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Chair

The Honourable Judy A. Sgro

Standing Committee on Transport, Infrastructure and Communities

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● (0950)

[*English*]

The Chair (Hon. Judy A. Sgro (Humber River—Black Creek, Lib.)): I call the meeting to order. We're now in open session. Pursuant to Standing Order 108, we continue our study of the unmanned aerial vehicle regulations. We have several witnesses with us today.

Before the witness testimony, Mr. Rayes, were you trying to get my attention?

[*Translation*]

Mr. Alain Rayes (Richmond—Arthabaska, CPC): Yes. Thank you, Madam Chair. I'd like you to clarify something for me before we get going. I want to check whether we are indeed meeting with the Minister of Infrastructure and Communities next Thursday to talk about the infrastructure bank.

[*English*]

The Chair: Specifically you asked to invite the minister. When he's here, he will speak about the infrastructure bank, and once he's here, he'll probably speak about anything that you ask him. He's still on the schedule for next Thursday, December 15, as you requested.

[*Translation*]

Mr. Alain Rayes: That's great.

Is he going to be here for both hours of the meeting?

[*English*]

The Chair: No, it's one hour.

[*Translation*]

Mr. Alain Rayes: Very good, so we can expect to meet with the Minister of Infrastructure and Communities next Thursday.

Will he be here for the first or second hour of the meeting?

[*English*]

The Chair: It's for the second hour, because we're doing committee business in the first hour.

Mr. Berthold.

[*Translation*]

Mr. Luc Berthold (Mégantic—L'Érable, CPC): I'd like to say something on that, Madam Chair.

With respect to the minister's appearance, we had asked you to see whether the minister could be here for the first hour of the meeting. Next Thursday will be the last time the committee meets before the holidays, and there could be votes. What's more, it's also the time when the goings-on in the House often have the effect of cutting short a witness's appearance.

We had asked you to make a different request to the minister. Do you plan to do that?

[*English*]

The Chair: I did ask again, and it was left at, if possible, he would be here for the first hour. Apparently, I'm not sure what meetings...but he already has something. However, I did ask. If he can be here for the first hour, he's assured me that he will be, rather than the second hour.

Monsieur Aubin.

[*Translation*]

Mr. Robert Aubin (Trois-Rivières, NDP): In the event that the House adjourns on Wednesday or Thursday morning, can we meet with the minister during one of the committee's first meetings back in late January or early February?

[*English*]

The Chair: I would be asking that he come to our first meeting, if possible, so that we can deal with the request from Mr. Rayes. Okay, thank you.

To our witnesses, welcome.

We have Rudy Kellar, Executive Vice-President of Service Delivery, with us. By video conference from Toronto, we have Hugh Liu, Professor, and Kamran Behdinan, Professor.

Welcome, gentlemen. My apologies for the delay, but we're very happy to have you with us today.

Mr. Kellar, would you like to start. You can introduce your colleague who's with you, Mr. Kellar.

● (0955)

Mr. Rudy Kellar (Executive Vice-President, Service Delivery, Nav Canada): Madam Chairman and members of the committee, thank you very much.

As mentioned, my name is Rudy Kellar. With me is my colleague Brian Guimond, who's Nav Canada's manager of military operations and unmanned aerial systems. Thank you for inviting Nav Canada to appear before the committee as part of your study into the regulations governing unmanned aerial vehicles. To us, this is an important issue, and we were pleased to see the committee decided to examine it.

For those who are not aware, Nav Canada is the private company that owns and has operated Canada's civil air navigation system for the past 20 years. We provide air traffic services, which include air traffic control, fight services, and other related services to pilots operating in Canadian airspace and international airspace delegated to Canada. We own the radars and other surveillance technologies that enable us to monitor the skies and the navigational aids used by all pilots flying in our airspace.

We are proud of our record in improving safety and efficiency in our skies and in reducing delays to passengers and aircraft operators. An act of Parliament gave us the right and responsibility to plan and manage airspace in Canada. Transport Canada retains authority to regulate us from a safety perspective, as they do with airlines and airports.

