UAS in Canada - 2015

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My Focus Today.....

• Report on the growth of the UAS sector in Canada as a whole

• Provide background on UAS regulation in Canada and on further developments underway

• Leave you with some comments on the next steps for regulation and BVLOS
Close to 800 members representing business, government, academia

To represent and promote the interests of the Canadian unmanned vehicle systems community. (Land, Sea and Air)

- Outreach,
- Education,
- Media Relations
- Regulation Development
- “Matchmaking”
- Journal of Unmanned Vehicle Systems
- “Community Building”
Canadian Unmanned Sector

- An increasing number of authorizations - 1672 in 2014!
Canadian Unmanned Sector

• **Over 300 companies UAS related companies (March 2014)**

"Identified" UAS Companies - 2014

- **34%** operators
- **17%** manufacturers/distributors
- **14%** components or control companies
- **28%** sensors or sensor systems companies
- **7%** data and information processing service companies
Canadian Unmanned Sector

- A wide range of Commercial Operations ….

What UAS Operators Are Doing.

- Mapping and Survey: 31%
- Aerial photo: 11%
- Inspection: 7%
- Surveillance: 4%
- Agriculture: 4%
- Real Estate: 8%
- Policing: 2%
- Other - Unspecified: 2%
- Other: 2%

Fostering success in unmanned vehicle systems
Promouvoir les systèmes de véhicules télécommandés
Canadian Unmanned Sector

• Global estimates for the size of the UAS market are wide ranging but compelling:

$ 800 M to $4.5 B / year!

• All of this depends on:
  – Permissive yet safe regulation that includes BVLOS
  – Development of BVLOS- enabling technology (SAA, Lost Link)
  – Further refinement of existing UAS technologies
  – Continued adoption by industry fueled by commercial success
  – Public Acceptance
All Canadian airspace is controlled by either Transport Canada or DND (The Canadian Aeronautics Act)

Privacy is the mandate of the “Privacy Commissioner” and is separate from Transport Canada!

UAV are explicitly included in the regulations!
Commercial operations of UAV are allowed!

Since 2007, USC and Industry have been working with TC to develop and refine the regulations:

2007 Working Group to “Define UAV Regulation”
2007 Revisions to SFOC Staff Instruction
2010 Initiation of CARAC Working Group on UAV Program Design
Involvement in current Notice of Proposed Amendment (NPA)
First, the Bad News…

- **Failure to have the proper authorization**
  - Individual Fine up to $5,000.00
  - Company Fine up to $25,000.00

- **Failure to comply with issued authorization**
  - Individual Fine up to $3,000.00
  - Company Fine up to $15,000.00

- **Unauthorized Operation within a restricted area**
  - Individual Fine up to $25,000.00 and up to 18 months in jail!

- **Hazardous operation of a model aircraft** – penalties as defined in court!
Three Paths to UAS Operation - 1

- **Model Aviation**
  - For “recreational purposes” only – all you get is a smile!

- **TC issued Guidelines**
  - Under 35 Kg
  - Kept within Visual Line of Sight (VLOS)
  - Respecting the privacy of others
  - And specifically:
    - Not within 9 km of an airport, heliport or aerodrome
    - Not higher than 90 m above ground level
    - Not within 150 m of people / buildings / vehicles
    - Not near populated areas (beaches, sporting events, etc.)
    - Not near moving vehicles, not distracting to drivers
    - Not within restricted airspace
    - Not interfering with first responders.
Three Paths to UAS Operation - 2

- **Special Flight Operating Certificate (SFOC)**
  - No size limit, although smaller = easier
  - Issued by Transport Canada Regional Inspectors
  - Application basically describes the risks of the operation and how each is being addressed (BVLOS is considered a big risk!)
  - Approval based on “acceptable risk management” by operator
  - May be for an individual site, date and flight or a “blanket” operation
  - Includes operations for “hire and reward”
  - Applications based on TC Staff Instruction SI-623-001, issued 2014-11-19 (available to the public!)
Three Paths to UAS Operation - 3 Exemptions from SFOC requirement

**Key Conditions as of Nov 27, 2014**

<table>
<thead>
<tr>
<th>“Lowest Risk” Operation</th>
<th>“Minimal Risk” Operation</th>
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</thead>
<tbody>
<tr>
<td><strong>37 Conditions</strong></td>
<td><strong>58 Conditions</strong></td>
</tr>
<tr>
<td>UAS under 2 Kg MTOW</td>
<td>UAS between 2.1 and 25 Kg MTOW</td>
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<tr>
<td>Liability Insurance of at least $100K</td>
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<td>Daylight, Good Weather</td>
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<tr>
<td>Continuous, unaided visual contact</td>
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<tr>
<td>At or below 300 ft. at all times</td>
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<td>Class G airspace</td>
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</tr>
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<td>Not within 5 nm of: Forest Fires, Airports, Built up Areas</td>
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<td>Not within 100 ft. of people, things</td>
<td>Not within 500 ft. of people, things</td>
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<tr>
<td>Trained in conformance with TC Guidance Material</td>
<td>Pilot Ground School training + Trained in conformance with TC Guidance Material</td>
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<tr>
<td>Pilot must be 18 yr. old (special case for 16-18)</td>
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<td></td>
<td>Operation Reports via Email to TC</td>
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Transport Canada Web site: tc.gc.ca/safetyfirst

