HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Standing Committee on National Defence

NDDN • NUMBER 041 • 2nd SESSION • 41st PARLIAMENT

EVIDENCE

Tuesday, December 2, 2014

Chair

The Honourable Peter Kent

Standing Committee on National Defence

Tuesday, December 2, 2014

● (1530)

[*English*]

The Vice-Chair (Mr. Jack Harris (St. John's East, NDP)): I'd like to call to order meeting number 41 of the Standing Committee on National Defence. Pursuant to Standing Order 108(2), we are continuing our study on the defence of North America.

I am in the chair today as Mr. Kent is unavoidably absent.

Our witnesses are Mr. Charles Barlow, president of the Zariba Security Corporation, and Mr. Ian Glenn, chairman and chief executive officer of ING Robotic Aviation.

Thank you, gentlemen, for your presence here today and for preparing a presentation for the committee.

I'd like to start with you, sir, Mr. Barlow, for an introduction. I understand you have some slides and video to show us. Thank you very much. You have up to 10 minutes. If you could try to keep within that, it would be very much appreciated.

Mr. Charles Barlow (President, Zariba Security Corporation): Thank you, Mr. Chair.

Thank you, members, for giving me the honour to appear before you.

My name is Charles Barlow. I'm a former military officer. I ran the Afghanistan intelligence response team, the national level team for Afghanistan at the Department of National Defence. They've sent me to pretty much every place that Canada sent people for the last 20 years.

I'm here to speak a bit about UAVs, so we'll start with a little quick history.

When Great Britain entered the First World War 100 years ago, it had about 100 military aircraft in service. By the end of the war, and that's just four years later, that number had grown to 22,000 aircraft. The same sort of growth happened with unmanned aerial vehicles, or UAVs. On 9/11, the U.S. Army had just 54 UAVs in service. That number grew to over 4,000 by 2010. The U.S. Air Force is now training more UAV pilots than fighter pilots and transport pilots combined. This is a revolution, one that came first to the United States, and also to Israel, but one which the rest of the world is working very hard to enter. Of course, it is not just a military revolution. Amazon and Google want to deliver packages with UAVs, and Facebook and Google are looking at drones capable of bringing Internet to more remote areas on the planet.

Consider that very few nations produce fighter aircraft, but over 60 countries today produce some form of UAVs. While most of these are little more than toys, several nations are developing serious, strategic-level armed systems.

UAVs come in a wide spectrum of sizes and capabilities, and there are several ways of categorizing them. I won't bore you with all the different categories, instead we'll stick with the old army system of tactical, operational, and strategic.

Tactical UAVs are small. They are operated by one or two people. They're usually carried in a vehicle or even a backpack. They're issued to small units. These tactical systems are generally unarmed, although there are a couple of armed systems. They have a short range and they feed the information directly to the people using them. They're very similar in some ways to the commercially available systems used in industry, agriculture, and just for general hobbyists.

The Aeryon SkyRanger is made in Waterloo, Ontario. It's a world leader in that category of very small UAVs.

Operational UAVs are larger. They are operated by a field headquarters or from a warship, and Mr. Glenn I know is going to be able to speak quite a bit to that. They require a dedicated team of operators and maintenance folks. They are, again, generally unarmed, but they may be used to cross international borders. The information they collect is primarily used locally, and it may be sent to the national command level.

Systems like this were used by Canadian Forces in Afghanistan and in service on our ships. A French UAV is being operated in Kabul, and a ScanEagle off one of our warships

Strategic UAVs are larger still. Here we're talking about systems like the famous Predators and the Reapers. They are generally armed. They're often used to cross international borders. They require significant resources in operations, basing, and maintenance; and they're generally operated at the national level. The United States and Israel retain the lead in fielding strategically armed UAVs with the capability of striking deep inside another country. Several other countries, including Turkey, China, and Iran, are working on comparable systems. The Chinese Blue Shark, for example, which is just a concept at the moment, was pictured at a recent Chinese arms show attacking an Indian aircraft carrier. There are similar displays of this kind of Chinese-made UAVs attacking American aircraft carrier groups off Taiwan.

While still largely aspirational, once fielded, these strategic UAVs will then be sold to a wide variety of countries that don't have access to American or Israeli technology. In other words, the coming decade is very likely to see the proliferation of strategic systems, especially throughout the Middle East.

● (1535)

The first great adopter of UAVs was Israel in the Middle East. They pioneered their use in the late 1970s. They were certainly a very active part of the Israeli presence in south Lebanon when I was there in 1999. Israel has conducted drone strikes over the Palestinian territories, and there are unconfirmed reports of Israeli drone strikes in Somalia and Egyptian Sinai. Other nations too have conducted drone strikes—for example, the United Kingdom—but of course the U.S. currently conducts more drone strikes than everyone else combined.

According to the Bureau of Investigative Journalism, Afghanistan is the drones' most lethal hunting ground. Roughly a quarter of all NATO air strikes in that country in 2011 were using strategic-level drones. One reason the drones are so popular is that they can watch a target for hours, sometimes even days, before firing. That helps confirm that the target is actually there and minimizes casualties. Another reason for using UAVs over aircraft, of course, is risk. Simply put, if a drone goes down, the pilot simply gets in his truck and goes home.

So in the early stages of a conflict, when we're doing what we call "suppression" of enemy air defence, using drones makes an awful lot of sense. But it's the UAVs' odd ability to travel across borders without arousing too much anger that has made them valuable in some of the world's most denied areas. The Pashtun lands, for example, that straddle both sides of the Afghan-Pakistan border, are accessible to U.S. and coalition forces only on the Afghan side. On the Pakistan side, the Taliban controls much of the tribal areas.

An odd situation has developed in which the United States targets Pakistani Taliban and Arab fighters using drones. This isn't because the U.S. Air Force isn't capable of conducting strikes inside, but because it's far more acceptable for almost everyone to have unmarked drones flying over Pakistan than it is to have the marked jets of a country. The same holds true for Yemen and Somalia, where other U.S. drone strikes have been widely reported.

I'm afraid this is the first slide with a video in it, so I'll just quickly describe it. It's a gun camera video, very grainy, of a little building in the desert that does blow up. We're used to seeing this sort of drone video—a target in the crosshairs, followed by the inevitable explosion—but this video is different. It was released by the Lebanese Shia group Hezbollah. It was released in September and it claims to show them hitting an al-Nusra Front target, a Sunni target, inside Syria using an armed drone. If that were true, it would almost certainly be of Iranian manufacture.

Now, I don't know if the video is real or fake, and certainly Iran has made some wild claims about the progress of its UAV programs. But it doesn't matter much, in the end; if they're not quite there yet, they very soon will be.

Dozens of nations already fly some operational UAVs, and they're being used. An Iranian UAV, for example, came down over a U.S. base in Iraq in 2007. Iranian UAVs, marked with Hezbollah livery, have also entered Israeli airspace on at least five occasions—and consider that Hezbollah has no other type of aircraft.

● (1540)

The Vice-Chair (Mr. Jack Harris): You have about a minute or so left, Mr. Barlow.

Mr. Charles Barlow: Yes, sir.

The tactical UAVs are the most numerous in the world. They're used for military reconnaissance, agriculture, and even high-end real estate listings. They're used most often to gather HD video and that sort of thing.

UAVs are being embraced by unfriendly groups. In 2011 the FBI arrested an American physics graduate—this fellow shown here—who was planning to fly those two little aircraft laden with explosives into the Capitol building and the Pentagon in the United States before he was arrested by the FBI.

Finally, ISIS, or the Islamic State—this is a video as well—released this video showing their own drones over both Mosul and Raqqa in Syria. They used the imagery they got from this to plan the attack.

What this means for Canada is that advanced nations such as ours no longer have the exclusive ability to gain battlefield imagery in near real time. Our enemies, even those with very limited resources, will increasingly be capable of looking back at us. Second, the UAVs will allow an increasing number of nations and some non-state actors to conduct drone strikes of their own.

In conclusion, UAVs of all sizes have already begun to be a feature in conflicts around the world, and their presence will expand with time. Manned and unmanned systems are already mixing on the battlefield, and humans will fight beside and against robotic systems, including UAVs. We need to consider our offensive UAV capability as well as our ability to counter the UAVs of other nations and non-nation states.

I appreciate your attention, and I will take any questions, Mr. Chair.

The Vice-Chair (Mr. Jack Harris): Thank you, Mr. Barlow, I appreciate the background.

I just want to remind the committee that this is a study of the defence of North America so perhaps the questions will be directed more at that than some of the things you have shown us. Thank you, sir.

Mr. Glenn, would you like to make your presentation as the chairman and chief executive officer of ING Robotic Aviation? I see you have some slides as well.

You have about 10 minutes.

Mr. Ian Glenn (Chairman and Chief Executive Officer, ING Robotic Aviation): Perfect. Thank you very much, Mr. Chairman.

It is a privilege, distinguished committee members, to be here to speak to you today.

