

Gen Joseph "Gus" Guastella, USAF (Ret.):

All right, I believe I have the aircraft now. So ladies and gentlemen, welcome. And again from me, I am the newest member of Mitchell Institute, and I'm really proud to be here. And as someone who has been a space power advocate, not as long as I've been an air power advocate, this is very, very exciting for me. As a matter of fact, I started out with a little bit of academic preparation in space, it didn't really go anywhere, it never really mattered as much. But it was the height of the surge in Iraq, in about 2006 timeframe. And I was running a lot of the air, I knew a lot about fighters, I knew a lot about tankers and airlift and ISR. A lot of the campaign was being prosecuted. But this guy named John Hyten, Colonel Hyten, was there with me. And he goes, "Gus, you know a lot about air power."

Gen Joseph "Gus" Guastella, USAF (Ret.):

He goes, "Do you know anything about space capabilities?" And I looked... By the way, Hyten, when he looks at you and implies that you don't know something, it's pretty compelling. That guy is a big brain. And so quickly I realized that my walnut-sized brain was lacking on space. But under the tutelage of a guy like General Hyten, later then General Raymond, fortunate enough to work at Space Command. Learned from DT Thompson and learned from Steven Whiting, and some others, I've developed a huge appreciation for the space domain and the Guardians that defend our nation. Great space strategists don't just reside in the United States. As a matter of fact, they reside all over the place. I recall one, in a small town in England there's a young boy who was different than the other kids. And this young lad, the other kids were making paper airplanes. But this young lad was taken beyond that. He was looking up into space and he was making, trying to craft, paper satellites.

Gen Joseph "Gus" Guastella, USAF (Ret.):

And while young Jeremy Atrtridge never realized his full potential as a Guardian, he fell short as a fighter pilot. What I want to offer you is a couple sticks here so you can practice orbital mechanics and positioning to advantage in the space domain. Anyway, again, everyone thanks for everyone's attendance today to include our international partners. I'm glad to be here.

Gen Joseph "Gus" Guastella, USAF (Ret.):

And we have an awesome panel, by the way. Our panel today is going to address some critical issues. Our national security space enterprise, fundamentally it's underpinned by technology. And the panel today is going to provide insights regarding how mission demands drive innovation, what sort of technological solutions will be most helpful, and how this ties back to some of the core mission areas and imperatives that exist. Especially when we realize this is an increasingly contested environment. The one thing about being a former requirements person in the Air Force and in the joint forces, the military has clear requirements. But it doesn't always know its requirements because sometimes it requires a dialogue with industry, for industry to actually present back to the department, this is what's possible.

Gen Joseph "Gus" Guastella, USAF (Ret.):

And only until you realize what's possible do we ever really realize that we actually have a requirement for it. And so the instant industry and DoD dialogue is fundamental, and more so than ever in the space domain. So I'd like to please welcome the phenomenal panel that we have up here today. We have Colonel Nathan Iven, goes by Crazy Iven. Good call sign. From the Chief Technology Innovation Office at Space Force. He's the deputy science technology and research. We also have with us Scott Forney, who's the president of General Atomics Electromagnetic Systems, which we're very glad to have. And Chris

Worley, our vice president of DoD Earth Intelligence Programs at Maxar Defense. Let's please welcome this awesome panel.

Gen Joseph "Gus" Guastella, USAF (Ret.):

So I'm going to take a seat as we do the rest of this. And I'm going to start with Crazy here. Crazy, looking at space power roles and desired effects, big picture-wise. If you could, break down the major mission focus areas, and how are changing demands impacting, and how those areas are evolving? For example, JADC2 wasn't even on the list a few years, and now it's the talk of the department, and it's one of the top priorities. Could give us a thrust of the main mission categories that you're seeing now, and what is driving that priority? And then, how does that differ from where the community was maybe five or 10 years ago?

