Outcomes of the feasibility study

ESA digital sky and beyond workshop - future downstream services
Topic: ADS-B based applications

ESTEC Noordwijk, 18.05.2018
Challenges facing the aviation sector

- Increasing use of airspace
- New airspace users: e.g. UAVs
- Remote areas
- Environmental responsibility
- Digital transformation
- Cost-efficiency

Safety & security demands:
- Global flight tracking (FRA - JNB)
- Earlier detection of off-track errors
- Improved weather avoidance
- Etc.
Some benefits of ADS-B

**Safety & Security**
- Improve weather avoidance
- Reduced activation time for SAR teams
- Possibility to significantly narrow down the search area
- Provide higher aircraft position updates compared to current satellite-based communication technologies

**Surveillance**
- Enhance aircraft surveillance and situational awareness in currently non- or partially controlled airspace
- Support of unmanned aircraft systems
- Detect earlier anomalies in flight behaviour
- Enable future air to air surveillance and information application

**Efficiency**
- Reduce separation standards, optimize routing and efficient usage of airspace
- Stakeholders benefit from reduced flight times, fuel burns and delays
Partners for the ESA IAP feasibility study (1/2)

TEKEVER

- UAV provider
- Technology development for unmanned systems
- Manifold UAV applications (e.g. infrastructure monitoring & maritime missions)

Administration de la navigation aérienne Luxembourg (ANA)

- Luxembourgish ANSP
- ATM perspective
- Advisor for regulatory aspects, user requirement assessment and technological implementation scenarios
Partners for the ESA IAP feasibility study (2/2)

LuxSpace
- Microsatellite integrator
- Terrestrial & satellite-based AIS data provider, data processing center
- AIS based added value services for maritime domain awareness

DLR
- Air Traffic Validation Center
  Facilities for validation of concepts, technologies & procedures in ATM

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Proba V: First demonstration of ADS-B from space

- **Launch:** May 2013, still operating, 1 Sat
- **Primary mission goal:** vegetation monitoring (daily overview of global vegetation growth)
- **Secondary mission goal:** Technology demonstration

<table>
<thead>
<tr>
<th>Aircraft detected</th>
<th>Aircraft expected</th>
<th>Aircraft identified</th>
<th>PTA [%]</th>
<th>PTI [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.106</td>
<td>17.235</td>
<td>9.538</td>
<td>87.6</td>
<td>55.3</td>
</tr>
</tbody>
</table>


Source: www.esa.int

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Proba V: First demonstration of ADS-B from space
Service value proposition

- **Shrink the information gap** in uncontrolled airspace for users within the aviation sector to increase situational awareness, safety and monitoring, and operations management.
- **We want to provide those users easy access** to the missing information.
- **We want to give those users the information they really need**, tailor-made to their business environment.

→ Modular service concept allowing the customer to subscribe to the building block he really needs.
→ No additional infrastructure investment.
→ **Provide a SWIM compliant “information only” service**.
→ Increased airspace awareness.
→ Increased monitoring capabilities.
Service value proposition

Benefits of acting SWIM compliant

• SWIM = System wide information management

• Access to real-time, relevant aeronautical, flight, and weather information → faster dedicated response possibilities

• Reduced implementation, operating and extension costs because of SWIM’s standardized character

• SWIM = requested fundament of the future for info based collaboration in ATM (Air Traffic Management) → being prepared for the future

Source: www.eurocontrol.int/swim
<table>
<thead>
<tr>
<th>ADS-B constraints/ user concerns</th>
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<tbody>
<tr>
<td>Garbling</td>
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<tr>
<td>Several messages arriving at the ADS-B antenna at the same time overlap and thus cannot be decoded by the ADS-B receiver</td>
</tr>
<tr>
<td>Jamming</td>
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<tr>
<td>Jamming of GNSS signal</td>
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<tr>
<td>Spoofing</td>
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<tr>
<td>Easy reception and recording + replay with own broadcast (no encryption)</td>
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<tr>
<td>Standardization</td>
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<tr>
<td>Introduction of Standards concerning functionality and performance</td>
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<tr>
<td>Standardization and for low power ADS-B transponders for GA mandate</td>
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<tr>
<td>Regulation</td>
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<tr>
<td>Establishment of Regulations for certification and application</td>
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<tr>
<td>Regulation of ADS-B data ownership and access rights</td>
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Lessons learned

- Aircraft ADS-B deployment rate is still unsatisfying (ADS-B out) from a user point of view
- ADS-B not a single source solution, additional data from Radar, MLAT and others needed to provide a meaningful airspace traffic picture
- Strong demand on customer side for more surveillance means in uncontrolled airspace
- Customer expects solutions with generic preparedness towards future information sharing needs/possibilities
- Integration of new airspace users e.g. UAVs, into ATC and ATM is seen as necessary but conventional ATM operations cannot be applied, since e.g.
  - No voice communication between UAV pilot and air traffic controller
  - Non existing capacities for conventional air traffic management to handle drone traffic
- Multiple usage potential: from ATM to supply chain management
Thank you for your time!

Questions?

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