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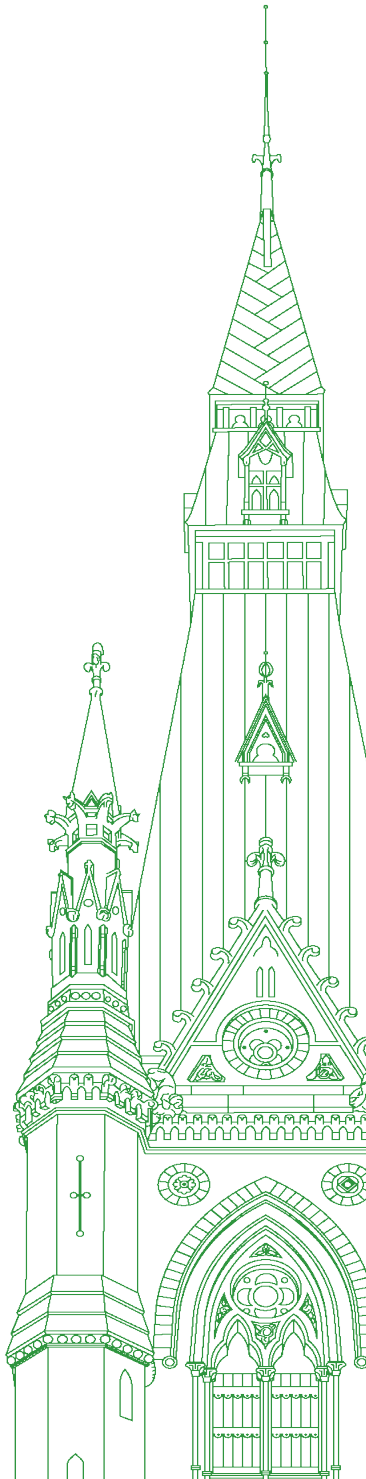

Chair: The Honourable John McKay

Standing Committee on National Defence

Monday, April 29, 2024

● (1100)

[*English*]

The Chair (Hon. John McKay (Scarborough—Guildwood, Lib.)): I call this meeting to order.

Colleagues, as you know, I don't normally read the chair's notes. This is because I think most people have read these chair's notes about 150 times, and if you haven't figured them out by now, you're never going to. However, there are some changes, and I'm going to take this opportunity to read the chair's notes with respect to avoiding audio feedback.

The first one is that in order to prevent disruptive and potentially harmful audio feedback—incidents that can cause injuries—participants are reminded to keep their earpieces away from the microphones at all times.

Second, as of Monday, April 29, the following measures are being taken to prevent audio feedback. All earpieces have been replaced by a model that greatly reduces audio feedback. New earpieces are here. The former ones were grey. These ones are black. Please use only the black ones. All unused earpieces will be unplugged at the start of the meeting. When not using the earpiece, please place it face-down on the middle of the sticker. There's a sticker on the thing here. I'm sure the clerk is going to have to remind the chair to do that.

Please consult the cards on the table for these guidelines.

The room layout has been adjusted to increase the distance between the microphones. It's more like a football field. I can barely see Brigadier-General Adamson's name there, but I'm sure he's here.

Those are the changes that have been put in place in order to cut down on audio feedback, which has been difficult for our interpreters. Thank you all for your anticipated co-operation.

As a reminder, wait until I, as the chair, recognize you. I'll remind you that comments should be addressed through the chair.

This is the start of our study on the defence of space.

I'd like to welcome our witnesses for the first hour. We have Lieutenant-General Blaise Frawley, deputy commander of the North American Aerospace Defense Command. We also have Brigadier-General Michael Adamson, commander of 3 Canadian Space Division.

Welcome, Generals Frawley and Adamson. I'll invite whoever is going to make the opening five-minute statement. I look forward to hearing what you have to say. We'll then go to our rounds of questions.

It's over to Brigadier-General Adamson for five minutes.

Brigadier-General Michael Adamson (Commander, 3 Canadian Space Division, Canadian Armed Forces): Good morning, Mr. Chair and committee members.

[*Translation*]

I am Brigadier-General Mike Adamson, Commander of Canada's 3rd Space Division and Commander of the Joint Force Space Component.

[*English*]

As the commander of 3 Canadian Space Division, I am responsible for the administrative functions of the division, which include the generation and development of personnel, strategic engagements with international allies and domestic partners, and identifying the operational capability deficiencies and needs. As the joint force space component commander, I am responsible for the delivery and use of space capability to support Canadian Armed Forces operations at home and abroad.

Space in the CAF has been evolving for over 20 years. Its first iteration, director of space development, was formed in 1997. The 3 Canadian Space Division was established on July 22, 2022, representing the operationalization of the space domain within the CAF. This reorganization has streamlined how we meet our mandate, which is supporting CAF operations with space effects, maintaining space domain awareness, and defending and protecting military space capabilities.

The focus of 3 Canadian Space Division is on the administrative business of the division, as well as developing and maintaining partnerships with our national and international space allies. The 7 Wing was also stood up subordinate to 3 Canadian Space Division. It is primarily focused on planning and coordinating the delivery of space effects.

The space domain is, as you can imagine, constantly evolving and changing. The growing accessibility of space means it is no longer limited to state players. Rather, we have seen incredible growth in civil and commercial activity as well as nefarious capability development by disruptive actors.

This creates challenges, as the space environment is becoming more congested, contested and competitive, making it an increasingly difficult environment in which to operate. It also increases the vulnerability of critical capabilities, potentially affecting the long-term sustainability of space-based services.

That is why Canada is working with other like-minded spacefaring nations to advance the development of responsible behaviours and identify how to reduce the risks of misunderstanding and miscalculations in the space domain.

As such, my priorities for the division are clear. The first is to maintain relevance within space alliance frameworks. The second is to maintain assured access to the space domain to support CAF operations at home and abroad. The third is the continued evolution of the space division and the CAF space operations enterprise.

Since our establishment, 3 Canadian Space Division has been focused on increasing what I have dubbed the “space-mindedness” within the CAF. That is the mindset that acknowledges the critical dependency that every CAF operation and activity has on space.

● (1105)

[*Translation*]

Space is just as vital to the day-to-day activities of Canadians. Space services power the stock market, provide Internet and cell phone services, get emergency services to where they're needed and even deliver meals to our doorsteps.

Part of my role is to ensure that space remains accessible and peaceful for the benefit of all, so that Canadians can continue to enjoy the services we rely on.

[*English*]

I appreciate the invitation to speak to you today and the opportunity to build space-mindedness within the Canadian public, and I welcome your questions about space and defence.

The Chair: Thank you.

Ms. Gallant, you have six minutes.

Mrs. Cheryl Gallant (Renfrew—Nipissing—Pembroke, CPC): Thank you.

This February—

The Chair: I'm sorry. I apologize.

You have five minutes, please, sir.

[*Translation*]

Lieutenant-General Blaise Frawley (Deputy Commander, North American Aerospace Defence Command, Canadian Armed Forces): Good morning, Mr. Chair and members of the committee, and thank you for the opportunity to testify today.

I am Lieutenant-General Blaise Frawley, Deputy Commander of the North American Aerospace Defence Command (NORAD), headquartered in Colorado Springs.

As Deputy Commander of NORAD, my role is to support General Gregory Guillot, Commander of NORAD, in the execution of our binational command's missions, namely aerospace warning, aerospace control and maritime warning.

[*English*]

Within aerospace warning and aerospace control, NORAD relies on space-based capabilities every day for providing threat warning and attack assessment, communication, navigation, intelligence gathering, reconnaissance, weather tracking and much more. There is nothing we do as a joint binational partner command that is not enabled or enhanced by space power.

While NORAD is not responsible for space defence, General Guillot has expressed that awareness and protection of the space domain is absolutely critical. As modern threats continue to blur the lines between air and space, it is now more important than ever that Canada and the U.S. work collaboratively in both domains, such as we are doing with the Arctic over-the-horizon radar initiative, to defend North America and better integrate space-mindedness into our operational environment.

Thank you, Mr. Chair, for the opportunity to address this committee, and I look forward to your questions.

The Chair: Thank you.

Ms. Gallant, you have six minutes.

Mrs. Cheryl Gallant: Thank you.

This February, the U.S. House intelligence committee chairman, Republican Mike Turner, disclosed a new threat by Russia to deploy a new anti-satellite weapon. How imminent is this new threat?

BGen Michael Adamson: Mr. Chair, thanks very much. It's a great question and certainly an issue that concerns us significantly. We are working with the American space force and space command in order to understand what that threat might be and what implications that might pose to activities in the domain.

We don't believe, at the moment, that there is any imminent threat, but as we look with the Americans and our allies to understand what might be going on, that's certainly something that in due course would be communicated to those who would be implicated.

Mrs. Cheryl Gallant: It was indicated that the new weapon developed by Russia may utilize nuclear weapons to destroy satellites. How credible is it, at this point, that it is feasible to do that in the near future?

BGen Michael Adamson: I think that, as a feasibility, certainly it is a possibility, but I don't think that we're able to conclusively determine at this point that it is in fact what the nature of the weapon might be.

Mrs. Cheryl Gallant: If Russia were to use nuclear bombs in space, what are the consequences if they were to detonate a nuclear device in low-earth orbit? Could you...?

BGen Michael Adamson: Certainly, it's a great question, and one that we're trying to understand ourselves. We've seen in the past, in the 1950s and 1960s, that there were tests done with these kinds of weapons in space, which provided, I think, a bit of a benchmark in case something like that were to occur again. It's probably worth stating as well that international law prohibits the placement of nuclear weapons in space, so this would be a direct violation of that and certainly counter to accepted norms of behaviour that we would expect from any spacefaring nation.

The impact and implications of something like that, I think, would be considerable in terms of what it might do to pollute the environment, how it might directly affect satellites that were in the near vicinity of such a blast—and certainly it would be a cause for concern that we might, in fact, lose some of the utility of some of those satellites if they're not appropriately hardened.

● (1110)

Mrs. Cheryl Gallant: And the impact on earth...?