ING Robotic Aviation, formerly ING Engineering, has extensive experience operating UAVs with the Canadian army and the Royal Canadian Navy over the last six or seven years. From 2008 onward we flew operationally in Afghanistan with some American technology very successfully. There were some 30,000 hours accumulated and by the end we were putting three aircraft up over our Canadian troops during the day, then bringing them back and putting two up at night, and we did that right through to the end of combat activities.

We were fortunate to be asked to provide the same support off our frigates in the Indian Ocean from 2011 until September.

It's a bit of a unique story. We really are today, as both a service provider and a producer of these technologies, the leader here in Canada. We've got some great recognition as we don't leave defence but pivot into five other sectors: oil and gas, mining, utilities, forestry, and precision agriculture. A lot of these sectors are also important to this committee because they are also critical infrastructure. Our ability to go out today is unparalleled. When you add up the number of hours that we've flown for our country—I added it up and it's about 81 laps around the planet—it is a pretty significant experience here.

We've got some great recognition just of late from both the IEEE here as the leading technology company in Ottawa and from the national association, receiving the organization award just recently in company with NASA and Transport Canada.

What I really wanted to talk about today was my opinion that perhaps the Canadian Armed Forces is going the wrong way.

When you compare what's going on with the rest of the world, and Mr. Barlow did a great job of summarizing the things that are happening in the rest of the world, for a country like ours, this ability to do more with less is something we do every day. We are very inventive and certainly in my company we are very inventive in creating cost-effective solutions.

We have this challenge of geography in Canada, which means we need many systems deployed in many places if we're going to do it and do it well. We've seen the high cost of some of the military-oriented drones, especially made by our brothers to the south or other parts of the world, so maybe those aren't the right answers for good surveillance.

Again, Mr. Barlow highlighted that the U.S. military has, he said 5,000—I would say 7,000—robotic aircraft. The Luftwaffe has said that as a point of policy they are going to get rid of their manned pilots. The Portugese military is employing a drone fleet to monitor its maritime air space which extends all the way out to the Azores. The Kenyan defence force uses some of our equipment along with other pieces of equipment on a daily basis to monitor their troublesome Somali border.

So what are we doing in Canada? Well, I would say the Royal Canadian Air Farce, sorry, excuse me, the Royal Canadian Air Force, and this is on the public record so I do apologize to my friends in the light blue, doesn't really have a credible system or a program to deliver this capability. We've seen the JUSTAS program move forward time and time again. The Royal Canadian Navy has abandoned its capability and is planning to develop something for 2021. The Canadian army has some hand throwable simple systems for close-in work but nothing for persistence.

Of course, our SOF folks have a minimal capability and I've seen in the press where they are looking to purchase manned surveillance platforms.

What I'd like to focus on are two case studies where I think these technologies in robotic aviation could play a role. The first would be Arctic search and rescue.

● (1545)

This slide just shows that we actually do stuff all over Canada both operationally and for exports.

Canada has signed up separately with the Arctic nations to enhance its search and rescue capability in the north. One of the things you can do with a robotic aircraft is fly out and see things without putting anyone in harm's way. That means that you, as the person responsible, can take greater risks without risking others' lives to go and see things. We've seen a number of cases both in the Arctic and across Canada where this makes sense. I know that when you have to fly a search and rescue aircraft 3,000 kilometres just to get to the area before you start to figure out where Bob went off the rails, where his ATV broke down, or where his snowmobile broke down, that's perhaps not the right answer. You can separate search from rescue. That's the first point.

You can provide from a community a fast search response with locally based robotic aircraft. They're persistent and you can exploit local knowledge. You can even do things like drop emergency supplies. That's a pretty cool capability. This is enabled by the fact that we have smart robots that can be flown locally in the community and, in the north, by Rangers. That's the first thing. From a government's perspective, it's something that the government could do now. The technology is there. This is something that is a fraction of the cost of the satellites required to talk to the big drone. Maybe under $25 million a year is within the scale of things for all the communities across the north. The added advantage there is that when you're out looking, by definition, you are exercising sovereignty.

The second thing I'd like to talk about is disaster response. Again, you have this ability to go out with a robot and see things and provide immediate assistance in a scenario. In most disasters the information you have is dated or in fact it's wrong, because there have been mudslides or the roads have changed or the rivers have broken through. A response team needs to be able to understand exactly what they're walking into. This is where robot mapping can actually create great detailed maps rapidly. This is an example of something we did for the community of Kuujjuaq, an Inuit community in northern Quebec. On the left you see 2-D and 3-D models of what we were able to collect from a single 15-minute flight. This ability to go out rapidly and map a disaster and provide detailed information back to those commanders who are trying to respond to that disaster, whether they are civil or military, is critical. In fact, if you want to do large areas, our Serenity aircraft, which flies for over eight hours, can map a 20-centimetre resolution. It's far in excess of what you can get from satellite. It's really useful information. We can map 200 square kilometres in a single eight-hour flight. That's a capability that just didn't exist before. It wasn't cost-effective before. It wasn't environmentally friendly before. Now you can put teams in place.

When we think of Canada, its budgets, and how we deal with things, our robotic aircraft called Responder, the helicopter, costs the same as a fully kitted F-150.

That fixed-wing aircraft there, which packs up into seven boxes that you can throw on an Air Canada air transport cargo plane, move into location, and actually go straight into operations with, costs about the same as a bucket truck. These are cost-effective solutions designed by Canadians here in Canada. Even the logistics trail of both of those systems—the first one being electric, this one being gas.... It uses fuel at less than half a litre an hour as opposed to a helicopter, which is always doing fuel dumps and also has an environmental cost associated with moving things around.

● (1550)

In my opinion, certainly organizations like DART, the disaster assistance response team, need this kind of capability. In fact, that's why we have reservists across our country who are equipped with this type of technology who give us a great ability to deal with natural disasters, sovereignty, and search and rescue, and to be prepared for the defence of North America.

Mr. Chairman.

● (1555)

The Vice-Chair (Mr. Jack Harris): I thank you very much, Mr. Glenn and Mr. Barlow, a most interesting topic and technology. I'm sure that members present will have lots of questions for you both.

Some of the PowerPoint images Mr. Barlow had we will make available to members of the committee. We'll find a way afterwards.

Mr. Glenn, if there is a physical copy of these we'll try to distribute them as well.

First of all, I have Mr. Leung from the Conservative Party. Mr. Leung, you have seven minutes.

Mr. Chungsen Leung (Willowdale, CPC): Thank you, Chair.

Thank you, witnesses, for providing that useful information.

I should preface by saying that in the eighties I had an opportunity to work at a U.S. defence college in southern California. At that time our best calculation was that for every combat person you put in the field, you needed to have six logistics support people to support that person in the field, in operation. I believe that's the same in Afghanistan.

My question is, given that it's impossible to cost out a combat mission prior to entering the combat mission, perhaps you can comment on what the cost savings are if we use this method, with all unmanned drones to handle what needs to be accomplished. Let's say that Canada now has six F-18s working in the Middle East. If we use an unmanned system, what is our cost savings, and what can we get away with?

Mr. Barlow, would you comment, please?

Mr. Charles Barlow: Thank you, honourable member.

I don't think I'm qualified to speak to the costing of the relative systems. In Canada we don't use....

The Predator, for example, is a $22-million system. It is very cost-effective as compared with a combat aircraft. But it's not combat aircraft capable. They're not there yet.

The one thing I will say is that whether or not we buy the F-35, whatever fighter plane we do buy will probably be the last fighter plane we ever buy, because 30 years or 25 years later, when it's time to replace that fleet, it will be unmanned. I think there is really no question about that at all.

I don't think we're quite at the stage where UAVs can take over, but as I explained very quickly in the presentation, they can go into places that regular aircraft can't. They can loiter longer, and watch a target much longer than a regular pilot can. They're not ready to fight yet in the same way that a fighter plane is.

But I do appreciate it, sir.

The Vice-Chair (Mr. Jack Harris): Mr. Glenn.

Mr. Ian Glenn: I find myself in the interesting position of having started in defence and then having to survive as an entrepreneur in the commercial world. Very specifically, I compete against helicopters and fixed-wing aircraft in the commercial market, doing high-resolution rapid mapping and survey work.

The short answer is, I'm cheaper than a helicopter.

Mr. Chungsen Leung: My next question is this. As we look at our defence of North America as a nation, in your opinion, should we start now to invest in research and development, and production of unmanned aircraft, or should we still maintain a dual stream in which we need to have a combat-ready force as well as unmanned surveillance to take over some of the functions of a previously armed force?

Mr. Ian Glenn: I had 22 years in the military myself as an armoured officer and as a RCEME officer and then had the opportunity to work alongside our forces in Afghanistan. I replicated the capability we had in Afghanistan at a fraction of the price, in Canada, with Canadians. What happens is that these systems just get incrementally better, smarter, easier to use, more capable.

If the issue is the defence of North America and you want to do surveillance or mapping tasks, we're there now. There's no question about it: we're there and we do it every day. If you're into mid-intensity or high-intensity combat, with the systems that we deployed in Afghanistan you're going to tread a lot, especially at war. One of the ways to succeed is just by having a lot of cheap stuff, inexpensive stuff.