Col Nathan Iven:

Sure. And first, thanks for the opportunity to participate in the dialogue and to the Mitchell Institute for providing the forum to do so. You've heard it a couple times already this morning, and you really can't talk about the main thrust mission areas without first starting with space domain awareness. And so, first and foremost, we recognize that space is going to be a key player in any conflict, and critical for success. And so, investing in technology allows us to better understand that domain, to be able to communicate that understanding to our joint warfighters and our partners, and really just increase the collective security. So that's where we start. It underpins all of the mission areas. And when you look at how those priorities are being driven, as we stood up the service, the requirement to develop and feel capability, that protects and defends our interests and those of our partners. We look at things like the new resilient missile warning and missile tracking. Intelligence surveillance, and reconnaissance capabilities usher EMTs for the joint force. SATCOM, and you mentioned C2. When you walk through that list, that doesn't sound any different than the things we were talking about five or 10 years ago. I think what's changed is the way we're approaching them. We've talked about proliferated resilient architectures, hybrid architectures that take into account the large growth in the commercial capacity. It wasn't really there five or 10 years ago, so I think that's how it's changed. But specifically JADC2, I mean command and control has been a joint function since the dawn of warfighting. So we've always been focused on it. But to highlight why space is, and the technology that it brings is critical for success. And along with our service partners, we're looking to develop and feel the space layer for sensing, the space layer for communications, for networking, in order to increase the speed, the agility, the resilience of our ability to make joint commander patrol and battle management decisions. And so that's our contribution and that has really exploded over the past five or 10 years. It's been a priority for the... The secretarian is operational imperatives, and it's a priority for the service as we look to invest in technologies.

Gen Joseph "Gus" Guastella, USAF (Ret.):

Thank you, the Space Force inherited a lot of the legacy capabilities that's exquisite and on orbit as you also try to course towards a future design. How do you see that those things happening together? Can you give us any insights on how you see that, the portfolio into the future?

Col Nathan Iven:

Yes. So when you're [inaudible 00:08:10] I'd argue that the space force has a pretty balanced portfolio when it comes to science and technology. And obviously we're focused on tech insertion with our current generation of weapons systems. But the first design you heard General Thompson this morning,

if you're not interacting with a space water fighting analysis center in the development of our first designs, as they continue to work through those and all the missionaries, we're missing out, and the S&T community is no different. So we're looking at what are those key technology gaps and capabilities that are required in order to make those first design architectures close. So we look to capture those and help solve those problems in S&T community. But we're also looking out beyond the first design, doing future forecasting and scanning the technology horizon. Really kind of left of the acquisition process, left of the first design process. So what is it that we could do? What does technology bring in terms of choices for all those options that the spot can then run through? So really it's a relationship that's both a as we support the force design.

Gen Joseph "Gus" Guastella, USAF (Ret.):

Good answer. Thank you. Well that's a perfect lead into some of the folks that can help us with what we could do. And Scott, maybe a question for you, one of the key trends we're seeing right now is the need to still execute traditional missions but approaching them in new ways given the operational demand. So for example, your team is working on a new weather sensing capability. We all know the weather mission has existed for decades and it's crucial, but your solution approach has evolved significantly, versus what's on orbit today? Could you walk us through how you tackled this and what drove some of the thinking there?

Scott Forney:

Yeah, thanks guys. First of all, thanks to the Mitchell Institute for such an austere gathering to meet with our colleagues like this. It's humbling to be up on the stage with you today. As you know, John & Thomas is probably better known for our ISR missions with our thousand plus UAVs that we've delivered over the years. So our goal was to take that technology to space, the main awareness in space. And we didn't launch our first satellite until 2019, so we're sort of the newcomers. And then we're fortunate enough to buy six companies to give us a jump start, so we could go after the EO/IR weather system program and amongst others. Unfortunately we did that in the middle of COVID, trying to hire people in COVID, and trying to execute a new facilities and building new clean rooms and new environmental was obviously a challenge.

Scott Forney:

However, our goal from the beginning was simple. We're a hyper vertically integrated company, so we try to build just about anything we design. And our approach was how agile can we be? Can we treat this as we do our IRAD programs to be able to be a lower cost provider, a smaller satellite bus, and in the end we found really great teammates, because we looked at the prior programs that weather satellites aren't new, obviously they keep restarting the DMSB replacement program. I think the last one was called Speedy. We learned from that program, we did bid it. And I'll give you one lesson learned, don't ever offer an option because it gets included in your price tag. So we won't do this again. But we did pick key teammates. So ER Vista has been a key teammate to come up with a 16 band, really small scale sensor that is low cost, very, very capable and also fits the swap of our ESPO Grande satellite.