BGen Michael Adamson: It really depends on the altitude at which something like that would happen, but I don't think we would expect there would be a direct impact on earth.

Mrs. Cheryl Gallant: According to a leaked U.S. intelligence report, China is building a sophisticated cyber-weapon—or more than one—to seize control of enemy satellites, rendering them useless for data signals or surveillance during wartime. How prepared is Canada to deal with this, and what is the financial allocation out of this budget to work towards getting our assets hardened?

BGen Michael Adamson: That's another great question.

That really speaks to the equities and expertise of my colleague on the Joint Force Cyber Component Command. It's certainly within their wheelhouse to understand that threat and how we might counter it.

Certainly, from our perspective, it is a concern. The space infrastructure we concern ourselves with consists of activities or platforms or vehicles that are on orbit in space. Obviously ground infrastructure would be a concern, and then the link between the two, the communication signal between those two, are all potential avenues for our adversaries to try to affect what we're doing and to degrade our capabilities.

On anything further than that, though, on the cyber front, I would have to defer to my cyber colleagues.

Mrs. Cheryl Gallant: Within the last several months, a satellite from China came very close to one of our North American defence satellites. It was eclipsing our satellite for a while. Is there any indication that the Chinese satellite obtained any information or changed any of the coordinates or did anything to the North American defence satellite?

BGen Michael Adamson: At this point, I would say there's no indication that it caused us to change, or would cause our allies to change, anything they're doing on orbit. Certainly we watch that with great interest. The ability to understand that kind of activity on orbit speaks to the criticality of space domain awareness and how important it is that we, either through our own contributions or by being plugged into wider allied efforts, be able to understand who's doing what on orbit—if a satellite, for instance, is approaching one of our own—and be able to attribute those actions to whoever might be responsible for that activity.

Mrs. Cheryl Gallant: The intelligence committee in the United States is also saying that nuclear weapons could be launched in space by placing the weapon into orbit. Is that possible right now? Do we know that it's not currently in place?

BGen Michael Adamson: We've not seen that at this point, so I don't believe that is something we're concerned with. Is it theoretically possible? It could potentially be, at some point down the road, but it's not something we're dealing with at the moment.

The Chair: You still have a minute. Go ahead.

Mrs. Cheryl Gallant: I'll go back to the Chinese Communist-owned satellites.

What, if anything, do they have to do with these balloons? Have you had any more sightings or experiences with any of these balloons that were such a concern a number of months ago?

BGen Michael Adamson: Mr. Chair, I'll defer to my NORAD colleague.

LGen Blaise Frawley: As far as a link between the satellites and balloons goes, we at the unclassified level have not seen any link between the two, other than the fact that a balloon flying over North America could be collecting surveillance data.

There are thousands of balloons that fly over North America every year.

Mrs. Cheryl Gallant: I know, but we're concerned about the ones that could be detrimental to our national security.

LGen Blaise Frawley: Absolutely.

When we have an unknown track and we think it might be a balloon, we first of all have to identify it as such, which is challenging, given our domain awareness issues. In other words, our radar coverage does not go far enough out over our coast and over northern Canada. Once we've identified what it is, we have to determine whether it is a threat to North America. We haven't seen a similar type of threat since February of last year, but we do assess every single balloon.

Mrs. Cheryl Gallant: Have you improved your equipment—

The Chair: We're going to have to leave that—

Mrs. Cheryl Gallant: Has your equipment improved at all so that you can detect more?

The Chair: You'll have to work your answer back in on something else.

Thanks, Ms. Gallant.

Mr. Fillmore, go ahead for six minutes, please.

Mr. Andy Fillmore (Halifax, Lib.): Thank you, Chair.

Generals, thank you very much for making time to be with us today and for your service and that of the team that is with you as well.

This is the first time the Standing Committee on National Defence has engaged on the topic of space, so there is a lot we don't know. I don't think anyone around this table would call themselves an expert in any respect. I think we're all very cognizant that there's a lot we don't know, and I'm really looking forward to this exercise today and over the coming weeks of the study so that we can understand those things that we don't know and that we need to understand better.

We've framed the study in such a way that we're trying to get an understanding of the role of space in national security and sovereignty, the role of space in how we fulfill our international obligations with international partners, and the role for Canadian technology and industry such that Canada can maintain its position as a leader. I'm hoping that today we can cover all those things, although maybe not in the six minutes.

Maybe I could start with the last item I mentioned.

We're seeing increasingly that the private sector is being turned to in order to get things into space. Right now Canada doesn't have a domestic launch capability. We're working hard on that at Maritime Launch, but this brings up the question of collaboration and co-operation and even interdependence with international partners. I wonder if you could talk about the role of the private sector in Canada and elsewhere in the world in achieving our space objectives.

● (1115)

BGen Michael Adamson: Mr. Chair, this is a great question. It's an initiative that we've seen advanced not just in Canada but also among our allies over the last couple of years.

As the previous commander of the U.S. Space Force was fond of saying, space is hard. It's resource-intensive and it's expensive and it takes a lot to field all of the capabilities one would want in order to conduct space operations. As we look at that and the intricacies of space domain operations, it has become very clear to us and our allies over the last little while that this really needs to be a large team effort in terms of not just having defence capabilities but also leveraging those of industry partners. We've seen that in current conflict environments, where industry is providing information or assisting in the collection of information, if you will.

What we've done, in order to recognize that and make sure we're able to work collaboratively with our industry partners, is stand up something called a commercial integration cell within our own Canadian Space Operations Centre. This is mirroring the intent behind what we've seen in the U.S., where over a dozen companies are part and parcel of that integration cell. It's something we've worked on through Interchange Canada to make sure this is purely for us to be able to speak with industry partners at a classified level about what's going on in the domain and is separated from any potential future projects or procurement or anything else so that we can keep it compartmentalized.

As we leverage industry and commercial capabilities, it's going to be really important for us to have that conversation and that dialogue at appropriate security classification levels. It is certainly a change we've seen in the paradigm of delivering space defence effects, and as I said, it's something that all of our allies are working on as we collectively look at how we do this with partners in industry and defence and allies internationally.

Mr. Andy Fillmore: Thank you for that.

LGen Blaise Frawley: I'm in town for this, but I'm also here for a NORAD summit. This is a first-ever Canadian summit for our program within NORAD. It's called STRDI, or Science and Technology, Research and Development, and Innovation. It annually brings industry to Colorado Springs. This is the first time we're doing it in Canada, in order to encourage Canadian industry. We outline the challenges of the future, looking 15, 20 and 25 years out for NORAD, and industry comes up with solutions.

You understand there's NORAD modernization, which is the Canadian project, but the modernization of NORAD is a thing that will continue long into the future. We want to make sure that we not only include Canadian industry but also identify space capabilities that could help us with our future problems in the NORAD context.

Mr. Andy Fillmore: Thank you.

Brigadier-General, you mentioned leveraging the private sector to achieve our objectives, which touches on what the Lieutenant-General said as well. The result of this study will be recommendations to government. This would be a good opportunity to let the committee and therefore the government know what we might do better or differently to make sure we're able to leverage the private sector and position the private sector and the domestic technology sector in Canada for that kind of support role and commercial success.

Do you have any reflections on that?

BGen Michael Adamson: This is a great question and one that, again, we've been looking at over the last little while.

When we look at the adversarial challenges that are out there, we often refer to China as the pacing threat, and trying to keep pace with that can be a challenge. The organizations that are probably best positioned to move innovation and technological development quickly are going to be our industry partners. I think we need to consult with industry to understand what new technology they may be working on and where we might be able to utilize that for best effect. Certainly, it has to be a collaborative and consultative engagement that we have with industry as we go forward.

Mr. Andy Fillmore: Thank you.

● (1120)

LGen Blaise Frawley: If I may, Mr. Chair, one of the things that we run into the most when we hold our STRDI symposiums is classification levels. When we talk about the future of NORAD, we're talking at least at the secret level, if not at the TS level. U.S. companies make an effort to have folks who are cleared right up to that level. Canadian companies do not do that as much, so they get excluded from the discussions that have to be at those levels. If there was one thing I could change, it would be to encourage Canadian industry to obtain the classification levels so we can have the discussions with them and we can include them.

Mr. Andy Fillmore: Is it important input into the planning and the—

LGen Blaise Frawley: Absolutely.

The Chair: Thank you, Mr. Fillmore. We have our first recommendation.

[*Translation*]

Ms. Normandin, you have six minutes.

[*English*]

Madam Normandin will speak *en français.*

[*Translation*]

Ms. Christine Normandin (Saint-Jean, BQ): Thank you, Mr. Chair.

I'd like to thank the witnesses for joining us today.

I'd like to pick up on one of the first things you said, Brigadier-General Adamson. You mentioned that one of your roles was to identify operational deficiencies within the armed forces when it comes to space. Can you tell us about these deficiencies?

BGen Michael Adamson: Thank you for the question. I will answer in English, as there are likely some technical terms I don't know in French.

[*English*]

Identifying deficiencies is one of the roles that we set out for the 3 Canadian Space Division when we stood it up. There was no operational authority within the Canadian Armed Forces up until that point to look at that. Really, we talk to our allies. We take a frank look at the adversarial threat that is out there. Almost on a daily basis, we learn something that we didn't know to begin with that will speak to what we should be doing from a capability development perspective. The nature of the threats and the nature of activities in the domain change on a regular, daily, weekly basis. Certainly we need to be, I think, agile in terms of how we look at that.

In terms of looking at capabilities we may not have now and ones that we might want to look at going forward, we have to do this in a holistic sense. We do something we call “allied by design” in terms of addressing how all of our allies work together to deliver space effects. We work very closely, obviously, with the Americans, with Australia, with the U.K. and others. There's no point in our building something that already exists. I think we have to have a complementarity in our capability development efforts in order for us to bring something relevant to the table and be of value to our allies. That's basically shaping the way that we're going forward and recognizing what we need to do next.

[*Translation*]

Ms. Christine Normandin: Thank you.

In terms of what you consider should be done to go further, could you tell me which weaknesses were identified and are currently being addressed?