As Mr. Barlow pointed out, the Americans are working on robotic aircraft at a price point that will compete in capability with manned aviation, but at the same price point. I don't know whether that is what we want as a country, but certainly for those tasks in which you just want to be out there seeing as much as you can see to inform your decisions—whether that bridge is out, whether there are folks who need to be rescued off that roof there, or whether that guy is out on that ice floe—those are things that can be done well by robotic aircraft today, at a price point that we can do now.

● (1600)

Mr. Chungsen Leung: I gather from this that we need to direct some of our investment to that area for operability, unless we're on such good terms with the American civilians that we can buy their products.

Mr. Ian Glenn: You can buy their products, but you're paying a price point.

There are two parts of the world. The reason I was able to export to Kenya was that I have designed my systems for the emerging market and for Canadian commercial consumption. That's a very deliberate choice: not to compete against everyone in the U.S., who can only sell to DOD.

Mr. Chungsen Leung: My last question is this. As you know, in many of the conflict areas that we're in, at the end of the day you need to have boots on the ground; you need to secure the geography. How does the unmanned aircraft do this?

Mr. Ian Glenn: The unmanned aircraft supports those guys on the ground so that they don't walk around the corner and get a surprise. That's exactly what we did in Afghanistan.

Mr. Chungsen Leung: Thank you.

Thank you, Mr. Chair.

The Vice-Chair (Mr. Jack Harris): Thank you, Mr. Leung.

We now have Élaine Michaud from the NDP for seven minutes.

[*Translation*]

Ms. Élaine Michaud (Portneuf—Jacques-Cartier, NDP): Thank you, Mr. Chair.

I would also like to thank both of our witnesses for their presentations today.

Mr. Barlow, my first question is for you.

I'm having trouble understanding how your remarks today fit into our study on the defence of North America. We've heard a lot about what's being done around the world. So my questions will focus on the North American context, to ensure they are relevant to our study.

I would like to know what the legal and regulatory roadblocks are to the use of UAVs in North American airspace.

Mr. Charles Barlow: I have to apologize, as I can't answer your question in French.

Ms. Élaine Michaud: That's fine.

[*English*]

Mr. Charles Barlow: That's an excellent question. I know Mr. Glenn is probably on top of this very closely, but the regulatory environment in Canada has generally been better, making a little more allowance for drones over our own airspace than that of our cousins to the south. The American FAA is supposed to come out with some new regulations and has been supposed to for quite awhile. We Canadians just came out, I think it was a week ago or something, with a reasonable set of rules and regulations.

The odd bit is, it's very hard for government regulators to keep up, because the technology changes; people buy them and they do strange things that nobody ever expected they would do. There is a huge division in Canada between using it for fun, as a hobbyist, and using it for commercial or government use. It is, in my opinion, a false divide.

Generally speaking, the aircraft hobbyists have been more responsible, older folks, and it has never really been a problem. Nobody has ever flown a radio-controlled or RC plane into a problematic area until very recently, so Transport Canada has never tried to regulate hobby aircraft, unless they're big. But as soon as you take that same aircraft and you want to do something with it commercially, or a police force wants to use it, that becomes a commercial use of the thing and is regulated by Transport Canada. While, as I said, their regulations are better than the Americans', it's still a very strange divide, in my opinion.

● (1605)

[*Translation*]

Ms. Élaine Michaud: Mr. Glenn, do you have anything to add?

Mr. Ian Glenn: Unfortunately, I am going to make the same apology as my colleague.

Ms. Élaine Michaud: That's fine as long as you can understand what I'm saying.

[*English*]

Mr. Ian Glenn: It's more painful for you if I do this *en français*.

I had the privilege actually, yesterday morning, to be on the *The Current* being grilled by Anna Maria Tremonti on this very issue, and in the commercial world the issue is commercial pilots are worried about the proliferation of drones. It is an issue, and Transport Canada has changed the rules completely for under 2 kilograms and 2 kilograms to 25 kilos. Fundamentally, you can now go do it, so you could have a reserve unit just go out and fly within visual line of sight, i.e., somebody is looking for the other traffic, and they can go fly. But they couldn't do it for DND because DND has a whole other set of rules, and remember that the ministers of Transport and Defence have equal standing under the Aeronautics Act.

That said, the real answer is there are in North America, and particularly in Canada, which is our concern, 37,000 aircraft. What we really need is the equivalent of Find My Friends, on your iPhone. The technology exists effectively—different technology, different name—transponders for all I call it, and I've told Minister Raitt this. That's what we need in the air. It's the rule for all new aircraft in Australia. It's been the rule for 15 years in Alaska. In Canada, if we put transponders on every aircraft we would not only reduce drastically—40% to 70% was the Alaskan experience—man-on-man incidents in the air, but it also would enable robotic aircraft to be used successfully in any mission, whether civil or defence-related, and that's again a—

[*Translation*]

Ms. Élaine Michaud: I'm going to ask you to quickly finish your answer, as I have other things I'd like to ask you about.

[*English*]

Mr. Ian Glenn: Okay.

[*Translation*]

Ms. Élaine Michaud: You're done? Great. You are very fast.

Mr. Glenn, you said the Americans are already using UAVs for border surveillance. Did I understand you correctly?

[*English*]

Mr. Ian Glenn: They have for years, yes. They fly Predators.

[*Translation*]

Ms. Élaine Michaud: Are you able to give us more details on how the information collected is analyzed? Which U.S. department is in charge of analyzing the border surveillance information collected by drones?

[*English*]

Mr. Ian Glenn: That's the Department of Homeland Security. They fly Predator B drones on our borders. Air traffic control actually at times passes to Canada, to Montreal control, because that's the way the civil air space is organized.

The information is fed back live to their control centres in the United States where they do all the analysis.

[*Translation*]

Ms. Élaine Michaud: Does the U.S. Department of Defense participate directly or indirectly in those activities? Would it be up to the Department of Homeland Security to then determine which institutions should be involved as far as the use of that information is concerned?

[*English*]

The Vice-Chair (Mr. Jack Harris): I think that's a question for... do they call it NORTHCOM?

Mr. Charles Barlow: I actually can speak to that a little bit. NORAD and NORTHCOM...the U.S. military has had a very difficult time with drones over the United States. They asked for permission, after the New Orleans flood disaster, to put some unmanned aircraft up, and that permission was denied. The U.S. military has some very specific areas they can fly in, and that's about it, within the United States.

[*Translation*]

Ms. Élaine Michaud: Thank you very much.

How much time do I have left, Mr. Chair?

[*English*]

The Vice-Chair (Mr. Jack Harris): You have about 30 seconds.

[*Translation*]

Ms. Élaine Michaud: Thirty seconds isn't enough time for me to ask my question, so I'll let my colleague use that time later.

Thank you very much.

[*English*]

The Vice-Chair (Mr. Jack Harris): Okay, thank you.

There are only a couple of seconds left now, so we'll move on for now to Mr. Bezan.

Mr. Bezan, you have seven minutes.

Mr. James Bezan (Selkirk—Interlake, CPC): Gentlemen, thanks for joining us today. I appreciate your opening comments and I'm looking forward to the continuing dialogue.

You were just talking about the U.S. using drones. A couple of years ago I had the opportunity to go down with the U.S. Customs and Border Protection and they used the Predator to surveil, pretty much from Thunder Bay right across into Washington state, and they do it all over Grand Forks. It is a tool they are using for border surveillance. I'm sure they are using it along the Texas-Mexico border as well patrolling the Rio Grande.

Looking at that platform and others—and you've already alluded to the fact of using more drones in the Arctic—do we have platforms out there now that can handle Arctic conditions? I was told a couple of years ago that it did not exist.

● (1610)

Mr. Ian Glenn: The answer is yes. The challenges with small aircraft are the same as with any Arctic aircraft, right? It's cold and windy. As Canadians, we've flown our helicopter in minus 33. We were up in Churchill surveying polar bears two weeks ago and it was 50, 60 kilometres per hour at the airport, and right out on Hudson's Bay it was above that. You need power, so that's why we design bigger, not the little quadcopters. They all fall down. I own a bunch of them. They fall down.

Mr. James Bezan: Is that [*Inaudible—Editor*] talking?

Mr. Ian Glenn: No, no. It's just a big helicopter.

Mr. James Bezan: Oh, that's a big helicopter.

Mr. Ian Glenn: Yes, it fits in a case. We shipped it up there.

Mr. James Bezan: But from a standpoint of range, though, a helicopter has limitations.

Mr. Ian Glenn: Right. If you want to go far, that's where our fixed-wing.... As you see on the screen there, that has a 10-foot wingspan, launches off a catapult, has eight hours' endurance.

The challenge, really, is around icing conditions, which is true of all aviation. We actually have funding from the NRC, Industry Canada, to further enhance our Arctic capability, and we are unique as a Canadian company tackling that problem.

Remember, all of these ones that you see were all designed in the California desert. They were meant to go in hot and sandy places. That's where, as Canadians, we take a different approach to things.

Mr. Charles Barlow: The other thing is that if it does crash, and everything that flies crashes eventually—

Mr. James Bezan: Don't tell me that because I spend a lot of time on planes. You're scaring me.

