Enabling Innovation and Opportunity:
A Canadian Approach to Regulating Drones

24 September 2020, TPT-WG 49

Presented by
Félix Meunier, Director, Remotely Piloted Aircraft Systems, Transport Canada

Purpose

1. Outline the trends, economic opportunities, and diversity of use-cases for the use of Remotely Piloted Aircraft Systems (RPAS / drones) in Canada.

2. Explain Canada's principles and strategy to regulate drone operations while respecting innovation and ensuring aviation safety.

3. Summarize additional considerations and actions to allow for future drone innovation in Canada.

Drones in Canada

- Drones are commonly used by consumers for recreational use and in commercial markets like public safety, agriculture, and wildlife monitoring.

- Since implementing new rules for visual line-of-sight operations in 2019, there has been increasing industry growth and user compliance:

70,000 active user accounts   48,000 drones registered   85,000 pilot exams taken   45,000 pilot certificates issued

- Commercial users are seeking regulatory predictability, and also minimal administrative burden, in order to innovate.

Canada has historically had a flexible framework that allows drone operations, but also a mandate to support innovation and improve safety by strengthening regulation.

Canadian Drone Opportunities

APEC — Asia-Pacific Economic Cooperation

Geographic Characteristics
- Isolated Areas of Wilderness
- Uncontrolled Airspace
- Remote & Rural Communities
- Diverse Weather & Topography
- Low Population Densities

Economic Characteristics
- Service & Resource Economy
- Strong Aerospace Sector
- Connected Trade Networks
- Maturing RPAS subsector
- Clusters of Capabilities & Expertise

Use-Case Opportunities
- Wildlife Monitoring
- Linear Surveys
- Drone Delivery
- Wildfire Operations
- Search & Rescue

Diversity of Drone Operations

APEC
Asia-Pacific Economic Cooperation

Visual Line-of-Sight: Current Operations

- Visual Line-of-Sight (VLOS) operations are conducted when the drone can be seen by the pilot or a visual observer.

- Currently, most regulators worldwide limit drone regulations to VLOS.

DJI Phantom
Consumer / "Pro-sumer"

Aeryon Skyranger
Public Safety

eBee Sensefly
Precision Agriculture

Beyond Visual Line-of-Sight Near-Term Innovation

- Beyond VLOS (BVLOS) is when the drone cannot be seen by the pilot or visual observer and detect and avoid is done through technology and/or procedures.

- BVLOS greatly increases the economic value of an operation by introducing greater efficiencies, range, and speed.

Griffon SeaHunter
Environmental Monitoring

**ING Robotic Responder**
Infrastructure Inspections

Drone Delivery Canada
Drone Delivery

THE NEXT GENERATION Future Market Disruptors

- Aerospace manufacturers and new entrants are proposing game-changing designs and operations

- Proposed applications include long-range cargo delivery, Urban Air Mobility (air taxis), and delivering telecommunications services.

Intel Volocopter
Passenger Transportation
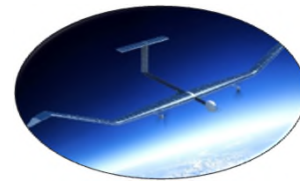
Airbus Zephyr S
High Altitude Operations

Uber Air Taxi / Bell Helicopter
Passenger Transportation

Google
High Altitude Operations

Regulatory Principles

- A principled approach to rulemaking is required to support this diverse array of drone use-cases, platforms, and economic opportunities in Canada:

Safety

- Safety remains paramount – mitigate risks to airspace users and people
- Evidence-based decision making – leveraging international research in airborne and ground collision severity
- Simplify the rules – focus on the *product*, *pilot*, and *procedures*

Innovation

- A predictable regulatory environment – permits the majority of common use-cases
- Maximize access to Canadian airspace
- Outcome-based requirements – enabling industry to find solutions to accommodate rapid technological change

Social Acceptance

- Embracing New technology – improving the safe use of drones for the benefit of Canadians
- Inclusivity – use accurate, gender-neutral terminology
- Enable public interest use-cases for the benefit of all Canadians

Visual Line-of-Sight Rules

📖 Regulation

Two categories of operation with simple rules that focus on the pilot, product and procedures

Basic Operations
- Lower risk activities: operations not near or over people or in controlled airspace
- Easy to follow requirements that allow recreational operations

Advanced Operations
- Higher risk activities; operations near or over people, or operations in controlled airspace
- More stringent requirements based on higher risks

Program Implementation

Creating tools and building relationships with key partners across Canada and abroad

Online and accessible service delivery

Enforcement partnerships across Canada

Developing a "Where to Fly" application for drone users

Supporting Activities

Complementing rules with safety awareness activities to promote compliance and foster innovation

Hosting webinars to foster safety awareness

Engaging stakeholders to spread messaging

Collaborating with NAV CANADA on airspace access

Beyond VLOS: Strategy

Technology: *Conducive Environments for Innovative Ideas*

Interim Measures: *Allowing Routine Operations*

Regulation: *Evidence-based Rulemaking*

The creation of mechanisms to validate technology and build safety confidence	*Approval of routine BVLOS operations with safety mitigations*	*The integration of BVLOS operations into the aviation system with modern rules*

Test Ranges

CED
CCUVS

Creating Venues for operations in controlled conditions and in dedicated airspace

Pilot Projects

Transport Canada
CANADIAN UAVS
DRONE DELIVERY CANADA.COM
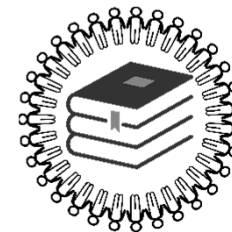CANADA POST POSTES CANADA

Validating procedures in real world conditions

Routine BVLOS Operations

Class G

Policies to accommodate unique Canadian use-cases in remote and northern areas, and uncontrolled airspace by utilizing risk-based processes to inform policy frameworks.