As the committee has heard over the past few weeks, the UAV industry is growing and there are applications for the technology that are quite exciting. However, it is essential that the growth occur in a way that does not undermine safety, for those currently using the skies, for those wishing to take to the skies with their UAVs, and for those on the ground.

Nav Canada has been an active participant in the Canadian aviation regulation advisory council, or CARAC, process that has been developing enhancements to the current Canadian regulatory framework governing UAV operations. We also sit on the International Civil Aviation Organization, or ICAO, remotely piloted aircraft systems panel, working on the development of international regulatory standards and recommended practices for states.

Airspace in Canada is divided into seven classes, class A through G, but can generally be thought of as separated into controlled airspace and uncontrolled airspace. On a day-by-day basis, commercial UAV operations in uncontrolled airspace are approved by Transport Canada or adhere to criteria for exemption from the approval requirement. UAV operations that have received Transport Canada approval through a special flight operating certificate, or SFOC, process to operate within controlled airspace include a requirement that their operations be coordinated with Nav Canada. They will contact one of our air traffic control facilities to work out the details of their operations so that we are aware of when and where they plan to operate. That coordination allows us to assess the risk from the proposed operation and impose restrictions as appropriate, such as limitations on altitude, hours of operation, communication, and determine the requirement, if any, for a notice to airmen to be published.

Normally, in controlled airspace, an air traffic controller's job is to use surveillance technology to know where all aircraft are and to provide control instructions for changes in altitude or heading by communicating with the pilot on the radio or through a data link connection. All control instructions are designed to keep aircraft in their airspace moving efficiently and safely separated.

There is some less busy airspace in which we provide traffic advisory services in Canada. Essentially that means ensuring pilots know where the other aircraft are in the area and what their intentions are. In this instance, it is the pilot's own responsibility to see and avoid the other aircraft once we have provided the flight information.

The integration of UAVs into the national airspace has provided unique challenges for air traffic management now and going forward. Controllers can't see the UAVs on our radar screens because the vast majority don't have transponders and are physically too small to be detected.

● (1000)

In those rare instances where a UAV is large enough or near enough to be detected by primary radar, the target on the radar screen looks the same as a bird would, and there is no communication available from the air traffic controller as they do not have the radio frequency, so they cannot be provided any instructions.

I think the committee has heard a lot in the past few weeks about how the technology is improving and what might be possible in the future, but today the lack of existing sense-and-avoid technology precludes complete integration of UAVs into controlled airspace, so a segregated integration concept is used to ensure flight safety.

The committee also heard about the potential of ADS-B technology to allow UAVs and pilots to see and avoid each other. Nav Canada is a world leader in the deployment of ADS-B technology. We were among the first air navigation systems in the world to use it when we deployed it around the coast of Hudson Bay in 2009 to fill a gap in radar coverage. We further deployed it up the northeast coast of Baffin. We are the majority partner in a joint venture to launch ADS-B sensors into 66 satellites, a constellation to provide the very first low-earth orbiting space-based surveillance of ADS-B. That is a global service that will provide surveillance worldwide.

It is important to recognize there are two very different types of ADS-B. There is ADS-B in and ADS-B out. With ADS-B out, the aircrafts broadcast information about their position twice every second. We have receivers in the Hudson Bay area, in the northeastern part of Canada, that capture that broadcast and provide our controllers with situational awareness, where the aircraft is at all times. ADS-B in, however, is the technology that allows the pilot in the cockpit or the UAV operator to see the other suitably equipped ADS-B aircraft around them on their own radar-like display, and in theory, take action accordingly.

While ADS-B usage has been growing, and there is a requirement that all aircraft in the United States be equipped by 2020, it is ADS-B out that they are equipping for, the broadcast capability only. No jurisdiction in the world is mandating that aircraft equip with ADS-B in, and the rates of equipage today are very low as the costs are very prohibitive for aircraft to equip.

It would, therefore, be incorrect to assume that ADS-B will, in any near term, provide the sense-and-avoid capability that will help to mitigate the risks beyond visual line of sight UAV operations. We favour further investigation regarding UAV ADS-B out equipage that would correlate with industry anti-collision equipment already installed on the majority of commercial aircraft in Canada. This is particularly important for internal airspace in and around airports.

