Space 2.0: U.S. Competitiveness and Policy in the New Space Era

TRANSCRIPT

Participants:

Keynote Address and Discussion

• Scott Pace, Executive Secretary, National Space Council
• Kenneth R. Weinstein, moderator, President and CEO, Hudson Institute

Panel Discussion: Regulatory Efficacy & Efficiency in Space Commerce

• Earl Comstock, Director, Office of Policy and Strategic Planning, US Dept. of Commerce
• Hon. Robert McDowell, Senior Fellow, Hudson Institute and Former Commissioner, FCC
• Dr. Michael Mineiro, Staff Director and Senior Counsel, House Science Committee, Space Subcommittee, U.S. House of Representatives
• Dr. Pierre de Vries, moderator, Co-director, Spectrum Policy Initiative, Silicon Flatirons Center

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Please note: This transcript is based off a recording and mistranslations may appear in text. The names of participants in the Audience Q&A have been removed. A video of the event is available: https://www.hudson.org/events/1553-space-2-0-u-s-competitiveness-and-policy-in-the-new-space-era42018
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Keynote Address and Discussion

KENNETH R. WEINSTEIN: Thank you, Brandt. I really want to thank you for the extraordinary effort you’ve put into launching what is a major initiative for Hudson Institute. Those of you who don’t know Brandt, he’s the former associate general counsel of In-Q-Tel. He’s someone with a distinguished record of service at both the Department of Homeland Security and the Department of Defense. He serves on numerous federal advisory boards at the Department of State and Commerce and played a very critical role in the NSE in his last stint there in moving satellites off of the ITAR Red List, which is an important thing for this industry.

Hudson Institute is a think tank dedicated to promoting American leadership and global engagement for a secure, free and prosperous future. Critical to American leadership is American technological leadership. And that's core to our mission, and core to what we do. Our founder, Herman Kahn, was a great visionary and saw the interaction between strategy, technology and demography as critical to shaping the future in ways that near-sighted analysts couldn't imagine. We do significant work on defense transformation, defense trade, on I.T., communications, and we are delighted to add space now to this mix and to have such an august group of CEOs, CTOs, thought leaders from the space-related industries here with us today to launch this new and important institutional initiative. I especially want to thank the members of our advisory board, Joe Pelton, Pierre de Vries, Dale Hatfield – all legendary figures in their own right – for the significant time they put in. And I also want to most especially thank Hudson Institute trustee Dr. Margaret Whitehead for encouraging us to undertake this major initiative on space and to drawing on her insights and her contacts as well. Margaret has been nothing short of a force of nature in moving us forward, and this is also a labor of love for her. Her late husband Tom, who was himself a beloved Hudson Institute trustee, was a pioneer and visionary in the satellite world at both Hughes Communications, where he launched the Galaxy satellite system, and with the Société Européenne des Satellites.

And on that note, we are especially honored to have Dr. Scott Pace keynote our event today. He needs no introduction, I think, to those of you who follow space issues. Scott is, of course, the executive secretary of the Trump administration's Space Council, an important new initiative that is putting great emphasis on the future of U.S. endeavors in space. He's the former director of the Space Policy Institute and professor of the Practice of International Relations at George Washington University. He's held senior positions in the Commerce Department, the White House and in NASA. Most recently at NASA, he was associate administrator of NASA for Program Analysis and Evaluation under NASA administrator Mike Griffin, himself a good friend of Hudson Institute who spoke here less than two weeks ago in his new capacity as Under Secretary of Defense for Science and Engineering. Now anyone who has spent time with Dr. Pace knows that Scott is extraordinarily well-suited as a creative and future-oriented thinker to help shape a U.S. strategy to advance American space capabilities to advance our geopolitical interests. Without any further ado, I want to turn the microphone over to Scott.

(APPLAUSE)

WEINSTEIN: Thank you for being here today.

SCOTT PACE: Thank you, Ken. Great to be here. And particularly, Ken, on behalf of the chairman of the National Space Council and Vice President Mike Pence, thank you for the opportunity to speak here today about the work of the council and what we're doing to advance American leadership in civil, commercial and national security space sectors. There's no doubt that the U.S. is a pre-eminent spacefaring nation in the world. There's no country more capable in space, nor is there any country that’s more reliant on space for its security, its economy, and its place in the world. And today under the leadership of President Trump and Vice President Pence, the United States is leading a return to the moon with international and commercial partners, not just to leave flags and footprints but to expand the economic sphere of human activity.

In contrast to the Space Race of the 1960s, leadership today is measured not by what we can do alone but what we can get others to do with us. And so one of the greatest successes of the International Space Station, for example, is the thousands of close-working relationship we have with major space-faring countries, including Russia. As others are willing to work with us in space, we can create new opportunities to advance our foreign policy and our economic goals. There are more global actors today than ever before, serious and growing counter-space threats from capable adversaries and private sector capabilities that offer lower costs and higher productivity. As the exploration and utilization of space becomes more complex, however, it’s more important than ever that we have a whole-government approach that recognizes how space issues cut across a wide range of national interests. International cooperation, space commerce, national security space are all interconnected and part of larger elements of national interest.

The early years of the Space Age saw the creation of several landmark treaties. Some have been an outstanding success, such as the 1967 Outer Space Treaty. Others have been failures, such as the 1979 Moon Agreement, unratified by the major space
powers. Some have been fortunately unused, such as the agreement on the rescue and return of astronauts. Some international legal experts are calling for new treaties today to deal with challenges in space. And the United States, however, does not believe that new treaties are needed but does believe that we should be working closely with other spacefaring nations to promote norms of safe and responsible behavior in space. And what this means is that rather than a top-down treaty negotiation, we should take more of a bottom-up approach with civil and commercial space operators to define best practices that can be developed into nonbinding, voluntary guidelines. As such guidelines become more internationally accepted, nations, including the United States, can then choose to codify these guidelines into national policy, law, and regulation. This positions the United States then to lead international discussions from a pragmatic position of experience and expertise rather than theory and polemics. The Trump administration, under the leadership of the chairman, Vice President Mike Pence, is determined to ensure the United States expands American pre-eminence in space.

The president’s decision to reinvigorate the National Space Council after nearly a quarter-century hiatus reflects the administration’s resolve to ensure the United States will lead in space. Executive Order 13803, signed by President Trump last summer, creates the framework for our council. And each of the members of the National Space Council, in turn, represents different aspects of the nation’s interests in space. The challenge is, then, to combine and align those sometimes disparate and competing interests into a unified whole, as any of you in the interagency process has ever experienced. You know the process. The administration’s goal is for the United States to be the indispensable nation in every space sector: civil, commercial, and military.

And one of the biggest challenges is to ensure that government priorities, policies, and regulations are then supportive and up to date and relevant to a changing market – technical innovations, international conditions. This is the theme, of course, of the 2.0 discussion today, that things outside of the regulatory world are moving much, much, much faster than that regulatory world has ever had to deal with before. And so this is the challenge for a lot of our discussions today. At present, we’re focusing, therefore, on the most urgent regulatory reforms: the streamlining of U.S. commercial space launch and re-entry regulations at the Department of Transportation, and the updating of commercial remote sensing regulations at the Department of Commerce. Now, it’s not enough to deal with existing regulations, but also, we need enabling regulations for new space development, such as satellite servicing, private space facilities, and space mining operations. Now, some of those are farther out, but you can see them coming. It takes a long time. We need to prepare to have them. So, no: regulation is just not the answer, but a light-touch regulatory environment is what we’re trying to create for a more predictable world.

The administration has assigned the Department of Commerce the lead for developing and consolidating space regulations not otherwise assigned. So if an activity transits national airspace, though, for example, the Department of Transportation has the lead, as it should for anything going up and down. The Department of Commerce is responsible for light-touch regulatory structure or all of that which is outside. And of course, we still have the FCC as the independent regulatory agency for spectrum. So we’re trying to reduce and consolidate, but we’re probably not going to get down to one agency. Now, virtually, all private space activities require radio spectrum, as I mentioned. And the FCC, while not a member of the National Space Council due to their independent status, is one where we’re strengthening our relationship with them as allowed by law, so improving the form of communications back and forth and, certainly, while being respectful of ex parte requirements and such.

The United States needs strong and innovative space industries. And if we limit, however, space activities – the activities of governments, we would handicap ourselves and cede a key American strength, which is the private sector. If we unleash private enterprise in partnership with government, there are really no limits to what the U.S. can accomplish. And this is why the Space Council has prioritized the development of policies at the interface of public and private sector interests. These include policies on space traffic management, new space technologies, regulatory reform, ensuring there are opportunities for private enterprise and space exploration, and improving space resilience. So, again, as you might have heard recently, discussions about lunar exploration – one of the parts of that story, which is still not fully appreciated, is the range of commercial opportunities that are being provided for sending instruments and so forth to the lunar surface using private partners.

Today, space sector revenues continue to be dominated by large aerospace and telecom firms. However, an increasing number of entrepreneurial firms are seeking nontraditional market sectors. And these sectors are experiencing revolutionary change: space launch, remote sensing, global broadband via large constellations, new services, such as suborbital and orbital human flight, prospecting, satellite service and assembly and manufacturing.

And in this environment, what can we do to preserve the U.S. strategic advantage in space? The answer is fairly simple. The United States needs to take those actions that helped to generate our advantage in the first place; that is, leading by example in a stable and transparent regulatory environment with government industry and partnership. I want to touch just briefly on a few of the sectors that we’re working on. In space launch, innovative American companies are changing the character and expectations for launch services. In recent years, for example, SpaceX has helped the U.S. gain back market share against
A logical solution would be for all countries to seek globally – or at least regionally – harmonized spectrum allocations for space commerce. That would harm the global economy, and a global approach is necessary to protect U.S. don't stop at borders, unfettered terrestrial wireless network use in one country could certainly preclude the use of satellite services to compete. Since radio waves, as you know, And to ensure we retain the strategic advantages afforded by space services, the United States needs to continue to open and the United States has a strong and entrepreneurial satellite communication industry available to engage in global competition. As I had mentioned earlier, the domestic and international demand for mobile broadband continues to grow, and there are a lot of companies eager to provide services for this. I should mention that this is not unrelated to the competition for 5G. The space environment is becoming increasingly congested and contested, that these trends present challenges for safety and stability – sustainability – again, sounds like alleviation too much. But today, the Department of Defense tracks over 20,000 space objects, and that number will increase dramatically as space situational awareness and capabilities such as Space Fence begin operation. And as the number of observable objects in space increases, both the probability of collisions and also the competition for spectrum allocation for commercial endeavors will become more intense. New license applications involving large numbers of satellites and new technologies are straining the ability of NOAA to meet its compliance requirements. And new capabilities such as hyperspectral imaging, full-motion video, and in-space imaging are taking longer to assess, and we simply can't take that long. If we want to make sure the United States continues to be an attractive home for commercial remote sensing, we need to make sure that our licensing regime is supportive. And we can't take this for granted, because companies as these need stability and predictability that can only come through a responsive and open government decision-making process. We can have another discussion about how satellite communications licensing migrated offshore, and what might be done to attract that back to the U.S. No one should take remote sensing for granted. The space environment is becoming increasingly congested and contested, that these trends present challenges for safety and stability – sustainability – again, sounds like alleviation too much. But today, the Department of Defense tracks over 20,000 space objects, and that number will increase dramatically as space situational awareness and capabilities such as Space Fence begin operation. Now, established companies – such as Boeing, Tulsat – and newcomers – such as Samsung, OneWeb, Laser Light, and SpaceX – all have announced plans to launch large constellations. Many thousands of these are planned. Several of them are already in orbit. And as the number of observable objects in space increases, both the probability of collisions and also the competition for spectrum allocation for commercial endeavors will become more intense. Now, this dramatic increase in the volume of commercial space assets exposes deficiencies in our current process for managing space traffic and spectrum allocation. And in light of these, the National Space Council developed and recommended a space traffic management policy. It's the first U.S. space policy to address this issue. The vice president talked about this briefly in Colorado. And as the saying goes, it's on that large piece of furniture known as the president's desk. So I'm hoping we have an announcement fairly soon. But it's been a productive process of discussing with the interagency, and I think we've reached a fairly good consensus.