Unmanned Systems Canada Web site: UnmannedSystems.ca
Canadian Experience To Date

- **Model Aviation**
  - Good long term safety record for those who follow the official association guidelines
  - Lots of misuse/challenges by “non-traditional modelers”

- **SFOC system**
  - Cumbersome to review each risk analysis, and results vary by region
  - Provided over 3200 operating certificates (2007-2014)
  - Great experiential data base on which to base future regs!

- **Exemptions**
  - Very limited in usefulness
  - Many operators ignore conditions, especially regarding proximity to built up areas (or so it is rumoured….)

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![UAS SFOCs issued in Canada](image)
Canadian Next Steps

- **Notice of Proposed Amendment (NPA)**
  - Using recent experience to build practical, performance based regulations
  - Focus on small UAS operated within Visual Line of Sight
  - Comment Period ended August 28, 2015
  - Regulations expected by mid 2016!

- **Beyond Visual Line of Sight Operations (BVLOS)**
  - “regulation committee” has completed their deliberations
  - Recommendations are being presented to Transport Canada
  - Expectation of further announcements in near future
Thinking on BVLOS

- Base **everything** on risk!
- Only consider what is different between VLOS and BVLOS

<table>
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<th>Risk</th>
<th>Mitigation</th>
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<tr>
<td><strong>Ability to “see” obstacles/other airspace users close to aircraft</strong></td>
<td>Flying into other aircraft or overflying obstacles</td>
<td>Define <strong>information needs of pilot</strong> – NOT THE TECHNOLOGY!</td>
</tr>
<tr>
<td><strong>Ability to “monitor” aircraft</strong> during normal flight and when things go wrong</td>
<td>Potential Loss of Pilot and ATM Situational Awareness, increasing other risks</td>
<td>Define procedures and information needs for lost link situation. Increase information provided to pilot for routine operations</td>
</tr>
<tr>
<td><strong>Ability to interact</strong> with other airspace users and ground installations that are local to the aircraft, but not necessarily the control station.</td>
<td>Lack of localized communication is at odds with current aviation – numerous things are managed via this approach</td>
<td>Ensure RPAS communication systems <strong>“mimic” manned aircraft</strong> systems.</td>
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<tr>
<td><strong>Communication and control links</strong> between control station and aircraft are longer, may be provided by third parties</td>
<td>Increased risk of “lost link”, thereby increasing the risk of loss of control and situational awareness</td>
<td>Need to develop either <strong>minimum standards</strong> for these links, or the procedures that occur when the link is not functional</td>
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Sense and Avoid Systems

- **Functions recommended by CARAC UAV WG complete (Small RPAS):**
  a) Provides a Detect Function – *ability to sense*
  b) Provides a Separation Function - *ability to indicate to pilot*
  c) Provides a Collision Avoidance Function – *ability to advise pilot and/or take over!*
  d) Provides a ‘well clear’ indication
  e) Operates in multi-aircraft conflict scenarios
  f) Provides system oversight
  g) *Is compatible with existing collision avoidance systems*
  h) *Includes ADS-B out*

- **Detection Performance Minima:**
  a) Sensor Field of Regard: +/- 180 deg. by +/- 15 deg.
  b) Resolution: Cessna 182 @ (15 + 2T) sec range
Other BVLOS Requirements

- Lots of other requirements for:
  - Lost Link
  - Flight Termination
  - IFR
  - Ground and surface obstacle detection
  - Lighting systems
  - Operations/Planning details

- Hopefully the full package will be disseminated this November at Unmanned Canada 2015
The recreational use of small quadcopters and drones is pervasive ......

Relatively unregulated, this can be a potential hazard to other users of the airspace and persons on the ground....

If all else fails, it generates “bad press” (and you have all seen this!)
Recreational, Model UAS

Potential solutions:

- Information provided to purchases at point of sale
- Provision of guidelines, information on model aeronautics societies, information on legal responsibilities
- Enforcement of current regulations to highlight the need for compliance.

Everyone in the industry needs to assist in this effort!
Questions?

Please join us at
Unmanned Canada 2015!

Halifax NS, Nov 3-5

- Will include Commercial UAS, UGV and UMV and regulatory workshops!
- New format events to increase business – 2 – business opportunities!
- Social events – Halifax is a great town!