Challenges with obstacle data for manned and unmanned aviation

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Co-authors

- Alexandre Petrovsky, EUROCONTROL
- Malik Doole, Delft University of Technology
- Joost Ellerbroek, Delft University of Technology
- Jacco Hoekstra, Delft University of Technology
- Filippo Tomasello, University Giustino Fortunato
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Why aviation needs obstacle data?

- Various airborne and ground applications require digital obstacle data
  - Ground proximity warning system
  - Contingency procedures and operating limitations analysis
  - Synthetic vision system
  - Etc.
Obstacle data requirements

<table>
<thead>
<tr>
<th></th>
<th>Area 1</th>
<th>Area 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical accuracy</td>
<td>30 m</td>
<td>3 m</td>
</tr>
<tr>
<td>Vertical resolution</td>
<td>1 m</td>
<td>0.1 m</td>
</tr>
<tr>
<td>Horizontal accuracy</td>
<td>50 m</td>
<td>5 m</td>
</tr>
<tr>
<td>Confidence level</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Integrity classification</td>
<td>routine</td>
<td>essential</td>
</tr>
<tr>
<td>Maintenance period</td>
<td>as required</td>
<td>as required</td>
</tr>
</tbody>
</table>
Challenges for novel applications

- **Helicopters**
  - Missions closer to ground and obstacles
  - Higher accuracy is required
  - Lower collection surfaces

- **Drones and Personal Air Vehicles**
Drones and Personal Air Vehicles

- High-density drone traffic below 500ft
  - Urban environment operations (above and between buildings)
  - High density of static and dynamic obstacles in BVLOS*

- U-Space
  - Unmanned Traffic Management system for Europe
  - Developed to integrate drones safely into the airspace
  - Requirement: Terrain and obstacle information

- Terrain and obstacle information
  - Needed for static and dynamic geofencing
    - 1 m accuracy (both vertical and horizontal)
    - Confidence level of 95 percent
  - Challenge: How do we geofence a construction crane?
    - Tactical geofencing
    - Obstacle information needs to be timely

*BVLOS – beyond visual line of sight
Looking for solutions

- Accurate digital geometrical data on the man-made structures (obstacle)
  - Potentially 3D in populated areas
- From authoritative sources (liability)
- Regularly updated
- Avoiding current cumbersome process for obstacle data collection

Contact information:
- alexandre.petrovsky@eurocontrol.int
- (m.m.doole, j.ellerbroek, j.m.hoekstra)@tudelft.nl
- filippo.tomasello@eurousc-italia.it
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