Now, as we look at this, this new policy sets priorities for SSA and space traffic management, which will, we hope, encourage the growth of the commercial sector, establish a modern space traffic architecture and promote safety standards and norms across the international community. And it really will align agencies to do, really, what they're supposed to be doing best, the Commerce Department, for talking to industry and interfacing with rapid changes, and the Defense Department is keeping a single catalog, the authoritative catalog, but freeing up some of its time and attention to focus on space war-fighting capabilities, which, sadly, are increasingly needed as we move forward. So we're getting the roles and missions of our agencies in alignment.

As I had mentioned earlier, the domestic and international demand for mobile broadband continues to grow, and there are a lot of companies eager to provide services for this. I should mention that this is not unrelated to the competition for 5G. The role of China in 5G competition also has a space aspect to it. Because in addition to our terrestrial communications industry, the United States has a strong and entrepreneurial satellite communication industry available to engage in global competition. And to ensure we retain the strategic advantages afforded by space services, the United States needs to continue to open and promote competitive markets and protect spectrum allocation for space services to compete. Since radio waves, as you know, don't stop at borders, unfettered terrestrial wireless network use in one country could certainly preclude the use of satellite services in neighboring countries. That would harm the global economy, and a global approach is necessary to protect U.S. space commerce. A logical solution would be for all countries to seek globally – or at least regionally – harmonized spectrum allocations for terrestrial and satellite services pointing to the upcoming World Radio Conference in 2019. There's an urgent need to provide
reasonable protections for satellite gateway Earth stations and certain frequency bands, as well as protection for satellite and user terminals in core satellite bands. And it’s for these reasons the National Space Council is examining how the Department of State, Commerce and FCC can better coordinate to ensure the protection and stewardship of spectrum necessary for space commerce – and, again, not just for space purposes and it’s unique uses, but also to make sure that we’re competitive in terrestrial areas, as new technologies like 5G come along.

Export controls, also mentioned earlier, need to be kept updated with advances in existing space sectors, as well as new capabilities. Burden and outdated parameters can have the unintended effect of compromising national security by incentivizing space industries to move overseas, and for manufacturers to change their supply chain. The Space Council is discussing how the administration might review items, components, technologies and services related to civil and commercial space activities and spacecraft missions and, in particular, providing more regular updates and reviews of those characteristics, so we make sure that we don’t fall behind the nature of the technology and markets. We’re interested in hearing more, of course, from industry perspectives on how to ensure these regulations remain relevant and effective in a changing world. And, again, there’s more on that to come.

In conclusion, the challenge of space leadership today is really to manage in the face of rapid change. And while we’re facing new commercial and military competition, the most important factor affecting the U.S. in space is not really what other countries do but what the United States chooses to do or fails to do. The National Space Council, with Vice President Pence’s leadership, is committed to taking the initiatives necessary to sustain and expand a U.S. position of leadership in space. Thank you. And with that, I’m happy to take questions.

(APPLAUSE)

UNIDENTIFIED PERSON: The gist of this question is: how do you regulate without crippling innovation? It’s obvious that there is great need for regulation below geostationary orbit. But if you begin to consider things like laser communication instead of RF, then the rules are completely different and, in a sense, much easier to generalize. And that extends even more so to beyond geo. How do you keep from crippling innovation when we are interested in permanent colonies on the moon, because things such as nuclear propulsion, and so on, make a lot of sense for that application and also getting to Mars in 30 or 60 days instead of a year?

PACE: OK, a lot there. So one of the things I would say is, the balance is: you need to have a regulatory structure, but you should not try to make it more detailed than necessary. So we talk about a light-touch regulation. You’ve heard maybe some of the concepts about mission authorization. To be wonky for a moment, you know, Article VI of the Outer Space Treaty says that member states, such as the United States, are responsible for providing authorization and continuing supervision to the activities of their nationals. Well, that can mean a full-up licensing regime, like remote sensing or commercial satellites, or it can mean a much lighter touch, such as a payload review and authorization.

So when we look at emerging capabilities, like private space platform or even satellite servicing – that we can provide more of that light touch where there is an authorization. There is a government role. But we don’t try to be overly prescriptive down to technical details in an environment that’s still changing. So it’s a matter of being, first of all, a little humble in the face of how quickly change is occurring, but not to go for zero, because that can mean lack of predictability for the industry. Really dramatic changes, such as laser com, are terrific because the sooner you can get out from, you know, under the kind of the constraints that the ITU and spectrum regulation traditionally gets you when get into a new area, that’s of course a wonderful place to be.

But in doing that, this also raises the need for norms of behavior, voluntary guidelines with other space entities that also may be doing laser communication. You don’t want people shining lasers where, you know, you don’t want them. Similarly, this is why the best practices I mentioned earlier are really important, because rather than having, say, a compulsory regulatory regime, developing voluntary best practices that countries can individually implement can adapt to this change more quickly.

You mentioned nuclear power. The United States has been part of a discussion of voluntary guidelines of use of nuclear power in space for many, many years. And what it essentially boils down to is we can do nuclear power sources in space. There’s nothing internationally that would bar us. But what it does mean is we don’t want to turn the reactors on until we’re headed outward. We don’t want what happened, of course, with the old Soviet radar satellites, you know, coming back into Canada and spreading nuclear waste. And so you want to be very, very safe and protect the biosphere. You want to use those nuclear power sources but only as they’re headed outward. So I think they have a crucial role in space. I think we’ve developed a lot of these guidelines with our other international partners, and that national law and regulation will be sufficient to go from there, going forward, as long as we don’t put too heavy a hand on it. In the back.
responses to intentional jamming? anything that the administration, the Space Council, yourself, and the groups that you deal with are thinking about any new this world that we live in, with the new space and Space 2.0, we have, still, intentional jamming. And I wonder if there's

UNIDENTIFIED PERSON: in light of changing conditions.

cluttered environment where everybody can operate. But it's going to take more work to ensure that that deterrence prevails

PACE: I guess I would challenge the presumption a little bit. I mean, one of the reasons that National Geospatial Agency is a gigantic buyer of commercial data is precisely because it can be widely shared with friends and allies, as opposed to classified data. So I think they're already fans of that kind of data. I think the tricky part is finding non-governmental customers for this data. And the government, of course, is quite good at processing the data and producing it into other products that it knows and uses. What has been more of a challenge – and I know has been long debated in the industry – is how far down the value chain to go. So if you switch from looking at this as a space issue, but more as a geospatial information technology issue, you find lots of other higher value-added products. And the question to which satellite companies want to integrate themselves down into those kind of market areas really is the challenge for them. If they want to remain purely satellite suppliers and selling essentially wholesale unclassified data, they can do that, but there's only going to be relatively few buyers at that end, which is going to be largely the government. If they want to go in and be part of a value chain selling to more niche markets, which requires different expertise and, therefore, is hard, I think there are opportunities, higher value opportunities, for those services, but of which the supply of the data itself is going to be a relatively small part of it. So that's really a business structure decision that they're struggling with.

UNIDENTIFIED PERSON: My question: you've a couple of times referred to the Outer Space Treaty and it's a foundation – we all know that – for the legal policy structure of activities in outer space today. But I wonder if you could discuss a little bit more the relationship between the Outer Space Treaty and this administration's goals and objectives in the military aspects of outer space. Obviously, there are things that are permitted and not permitted under the Outer Space Treaty. But you pointed out earlier that if there are going to be changes, they should be incremental. Let norms develop and then you can decide whether they should be taken into a treaty. But could you discuss a little bit more the vision of this administration, where you would see things, say, 10 years from now on the military domain? Because, clearly, there's a lot of rhetoric flying around about outer space being the next military domain, the next warfare domain, et cetera. Thank you.

PACE: Sure. So being the former professor that I am, I would refer you to the text of the National Security Space Strategy, and the section on space in the National Space Strategy, which actually has some sections on multilateral cooperation and the need for that in all areas – again not just in the military area – but really across a range of activities in space, not just the Outer Space Treaty but of course ITU, missile tech control regime, and so forth. So I think the view is that the United States views the current set of treaties as broadly permissive, and therefore, we're able to do whatever it is we really want to do in space. What has changed is the nature of the adversary environment. So back maybe a decade or two ago, I think people still talked about space as a potential sanctuary, and what we'd do and what would the U.S. do or not do to change that. That discussion has gone. The discussion is gone. And it's gone because it's been changed by the actions particularly of Russia and China in counter-space systems. And I can refer you to the testimony from the intelligence and defense communities what's happened. So the first priority is to make sure that, in this environment, which we are very reliant upon, that we are at least more resilient; to making sure that -- it's not that satellite systems will ever be invulnerable -- they won't be -- but that the functions that we want them to carry out are going to be resilient against a wide form of challenge, and then that we have capabilities to respond across domain and other areas, if necessary, to any challenges or threats to that capability.

So what you're seeing now is really a rethinking over the changes that have been occurring for some time, but which now, I think, is more openly recognized in this administration. So I think you're seeing more open discussion of it. I think certainly an ideal situation for the United States is for space to remain a very peaceful and calm environment because that is deeply in our national interest. And I think -- as I've also said in other areas -- one should not assume that because space is a war-fighting domain, that it's inevitable that war will occur there. We have nuclear combat skills and nuclear combat capabilities. And we have tried mightily for decades to make sure that deterrence is preserved and that we never use those weapons. And so I think preparing for and ensuring we have resilient systems and abilities to respond in order to deter and prevent warfare in space is, I think, our top priority. So I would hope in another 10 years that space continues to be a calm and peaceful and maybe even less cluttered environment where everybody can operate. But it's going to take more work to ensure that that deterrence prevails in light of changing conditions.

