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HEARING ON

**SPACE SITUATIONAL AWARENESS:
GUIDING THE TRANSITION TO A CIVIL SSA CAPABILITY**

**BEFORE THE
US HOUSE OF REPRESENTATIVES COMMITTEE ON SCIENCE,
SPACE, and TECHNOLOGY,
SUBCOMMITTEE ON SPACE AND AERONAUTICS**

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Good morning, Chairman Beyer, and Ranking Member Babin. Thank you for the opportunity to appear before the Committee to talk about U.S. leadership in the area of space safety and sustainability.

Today, I'm not only representing my own perspectives on the pathway to a civil space situational awareness (SSA) capability, but also the views of a Coalition of experts organized under the American Institute of Aeronautics and Astronautics, or AIAA. The Coalition sent a letter to the Committee last October, and I have taken the liberty of resubmitting it along with my testimony. I'm also representing the Commercial Space Initiative, or CSI, an organization that I recently co-founded to develop new ideas for improving predictability and sustainability in the space economy.

THE COMPELLING NEED FOR A CIVIL SSA CAPABILITY

Mr. Chairman, there remains a compelling need for the United States to create a civil SSA capability, and to accomplish it as quickly as possible. There are both positive and negative motives for doing so. Let me explain.

First, on the positive side, as I testified before Congress last July, the space economy is "accelerating and diversifying" with new market segments and services emerging all the time. While we used to focus mainly on space-based communications, remote sensing, and navigation – capabilities that continue to change – we now see markets emerging in areas ranging from space tourism to space medicine. We might consider 2022 the year of the Lunar Economy as the first landers and infrastructure capabilities arrive to ultimately enable a permanent US presence on the Moon. As a parallel to developments in the space launch business, a new wave of in-orbit activities designed to inspect, refuel, and repair satellites

will literally change the economics of space and fuel additional new innovations in space commerce. As space becomes more accessible, we see non-traditional space companies working to leverage it, and entities from US States to foreign countries working to more fully participate in the space economy.

Recent developments show the challenges that lie ahead. As space activities continue to improve the lives of many people on Earth, with plans to do even more, our adversaries show wanton disregard for the value of the space environment. Russia's highly irresponsible anti-satellite (ASAT) test last November generated over 1500 new debris pieces and created what have become known as "conjunction squalls" for space operators. (Think about a baseball batter at the plate who occasionally sees 1000 baseballs coming his way without knowing which one to hit or, more important, which ones might hit him). Russia and China continue to create capabilities that threaten US national security, civil, and commercial space missions. Meanwhile, by simple math alone, the space debris problem continues to grow by the day. We see this in everything from the narrowing of launch windows to last weekend's need to maneuver the International Space Station (ISS) to avoid space debris from the Russian ASAT test.

There are many needs and benefits, Mr. Chairman, that drive us to implement a civil SSA system as quickly as possible. Among them are to allow the US Space Force to focus on the space domain awareness that is growing in complexity and importance; to allow us to collaborate more seamlessly with our allies, partners, and the space operator community at large; to leverage state of the art technologies, and to encourage the continuing development and growth of a US space safety industry. SSA is not only seen as crucial to our immediate future in space, but to the broader development of a cislunar economy.

THE US POLICY CONTEXT: CONTINUITY OVER CHANGE

National policy discussions about the space debris problem date all the way back to the Reagan Administration, with significantly greater emphasis during the Obama, Trump, and now Biden Administrations.

Space Policy Directive -3 (Space Traffic Management; June 2018) was issued during the Trump Administration with acknowledgement of three major points: that the space debris problem was urgent and getting worse; that a "whole of government" approach would be necessary to help mitigate it; and that strong cooperation with industry and international partners in dealing with it would be essential. The NAPA Report mandated by Congress in 2020 strongly endorsed the role of the Department of Commerce and the Office of Space Commerce in playing a lead role in transitioning conjunction warnings from the Department of Defense to the Department of Commerce. DoD needs to get out of the conjunction notifications business in order to focus on the more complex strategic space environment, such as aiding our allies in protecting their capabilities and assessing the capabilities and intentions

of adversary space activities.

One point that is often misunderstood there is that Commerce was to simply replicate the system developed by the Department of Defense over the decades as a derivative mission from its classified national security missions. Not correct. The idea was actually to have Commerce develop a modern system that could adapt quickly to accommodate the expected rapid growth in satellites and other complex space activities. Such a system will need to adapt rapidly as innovations like in-orbit servicing, space solar power and others enter the market.

