Dr. Derek M. Tournear
Director, Space Development Agency

Defense Writers Group
Project for Media and National Security
George Washington School of Media and Public Affairs

28 February 2022

Moderator: Good afternoon. Welcome to the Defense Writers Group. We're honored to have Dr. Derek Tournear, Director of the Space Development Agency with us. I'm Thom Shanker, Director of the Project for Media and National Security here at the School of Media and Public Affairs at George Washington University. As always, this discussion will be on the record, but it's not for rebroadcast in any way, either audio or video. And again as always, I'll ask the first question and then call on any of you who have questions of your own.

Again, Dr. Tournear, thank you for joining us today.

Dr. Tournear: Thank you. My pleasure.

Moderator: The first question comes right off the news. Your organization put out a rather dynamic press release this morning. Your charter is to develop and field national defense space architecture and this morning's announcement is about how you awarded $1.8 billion in agreements to build a prototype constellation Tranche 1 Transport Layer. I'm not a space person. Everybody on this call knows more about this than I do. But for me, and just to lay the groundwork, sir, could you tell us more about that agreement, that deal, and what benefits it brings to combatant commanders and the joint warfighter and also when will we see that capability coming online?

Dr. Tournear: It is very exciting. If you add up the three contracts we awarded it comes out to 1774, the $1.774 billion. I never want to pay more than we have to, but $2 million more would have made it a round out 1776. That is exactly what we're all about, we're all about empowering the warfighter to keep freedom.

So what those three contracts are all about are to deliver the baseline of our Tranche 1 Transport Layer. Those are 126 satellites.

So each of the vendors was awarded a contract to deliver 42 satellites each, and each of the vendors has the same scope of work, so all their 42 satellites provide the same capabilities. And those capabilities will give the warfighter tactical connectivity globally.

What does that mean? Essentially what we have today, we have tactical datalinks that weapons platforms can talk to one another but they can essentially only do that basically within a line of sight, so a few hundred nautical miles. This will allow that to reach out to be essentially a global connectivity, a global network. So that is the key to tie all of the sensors and shooters together so that global tactical datalink, and in addition to that we will also have global optical laser coms. So these laser com terminals not only form the mesh network of what we're building out but they also provide low latency, high bandwidth communication to users that have optical terminals on the air, on the ground and at sea. So that also gives a way that we can have high data rates to our warfighters.

Then finally, we have connectivity directly down to targeting cells. So we'll be able to take data from anywhere around the globe and pass those data directly down to the targeting system so that those can be used to calculate a fire control solution which we can then send directly to a weapons platform over those tactical datalinks.

So Tranche 1 Transport Layer, as we're calling this, T1TL, all of that will be made possible and the first launches occur September of 2024. This is our initial warfighting capability. At that time frame we'll actually be able to effect a fight with these capabilities.

Moderator: During my 13 years covering the Pentagon, sir, the Pentagon always talks about asymmetric advantage, both ours and those of our adversaries. Can you put this in the context of is anybody else doing this? And is this an area of US asymmetric advantage?

Dr. Tournear: It certainly is. It certainly is an area of asymmetrical advantage. Other nation states are developing proliferated constellations to be able to do a lot of this low latency type of ISR kind of connectivity, but as far as the ability to tie in directly to tactical datalinks and form that whole mesh network across the globe for existing tactical data

systems, no one else is doing that. And primarily no one else is doing that because the US has built up over the last 30 years the infrastructure of the existing radios. So all o that already exists. What we are doing is we are tying all that together to get the low latency global connectivity which doesn't exist and to my knowledge, you never know what people are working on behind closed doors, but to my knowledge no one else is developing such a system.

Moderator: Thanks so much.

Our first questioner from the floor is Theresa Hitchens of Breaking Defense.

DWG: Could you just elaborate a little bit on how these Tranche 1 satellites are different from the Tranche 0 satellites? What more capability they provide.

Second of all, can you maybe be a little bit more specific about the optical datalinks. Are these now functioning on each of the -- will they be functioning, and I know you had some trouble with GA in the link effort. So I wanted to try to figure out where the optical datalinks were. Thanks.

Dr. Tournear: The biggest difference between Tranche 0 and Tranche 1 for these transport birds is on Tranche 0 the satellites were a little smaller and we broke out the capabilities among what we called an A transport satellite and a B transport satellites. So the A transport satellites had optical crosslinks to go in plane and cross plane, but they did not have the capability to talk to Link 16 users on the ground. The B satellite only had optical connectivity to go in plane and then they had the Link 16 connectivity down to the ground.