[*English*]

BGen Michael Adamson: I don't know that I would characterize them as weaknesses at the moment, as opposed to understanding the threat environment.

What we've seen over the last little while is a significant level of effort and development on the part of our adversaries to deny us the ability to be able to conduct operations in the space domain. Everything we do, whether it's aircraft or ships or tanks or a soldier walking through the woods, relies on some kind of space-enabled capability, whether that be a GPS or satellite communications or what have you. Our allies are looking to make sure that we maintain assured access to those things so that we can use them. Our adversaries understand that that is something they would want to rob us of in order to then give themselves the upper hand.

It becomes interesting when we realize that the GPS signal that is helping us formulate our plans to conduct military operations is the same GPS signal that's in your car and is getting you to the grocery store or getting the first responders to the heart attack victim or what have you. The same satellite communications that they would deny are the same ones that we rely on societally on a daily basis as well. Certainly there is added interest and impetus for us to be able to address those things.

[*Translation*]

Ms. Christine Normandin: Thank you very much.

I'll come back to something Ms. Gallant raised in her questions, which is nuclear power in space. Unless I'm mistaken, the United States and Japan are sponsoring a resolution at the United Nations Security Council to prevent the deployment or development of nuclear power in space.

Is there a deterrence approach for nuclear power in space similar to the one used at ground level? I'd like to know if the concept exists and, if so, how it is articulated.

BGen Michael Adamson: Thank you for the question.

[*English*]

Deterrence is a whole-of-government effort. Something like this is going to rely on a number of different departmental entities and stakeholders to be able to deter the adversary.

Obviously, impacts would not be felt just militarily; there would be impacts to society in terms of our ability to access these services that I've just spoken about. However, the deterrence component will come from Global Affairs Canada. It will come through sanctions. It will come through diplomatic means, *démarches*, and what have you. Certainly, I can't speak at great length about that.

The other deterrent is the fact that militarily we want our adversaries to understand that it's not ever going to be in their best interest to do something like that. The best way for us to deter adversaries is to maintain a strong, united front with our allies. When they look across the table and they see that we are part of a team, that is, I think, the strength in our deterrence capability. Our adversaries don't necessarily have friends and colleagues like we do in the west, whether that be through alliance frameworks or what have you. Really, it's important to maintain a strong and collaborative front in that regard to deter those kinds of activities.

● (1125)

[*Translation*]

Ms. Christine Normandin: Thank you.

Space debris is also a problem. We're hearing some rather strange suggestions, including a giant magnet or a laser that could rid us of this waste. So I'd like to know what realistic solutions are being considered to deal with space debris.

BGen Michael Adamson: Thank you for the question.

[*English*]

Debris is interesting. I think what we're going to have to see going forward is legislation globally, internationally, on norms of behaviour that would state that if you're going to launch a rocket into space, it would behoove those launching parties to de-orbit rocket bodies responsibly. If you have a satellite in space and it's going to reach end of life, make sure that you keep enough fuel on board to de-orbit or to be able to dispose of it.

At the same time, there's going to be, I think, business opportunities for folks out there or companies that come up with a great way of being able to either capture or dispose of debris in their own way. I've seen lots of innovative ideas out there, from butterfly nets to lasers and everything in between.

Debris is certainly a problem, and I think we're probably going to be hard pressed to negate some of the debris or a lot of the debris that is out there. It's going to be in our best interest to make sure that we don't add to that problem going forward, and that's internationally.

[*Translation*]

Ms. Christine Normandin: Thank you.

[*English*]

The Chair: Ms. Mathyssen, go ahead for six minutes, please.

Ms. Lindsay Mathyssen (London—Fanshawe, NDP): Thank you so much for appearing before us today.

When the Canadian space division was first announced in 2022, you informed the media that you wanted to reach the personnel level dedicated to the division of 270 CAF members.

There's been a ton of focus, of course rightly so, on recruitment and retention issues within the CAF and that other division that we're speaking about building up, the cyber force.

We've been hearing in this committee a lot about all of the things that the CAF need in order to be the strong force that they need to be. That's appropriate housing, affordable housing, a reasonable cost of living—you name it.

As these responsibilities and worries grow on CAF personnel related to all the things that I know the general population in Canada also worries about, can you talk about getting to that 270 mark—how you've done it, how you want to continue to do it and what the personnel needs are in your division to get to that 270 mark?

BGen Michael Adamson: There are some elements of the question that I think I would best defer to our military personnel command in terms of looking at things like housing, benefits and recruitment and retention issues. Those are squarely within their lanes, and they've certainly got a lot of effort going into programs to try to address all of those.

From a space division perspective, we are growing towards that 270 goal. We are unique insofar as none of the folks who work in the space division come directly off the street, so this isn't a recruiting issue. We typically take personnel who are already in the Canadian Armed Forces—the army, air force and the navy—because we are joint.

We'll bring them in and we will teach them what they need to know to be space operators. We'll retain them for the normal tour length of three or four years, and then they'll normally go back to wherever they came from with the idea that at some point, we'd bring that expertise back at the next rank level, and they would be future space leaders.

I'm not worried about recruiting off the street in that regard. Certainly when we look around the Canadian Armed Forces to find people who may be interested in coming to us, that is the number one question I get when I speak at town halls: “How do I get into the space organization?” It's absolutely fascinating for folks, and there's no shortage of potential applicants.

To that end, I am blessed that I have a workforce that is absolutely thrilled about doing what they do and that I can walk around the spaces for both 7 Wing and the division and run into people who are passionate about space and delivering those effects. It is really heartwarming for us.

● (1130)

Ms. Lindsay Mathyssen: Maybe it's not recruitment, but retention is certainly an issue, as well as the competition that we see from the private sector. Can you speak to that and the issues that you're having on that end?

BGen Michael Adamson: From our perspective, I don't see the retention issues within the space division, as I said, simply because I have a highly motivated and highly enthusiastic workforce.

Beyond that, in the larger CAF, again, that would probably be a question that would better be posed to our personnel command folks.

Ms. Lindsay Mathyssen: One of the issues that we're also hearing a lot about that comes up a lot in re-examination is universality of service. Is there a potential to re-examine that and see that as a movement to bring people into that very exciting role and the jobs that you have available in space division and maybe the elimination, potentially, of that universality to open that more to people who don't want to leave CAF and want that exciting reposting?

BGen Michael Adamson: I think it probably wouldn't come as a surprise to understand that most space operations are done at a desk, at a console in an operations centre, as opposed to deploying perhaps in harsher environments where universality of service is a factor.

It's probably worth noting as well that close to 50% of the space division at the moment is civilian personnel who obviously aren't subject to universality of service concerns. We are well aware that if there are folks who have restrictions on their universality of service, we are welcoming as long as they can do the job that we need them to do and are able to meet those requirements.

There is an element of being deployable with some of our folks. There is a possibility that we may deploy space support teams into the field to support deployed commanders, but for the most part, our work is done locally within the headquarters environment, and certainly we'd be able to accommodate those universality of service concerns.

Ms. Lindsay Mathyssen: Mr. Fillmore was asking a lot about the private side, the commercial side, and how we support Canadian industry, and it's good that we move in that way. It's certainly something burgeoning and something that we do need to work more on.

Currently, the Americans have built a network of hundreds of spy satellites, but through Elon Musk's company. I have a lot of questions about that partnership, considering our allyship and our extreme intertwined role with the United States. How reliant are we upon a company like SpaceX, for example, for our capabilities?

BGen Michael Adamson: That's a great question.

I guess I would probably not characterize any of the SpaceX capabilities as spy satellites. Really, they are communication satellites that are designed to provide high bandwidth communications to a consumer or customer.

Now, I know that in the interests of understanding how that might work in a military context, there has been use of Starlink capabilities on the U.S. side to better understand whether or not that would serve a need for more communications. I don't think we can ever have too many communications capabilities in a military context.

As for our reliance on it from a Canadian perspective, we're not reliant at all on anything like SpaceX or Starlink for conducting any of our business, which isn't to say that at some point we might not want to use SpaceX or another commercial provider for satellite communications, in addition to military satellite communications, but that would be the same as using the Internet.

The Chair: Thank you.

Mr. Kelly, you have five minutes.

Mr. Pat Kelly (Calgary Rocky Ridge, CPC): Thank you.

General Frawley, in response to Mrs. Gallant's question about domain awareness and her question about the possibility of further incursions into Canadian airspace such as what we saw in the early months of 2023, you said that our radar coverage is insufficient to detect these kinds of threats, or at least all of these kinds of threats. Can you elaborate on that?

LGen Blaise Frawley: Absolutely, Mr. Chair.

This has been identified over numerous years. Our commander makes a report to both the Secretary of Defense and the Chief of the Defence Staff highlighting that we have issues with domain awareness when it comes to our radar coverage. If you look out beyond our coasts, both east and west and in the north, you see that once you get a distance off the coast, we have no radar coverage.

In northern Canada and central northern Canada especially, where everybody lives in northern Canada and there are very few people, there's very little to no radar coverage, including communication coverage. Again, that has been identified, and that's why we are moving forward with over-the-horizon radar to solve that problem of covering those areas that are currently not covered.

● (1135)

Mr. Pat Kelly: What's the delivery date for an over-the-horizon system that will correct all of these shortcomings?

LGen Blaise Frawley: I can speak to over-the-horizon radar. It's OTHR Arctic, which is one of two Canadian radars that will be fielded by 2026. For the polar variant, which will be situated further north in Canada and will look over the poles, I don't have a date on that, but it's a number of years later. There is still a certain amount of R and D going on to figure out how to bounce off the polar atmosphere. The U.S. is in line with similar timelines, with 2026 for their radars for the coasts.

Mr. Pat Kelly: In 2022, the Auditor General reported that it will take a decade for the Canadian Space Agency to launch a successor to RADARSAT and that an interruption in satellite earth observation services past 2026 is a significant risk.

When will we have a successor to RADARSAT?

BGen Michael Adamson: We have been leveraging RADARSAT-2 for a number of years to provide synthetic aperture radar intelligence gathering—or information gathering, if you will—overlaid with automated identification of shipping, to look at the approaches to North America.