When pilots see a UAV during flight today, they report it to Nav Canada's air traffic controllers and flight service specialists, and those reports are made available to Transport Canada through the Canadian aviation daily occurrence report, or CADORS. CADORS reports of UAV encounters were 182 last year, up from 72 the previous year, and are anticipated to continue to climb, with the majority occurring around the urban centres of Vancouver, Toronto, and Montreal.

Nav Canada is a member of the CARAC, as mentioned earlier, and a member of the CARAC UAV systems program design working group. In August we submitted comments to Transport Canada on the proposed regulatory amendments designed to govern visual line of sight operations for UAVs under 25 kilograms. We have advocated for more rigorous requirements on such items as registration, operator education, training requirements and licensing, minimum age requirements, and most importantly, minimum distances to aerodromes.

In the longer term we think there is a need to examine the potential role of ADS-B technology and to consider ADS-B equipage requirements in certain airspaces in Canada for both piloted and non-piloted aircraft. Government should also be working with UAV manufacturers to implement geofencing to keep amateur UAVs away from controlled airspace and below certain altitudes.

In the meantime we believe there is a critical need now to improve enforcement capabilities and clarify legislation enabling law enforcement agencies to assist in real-time enforcement of UAV-related violations to the Aeronautics Act. Today, we understand, only the RCMP has the delegated authorities to enforce the Aeronautics Act. Local, provincial, and municipal police have no authority to enforce such violations, yet are being asked to address the issue.

Thank you. I'd be pleased to take questions when required.

● (1005)

The Chair: Thank you very much, Mr. Kellar.

Mr. Liu, please go ahead.

Professor Hugh Liu (Professor, As an Individual): Good morning, and thank you for calling me to present before the committee.

My name is Hugh Liu. I'm a professor at the University of Toronto's Institute for Aerospace Studies. My own research expertise is in the area of aircraft systems and control. Regarding UAV-related research, I have made contributions in autonomous, unmanned systems development for formation flight and the co-operative control of a group of UAVs.

Our aim is to increase the UAV's scope, scalability, and flexibility by flying a number of UAVs together. For example, we have conducted successful research on wildfire monitoring in collaboration with Ontario's Ministry of Natural Resources, and we also have successfully demonstrated this through a few flight tests. We are collaborating with scientists in biology and geography for wetland inspections. As a result, we have seen great potential for UAVs in this emerging market.

In addition, I am a leading principal investigator of the collaborative research and training experience program, also called CREATE, on research and training with UAVs. This was awarded by the Natural Sciences and Engineering Research Council of Canada, NSERC, back in 2015. As a result, I'm the director of the centre for aerial robotics research and education at the University of Toronto.

The program falls within the industrial stream and is a unique research and training opportunity, focused on UAVs, that will give our students, especially graduate students, the interdisciplinary research, entrepreneurial, and leadership skills needed to propel Canadian aerospace companies forward into a prosperous future in this field.

Our academic team of 11 faculty members from three universities, assembled for this program, brings the unique expertise of each member and collectively spans all key scientific and technological areas.

The strategic research training in UAVs will create a new interdisciplinary program that directly addresses the Canadian research priorities of information and communications technologies, as well as natural resources. We believe unmanned aerial vehicles hold great promise for applications as diverse as natural resource monitoring, infrastructure inspection, agriculture, mineral exploration, and so on. This is the most vibrant sector of the aerospace industry, and is growing very quickly.

Canada has a long history of leadership in aviation. We certainly hope, as academics, we can be a part of that and support the Canadian sectors and communities in developing a strategy for this emerging sector to keep our nation's interests and leading-edge advantage.

In terms of UAV regulations, it's important to maintain the aviation sector's rigorous policy and procedures to ensure safety and security are in place, yet keep an open mind so as to support the commercial applications of UAVs and to address the special features involving unmanned aerial vehicles.

It is important to identify different needs and requirements between commercial applications and consumer products, and establish separate and distinctive policies and guidelines accordingly.

Thank you.

● (1010)

The Chair: Thank you very much, Mr. Liu.

Mr. Behdinan, go ahead.

Professor Kamran Behdinan (Professor, As an Individual): Good morning, Madam Chair and members of the committee. Thank you very much for the invitation.