For Tranche 1, all of the satellites will be able to have connectivity in plane and cross plane and the Link 16 down to the ground. That's the biggest difference. That makes the satellites a little bigger, a little more massive so they can have enough power and enough size, weight and power to do that mission.

Obviously our plan is to have all the optical cross links working on all these satellites.

As far as our demos that were launched in 2021 that you allude

to, yes, we had four experiments launched on six satellites in 2021. One of those experiments was the link. That was where SD18 with GA and it did have some problems. Essentially those satellites were never able to command and control those after launch.

The second experiment, Mandrake 2. Mandrake 2 was the other optical com demonstration. That's SD18s with DARPA on that one, and that one is still going through test and checkout. Everything is working nominally. We had some minor issues that we were able to work out with some fixes with some software uploads on the ground. But everything's working nominally on that one and progressing forward.

Moderator: Next questioner is Brian Linder of Politico.

DWG: A little bit more on Thom's question. Talk if you can about how path-breaking potentially this constellation really will be. The press release referred to it as the backbone of the Joint Command and Control effort that military more broadly is engaged in to connect forces in all domains on the battlefield. But how much is riding on this? If this thing doesn't work, what's plan B?

Dr. Tournear: The short answer for that from SDA's perspective is we are built on two pillars. Pillar number one is proliferation; and pillar number two is file development. That second pillar, that's always plan B. So we will always have a tranche that is in development, ready to launch essentially on two year center. So that's how -- obviously I don't anticipate all of Tranche 1 to fail, but if parts of it fail, then Tranche 2 is right behind it and it will be up just two years later. So that will give us additional capability.

So as far as what is the actual, what is groundbreaking and what is the department relying on this? Primarily from the department's perspective, the Transport Layer is the JADC2 backbone, so that means that we are responsible for tying the services together. Each individual service has their own JADC2 instantiation on how they tie their own sensors and their own shooters together. But then SDA flying the transport layer is what allows each of the services to be able to communicate globally with one another in this low latency tactical timeframe so that they can pass sensor and targeting data amongst each other so that we can tie into all the JADC2 instantiations.

So that is what essentially, the big thing we're bringing to the fight. So obviously if all of Tranche 1 were to fail, worst case scenario, then at that point we would still be in this kind of stovepipe area for that JADC2 instantiation from each of the services, but obviously we don't anticipate that and Plan B is always you've got another Tranche coming up two years later.

Moderator: The next questioner is Sandra Irwin of Space News.

DWG: Just a few short questions.

Can you give us a sense how many bids SDA received for tis contract? And can you explain why Lockheed and Northrop got such much bigger contracts than York for the same number of satellites?

Dr. Tournear: We received eight proposals, so there were eight offerings. AS far as York and Northrop and Lockheed, the price differential, it's the same answer for Tranche 0 essentially. Each one was given a set of requirements and they bid to that capability. Realistically, York is just able to deliver at a lower price point than what Lockheed and Northrop bid. So obviously we weigh that in. The way SDA does its evaluations, we look at schedule. Schedule risk is number one. That's our motto -- we're all about speed to make sure we hit those two-year cycles. Then after that, 50 percent of the evaluation criteria is in the cost reasonableness so we looked at that. So that's a big factor. But overall, it's just that York is able to deliver at a lower price point.

DWG: And in terms of the launch, you have a launch planned for 2024. This is going to be a lot of satellites to launch in a short period of time, so do you expect to have the funding to do like six launches in one year? That's like 21 satellites per launch. So what is your plan for getting that funded and done in such a short time?

Dr. Tournear: That's in our budget, to fund those six launches through, and this is phase two. So the first launch will be September 2024 and then essentially we'll have one launch a month for six months until we get all the planes populated.

Moderator: The next questioner is Jared Serbu of Federal News Network.

DWG: Just a language clarification first. The press release talked about these being prototype agreements. Is there any meaningful sense in which these are prototypes vice real operational capability, or is that just the unique language of OTAs?

Dr. Tournear: This was done under Other Transaction Agreement authority with a middle tier of acquisition acquisition model for rapid prototyping. So these are going to be, these are being acquired as prototyping systems where we reserve the right that if everything goes well at that point they can be turned over and used for operational missions. But essentially we're going under an acquisition pathway that treats these as prototypes.