Improving space safety for everyone remains the immediate task. That involves a much deeper understanding of where space objects, including debris, are located and the creation of more timely and accurate warnings to all space operators. If executed correctly, that will serve as a pathway to new space safety services that will enhance national security and serve as a further foundation of the space economy. One of the most logical “next users” of this data, for example, will be the space insurance community, which lacks sufficient data to inform risk models and therefore set accurate premiums. Leveraging commercial capabilities within a civil SSA system will allow us a credible mechanism to understand risks in space in much more accurate ways.

National Space Policy developed over the last three Administrations not only directs continuing US leadership in commercial space activities, but also that federal agencies play a key role in enabling it. It directs US government organizations to encourage the US commercial space industry in developing world-class, innovative capabilities to support our national security and civil needs, as well as our rightly ambitious plans for space exploration and space commerce.

The need to do better at this is a loud and common refrain from US government officials, private sector executives, and even the Congress. Apart from a clearly bipartisan interest to encourage a strong, vibrant, US commercial space industry, leveraging private sector innovation is one of the most important tools in fending off hostile adversaries, and addressing serious challenges like the space debris problem. A brief historical example might illustrate the point.

LESSONS FROM OTHER AREAS OF SPACE COMMERCIALIZATION

By way of background, Mr. Chairman, I have worked on space commercialization issues for almost 30 years, including from different vantage points. I began work on satellite imagery commercialization while working for the Director of Central Intelligence in 1994, served as the Executive Secretary of a Commission that assessed the National Imagery and Mapping Agency — predecessor to the National Geospatial Intelligence Agency — and served as both member and Chairman of NOAA’s federal advisory committee ACCRES. While at RAND and in the private sector, I focused my research efforts on global satellite imagery markets and their security implications, resulting in multiple studies and op-eds, including the co-authored

volume “Commercial Observation Satellites: At the Leading Edge of Global Transparency.” (2000, RAND/ASPRS).

With time, Mr. Chairman, we could walk through the long and sometime difficult path that it took to gain adoption of commercial remote sensing, including disbelief that such a highly technical business could be subject to commercial practices, whether it would have value for intelligence and national security purposes, and worries about the security impacts of the new transparency that it would create. Resistance isn’t entirely out of the system today in spite of the demonstrated benefits from leveraging commercial remote sensing capabilities.

Today, thirty years after bold Legislative and Executive Branch action, we see the many different benefits of the government’s use of commercial satellite imagery. Satellite imagery data and analytic products help intelligence organizations like NGA and NRO fulfill their national security missions and to share imagery data where the use of classified imagery is not possible. The space-based transparency that we wrote about over twenty years ago calls attention to horrific Russian atrocities in Ukraine and has helped deflate Russian disinformation and catalyze both Western government and public response. Commercial radio frequency sensing has provided other insights, such as Russian jamming of Ukrainian communications satellites. Recent policy decisions have allowed USG agencies to purchase of satellite imagery from our closest allies and partners, with substantial benefit.

I offer this example to note some of the pitfalls to avoid as we as we consider the need to leverage commercial capabilities within the creation of a civil SSA capability. While no parallel is perfect, there are important lessons to be learned from other examples like GPS commercialization, which resulted in hundreds of applications that we use regularly. As I said many times during my time at Commerce, and since, federal agencies are doing better at leveraging commercial capabilities, but far more can still be done. Especially in the case of a civil SSA system, we will need to leverage the speed, agility, and anticipation that can only come from the private sector.

Of course, my time as Director of the Office of Space Commerce provided insights on a wide range of new space market segments, whether for purposes of linking entrepreneurs to USG programs, understanding industry trends, helping break down regulatory impediments, and otherwise advocating for the US commercial space industry per OSC’s legal mandate. While the Office took on a significant responsibility for SSA/STM over the past four years, its main role is to “foster the conditions for the technological advancement and economic growth of the US commercial space industry.” (Title 51 USC 50702). The role is predominantly about economic growth, competitiveness, jobs, and innovation from space and related activities, including in the area of SSA.