Scott Forney:

We picked Parsons to help us with ground stations and we picked AER to help us to process the data. But one of the companies we bought, which was the former GuideStar, has been doing weather predictions using a lot of weather data, trying to decide, when's the best time to make optical intrusions, whether it's with laser communication terminals or high energy lasers. And so we leveraged

that in-house capability, we had some folks that were from Norway, that worked in the company so we really wanted to get the technology edge. And since we were the newcomers, we knew we had a lot more to prove to make sure that we could... To go after that. So today our payloads are demonstrating in the lab, our clear rooms are built, our environmental test facilities are in. We've hired the people. Got through I think COVID attrition challenges in Denver, Colorado as we all know is probably the worst place to be in the middle of this change, and a great resignation.

Scott Forney:

But here we're at today feeling pretty good about our technology and most importantly the Space Force customer has just been awesome to work with. Very, very good. So thanks for the question.

Gen Joseph "Gus" Guastella, USAF (Ret.):

Great, thank you Scott. Okay, Chris, over to you. Your company has really upended things in space and your capabilities on orbit available to commercial users and government clients for once the realm of probably the most classified parts of the military. But now we see your imagery broadcast at the NATS games, we see it shaping battlefield outcomes in Ukraine. Can you talk to us about how it has been operating in this arena and what you've learned as a pioneer from the real world factors you guys have seen?

Chris Worley:

Thanks. And thanks for the invitation to participate. So it's unfortunate that an event such as Ukraine has brought us to the forefront people's attention, and unfortunately global history, that's too often the case. But Maxar is fortunate in the capabilities that we've been able to bring forward. And the biggest lesson learned I think is the importance of the ability to share information. The Five Eye construct was largely derived from a world, a cold war mindset. And who are our allies now? In Europe, Poland, it's Germany. In the Pacific, Philippines, Japan. The ability to say, no foreign needs to be removed from our lexicon. And unclassified commercial data set. It should be yes foreign right? And to us that has been the key to I think what we've seen as a common geospatial framework to operate from. From mission planning to post mission debrief, identifying displaced persons, ER support the Tonga when the volcano erupted, even to now looking at Florida, post hurricane Ian.

Chris Worley:

So for us, the key that the commercial element brings to the DoD, to Space Force, to anybody working in this environment, is the fact that what we have is a exquisite product down to 30 centimeters. Growing up as a 14N under a [inaudible 00:14:59] or a General Raaberg, I would've just been with joy to be able to get my hands on that. And now I can pull it down unclassified over the net. So that kind of exquisite product to be able to share between allies to do not only virtual environment training but actual operations I think is going to be kind of the benchmark of where we go forward.

Gen Joseph "Gus" Guastella, USAF (Ret.):

Absolutely. So if I could follow up on that, traditionally Chris, the capability your company feels would've been underwritten by a government program like you mentioned. Years of appropriate investment and government oversight, your team clearly went quite in a different direction. And what lessons do you have from this experience, as the government seeks to harvest more from what an industry can bring to the table, and what determines when a company should commit to a program with its private funds,

when the speed of government and the funds don't flow at the rate that you'd like. Any advice in this domain?

Chris Worley:

Let me be clear. We're perfectly fine with government funding. So I don't want to give the impression that, no, no, keep that. I think, when you look at the commercialization of space and bringing this kind of information, how do you bring in data fused products like TikTok videos, Facebook posts, commercial imagery all together has created a whole new contextual environment to operate with. So for us investing in these technologies, we do have an enterprise commercial sector that we support, and you're probably very familiar with it if you go on certain search engines. But being able to now extend that into operational frameworks for the government, be it in Homeland Security, Border Protection, the range of spectrum of operations with combat and commands. Earlier we were talking about SOUTHCOM and AFRICOM not getting love. We all remember the days when we were in SIMCOM, we looked at the people who we called SATCOM because of the funding gap.