Although my background is not in UAVs or regulations, I will be glad to help with this important cause. To give some brief background about me, I am a professor of mechanical and industrial engineering at the University of Toronto. I am the design chair for the faculty-wide Institute for Multidisciplinary Design and Innovation. Before that, I was at Ryerson University. I was the founding chair of the department of aerospace engineering at Ryerson University and the founding director at Ryerson University for aerospace design and innovation. So I have been involved with aerospace-related research and programs for a while.

Currently at the University of Toronto, we have a lot of collaboration with aerospace companies, including Bombardier, Pratt & Whitney, and other companies. My own research falls in the area of lighted structures for both aerospace and automotive applications.

In terms of the UAV, I have been lucky enough to have a collaboration with Drone Delivery Canada, which is a new company. We have run a couple of projects with them so far. One of them, which was recently in place, is for the delivery of the payload, so we are working with them on the mechanism for the delivery of the payload.

Overall, certification is a very important issue, because it has an impact on the safe operation of aircraft, including UAVs. I was looking into the background of that, the regulations that have been in place—and I believe one is going to come into effect very soon—about airspace for the drones, which has also been in practice for the past few years. I think this is very important, because this is the area that I believe has an impact on the safe operation of UAVs in general.

I'm quite supportive of any regulations that bring into play safety and the airworthiness of these aircraft, including UAVs.

Thank you very much.

The Chair: Thank you all very much. We appreciate your information.

We go on. Mr. Berthold, you have six minutes.

[*Translation*]

Mr. Luc Berthold: Thank you, Madam Chair.

Thank you to the witnesses for being here and educating us on such an important issue. As we know, the aviation industry is about to face a major transformation. I'm glad we have the NAV CANADA officials here today.

As far as the aviation system is concerned, you are the map of the sky, in the sense that you prevent any conflicts between air routes. I'd like to quickly come back to the systems you talked about. I'm not a technologist or an engineer. The systems you talked about, the ADS-B technologies, would appear to be very costly.

Given what you know about the market, do you think manufacturers could, in the very near term, integrate geolocation systems that would be helpful for other users, aircraft pilots and NAV CANADA?

Is the technology now at an acceptable point, where the development of this new industry would not be hindered?

[*English*]

Mr. Rudy Kellar: Thank you for the question.

I took this as two main questions. I think the technology is there or very close to being there for ADS-B out transponder technology, and I believe it fits within Canadian aviation and the other aircraft flying. I guess the first and foremost use would be in controlled airspace—that is, busy airspace—with the aircraft that have anti-collision detection avoidance equipment that picks up the transponder.

The manufacturing itself I don't know much about, but I'm sure that as time goes on, the skills that are out there that have put this technology to where it is today are probably quite capable of expanding, in the manufacturing stage, some form of transponder requirement as well as the registration component.

● (1015)

[*Translation*]

Mr. Luc Berthold: In your opinion, then, the ability to geolocate drones is absolutely crucial to the industry's development.

[*English*]

Mr. Rudy Kellar: Yes, it is, particularly around busy terminal airspace and airports in a controlled airspace.

[*Translation*]

Mr. Luc Berthold: I'd like to quickly address a situation in Thetford Mines, in my neck of the woods. It has a tiny airport that lacks the technology of major airports. It does, nevertheless, provide air navigation, particularly for recreational pilots.

If they were equipped with the transponders, would small planes have the ability to geolocate drones?

[*English*]

Mr. Rudy Kellar: That's a very good question, and a lot of Canadian airports are experiencing a high volume of smaller aircraft flight training, and a significant portion of those aircraft are not equipped to detect an anti-collision transponder from other aircraft or from UAVs. They rely on the radio communication and a visual line of sight to communicate with each other.

[*Translation*]

Mr. Luc Berthold: If I understand correctly, then, large aircraft that fly at very high altitudes are equipped for that kind of detection, but small aircraft that fly very close to drones are not equipped to detect them even with transponders. I'm talking about most small aircraft.