THE COMMERCIAL SSA ECOSYSTEM

The United States already has a diverse and impressive ecosystem of companies focused on

SSA and the broader problems of space safety and sustainability. Inspired by a challenging problem and growing concern about space debris, many are leveraging private investment as they come into to the market. Some of these firms are focused on unique sensing of the space environment from Earth, and they will soon be joined by space-based sensors to collect other unique data about the space environment. Other companies have developed unique capabilities for detecting radio frequency interference between space objects or focus on the autonomous maneuverability required to avoid debris.

These companies are staffed with world-class talent, and are leveraging the data storage, data management, analytics tools and engines, visualization, and other capabilities drawn from a global IT ecosystem that supports millions of decisions daily in healthcare, global finance, and gaming, to name a few. (We might note that the US Space Command commercial strategy announced by General Dickinson earlier this month made similar arguments and the need to leverage them).

Since leaving the US government, I have had the opportunity to work with a number of these companies, and stay connected with many others. When I look across these companies, I find their efforts to be highly complementary, and therefore an excellent basis for immediate participation in a civil SSA system.

Some of these companies already have US government contracts with NOAA and the US Space Force, while others are working with our allies and partners for basing sensors and to provide key support to NATO. Many of these firms are tested three times a year in the joint DoD-DoC Sprint Advanced Training Exercises, in scenarios designed to play out how Allies exchange information and how governments can work with commercial providers.

International partnerships are essential in dealing with this challenge. The SACT exercises and other DOC international outreach, in partnership with the State Department, can serve as forums for the US to work with allied and partner SSA services like the European Union's Space Surveillance and Tracking (EU/SST) partnership. This can help ensure coherent, complementary, and interoperable solutions for both civil and commercial spaceflight safety and the protection and defense of US and allied space systems.

That said, our Allies are already taking the lead in funding and leveraging commercial capabilities as part of their strategies. The European Union released a new strategy for space traffic management in February that provides funding for European companies and mandates that space operators leverage capabilities equal to or greater than the EU/SST, in other words, commercial SSA capabilities.

Back at home, a demonstration at this year's Space Symposium showed the very quick work of eight different companies in developing an end-to-end assessment of the Russian ASAT test. All of the companies work with the USG in some capacity, and leveraged large-scale investment in imagery and SSA capabilities and the power of a massive private cloud

infrastructure. This was an example, but only one example, of the kind of capability that the US government can leverage as part of creating a civil SSA capability quickly. The demonstration was built with company resources, not US government resources, and was completed in a number of days. I would encourage the Committee Members and staff to take a look at it and the many other capabilities already in the market.

Increasingly, these companies have substantial inputs from the growing space operator community. Today, a large percentage of the satellite operators in LEO are working with these firms, and the exquisite data required to connect two space objects in innovative new missions like Northrop Grumman's MEV-1 and -2 missions were provided by one company. Needless to say, these companies are making discoveries about developments in the space environment that are also helpful to our strategic understanding of the space environment.

THE PATH AHEAD

As we create a new civil SSA capability, Mr. Chairman, simply making token commercial purchases will not be enough. As a strategic imperative and as a path to creating an effective civil SSA system—from the unsustainable path that we are on to a robust public-private partnership that promotes safety and sustainability—the Office of Space Commerce needs to fully leverage the commercial capabilities now or soon to be in the market. As we have seen in other areas, there is nothing wrong with the US government being a first customer, with the idea that it not be the only customer. A civil SSA system constructed with that in mind will allow for service to appropriate government roles, but also encourage the growth of this commercial sector as additional partners like space operators and our allies leverage these capabilities.

Further, to take a traditional government build path on this would effectively create a competitor to industry, put at risk the investments by these companies and their investors, and prompt an emphasis on working overseas. Given the global interest in the topic and the diverse capabilities, the USG could wind up making investments that leave the taxpayer with a legacy capability and an industry focused abroad.

To say it another way, OSC has the advantage of using commercial capabilities without being encumbered by the existing architecture. OSC should avoid a prolonged acquisition strategy, and should potentially consider acquisition approaches, like Other Transaction Authorities, that have been proven to be helpful in the DoD acquisition cycle when urgency is called for. This comment is similar to many others calling for more flexibility and diversity in acquisition strategies, especially when the need is urgent. In the space arena, this includes the ability to leverage data buys, space as a service, and even non-conjunction analysis services. If OSC gets anywhere near its FY2023 request, it will have sufficient resources to move out on all of these fronts, including maximum leverage of commercial capabilities.