Chris Worley:

What we want to do with Maxar, is become not simply a complimentary or an ad hoc partner. We want to become an integrated part of the architecture of how information is provided to the warfighter. And even if we're not the first choice for the first priority for the commander, there are other priorities on that list across the globe. And so if we're able to support AFRICOM, looking at Chinese investment mining, in the CAR. Or if we're looking in the Pacific and what's happening with regards to sanction busting shipping and illegal offloads, those are all things I think we can contribute and that's the investment and where we think the space that we play a significant role or could be, going forward.

Gen Joseph "Gus" Guastella, USAF (Ret.):

Fantastic. I could just jump on something you said. As an air component commander in a region that was very turbulent, a lot of the... The relationships are based on trust and when you can walk into a host nation and you can push an image across the table, or information across the table that you could quickly get to right before the meeting to bolster your discussion point is instrumental. And so I completely agree we need to use our commercial capabilities to bust through the no four and morass that we have with a lot of the systems that we deal with government-wise. So thank you for bringing that up. Okay. Crazy back over to you. Not all capabilities are on orbit and space. Matter of fact, there's so much of space, that's the ground segment and the links. And could you talk to us a little bit about those ground segments and how they're evolving and we clearly need to improve how we communicate capabilities on orbit to accommodate broader multi nodal connections, plug and play evolution integration with commercial, but how does that play into the ground piece of it?

Col Nathan Iven:

Well, so I have the opportunity for the chief technology innovation officer in the Space Force, and so that's kind of a new, didn't exist in any other service when we stood up the Space Force. Dr. Costa has a role in being champion for things like open standards and architectures and modular design when it comes to the technology, especially the digital technology that's involved in our ground systems. It prevents things like vendor lock and promotes reviews, cybersecurity, those kind of things. Taking an enterprise view from the service perspective. And we've had that view when it comes to enterprise ground services for several years now. Really predates the setup of the Space Force. It's a tough

challenge. Space systems Command is working towards that challenge as they bring on new capability, because we're trying to avoid that stove piped architecture that has come in the past.

Col Nathan Iven:

And so that's been a big focus for my boss as we look at how we developed those architectures. And you can see in terms of the multimillion connections, it was probably five or six years ago that small business innovation research funding supported work at that kind of phase ran kind of technology for ground systems to be able to talk to ion or with assets. And we've now seen that go through studies through what was then SMC now space systems command. And you're starting to see that being awarded in contracts for development just past summer. So I think we're making a lot of progress there, but still a lot of work to do.

Gen Joseph "Gus" Guastella, USAF (Ret.):

Great. Okay. Thanks. Crazy. Okay Scott, back to you. Your company is also on the forefront of helping pioneer, no kidding maneuvering space. Your work on the space nuclear thermal production propulsion through DARPA DRACO program is really looking to change how we execute missions in space for both military and exploration purposes. Can you walk us through any of the visions that your company has in this area?

Scott Forney:

Yeah guys, thanks. Really exciting program. General Atomics has actually been pursuing nuclear space since 1958. We were the leaders on the program called Project Orion, which today I don't think anybody would ever recommend, but it was a [inaudible 00:21:24] nation, was basically little atomic bombs behind a spacecraft to launch out space and do the same thing in space. However, it was definitely a very, very interesting and efficient propulsion system and efficient. In 1965 the United States launched the only fission reactor that we've ever launched, which was the SNAP-10A. And that SNAP-10A was a demonstrator. It had uranium zirconium hydride fuel, which I believe to this day, John & Thomas is the only company that makes that fuel. So that's our fuel, the power, that spacecraft. And today we have a joint agreement with Framatome, we have a joint business that we produce that fuel in Romans, France.

Scott Forney:

And then in the [inaudible 00:22:11] program there was a lot of reactors produced but they didn't quite get there, because of erosion and high velocity and high temperature from the gases hydrogen, and the erosion through the graphite to the uranium carbide fuel. Well over the years there's been many other ups and downs. So when you get to look at a thermal propulsion today, we've expended a fair amount of hydride working on the fuel problem to solve that erosion problem. And we run to the program whether it's nuclear thermal propulsion for NASA, or for DOD, thinking that we could use our silicon carbide material, but the temperature's just too hot. So we came up with zirconia carbide tubes. We've done a lot of high temperature, high flow testing to solve that problem. But that wasn't it for us. We had to come up with new fuels and we're a team with a company called X Energy on that program.