RADARSAT-2 then begat RADARSAT Constellation Mission. We worked very closely with the Canadian Space Agency in order to deliver those effects. I believe it was just last year, if I'm not mistaken, that there was a funding announcement for the CSA in order to extend the lifespan of RCM, the RADARSAT Constellation Mission.

I understand that my CSA colleagues are following us today, so I'll let them talk about how RADARSAT Constellation Mission will be extended going into the future.

Beyond that, we do have a program of record, called “defence enhanced surveillance from space”. That will provide synthetic aperture radar, as we see now with AIS data, and then potentially other on-board sensors as well, to contribute to our understanding of what's going on around the globe. Delivery timelines at the moment, I believe, are probably mid-2030s.

Mr. Pat Kelly: If I may go back to General Frawley, if RADARSAT fails in 2026, as is the expectation built into the lifespan of that system, how does that affect North American air defence?

LGen Blaise Frawley: We use RADARSAT—RADARSAT Constellation Mission—primarily for maritime warning, the third mission that I mentioned. It's not the only source of data. Clearly, there's RCM, and there's other data available, so it's blended in with significant other ISR data from other platforms to give us our maritime warning picture.

Mr. Pat Kelly: You're going to defer to our next panel on the expectation of replacement on that. You don't know when a RADARSAT replacement will be ready.

LGen Blaise Frawley: For the RADARSAT Constellation Mission, I don't have any information on that, Mr. Chair.

The Chair: You have 30 seconds.

Mr. Pat Kelly: Is there capacity within the private sector to provide the information that we are waiting for? Is there anything off the shelf that can be quickly procured for the replacement of this system or to replace the capability of the system?

The Chair: Let it be quickly procured and quickly answered.

BGen Michael Adamson: I'll answer very quickly, then, Mr. Chair.

Yes, I fully expect that there would be some kind of civil or commercial capability that would be available for us to leverage.

The Chair: Thank you, Mr. Kelly.

Madam Lambropoulos, go ahead for five minutes, please.

Ms. Emmanuella Lambropoulos (Saint-Laurent, Lib.): Thank you, Chair.

Thank you to both of our witnesses for being here to answer some of our questions today.

Based on the conversation that we're having, it seems like we don't know much because it's a domain that we don't have very much research on. Just in general, we rely very heavily on our allies in order to have a united front to protect ourselves.

What are some of the challenges or barriers specifically when it comes to an emerging domain such as this? What are the specific barriers that we have in front of us? Are there any strategies in place to make sure that we get to where we need to be in order to be effective?

BGen Michael Adamson: That's a great question, Mr. Chair.

I would characterize them as not necessarily barriers, but things that we're working on and things that we need to make sure that we better understand.

Space domain awareness would be a classic example. It's understanding what's going on in orbit and understanding what our adversaries and other companies are up to.

The domain is getting increasingly congested. There are far more actors in space than there used to be. It's not just nation-states that have the ability to do this now, but a significant number of commercial actors are out there. There's a lot of activity. It's about understanding what's going on and being able to prevent collisions or potential impacts out there. Space domain awareness is probably one of the larger challenges we're dealing with at the moment.

We maintain this awareness through a number of fronts. We have Canada's satellite, Sapphire, which contributes to the space surveillance network in the U.S. Sapphire contributes to the larger database, and then we get all sorts of great information in terms of global awareness of what's going on.

We're also part of an organization called joint commercial operations, which is almost like crowdfunding space domain awareness. It leverages a number of satellite observation stations on the globe, as well as radars, whether they be from academia, commercial companies or industry. All of those companies subscribe to the central database. They put all of their information in there—it's unclassified—and basically we collate all of that as one of the partnering nations. We're able to use that information to better understand what's going on in the domain as well.

It is a challenge, and certainly I don't think we'll ever say that we have too much ability to understand what's going on in the domain. From a Canadian perspective, it's these international efforts and collaboration that allow us to maintain a shared awareness.

● (1140)

Ms. Emmanuella Lambropoulos: Thank you.

I appreciate that you brought up commercial actors. I know that Canada has an aerospace industry that is quite strong.

Ms. Mathyssen also raised this: Is there a specific way that we can get them involved in a strategy that isn't just about data and sharing data, but actually creating equipment that could eventually help us get to a better place?

BGen Michael Adamson: Mr. Chair, it's a great question.

I think it goes back to some of the comments that General Frawley made earlier.

We absolutely would love to collaborate more with industry and commercial entities in understanding what's going on and delivering space effects and, like I said, protecting our access to it in the face of potential adversarial actions, but that requires us to be able to have frank and at times classified discussions with our industry partners. It's something we need to work on and that we can do better here in Canada to make sure we're able to have those discussions with industry.

Ms. Emmanuella Lambropoulos: Thank you.

I'll bring it to a different place. I know you touched on it a little bit once again.

What do you think an increase in launch schedules from China and Russia could potentially mean for Canada? Does it place us at a greater risk, or is there a threat to Canada? What do you think of those?

BGen Michael Adamson: We've seen a huge increase in launch pace over the last few years. It's gone from maybe 100 per year to hundreds of launches per year. Each one of those launches is potentially putting 50 or 60 satellites at a time in orbit. That increased pace of launch has both an upside and a downside.

There's an increased pace of launch because it's less expensive now. There's a lot of opportunity there for commercial and industry partners to take advantage of that.

Conversely, though, if it's some of our adversaries, we don't know what they're launching, necessarily. Understanding what they've launched, where they've launched, what orbit it goes into and then, when it gets up there, what it is doing are questions that we ask ourselves and work very hard to try to understand, because not all of that is necessarily for peaceful, academic or scientific use. There are, of course, activities that are nefarious in nature. We need to be able to attribute those activities.

The challenge in that regard is space domain awareness and understanding what's happening in the domain.

The Chair: Thank you, Ms. Lambropoulos.

I join Mr. Fillmore and Ms. Lambropoulos. We're trying to up the knowledge base of the community, and I appreciate that occasionally we'll lapse into acronyms. Perhaps you could just catch yourselves and disaggregate the acronyms for those of us who don't deal with this on a daily basis. Thank you.

Madame Normandin, go ahead for two and a half minutes, please.

[*Translation*]

Ms. Christine Normandin: Thank you very much, Mr. Chair.

Witnesses, several non-allied countries are interested in space for commercial reasons, but also for scientific reasons. Sometimes, these countries conceal military motives behind this scientific and commercial screen. China comes to mind, for instance. I'd like to hear your comments on that.

From our side, how can our military sector ensure validation of scientific and commercial projects from countries whose views are dissimilar from our own, and how do we ensure that we don't overlook something that's hidden behind a scientific or commercial screen?

● (1145)

LGen Blaise Frawley: Thank you for the question.

We don't have as much information on China as we do on other countries, and that's one of the problems. I, for one, would look at China's intentions in the Arctic, which might help draw connections with its intentions in space. Every summer, we see the *Xue Long 2* going north. According to the Chinese, it's a scientific vessel. However, we're fairly certain that it's not. If we make the same connection with what they're doing in space, we really have to surmise what they're up to. What the Chinese do in space is often unclear.

BGen Michael Adamson: That's absolutely right.

[*English*]

China is not going to tell us what they're doing. They're not going to advertise and say that this is a satellite or this is a capability that we're using for this purpose. Even when they may hint at that, the fact of the matter is that we basically enter into that with the suspicion that whatever is going on is probably at least dual-purpose in nature. If it has an academic or scientific purpose, it probably has some kind of military or intelligence-gathering capability as well, because I don't think you can clearly differentiate between the two and compartmentalize those within the Chinese context. Therefore, all we can really do is to continue to watch to better understand and to try to infer from their activities and their actions what is going on.

[*Translation*]

Ms. Christine Normandin: Thank you, gentlemen.

[*English*]

The Chair: You have two and a half minutes, Ms. Mathyssen.

Ms. Lindsay Mathyssen: Thank you.

Just to build on what we were talking about before and in terms of the private side and our arms trade treaties, we've talked a lot about China, but what about the other players around the world? Could you expand more on North Korea, Iran and India?

Canada does a lot of trade with countries like Israel in terms of the space domain. We've now put forward a motion to really heighten our arms trade controls and those arms trade treaties. Within two minutes, can you speak to that and to what that means in terms of space and those other players on the world front?

[*Translation*]

BGen Michael Adamson: Thank you for the question, and I wish myself luck.

[*English*]

It's a great question. I'm not sure I can speak to a lot of that.

At the moment, we're concentrating our efforts in the space division on working closely with our allies to understand the near and present threats from a military perspective. The obvious answer to that would be China. Russia would be another one, and we haven't talked a lot about Russia.

Russia is really a space power in decline. It continues to launch, but not nearly at the rate it did in the past, and I think certainly not at a rate it will continue to enjoy. I think the sanctions and the activities and the illegal conflict in Ukraine are having adverse effects on Russia's abilities to do all of that. Certainly it's losing commercial customers in terms of launch because of its activities in that regard. We are watching it carefully. It continues to field significant capabilities to deny us use of the domain, but we don't see it using the domain in nearly the same way or being nearly as reliant as we have been seeing.

The Chair: You have 30 seconds.

Ms. Lindsay Mathyssen: I mentioned Israel, and you didn't respond. Do we share satellite space intelligence with them, and does the Arms Trade Treaty apply to them? How do we navigate that?

BGen Michael Adamson: I can't speak to that. The CF Intelligence Command is the organization with the Canadian Armed Forces that does any work in that regard. That's not something that we work in at all.

The Chair: Mr. Bezan, you have five minutes.

Mr. James Bezan (Selkirk—Interlake—Eastman, CPC): Thank you, Mr. Chair.

I want to thank both of our witnesses for being here.

It's good to see you again, General Frawley. It's always great to have NORAD at the table.

General Adamson, welcome to the committee.

Just to drill down more on the nuclear weaponization of space, the U.S., back in the 1960s, did a number of nuclear tests. I think there were five under Operation Fishbowl. Knowing the impact back then, if Russia decided to target satellites, how big of a blast area would we potentially be talking about, and how many communication satellites and other satellites that we have in space would be impacted at the various levels? Has anybody done that analysis?