Mr. Charles Barlow: You don't have a pilot stranded 2,000 miles from the middle of nowhere, right? This is what happens if an aircraft is flying on the northern patrol and it goes down. Even if you know exactly where the guy is, just the rescue bit is not going to happen. It's just not going to happen in time, right? Whereas if you lose one of these unmanned vehicles, first of all, they're not very expensive. Second, there's nobody on board. That's the other major consideration.

Mr. James Bezan: When we look at the Arctic, at the defence of North America, at search and rescue and surveillance, especially in the Northwest Passage and who is going up and down through the passage as soft ice conditions continue to advance, where should we be basing drones? How many locations are we talking about? I guess it comes down again to what platform you use.

I like the idea. I hadn't even thought about using the Rangers as the operators. That actually expands the whole capability. You don't need big, extravagant runways, like we have at Churchill or Iqaluit, but maybe there are other locations where we can be stationing UAVs.

Mr. Ian Glenn: The short answer is you put it in every community. I mean, if you think about the whole contract we have with the Rangers, they're our eyes on the ground. Well, now they have to get some little mechanized thing to go out and look. When we, as a country, condensed everybody into these communities—quite deliberately—what robotic aircraft actually will allow them to do is to expand back out again safely. Every Ranger patrol should have their own aircraft overtop of them. It helps them plot routes safely through the ice conditions. If something goes wrong, it actually can give them better communications back to the community. You can run these from every community today. It's just that simple. That's where you want to be. I need to go into the bush. I need to operate, right? If I'm doing a pipeline, I need to go from place to place to place. I need 300 feet or so and I'm good to go.

Mr. Charles Barlow: I should just say something quickly. Remember earlier I showed you the small ones, the medium ones, and the big ones. The big ones are not better than the small ones, and vice versa. For example, you have the Mexico border with the United States and they have, let's say, one $22-million Predator flying alone. Or you could put a small one in every patrol vehicle and cover hundreds of points along the border for the same money. I'm not saying that's necessarily the way you want to go either, but the military uses pistols, rifles, and artillery, big to small. It's the same thing with robots. The Predators are not better than the little guys; the little guys aren't better than the big ones.

For example, you can put a little one over a city or a population a lot more safely than a big one. It can loiter and just sit there if it's some sort of helicopter, so you can get persistent surveillance. The big ones go further and longer and they get a bigger swath, but they're not very close and you can't fly them over Toronto, for example. If you're looking at the vast open spaces of the north, you're looking at a big system, obviously. If you're talking about urban areas, the Thousand Islands, that kind of thing, you're going to want to look at a much smaller system—a bunch of much smaller systems.

When you say they have to be operated, there's not that much operation left. You kind of tell it what to do and then go have coffee, right? The machine will fly the GPS route that you've told it to fly and the video will come in. It's not a labour-intensive process at all.

● (1615)

Mr. James Bezan: Correct. For coastal it can be put on flights or coastal vessels or frigates and do the same job and expand the eyes out—

Mr. Ian Glenn: Absolutely.

Mr. James Bezan: You're talking hundreds of kilometres farther than where the ship is actually located.

Mr. Ian Glenn: We are under contract to build a bigger version of our helicopter in the defence industry research program. We call it Horizon, and it will go off the ship and go out. We are working with a Halifax company that makes transponders to put on icebergs. Do you know how they do it now? You can't put people out there. You have to drive out with the ship. The guy out with the biggest arm takes this big ball and throws it onto the iceberg. That's where we're at. Its a case of occupational safety. We are working with them to pick up those transponders and go place them and come back. Back and forth....

The Vice-Chair (Mr. Jack Harris): Thank you, Mr. Glenn. Your time is up, Mr. Bezan, thank you.

The next questioner is Madam Murray for the Liberal Party.

Ms. Joyce Murray (Vancouver Quadra, Lib.): Thank you.

This is fascinating. Thank you for your presentation to the committee.

I am trying to understand why Canada is so far behind in its own JUSTAS program, the joint unmanned surveillance and target acquisition system. It was announced in the 2005 election campaign by the Conservative Party that, if elected, it would be using these UAVs in Goose Bay, Comox, and so on for Arctic air surveillance. As we know, that has been a failed procurement, and there has not been anything delivered past the options analysis stage. You're providing a lot of information about how this can be used in surveillance as well as.... We also know that it could be used in a place like Iraq, where we don't have ground information and where these kinds of unmanned vehicles can carry precision optics and radar, intercept cellphone networks, and find out what people on the ground are saying to whom, where their weapons dumps are, and what their plans are. Do you think that the Canadian government should accelerate its...? Well, they can't go more slowly, but do you think this is an important program for the country, both for the overseas military operations and for the Arctic surveillance and defence, or do you think it should be focused more on the local Canadian needs?

Mr. Charles Barlow: When you jump into new technology, there is always a temptation to wait just a little bit longer, because there is always the next great thing just about to come out. We're used to that with computers and cellphones and things like that. I think that part of the reason there has been a reluctance to jump in is that the next systems are always going to be so great. However, at a certain point you have to jump in and start getting into the process, because it's not just the physical piece of equipment that you're using; it's the regulatory environment and the command system that gets put into place to run these things. It's the commanders and troops on the ground who start to learn how to use UAVs as part of their battle procedure, for example. The physical machine that you are using doesn't particularly matter at the end of the day. When I was an intelligence officer, I didn't care where the imagery came from—a satellite, an aircraft, a guy on the ground with a camera. I needed the image. I think the defence department has been a little bit slow. The Israelis have been using these things since the 1970s.

● (1620)

Ms. Joyce Murray: Excuse me. That is a whole legitimate but longer conversation, and since I have only a few minutes.... I think your answer would be yes, we should be moving forward both for deployment abroad and for local domestic use. I'm seeing a nod over here.

Mr. Charles Barlow: Oh, absolutely. For robotics it's time to jump in.

Mr. Ian Glenn: Remember that Defence, in particular, and Public Works who buy things.... There's always a mismatch between the evolution of technology and the ability of the system to buy stuff. Why were we successful in Afghanistan? We walked in with a service-based model where the technology was allowed to evolve rapidly. They bought services, and we were integrated directly into the combat operation. The soldiers flew the systems—not pilots, but soldiers. We took care of the flight critical pieces. That will always be the case.

Ms. Joyce Murray: Are you prepared? Do you have enough background in this with what's happened in the past to judge whether it is simply decision paralysis through inexperience that's happening now? Or have the cost savings instructions, with the planned clawbacks and the budget cuts, put this on the back burner because there are greater priorities for the government?

Mr. Ian Glenn: As someone outside of the government, I can only speculate.

It's systemically not meant to succeed. What drives that, I don't know.

Ms. Joyce Murray: It has succeeded in other places, times, and countries.

This is just to help me understand. The Boeing ScanEagle, which is a 50-pound, 24-hour piece of equipment, how is that similar or different? Is it more capable? Less capable?

Mr. Ian Glenn: It's the same as what we built with Serenity.

Ms. Joyce Murray: There were U.S. commentators who suggested that because Canada has good competence in intelligence analysis, good technicians, and companies such as those you're representing, Canada's best contribution in Iraq would have been these Boeing ScanEagle sized—

Mr. Ian Glenn: Or a Canadian made one with the same capability....

Ms. Joyce Murray: Yes, that size of UAV with imaging capability and with signals intelligence capability would have provided a huge benefit at a time where we had an absence of that intelligence, instead of sending essentially bombs on aerial trucks to join a much larger, more capable fleet doing that less pinpointed damage. Would you say this would have been a good deployment of Canadian resources to Iraq?

Mr. Ian Glenn: Of course I'm biased, but I would say yes.

Mr. Charles Barlow: If I may jump in really quickly, I showed you earlier that very small Canadian one. If you were to supply something like that to the guys defending the town of Kobane, for example, it doesn't go very far. It only goes a few kilometres but it can fly out over the town, see exactly where the enemy is, give you a latitude and longitude, and you can call NATO now on your cellphone and tell them, I can actually see the bad guys three blocks away. That's the sort of thing we could be thinking about doing as well.

This is a revolution. You're seeing the kids.... They were flying UAVs over the Hong Kong protests. It's a revolution that's happening faster outside of government than within.

Ms. Joyce Murray: But we could have been doing it now—

The Vice-Chair (Mr. Jack Harris): Thank you.

Your time is exceeded at this point. Thank you very much.

Ms. Joyce Murray: I see the nods. Thank you.

The Vice-Chair (Mr. Jack Harris): Now we have round two.

The first questioner is Madam Gallant from the Conservative Party for five minutes.

Mrs. Cheryl Gallant (Renfrew—Nipissing—Pembroke, CPC): Thank you, Mr. Chairman, and through you to the witnesses.

We know why we're a bit behind as far as UAVs. It's because of that decade of darkness we suffered before.

We're focusing on innovation and helping businesses move forward. I look forward to seeing your businesses grow even more.

Could you describe the data fusion capabilities that you currently have in your UAVs?