Industry Dialogue

Consulting with Canadians to normalize lower-risk BVLOS operations:
- *In isolated (remote) areas;*
- *Below 400 feet AGL;*
- *1 kilometre away from a population of more than 25 people per square kilometre;*
- *For RPAS above 25 kg outside of controlled airspace.*

TC published its regulatory whitepaper outlining its proposed BVLOS rules in April 2020, and received over 200 stakeholder submissions.

Thinking Ahead: Planning for Future Drone Use

- **Segregation of airspace users can impede innovation.** Current rules limit altitude and airspace access, Canada is collaborating with NAV CANADA, the air navigation service provider on developing an airspace strategy:
  - Actions include creating pilot projects, safety tools, and delineating responsibilities to permit greater innovation for drone companies.

- **Research and Development is fundamental to successful innovation.** Canada has outlined seven research priorities to help guide academia and innovators:
  - Technical topics include performance in winter conditions, collision analysis, automation and autonomy, human (pilot) performance, and systems and sensors to detect other aircraft.

- **International engagement is essential** to creating harmonized safety standards that ensure aviation safety; Canada is engaged through multiple multilateral forums:

International Civil Aviation Organization — Developing Standards and Recommended Practices

RTCA Radio Technical Commission for Aeronautics — Creating standards for critical safety systems

ASTM International — Committees on RPAS design, safety, and traffic management

JARUS Joint Authority for Rulemaking of Unmanned Systems — Working groups on technical safety topics and creation of risk assessment model. Co-chaired by Transport Canada 2020-2021

Considerations on the Horizon

How will we certify autonomous systems for drones?

Are current fuel systems and energy sources (gas hybrid, electric battery) adaptable to air taxi and cargo drones?

Do drone pilots respond differently than pilots in traditional aviation in the same conditions?

What is the appropriate economic regulatory framework for drones?

How do we safely and securely accommodate a growing and diverse number of new airspace users?

Technical and Regulatory Issues
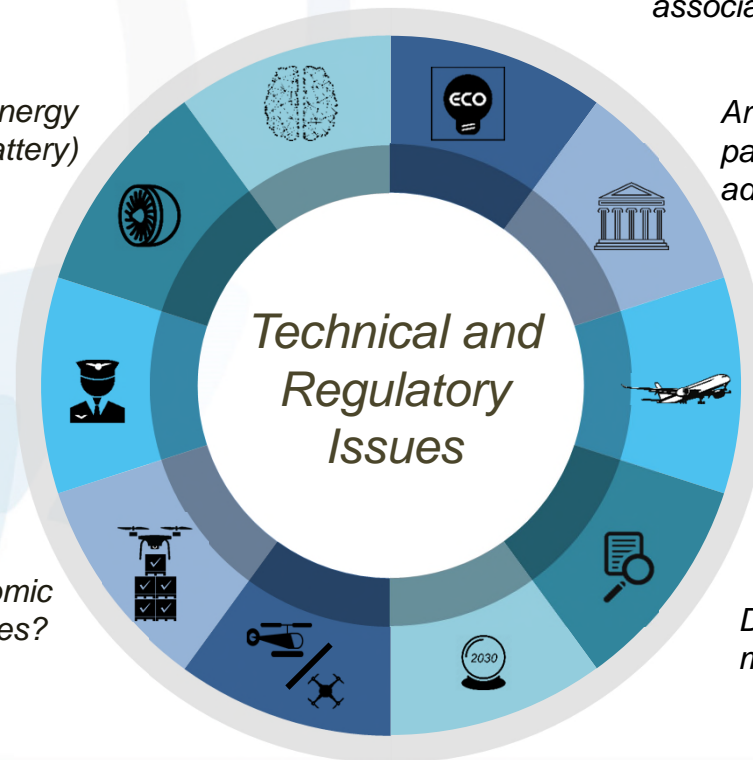
What are the environmental considerations associated with technological developments?

Are our provincial, territorial, and municipal partners ready (and willing) to deal with additional airspace users?

Is the public ready to accept drone delivery or riding an air taxi?

Are our privacy laws sufficient to deal with the collection of data by drones?

Do we have the right regulatory instruments to manage risk without stifling innovation?

Does the aviation workforce need additional skillsets to manage new drone technologies?

Conclusion

- **Canada has a unique formula** to allow for drone operations:

Vast Isolated Geography + **Service and Resource-based Economy** + **Innovative Use-Cases** + **Flexible Regulatory Environment** = **Progressive Canadian Drone Policy**

- **Regulation cannot stifle innovation:** Canada seeks a balanced, evidence-based, and engaged approach to regulating the growing drone industry.

- **Moving forward, Canada will continue to seek out opportunities** to address emerging drone considerations and develop strategic frameworks.

Annex A: Drones in COVID-19 Emergency Response

- Transport Canada (TC) is working with its federal partners on ensuring the safety of Canadians during the COVID-19 pandemic, while maintaining the safety and efficiency of Canada's transportation system.

- TC recognizes that the operation of RPAS can supplement emergency response activities to COVID-19:
  - The department will review applications for Special Flight Operations Certificates that are in the public interest and used for emergency response that are conducted in the service of a government authority.
  - The department will prioritize requests that originate from, or are endorsed by, a government authority and are operated in response to a declaration of a state of emergency.

- TC is working with a number of stakeholders who have approached TC or other government departments on using drones to supplement emergency response activities to COVID-19, mainly for supply delivery operations to remote and rural communities.