UNIDENTIFIED PERSON: So that it could be recorded somewhere right? Sounds good. Yes, of course. Question for you: in this world that we live in, with the new space and Space 2.0, we have, still, intentional jamming. And I wonder if there's anything that the administration, the Space Council, yourself, and the groups that you deal with are thinking about any new responses to intentional jamming?
PACE: Yeah. The short answer is I probably can’t really respond with any deep substance on that. Certainly, even unintentional jamming is actually a problem - and working to reduce that. Trying to get to a point where we can reduce the amount of unintentional jamming such that any actual and deliberate attempts of intentional jamming stick out and become very, very noticeable I think is something that a lot of us would like to see. Because if there is intentional and open jamming, and you can assure yourself that it’s not an accident, then you have a variety of options you can take depending on the state of international conditions against that. If, however, you have a rather noisy environment, then it becomes much more difficult. And this is one of the reasons why I think a lot of people, myself included, are very keen to keep satellite spectrum very clean and pristine. Not simply for performance reasons, but because in a clean environment any bad actor kind of sticks out fairly clearly, whereas if it’s a really noisy environment, it’s sometimes hard to find that actor. So good spectrum management is not only good for commerce. It’s good for national security.

UNIDENTIFIED PERSON: Two issues were discussed early this morning. One was that of spectrum allocation and the other one that’s orbital debris. On the issue of spectrum management, one of the things that’s been discussed is the extent to which, for the millimeter waves, there could be sharing. Of course, it’s a clean environment, but also, given the preponderance of pressure for 5G, it looks like satellites may have to do sharing. Just comments on that, and then also on orbital debris.

I just got back from a conference in South Africa where it was proposed that we should have automatic de-orbit commands that then would be validated each week to say, no, “it’s still operating; don’t de-orbit,” because some satellite systems at 40 percent, you’ve just lost communications’ capability to command de-orbit. Just comment about any innovations we can make on orbital debris that make sense.

PACE: I’d really want to make sure that a U.S. finger is on any button that did an automatic de-orbit.

(LAUGHTER)

PACE: Just me, I want to make sure we control that. I shouldn’t comment about, you know, millimeter wave, or some of the debris issues, because some of those things in fact are the subject of open rule-makings that the commission is engaged in. What I think I can say is that it’s really important that we have specific protections for satellite services, that the worst outcome is that we’d be uncertain about what the global standard are for protection of a satellite service. So one may agree or disagree about the protection level in a particular case, you know, say with millimeter wave or particular rule-making. But I think the larger issue is satellite services deserve – need, require – a protection limits. That’s true on a global basis, or at least as wide a regional basis as possible. Because unlike terrestrial systems, you really can’t go administration by administration to work those things out. So I think in a very sort of high-level that the U.S. should support those kind of global protections in international environments, with the subject of what they are to be part of our own national processes that we’ll take in our positions in the work.

MARGARET WHITEHEAD: Margaret Whitehead, Hudson trustee. Thank you for being here. Hudson is honored to have many major satellite CEOs here today and major American innovators. And I wonder what you can tell them and tell us about this time game that’s going on in terms of this marvelous emerging industry that’s so important to our country, and the impulse to overregulate it, or correct, or reform the space policy. How is all that going to unfold with the industry itself and their impulses to get into space? And what is the Trump administration going to do about this?

PACE: Well, we want the commercial industry to thrive. And we want it to be a global leader because it serves a variety of our national interests, not only economic growth, but national security, and also the ability to shape and influence what the rules are in space. People have known my phrase: “rules are made by the people who show up, not by the people who stay behind.” And so we need to show up, you know, at these meetings and standards. I think one of the biggest threats to the space industry is not a question of whether an agency or whatever is supportive or not. I think everybody is broadly supportive. What happens is, is really the coordination of it. So you can have people quite well-meaning going down a particular path on a standard or working a problem that can have an impact on the satellite side or space side that’s simply not recognized. Or they attempt to apply a model that works in one domain of technology and try to misapply it to the space domain.

And, of course, a natural reaction is, well, everyone always pleads why they’re special. You know, so a natural reaction is to say, well, just another special-interest group pleading as to why they should have separate treatment. Being able to actually go a little bit more technically deeper with the regulatory agencies and with the departments and agencies as to why you need to work certain problems differently on the space side than what you would do, say, in the terrestrial communications side, or non-communications capabilities – I think that’s really the hard question. The Space Council, I think, provides a good mechanism for doing that, for bringing that leadership to bear. But the leadership doesn’t always know what’s happening on the front lines, in the industry or with the technology and out in the markets and cutting edge. I mean, that’s not necessarily their job. So our job in the White House is to make sure we press the administration’s agenda down, we adjudicate issues and conflicts that come up. So one of the ways that I would urge that industry can kind of help us in that regard is to go and engage
with the departments and agencies. You know, go to your customers or go to the people in Defense Department and in NASA and in Transportation and Commerce and make sure that they know how their equities are being affected.

I would also say this is most effective if it's done as an industry-wide effort rather than an individual effort. When I was in the Commerce Department the GPS market was just sort of starting. And one of the first things I said to the companies was, "I'm not smart enough to understand all your competitive strategies with each other. What I need you to do is to go and form a trade association and come back to me with an industry position because I'm not interested in favoring any one company or not. I'm interested in having an industry viewpoint that then the Commerce Department can then act on." So the importance of groups like the Satellite Industry Association – Tom, plug! – and, you know, other groups to go into the department agencies – so that's how it then gets into the interagency is when commerce comes and says, we've got a problem, Defense says, we've got a problem. Then that's something that's, you know, easier, you know, for me to deal with. I can hear from industry, and I want to hear from industry. But I'm in a position where I first need to respond to what my boss wants and then what the departments and agencies are saying. Because then those departments and agencies become advocates, you know, for an approach that is broadly shared across the industry. Then it's much, much easier for us to engage.

WEINSTEIN: I want to thank Scott Pace for those characteristically deeply insightful remarks. We can see why the vice president has entrusted him with being executive secretary of the Space Council, which is a signature initiative of this administration, one that the president himself has entrusted our old friend Vice President Mike Pence with. And I can remember conversations with the vice president going back to 1994, 1995 on space issues that we've had. So I want to thank you; can't imagine a better way to launch our new Space 2.0 initiative. I want to thank everyone for being here, thank our C-SPAN audience. We will adjourn now for lunch. And we will reconvene at 1:30 with a panel discussion. Lunch will be served right outside. Thank you very much.

(APPLAUSE)
SCOTT PACE: I'd like to introduce - I'd like to introduce our moderator for this afternoon's panel, Pierre de Vries. He's a co-founder of the Silicon Flatirons. There you have it. And - who has been laboring diligently with me over these months to bring today's events off. And so I'll hand it off to you, Pierre. Thank you very much.

PIERRE DE VRIES: Thank you very much, Scott. And thank you everybody for being here. You came for Scott Pace. You stayed for the lunch, and you stayed for us. So thank you very much for that. So the goal for this conversation is to think a little bit in more detail about the issues that Dr. Pace teed up for us and to really explore how federal regulation and federal oversight can maintain U.S. leadership in space in this Space 2.0 era. And we'll be talking about many things. But for me, the key question really is, what's going to be different going forward? And we have an illustrious panel here. I will just introduce them, give you their names, identify them. I can't talk faster than you can read, so I refer you to their bios that are in the program. And there, you can actually see exactly how striking their CVs are. So, on your left, we have Earl Comstock. Mr. Comstock is the Director of the Office of Policy Planning at the Department of Commerce. In the middle, we have Dr. Michael Mineiro, who is Staff Director and Senior Counsel for the Space Subcommittee of the House of Representatives Science, Space, and Technology Committee. And on my immediate right, we have the Honorable Robert McDowell, former FCC commissioner but now a partner with Cooley, LLP. Thank you, gentlemen, for being here. What we're going to do in this conversation is - we'll just start off with a conversation on the stage. I'll ask a few questions, the panelists will engage with each other, and then we'll move to audience questions when the time is right. So I wanted to start, Earl, with you. You know, you're actually at Commerce. Commerce is driving a lot of these things. You're in the engine room. How is the reform process going?

EARL COMSTOCK: Well, thank you for that question. And it's a pleasure to be here with everybody. It's going very well. Secretary Ross is just incredibly enthusiastic about this transition, the way the National Space Council has been reconstituted under the direction of Vice President Pence. We have the full support of the president, which is just fantastic. So this has been quite, I think, an engaging process for him and one he's very excited about. So that's trickled down immediately to the department. We are moving sort of full steam ahead. Obviously, there's an administration process here. And that process is continuing through the direction of the Space Council. But at the moment, we are actively, as the secretary has said, moving the Office of Space Commerce and reconstituting a backup under his direct supervision. And that's ongoing and making good progress. So we have to - we still have to go work with our colleagues in the Congress who have to approve the reprogramming. But we anticipate that will happen in the near term. And in the meantime, you definitely have the secretary's full attention and focus on this matter. So we've met a lot of hardworking staff in the department who have long been working on these space issues. And they're very excited by the attention they're receiving and the input that the secretary has had. So those people will all be continuing to work on these things. But they'll be moving up and working more directly under the secretary, which will be, I think, a real benefit to moving the process along.

And just to illustrate that, we recently had an incident where SpaceX, after their successful Falcon Heavy launch, people reviewed that and realized that there was a remote sensing issue connected with the second stage of that. And so as they went to launch another satellite, in the space of four days, literally, we were able to get a license moved through, which essentially had never been done. It did have a restriction on it, which caused them to have to turn off the feed. But the point was we were able to get through the process, get the license issued. And now we're actively working with them on a longer-term solution to this issue because, obviously, the remote sensing act is more focused on cameras that can actually see Earth imaging very well as opposed to simply the GoPro camera that's looking to see if you've had successful separation and deployment of a satellite. So we're trying to make those adjustments as we go along. But I think that just illustrated the kind of thing that can happen when you have this level of attention from the administration on the process.

DE VRIES: Will you expand a little bit more? You were talking about the way NOAA used to manage, or does currently manage, remote sensing. How do you envisage that changing? What's the vision for how these processes will work?

COMSTOCK: Well, it's as I said. I don't want to get too far out in front of the reprogramming. But, basically, there is an Office of Space Commerce. There is a director position there that hasn't been filled for the last, I think it's 10 years. So we are actively in the process of bringing somebody on board for that. And we're going to move that staff up. And again, as I said, the main difference right now is you have just tremendous focus by the secretary and the secretary's immediate staff on this process. What do we need to do to reform it? How can we work with the other agencies, I think, over at DOD and Transportation? They're getting a higher level of visibility as well. And so that whole process, really, through the space council and the efforts of Dr. Pace and the vice president have, I think, just elevated the whole thing so that there is this attention. And as the secretary pointed out, I mean, we literally got to the point where the U.S. lost the space launch business. And now, obviously, we're back in full force for the commercial side of the equation. And there have always been the military launches and the government...
launches, but now we're back seeing a real revitalized and engaged commercial sector. And that's - I think that's getting everybody's attention.

**DE VRIES:** One of the things you said was you are pushing ahead, but you also need to look to the Hill for work that has to be done there. Mike, do you want to talk a little bit about what's happening there? You are very much engaged. You can tell us what's passed recently and what's on the slate.

**MICHAEL MINEIRO:** Happy to. I do have to make a disclaimer. I speak as I understand the committee's position, but I'm not speaking for the committee. And for the reporters in the room, that's an important distinction - so I'm not speaking for the members or the committee. This is my view as I understand it.