DWG: Got it. Can you say a little bit more about why OTA made sense for this tranche? You guys had quite a bit of success using traditional FAR-based contracts and going quickly with them in Tranche 0.

Dr. Tournear: We did. I was always pretty adamant that the FAR allows you to go quickly. There's good things and bad things about using the FAR and using OTAs. The good thing about using the FAR is you have dozens of years of case history that you can draw on and use that and the clauses become pre-populated and you push forward from that.

So with an OTA, realistically you can go quicker but that wasn't the real reason we switched from a FAR-based RFP to an OT. The reason we switched, there are some clauses that are based on that case history that are tied up into using the Far that in this case where we were using teaming with industry to get these out there faster and push forward, some of those clauses were not consistent with what industry was proposing and wanted to do to move quicker. So we went with the OT so we would essentially give industry more freedom to propose what they needed to be able to deliver on the time scales that we have for them.

Moderator: Our next questioner is Danny [Lentz] of NASASpaceFlight.com.

DWG: I was just wondering based on the fairly quick timeline would the Tranche 1 launches be in the next batch of an NSSL award that should be coming up soon?

Dr. Tournear: They will be procured within SSL Phase 2. So you'll see the SDA 1 through 6 launches on the NSSL Phase 2 manifest.

DWG: Some of these companies and satellite buses are still a bit immature. Is the progress you're seeing on Tranche 0 giving you confidence that they'll work well for Tranche 1?

Dr. Tournear: Yes. We are set up for 30 weeks to launch for Tranche 0, for the first launch there and everything's pushing forward. And as far as the critical path goes for Tranche 0, right now all of the satellite buses across all four of the vendors are doing well to push forward on those.

There are supply chain issues that we're fighting to make sure that we can keep those launch dates, but those are more about some of the electronics required for some of the radios and for some of the payloads, but the buses themselves are performing well through build and we expect them to perform well through tests and we have high confidence in that aspect.

Moderator: Our next questioner is Jim Garamone of DoD News.

DWG: I'm just curious. First off, I only understand about half of the things you're saying because I'm not really a space guy, but I'm just wondering how it really makes a difference at the unit level. If my son is deployed somewhere, will this affect him? Or is this something that's seen at a higher level?

Dr. Tournear: For the warfighter on the front line, they are connected right now, depending on the size of the unit and where they are, but they could have a hand-held PRC-161 radio. That is a Link 16 radio that is deployed with this mounted turret system. It's the same kind of radio that's used on vehicles. That is what gives them the connectivity to other Link 16 radios that are within their unit for their AOR.

Now the beauty of that is, your son on the front line could be using that radio to pass data, targeting data, from what he sees, what his sensors sees, or anyone else nearby him. Him or her. But if they wanted to get data from something else, so this could be an ISR -- intelligence, surveillance, reconnaissance asset -- that's in space or it could be an ISR asset that is an airborne system but it is outside of that

initial couple hundred nautical miles but it is still picking up data, could be from SIGINT or any other kind of sensing system.

Right now today, those data would be completely opaque to your son on the front line. There's no way that those data could be passed from what they see to the weapon on the front line.

In addition to that, the actual data that is coming -- your son fighting on the front line has real world information about what is going on. It is difficult for them to be able to pass that data from the front line back to the targeting cells and back to command and control headquarters. That's a very difficult command chain, that takes multiple hops to get there.

What the Transport Layer would do is essentially open all of those lanes of communication. So now with the PRC-161 radio you will have tie-in to anyone else, any targeting cell that you need to globally that is feeding you data so that you can get data that you can use to target from any ISR system that's available. That's what will allow the speed of that information flow to affect the front line so that you can actual target based on the best data availability.

DWG: So how does JADC2 play in all this? Does that have to succeed before the rest of these things can come together?

Dr. Tournear: So JADC2, the whole idea behind JADC2 is to tie all weapons and all sensors together. All sensors and all shooters together.

That obviously is not a black and white issue, so it doesn't happen at one point where you snap the line and say it's done. It actually happens incrementally.

So for today, just as I was describing in the earlier scene, you can have people passing command and control information from a sensor, which could, take it simply, right? That sensor could be a sentry that is looking over the hill passing command and control information -- a fancy way to say voice data -- passing voice data over that PRC-161 radio to the handheld unit that's doing the shooting. So that in essence is, we'll call that JADC2 generation 0. That's kind of what can exist today.