[*English*]

Mr. Rudy Kellar: Yes, I guess I would try to clarify that. There is a specific weight certification of aircraft that are flown commercially and that is dictated by the regulations in Canada for IF—instrument flight—rules. These aircraft must have anti-collision detection technology. That would be the majority of all of the commercial traffic within major Canadian airports and many smaller Canadian airports, but aircraft flying within visual flight rules, which may be independently owned or operated, do not have that technology at present.

We will be, over the course of the next several years, working with Transport Canada and Nav Canada, as well as all of the operations in Canada, flight schools included, to try to determine whether we feel ADS-B transponder equipage should be mandated in certain classes of airspace in Canada. It's unknown yet where that specifically will be and how that will be supported within industry.

[*Translation*]

Mr. Luc Berthold: I have one last question.

In preparing some recommendations for the draft report, I tried to categorize drones. You have recreational drones for children. You have drones used by amateur photographers. You have slightly larger beyond-line-of-sight drones. You also have the drones represented by Drone Delivery Canada, which submitted a drone recognition request to NAV CANADA with respect to airlines.

Do those four categories seem adequate to you?

[*English*]

Mr. Rudy Kellar: It seems to me that the four categories you've just explained cover the majority of drone use that is anticipated, and I think it's probably a great place to start. I think the industry, both the UAV drone manufacturing, operating, and education industry, as well as our regulator Transport Canada, is actively working on being able to manage things safely in those four segments. I think that's probably a good categorization to start.

The Chair: Thank you.

Mr. Fraser, you have six minutes.

Mr. Sean Fraser (Central Nova, Lib.): Thank you very much, and thanks to our witnesses for being here, including remotely.

Quickly, for Nav Canada, I'm interested in your view on the transponders. Should we only be dealing with certain UAVs that should have this kind of transponder, for example, the ones in controlled areas or ones above a certain weight class? The fear I have is that we will be over-regulating, if we're applying it to, essentially, what most people view as toys.

● (1020)

Mr. Rudy Kellar: It's a good question and it potentially could saturate the transponders out there in the airspace where it's not required. I think that the transponder requirement and hopefully the future transponder requirement will apply to certain types of airspaces, particularly controlled airspace. That's where we're integrating unmanned aerial vehicles and piloted vehicles today. But I think that through rigour when setting regulation going forward, it's a combination of the transponder requirement on the type of UAV, the purpose of the UAV, and the specific operating parameters in the area the UAV would be intended....

In uncontrolled airspace, at low flight levels, it's quite possible that UAVs would not require a transponder and could operate safely within the range of certain altitudes. It's a challenge of mixing all of the factors into regulation that affect not necessarily too much transponder equipage but certainly an adequate amount of transponder equipage as it gets close to controlled airspace that is shared or will be shared with piloted commercial aircraft and piloted private aircraft.

Mr. Sean Fraser: On the ADS-B equipage that you spoke about, I assume we're talking about a similar issue. You're talking about controlled airspaces and drones that would be used in applications that could potentially interfere with commercial flight patterns.

Mr. Rudy Kellar: Yes, that is our primary concern.

Mr. Sean Fraser: While we're on prevention as well, I think we've heard some great testimony from all the witnesses on things like registration, education, licensing, which you mentioned briefly as well. When it comes to other strategies to prevent incidents between users and commercial aircraft, or any aircraft for that matter, we've learned a bit about geofencing. You mentioned potentially investing in geofencing around sensitive areas and certain altitudes.

Are there other preventative measures we could take or more specifics on geofencing that you think we could recommend the government look into?

Mr. Rudy Kellar: I think the other three, or the other two primarily, are really a clear understanding of where transponders will play a role, but more importantly, I think, the government could take an active role on funding and supporting the stuff that's been stated already around education, and education as to how UAVs can be integrated into uncontrolled airspace and the risks associated with the controlled airspace. It's education and training.

Mr. Sean Fraser: Sure.

One of themes that came out through the previous testimony we heard was that a lot of the problems right now are arising with recreational users accidentally violating regulations like the rule of keeping it so far away from an aerodrome, for example.

We heard at least in one instance that some sort of a non-punitive reporting mechanism would help to encourage people to say, “Look, I made a mistake. My drone battery ran out on an airstrip”, or whatever it might be. Is this a model that you think would be helpful?