Mr. Charles Barlow: I don't make UAVs. I sell them, set them up, and get the systems working for other people.

A good gamut of what we would normally do is intelligence gathering. You can get great imagery by day and night. As Mr. Glenn said, you can get way down to the resolution that's far beyond what you can get from satellite. You can do signals intercept. You can do signals relay, where you've got the thing up and you can use it just to relay your own communications. You can put nuclear, biological, and chemical detectors as payloads. There are a number of things that you can do with these machines.

It's not unlike what you can do with any manned aircraft. It's just that it tends to be a little less expensive.

● (1625)

Mrs. Cheryl Gallant: But can you take that information, the IR capability, the actual visuals, and other types of centres and fuse that data so that you can get a clearer picture of what's actually going on?

Mr. Glenn?

Mr. Ian Glenn: Absolutely. As you know, before I retired from the military I was the architect of the army ISTAR program technically and programmatically. It's a bit of a passion for me.

Beyond our platforms, of which I have a rotorcraft and a fixed-wing, I have a set of technology thrusts that we call “glass to glass”. It's from that lens to the iPad, in my case, and the farmer with the PayPal button.

It's the same for the oil industry. I push that information as they want it straight into pipeline integrity monitoring systems. We pushed live feeds directly into the various Caribbean nations down in South America. We have that ability to do that now.

On the fusion piece, there are increasing tools that allow you to do that. Some of the mapping pieces you saw, those were using some analytics that allow us to very rapidly create 2-D or 3-D maps from imagery we're collecting in real time, and then in near real time creating better products down the road.

Those are all geo-referenced. Everything's geo-referenced, so from a National Defence point of view, I can push directly into any of the command and control systems today.

Mrs. Cheryl Gallant: How easy is it for non-state actors to obtain UAVs that can be used for purposes that would compromise the safety of North Americans, and are either of your companies subject to ITAR?

Mr. Charles Barlow: I did mention the fellow in the United States who was planning to attack the Capitol building. That's an attack profile using unmanned systems that we are going to see, I'm afraid, for the rest of our lives. It's just an absolute inevitability.

When we discuss the ability of the other side, as it were, to get access, if you think back to Google Earth, I remember when Google Earth came out everybody over at Defence went “Yikes” because most of the countries had never had satellite imagery before. Most of the people who we were facing had never had satellite imagery and all of a sudden they did.

Now UAVs are going to do the same thing. Not only are they doing the same thing now already, I mean, we were over-flown in Afghanistan by very rudimentary aircraft, model aircraft with cameras strapped on the bottom of them. That's going to get better as well. You can buy some pretty good non-ITAR robots right off some good websites. We are going to see the bad guys using those more and more, just as I showed you their using them in Syria in the ISIS videos.

But we're also going to get as these things proliferate.... The UAVs are up and they're doing their job. Let's say they're delivering pizzas, but they're still collecting data on the wind, the imagery, and all the other stuff.

What you're going to see in five or eight years is an almost live Google Earth for certain areas of the planet because they're going to have a lot of UAVs over them, and that data is going to be coming in.

Mr. Ian Glenn: Non-state actors? Yes, they've got everything they need. You know, stop at Future Shop or Best Buy on the way home and pick up what you want, fly with your iPhone, and you're there. It's just no longer an issue. It's why Transport Canada had to change the rules: they couldn't keep the rules because the world had changed.

The Vice-Chair (Mr. Jack Harris): I'm sorry, Madam, but your time is just about up. You have five seconds and you can't do much with that.

Mrs. Cheryl Gallant: Auroras, would they support—in what ways would they support or eventually replace that type of capability?

Mr. Ian Glenn: Aurora is a great platform with a lot of people on board and it will persist as long as it needs to. Eventually, these unmanned systems will have the same capability without putting human life at risk. They're cheaper to operate, safer, and off you go.

The Vice-Chair (Mr. Jack Harris): Thank you, Mr. Glenn.

Thank you, Madam Gallant.

Our next question is Mr. Brahmi on behalf of the New Democratic Party.

[*Translation*]

Mr. Tarik Brahmi (Saint-Jean, NDP): Thank you, Mr. Chair.

Mr. Glenn, your perspective on UAV systems is more industrial and technical. Would you say that, right now, there is a sort of convergence of the various technologies? The avionics component of UAVs is becoming less and less important. There is a commonality between land and air robots. That commonality will eventually lead to a convergence in terms of everything command- and control-related, meaning there will no longer be any real separation. Industrially, I assume you use the same platforms, do you not?

● (1630)

[*English*]

Mr. Ian Glenn: That's a great question. I had the opportunity to speak at a keynote for Canada's first national robotics conference at McGill last week, NSERC conference. The answer is, yes, there is a convergence, absolutely. Smart guys are solving problems every day, and those technologies apply from everything—it's the same technology in this, gyros, rate gyros, all the things you need to know, really high-resolution cameras. Whether I throw this in the air and fly it around or I put it on a robot and drive it around, it's the same technology. There is a strong convergence there.

[*Translation*]

Mr. Tarik Brahmi: In Canada, how will UAVs contribute to maritime defence, for instance? They will be one of the solutions, not necessarily the solution. I would imagine that there are UAVs with submarine capability and that they could eventually replace existing submarines. As Mr. Barlow was saying about the new F-35s, they will probably be the last generation where avionics will play a critical role. Do you foresee the same technological change in maritime surveillance? Will emerging submarine technologies be able to replace existing submarines?

[*English*]

Mr. Charles Barlow: Thinking really quickly, the Royal Navy is already working on a program to buy an unmanned surface vehicle, a USV, that will go to sea for three months on a single tank of gas with some rotors and stuff to keep the power up. That thing can go out to sea and patrol for three months at a time.

They will be deploying that kind of stuff, not only for large deepwater patrols, but also for the close-in stuff. If they're running it through rivers or lakes, or along coastlines, the robots allow you to do certain things that you can't do with manned systems. You can sail a robot into somebody's territorial waters without triggering the same response as you would if you sent in a ship with people on it. I think that drones are one thing, but robotics—no matter whether they crawl, sink, or fly—are the essence of this whole thing.

Mr. Ian Glenn: I would add that I've worked with autonomous underwater vehicles. UVic has a great system from an American friend of mine. It's about the convergence.

What the flying piece does is give you a great view of the ground. The ground robot is good. Underwater is also good, but with limited communications. If you give the underwater the ability to carry a little antenna, and you have the airborne piece, you can go back and forth so you can get the data back.

Using your imagination when you think about the problem you're trying to solve, and with the flexibility to use robots, you can do amazing things.

The Vice-Chair (Mr. Jack Harris): You have another 40 seconds.

[*Translation*]

Mr. Tarik Brahmi: Mr. Barlow, you talked about the next generation of aircraft. But what about the next generation of ships? Will North American maritime defence move towards robotic systems?

[*English*]

Mr. Charles Barlow: I'm convinced that we will.

The one bit that becomes tricky is when you arm them. Once you arm a UAV or a robot of some sort, and you can't get communications with it.... For example if you have a submarine, and it's out and it sees what it needs to see, the people on board can make the decisions about whether or not they are going to use force. If you don't have a connection to the robot you can't do the same thing, unless you give it specific orders to fire at certain times under certain conditions.

For surveillance and for communications, robots are brilliant. If you start talking about armed robotics there is a limiting factor, which is that the decision-maker is potentially thousands of miles away.

● (1635)

The Vice-Chair (Mr. Jack Harris): That's the end of the time.

The next person questioning is the Conservative Party's Mr. Van Kesteren. You have five minutes.

Mr. Dave Van Kesteren (Chatham-Kent—Essex, CPC): Thank you for appearing here today. I'm not normally a part of this committee, but I'm happy to be here and talk about some of these things.

I remember when drones first were talked about. I think that all of us were fascinated, but we live in a day and age where we're quickly bored with what we see. Although it is a marvel that they're able to do these things, much of the technology talked about has been around, at least in terms of today's technology, long enough that we're waiting for the next quantum leap.

Thinking about the technology that's involved here, the batteries and the different computers, what's on the horizon? The other day, I was reading about a new engine that's being developed—it's speculative at this point—a pulse jet engine or something. What's on the horizon for drones? What can we expect to see?

The second part of my question—in case this goes on a little longer than I expected—I remember in industry we were involved with MacDonald...I forget the name, the ones that did the satellites. Have we got companies, and I could refer to yourselves too, that have the capabilities to develop into something like that, where we would become world leaders and we would start to develop some of these new-generation technologies? Either one of you can take this.

Mr. Ian Glenn: We already have the ability to do stuff. We're discovering what we can do.

At the end of the day, I tell my guys it's not about the air show. For my fixed-wing and rotorcraft I give them five design criteria: fly as long as you can, as far as you can, carry as much as you can, don't fall down, and make it push-button-get-banana easy. In those streams, just go off and innovate. That actually solves a lot of problems.

In every dimension of everything we do there's an innovation every day: a faster way to process imagery, better communications, or a better way to see things. It's really now that we're able to shape it on a customer-by-customer basis.