● (1150)

BGen Michael Adamson: Mr. Chair, that's a great question.

There are a lot of variables in the answer. It would really depend on the size of the weapon. That would obviously be something we would be interested to understand, if this were in fact a reality.

Where on orbit it would then be detonated is also a concern—low earth orbit, medium earth orbit, geostationary or somewhere in between—as it would certainly affect the blast pattern, or the blast radius, if you will. Whether or not those effects would then reach across various orbital domains would also be something we'd be interested to try to understand, as well as the long-term effects.

Obviously there would probably be destructive effects with those satellite vehicles that would be in the direct line of sight of such a blast. The follow-on concern then becomes the irradiated space that would exist afterwards, again depending on the orbital domain, that other satellites might be going through over the next period of time, whether that would be hours, days, weeks or what have you.

The expectation is that it would have a deleterious effect. Whether that would result in the destruction of those satellites or a reduced lifespan or would have no effect at all remains to be seen. Certainly when those tests were done in the 1960s, there wasn't nearly the on-orbit activity that we have now, so it would be kind of hard to assess that at the moment.

Mr. James Bezan: I appreciate that. My understanding is that in one of those tests in particular, over a third of the satellites in orbit at that time were impacted because of both the after-effect plus the immediate blast. Given the exponential growth in satellites that are currently in our space, it would have a much greater impact and would impact the way we do business, as everybody relies on satellite communication.

Speaking about that satellite communication, we talk about NORAD modernization and we talk about the F-35s coming online. The DPU talks about having advance warning aircraft and command—AWACS.

What do we need in space to enable those platforms to do the NORAD mission, particularly in the Arctic?

LGen Blaise Frawley: Obviously, anything linked to ISR—intelligence, surveillance and reconnaissance—is critical for us, especially polar over-the-horizon radar. Given where it's going to be, it'll communicate through SATCOM to get its information back to our headquarters.

Certainly with regard to SATCOM communications, as I said earlier, we have huge, gaping communication holes over northern Canada and over the Arctic. If we're going to reach out and touch the Russian bombers before they launch their cruise missiles, which is our goal, then we're going to have to be able to get a long way north, so we need communications that cover the entirety of the northern pole.

Mr. James Bezan: I appreciate that, because I've seen the map that shows where we actually have our north warning system and how the entire interior of northern Canada and the entire Arctic archipelago, with the exception of Alert and maybe Resolute Bay, are completely bare naked. There is no surveillance there at all, so the over-the-horizon radar is important.

What about using LEOs—low earth orbit satellites—to help inform our early warning system as well? Is that something NORAD is looking at? Is that part of the intelligence gathering that space command is going to be needing?

LGen Blaise Frawley: What I can say, Mr. Chair, from a NORAD perspective, is that NORAD doesn't do space; we rely on space.

We describe what our requirements are. Then, on the U.S. side, the U.S. Space Command and the U.S. Space Force will determine the best way to deliver that. On the Canadian side, it would be DG Air and Space Force Development.

Again, we very clearly highlight what we need and where our shortcomings are, but we don't actually determine what is best suited, whether LEO, GEO, highly elliptical orbit, etc.

The Chair: Thank you, Mr. Bezan.

The final question goes to Mr. Collins.

Mr. Chad Collins (Hamilton East—Stoney Creek, Lib.): Thanks, Mr. Chairman.

Generals, welcome to the committee.

General Adamson, I'll start with you in terms of the commercial integration cell. I want to follow up on Ms. Mathyssen's question that she asked earlier in terms of working with industry.

You've highlighted the benefits, and I think some of them are very obvious. It's an expensive process that we're involved in. Relying on the private sector certainly helps us lower the cost, I would think, for some of these initiatives. Supporting industry also drives innovation, and we'll see benefits there.

I am fascinated with our increasing reliance on industry. There is the politics of industry itself. I'll raise the Starlink issue with the Ukraine-Russia conflict. That played out in in a very public way.

Some in the public might say that with an increasing reliance on the private sector, industry or for-profit organizations, there may arise in the future—and I'm not asking for your opinion on the Starlink situation—some question about security in partnerships, whether they're legal or not.

How can the public be assured that we're protected with those agreements, knowing that there's an element of politics with some of these situations that arise?

● (1155)

BGen Michael Adamson: Mr. Chair, that's a great question.

That's an issue and a concern that we have lived with as we've looked at standing up our commercial integration cell, because we want to make sure that there is no appearance of impropriety in dealing with a commercial company, such that their participation in this initiative would provide them with some kind of undue advantage on a future project or procurement capability. It's one that we've seen our allies come to grips with as well. You have to have very clear guardrails in place to make sure that you keep things appropriate.

I am much more beholden to policy advice in this position than I've ever been before, and I don't do anything without talking to my policy and JAG colleagues when we look at this. It's something that we're highly sensitive to, and something that is certainly looked at very closely as we go forward.

Mr. Chad Collins: General Frawley, on that same issue, in terms of private contracts that we have, there may be an element of politics in terms of positions that are held by corporations or individuals and the public's assurance that with the increasing reliance on private industry, the investments that we make will be protected in a time of conflict.

LGen Blaise Frawley: On the NORAD side, we don't see nearly as much of that type of contracting as we do in other parts of the government and within the Department of National Defence. Most of that would be on the U.S. side as opposed to the Canadian side, which I'm not at liberty to talk about.

Mr. Chad Collins: General Adamson, can I talk about the Wild West scenario that you talked about earlier?

With many issues, whether it's the space debris issue that was raised earlier or some of the nuclear threats that were talked about, there really aren't a lot of structured, international agreements at present that talk about the rules of space. Knowing that we have some state actors that are unwilling to assist in that regard in terms of formulating those agreements—Russia and China being top of the list—how do we move forward with our allies in creating some rules of order in an area where it is early days and still that Wild West scenario?

BGen Michael Adamson: That's a great question, Mr. Chair.

I'll highlight the combined space operations initiative, which currently comprises 10 nations—our Five Eyes partners, plus France and Germany, and Italy, Norway and Japan joined just before Christmas.

It's a body that is represented by nations from around the world that are like-minded in terms of advocating responsible behaviours. Collectively, we have the ability to call out irresponsible behaviours on the part of any nation-state or even a commercial actor that might be acting irresponsibly.

Other than that, what we can do collectively, with the voice of a number of nation partners, is maintain the moral high ground. From a Canadian perspective, I think we need to take a look at how it is that we employ assets in space and how our own industry operates in space, make sure that we're not doing anything that would call into question our behaviour in that regard, and set the example. I know that our allies are like-minded in doing that as well.

Mr. Chad Collins: You highlighted the evolution of the space division in your opening. Can you talk about where we'll be in five to 10 years from now, or where you hope we will be?

BGen Michael Adamson: It's been an absolutely incredible journey these last couple of years. The space-mindedness of the Canadian Armed Forces has been increased. Our joint force understands how important space is to everything that they're doing, and also that they need to be sensitive to the fact that if that is degraded or denied to them, they need to be able to work through it.

I think that this educational piece is there. We will continue to do that over the next few years. We will continue to recognize capability areas that perhaps don't exist at the moment but might become an issue or a concern. Space domain awareness will go beyond the geostationary belt to cislunar space, as we watch more and more missions heading out towards the moon, Mars and potentially beyond.

Space is the limit. Who knows? I'll be interested to see myself.

The Chair: Thank you, Mr. Collins.

Unfortunately, that brings our first hour to a close. This has been absolutely fascinating and a terrific start for the committee.

Just before I let you get your well-deserved lunch, if NORAD detects a space threat such that it needs to be activated, is Canada entirely dependent upon the U.S. response to any threat?

● (1200)

LGen Blaise Frawley: Thanks for the question, Mr. Chair.

NORAD doesn't watch objects in space. What we do is watch terrestrial launches towards space. Of course, what we're watching for, predominantly, are ballistic missiles or missiles that could become hypersonic missiles. We also see all re-entries. We do this through what's called OPIR, or overhead persistent infrared. It's a satellite system that essentially watches the earth constantly.

Watching objects in space is absolutely a U.S. Space Command responsibility, and Space Operations Command. We're obviously concerned about anything that might have been in space for a period of time and could de-orbit and become a ballistic missile or hypersonic weapon. We're always watching for re-entries.

Again, we're not monitoring space specifically. U.S. Space Command does that, as do the Canadians in the SpOC.

The Chair: Is that a distinction or an activity that can stand in the current situation? You're monitoring stuff leaving and coming back in, but when it's out there, you're not monitoring it.

LGen Blaise Frawley: We're made aware of it.

The Chair: Yeah, we're made aware of it, but it's not NORAD looking at it.

LGen Blaise Frawley: No, it's U.S. Space Command, because that's their primary area of responsibility.

What's going to sort this out—I think it was asked in a previous session—is CJADC2. As we push information across all domains, all combatant commands, countries, NATO and NORAD, and are able to communicate and make decisions based on a pretty similar architecture or system, we'll have the information available that we need. However, we all have our specific focus areas. Our job is to defend North America, while Space Command defends space as best they can.

The Chair: Thank you for that—at least, I think it's thank you. I'm not quite sure. That's the point of doing these studies.

With that, colleagues, we'll pause to re-empanel. Again, I want to thank you for setting this study up. It's been quite excellent.

General Adamson, you're welcome back any time. Thanks.

● (1200)

(Pause)

● (1205)

The Chair: I'd like to call this meeting back to order.

I'd like to welcome the witnesses for our second hour.

We have Maja Djukic and Guennadi Kroupnik, director general of space utilization. Welcome to the committee.

With that, I will ask Ms. Djukic for opening remarks for five minutes.

Ms. Maja Djukic (Director General, Policy, Canadian Space Agency): Good afternoon, Chair and committee members. Thank you for the invitation to speak about the Canadian Space Agency and its role in Canada's space program.

My name is Maja Djukic and I'm the director general of policy at the Canadian Space Agency. I'm joined by my colleague Guennadi Kroupnik, director general of the space utilization program.