Mr. Rudy Kellar: I think the model exists today. Transport Canada has a reporting system not only to us, through Nav Canada, for the CADORS, but through their own independent reporting system, which is not necessarily punitive, and the aviation culture in Canada is intended to be an open-reporting, just culture in general.

I don't know the specifics of the incidents that are of one severity or another, recreational versus larger drones or malicious potential threats. It's very difficult to ever know that because often, as I mentioned, it's very hard to find the drone or the UAV after it's been located or seen, and the limitations for the authorities prevent a really good capture per se of what the actual incident may have been caused by.

Mr. Sean Fraser: Again, educating the general public and the users of drones for recreational or commercial purposes on this reporting mechanism that exists today would be a good approach.

Mr. Rudy Kellar: Yes, educating the users, the operators, and the public, and specific education for our authorities would be most valuable as well.

● (1025)

Mr. Sean Fraser: Excellent.

Madam Chair, do I have any time remaining?

The Chair: Yes, you have 45 seconds.

Mr. Sean Fraser: It's not going to be enough.

Are there other tools just on the enforcement piece that you mentioned that we could recommend the government adopt to help prevent accidents or capture malicious users?

Mr. Rudy Kellar: Yes, technology is a wonderful thing. I'm not sure when it will be before we have technology on drone detection. Maybe my colleagues here, who are on the academic side, know of such a thing, but drone detection, if it exists or when it exists, would be of value.

Mr. Sean Fraser: Thank you very much.

The Chair: Mr. Aubin.

[*Translation*]

Mr. Robert Aubin: Thank you, Madam Chair.

Welcome, ladies and gentlemen. I'm going to take advantage of your expertise in order to improve my own knowledge.

All of you talked about safety with respect to the use of drones, whether for recreational or commercial purposes. The first question I'd like to ask you all is in relation to the next step we will be taking. Do you believe in drone manufacturing companies regulating themselves?

In recent years, we've seen a trend towards self-regulation, especially in the transportation industry. As far as drones are concerned, do you think self-regulation could work, or do you think the government should be responsible for regulating the sector?

Perhaps you could answer my question in the same order you followed for your presentations.

[*English*]

Mr. Rudy Kellar: Potentially, there is room for some self-regulation on the manufacturing side in terms of what is equipped on a standard manufactured drone. However, the operation of a drone, or UAV specifically, could also have a blended approach. As it pertains to commercial activities and as it pertains to controlled airspace, we've had great success with Transport Canada as a regulator. We need to continue to follow government regulations as they pertain to safety, because that is the concern here. This is not a concern of economics; it's about public safety.

That being said, in uncontrolled airspace, in certain areas that can be very well depicted in this country, a recreational self-regulated system could work with maybe minor oversight from the federally regulated operating criteria.

[*Translation*]

Mr. Robert Aubin: Thank you.

Mr. Liu, what do you think?

[*English*]

Prof. Hugh Liu: The answer is yes to both sides. In the traditional aviation industry, we always have regulations from government agencies to protect, and that are in the best interests of safety. Self-regulation for manufacturing not only will improve the product but it's also to the industry manufacturers' interests to ensure their UAVs and drones will be reliable and safe in operation. They don't want to see their brands or products in any accident on the news.

[*Translation*]

Mr. Robert Aubin: Thank you.

Where do you stand, Mr. Behdinan?

[*English*]

Prof. Kamran Behdinan: In terms of self-regulation, it's a very good idea that these manufacturers of drones should provide evidence that the drones have been designed to meet certain objectives. It is not just about manufacturing; they have to also provide evidence of their design, the analysis that they have performed, and if it fits the requirements of the design, their ultimate role.

Overall, this whole practice is going to help put in very safe practices in terms of the operation of the drone later on.

[*Translation*]

Mr. Robert Aubin: Thank you.

My next question is for Mr. Liu.

In your opening statement, you talked about Canada's leadership in the industry. Other witnesses we have heard from told us that Canada was lagging behind, particularly as compared with the United States.

Are we still a leader when it comes to drones, or are we lagging behind? If we are behind the times, where do we have the most ground to make up?