Scott Forney:

We wanted to learn more about Cislunar. We think X GEO is so, so important for DoD in the future, that we start looking at what other opportunities. So we were on DARPA's team to go on a far side of the moon on commercial lunar payload system program in 2025. Very excited about that. And we recently be, I guess not so recent. Back in April, we bet on the Cislunar Highway Patrol system now here, called

Oracle. So hopefully that announcement is made soon on who wins that program. For us, it's also about communication. How do you communicate with something that's out at [inaudible 00:23:44], effectively? So one of the reasons why we started investing in optical communication is to ensure we could communicate. And because of all the ISR we've done in airborne, now we're trying to bring that to space with different laser related lidar technologies, and other ISR capabilities and communication capabilities. Because we're going to need to be able to see real time for space domain awareness for some of these systems. So it's very exciting.

Scott Forney:

We have not had so much excitement in our fuel factory in probably 20 years. So we're going to town right now and I think it's a renaissance. So we're very hopeful.

Gen Joseph "Gus" Guastella, USAF (Ret.):

Thanks Scott. You used about 10 words that I've never even heard before in my life, so that's awesome. Clearly my education is continuing here on the stage, but we're glad to have you and your team. So speaking to teams, Chris, as you build your team, both the HR, the individuals and who you partner with, how're you cultivating and seasoning them differently given where we're going? And how it may have differed from where we've been in the past?

Chris Worley:

Yeah. There's a one talent, we all face it, especially in the fields of software and technology. To us, you're building a culture of innovation is key. And I think the most critical aspect, innovation, is humility. If you think you've already got all the answers, then you're really not looking for anybody else's ideas. So bringing in young and even more mature professionals from across industry and university academia that come in wanting to try new things. In Maxar, you think, okay, we take pictures from space. Great, we also do ground MTI, which nobody may not think, well how did you do that? But we did it through people thinking about phase like collection from a single image, and being able to identify whether something is moving through those phases, and identifying the speed with which it's being done. We do not simply looking at the earth, but non earth imaging.

Chris Worley:

So if you're looking at your satellite consolation and wondering, do I have a maintenance issue? We can now picture that and tell you. So to us being that kind of a culture of free discussion, new ideas, new ways of looking at problems from an old framework, I think that's key, right? Compensation is always going to be critical. We all have to live and eat and support our families, that there's more to life than that. There's rewards, there's commitment. A lot of us who are in uniform before we retired, we're back here not because of simply we want a job, but because we still care within the field of technologies and in Maxar. It's really a group of people who still care, and that's kind of what we build our company on.

Gen Joseph "Gus" Guastella, USAF (Ret.):

Fantastic. Thanks. Scott, how about you? How are things changing with your teams?

Scott Forney:

That's a great question. I agree that getting the right resources is the most challenging problem of our time anyhow. And when we're diverse, it even makes it that harder. So General Atomics has started 12

scholars program from Florida to Purdue to MIT, to California, to Mexico, Alabama and Mississippi, trying to make sure that we find the best of the best to come work for the company. And then that's item number one. Number two is, we have to change our culture to allow the newer generations to do things the way that maybe all of us were not going out for work. Things like, alternate work weeks. 10, 20 years ago, I would've never thought that all of us would be having to do nine eighties or work from home. But that's the new environment we're in. The other thing is, we have to win, or at least self invest in really critical R&D programs to keep them interested.

Scott Forney:

So whether it's a nuclear reactor in space, go figure, who would thought that we'd be talking about that today. Or going to the moon on the backside, so that we can see what's going on. Do we have the right ISR space domain awareness capability? And I think the answer is, it's all coming together. And then investing, investing, investing in your people for training has been a big thing. So we're lucky to invest and provide all of our environmental equipment. Even though as of today I think we've produced 32 satellites, we want to make sure in the future we could do all the environmental testing in house, mostly because of our classified customers, but equally for the personnel. They want to touch it and feel it, and make sure that they have the right hardware. And then lastly for us, we had a space mission operation center that we're controlling satellites from right now. And the folks, that are operating the system gave us all this feedback. So by the end of this year, we'll have a new capability to operate 12 different systems concurrently. So we're very excited about those capabilities.