To your second question, are we in a position to do this? I ask—and I certainly have these discussions with Industry Canada—where's the next breakout in this country? We've seen what we've done in telecom. We've been there, we've done that, and we've got the shares to still deal with that.

In aviation, what is Bombardier going to do that's going to be a breakout? What are the things that we're going to do?

My point is, in robotic aviation, this country has been a leader in aviation for as long as there's been aviation—the bush pilots, our training for World War II—in all of these things we've been leaders. Now we have the ability to do it again.

I happen to lead the sector. There are guys chasing me hard, which is great. In this Canada is a leader, absolutely, and I know that one of the things that drives Minister Raitt to improve the conditions in the commercial market is to allow us as a country to lead in this space.

Mr. Charles Barlow: I'll just quickly say that the categories of the robots are basically all established. You're going to see incremental changes like the iPhone 4 to the iPhone 5. The cameras will get better, and the batteries will get better. There's no huge jump that way.

The huge jump that's coming is that these robots are going to all start cooperating. It's called swarm robotics. It's been worked on for a long time and it's starting to become very useful, the way that these things start to understand the situation of the other unmanned systems around them, so that if one of them falls down, the others converge and cover off the area.

I think you're going to see less and less human involvement in robotics, and that on a very steep curve, until—and I'm not talking more than five years from now—you will not need a human to even look at these things. They'll be doing their job 24 hours a day.

● (1640)

Mr. Dave Van Kesteren: What about the propulsion? I guess I'm looking for something science fiction, like *Star Wars*. These things move at a fairly substantial speed. Are we moving into jets? I see the Chinese at least are advertising jet propulsion. Is that something that's a capability, seeing these things travel faster than Mach 2, 3, 4, or something like that?

The Vice-Chair (Mr. Jack Harris): You have about 15 seconds.

Mr. Ian Glenn: Right, so you can go really fast, but if you want to see stuff, what's the point?

Canada developed the CL-289 20, 30, or 40 years ago, 50 years ago. That was fast-moving at 400 knots. Germany and France bought it. It was made by Canadair, then they replaced that with wet film, with electronics.

What you really want is persistence, and you want to go and use the stuff you see.

Mr. Dave Van Kesteren: Imagery, that's the key.

The Vice-Chair (Mr. Jack Harris): Thank you, Mr. Van Kesteren.

Next is Madam Michaud for five minutes on behalf of the NDP.

[*Translation*]

Ms. Élaine Michaud: Thank you, Mr. Chair.

I'd like to pick up on the use of surveillance drones in the Arctic. I think that is where they would be most useful in the Canadian context.

We're still quite a ways off from armed drones, which are not consistent with Canadian values, in my view. So I won't be getting into a discussion on that.

Systems used in the Arctic need to have specific technical requirements, given the harsh conditions. We are learning that ships the navy is looking to purchase will not be capable of performing all the necessary surveillance activities in Arctic winters. More and more consideration is being given to the use of drones. Coming up with a drone that could function in the various conditions present in the north would seem to be a challenge.

Are you able to give us any details on that? I am curious as to whether a single type of drone would do the job in the Arctic or whether different types of drones would be needed. I'd like to hear your take on what Canada's needs in the Arctic are.

[*English*]

Mr. Ian Glenn: There are two.

Number one, if you're trying to solve multiple problems, take multiple approaches. That's why I have a rotorcraft and I have a fixed-wing. I get persistence from the fixed-wing, and I get on-the-spot, tactical, instantaneous response out to 10 kilometres. In every case, you're safer using a robot than you are people. We had a tragic loss of life last year off one of our coast guard vessels that was out doing a tactical ice survey, when it could be done today with a robotic aircraft. It's just the way it is.

When we think about the increased number of vessels transiting our Northwest Passage, this was proposed to me years ago. We have harbour pilots to come in and out of our harbours. We as a country are in a position to say, "Do you want to transit? We have new regulations. If you want to transit our Northwest Passage, then you put a harbour pilot equipped with this technology." That could actually be an aboriginal responsibility, from robots that are based in their communities as they transit through.

The beauty of that is we provide tactical ice reconnaissance for those vessels. They're able to go faster, their insurance rates are lower, and we would have eyes on everything that they did. If there is an inadvertent pumping of bilges or whatever, we would be able to see that. If there's an incident, we immediately have information about what that is. Everyone else in the country who's responsible for effecting the rescue piece or the response piece would have detailed information on which to act.

You don't have to buy one thing, because one thing doesn't solve all things. And you don't have to. The beauty of it is, you don't have to design it to carry a person.

Mr. Charles Barlow: If I may, I wouldn't out of hand dismiss the armed bit of the problem as well. When the Russians send their bombers up to Tiksi and Anadyr, their northern bases, we send our CF-18s up to our northern bases, and they're armed. If we are speaking at some point in the future of more robotics and fewer humans, you can't discount the fact that at the end of the day they can't just look, in some cases.

● (1645)

[*Translation*]

Ms. Élaine Michaud: We could get into a lengthy debate on the subject, but we won't go down that road.

Mr. Glenn, your presentation gives rise to questions, including which department or federal agency should be in charge of drone surveillance operations in the Arctic.

Should that responsibility be shared by a number of departments or be given to a single organization? How do you think we should define that responsibility in the north?

[*English*]

Mr. Ian Glenn: As you may or may not be aware, that's the real challenge in the Arctic. Multiple departments have responsibilities. The coast guard has responsibilities, the RCMP has responsibilities, National Defence has responsibilities, and there have been attempts to do working groups where the various organizations involved are responsible. I don't know the answer.

[*Translation*]

Ms. Élaine Michaud: Is there anything you would suggest?

[*English*]

Mr. Ian Glenn: Let me think about that. I actually don't have a suggestion.

The Vice-Chair (Mr. Jack Harris): Thank you, all.

Next, Madam Gallant for five minutes.

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

Most countries effectively use satellites to monitor their airspace and maritime regions. How would surveillance drones be any different? How would they contribute to our existing satellite abilities?

Mr. Charles Barlow: Civilian satellites are getting very good. The gap between military and civilian satellites is closing to the point where I know there are discussions about whether or not we're going to need a military satellite system at all, really, eventually, because the technology closes. However, if it's cloudy, it's still cloudy, and satellites can't see through clouds very well. So, again, you get back to some sort of aircraft, be it manned or unmanned, that can fly lower under the clouds and see what the situation is.

Satellites have fundamentally changed the way the world works, as a matter of fact, with Google Earth and all the other things. But they don't replace that closer-in stuff, and they never really will be able to. It's also very, very difficult to task a satellite. Satellites do their thing, and if you need a satellite over an area and the satellite's not doing that right now, then you're out of luck. That's just the way it goes. It's not like in the movies, where you can follow Will Smith around.

A voice: It really doesn't work that way.

Mr. Charles Barlow: No, but you can do it if you have an aircraft in....

I remember one time I was at Defence and we got a call. It was a shipment going to Alaska, and it had gone missing along the coast highway. The guy just hadn't called in. So we called the local RCMP detachment and said, "Could you please drive the highway between here and here and just see if this truck is there?" The guy said, "Yes. I'll get back to you within at least two days."

That gave me an idea of how big.... I'm an Ottawa boy. I drive from here to the Glebe; that's where I live. But when you start to get a sense of the size of the country and our ability to actually respond, to fly a thousand miles of road.... The RCMP said, "We patrol that road once every two weeks normally, but we'll send a guy out and he'll drive it for you today, but it's going to be days before you get an answer." That's where if you had a UAV or a manned aircraft, but cost-effective, you could toss that thing up and have an answer in a few hours.

Mr. Ian Glenn: That's right. Charles has the answer: persistence versus satellite. And I compete against satellites. I produce much higher resolution. I have persistence, and I can cover the area. The cost is much lower. Remember that when satellites go up, that's it. It's one-shot. We put the latest hyperspectral from the Institut national d'optique. It breaks light into 700 bands per pixel. We do that. This is the stuff we're able to innovate, continuously getting the right answer, and it's because we're there—so persistence. We operate under the weather, under the clouds. This is very true of what we did in Afghanistan, by the way. Also, the cost and local knowledge.... So I'm advocating for community-based or local-based flights, where people know the terrain. They know what's different. We're enabling them to be much more rapid in their ability to get the right answer.

Mrs. Cheryl Gallant: If you have a satellite that would have a much broader or widespread view, and you can maybe hone in on a certain thing, if there's a UAV in the region, is there a way to take its picture and impose it within the satellite pictures so that you have the broad as well as the honed-in point of view?

● (1650)

Mr. Ian Glenn: Oh, sure. We pump our stuff into arcGIS, into Google Earth, or whatever. Yes, that's easy.

Mrs. Cheryl Gallant: Okay, and it is easy—

Mr. Charles Barlow: You're also feeding it with signals intercepts, so that you're taking the pattern of signals intercepts and you're overlaying them onto the maps. You're getting little breadcrumbs of where the ship was, for example, even if you never saw it—or the guy, the camel, or whatever it is you were trying to follow.

Mrs. Cheryl Gallant: Very good.