Then you can take that a step further and you can start to tie more and more weapon systems into that. For example, you have

JSTARS that is providing GMTI -- Ground Moving Target Identification data -- and that is providing data to a targeting cell where that targeting cell then disseminates it out eventually over a Link 16 network to the shooter in the field. So that is also a type of JADC2 that kind of exists today.

So the future of JADC2 is trying to cut out and make that seamless within a service. So for example the Army Project Divergence may have the Titan user system. It's their goal to be -- all of that goes through Titan where you have the data feeds coming in, you have the targeting done, and you have all the connectivity on the targeting centers.

The Navy with Project Overmatch has a similar thing, what they call MTC A and X -- Maritime Targeting Cell Ashore and Afloat.

And the Air Force has theirs with ABMS.

They're all doing exactly the same thing. So as they build up that capability and move data organically between that service, between the sensors and shooters, SDA will enable them to be able to tie sensors and shooters from other services altogether all at once.

So it's not that one has to happen before the other, because you don't look at it as this is either working 100 percent or it's not working and it's a 0 percent. It's a gradual or incremental approach to better and better sensor to shooter connectivity.

Moderator: The next questioner is Jen DiMascio of Aviation Week Network.

DWG: The release said this would be an initial warfighting capability. When Tranche 1 goes up, what piece of what you just described to Jim will this be enabling?

Then also, the space to ground links on Link 16, are those also optical laser cones, links? What are those?

Dr. Tournear: The main things that we'll be providing as part of the initial warfighting capability is that connectivity, that global connectivity to Link 16 which is L-Band RF. So that's over an existing radio. There's hundreds of thousands of Link 16 radios out there. With no modification to those radios, we'll be able to talk to them. That's all [Inaudible] RF and

that will be part of Tranche 1 to tie all of that together.

We will also have optical connectivity down to certain users. Not everyone is going to have an optical terminal that can talk to Tranche 1, but there are certain prioritized users that we're working with to put optical terminals on their platform so that they can also tie into Tranche 1 which will allow them to have high data rates with very low latency through that optical communication. So that will also be there. And primarily, that is to enable large data transfer to targeting cells and then from the targeting cells up to the transport layer so that we can get it down to the shooter via Link 16. So that will also enabled for the warfighter in Tranche 1.

Then we'll also, in addition to that optical site, we're working with folks, such as Titan with the Army so that we can go down over KA because optical's not all weather. Optical has problems in cloud cover. So we can go down to certain sites via KA too and we have two versions of KA. So we have KA that goes down with high bandwidth to targeting cells such as Titan for the Army, for example. Then we also have a smaller terminal that can go down in more of a tactical scenario so that you can put that on a platform similar to the platforms you would put the optical cross-link, but they can get the KA data if they were going to operate in an environment where weather were an issue. So that will all be provided to the warfighter.

Now there's also something that's part of Tranche 1 that we haven't really talked about, but it's important. If you're tied into our network you can also use that network to give you an alternative signal for position, navigation and timing. So we're not going to broadcast like GPS but that does give people an alternative to use that in the event that GPS is denied or degraded.

DWG: One follow-up about cost. You're sending up sets of satellites every two years. Is it going to be about, do you anticipate spending the same amount of money every two years? It's going to be about $2 billion to send up the next tranche in 2026?

Dr. Tournear: The short answer is yes. I'll tell you how I think about it and how I kind of describe it within the department. I view it as this was a major shift. So when I talk about the disruption that SDA is bringing to the DoD space

enterprise, people focus on proliferation, people focus on LEO. Those are important. Pillar number one is proliferation. That's one of the big disruptions. But pillar number two is just as profound and just as critical to success and that is to spiral development. So we will provide these new capabilities every two years, and the capabilities will be based on what is the best technology that can be fielded at that time and what are the current threats. And every two years you'll get kind of this new refresh. The satellites have a five year lifetime and that gives you a complete constellation refresh every 2.5 tranches.

But you shouldn't view this -- historically people have viewed programs acquisition within the department as how many billions of dollars is a given program, and that's usually in the realm of tens of billions of dollars for a big space program.

The way I view this, we should view this as SDA is providing this continually spiraled refresh service, essentially providing a service within the department, and nominally the budget is about $2 billion a year to be able to provide all of these capabilities. And for $2 billion a year you can look and you can try to say how much is that going for Tranche 1, Tranche 2, and Tranche 0, you know, at any given time. But the other way to look at it is that's the SDA budget. These are the capabilities that SDA is providing, and we're providing that essentially as a service model to the department so that includes the refresh rate, it includes to make sure that all these new technologies are folded in.