**ROBERT MCDOWELL:** He wants to keep his job, OK? So, got that?

(LAUGHTER)

**MCDOWELL:** Got it, OK.

**MINEIRO:** All right.

**MCDOWELL:** All on the same page.

**MINEIRO:** All on the same page. So first, let me thank the Hudson Institute for organizing this. I think this is a well-timed and important event. There's a lot going on, and this is real help to the community to move the public discourse forward. With regards to the Hill, I'm happy to report, last week, the House of Representatives passed a bill that Chairman Smith, the chairman of the science committee - I worked for Chairman Smith - was his signature legislation. And what that bill does - it's called the American Space Commerce Free Enterprise Act. It accomplishes two policy goals: one is to reform the regulatory and statutory construct that governs space remote sensing in this country, and the other is to provide a minimally burdensome, but effective, mechanism for the government to authorize and supervise private U.S. space activities to be in compliance with their Outer Space Treaty. That's the policy philosophy of the bill. So that's the great news, is the House has taken an action. It was a bipartisan voice vote, which essentially means unanimous consent in the Senate terms. And it's been sent over to the Senate.

Another legislative activity that happened two weeks ago was the NASA 2018 Authorization Act, which was marked up out of the House science committee. So for those of you unfamiliar with the processes, it was introduced; it was referred to the science committee as the committee of sole jurisdiction; and then we went through a legislative hearing to determine whether to send it to the House floor for consideration. It left the committee on a bipartisan voice vote, and so we now have a bipartisan 2018 NASA authorization bill. For the House is - in its entirety, its consideration. From a policy perspective, it does many things. It reaffirms the exploration activities of NASA, like SLS Orion and the ground systems development. But also, it does some other things which are novel to the administration's positions in space. If you look at the president's budget request, he had a number of actions within that request he was requesting, which was designed to move the ball forward in the exploration agenda of NASA to empower NASA to find creative ways to work with the private sector for services - for example, lunar services - that could complement the science agenda of NASA.

And there's also some discussion in there about what's the future of the LEO human spaceflight program and the requirements of NASA look like, particularly as it relates to the ISS. And that's a very important and ongoing discussion that the Hill and the administration are having.

So those are the two major pieces of legislative activity that just happened within the last two weeks. There's also a smaller bill that was marked out of committee on a bipartisan vote about four weeks ago, introduced by Representative Poe, called the Commercial Space Support Vehicle Act. This is an act that addresses a certain class of vehicles that can support a space flight, like a Stratolaunch or like a Virgin Galactic sort of airplane, that might have other uses. And so that bill is designed to empower a mechanism for those uses to be provided to the public for compensation, but in a way that meets the other public interests. So those are the three major legislative activities - just in the last month - that's happened on the House side.

**DE VRIES:** And so my understanding is that, to some extent, that the action now moves to the Senate. Is that right?

**MINEIRO:** Yeah, that's usually how it works on the Hill. The Senate is the cooling saucer, I think they call it.

(LAUGHTER)

**MINEIRO:** So we're all...
MCDOWELL: That's very diplomatic for a House guy.

MINEIRO: Yeah.

MCDOWELL: (Unintelligible).

COMSTOCK: As a former Senate staffer...

MCDOWELL: Yes.

COMSTOCK: ...All I...

MCDOWELL: Let them duke it out.

MINEIRO: Thank you for that remark, yes.

(LAUGHTER)

COMSTOCK: We do cool the temper...

MINEIRO: Cooling it down.

COMSTOCK: ...In the House.

MINEIRO: But at the staff level, I talk with both my Republican and Democratic staff colleagues on a fairly regular basis, try to maintain open communications. I hope that their members desire and move forward with the introduction of legislation on both of those fronts - on the commercial space front and on the NASA authorization.

DE VRIES: One of the things that I think we'll get into in more detail as the conversation progresses, but I just wanted to get you to speak authoritatively about is the difference in the structure between the House side and the Senate side. So when I think about the issues in space, traditionally, at least - you know, the one is "stuff is going to bang into each other physically," and "stuff's going to bang into each other in terms of radio signals and receivers," so you - which is, you know, framed as space and communications. Now, on the Senate side - and I think it's differently structured from the House. Could you say a bit more about that?

MINEIRO: Yeah, that's - and before I address the institutional constructs of jurisdiction. I think it's a relevant question for another reason, which is, I think, why we're actually on the panel today, which is what's happening that we're all talking about this. And so one of the things you'll see when I articulate the committees we work with on the House side and how the Senate is structured is that new private space actors - the private sector doing something new and novel means the government's asking questions. This is a really good problem. If the government was the only one doing anything, we wouldn't have any laws, really. I mean, maybe we would have a few. But it's when the private sector goes out there that the public asks what's the public equity in that activity. How do we balance those equities with the needs of national security or foreign policy or other needs? And so this is one of the reasons why there's this sort of interest now and a real debate because people are doing real stuff, and that's exciting.

And when you look at the structure of the House - I won't get into the nitty-gritty - but essentially the House science committee under the House Rules has jurisdiction over outer space and control thereof. And traditionally the way that's been exercised is it includes oversight over NASA. It includes oversight over NOAA space activities. It includes oversight over the regulatory functions related to operations. So it would be the remote sensing or the launch and re-entry. The spectrum falls primarily into the Energy and Commerce Committee of the House. So you do have this interesting observation from a spectrum perspective that you have two committees with relevant equities - the same thing when you look at the Transportation and Infrastructure Committee because the Office of Space Transportation is in DOT. But, you know, we are the committee that moved the legislation forward for the legislation that enacted the Office of Space Transportation. And if you look at the 2015 Commercial Space Launch Act, that came through our committee. And so you have another committee that has, you know, an equity. If you look at the Intelligence and Armed Services Committee, on their face they have equities - right? - the DOD and intel community. And when you switch to the Senate, what I think is interesting - and, you know, you gentlemen can speak probably more astutely than I can - is that the Senate Commerce Committees can capture the Energy and Commerce and the Transportation Committees on the House side. And it allows their members to look at the issues set from a jurisdictional perspective in a different way and in some ways empowers them to address issues in different ways as well. So that's the biggest difference between the two.
DE VRIES: We'll probably get into some of these questions about how the equities get balanced, but I'd like to step back a little bit. Rob, you've actually been around the houses a lot. You've seen all the unintended consequences. You've seen how unexpected things can derail processes. Would you like to give a bit of - sort of a reality check on how this thing might play out or might not play out?

MCDOWELL: Absolutely. And first of all, many thanks for moderating this. Many thanks to Hudson Institute board member Margaret Whitehead for being a driving force behind this program and for our President Ken Weinstein for allowing us to do all this and also my fellow panelists. You know, when you're talking about space, you're talking about the infinite horizon, right? But we don't have an infinite amount of time. And by the way, I'd rather hear these two guys talk because I'm learning a lot. I'm taking notes. So I'll try to be very concise. But - and you're very kind to a has-been unelected Washington bureaucrat, so I appreciate that. So when I was an unelected Washington bureaucrat at the FCC, kind of to your point, I learned a lot about unintended consequences and things that are unforeseen that will come over the horizon - and in this case, quite literally. So I had adopted early in my first term sort of this orphan proceeding at the FCC. I was going to try to get more satellites up there, make orbital slots narrower. I mean, it was thousands of miles between satellites, an object that might be the size of maybe a bus, or even smaller. Of course, some were much smaller. And we could see the technology that was coming, that they were getting smaller. And, gosh, couldn't we squeeze in just one more in per slot? And this hadn't been a priority for the FCC chairman at the time, for a variety of reasons. Other matters just took priority. And so what are the odds of these satellites hitting each other when they're thousands of miles apart? And they're so small relative to their orbital slots. And right as I was starting to get a little bit of traction, a dead Russian satellite smacked into an Iridium live satellite. And, well, that was the end of that. So that was the end of my little initiative to try to get more satellites up there.

So it was the essentially greater odds of maybe being struck by lightning, which actually is not good. I mean, you could get struck by lightning much more easily. But since then, we've seen the skies, the heavens fill up with all sorts of debris. And that is going to be an ongoing issue that I think drives a lot of the policy here. And that is a classic place for government, national governments but also intergovernmental bodies to focus on. And, so, one of the products or byproducts of this great leap in innovation and investment is things like orbital debris. And how are we going to get your satellites, you know, just to launch past that cloud? Or what's going to crash into other things - among many, many other things. So there are so many issues here at play: geopolitical issues, environmental issues, economic issues, privacy issues. I mean, when you talk about space policy generally, really it is infinite in terms of number public policy issues here.

DE VRIES: Are there ways to prioritize?

MCDOWELL: Well, some of that's political, right? So some of it is a matter of engineering and logistics and what's necessary and what's going to be necessary in a time horizon of five to 10 years. And some of that's going to be just the political aspect. And I don't mean big P, necessarily - R. versus D., republican versus democrat - but of just which committee is going to have jurisdiction. Who's going to be driving it in Congress, or which office of the executive branch or an independent agency where I was? So there are a lot of piece parts of government here that determine this mosaic we call a space policy. And it really needs to be much more comprehensive and streamlined. As Earl and Mike were both pointing out, there have been great leaps and bounds. We have new and novel technologies, but government has not really kept up with trying to figure out how to deal with all this. And it's going to have to, because it's going to becoming an increasingly part of not just our economy and our lifestyle but throughout the developing world as well. And so you're going to have 194 nations all very interested in space policy. And they will all have their own agendas.

DE VRIES: We'll come back to the World Radio Conference. I just want to turn to Earl because we've now touched on this thorny subject of space debris or space safety. One of the actions that you've taken is to actually have the plan to move some of the activities out of the DOD into the Office of Space Commerce. Could you say a little bit more about what the philosophy is there, and what you think one can achieve by doing that?

COMSTOCK: Thank you for the question. And obviously, this sort of explosion of activity and the potential for debris - pardon the pun, but - is part of the driver here. I mean, essentially, DOD has done a fantastic job of providing, sort of, a public service - all this time in terms of tracking objects in space. But now as there's more and more actors, they would like to find a civilian agency that would undertake that mission. So they'll continue to be involved obviously. They have the resources and the capabilities to track all these things. But then in terms of providing an interface and hopefully a two-way mechanism in getting, there already is feedback coming into the DOD from various companies as to what's up there. But again, as that expands, they look at this and say, this isn't part of my core mission. This is, you know, sort of an ancillary service. There really should be a civilian agency that's the public face of this. And so that's one of the objectives that the Space Council identified is: how do we transition, you know, this process, continue to maintain the resources of DOD doing this, but relieve them of the burden of having to interface so much with the public? And that will now take on a civilian agency face, which will be the Department of Commerce. And we're excited about that role. It's going to be a challenge. I think many of you are aware, I
One of the things we will be looking at in the licensing process, either through the legislation or through whatever capabilities the administration might have, is: how do we ensure, as more and more people go up, that there is essentially a - you know, I guess to borrow a philosophy from the environmental side, you know: “Pack it in. Pack it out.” You know, I mean, take whatever you take up there. Bring it back. You know, and don’t leave it floating around up there for others to run into. So we’re obviously looking at that issue right now and trying to figure out, what are the mechanisms? You know, I think the core objective that the Space Council has is, really, how do we keep the United States as the flag of choice for companies that want to go into space? We would like to get these companies to come here and launch, and I think there’s a real logical reason for that. As has been pointed out, under the Space Treaty, there is an obligation to licensees. And I think what we want to ensure doesn’t happen is that we see, essentially, flags of convenience pop up all over the world. People just say, you know, give me a million dollars or whatever the price may be, and we’ll put our flag on and send you up without any sort of oversight or assurance that there’s going to be responsible space practices. So that’s a real objective that the administration has.