[*Translation*]

The agency is the federal agency responsible for Canada's civil space program. We work with our colleagues at the agency to promote the development and peaceful use of space for the good of Canadians.

[*English*]

Under the Canadian Space Agency Act, we are responsible for coordinating the government's space policies and programs, leading activities to advance space research and the applications of space technologies, promoting the adoption of space technology by Canadian industry and encouraging commercialization of Canada's investments in space.

[*Translation*]

These functions require that we work with our colleagues across federal departments, including the Department of National Defence.

[*English*]

Space is important, and not only for its role in our security and sovereignty: In 2021, Canada's space sector generated $4.9 billion in revenues and contributed $2.8 billion to Canada's GDP. It directly employed over 11,600 Canadians, the majority in highly specialized STEM occupations, and supported more than 12,000 additional jobs in the wider economy.

Canada's space firms are also highly innovative, investing $547 million in business-led R and D in 2021.

Many of the activities that the Canadian Space Agency undertakes as the lead on Canada's civil space program contribute to safety, security and defence.

● (1210)

[*Translation*]

These dual-use assets underscore the importance of ensuring the resilience of space capabilities.

[*English*]

The CSA's three program areas—space exploration, space science and technology, and space utilization—align with our core mandate and functions.

Under the space exploration program, we lead Canada's participation in the international space station, our participation in the NASA-led Artemis program and scientific missions to explore our solar system.

[*Translation*]

Our space science and technology program helps strengthen Canadian capabilities in disciplines that are important to both civil and defence space objectives.

[*English*]

Our space utilization program, which Mr. Kroupnik is responsible for, ensures that Canada has the satellite capabilities to support our safety and security, to respond to economic opportunities, and to support scientific understanding of changes in our environment.

The RADARSAT Constellation Mission is a flagship example of a dual-use asset led by the civil space program and supports a wide range of federal responsibilities. It monitors the entire Canadian land mass and oceans on a daily basis, and the entire Canadian Arctic up to four times per day.

The Department of National Defence, the Canadian Armed Forces and our allies are the largest users of RCM data. They use this data for maritime and Arctic surveillance, real-time ship detection and in support of deployed operations overseas.

Ensuring the resilience of the RCM means protecting the Canadians who benefit from the services that it supports. In fact, we are currently developing an additional satellite to extend the operational life of the RCM. We are also in the early stages of developing a next-generation satellite system to succeed the RCM. This initiative is called RADARSAT+, and it will ensure continuity of essential satellite earth observation data to numerous federal organizations so that they can continue delivering services to Canadians.

[*Translation*]

Thank you again for the invitation to speak today. We're glad to answer any questions you may have.

[*English*]

The Chair: Thank you.

We have Mrs. Gallant for six minutes.

Mrs. Cheryl Gallant: Thank you, Mr. Chairman.

The race to land on the dark side of the moon is on, and the Communists who control China appear to be winning this race. What defence and security threats could this pose for our nation?

Mr. Guennadi Kroupnik (Director General, Space Utilization, Canadian Space Agency): The Canadian Space Agency is working on the peaceful exploration of space. We are working with our partners on a peaceful return to the moon to stay and to work on behalf of humanity to advance exploration. It's not within our mandate to assess threats of other nations on their actions.

Mrs. Cheryl Gallant: This is the national defence committee.

Given that neither Russia nor China is interested in taking part in the Artemis accords, which I think you obliquely referenced, should peace-minded countries be planning a type of NATO with a wider area of operation and responsibility in order to mitigate or deal with any potential security threats? Are they already doing that?

Ms. Maja Djukic: Mr. Chair, this falls outside of the mandate of the Canadian Space Agency. We cannot comment on those matters.

I'm happy to talk about why Canada is part of the Artemis accords. As my colleague Mr. Kroupnik said, we're in it to work with other like-minded nations on the peaceful uses of space.

Mrs. Cheryl Gallant: Does the Canadian space division work together with the Canadian Space Agency at all? Do you have any of your personnel who are co-located in one spot?

● (1215)

Mr. Guennadi Kroupnik: We coordinate and collaborate with the Department of National Defence on many aspects, including the space division. We coordinate our space surveillance activities, and we have been discussing for a while potential participation in the exchange of personnel. We maintain a very close relationship.

Mrs. Cheryl Gallant: Okay, but there's no co-location.

Mr. Guennadi Kroupnik: No.

Mrs. Cheryl Gallant: How, if at all, does satellite spoofing impact the Canadian Space Agency's operations?

Mr. Guennadi Kroupnik: Taking into consideration that we are more concerned with the peaceful use of space, where we see a lot of spoofing is, for example, the RADARSAT Constellation Mission, which has two payloads. One of them is the automatic identification of ships. This is where very often we see spoofing occurring, but as to how it is dealt with, the Department of National Defence will be better positioned to answer.

The Chair: I'm just going to hold your time here for a second.

Can you give the committee an operating definition of what satellite spoofing means?

Mr. Guennadi Kroupnik: It's a very wide term and has many aspects. For example, in a case of the automatic identification of ships, it's when a ship's transponder would send misinformation about its location or its purpose or its cargo or other misinformation.

Another very wide area where it is very pertinent is in positioning, navigation and timing systems such as GPS in the United States or Galileo in Europe, where adversary actions can affect the accuracy of signals and provide completely erroneous information for operational purposes.

The Chair: Thank you.

Go ahead, Ms. Gallant.

Mrs. Cheryl Gallant: We have widespread co-operation with respect to the international space station. Why can't the countries agree on a similar type of agreement when it comes to space landings on the moon? What is it that is preventing an agreement like the international space station from coming forth with respect to the moon?

Ms. Maja Djukic: The co-operation on the international space station is specifically between the partners of the station: Canada, the U.S., Japan, the European Space Agency and Russia. All operations of the station and the participation of these nations in the program are guided by that agreement.

I think we are still, it's fair to say, some years away from nations that want to participate in the peaceful exploration of the moon forming a partnership. It might be something that will come in the future. It might involve the participants that are currently collaborating on the international space station and perhaps beyond that, but at the moment, it is not yet formalized or in place.

Mr. Guennadi Kroupnik: If I can add very quickly, we do already have examples of collaboration, such as the Lunar Gateway, which the Canadian Space Agency participates in. That is very similar to what ISS is in low earth orbit, but that will be in lunar orbit. Canada plays a very prominent role in this one.

● (1220)

The Chair: Thank you, Ms. Gallant.

Mr. Fillmore, you have six minutes, please.

Mr. Andy Fillmore: Thank you, Mr. Chair.

Thank you to our guests for spending part of their day with us today. We're very grateful for that.

I want to ask you for a quick update on the Artemis mission and where we are in the timeline and maybe just unpack a little bit what that mission is and what will be happening, if you're in a position to do so.

Ms. Maja Djukic: It's a little bit of a technical question when it comes to unpacking the mission.

Artemis II mission preparations are currently ongoing. Canadian astronaut Jeremy Hansen is scheduled to fly on that mission. He will be the first non-American astronaut to fly around the moon, so it will be a big accomplishment for Canada.

Currently the launch is not expected before September 2025, but you will appreciate, based on the testing and the results from the Artemis I mission, that these timelines are in flex and in the end it will depend on the readiness of the system.

Mr. Andy Fillmore: What is the mission itself? What do we hope to learn or achieve?

Ms. Maja Djukic: That will be the first crewed flight of the Artemis rocket. The first one tested the technical aspects of flying around the moon. This one will have humans in the rocket and will test the procedures that go with the flight.

I would probably not be lying if I said they will fly for about 10 or 11 days around the moon. During that time, they'll evaluate a large number of systems that maintain the life on the rocket, but also technical things related to the flight itself.

Mr. Andy Fillmore: Okay.

Mr. Guennadi Kroupnik: If I can add to that, it will fly beyond the moon and will actually be the furthest space foray for human beings.

Mr. Andy Fillmore: That's fascinating. Thank you for that. The mission is really about establishing the way that we're going to be in space in the future. That's wonderful.

I want to switch over now. You've clearly identified that science and knowledge seeking is at the core of what you do. I met recently with a group of astrophysicists at Saint Mary's University in Halifax who are very interested in being involved in what will replace the Hubble telescope and the outward-looking telescopes that survey deep space and don't turn around to look back at Earth for defence and so forth.

In what way does the Canadian Space Agency touch projects like a new outward-looking space telescope?

Ms. Maja Djukic: The Canadian Space Agency currently participates in the James Webb telescope with international partners, and we maintain expert capacity in the agency, such as staff who work on astronomy and planetary science missions.

We participate in a number of ongoing missions, but going forward we're exploring potential partnerships with other nations, including on some of the ideas that come currently from the Canadian astronomy community.

Usually our science efforts are consulted on with the scientific community across Canada, regardless of the domain of study, and our search for potential future opportunities is in line with the priorities of the community.

Mr. Andy Fillmore: Thank you.

As I understand it, both Hubble and James Webb are pretty much ready to be retired and replacements are needed. Maybe Hubble is already retired—I'm not sure—and James Webb also has some constraints.

I'm not a scientist of this nature, but whether it's spectrum constraints or infrared constraints, I know there's a full spectrum of observations not available through James Webb. However, its replacement might be able to fill in those missing gaps in observation.

I'm trying to figure out what Canada's role in this international partnership is and whether the role really lands with the Canadian Space Agency so that we can support it effectively.

● (1225)

Ms. Maja Djukic: The Canadian Space Agency contributed instruments towards that mission. The technical aspect of it is also outside of my domain, so I wouldn't be able to speak to exactly what the instruments do. One of them helps with fine guiding and navigation, and the other one has a scientific purpose. Canada actually is one of the key partners in the James Webb space telescope mission.

Mr. Andy Fillmore: Okay. Thank you very much.

Although we are the national defence committee, we're not looking only at the role of space in defence; we're also looking at space observation and its importance. Swivelling that sort of imaginary telescope back to earth, what role does the Canadian Space Agency have in environmental observation and that kind of thing? What do we learn from the space agency to help us manage the planet?