Moderator: The net questioner is Courtney Albon of C4ISR Net.

DWG: I had also a question about cost, particularly the cost per satellite. I recognize there's three different contractors here, but can you provide an average cost per satellite for this particular Tranche 1 grouping for these transport satellites? And how does that compare to Tranche 0?

Dr. Tournear: It's actually very similar. Both of them would come out around $14 million. So $14 million per satellite. If you look at Tranche 0, when we originally pitched that idea within the department, that was the biggest perspective. In order to do what you're trying to do it's going to cost about $100 to $200 million per satellite. But based on what industry is doing currently, if we let industry based on their

commoditized model, the price should be around $15 to $25 million is what we estimate. It came back $14 million. $14.1 million was Tranche 0. For Tranche 1, if you just take that 1774 number and divide it by 126 you come up with a number that's just over $14 million. That includes a lot of the networking applications and things like that. So if you take that off and say what about just the spacecraft cost, it comes in just under $14 million, $13-something, something like that if I remember right.

DWG: Given that there's so many more satellites in Tranche 1 than in Tranche 0, were you anticipating the cost per satellite to be lower? Can you talk a little bit about why it's not?

Dr. Tournear: We added more capability, as I mentioned to Theresa's comment. The biggest difference is we added quite a bit more capability. I don't want to downplay the change from Tranche 0 to Tranche 1. But for Tranche 0, not every satellite has Link 16, and so we had to increase the number of optical cross-links on the Link 16 birds and put the Link 16 payload on the optical com birds. That's a pretty big change to the satellite. That made the satellite go up in mass. I don't want to say a number because I'll get it wrong and I'll be quoted on it. But each satellite obviously went up quite a bit in mass to be able to accommodate that additional power needed.

That's where you see that burn-down in the commoditization come through. Not that the price went down, but that for the same price point we were able to get a lot more capability.

Moderator: Our next questioner is Frank Wolfe of Defense Daily.

DWG: To go back to the cost for a second, just in terms of the roughly $700 million or less I guess for Northrop Grumman, but $700 million for Lockheed Martin and Northrop Grumman, but the $382 for York. You kind of elaborated a little bit on it, but in terms of why that's so, like you said the cost per satellite is roughly $14 each. Is it because, again, they're lager companies so they have more overhead?

Then in terms of the weight and the mass of each satellite, how much did that go up for Tranche 1 versus Tranche 0? And those are the primary 2. I guess the third would be in terms of the PRC-161, how you're doing, in terms of the hurdles you see in getting that, the data down to that tactical user, the PRC-161,

the other radios. If you would speak to that.

Dr. Tournear: Sure. The first one, I won't speculate on the internal overhead differences between York and Lockheed Martin. York is a different business model. They do a lot of, well, everything they do is potentially commercial -- [6 flight] type mode. They're not set up to do the same kind of processing as far as overhead that Lockheed and Northrop are. But as far as the details, all I know is that York is delivering for a price point that's lower, and Lockheed and Northrop, expect them to deliver for a price point they bid that's higher, and on Tranche 0, that's what we're seeing. York came in significantly lower than Lockheed. Both of them are performing quite well and are pushing towards delivery.

For the mass, we'll have to get back to you on that one because I would hate to quote a number and then be wrong. But it is on the order of 15 to 20 percent difference in mass between Tranche 0 and Tranche 1, based on those additional capability requirements.

Then as far as how we get down to the radio, that's a big deal. Our plan is to be able to broadcast at Link 16, L-Band RF, to any mid terminal that is fielded right now and be able to communicate with them. That is a managed network. You get a time slice and all of that's managed. So you have to do doppler corrections both on transmit and receive because this network was never designed for two things. We're breaking the network in two ways. One, it was never designed to go further than 300 nautical miles. Well we're orbiting higher than that, so that's not going to work especially even if you're just overhead. So we had to have some work-arounds there Then second it was never designed to operate with anything with an orbital speed, so you have to do a lot of doppler corrections to correct for that change in speed as it changes the radio frequency.

The good news is SDA is trailing on a lot of the tech development. That's SDA's model. We take technology that's mature and we field it in a rapid sense. In a sense we are prototyping constellations. We're not prototyping individual technologies. That's the biggest difference. We can be viewed as a constellation prototyper and developer.