● (1030)

[*English*]

Prof. Hugh Liu: Thank you for asking this one. My view is that since Canada has a long history in aviation, as well as a large landscape and natural resources, there is a need for us to maintain the leadership position or maintain a certain leading-edge advantage in this sector.

Are we leading in all aspects? No, we are not, but we see that we have some emerging companies that have been doing very well nationally and internationally. They've been developing new designs of drones and new technologies. As well, in the background, we have very co-operative government agencies looking to allow those technologies to be tested, applied, or at least piloted. That is a great advantage on our side.

In terms of marketing size, we are not very big but we should focus on that technological advantage in certain areas. For example, for autonomy and for remote sensing, we definitely have a leading advantage with those technologies.

The Chair: Thank you, Mr. Liu.

Mr. Iacono, go ahead.

[*Translation*]

Mr. Angelo Iacono (Alfred-Pellan, Lib.): Thank you, Madam Chair.

I, too, would like to thank the witnesses for being with us and educating us on unmanned aerial vehicles, known as UAVs.

Mr. Kellar, you mentioned in your presentation that airspace in Canada is divided into seven classes but can generally be thought of as separated into controlled and uncontrolled.

Earlier, my colleague said there were four categories of UAVs. What is the relationship between those categories and the seven classes of airspace?

Should the regulations take the seven classes you mentioned into account, and if so, how?

[*English*]

Mr. Rudy Kellar: Yes, they should be taken into account, and the reason I tried to simplify the seven classes of airspace into uncontrolled and controlled was to simplify the view of that.

I don't know if the four classes of drones or examples of classes of drones, UAVs, that your colleague provided are the accurate ones, but it sounds like a pretty good place to start. It's not necessarily official, but it comes down to the government supporting the work that's currently under way with Transport Canada on implementing regulation that is not too constraining for the lighter recreational use of drones in uncontrolled airspace versus all drones in controlled airspace that pose risk.

Eventually, as time goes on—and this will progress most likely at a fairly good pace—the implementation of commercial use near controlled airspace or how it would operate outside of controlled airspace, lower flight altitudes, and beyond line of sight.... There are the different types of drones we can think about seeing, or UAVs, then there is the operating within line of sight, and then there is the future of operating beyond line of sight. All of this becomes much more important in and around controlled airspace, and in particularly airports and close to airports.

[*Translation*]

Mr. Angelo Iacono: Could you tell us what the seven classes are?

[*English*]

Mr. Brian Guimond (Manager, Military Operations and Unmanned Aircraft Systems, Nav Canada): The class A airspace is high-level airspace, above a flight level of 18,000 feet. I should point out that the different classifications of controlled airspace are all based on the types of traffic that operate in those regimes, and it's all based on the amount of control service that's provided. Some of these airspace classifications have equipage requirements, so that the appropriate control service is provided.

Class B airspace is above 12,500 feet, and in that area all aircraft are controlled. Between 12,500 feet and the surface you have class E airspace, which is airspace that does not have the same traffic levels as the class D and class C airspace that appear around aerodromes.

It's a complicated issue to describe, because the rules that are associated with each class, as I mentioned before, depend on the amount of traffic that appears there and the rules that are applied to provide that service required to ensure flight safety. Class F is a special airspace that allows Transport Canada to restrict operations, so that nobody appears in that and nobody goes in there unless authorized by the user of that restricted airspace.

● (1035)

Mr. Angelo Iacono: Thank you. I'll give the remaining time to my colleague.

Mr. Gagan Sikand (Mississauga—Streetsville, Lib.): Kamran, you said, you were from the design side. With the advent of drones being found at the ends of runways, I'm concerned that one of these might collide with an airplane. I equate this to being a mechanical bird. I'm just wondering if airports can employ a mechanical hawk, because I see the hawks there to scare away the birds.

From a design perspective, can we have a drone designed to intercept these other drones? I know we have geofencing and the like, but that software can be overwritten. Do you want to comment on that?

Prof. Kamran Behdinan: That's a very good design problem, an open-ended problem. I don't think that we have such a thing right now. When there were all the bird strikes and the impacts, lots of research had been done around that. I'm sure we can look into that to see how we can provide a kind of firewall for the drones, as well. Right now, I think regulations where there is a safe zone around the airport and around people is a good way to go. I don't think we have such a shield right now, as far as I know, but that can be looked into. I don't have the answer to this, but that's a very good design problem.