Scott Forney:

Of course, we can't talk about classified programs, but I'm going to steal Chris's term. It should be, [inaudible 00:28:42]. We should have more international cooperation for certain... To help out with... About this new generation of pioneers in space

Gen Joseph "Gus" Guastella, USAF (Ret.):

Thanks for getting that message loud and clear. Well, so for both of you, Chris and Scott, if the government wants to increase innovation, investment and agility from industry, what kind of reforms are needed to help you guys do your jobs better? What advice do you have for the government in those areas? And maybe we'll go with Chris and then to Scott.

Chris Worley:

Thank you. I think the key to integrating us is going to be speed. And I don't mean speed of technology development or even fielding, but how do you integrate us into your CONOPS? That's been one of the biggest challenges is people see what commercial industry can do, whether it's not our company, even if you're talking about all this realm of commercial tech that's out there. AIML, imagery, RF, it's fascinating. People want it. But then getting into the J Rock, the requirements process, the programming record, bringing it into the CONOPS, identifying how we're going to bring it into the communication constellation. Are we going to be part of the mesh network? Are we going to have to create our own sport, or our own architectures? Those are the kind of discussions we need to have. It's not simply the end use case that the war fighter's going to be employing.

Chris Worley:

That's easy. We can deliver that, we can send that, I can text that. The bigger problem is, how do we maintain and sustain and grow from that? And that's the policy part. And I think we are starting to have

those discussions. Early today, we talked a little bit about that. I think there's been movement with regard to far innovation, and trying to move the far along for commercial companies. I think we haven't spent as much time on the requirement side, innovating that. Whenever a company like ours is given an RFP, you're not seeking our solution, you've already come up with a solution. You're seeking our ability to execute your solution. What if we have a new idea, a different way, a different approach. So I think there needs to be more of that broader dialogue on policy CONOPS and how to bring in commercial industry. And I think that's one thing that we would love to be a part of.

Gen Joseph "Gus" Guastella, USAF (Ret.):

No thank you. And, Scott.

Scott Forney:

Chris, great answer. For us, we're trying to take a little bit of different approach. We spent a lot of internal research and development funding to figure out what the next thing's going to be, to help. Because a lot of these classified programs, if you don't have that backbone investment or if you haven't been in the space business since Moby Dick was a minnow, then you don't have anything to offer. And once you get into these programs, certainly we do all kinds of classified programs across the company, but getting the new systems and getting the approvals is a very slow process. Way, way too slow. This isn't about technology development, it's how quickly can you deliver it to the war fighter, which means you need the systems to deliver that. And to be able to bid on these programs, you need to be able to access those programs.

Scott Forney:

So there is a... I don't know if it's an over classification, but a big challenge for anybody new in the business. For those that have been in for decades, I suppose it's a bit easier, but we all have our challenges there. That's one aspect. The second aspect is, it'll be nice if we found better ways to have tax credits, that we're going to make all these R&D investments and we're limited today, and the administration would serve us all well to talk about how much better we can do with tax credits as we go forward. Whether it's on capital infrastructure or research and development dollars. The last thing, we have such a responsive need in space available launch. We as General Atomics are trying to try out as many launch providers as we can. We just launched our New Zealand Rocket Labs two weeks ago, on our New Zealand spacecraft, that by the way, it's operating well. We're waiting to start up the government's payload from Cades, and what a great launch that was.

Scott Forney:

For New Zealand, we thought, oh this is going to be too hard, it wasn't. We launched on Falcon Heavy on SDP two, awesome, awesome. Just perfectly where we need to get it, and started up the spacecraft quickly. The same thing with Falcon Nine, or we've had several ULA launches, but the point is maybe we can be more cooperative with the government to help choose those launches, because we may have a preference and if we want to go quicker, let's choose the right launch mechanism. And there's so many upstarts right now, we even put a deposit during the firefly trying to... We didn't even know what launch is going to be, but we really want to make sure that we have that rapid capability and understand what we're getting into. So it's a very, very exciting time.

