

Municipalities, UAVs & Autonomous Vehicles for Public Transport: Managing Risks and Fostering Innovation

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UAVs and Drones



Terminology and Technology

- **Unmanned Air Vehicle (“UAV”)**
- **Unmanned Aircraft System (“UAS” or “sUAS”)**
- **Remotely Piloted Aircraft System (“RPAS”)**
- **“Drone” or “Model Aircraft”**

Terminology and Technology

- **Visual-Line-of-Site (“VLOS”)**
- **Beyond-Visual Line of Site (“BVLOS”)**
 - Visual Meteorological Conditions (“VMC”)
 - Instrument Meteorological Conditions (“IMC”)
- **Vertical take-off and landing (“VTOL”)**
- **Quadcopters versus Fixed-Wing**
- **Vertical Take-Off and Landing (“VTOL”)**

The Law – Federal Regulations

- **Transport Canada has exclusive jurisdiction to govern UAV flights and introduce regulations**
- **A Special Flight Operations Certificate (SFOC) is required unless the flight is exempt**
- **UAV operators must also comply with all other applicable laws and regulations, including the *Criminal Code* and municipal by-laws**
- **Recent changes introduced for recreational use of “drones”**
 - ***Interim Order Respecting the Use of Model Aircraft, March 13, 2017***

Risk Management Considerations

- **Operation near airports**
- **Operations near hospitals with medevac pads**
- **Hampering EMS activity**
- **Privacy breaches, trespass, and nuisance**
- **Battery failure or mechanical failure**
- **Operation in high wind**
- **Hacking of drone controls**
- **Damage to personal property**
- **Damage to critical infrastructure**
- **Personal injury**

Insurance Options & Safety Issues

- **Does the UAV operator have adequate insurance?**
- **Can the insurance policy respond?**
- **Is the UAV operator embracing the risk or using outside vendors?**

A Municipality's Role

- “Exclusive Jurisdiction” versus “Municipal Powers”
- Transport Canada has exclusive jurisdiction over civil operation of UAVs and model aircraft. However, recent changes to the regulations of recreational operations opens the door to enforcement by municipality and local police forces
- Introduction of “No Drone Zones”
- Enactment of a Municipal By-Law
 - Can a municipality owe a duty of care in relation to its enforcement of UAV by-laws?
- Richmond, BC has a by-law banning the flight of UAVs in City parks and on school grounds



Canada

A Municipality's Role

- **Transport Canada inspectors investigate reports of unsafe and illegal UAV use**
- **Transport Canada's Civil Aviation Daily Occurrence Reporting System (CADORS) reveals over 100 reported incidents involving UAVs in 2014 and 2015, and 76 reported incidents in 2016**
 - **CADOR is used primarily for commercial air carriers' complaints against UAV/drone usage**
- **Transport Canada now offers “Drone Incident Report Forms” on their website**
- **Transport Canada advises to “contact your local police department immediately if someone is flying a drone in a way that poses a threat to safety, security, or privacy”**

A Municipality's Role Continued

- **Supreme Court of Canada released two decisions in 2010:**
 - *Quebec (Attorney General) v. Lacombe*, 2010 SCC 38
 - *Quebec (Attorney General) v. Canadian Owners and Pilots Association*, 2010 SCC 39
- **The SCC was clear that the provinces do not have jurisdiction to regulate aeronautics directly and any provincial law that touches on a core federal power over aeronautics will be inapplicable**
- **A municipal law banning drones could be invalid as it falls outside the municipalities' jurisdiction**
- **Increases in technology and rapid changing requires co-operation between levels of government**

UAV Uses

- **mapping and surveying**
- **real estate**
- **remote photography and filmmaking**
- **agriculture spraying**
- **inspections of:**
 - Powerline and pipeline inspection
 - Municipal sewers
 - Bridges
 - Infrastructure
 - Aerial inspection for land to be discussed at public hearings
- **insurance (claims documentation, roof inspection, fire inspections)**
- **law enforcement by police – tracking a fleeing suspect, MVA assessment, search for missing persons**
- **fire fighting – seeing inside burning buildings with UAVs built to withstand intense heat and infrared cameras can allow drones to navigate in low-visibility conditions.**
- **construction crews monitoring sites for safety issues**
- **medical Care and defibrillator and transport of medications to remote locations**

