Operational and safety information sharing for Unmanned Aircraft Systems

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Content

Background and needs

- UAS regulations, standards and guidance material
- Newly proposed approach for UAS data collection & analysis
- UAS operational & safety data study (for Netherlands Ministry)
- Future Sky Safety Risk Observatory (for European Commission)
- Incentives for operational & safety information sharing

Outlook
Background
• Very little UAS operational and safety data available
  → Difficult to identify safety issues & perform oversight
  → Difficult to motivate changes in regulations for UAS

• Reporting systems from UAS operators to States often not commensurate with their size, thus not adequate

• Appropriate methods to support UAS operators with identification and assessment of hazards are needed

• Some countries develop rules to report UAS usage
Safety Management in UAS sector
(anticipated)

• Operational limitations in Low Risk Category *
  – Safety Management System not required to be regulated

• Elements safety management in Regulated Lower Risk Category *
  – Risk assessment of proposed operations
  – Analysis of safety data
  – Sharing of safety information
  – Safety promotion
  – Occurrence reporting

• SMS (ref. ICAO Annex 19) for Regulated Increased Risk category *

* Three categories of operations are distinguished in ICAO’s UAS Toolkit
• Study for Dutch Ministry of Infrastructure and Water Management
  – What UAS data and information is useful and required?
  – How to gather data from operators in a user-friendly way?
  – How to visualize data and provide feedback to operators?
  – What are appropriate user and system requirements?
  – How to use data to support safe introduction of UAS operations?

• Involvement certified Dutch operator associations (DARPAS, DCRO)

• ICAO is informed through Information Papers for the ICAO RPASPD
Concept for UAS data analysis

Operational Risk Assessment

Acceptability of UAS Operations (UAS ALoSP)

ConOps

Safety Performance Indicators (UAS SPIs)

UAS Risk Picture

Data on the operations

PLATFORM

Data on safety issues
DORSEY - Approach

Diagram showing the approach with Operator, Pilot, UAS, Safety Manager, Safety database, UAS flight log, UAS maintenance log, Drone Operational Repository for Safety (DORSEY), Drone Registration System, Operator profiles (certifications), Safety database (reported occurrences), Authorisation of type of operations, and Incident/accident investigation body.
Example safety issues

Operational issues:
- Airspace infringement
- Proximity to other aircraft
- Visual loss of UAS
- Loss of control

Technical issues:
- Failure of guidance & control system
- Loss of command & control link
- Auto-flight system failure
- Instable or non-functioning batteries

Human factor issues:
- Insufficient knowledge of aviation
- Unexpected adverse weather
- Pilot errors with link procedures
- Task management issues (control vs payload)

Communication issues:
- Radio frequency spectrum issues
- Loss of voice communication with ATC
- Jamming/spoofing of frequencies used
UAS Data Visualization

**Serious incidents**

![Map and chart showing serious incidents over time and by category.]

**Unexpected/Unintended action of pilot**
- Airspace infringement
- Structural / Technical failure
- System unfamiliarity
- Regulatory/procedural non compliance
- External pressure / high workload
- Procedures incomplete
- Ground handling
- Distraction / attention distribution
- Pilot incapacitation
- Environmental / external factors
New Solutions for today’s accidents

Strengthening the capability to manage risk

Building ultra-resilient systems & operators

Building ultra-resilient vehicles

GOAL 1
The European ATS has less than one accident per ten million commercial aircraft flights

GOAL 3
The European ATS operates seamlessly through interoperable and networked systems allowing manned and unmanned air vehicles to safely operate in the same airspace

GOAL 2
Weather and other hazards from the environment are precisely evaluated and risks are properly mitigated

https://www.futuresky-safety.eu

https://cordis.europa.eu/project/rcn/193734_en.html
• Study performed for European Commission (EC), coordinator NLR
• Consortium of 35 partners, budget 30 MEuro, duration 2015–2019
Why P4? Why Risk Observatory? How?

“Why normal performance?"
“Why would like to prioritise hazards?"
“Ensure the interfaces are working together effectively”

Data
- Occurrence data
- Exposure data

Techniques
- Risk modelling

Applications/Information
- Monitoring
- Prediction
- Text/Data mining

SAFETY | FUTURE SKY

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Introducing the Risk Observatory

The risk observatory acquires, fuses and structures safety data and translates it into actionable safety intelligence.
Risk Observatory – Use Case UAS

Spread of drone sightings over the year
Risk Observatory – Use Case UAS

Drone sightings – Proximity to other aircraft
Risk Observatory – Use Case UAS

Drone sightings - Reporting & operational effect

Count of Detection By

- Third party observation
- Airport authority
- Flight or cabin crew

Count of Operational Effect

- Evasive Maneuver to Avoid Airborne Collision
- None

Operational effect
- Null
- Diversion - other reason
- Evasive Maneuver to Avoid Airborne Collision
- None
- Other
- Return to airport
- Unknown

saferyt Institute

Dedicated to innovation in aerospace
Need for new approach for UAS

- UAS operations growing significantly. Wide variety applications. Surveillance, aerial work, inspections & agricultural purposes, ...
- New challenges for safety assurance of UAS operations
- A key step towards increased integration in airspace is to collect basic operational and safety information about UAS operations
- This makes it easier for authorities to approve (specific) safe UAS operations under certain conditions and requirements
- This will enable UAS operators/industry to perform more flights
Incentives for voluntary data sharing

• Intelligence in risks and causal factors of safety events enables predictive risk analysis & defining safety performance indicators
• Compare safety performance between operators and States
• Access to data that is difficult to get on its own from own sources
• Demonstrate that safety is taken seriously and in a pro-active way
• Protect data against misuse for purposes other than safety
• Possible benefits in return for sharing operational/safety data
Outlook

- Need for validation of new UAS rulemaking proposals with data
- Some countries already developed rules to report UAS usage
- New approach for UAS data collection & analysis is needed
- Test Case with DORSEY in the Netherlands (2018/2019)
- Alignment with iSTARS and possibly SIMS (new UAS module?)
- Prepare for ICAO UAS SMS standards (*in new Annex 6 Part 4 & Annex 19*)
Fully engaged
Netherlands Aerospace Centre

Your contribution to this work:
➢ Possible cooperation?
➢ Sharing of information or ideas?

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