DE VRIES: Yeah. I mean, the thing that’s interesting – when you say flags of convenience – is forum shopping, offshoring: the kind of things that we’re trying to avoid. One of the things that is intriguing is where to strike the balance between making it easy for people to operate and then creating an environment globally where there are responsible actors. So one of the things, for example, Mike, that I noticed in the House Resolution 2809: the approach is essentially self-certification at a presumption that approval will happen, which is very good news for companies that want to innovate and want to get ahead. Now, if I compare that to the way the FCC, for example, works, that’s not the way the FCC works. To what extent will you see this creating a race to the bottom, where the U.S.’s environment is so permissive that other countries will also create permissive environments - countries that don’t have as strong institutions as the U.S. does?

MINEIRO: Right. So let me just touch on a few points to answer that question. So first, at a meta level, I think what’s really interesting is that the administration and HR 2809 and the House position align to the following principle, which is: the United States should be the jurisdiction of choice for foreign investment, and for people to come here and to create and build businesses in space. At the same time, there’s a recognition that there’s national interests, including compliance with their international obligations that needs to move forward. Now, you can debate the specific language in the Free Enterprise Act, HR 2809, but that’s the policy philosophy. Now, there is language in there designed to strengthen the international regime. If you look at how the definition of who was captured under that regulatory schema, it’s designed to prohibit flags of convenience. If you look at how other states have interpreted their treaty obligations to authorize and supervise, some states will say, “if you go to another country” – right? – “it’s kind of not our problem.” I won’t name the states. But there’s a few states who basically said, “we’re not going to worry about authorizing and supervising you. We’ll launch you.” Some states will launch without authorization and supervision. And so one of the things that that bill does - and I don’t think - it’s very technical, so people don’t talk about it. But it actually strengthens the ability of the treaty to function. And it tries to plug gaps, which is a really useful thing.

DE VRIES: Yeah. I mean, one of the things that struck me - just to go back to Earl for a second. You said, you know, you’re excited that this is going to be a challenge. And, you know, one of the things that strikes me as perhaps a challenge is just doing all the approvals as this business gets bigger. How much resource do you need in the Office of Space Commerce to do all the work that you see coming down the pike?

COMSTOCK: Well, I don’t know that we have an exact number. But, obviously, we’re looking ahead to both possibly a modification in FY ’19, and then, obviously, all of the administration is starting to prepare the FY ’20 budget. So certainly, by then, we expect to see an increase in resources. As I said, we have a reprogramming request that will be going up shortly, which will allow us to get some more resources if the appropriations committees approve. So I mean, we’re seeing this sort of ramp up. You know, fortunately, we’re trying to match the private sector as it expands and as more has developed.

You know, to your point about what will prevent the flags of convenience, don’t forget: as novel as space may be, this is much like some of the conversation that goes on with the Internet. It’s not so novel. You know, there’s a lot you can draw to from maritime experience.

And frankly, in the maritime world, one of the key drivers was insurance. And I anticipate that as the industry gets bigger, the insurance community will see a financial opportunity. But we will look to things like insurance to try to drive some of this, so that, in other words, if you set up a regime where the United States is - you know, sort of has a clear oversight mechanism, to Mike’s point, that’s not onerous but that facilitates business. And they see that: look, if you go to the United States, and you go through their process, we, the insurance community, have a certain certainty that, you know, this is not just a fly-by-night operation, that somebody is taking a look at this. There are reasonable measures in place. We’re hoping that the insurance
community then will step up and start putting pressure on responsible companies to say look: if you want to do this, if you go to this flag of convenience, no insurance. If you go to the United States, you’ll be insured.

And so there are market mechanisms out there that we intend to try to facilitate. And like you said, there are examples that you can look to. And obviously, as the United States builds up what we consider the best practices, we’ll be taking those to the rest of the world, saying this is the way responsible states should do that. And we anticipate that you know the EU, Japan will all follow suit and - or work with us to develop common goals. And then hopefully, that will translate into the rest of the world as well.

MINEIRO: If I may follow up, I want to clarify something. You talk about the race to the bottom. And the question is: what race to what bottom? What do I mean by that? So we can go back to the Free Enterprise Act because I work for the committee. That's their bill. So I'm going to go to that for a minute and then talk bigger policy. So in the Free Enterprise Act, there were basically two policy thrusts. One was to reform the existing remote sensing regulatory system. So that reform, in and of itself, had to do with restructuring how the system is balanced for or against presumptions of approval or denial on the basis of national security. And when the regulatory schema was created under Scott Pace's tenure in 1992, when the law was enacted and then put into place by regulation in ’93, there was no one up there doing anything, and they were just starting. And so it made sense to say, hey, this is a Cold War technology that we don't know what the implications are for the United States' interests. So we're going to presume there's something wrong. We prescript a principle here.

You fast-forward 25 years, and it's become more of an information technology that fits into a broad ecosystem - UAVs, Insitu, airplanes. It's one of many ways people get information. So the question for the members I serve was: is the balance from 1992 still the right balance? And their answer was no. They said we need to shift the balance and allow it to be more like this, more of a balance - a true balance. And the way they did that is they put the burden on the government to provide some evidence basis on why a license should be conditioned or denied for remote sensing, which on its face seems reasonable if you believe that you want to empower people to move forward and innovate but at the same time balance the public equity. So I think in the remote sensing arena, there's no race for the bottom within the United States. However, I think countries that don't have any national security equities can immediately start at the bottom. So if you're a country that doesn't operate anything in space, or you don't care about national security space, then you have no incentive to ever provide any condition at all. And so the United States, in a way, takes the high ground. It's self-interested, but it's the high ground. Now, when we're talking about the second provision of the bill, it does a very discrete thing to very discrete issue. And that has to do with creating an explicit authorization schema to meet Article VI of Outer Space Treaty compliance.

Now, if you get in a time machine, and you go back three or four years ago, there were two companies in America who wanted to go and do things operationally in space. There's Bigelow Aerospace. They wanted to go up there and get permission to put a hotel up there. And then Moon Express, which is a moon rover company. At the time, it's still actually - it's still today. There's no clear explicit authority for any government agent to provide on-orbit regulatory authority to assure treaty compliance. And so Moon Express ended up going to the FAA because they were going to be on an American-licensed launch. And under the FAA's rule structure, if no other government agent has provided a license or permit to authorize the activities up there, the FAA gets an opportunity to look at them - look at that payload not only for public safety - for the safety of people on the ground - but also for foreign policy and national security. So that's how Moon Express in 2016 got up into space. But the press release from the FAA was very explicit. You go to the very last paragraph, and it says, we cannot promise in the future we'll be able to authorize a payload on an American-launched vehicle because we're not sure we're going to be able to assure we're satisfying authorization and supervision under the treaty. And so a number of ideas sprouted up. They all had this similar theme, which is you create some way for the government to look at what's going to be proposed to be operated in space and allow the government to make a decision whether or not it meets the treaty obligations of the United States.

So HR 2809 is a - the idea behind it is one way to solve that problem. The way to solve that problem in that bill is to give it to the Department of Commerce. It's very consistent with the administration. It was actually a year before the administration proposed all of this. But the idea was give it to Commerce, elevate the remote sensing office, elevate the Office of Space Commerce, consolidate them under the secretary, and then allow for this additional mechanism, which is minimally burdensome, for people to get the necessary authorization to say, "we're compliant with our international obligations." Now, reasonable people can disagree whether you need to add on top of that, or you want to make it a more coercive regulatory structure. But that was the philosophy of it. And to note about the race to the bottom, to my knowledge not one country has ever démarched the United States to date that it's not in compliance with its treaty obligations. So here's the United States trying to take a step forward, even though no one's ever called them and said, “hey, you're violating your treaty obligations.” So to the United States' credit and to the House's credit, they're actually trying to move the ball forward on behalf of the international community.

DE VRIES: So that's, I think, a very good example of trying to establish best practices ahead of the game so that other countries could follow. I mean, there are many moving parts here in terms of agencies. You've mentioned the FAA here. We've
got commerce. I'd like to turn to the FCC for a little while and actually to go back to geopolitics. Commissioner McDowell, I'm sure, has spent many sleepless nights in the bowels of a hotel in Geneva at World Radio conferences. You've seen how difficult it is, I'm sure, to negotiate with 192 other countries. How do you see that playing out particularly with space and satellite communications? What are our geopolitical contexts here?

**MCDOWELL:** And so just like, you know, we talk about space policy, and it's glamorous. And then Earl pointed out the very practical application of insurance law and how that quickly becomes mundane. You're like, "Oh, really? This is going to be an insurance policy conference?" But it does then boil down to the variety of interests of all the member states of the International Telecommunication Union - there's no "S" on that one - Telecommunication Union - just one communication - and the World Radio Communication Conference. We have one coming up next year. So the WRC as we call it - WRC '19 is coming up. And so for those who don't know or those who are playing at home, you can't just launch a satellite anytime you want. There are orbital slots that are regulated by treaty. There are radio frequencies that they use for the operation of the spaceship, as well as whatever its core function is, as well. Those are also governed by treaty - harmonization and also national governments - within national governments. So trying to find consensus takes years. As soon as one WRC conference or treaty negotiation is resolved, you immediately start the next one essentially through working groups. And it's an ongoing process. And as it's already been pointed out, so, you know, if we look back to the 1960s - I was born in 1963, so it was the Space Age. And that all seems so quaint now. That was the Space Age? That's like the old video game Pong...

(LAUGHTER)

**MCDOWELL:** ...As the state of the art of computer, you know, gaming. So obviously, we've come very far since then. And other countries - you know, back then it was the Soviet Union and the United States. And now it's far more countries that are involved in this game - both with their own launch businesses, their own operations, as well as just gaming the system maybe for other purposes. So they all have a stake in this. Or they want broadband in their developing country, and they want to proliferate more low Earth orbit satellites that might help deliver that more cheaply to their population. Or they don't want broadband because it's an authoritarian regime. Therefore, they're going to try to thwart that. So you have all those counterpressures going on all the time. And then you've got business interests. You have satellite operators. You have mobile broadband providers. You have the unlicensed community, some of which can be all the same, but you have a lot of different constituencies, you have governments. You have a lot of different constituencies within the radio frequency neighborhood - right? - as to who wants what for what frequency. As we've seen, these higher frequencies - over the past 10 or 15 years especially - that have traditionally been used for satellites, now there's a big push for a lot of those frequencies to be used for terrestrial mobile broadband. And that drives tension as well. So it becomes much more complex. As far as I know - Earl, I don't know, correct me if I'm wrong - we're still looking for WRC ambassador. I don't know if one's been appointed yet. So any volunteers from the audience, feel free to let us know. They're still looking for one.