Gen Joseph "Gus" Guastella, USAF (Ret.):

That's a really great point Scott. Thank you. Okay, so the last question for up here, for all of you. And we'll start with Crazy having person. If we were to grade the Space Forces innovation homework in five years from this tech vantage point, what are the key elements we should be tracking and assessing, looking into the future.

Col Nathan Iven:

There's a couple, and Scott, and Chris already talked about one that's looking at our people. So we creating a culture that allows us to attract and retain the right kind of technical scientific talent, as we build this force. That's really going to be required to compete. And so what are the mechanisms that we're using in terms of talent development on the DoD side, in terms of both folks in uniform and our civilians. So there's a lot of focus on that right now in terms of the type of STEM degrees, and backgrounds and experience you have, really to be a war fighter in this domain quite frankly. So measuring how we're doing on that. The second thing I'd say is, how well are we integrating our partners both from allies and partners perspective, commercial and academia, particularly in the S&T communities. So the university partnership program that the Space Forces start up is kind of a public... For many of you in the room, we've heard about that very public MOU signings with the universities.

Col Nathan Iven:

There's a component of that, the university consortium focused on the research that... We've done a couple pilots and we'll see more in the future where we're trying to leverage cooperate agreements and other transaction authority where universities and industry can partner together to solve problems. And so you'll see us with announcements in the future in areas like SDA and I know about servicing and manufacturing, and those types of areas, so that's coming in the future. We'll see that. So how well are we integrating? And then most importantly and we've been talking about it all morning, how are we able to deliver capability and insert technology on operationally relevant timeline? And a lot of times folks are very focused on bridging that value of getting things out of S&T into prototype and into programs and records. And we recognize that there are a lot of avenues for transition.

Col Nathan Iven:

It could be into a vendor library. We could work transition to commercial partners, who then take away the traditional, bring it into a system of record. But I think the measurement that we need to look at it in five years and beyond, it's really a thorough put argument. Are we sustaining the technology pipeline, such that it can produce that transitions for this fight tonight? The operational imperative that the secretary is focusing on? And then beyond. And that starts with basic research, behind research. So is there a portfolio balance, so that it supports that group all the way through. And I think that's a continuous five years is even kind of short, when you look at the technology timeline. So is that timeline healthy?

Gen Joseph "Gus" Guastella, USAF (Ret.):

Great. Thank you. Crazy. Right. Chris.

Chris Worley:

So for me, in five years where we are today is largely centralized control and execution of commercial space, coming through the major agencies like NRO and NNGA. And I think as we look forward to contested environments, especially whether you're looking at resiliency, I'm excited by putting together a space force component under each of the PACOMs. I think that's where we have to look at with regard

to our future architectures. When you talk to the customers out in PACOM the for example, the biggest fear is that in a contested conflict day one, they lose conus, right? They can't talk to anybody, they don't have access to the cloud. So how do we ensure that what is available and gets to them? With our legion consolation going up, we've been talking to them, maritime surveillance with those additional assets will be able to hit the same spot on earth 15 times a day.

Chris Worley:

So not every 90 minutes get an image. So we'll be able to track ships, right? Leaving port all the way to destination, that's critical to what they want to keep track of. But if all that goes back through conus, through cloud-based architecture that then gets piped to them, and they fear they're going to lose that, how do we maintain that kind of [inaudible 00:38:05]. So for us, the future is judged by the ability to support the war fighter, no matter where they are at the edge. And how do we get our capabilities that we want to bring forth as a partner to the edge in the right speed at the right time.

Scott Forney:

It's never good to be the last one to comment, because they took all the good nuggets. So I'm going to quote DT Thompson something this morning. "Let us hope that we are not extinct in being the leader in space in five years." I think that's probably number one. That means, space control, that means XGL, that means space domain awareness that we really are continuing to lead. And let's not be afraid of doing things that we haven't done before. We talked about nuclear thermal propulsion, which is important to our company, General Atomics, but there are other nuclear capabilities that maybe we don't get involved with, but it's so important. The Chinese just approved the 10 megawatt reactor. They're going to put it in space. We better make sure that we don't let them do that first, because what are they going to do with it? What are they going to do on the backside of the moon? I don't know. There are other technologies that we should be considering. So I hope that if you look at...