Now, we had that situation where a U.S. UAV went into Iran, and they say that they captured it. Why would there not be a self-destruct button in that? Or was there? Or is that something that's normally done so that if a drone is diverted, crashes, or lands in enemy space, they don't retrieve the information from that?

Mr. Ian Glenn: You can do anything you want. If that's your requirement, it's a fairly small package and it's a specific signal. We are required to have a flight termination system in order to avoid other aircraft, for instance. I will command my aircraft to the ground if it's safe to do so.

The Vice-Chair (Mr. Jack Harris): Thank you, Ms. Gallant.

Mr. Bezan, for the final question in round two, for five minutes.

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

We're talking about all the capabilities, and the one thing that you mentioned earlier, Mr. Barlow, is that right now we are seeing ISIL as well as Hezbollah and other entities having capabilities with drones. They are coming in and taking a look at where Canadian positions could be in theatre, along with our allies. How do we defend against that? What types of countermeasures are capable...? I know that with the situation in eastern Ukraine right now all their UAVs were knocked down by the Russian-backed separatists. Exactly what technologies are out there from a defensive side, and should Canada be employing those countermeasures?

Mr. Charles Barlow: The world is a long way behind in the defence part as opposed to the offensive part of UAVs.

For example a couple of months ago two UAVs were found crashed in South Korea that had originated from North Korea. They were dinky little things, but they had filmed the presidential palace and a few military installations. They caused cabinet crisis meetings and all sorts of things.

Now the South Koreans are looking to buy a system with advanced radars because that's what you need to find very small machines and some sort of defensive system that they want to build. That's going to be an enormous program. The Americans—DARPA, the Defense Advanced Research Projects Agency—are working on all kinds of solutions such as counter drones, but this is a big problem. Guys are dropping drugs into prisons in Canada with little UAVs. They just fly it over, drop the drugs, and fly away.

There isn't a good counter system for that. You can't jam the frequencies because they are using regular frequencies most of the time. A prison, for example, can't blanket-jam all the frequencies around it. This is an issue that hasn't quite been solved yet. We've also seen some video recently of guys flying small UAVs near aircraft in Toronto and Vancouver in the flight path. We need some counter systems and we need a system within the government. As Mr. Barlow said earlier it's tough to procure new stuff. It's really tough to procure new stuff until we have a major incident with a UAV and then everybody is going to be jumping around looking for some sort of good system, to defend.

Mr. Ian Glenn: That's a pretty comprehensive answer.

There are some things you can do. Like any system, there are vulnerabilities, but the beauty of having a cheap system is you can knock one down one and the other one is there. If they are only buying RC stuff, they would be just throwing more and more stuff at you. It's not a trivial problem.

Mr. James Bezan: You have shown in some of these slides UAVs, including domestic terrorists wanting to make use of them. We know that we've seen this proliferation of Tomahawk cruise missiles around the world. If somebody came in close enough to our shorelines they could launch a UAV to carry a cruise missile inland and do a pile of damage I suspect. Cruise would be able to fly quite a distance themselves, but even somebody on a fishing vessel could launch a UAV and a dirty bomb, from a terrorist attack capability, and then it goes some place like a port city.

● (1655)

Mr. Ian Glenn: They are hard to detect. We flew 30,000 hours over the population in Afghanistan at about 2,000 to 3,000 feet and no one ever looked up. We were photographing polar bears and nothing moved. You don't normally notice.

The other thing I remember from my days in the armoured corps was that we used to fly these little RC planes and we would practise our air defence...a squadron of Leopard tanks, 19 guys on machine guns, we never hit them because it's really hard. They are small. They are only carrying a camera and it is a hard problem.

It's not that it isn't soluble, but it's not trivial.

Mr. James Bezan: Mr. Glenn, you mentioned earlier about the funding that you got from NRC Canada. Can you talk a bit about what you are doing through the industrial research assistance program?

Mr. Ian Glenn: Absolutely. We are on our fixed-wing and specifically we are improving its Arctic performance and short landing capability, and nets of some kind so we won't require a runway to land on or even a grass strip. We are looking at better engines, enhancing our rapid mapping capability, and there are some other general performance...pushing the performance envelope from 8 to maybe 25 hours.

The Vice-Chair (Mr. Jack Harris): Thank you.

That is the end of the second round. We seem to have a fair bit of time left, so I am going to offer a third round to be one from each party for five minutes each. We will start with the New Democratic Party, Mr. Brahmi.

[*Translation*]

Mr. Tarik Brahmi: Thank you, Mr. Chair.

Mr. Glenn, I'd like to pick up on the search program you received support for. You said the system's arctic capability and performance had improved.

Does that improvement extend to armed capability?

[*English*]

Mr. Ian Glenn: No, we're not in the shooting business.

[*Translation*]

Mr. Tarik Brahmi: Very well. There is not—

[*English*]

Mr. Ian Glenn: Commercial surveillance, not in the shooting...I had a career in the military. I know how to do that. That's not what we do.

[*Translation*]

Mr. Tarik Brahmi: Very good.

More generally, I'd like to round out the question that was asked earlier and come back to the use of drones for maritime protection.

Will the next generation of drones be equipped with underwater detection systems?

[*English*]

Mr. Ian Glenn: You mean airborne delivery? Like a helicopter stick?

[*Translation*]

Mr. Tarik Brahmi: Will the next generation of drones have underwater vision or detection capability that relies on infrared imaging? In fact, they would have the same capabilities as submarines.

[*English*]

Mr. Ian Glenn: Submarines are interesting because you also use them for other things like covertly delivering people to places you want. Airborne delivery...some of the science missions require us to dip transducers into the water in the Arctic. From a technical point of view we can solve that problem. If there's a need that somebody wants to take that approach you can do transducers as you would drop sonar buoys from a Sea King.

With imaging systems under the water that's where satellites work well because weight detection is one of the cool things you can do. Specifically you need to look—it depends on a lot of different conditions—at normal visual. If it's in the Bahamas you can see in the water easily. If it's off the coast of St. John's it might be a little harder to see. Turbidity and all those things do impact your ability to see, which is often why—from our ASW piece in the manned world—we're dropping sonar, listening, and then being able to triangulate, detect that way. If those systems are small enough then you can deliver. It doesn't matter whether there's a pilot on board the delivery system.

● (1700)

[*Translation*]

Mr. Tarik Brahmi: I have another question for you on the counter-measures we were discussing earlier.

Which is the more effective system, in your opinion? Is it the ability to interfere and take control of an enemy UAV or the ability to launch a direct attack via a missile defence system? A missile has no communication capability. It has an automatic guidance system so that it hits its target directly.

Which of those two options is more effective? Is it the interference and takeover capability or the direct attack capability?

[*English*]

Mr. Charles Barlow: Right at the end of World War II the Germans were firing V-2 rockets at London. The Americans came up with a remotely controlled airplane, a bomber, and they filled it full of bombs. They put a remote radio control inside the aircraft. The guys would take off, they would parachute out of the airplane, another airplane would fly along controlling it, and they would guide it into the missile sites. That happened in 1944. Robots have been used to attack missiles for 60 or 70 years.

In terms of defeating UAVs I mentioned earlier that humans will fight both alongside and against robots. Robots will also fight those things as well. There will be counter-UAV robots, counter-UAV UAVs. If they detect it they'll crash into it.

The Israelis are using a system in their northern border for exactly that same reason, but overall you're going to need to detect them and then jam them.

The Vice-Chair (Mr. Jack Harris): You're out of time, sir. Thank you.

Thank you very much, Mr. Brahmi and Mr. Barlow.

Next is Mr. Leung for five minutes.

Mr. Chungsen Leung: Thank you, Chair.

If we look into the defence of North America and how we're going to prevent an unintended war—because I just heard you mention that these drones could be unmanned, but they're also unmarked whereas regular combat aircraft are marked—what is our assurance, or how do we prevent ourselves from getting into some sort of terrorist war where a third world country will send a drone with U.S. marking or Russian marking and hit a target?

What's our assurance? How do we prevent that from happening? Your comments, please, Mr. Barlow.

Mr. Charles Barlow: Sir, I think for one thing, it's very likely to happen against our own deployed forces before too long. I know that's not North America, but still, if you're a Canadian warship, wherever you are, you're in Canada—sort of. So that's likely going to happen. We've already had imagery taken against us in a hostile manner. It's very likely that at some point somebody's going to do a terrorist attack using unmanned systems the way I mentioned.

How do we defend ourselves? It's the same way we do against all threats: watch for them, set up some systems, think about it. It's a very, very quickly emerging thing. The one thing that I've learned about a lot of our opposition is, as they say in the military, the enemy is just as smart as you are, but they're coming at it from a different perspective. So I think we're going to get surprised, no matter what we do.

Mr. Ian Glenn: There's no short answer to that. At least with manned aviation, you have that pilot and you can probably trace back who that was. You go back to that chipset, and it's probably made in China. That's it, at the end of the day. You can pick up some nice decals at the local hobby shop here and make it anything you want it to be.

It's a great question.