AFRL is who we're training off of. AFRL has the XVI which is the Roman number 16 experiment that they burned out a lot of the

non-recurring engineering to be able to figure out how they would actually get a Link 16 radio to communicate with a satellite. They worked with Mitre and did some rocket tests to do some [sounding] rockets to show that it could be done. So all of that technology has been burned down and we're going to actually fly and demonstrate that as far as Tranche 0. But that's one of the technical challenges that we've been working on to make sure that we know all of the issues there and we can demonstrate that.

Moderator: Our next questioner is Meredith Roaten of National Defense Magazine.

DWG: I just wanted to follow up on Jen's question. When you mentioned that there's going to be a certain number of users that are prioritized for optical links to connect to their platforms, do you have any kind of estimate on how many users will have those optical links to connect on the ground? And what type of users they might be.

Dr. Tournear: We don't have an estimate on the number of those users at this time but I'll say that our model is to work with any and all DoD users and even provide them if they need to the optical cross-link to connect into our network. So we're working with a handful of users now that are going to test this out and see if it works for their applications. And essentially the agreement we're working with users is we can bring an optical cross-link that will tie into our network to you and be able to do the networking. And then if you do the integration onto your platform, whether it be land, air or space platform, then you can certainly tie into our network.

So we don't have a certain number on how many that will be now. When we start it will be on the order of dozens, not on the order of hundreds. And then that will move up from there.

Moderator: That's our first round of questioners. The first person in round two is Sandra Irwin.

DWG: I wanted to ask you about tracking layer, T-0. We heard from LCHarris that their satellites passed the reviews, have not heard from SpaceX. How are they doing? Is that going to be ready to launch in a few months like you planned to?

Dr. Tournear: All green lights right now, Sandra. We're

tracking for that end of September launch for those tracking satellites. The critical design review for the SpaceX satellites is next week according to their schedule, so we're pushing forward on that.

DWG: What about the procurement of the 18 [types] experiments? When is that going to happen? And do you know what types of payloads you will be looking for that?

Dr. Tournear: We have a couple of different irons in that fire now, and I'll talk to both of those.

The Tracking Tranche 1 solicitation where there is a mark in the SACD mark to give us a significant plus-up in FY22 to allow us to start that Tracking Tranche 1 as soon as possible. It that mark holds and we get the funding then we will start that Tracking Tranche 1 which means that we are essentially holding and ready to release our tracking solicitation as soon as there's an appropriation act. If there's an appropriation act and it has that funding, we'll release the tracking solicitation and run forward with that.

We also have [Tides] that is essentially ready to go and we're ready to release that. We are very concerned with the bandwidth of our industrial performer base as well as our internal SDA bandwidth, so we're not going to release both of those solicitations at the same time. We would stagger those. If it looks favorable that we're going to get a budget and the tracking plus-up will be in there, we'll release the tracking with at appropriation. If not, then we'll go forward and release the [Tide] solicitation, so this could all happen in the next couple of weeks. We'll let the [Tide] solicitation and then go forward with awards on that. But we'll stagger them, and then obviously we wouldn't have a tracking solicitation until award at the beginning of FY23 when we have FY23 funding for that. But for [Tides] then, we would essentially solicit the [Tide] solicitation after the tracking proposals come back and then for an award later this year in the fall.

Moderator: Theresa Hitchens.

DWG: My question is about your relationship at SDA on the data transport layer with the Space Warfighting Analysis Center. I interviewed Mr. Cox a few weeks back and he talked about how one of the force designs they were working, one of the key, the

major force design they're working on right now for the data transport layer, and General Raymond mentioned it the other day as well.

In my head force design was a blueprint, something that comes before, but SDA already has a blueprint for a tracking layer. So I was kind of confused about how you guys are working together. Can you explain how that relationship works?

Dr. Tournear: First, the way I view SWAC, and I'll paraphrase but I don't think that Andrew would have a problem with it being described this way. SWAC isn't necessarily -- the force design is not a blueprint. The force design is a vector to give you an overall idea of where you want the architecture to go. So a blueprint would be something you could build to. So the blueprint comes from the acquisition org.

For example, tracking was the first force design structure that SWAC did and we worked extremely closely with them and they came up with a force design structure that looked very similar to what we were doing for the LEO portion of that, but then they added some because they did some analysis to show if you add in different portions of that you can have an overall architecture that has synergy so it's a lot more resilient than just the sum of the parts. So that met the overall force design. Then SWAC snapped the line on that and moves forward to say okay, now this goes to Space Force to come up with the actual requirements, and then the acquisition org to come up with the plan. So that's where we come in.

