.

So I think this addresses a little bit what you had raised earlier about are we looking at making sure that the money is utilized, that there is good cooperation and coordination at least within the National security space community. Obviously, it does not address so much outside, but it is really a very good body and it has really taken on some very difficult topics of discussion, including ORS, as it works through the various space issues. It is taking a growing role in budgets. So I have been very impressed with this organization and its efforts since I have been over there.

Senator NELSON. Well, it is encouraging to know that there is that effort at coordination and collaboration because if there is any quick way to lose opportunity or to miss optimization, it is everyone going off on their own way. It will increase the costs, I think decrease the efficiency and efficacy of being able to put something

together in a far more comprehensive and cost-effective way. So I appreciate that that is being undertaken.

And I thank you all for your presence here today and for your responses. If there is something at some point that we ought to have a behind-closed-doors session, let us know that and we would be glad to follow through on that. So I guess we will come back to make a decision about that a little bit later. But thank you very much. I appreciate it.

The hearing is adjourned.

[Whereupon, at 4:25 p.m., the subcommittee adjourned.]