The Chair: Unfortunately, Mr. Fillmore was a little slow on the swivel, so he ran out of time.

[*Translation*]

Ms. Normandin, you have six minutes.

Ms. Christine Normandin: Ms. Djukic and Mr. Kroupnik, thank you for joining us.

Ms. Djukic, you mentioned the issue of dual use in your opening remarks. I'd like to know whether having to collaborate with National Defence on occasion can have certain drawbacks. For example, we know that defence procurement is very slow: Could this have an impact on some of your programs, particularly by causing delays because there are more regulations to follow?

I'd like you to tell us about your relationship with National Defence and whether it creates any constraints.

Mr. Guennadi Kroupnik: Thank you very much for that highly relevant question.

[*English*]

I would like to mention that we collaborate and coordinate requirements with the Department of National Defence as well as with a large number of other government departments to harmonize needs on behalf of the Government of Canada. However, we have a completely independent procurement group, and we usually acquire our assets independently.

Of course, we always coordinate and use an interdepartmental governance mechanism for decision-making. However, I would say that we have not seen the procurement impediments you were alluding to in past procurements.

[*Translation*]

Ms. Christine Normandin: That's interesting. That is good news and we're happy to hear it.

As to coordination with various federal departments, we know of the National Space Council in the United States, chaired by Kamala Harris. However, Canada has no equivalent body, which could be chaired by the Prime Minister and ensure coordination between the federal government and industry. Would such an entity be useful for the purposes of the Canadian Space Agency?

[*English*]

Ms. Maja Djukic: That's an excellent question.

Canadian industry and industry associations have been asking for better federal coordination on space issues. Just in the last budget, the government announced the creation of the Canadian version of a National Space Council. It will be a whole-of-government coordination mechanism that will ensure coordination on issues crosscutting civil, commercial and defence space domains.

You'll appreciate that this is a recent decision, and we're still working through the implementation details. Those will be forthcoming shortly.

[*Translation*]

Ms. Christine Normandin: Thank you. In response to two questions, we heard two pieces of good news. That makes us happy as members of the Standing Committee on National Defence, since it doesn't occur that often.

We touched upon the RADARSAT mission and mentioned the possibility that there may be no data collected between now and when the satellites are replaced. How does Canada collaborate with allied countries to obtain information? What is Canada able to offer allied countries in return for this information? What are the dynamics in this context?

● (1230)

Mr. Guennadi Kroupnik: Those are excellent questions and I thank you for them.

We are currently considering at least four potential solutions.

[*English*]

First of all, there is open data. We are promoting within the government family the wide use of free and open data, which is available more and more.

The second element is commercial data. There are international and Canadian capabilities that we are very interested in.

The third element is a sovereign system—the RADARSAT Constellation Mission, RADARSAT-2 and the upcoming RADARSAT+—which addresses that element.

The fourth element is international collaboration. We have very close relationships with our allies. We have very close relationships with the EU and the European Space Agency. We have an arrangement for contingency planning with the European Space Agency. For example, about a year ago, the European Union lost the Sentinel-1B satellite. They required our support, and we provided support to them with respect to that. Reciprocally we expect that if something happens on our side, they will provide us with support.

We are working very closely with Japan's space agency, JAXA. We have a memorandum of understanding. We have a very active exchange of RADARSAT Constellation data for data from ALOS-2 and the upcoming ALOS-4 that will provide Japanese satellite advanced synthetic aperture radar data over Canada.

We have excellent relationships with our closest partners at NASA. In a few months NASA, in partnership with India, is going to launch a NISAR mission. This will have great coverage at six-metre resolution by L-Band SAR over Canada. We made an agreement that we will provide RADARSAT Constellation data over Greenland. In exchange, we'll get NISAR data in Canada.

We continue discussions with a number of other like-minded nations with which we hope to have relationships as productive as the one I just mentioned.

The Chair: Thank you.

Thank you, Ms. Normandin.

Thank you for all that good news. Apparently not everything is broken.

Voices: Oh, oh!

The Chair: Ms. Mathyssen, you have six minutes.

Ms. Lindsay Mathyssen: First off, the United Nations has been working on space agreements and protocols around space disarmament for years. The U.S., Russia and China are investing in the militarization of space. Last week, the United Nations resolution against nuclear weapons in space was vetoed by Russia.

Can you talk about the status and the state of space disarmament and the work that Canada is doing or needs to do and how we need to invest in that to ensure that our diplomatic efforts are recognized in this regard to progress further?

Ms. Maja Djukic: Mr. Chair, this question falls within the responsibility of Global Affairs Canada.

The Canadian Space Agency is engaged in multilateral fora. We do participate in the work of the UN Committee on the Peaceful Uses of Outer Space. However, on the issue of disarmament, our support is for our Global Affairs Canada and DND colleagues who lead that engagement.

Ms. Lindsay Mathyssen: Okay.

In response to Ms. Normandin's questions, you spoke about the dual use.

Certainly in terms of co-operation internationally, space is that new frontier, the next frontier, where it is possible to further the relationships we have internationally in ways that we haven't been able to on earth, for various reasons. In terms of how we build that peace, that sharing of information that you were talking about, I think of it in terms of search and rescue and climate change information. How can Canada be a leader in that regard to further build those relationships? How necessary is that?

● (1235)

Mr. Guennadi Kroupnik: We are very proud of the fact that Canada was one of the founding members of the international charter on space and major disasters. That organization recently celebrated its 20th anniversary. Today it brings together 17 international agencies. Canada, the European Space Agency and the French space agency were founding members of this organization. This organization provides, free of charge, earth observation data anywhere in the world when a major disaster hits. We are very active contributors to this organization, with both RADARSAT-2 and RADARSAT Constellation Mission data provided to calls of that organization.

We are very proud that because of the implementation of fast-tasking capabilities on the RADARSAT Constellation Mission, the RADARSAT Constellation Mission data is among the first being delivered to disaster mitigation teams anywhere in the world.

Ms. Lindsay Mathyssen: Is that only with allies?

Mr. Guennadi Kroupnik: No. It's anywhere in the world.

Ms. Lindsay Mathyssen: If somebody else is at risk, some other country that we're not necessarily on friendly terms with, this is an opportunity for us to give them some information to save lives. It comes down to that—the saving of human lives.

Mr. Guennadi Kroupnik: That is absolutely correct.

Ms. Lindsay Mathyssen: That's the goal.

Mr. Guennadi Kroupnik: We are partnering with United Nations organizations. Almost every country has so-called authorized users. Those are usually analogous to our government organizations responsible for public safety and disaster mitigation. They can activate the charter any time a major disaster happens.

Ms. Lindsay Mathyssen: You stated that Canada was a founder and one of the first in this field. We often need recommendations for committees going forward. Are there things that Canada can do now to expand on that, to make that stronger, to be a leader in that?

Mr. Guennadi Kroupnik: I think we are already a leader. We are just finishing our leadership of this organization. This organization's leadership is rotated every six months. We are just finishing our six months of leading this organization with EUMETSAT, the European meteorological agency. I believe our reputation within the organization is very high.

Ms. Lindsay Mathyssen: This would be similar to something like the Arctic Council. The conflicts that occur on earth and away from those organizations—do they hinder? Have you seen any sort of hindrance of your work in that regard, as we kind of saw with the Arctic Council and Russia?

Ms. Maja Djukic: Maybe I can take that one.

Currently, as I mentioned, we have active collaboration on the international space station that involves Russia. To this day, the main objective of all the partners who are involved in the program is to focus on maintaining the safety of the program, the safety of the station and the safety of the crew. We have not seen issues so far, but in all fairness, the participants on the space station depend heavily on each other. That really drives the interactions.

● (1240)

The Chair: Thank you, Ms. Mathyssen.

Colleagues, we have 25 minutes' worth of questions and 20 minutes' worth of time.

I'll start with Mr. Allison for four minutes.

Mr. Dean Allison (Niagara West, CPC): Thank you, Mr. Chair.

Thanks to our guests who are here today.

As you're looking at what's going on around the world in terms of space, can you give us a status update on what's going on with the Chinese space station? Do you have any details for us on where they're at and what's going on with them?

Ms. Maja Djukic: I would not be able to offer any details on that topic.

Mr. Guennadi Kroupnik: We don't have close partnership or collaboration with China. We are focusing on work with our allies and partners.

Mr. Dean Allison: Okay. Thank you.

I have another question in terms of how we don't have a lot of capacity when it comes to launch. I know that we've talked about partners and stuff. Talk to us about whether we should be trying to look at the ability to launch and do more of these things in the future, or is that not cost-effective, and we should just continue to work with our partners on that?

Mr. Guennadi Kroupnik: As you are probably aware, there are several commercial entities in Canada that are trying to establish commercial launch capabilities in Canada. It falls under the mandate of Department of Transport. We are providing expert support to the Department of Transport related to launch activities, but they would be better positioned to answer to those questions.

Ms. Maja Djukic: It is a a growing space sector domain. For Canada to have domestic capabilities to launch would complete the spectrum of capabilities that we have in Canada.

The Canadian Space Agency usually collaborates with international partners on our missions. That includes the launch of our assets into space. At this point in time, we're using other available sources, but should there be a domestic launch capability, it would certainly position the Canadian space sector to take a good share of that growing market.

Mr. Dean Allison: To your point, you said that you work with a number of Canadian companies right now. How far off would you say that is? Is this a possibility in the short term, or is it in the distant future?

Mr. Guennadi Kroupnik: I would not speculate on behalf of commercial entities, but there are very solid cases in Canada that have good chances for success.

Mr. Dean Allison: Thank you.

I have only about a minute left. You guys talk about threat assessments as part of what you guys do, or at least that you happen to be aware of. If satellites were taken out in terms of communication for our country, what type of backups or redundancies do we have and how would that leave Canadians should there be an issue in terms of a compromise regarding some of the things that you guys are looking after?

Mr. Guennadi Kroupnik: Being a Canadian space agency, we are concerned more with making sure that we are not denied those capabilities in space. That means resilience. That means building partnerships that can supplement our assets. Replacing space capability with other capabilities falls within the responsibilities of other government departments with which we are working very closely, and they would be better positioned to answer that question.