But certainly you don't want this to be throwing information over a fence. So we were involved very closely with SWAC early on and had that interaction, as did a lot of other people. That's why SWAC was able to come up with this plan that had all of these inputs, because we had all the industry in place so we were able to feed that to them, and then work hand in glove.

The same with transport. We have a plan and we're pushing forward on Tranche 1, but our spiral model for Tranche 2 is still TBD as far as what the minimum viable product of Tranche 2 looks like. So we're working with SWAC to put together okay, within that overall architecture, when you give us that vector, how do we want, are there any changes we want to do in Tranche 2 to move that so that we, if that vector changes any, and that's where we would make that change. So that's kind of how we work

together.

DWG: Is it fair to characterize this as SWAC is kind of looking at the bigger picture? Like how the SDA satellites, the transport layer satellites will interact with sensors and everybody else, and other satellites and all that? Whereas you guys are focused really on getting that capability up. Is that a fair way of characterizing the relationship?

Dr. Tournear: It is. And I would also add to that, that's a good characterization. The other way to look at it is SWAC, if you hear about what I'm talking about, I'm talking about tactical targeting data from sensor to shooter. Now data transport, we provide a backbone to move data to targeting cells and such like that. But data transport overall is more involved than just that. So you need to have command and control for other satellite systems, you need to be able to have back haul data for how you do transports or just wideband communication which we've always delegated to say that's kind of a commercial job and Space Force can do part of that. But all of those are activities that involve data transport and SWAC is worried about that big picture on how that ties in. So they can say okay, the SDA, that is maybe, and obviously in my opinion is the right way for that tactical data transport piece, but then how that fits in with all of these other pieces and how that ties in with what needs to be done for the entire Space Force, that's a bigger picture view. That's what SWAC is trying to say. This is to vector what we think the force design should be over the next five, ten years, and then we'll worry about making sure we deliver on the piece that we need to.

Moderator: Jared Serbu, you're up next.

DWG: I apologize if you've addressed this, but I'm still trying to get my head around, I know you said all three vendors are really meeting the same exact requirements. Is there any meaningful differentiation in terms of, do they have different global coverage areas? Or could they no-kidding operate as one independent constellation if the other two went down.

Dr. Tournear: Thank you for asking that. That is a key part of what we're doing at the Space Development Agency.

We are instituting a standard of communication and networking so that any of the satellites on this network in the transport

layer are interchangeable with one another. That's important for a couple of different reasons. One, it's important obviously to the point you made, if one goes down can we rely on another one to provide the same connectivity and all that. Yes. They are interchangeable, they all look just like nodes on a network and you don't know which one is a Lockheed node, which one's a York, which one's a Northrop. They're all on the same network.

The second reason that's really important is that is what allows us to create this market that every two years we can have this open competition that anyone can feel empowered to invest their own IRAD to come up with an offering and then bid it back to us and they have a shot at winning without there being a vendor lock.

Now how do we force that? We can say that, but how do we actually force it? As part of Tranche 0 and part of Tranche 1, we have a government referenced architecture that has a gold standard where all of the vendors need to come and show that they can connect to our government owned and run test labs, so that they can do the connectivity tests within that lab and then show that they can communicate and do networking. So if you can do that. So for Tranche 0 we're using Naval Research Lab. They have a lab, you bring your com system and your networking system and you communicate with that with the lab. If everything works out and checks out well, then you get the green light to go forward and start producing your satellites.

Same way on Tranche 1. We'll have an operations and integration vendor that is in charge of both nets to make sure that all of the satellites are interoperable so that we know we won't be stuck in vendor lock. If you can talk to the government reference architecture then you can talk to all the satellites and you can just push forward. That's how we have this standard that works.

DWG: So would it be right to say all three vendors will for sure launch the number of satellites that are called for under these OTAs, but some or all of them w don't know yet might move into a production OTA status to deliver operational capability in some sort of more enduring way. Does that question make sense?

Dr. Tournear: It makes sense. Obviously with the OT that's the

nice thing about that, we have that ability to go from this prototype to production and move straight into that.

I will say though, I can't footstomp it hard enough, that's not SDA's plan. SDA's plan is to have a new competition every two years for the new tranche so that we have a stable market that industry feels empowered to invest in and bid on.

Moderator: Courtney Albon.