The Chair: Mr. Badawey.

Mr. Vance Badawey: Thank you, Madam Chair.

With respect to Nav Canada, has Nav Canada developed any strategies to manage or set aside airspace for UAV operations? That's question one.

The second question is, as a limited resource, how should UAVs and manned air vehicles safely coexist in national airspace systems?

Mr. Rudy Kellar: To answer the first question, the segregation or determination of airspace is a responsibility of Transport Canada, which remains the authoritative figure on that. We have actively worked with Transport and industry in Canada to allocate certain airspaces for testing and experimentation of the drone use across the country.

The second question, if I understood it correctly, is how we feel UAVs can coexist with commercial aviation, or general aviation, or any type of aviation. Is that the second question?

Some of the key points in my opening remarks were intended to directly reflect that. I think the real challenge starts with the integration into the various classes of airspace of what types of drones and what type of equipage and certification those relative types of drones would need in those classes of airspace.

My colleague Brian described a couple of the different airspaces. In simple terms, if you can imagine it like an inverted wedding cake, then the closer you get to the airport and to the ground, the higher the risk in a smaller area, which we need to be sensitive to for safety risks in terms of awareness for the operators of UAVs and the operators of aircraft in a busy terminal environment. At higher altitudes, we don't necessarily anticipate as much UAV traffic, but when it does someday evolve and will be in that airspace, the equipage of the UAV drone and the aircraft, and the communication techniques, need to be very similar.

● (1040)

Mr. Vance Badawey: The biggest concern I have personally is with respect to security and safety, whether it's at an airport, in someone's backyard, or peeking into someone's window with respect to privacy, or with respect to security, flying one of these things into a stadium with 100,000 people in it, equipped with things they shouldn't be equipped with.

I'll throw this question out to all four of you. What is the ultimate solution well into the future to prevent those situations from happening?

Mr. Rudy Kellar: All I can say from the Nav Canada perspective is that our focus and our mandate is around the integration of aviation, piloted today, and now we have a new entrant piloted from the ground, within line of sight and beyond line of sight. As much as we can progress in a way similar to the way we moved new aircraft into the airspaces, we have to consider similar technologies and similar ways of operating the equipment.

The new technology that's available in a UAV is much smaller and moves at a faster pace, so from a regulatory rule-making and operating procedure side, we need to be ready to move relatively quickly as well, because it seems to be imploding.

The Chair: Thanks, Mr. Kellar.

I would like to get Mr. Rayes in for a couple of minutes of questioning.

[*Translation*]

Mr. Alain Rayes: Thank you, Madam Chair.

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

My first question is for the NAV CANADA officials.

Could you tell us a little more about existing regulations elsewhere in the world? Are we really behind on this? Are there things that others have done right that we should take into account?

[*English*]

Mr. Rudy Kellar: I don't think we're truly behind in Canada. From the regulatory perspective there are some small differences with our colleagues to the south of the border, in the United States, but some of those differences could suggest we're at pace or ahead.

In our understanding and our discussions with some of our colleagues in Europe, the United States, and elsewhere, I think industry is doing a pretty good job of trying to share information, and regulatory groups within those same jurisdictions are working pretty actively to share with each other their concerns and what they are doing. I see that as a good thing, but it's not necessarily universal. Not all states are on the same page, but certainly many of the more advanced states with which we work and deal closely are moving in similar patterns.

We're also learning from each other. That could be the operator of the air navigation system, such as Nav Canada, or it could be the regulator. I'm sure that if you ask Transport Canada you would get their view, but I think it's going quite well as far as sharing information is concerned.

The Chair: This will be the last question.

[*Translation*]

Mr. Alain Rayes: Thank you. I will stop there.

[*English*]

The Chair: Thank you, Mr. Rayes.

I'm sorry. Time escapes us very quickly here.

I want to thank the witnesses very much for being with us today and again adding to the important work we're doing on the UAVs. Thank you all very much for being here.

I will suspend the meeting momentarily, and then we will be going back in camera for an additional half hour.

[*Proceedings continue in camera*]