Mr. Dean Allison: Okay. Thanks.

The Chair: Thank you, Mr. Allison.

Ms. Lalonde, you have four minutes, please.

Mrs. Marie-France Lalonde (Orléans, Lib.): Thank you very much, Mr. Chair.

Through you, we briefly touched on the mission of Artemis. We also spoke—and my colleague did speak—about Russia and China not being signatories to an accord. I would like to reflect on Canada being one of the signatories to the Artemis accords.

That was initiated by NASA regarding the exploration of space: "The principles set out in these Accords are intended to apply to civil space activities conducted by the civil space agencies of each [of the signatories]."

Section 11 specifically talks about "the deconfliction of space activities". That section speaks primarily to this and states:

> The Signatories commit to seek to refrain from any intentional actions that may create harmful interference with each other's use of outer space in their activities under these Accords.

I would like to hear from you in explaining the importance of the Artemis accords in ensuring that the space domain is more predictable and more secure.

● (1245)

Ms. Maja Djukic: The Artemis accords are a set of high-level principles established originally by NASA, as you pointed out, with the support of a handful of agencies. Currently the numbers are growing. We are hitting 38 and 39, so they're definitely growing. The objective is to ensure sustainable operations in the lunar environment.

Through the Artemis accords, Canada is really supporting the next stage in human space exploration. The objective for many space agencies is a sustainable human presence on the moon. Going back and landing on the moon would be the first step; however, all of the big international space agencies are talking about staying there and living and working on the moon.

Setting the norms of behaviour while we are all on the moon eventually is one of the key elements. The Canadian Space Agency, as one of the early signatories, is also taking leadership in promoting the Artemis accords among the international community. Next month, we are actually hosting this community in Montreal for a workshop, where they'll talk about concrete steps to ensure some of the norms are implemented in the way you were describing, including deconfliction of activities on the surface of the moon and how that would work. They'll be working through some of those questions during the workshop.

Mrs. Marie-France Lalonde: This seems like a lot of work. From a transparency perspective, how important is it that we have this open dialogue among the most countries possible, to ensure what would happen if—actually not if, but when—we land and we decide to inhabit the moon and stay on it? What's the importance of that transparency aspect?

Ms. Maja Djukic: It's going to be critical if many nations—not a select few, as was the case with the international space station—are to work and live together on a planetary body.

The Chair: You have one and a half minutes, Ms. Normandin.

[*Translation*]

Ms. Christine Normandin: Thank you very much, Mr. Chair.

Ms. Djukic, my question will somewhat echo what Ms. Lalonde said. We seem to be in a kind of space race 2.0. You've already talked about what's being done in terms of a presence on the moon, but beyond that, what are the next targets? What are the next goals of the world's various countries in terms of space exploration? Can you give us an overview?

[*English*]

Ms. Maja Djukic: Mr. Chair, that speaks to the question of inspiration, knowledge and understanding of our universe, and really through that an understanding of who we are and where we come from.

The moon is the closest to us at the moment. It's not the only destination. It's one step towards the next stage of human exploration, which is Mars. You will appreciate that going to Mars would be, from a technological perspective, far more complicated, and such a trip would include serious effects on the human body. Making these calculated steps over time will help us to understand the impacts of space. It's a really harsh environment. It will also help us prepare better for the next stage in terms of travel to deep space.

● (1250)

The Chair: You have one and a half minutes, Ms. Mathyssen.

Ms. Lindsay Mathyssen: Further to that, we talked a lot—and I think you mentioned it too—about the commercial data, the commercialization of space and that potential private interest in space. In all the things that states and nations are trying to achieve in that exploration, in ensuring that we keep science and inspiration at the heart of it, how do we protect that exploration and ensure that monetization doesn't come into play when it requires a lot of money to get there?

Ms. Maja Djukic: Commercialization of investments in space is actually one of the Canadian Space Agency's responsibilities under our mandate and the act. We don't object to the commercialization of these investments.

I'll give you some good examples.

Through advancement in our robotic capabilities, we've advanced certain technologies that are used on earth. Very precise robotic medical technologies used in breast cancer detection came out of investment into the Canadarm. There are similar investments in science that have translated into improvements for life on earth.

In that sense, we make it part of our mission to seek out both technologies and areas of research that have potential application for life on earth. Currently, as part of the investments in our space exploration technologies and knowledge, we're looking at health-focused and food-focused technologies.

The Chair: Thank you, Ms. Djukic.

Mr. Bezan, you have four minutes.

Mr. James Bezan: Thank you, Mr. Chair.

Thank you to both of our witnesses for being here.

Just so I'm clear on this, the Canadian Space Agency is the lead agency in approving any Canadian government assets that are going to be put into space. Is that correct?

Mr. Guennadi Kroupnik: It's civil space. We are responsible for the coordination and acquisition of assets for civil space Canadian programs.

Mr. James Bezan: If you're just on the coordinating side, what is the lead agency responsible for the replacement of the RADARSAT Constellation Mission?

Mr. Guennadi Kroupnik: It's a very good question. The Canadian Space Agency is responsible. We received funding in 2023 for the RADARSAT+ program Maja Djukic mentioned in the introductory remarks and we are implementing the RADARSAT+ program. Nevertheless, there is a program that the Department of National Defence would be better positioned to talk about.

Mr. James Bezan: How many of the assets that the CSA is currently working on are multi-purpose, in that they are there for the Government of Canada, for supporting civilian infrastructure like communications and for providing services to the Department of National Defence?

Mr. Guennadi Kroupnik: Currently, again, as we mentioned in the introduction, the RADARSAT Constellation Mission is one of those. RADARSAT-2 is another one.

As well, we're working with the Department of National Defence and their research arm, DRDC, on two micro-satellites. One of them, NEOSSat, is still being operated by the CSA. We share the tasking of that satellite fifty-fifty between science and defence research. The second one, M3MSat, is currently operated by private entities. Before 2021, it was operated on behalf of DND by the CSA.

As well, CSA is buying commercial AIS data for the Government of Canada. DND is one of the departments that benefits from that commercial data purchase.

● (1255)

Mr. James Bezan: You mentioned DRDC—Defence Research Development Canada. How much collaboration does the CSA have with DRDC? Does it go beyond that one platform you're talking about, or is it multiple platforms?

Mr. Guennadi Kroupnik: With DRDC, under a memorandum of understanding between the Canadian Space Agency and the Department of National Defence, we have a so-called ACCORD committee, which coordinates research and development for civil and defence purposes.

Mr. James Bezan: As we look into the future and into the potential weaponization of space, which would impact the mission of the CSA, what action is the agency taking to protect those assets, or what collaboration are you undertaking with the Department of National Defence?

The Chair: Answer very briefly, please.

Mr. Guennadi Kroupnik: The Department of National Defence is responsible for protection. We are coordinating our planning activities with them.

The Chair: Thank you, Mr. Bezan.

Mr. Fillmore, you have the final four minutes.

Mr. Andy Fillmore: Thank you, Chair.

We've discussed at various times today, with you and with the previous panel, the general notion of good behaviour in space. It's sometimes referred to as "the norms of conduct in space". One of the things we've talked about is the threat of space debris, whether it's from scientific endeavours or from bad actors blowing things up or that kind of thing.

What is the interface with the Canadian Space Agency, or what role can the agency play in negotiating treaties with other countries that are exploring space?

Ms. Maja Djukic: Within the civil space program, the Canadian Space Agency has a number of active bilateral agreements with nations with which we work closely. NASA, obviously, would be one of our largest partners, and we have an agreement with them. We've also had a long-standing co-operation agreement with the European Space Agency, since 1979. In fact, it's going to be the 45th anniversary this year of the co-operation agreement with the European Space Agency.

We also have some more recent newcomers to the space world, agencies with whom we share common interests. Recently in Colorado Springs we expanded our collaboration with the UK Space Agency. We collaborate with the Australians, with New Zealand and with individual nations in Europe. We have a long-standing collaboration with the French and a couple of programs with them as well, and with the Italians and Germans. We have broad engagement with a number of key space partners, all in the domain of civil space.

Mr. Andy Fillmore: Okay. Thank you for that.

Go ahead, sir.

Mr. Guennadi Kroupnik: If I can add to that very briefly, we also work with the UN COPUOS with other nations on developing international guidelines and rules of good behaviour. As well, we are part of the inter-agency debris mitigation committee, where we are working with other nations. By the way, Russia and China are part of that committee.

As well, on our side, the CSA is contributing to the space situational awareness data through the NEOSSat satellite. We also have developed a sophisticated analytical tool called "CRAMS". It's a conjunction risk assessment and mitigation tool that assesses probabilities of collisions in space and works out recommendations for potential manoeuvring for satellites to avoid such collisions.

● (1300)

Mr. Andy Fillmore: Does that mean that you or someone is tracking the debris?

Mr. Guennadi Kroupnik: We rely on data provided by international partners.

Mr. Andy Fillmore: Okay.

You mentioned Russia and China a moment ago, which leads me to a question. Are there any gaps in treaties on norms of conduct that the committee should be aware of? On this, are there countries with which we still have some work to do?

Ms. Maja Djukic: With Russia and China, we would engage through the multilateral fora. In those cases, Canada lines up with its key allies so that we coordinate. As the generals were explaining previously, we coordinate our engagements in those committees.

I guess I would say that you want to be engaged. Communication is never a bad thing. Communicating even with your adversaries is a good thing. You want to know what is going on, and these multilateral fora allow for that type of conversation.

Mr. Andy Fillmore: Okay. Thank you for that.

I think I might have a minute—

The Chair: No, you don't.

Mr. Andy Fillmore: I do not have a minute.

The Chair: No.

Mr. Andy Fillmore: All right. Thank you very much.

I tried to brainwash you.

The Chair: Yes. It's only four minutes, not five. Thank you, Mr. Fillmore.

I want to thank both of you for your presence here today. We're just beginning our study. The information that you have given us will be very informative in our ongoing study. Thank you for your attendance.

With that, colleagues, the meeting is adjourned.