DWG: Just to clarify, on the plus-up that you all are waiting for in the budget, is that just -- for Tranche 1 tracking. Is that just to speed up the pace? Or is there potentially funding in there that would add more satellites to that tranche? Is it just to allow you to go faster?

Dr. Tournear: The language that was included with that plus-up was essentially to accelerate and prioritize the Indo-PACOM needs, to make sure it would make us aware and focus on making sure that all of the Indo-PACOM tracking needs are addressed. But then in this spiral model, we have our plan for 28 satellites essentially is what we've notionally asked for in our draft solicitation and it would just speed up that 28 because then you would essentially shift the entire Tranche 1 and Tranche 2 forward, so that's how we worked in the tranche model and the spiral model versus trying to add mores satellites to a given spiral.

DWG: The other question I had, and maybe this ties back to Theresa's questions around the SWAC force design process, but there's been a lot of talk from the Space Force about resiliency, about making the architecture more resilient, and also about, around the 2024 POM there being kind of a shift in the budget toward China, the China fight or whatever.

I'm curious how that discussion affects the Space Development Agency. I recognize that that could make a stronger case for what you're doing because you're supporting that resiliency posture, but can you speak a little bit about what that means? Are there changes to your plans? Are there discussions around that at all?

Dr. Tournear: I think you'll see, and I won't comment on the President's budget request that's in works right now or the POM deliberations, but you will see some changes in the budget going

forward to show a reprioritization in the space arena. As far as how that affects SDA, I agree with you that the only thing I see it's doing is really codifying and supporting our spiral development and rapid delivery model and what we're planning on delivering. So there's no major shift.

We did do some tweaks in working with the Space Force and with SWAC as far as what we would include in the minimum viable product for our Tranche 1 tracking going forward, but no real shift.

Moderator: Dr. Tournear, we're approaching the end of our hour together and I always like to give our guests a closing comment. But first I want to thank you for taking the time and sharing your wisdom in this very informative discussion. And sir, the floor is yours for our conclusion.

Dr. Tournear: Thank you, Thom.

I'd just like to thank everyone for coming and asking thoughtful questions. That's always helpful.

I'd like to put this in perspective. In just under two weeks SDA will be celebrating our third anniversary, if you will, our third birthday. We were stablished March 12, 2019 to be a disruptor, a constructive disruptor as it was later termed, within the department to show that we could demonstrate proliferation and spiral development as a means to get these capabilities to the warfighting in a much more efficient manner than what has been used in the past. Based on the advances in commercial technology.

So you have to ask yourself, now three years in, have we disrupted anything? Have we been successful? Or are we pushing towards success or failure? I think the evidence overwhelmingly suggests that we're pushing towards success. So let's look at the data points that support that.

Just this last year, in 2021 we launched four experiments on six satellites which I've already kind of spoken about. Now keep that in mind. The first two satellites, the Mandrake 2 mission where we teamed with Northrop, we delivered those to the launch pad nine months after receipt of funding. That is a completely different model, to be able to push forward and do things that quickly.

If you look forward on Tranche 0, that will launch this year. We're just about 30 weeks from Tranche 0 launch. That is our warfighter emersion tranche, to be able to demonstrate these capabilities on orbit on these constellations so that we can give the warfighters a chance to be immersed in the data and use it in their exercises so they develop TTPs. That's important, because the Tranche 1 is just around the corner, September 2024. That's when we'll actually deliver this warfighting capability. At that point we need all of the warfighters who have already exercised with our Tranche 0, have developed how they would use these in an actual scenario, and be ready to use them because the satellites will be up there, we'll turn them over to Space Operations Center when they become operational, and those will be something that demonstrate this new capability.

So I would say that we've certainly demonstrated a disruption. And if you look at what's coming out of SWAC in different force design structures and how people are talking about this, no longer are people saying that LEO is something that's not useful for national defense. Now people are really saying, you know, proliferation and LEO are areas that can really enable a lot of military missions going forward.

So I think we've been extremely successful. I think we're ahead of schedule as far as doing that constructive disruption. And I'm really looking forward to getting that Tranche 0 launched in just under 30 weeks, and then again Tranche 1.

Thank you all for your time, and please continue to follow us.

Moderator: On behalf of the Defense Writers Group Dr. Tournear, I'd like to thank you as well as all the correspondents who joined us today and also your staff for their support in this conversation. Have a great afternoon everyone, and stay safe.

# # # #