In addition, Mr. Chairman, with over 8,000 metric tons of debris threatening space operations

today, the US government needs to consider a remediation roadmap, as is suggested in recent solicitations from the US Space Force and in the Administration's new in-space servicing, assembly, and manufacturing strategy released earlier this month.

Congress is not silent on this issue. In the past, Congress has been pivotal in telling the Executive Branch not to build what it can buy in the market. Further, a hard fought consensus on the current plan, including the key role of the Department of Commerce, is codified in the SPACE ACT(s) of 2020 and 2021 and now in conference as part of the US Innovation and Competition Act. I would especially highlight the idea of a Center or Centers of Excellence on SSA that is already written into the legislation. I would urge Congress to fund, demand expediency, and oversee proper execution of the civil SSA capability in a way that capitalizes on the items outlined in this testimony.

CONCLUSION

Mr. Chairman, I appreciate the opportunity to discuss this important topic today. As the United States confronts multiple adversaries in space — one with an approach that fuses civil and military interests, another who seemingly has no due regard for anyone else's interest in space — I believe that we are at a pivotal time to extend America's leadership in space through the rapid creation of a civil SSA system. The bad news, in my opinion and the opinion of many other experts, is that we are out of time. The good news is that we have private sector tools and innovation that are available immediately to help with the current space debris problem and adapt quickly as the space environment changes.

A large, traditional government program will not work here. An effective solution requires a much more aggressive approach to leveraging private sector capabilities, not only as discussed here but by an increasing number of senior officials from within the Executive Branch, from within the Congress, and the private sector. There is no faster way to ensure rapid mitigation of the challenging space debris problem and helping keep space sustainable for our future security, exploration, civil, and space commerce interests.

Thank you, and I will look forward to your questions.

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Kevin M. O'Connell is a recognized expert on space commerce, the global space economy, international intelligence and U.S. national security matters. For almost four decades, he has focused on space commercialization and technological competitiveness and how to advance them in global markets. He has also focused on how these innovations impact U.S. and allied national security.

His U.S. government assignments include the Department of Commerce (SES), The Department of Defense, The Department of State, The National Security Council, The Office of the Vice President, and The Office of the Director of Central Intelligence. Within the private sector, Mr. O'Connell was a senior research analyst at RAND and was the first Director of RAND's Intelligence Policy Center. In 2007, he founded *Innovative Analytics and Training, LLC*, a consulting firm specializing in assessing high-tech market areas including geospatial markets, cloud computing, and cyber analytics.

Mr. O'Connell's most recent role was Director of the Office of Space Commerce (OSC) within the U.S. Department of Commerce. He was the principal architect of outreach to U.S. private space companies to facilitate innovation and encourage increased market growth and viability. He focused on the growing role of the private sector in space, encouraged new space partnerships, worked to ensure the competitiveness of the U.S. commercial space industry, and advanced American leadership in space safety and sustainability. Mr. O'Connell testified before Congress on space policy and regulatory issues, American space competitiveness, and the growth of space commerce. He was awarded the Vice President's Dedicated Service Award for his support to the National Space Council.

Mr. O'Connell also expanded international outreach on space commerce issues with a wide range of U.S. allies and partners, especially to compare notes on regulation, encourage new partnerships and advance space safety and sustainability. His overseas space engagements included participation in the U.S.-Japan Comprehensive Space Dialogue, as part of a Space Delegation to Luxembourg, and including high-level discussions with the EU, India, Thailand, Singapore, Indonesia, and Commonwealth partners.

Mr. O'Connell is a recognized expert on the policy, security, and commercial aspects of satellite remote sensing technologies and markets. He served as the Executive Secretary of the Independent Commission on the National Imagery and Mapping Agency (NIMA) in 2000 and later as an advisor to the Director, National Geospatial-Intelligence Agency. He was a long-standing member of NOAA's federal advisory committee, ACCRES, including as Chair between 2012 and 2016.

Mr. O'Connell has been a regular author on space commerce issues. He contributed the foreword to "Space Policies for the New Space Age: Competing on the Final Economic Frontier," by Bruce Cahan and Mir Sadat (*NewSpace New Mexico*, December 2020). He co-authored *Commercial Observation Satellites: at the Leading Edge of Global Transparency* (ASPRS/RAND, 2000). He has an active TS/SCI security clearance with additional special accesses. He taught graduate courses in Georgetown University's School of Foreign Service and the RAND Graduate School for many years and has lectured at academic and research organizations around the world.