Mr. Chungsen Leung: It concerns me not so much how we use these in the democratic role of those who have a moral right to do something, but it concerns me when some of these rogue states are simply going to use them as a method for a terrorist attack, to pit two countries against each other.

Mr. Ian Glenn: I think it will go back. If you have the technology, you look at it, that's what intelligence guys are meant to do. The technical intelligence guys can go back, look at the code, look at the firmware, make some deductions.

● (1705)

Mr. Chungsen Leung: Do we at the current time have the ability to detect an unmanned vehicle by the profile of its engine, the profile of its electronic communication or RC capability, to detect where that product was made, or who manufactures it? Is that type of footprint available?

Mr. Ian Glenn: They're made with parts from all over the world.

Mr. Charles Barlow: As an example, there's a German machine called a micro drone. It's a small machine. The Iranians just put out a big press release about how they developed their own small drone. It was a photograph from the micro drone website, so I don't know if they're actually buying microdonts, or just copying them. But as Mr. Glenn said, the electronics are sourced from pretty much the same place.

Mr. Chungsen Leung: With a concept like this we could all put these things to civilian and commercial use, it would be wonderful, but unfortunately, that's not the way the world is going.

The Vice-Chair (Mr. Jack Harris): You have about a minute, Mr. Leung.

Mr. Chungsen Leung: That's about it.

The Vice-Chair (Mr. Jack Harris): Thank you.

The final questioner in this round is Ms. Murray for five minutes.

Ms. Joyce Murray: Thanks so much.

I'm just really mesmerized by your comments about where we're going in the future with these technologies. They are already completely available if we were to avail ourselves of them for military.... If we were to be doing surveillance of our vast ocean area, what might that mean for some of the big, expensive equipment replacement projects that are planned? Should there be a future government that's a different one from the current government, are we going to be faced with...? For example, fixed-wing search and rescue, it was a big priority starting in 2003. In 2013, it's still a big priority, and an urgent one according to the Auditor General. Oh, I forgot, it's all the fault of the previous Liberal government. So in the nine years, nothing has progressed under this government, but are we not going to need as many fixed-wing search and rescue vehicles if the search can be done by drones?

I guess the other obvious one is, if we are really patrolling through aviation robotics, are we then going to find that the need for Arctic offshore patrol ships to patrol vast areas of our Arctic Sea...? Again, it's a project that has been delayed and delayed and delayed, and the first one may not be available until four years from now. But if the last nine years continue, it might be longer than that. Are we going to find that these are obsolete by the time we actually have them coming off the assembly lines?

What you're suggesting is a lot cheaper. That's expensive equipment. Are we going to need both, or is it going to replace some of these others?

Mr. Ian Glenn: I think you start by looking at what you have to do. The northern bit of Canada is 40% of Canada, so it's huge. We have the second biggest country in the world. In no way have we ever had the resources to effectively patrol it or do search and rescue. Whatever assets are provided by whatever government will, by enabling better search, be more effective in the execution of their duties.

It's about better information. Some of it is satellite-based; much of it, I'm saying, can be done locally, out to hundreds of kilometres from a particular base. By having multiple ones, now you have a system that provides accurate and timely information to those commanders who need to get things done.

I don't really care how they do it, but blisters on the side of an aircraft was very World War II.

Ms. Joyce Murray: Well, this certainly poses challenges, but it also could mean big cost savings down the road.

Using swarms of drones and the kind of “scene understanding” intelligence that they provide is already under way. From what I know the U.S. are doing field experiments on what they're calling “course of action” analysis. That's already out there; it's already doable.

We could be using this in Iraq, or we could be using it in Ukraine, for example, to assist in identifying what is going on. Is that correct?

● (1710)

Mr. Ian Glenn: Yes, absolutely.

Ms. Joyce Murray: Yes. So this isn't really in the future; it's here. We're just—

Mr. Ian Glenn: —not doing it.

Ms. Joyce Murray: —somehow a few decades behind, in terms of our use of equipment.

Are there ways in which we could be using that kind of "course of action" analysis with drones here for domestic protection, security, and defence, or is that more an overseas...?

Mr. Ian Glenn: It's all about the information. You make decisions on the information you have. Every military commander is trained to make decisions under stress and with insufficient information. What changes is information that you think you need in a timely fashion, and no one is in harm's way to get it.

Ms. Joyce Murray: Do I have time for a last question?

The Vice-Chair (Mr. Jack Harris): You have about half a minute.

Ms. Joyce Murray: My understanding of this whole thing of armed drones, such as the Predators, is that they are more precise than the CF-18s—they can target individuals—but that when there are no ground troops, there is not necessarily good information; there is mis-targeting, and there can be civilian deaths; that wherever we don't have ground troops, it's especially useful to have the unarmed drones providing intelligence; and that the Predator-type drones are a big liability in terms of humanitarian and political costs when they mis-target.

The Vice-Chair (Mr. Jack Harris): Can you give a short answer to that? I think we used up most of the time with the question. Give us a short answer, if that's possible.

Mr. Charles Barlow: I think the case may be the opposite. If you can sit over a target for eight hours watching it calmly before you drop, you won't end up with something such as we had at Tarnak Farms. There, we had soldiers out on a rifle range shooting. A pilot was flying by and saw the shooting thousands of feet below him and decided that he was going to roll in in self-defence, and we ended up with a huge disaster. That wouldn't have happened with a drone. It's always a balance.

Ms. Joyce Murray: It would be better, I guess, than the fighter jets, but they still make mistakes.

The Vice-Chair (Mr. Jack Harris): Thank you very much.

Thank you both for coming.

We're at an end to the questioning, but they say the chair has a slight prerogative to ask a question or two at the end.

I'm very excited, I have to say, Mr. Glenn, by your representations about the possibility of having stationed drones or robotic aircraft in communities in the north in particular. I'm thinking of a young man named Burton Winters, who at 14 years of age died off the coast of Makkovik. We know the response time and how long it takes to get from Trenton to Resolute Bay or from Gander or Greenwood to Labrador.

I'm assuming that you find it a very practical project to have one of your responders or other aircraft stationed in communities and that the Rangers we have now can be trained to operate and use these and collect information. Is that doable?

Mr. Ian Glenn: Yes.

The Vice-Chair (Mr. Jack Harris): I'm also looking at your website, and I see "Meet RESPONDER" and "Great Information Comes From Great Tools". It says "Buy Now". I press on the button and I don't get a price; they want my name and email and a message.

Mr. Ian Glenn: That's exactly right.

Voices: Oh, oh!

The Vice-Chair (Mr. Jack Harris): Well, I'll give you my name and my card so that you can get my email address.

Can you give us an idea of the cost of this equipment? Search and rescue is a military function in Canada. Is this something that's deployable, or do we have to multiply it by 10 times the cost to put "RCAF" on the side of it?

Mr. Ian Glenn: I'd be delighted if we did, but I have to compete in the world. As I said earlier, the helicopter is priced like a tricked-out pickup truck; it really is.

We have operated across Canada and up into the Arctic. We just do this. This is what we do now for Environment Canada, for the oil companies, etc.

The price points are absolutely what is affordable, even by the Rangers.

The Vice-Chair (Mr. Jack Harris): We're talking in the $50,000 range.

Mr. Ian Glenn: Yes.

With the bigger systems—the seven-boxers, or I would go with eight, and so with a two-aircraft system—you're a little bit more than that, more or less in the range of a combine harvester.

The Vice-Chair (Mr. Jack Harris): My next question has to do with the JUSTAS program, which you know about. Ms. Murray asked about it. It was originally planned and in the planning stage in the year 2000. In 2006 it was supposed to cost $500 million. The latest figures are $1 billion to $1.5 billion. Am I the only one who thinks that's a lot of money for the surveillance side, for example, even given Canada's coast?

Is this something that, as a result of time and technology and all of the things you're talking about today is way more doable now for a lot less cost?

● (1715)

Mr. Ian Glenn: Yes, that's absolutely true. Technology has become cheaper and better; we have moved on. The fact that it has an American flag on it doesn't make it the right product to buy.

The Vice-Chair (Mr. Jack Harris): Okay.

Those were really my two questions. As I said, the idea of our Rangers actually being able to extend their capability and meet some of the capability problems we have with the size of our country, particularly in the search and rescue instances that are going to occur where people live.... If we already have people there in the form of Rangers, or the capability to have them there, that can certainly help with search, such as in a search for a boy like Burton Winters, who walked for 19 kilometres when nobody was there looking for him.

Is weather in the Arctic less of a problem for these than we think it is, or what is the case?

Mr. Ian Glenn: You just need the power to deal with the weather. There are days when there are reasons, in Inuvik or Tuktoyaktuk, for their taking big cables and strapping down the houses. There are days when it just isn't a good day. But that is the reason we designed to at least match manned aviation in the flight profile and then push those envelopes.

The Vice-Chair (Mr. Jack Harris): Thank you very much.

This being the end of our session today, I thank you both very much for coming. It was a most interesting meeting.

If there is nothing further, I will accept a motion to adjourn.

Mr. James Bezan: I so move.

The Vice-Chair (Mr. Jack Harris): Thank you.

The meeting is adjourned.