Scott Forney:

I look forward to the success for example, of the transport [inaudible 00:39:17] with what Derek Tranan is doing. It's a revolutionary way to be able to communicate at speed of light, and not be able to get in the way of cracking that system. I hope that we're successful there. So I'm going to take a little more technical approach. Me personally, for General Atomics, I hope finally weather's not the priority 13 out of 10. I hope we at least make it into the ninth category, because it's way overdue. And the US Navy needs that. But there are also very important issues that I think we really have to really expand our allied interaction. I think it's so important. General Atomics works on a system called Talent Fresher, which is a data fusion system.

Scott Forney:

And we think it's really vitally important that we get more and more of the allies to be able to get some of that data and speed of light. And I think that's been the theme here today, all day so far, as we really have to think about our allies. And if nothing else, the Ukrainian Russian War has taught us that we have to have much closer relationships. So I think those are some judgements.

Gen Joseph "Gus" Guastella, USAF (Ret.):

Really good inputs. Okay, we got a few minutes left for some Q&A from the audience. And so what do we have from the audience for this great panel? See in the back?

Speaker 5:

Thank you. [inaudible 00:40:44] Space News. I have a question for Mr. Chris Worley. You talked about the integration of data into the architecture, and I was just curious if the NRL with this new ELCL contract that with industry, are they able to provide better integration, like with DoD systems? Or does DoD have to do something differently to be able to get more integration? Thank you.

Chris Worley:

So Maxar is very proud of in one of the recipients of the ELCL contract that purchases commercial imagery. And that's made available into the DOD through a program called global EGD run out of NGA, so all that imagery is fully available to anyone associated with that program. And we work to educate and train everyone on how to leverage that from NGA. Now we have capabilities beyond ELCL, that we continually work with NRO, NGA, and the war fighters across the globe kind of leveraging, for example, with Ukraine, and be able then to share that with our international partners. But that information is already integrated in there, and we don't want to sell the DoD a new piece of glass. We wanted to be able to integrate into the frameworks, the architectures that you've designed and have identified as your priorities.

Chris Worley:

So whether that's creating the APIs to load into Bode, to go into your top of choice. And DIZE, for targeting, these are all things that we have at the forefront of what we're currently working on from an engineering standpoint. So we don't want to create a Maxar iPad, we want to integrate into what your approach to consuming information is.

Gen Joseph "Gus" Guastella, USAF (Ret.):

Great. Other questions.

Gen Joseph "Gus" Guastella, USAF (Ret.):

All right. I think we've come to the end of the panel. Before we end, I just want to say one last thing, that was mentioned before. And that is, we just now have stood up the first space component in Indo-PACOM. And I think it's very, very important and I'll explain why I think it is. And that is because historically a combatant commander is a joint force commander. He may or may not, he or she may or may not be an airman, and he certainly may or may not be a guardian. So who do you go to for your understanding and expertise in that domain? It's your component, right? Historically we'll go to the air component, whether there is a dural space for, well certainly, but it's a maritime matter will go to the maritime component commander, or the land component commander or the special ops component commander.

Gen Joseph "Gus" Guastella, USAF (Ret.):

But finally we have at that same level a space component. All right. And space expertise. Where by the way, it's just not high end exquisite space capabilities that you can answer to there. It's also how to better leverage the commercial pieces that are out there. And so for industry, now you have another avenue of approach that's the space components that are out there. And every one of the geographic COCOMs, it's not just the functional components that exist within US space command, it's also the geographics. Because at the end of the day, it's about understanding the customer needs and where does that customer need really understood, it's in that component. And so I think it's a big thing for the

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space domain to fight that way. Well ladies round applause for this fantastic panel up here. Good job, well done. I think we're taking a break for lunch, and we'll be back in here in about 10 minutes with lunch.