**DE VRIES:** You mentioned going up to higher frequencies, and I think that's one of the things that struck me about the conversation about space. I thought that, you know, the big issue really is space debris. And the stuff that I'm interested in, which is radio interference, is secondary. But it turns out that the satellite industry is very, very exercised about what's happening, in fact, in the U.S. preparations for what's going to be happening in Geneva next year. And that goes to the balance between terrestrial interests - 5G, anybody? - and satellite. So how should one think about making that trade-off?

**MCDOWELL:** It's very difficult. First of all, just in the debris part, there are thousands and thousands of piece parts up there. It's a cloud, right? And just to be able to launch a satellite through that gets more and more treacherous every day. Right? So how do you resolve it? It's small-P political in a lot of ways. You know, when I was a commissioner, I always liked to defer to engineers. Like, I don't care what the various business interests want. Tell me if this works or doesn't work. I don't know how much analysis like that is still done. I've been out of government for five years. And I know with these gentlemen, there's a lot of the "let's work it on it from the merits." But it is very intricate and not easy, by any means.

**DE VRIES:** I mean, one of the things that's striking, though, is that the regulatory business model is different for the satellite industry and the cellular business because the cellular business gets its license by auction, whereas satellite doesn't.

**COMSTOCK:** Well, I think you raise - I'll jump in here for just a bit. But again, from the policy perspective, I think there's a couple of things that everybody needs to keep in mind. You know, obviously, this is something within the Department of Commerce, the NTIA is taking a close look at. You know, the challenge for satellite is obviously that it's typically a global operation. And even on things like 5G and terrestrial, there is a lot of effort to harmonize sort of things really for the convenience of people moving around. But you can put in different chips and operate in different bands sort of globally. For satellite, your challenge is that you're typically sending a much weaker signal from space. And particularly as we get smaller and smaller devices and smaller and smaller power levels, if you're going to utilize that, you do have to have this global coordination. It's just not possible and would frankly be a huge impediment to business if people had to go country by country.
by country to get authorization, whereas in the terrestrial communications world, at least to this day, things are still done much more on a country-by-country basis. So the companies typically operate more in that kind of footprint.

So I think there is a distinction, and that's recognized in U.S. law in that, yes, we don't auction the satellite spectrum. We do auction the terrestrial spectrum. Different business models, different approaches. I think from the secretary's point of view, and certainly from the fact that it's recognized in the recent Space Council documents, there is a concern within the administration that we need to make sure that, as we go forward, and we obviously want to facilitate 5G, we want to facilitate broadband, but we also want to keep an eye on the future of if we're going to have this expanding space market, we don't want to discover that we've basically stunted the growth of that market by denying the spectrum that might be needed for those transactions. So it's going to be a balancing act. It's going to be something that people have to take a hard look at. But we are very cognizant of the fact that when you're looking at the space regime, we are looking to the future. We're looking at an expansion of this. It's a very significant expansion. And so we want to move very carefully in terms of any changes that might end up shortchanging that ability to move forward in space.

DE VRIES: To pick up on your point about, you know, denying access because of interference issues, just settling back to the denying physical access question, we were talking a little bit earlier about debris. As I understand it, the terms of space situational awareness and space traffic management...

COMSTOCK: Right.

DE VRIES: ...Which to me really is just the difference between what's up there and what do we do about it. My understanding is that, so far, the administration - and in fact the legislation, too, I think - has given some pointers on space situational awareness, moving the public-facing function to the Department of Commerce. How should we think about the traffic management, though? Because, again, there's a number of different ways to do that. There are a number of different agencies in the game. Can you say anything about the outlook?

COMSTOCK: Again, that's an area that is being looked at heavily by the Space Council. And we're looking to develop that. I think much as the approach in the House bill, the initial approach will be to try to basically set out best practices and not look at extensively regulatory regime. But obviously as we learn from the situation, that could change. But the goal of the government and certainly what the DOD has been doing in the past is as we see potential collisions potentially arising, they've been very good about notifying operators to say, "hey, you may want to take a look at this." The challenge, as I understand it - and I'm not an engineer - is, you know, they can sort of project out - OK, if this object continues to go way and this one goes this way, it looks like they might collide. But you're talking about something where we don't have super precise measurements in space. So they can basically alert people, "you might want to take a closer look at this. You know, you're the operator of this object, so your call as to whether you follow the instructions." But they definitely give you a yellow flag that you ought to take a look. And we intend to try to continue that practice.

MINEIRO: If I may - just to follow up on that, so neither the House nor the Senate, to my knowledge, has introduced legislation - this Congress - specific to space situational awareness or space traffic management. I think the only quasi-exception is - and you can go look and correct me if I'm wrong - but I think the NDAA as marked up in the strat committee on the House side last week had a provision specific to this telling the DOD...

DE VRIES: NDAA?

MINEIRO: The National Defense Authorization Act of 2018 had a provision in the mark - the subcommittee mark - directing DOD to get out of this business of being the public service provider within X number of years. I don't want to misquote the bill, but that's essentially what I think is happening in the strat mark that happened last week. So the reason I wanted to highlight that is, at least for the members I serve, they've not taken a position. So there's a lot of trade space about everything from roles and responsibilities to, what are we doing and why?

Now, from a cognitive framing perspective, the way I try to frame it internally to help explain things and to work through problems is as follows. There's really three issues, three policy issues: science and technology, space situational awareness, and behavior. You can call it management, or you can call it behavior. I call it behavior. And when you look at those three buckets, you begin to look at the problem set differently and the solution set differently.

So for example, Earl referred to the fact that on the S&T side, we have a fundamental challenge of even having sufficient knowledge of where things are at with sufficient fidelity to know whether or not to move. So that has to do with everything from: in situ measurements of debris, to working with algorithm development, to working with big data problems, with improvements on fundamental technology for radar. There's all sorts of things you can do to solve these sort of science and
technology issues. And that's one policy area we need to focus on. The next one, which is what DOD currently does under 10 USC 2274, authority, commonly known as sort of the public SSA services, is if...

DE VRIES: SSA?

MINEIRO: SSA, space situational awareness - is the DOD, free of charge, will help people - if they ask for it - to be warned if there's a possibility their satellite is going to hit a piece of debris or another satellite. And so from an SSA perspective - space situational awareness - there's a number of questions we have to answer. If the DOD isn't going to keep doing this, which government agent (or, if any government agent?) will do it? Do we need a government agent to do it? If it is a government agent, what agent and to what end? How, if at all, should the private sector be involved? And how do these activities relate both to the S&T function and to the behavior function? And that comes to the last bucket, which is within the question of behavior. This is where people really get interested because what you're really talking about ultimately is, what do you want people to do up there? Do you want them to turn left or right to avoid each other? Do you need to force them to do it, or do you need to incentivize them to do it? Do you want people to develop ways to minimize debris falling off? Do you want them to force their satellites to go back into the atmosphere?

It's really about behavior: how you make the thing, how you launch the thing, how you get rid of the thing, how you operate the thing. And so in the behavior spectrum, you have all these different tools you could use depending on your perspective. You could have non-coercive bottoms-down behavior, like a standards development construct. You could have coercive bottoms-down behavior, everything from an international regime flowing into a domestic regulatory schema. When I look at all this, the one model that seems to make sense on its face is how we did the orbital debris mitigation guidelines in the '80s and '90s. And what we did there is we got a bunch of technical people together at NASA at the agency level. And they said, "what are some technical standards we should follow?" They socialized those with their like-minded space agencies. And then in the '90s, they came up with common technical standards which were then adopted in domestic regulatory schema and then were floated into an international consensus-building process through the U.N. So it took about 25 years to get to a point where people felt quasi-comfortable there was a consensus on basic space debris rules. So is it going to go that way? I don't know. But in my mind, these are like the policy buckets and the policy issues that everyone's pulling at.

DE VRIES: So what I'm hearing – and correct me if I misunderstood – is that there are all these different models of dealing with this problem, same will be true for all the other problems. There's the bottom-up, there's a top-down, there's the Goldilocks in the middle. And right now, we haven't really made our mind up. My sense is that the administration, you know, is minded to do a bottoms-up guidelines process. I wonder, if we have 25 years - you know, we have 25 more years of thousand-satellite constellation launches.

COMSTOCK: I think to that end - you know, and again, I - be cautious here. I'm not speaking for the administration on this first. It's just, you know, my Earl Comstock, Policy Director at Commerce. You know, I think that's - what's evident from the Space Council's efforts is that, no, we don't have 25 years to solve this problem. So you know, I think the philosophical approach is to say, 'are there collaborative methods we can use with industry to solve these problems?' Are there things that we can sort of set out as guidelines? You know, model behavior? Whatever you want to call it. If we need to, you know, we can always then look to regulation. And that's where obviously things like having Congress pass legislation, provide some greater clarity on that. But I do think what you're seeing with the Space Council and the others is a recognition that, you know, before, we kind of had this luxury. There were a small number of players. It was a very select club. You know, there were huge barriers to getting into space. Basically, you needed a massive government effort to get there. That's no longer the case.

So we're seeing, you know, faster and faster iterations by the commercial sector of how to get up there. You know, if you fast-forward five years from now, it's going to be a vastly different picture than it is today. And if you talk to any of the companies that are doing launches, they're literally down saying, you know, we need to get our tempo up to where we're doing a launch week. Some might even say a launch a day. So at that kind of speed, there really is a need. And that's what the Space Council is trying to fill, is to say we need to get - you know, we, the U.S. government working with industry, need to get out there and start figuring out, what are the mechanisms? Because we do have this space treaty obligation. But more importantly, if we don't, it's just going to be a chaotic Wild West scenario, and that's not going to end well for somebody. So rather than wait till there's a real problem, we'd like to try to get in front of it and set this up. And so that's why I think you're seeing a real whole-of-government effort to put those kind of structures in place and see what's needed. I mean, we're not sitting here saying we have the answers. We're saying we see that there's a definite problem. And it's getting bigger, not smaller. So how do we organize ourselves to get in front of it and hopefully provide a stable regime to encourage folks to come here and make the United States a flag of choice?

DE VRIES: So we have, you know, the two sides of government, whole-of-government approach to try and make this work, which is really admirable. Rob, I want to turn to you because you're no longer in government. If you were advising a client
who's looking at this space, who is in this space and that person says to you, “what's going to happen? What should I expect? Is it going to get more chaotic, less chaotic?” What do you advise them?

MCDOWELL: So first of all, to Earl's point, an excellent point which really kind of underscores, maybe, this whole conference, is the barriers to entry here are much lower and will continue to be so. Right? So we can't even really imagine it, I don't think, even five to 10 years out. And I know people are trying hard to imagine it. But it'll probably be even more energetic and cheaper to get into this business than it was. I remember years ago when I was commissioner talking to somebody in the satellite industry. The most common word associated with the satellite industry is bankruptcy. Right? It was just hard. He had to plan years in advance, build the spaceship, build the launch vehicle. And by the time it got up there - and you insured it, by the way - and if it didn't blow up on the launch pad, or somewhere in between, then it was obsolete almost, you know, within Day One because that technology was now, you know, 3 to 4 years old. So that is quickly passing, right? And so I would let them know the good news is the economic barriers to entry are lower. But there are a tremendous amount of logistical challenges here. I think it gets more and more complex.