Municipal Use & Administrative Concerns

- **A City's Recreation and Park's Department wants to use a UAV to monitor its parks for maintenance purposes**
- **Collection of Data**
 - What is the intentional data to be collected? E.g. tree images/growth, walking paths, water ways
 - What is the unintentional data that will be collected? E.g. employees and park visitors
- **Administrative Concerns**
 - How will the video need to be processed?
 - Will third party companies be required to assist with the data?
 - How will the information be available to the public? E.g. available online for public view, *Freedom of Information Act* request
 - Should notice be given to the park visitors and employees?

Future Regulations – For Commercial Operations?

- **Creation of two categories for UAVs weighing less than 25 kg**
 - “complex operations with sUAS” around urban or built-up areas or close to aerodromes
 - “limited operations with small UAVs” – remote areas
- **All operators considered “pilots” as defined under the *Aeronautics Act* and the *CARS*...may require a “pilot permit” for complex operations**
- **Four-letter registration marks**

Autonomous Bus Technology

- The Mercedes-Benz Future Bus



EasyMile – Autonomous Bus Tests

- One of the first autonomous bus tests in an urban environment. It is a street traffic-trial
- Piloting a driverless bus on the streets of Finland
- Robotic buses used in addition to existing public transport options, to supplement but not replace them
- Goal is to use this technology as a feeder-service for high-volume bus or metro traffic
- Exemplifies the difference between ADAS – Automated-Driver Assistance Systems and the fully autonomous vehicle
- Those in cars will have to get used to navigating behind the robot buses with an average speed of about 10 km/hour
- Unclear if the technology will have a safety driver or override system

IBM & Local Motors - Olli

- **“Olli, can you take me downtown?”**
- **Looks like a miniature bus to transport up to 12 passengers**
- **The technology allows passengers to communicate with the bus while driving by asking questions such as “Olli, can you take me downtown?” to start a trip**
- **Passengers can ask where they are going, vehicle functionality and restaurant recommendations**

Australia – Autonomous Electric Bus Trial

- **Driverless, all-electric bus in Perth**
- **Top speed of 45 km/hour and can carry up to 15 passengers**
- **Built by NAVYA SAS, a French transport company**
- **Has semi-autonomous radar and camera-based technologies (already available in cars) which can steer, accelerate and brake**
- **Multi-sensor technology with 3D perception that allows it to map the environment, detect roadway obstacles and interpret traffic signals**

The Meridian Shuttle

- **Used in London, England**
- **Great for campuses, hospitals and theme parks**
- **Uses LIDAR – Light Detection and Ranging**
 - Uses a pulse of radar light to measure distances. It illuminates a target with a pulsed laser light, and measures the reflected pulses with a sensor
 - Differences in laser return and wavelengths are used to make digital representations of the target.

Mercedes-Benz' "Future Bus" – Semi-Automated

- **Semi-automated bus using a 20 km track through Amsterdam**
- **Uses a driving system called "CityPilot" which allows buses to drive partially autonomously in specially-marked bus lanes up to 43 mph, with a human driver onboard to monitor safety**
- **Mercedes is aiming to send vehicles into production by 2020 – implementing portions of the system – driving into and away from bus stops**
- **Riders can also wirelessly charge their smartphones through charging pads and view information on large displays**

THE PRESENT

- **Autonomous technology in Ontario is already being tested**



Roscoe Vision Systems VQS450:
www.roscovision.com

LIABILITY & Legal Questions

- Who is liable if there is a collision or injury?
- For Semi-autonomous transport, would there be a continuing basis for driver negligence?
- When would the owner be held vicariously liable and under what circumstances?
- Would a manufacturer be liable? If so, which manufacturer when there are multiple-systems engaged in autonomous or semi-autonomous transport?
- Can we engage the retailer under a provincial *Sale of Goods Act* legislation to respond?
- Should the industry or end-users work with the Government to introduce legislation?