It'll be more competitive, and that will drive cost down and innovation up. And that's all good for the consumers of these services. But at the same time, because of all the issues we've discussed regarding debris and harmful interference, radio frequency and all the rest, that's going to force a lot of difficult questions. And back to what I originally said: will government or governments be able to respond as quickly, both multilateral governments, as well as national governments? And that is what we don't know. That's the big X factor. So when I advise clients just generally about any area that's regulated, regulatory risk is a big part of almost any calculation. And so we've seen a great illustration here of how many decades these discussions and these ideas have gone on. Mike was just talking about an idea from the '80s, now 30 years hence, is being revived and revised. And that's terrific. But this will continue to be iterative. So my biggest word of caution to anyone getting in this business is there is regulatory risk here. And we just don't know where it all lands.

DE VRIES: So we're going to turn to the audience for questions in a moment. So please think about, if you want to ask a question, what your question is. I just want to follow up with Rob on what you've just said, though. One of the things that investors and companies crave most is certainty. We all do. And as you say, there is regulatory risk. What's your sense about the trend? Is there more or less certainty now that the administration's got its teeth into this problem? Is the regulatory risk going up or down?

MCDOWELL: So domestically, I think, actually, we've seen some tremendous leadership and focus. Some very tough issues are being met head on. It has the attention of the West Wing of the White House, throughout the executive branch and also the leadership of Congress. So I think domestic policy advisers and policy-makers understand that the U.S. is resurgent in this area. And that's a good thing for our economy and for our future on so many different levels: national security, geopolitics, etc., trade, everything. So domestically, I think we're on a good trajectory. Sorry to keep coming up with the puns. They're really totally unintentional. Internationally, I don't know. And back to what I said at the very beginning, it used to be the Soviet Union and the U.S. Right? And they had primarily just the governments, right? So Sputnik was not a private sector endeavor, as I recall...

(LAUGHTER)

MCDOWELL: So and we've come a long ways in those 60 years since Sputnik, which is hard to believe. And now you have France, India, China, you know, others all getting in this game with launches and services. And as it becomes cheaper, countries that we never would have thought could be in the space business are. They, at the multilateral level, at the ITU level, are all going to have their own national interests. And I think that provides - actually, you can make a case either way, so I'll try to be academic about this. You could say, if they're all getting into similar businesses maybe there's alignment on some issues. But they all are competing, so there's that regulatory arbitrage that happens. And I used to joke, but I was actually serious: the most common request I used to get when I was a commissioner at the FCC, when you boil it all down, whatever argument it is, if anyone walks into my door is, “please regulate my rival, but not me.” OK. So that's going to go out of the international level, too, right? “What can we do to hobble our rivals so we can prosper or get whatever it is we want?” So that I think becomes more complex, but feel free to disagree. Earl's not shy about disagreeing with me (laughing).

COMSTOCK: I would agree with you. Everybody does want their rival regulated.

MCDOWELL: This is true.

COMSTOCK: That is usually the main ask.

MINEIRO: I have an observation from self-reflecting on this discussion. And it's that regulating space isn't regulating space. So when we talk about regulating spectrum, it has to do with deconfliction, and giving out or allocating unlimited natural
resource. When you talk about space traffic management, you know, most people think physical deconfliction, or Orsha. You think about remote sensing, you're thinking about national security vs. private equities. And I think this is a really important observation because it's easy in the discourse for all of us to just say we're talking about regulating space, but if you begin to classify what you're talking about, not only do you identify this sort of stovepipe thinking we all carry in that subdomain, but you can then say, "well, how can I approach orthogonally," right? "How can I bring something that maybe this subset of the domain hadn't considered before."

MCDOWELL: For people who aren't as smart as you, what does orthogonally mean? Thank you.

MINEIRO: Different angle. And it might enlighten us as we move forward.

(LAUGHTER)

MCDOWELL: Can you spell it? I'm just teasing.

DE VRIES: He's taking notes.

MINEIRO: So to find different solutions set. So like, you know, I don't want to presume what the answers are for deconfliction physically. But there might be ways to approach that that don't necessarily have to resolve the same way we do spectrum, where the government says, "you go this way, you go that way." There might be a broader palette for us to consider about economic incentives or insurance incentives or self-interest. And I think this is a really important part of the conversation. The other thing I've noticed in our conversation is we're all operating - no pun intended - in an operational regulatory domain. And we failed to identify that when you're looking at our national interest – and I'll do that without any shame. I'm an American. I'll look at our national interest – if you look at our national interest, and why would we choose to regulate a citizen or entity's behavior, there's all sorts of reasons we might do that that don't need to be implicated through an operational regulatory schema. We have trade compliance controls. We have export controls. We have the Signals Wiretap Act, the Signals Intelligence Act. Like, there's all sorts of tools in the tool kit. As a nation, that might be more effective to use as opposed to regulate the physical operation of a satellite or a system.

COMSTOCK: Yeah.

MINEIRO: Let me just build on that one point. I think it's an important one. In sort of more colloquial English, I mean, the bottom line is (and this is certainly the experience I bring to this from looking at things like the Internet): most of the activities in space are activities that we've seen before. They may be, you know, new technology now or something else. We don't have to create a whole regime to regulate space. Business arrangements in space are no different than arrangements on Earth, same thing with spectrum, same thing with other things. There may be different policy considerations that you would bring to it. But I think that's one thing that allows the administration when we're looking at this, say, "look, we're not having to make this up out of whole cloth." There will be people who will advocate that, and say, "this is unique, never been seen before." But the bottom line is, a contract is a contract whether it's here or it's up in space, same thing with a lot of the spectrum things, same thing with the activities. Are you listening in on somebody's communications? Well, does it matter that you're in space vs. next door? So we actually have a lot of rules and regulations that apply to activities, and you don't even have to change the law. I mean, it's just that they're there. So I think the real thing we're going to be focused on is, is there anything unique that we have to deal with?

Then, like you said, I'll come back again to the insurance regime. Don't forget there is a treaty that basically says countries are liable for things that happen in space for people who they've authorized. And that's another element that the United States can use to basically help encourage proper behavior. We have courts, we have things: if you're allowed to bring suit against the guy that, you know, allowed his object to collide into you, and you can effectively recover here in the United States, that's another reason why people might think of coming here and being flagged - both in the United States - for their own protection, and also then to avail themselves of our courts and our laws in terms of recovery for damages from other countries. So, I mean, these are the kinds of things that we need to sit down and look at. How can we use what's already there – you know, not reinvent the wheel – and come up with a rational regime? And then for those few things that are truly unique to space and to the operation up there: do we need new regulation? Do we need new law? Or can we simply promote best practices that get us to the same place? I mean, I think that's really how we're approaching this. Because the goal is to do a minimally invasive sort of approach, to the extent we can, while addressing the significant problems, and protecting the national security interests that we do have.

MCDOWELL: Well, and then just real quick because I know we want to get some questions, which is actually a common thread between what the both have been saying I think is that there are market forces here. So, you never know how market forces are going to yield a nice positive result. Space policy has been very government-oriented, not private sector-oriented, from the
launches and the vehicles going up that were government-owned, to the treaties that governed that, et cetera. And now we're seeing this literally Space 2.0 where there's a turning point. And so what Mike was saying a minute ago sort of reminded me about spectrum policy, generally - and Ronald Coase, 55 years ago now - coming up with his paper on the FCC saying how spectrum should be auctioned. I'm not saying satellite spectrum should be auctioned. (And by the way, I should have said in the beginning, I'm not speaking on behalf of any client of my law firm. Is it too late for anyone to be mad at me? Can you be un-mad at me? I'm not speaking on behalf of anybody, including myself.) But that was considered nuts to auction spectrum. The government should hand out the license, either comparative hearing, or other types of processes – very litigious, usually – and, actually, it was adopted under a very bipartisan basis. Earl is one of the authors of that legislation when he was with Senator Stevens. And it has worked quite well. Again, I'm not saying satellite spectrum should be auctioned, necessarily. (Unless that's what you want, and then you agree with me.) But nonetheless, the point is: there are new ways of thinking that would have seemed unthinkable or impossible just a short time ago, which may resolve some of these thornier issues. And I think that's at the heart of both of what they're saying.

DE VRIES: Good. So let's turn to questions. Before we start, I just want to get a sense of how many people have questions. So everybody who has a question, let's just see by a show of hands. OK, so I think we have quite a few people. What I think we'll do is we'll take them two at a time to make sure that everybody gets a chance. Please introduce yourself with name and affiliation. And we'll start over on this side and work our way back.

UNIDENTIFIED PERSON: I found it interesting that each of the panels, in their own particular vernacular, approach this notion of an orthogonal perspective. Arguably, what we have done from a technology standpoint is basically work problems in a reactive mode, effectively after the fact. Arguably, we need an orthogonal perspective that could offer a way to get in front of the problems. I would argue, from my perspective, that if we thought of the functions that are to be performed, and what the customer requirements for those functions are, that might offer such an orthogonal perspective. And as mine - yeah, well, play on this - what our company is doing is trying to look for how you create a cislunar electrical power and ancillary services utility. That will be fundamentally transformative and - how could we do that? What is the perspective that's going to enable that sort of innovation and transformation of the market?

DE VRIES: Very good. Next question - let's take the gentlemen right at the back since he has a microphone.

UNIDENTIFIED PERSON: I'm an author with Wiley Publishers, doing a series on the history of satellite industry. And the panel's conversation about space situational awareness and space debris, I thought, was very useful. But it highlighted two alternative views of this, or alternative perspectives. One is domestic, and the other is global. The panel made clear that most of these satellite issues – frequency, debris – are global. You can't think of it as one country, another country. And then the panel also said that, well, on this question of space situational awareness, we have to decide is it the United States Air Force? Or is it the United States Department of Defense? Or is it the United States Department of Transportation? Or the United States, you know, Department of Commerce? Who should manage this? And there's a clear contrast between the global and the domestic. The domestic saying, the conflict is between private sector and government, and they have to work that out. And the global being: there's India; there's China; there's Japan; there's dozens of countries that are putting debris up there. So the question I have is: does anyone on the panel believe that the issue or the problems of space situational awareness and growing debris can be solved domestically by unifying totally America's approach to this issue? And secondly, if the answer - if anyone says, no, it can't be dealt with domestically – and assuming we don't have 20 years to come up with a global solution – is there any prospect of a international organization that manages, you know, space surveillance? Or I don't even know what the answer is. But maybe it's a NATO, or a U.N. or some multi-national undertaking that would deal with it. Thank you.

DE VRIES: Thank you.

COMSTOCK: Well, just to comment on that and, I think, to build off the first question too, you know, there are lots of new activities coming. And I think from our perspective, the United States can take a leadership role in this because it is a global problem. But on the other hand, I think if you tried to wait for an international organization, some people may still be around, but a number of us won't. So I think the Space Council's thinking is: let's take a leadership role on this. Let's get out there and do this. You're going to have activities. And I love that word, cislunar space. I had to think about it for a long time to figure out what that meant.

COMSTOCK: There you go. So, basically, it's an activity that's outside of orbit and out to the moon. So, you know, we are going to see those kind of activities happening in the near future, in the next five years, I would say. And, so, we can model this. We can set out a regime where we do this. And as I said, we're going to have to look at a number of different tools related to insurance, related to possibly litigation if people are poorly behaved. But we have, as a national security matter, an interest in monitoring what's going on up there. And I think, frankly, kudos to the United States government and particularly the Department of Defense. They've done a great job of providing a wonderful public service to the world in that. But as this gets more active, it's logical to try to say, let's create a civilian agency to basically be the interface. The reality is Department of
Commerce or any other department we might pick doesn't have the resources to do that space situational awareness. That is going to be DOD. Thankfully, they have a very great interest in doing that for their own reasons. But one of the goals we have is to continue to provide that public service to the globe, again, as a means of attracting people to the United States, saying, “this is the place you want to come and do business. This is the place to launch your space activities.” And I think if we can do that, it’s going to make it very appealing for folks in other countries to not only come here, but it’s also going to set a standard for the rest of the world. And hopefully, we can unite the club of sort of responsible actors – whichever governments those may be – and say it’s in our larger interest to have these global things so it doesn’t take 20 or 30 years and a new international organization to put that in place.

MINEIRO: Sir, I appreciate your question, but I want to address a common misperception that you articulated. And I alluded to this earlier, but I’ll reiterate it. Having data about what is up in space is distinct from being able to use that data to make a decision, which is distinct from having to make a decision either on a voluntary or a coercive basis. So to translate that: in 2007, Congress decided they were going to tell DOD to provide data and a small amount of service analyzing that data for both their self-interest and for the public good. Now, that's why we're having that debate, because there's no one else in the world with that much data right now. They've got really good data. And so if you start thinking about, what do we do to make more data available? How can we allow that data to be more useful? Right? You can look at the S&T component, and you can look at the question: is there a market force to generate an incentive for people in the private sector to create data and analyze data? Does that have to be a market force which is impugned through some regulatory requirement or not? And then you can end up - once you have better fidelity of what’s up there, you can then be able to ask the question: well, now since we have a much better idea of what's up there, should we talk about coercive or non-coercive behavior forcing? And I reiterate that because I'm not a scientist and it took me a while to understand. But there are things called error ellipsoids, which are around every object in space. And there is a high degree of uncertainty about where something is. So one of the things we need to do is increase our scientific fidelity of what the space environment is like.

DE VRIES: Thank you. So let’s have another round of questions. Let's do three this time. We'll start in the back and then this gentleman and then that gentleman.

UNIDENTIFIED PERSON: Thank you. [I’m] with Vector Launch, Tucson-based CubeSat launcher. And I have a question that's really directed toward Earl and Mike specifically.

COMSTOCK: Go ahead.

STADD: Earl, back in the ‘80s, I was one of the folks that helped charter the Office of Commercial Space and then went over to DOT as one of the early directors of now-AST. So I've seen both the promotional effectiveness of commerce, and I've also seeing the regulatory culture. And they are distinct. From your vantage point – and again, Dale, I'd like to have your legislative view of this – in a sense, what the secretary is doing with all of his enthusiasm is bringing those two critical cultures together, if you will. And I'm, again, curious: from your standpoint, what does that entail? What are the challenges?

DE VRIES: Well, very good. Let's just get two more questions. We're running out of time. I want to get as many people to speak as possible.

UNIDENTIFIED PERSON: What sort of coordination is there between the Commerce Department and the Hill in terms of the legislative proposal for commercial remote sensing reform - that was one of the recommendations of the last National Space Council meeting - and the legislation, like HR 2809 and whatever is going to come in the Senate, to actually create that change in law to enable that remote sensing reform?

DE VRIES: And one more question over there. Yes.

UNIDENTIFIED PERSON: [I'm] from the University of Colorado. And I wear a lot of hats. So in this case, I'm going to be speaking at a research university, as a research group that launches satellites. And we're talking about, here, people launching thousands of satellites. In this instance, you may just want to launch one satellite. It's going to be in orbit only for a few months. And that can lead to an awful lot of good research that's applicable more broadly. But a lot of this sounds like it may be very challenging or difficult for people who have an interest and can produce lots of good research. But this is an awful lot of regulatory hoops to get through if you're just going to launch a single satellite with a limited duration.

DE VRIES: We'll start with you, Earl.

COMSTOCK: Yeah, let me try to jump through a couple of them, maybe starting with Dale's point first. I think what you're going to see - and this, you know, again, is why we'll be looking at this – there are already people today who package launches. The tough part is getting your satellite up in the air first. So there are companies already out there that are packaging that.
And I think one of the services they provide in that process is, essentially, a little bit of a buffer and an interface with the regulatory regime. So they're the ones who go to the DOT and get that worked out. They put a whole payload together, and that payload may have, you know, 30 or 40 different satellites. So, to your point about it may only be up for a couple of months: again, it depends on what it's doing. You know, if it's taking pictures of the Earth and you've got to come to NOAA and get a remote sensing license, that'll be one of the things we'll be looking at as we try to get this policy pulled together, is, basically, the authorization of the activity in space. So our goal is to have that as streamlined as possible. And if it really is something that's not going to image the Earth – it's going to, say, collect some kind of atmospheric data – hopefully, that's something that doesn't really involve anything more than the launch and re-entry licensing.

To the point about the regulation and the culture, I think that's one of the reasons the Department of Commerce is looking at this, is – you know, the challenge of any nascent entity, though space is not that novel and new, but this idea of commercial space is – if you place it in something where it's kind of subsidiary - and right now in DOT, obviously, their main focus is on the aircraft side of things. So there's a bit of a challenge for them kind of getting out from underneath the umbrella of the larger aviation industry. And, you know, as you look at commerce, that's not there. So we will be looking at the regulatory side, but we're also looking at the promotion side. And we're hopefully going to find a nice blend between those two. And in terms of the question on the coordination, obviously it's not a coordination between the Department of Commerce and the Hill. It’s: the administration has a position, and that's being led by the National Space Council. And then obviously, we go through the usual NSC/OMB review process. So the position that gets advanced by the administration, which is still under development, will be a whole-of-government sort of approach. But I know Mike can speak more directly as to who he talks to down here. But we are very careful. It's not an individual activity by DOC or any of the other agencies by themselves. It's coordinated across the government.

MINEIRO: I'm happy to report the Constitution grants every U.S. citizen the right to petition their government.

(LAUGHTER)

COMSTOCK: And they do.

DE VRIES: I think I'll take that as a pass. Any other comments? Good. So I think this will be the last round of questions. So we'll just get everybody who hasn't had a chance yet.

UNIDENTIFIED PERSON: An observation: the problem is we no longer have a club of responsible actors. You have rogue states, which I have not heard mentioned in any part of the discussion earlier this morning or this afternoon.

MCDOWELL: I absolutely mentioned them. Authoritarian regime - that's another word for a rogue state.

UNIDENTIFIED PERSON: What did you call them?

MCDOWELL: Authoritarian regime.

UNIDENTIFIED PERSON: Well, it's more than that.

MCDOWELL: OK. Well, whatever, the premise is the same, sir. But please, go ahead.

UNIDENTIFIED PERSON: The premise...

MCDOWELL: You said it wasn't mentioned on the...

UNIDENTIFIED PERSON: The premise is...

MCDOWELL: ...Panel and it was.

UNIDENTIFIED PERSON: ...Not the same.

MCDOWELL: Yeah, but go ahead. I want to hear.

UNIDENTIFIED PERSON: You did not mention rogue states. You did not also deal with effective international dispute resolution. It will not come from the International Telecommunications Union. It will not come from the work because they can't do it. And so when you talk about the United States as the primary flag, I put to you: why not Luxembourg as the primary flag? Perhaps they're a little bit in advance. But you have to consider the players that you have, and not simply figure out that it's business as usual. It says, “the new space era.” That's what you're in. And the parties have changed, and the stakes have changed. And the time frame is rapidly running out.

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MINEIRO: I will provide a tactical observation and then a big-picture observation. So, tactically, you can see demonstrated through their actions that elected leaders in this country for several years have realized that we need to do more to protect U.S. national interests and to incentivize people to operate here. If you look at the 2015 Commercial Space Launch Competitiveness Act, it established a right under U.S. courts for people to maintain rights over assets that they have from outer space. And it allowed them to avail themselves to the court system. If you look at the HR 2809, the Free Enterprise Act, there’s a provision in there which directs the president to use the ambit of national power — it’s a soft directive — but the ambit of national power, essentially, to protect and promote U.S.-flagged equity interests in there. Similar to if we had a flagship on the high seas, there’s benefits of having an American flag on the high seas versus a Liberian flag. We want people to realize that’s important. There’s reasons you want to be under our jurisdictions. It comes with privileges, rights. But it comes with obligations, too, you know.

There’s certain things you have to do if you’re a U.S. corporation or a U.S. citizen operating. At a meta level, I think, Del, one of the reasons people are starting to have this big debate and there’s this tension internationally is because what happened in the Cold War was an anomaly. All right? You had a prescriptive regime with essentially a bipolar — almost tri-polar — space paradigm over 50 years ago. And what’s happened today is a normalization of what’s a typical process, sort of how the high seas developed, right? You had people building ships and going out, learning how to do things and then coming up with rules of the road and different ways to operate. There’s a few big differences. Number one, the time frames have to be really compressed now. We don’t have a thousand years for legal scholars to write all their things and come up with common rules. Right? We are under a time frame crunch. Number two, because it was a government domain and it has broader equities outside of the civil sequitur, specifically national security equities, you have an automatic interest of major world powers in the discussion? And the third thing is the proliferation of technology and access and the sort of diffusion of capital and the knowledge to use that capital, which is a really good thing, is driving this debate at the domestic level. And so I think traditionally, what you see is you see different states taking different domestic laws and experimenting about how they want to accede and drive their interests, conforming with their international obligations — which, by the way, the treaty is a good umbrella and people are sort of in that process now. And there’s going to be, you know, differing of opinions. And
ultimately, that difference of opinion hopefully will be resolved in a peaceful way over time. But that’s the tension, I think, that you’re observing. What was prescriptive is now more of a rational evolution of the process.

DE VRIES: Commissioner McDowell, you get the last word.

MCDOWELL: So very briefly, I can’t do any better than Dr. Mike and Earl here on those responses. I think to add to that, though, the only thing that’s for sure is that we will see surprises. We will see pleasant surprises, and we will see unpleasant surprises. That could be said about a lot of things in life. And I think it’s absolutely terrific that Hudson Institute has launched – sorry for the pun again – this particular program. And it hopefully becomes a series and we do a lot of good, thoughtful work here because it’s very relevant and a lot of these very difficult questions need to be studied in a dispassionate, thorough way. And so I want to thank again Margaret Whitehead and Ken Weinstein and everyone involved here, everybody who’s been working on this issue. So I look forward to more of this. So thank you very much.

DE VRIES: So thank you.

(APPLAUSE)

DE VRIES: I’d like to thank the panelists for a wonderful conversation. I think we could have gone on for at least half an hour, probably another hour. I would like to thank you in particular for spending so much time with us today. We couldn’t have done it without you. Do stay tuned. This is just the beginning of a process and we look forward to continuing the debate. Thank you.

(APPLAUSE)