canso
civil air navigation services organisation

Die Position von CANSO zu unbemannten Luftfahrzeugen

TRANSFORMING
GLOBAL ATM PERFORMANCE

TU Braunschweig, 16/02/2016

Agenda

- Presentation CANSO
- Definition
- Challenge of RPAS Integration
- International RPAS activities
- CANSO RPAS activities
- DFS RPAS Activities
- Perspective

Presentation CANSO

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INTRODUCING CANSO

- CANSO is the global voice for ATM
- Founded in 1997, based in Amsterdam
- Full Members (ANSPs) and associate members
  - Open to all aviation industry players
- Full members control 85% of the world air traffic and serve 73% of the world airspace
- Regional activities in :Africa, Americas, Europe, Asia-Pacific, Middle-East
- ICAO Liaison office in Montreal
- European Regional Office based in Brussels

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CANSO Standing Committees

- **Safety Standing Committee (SSC)**
- **Policy Standing Committee (PSC)**

Operations SC Steering Committee

Thomas Hoffmann (Austro Control GmbH) – Chair

ENV WG	AIM WG	RPAS and Emerging Technologies WG	PBN SG	CDM SG	Surveillance TF	Fir Boundary Crossing (FBX) TF
Chairs: Doug Stoll (Boeing), Ian Jopson (NATS)	Chairs: Roland Bauman (skyguide), Gregory Pray (FAA)	Chairs: Doug Davis (Northrop Grumman) , Frank Black (FAA)	Chairs: Jeff Williams (Tetra Tech AMT), Phil Rakena (Airways New Zealand), Jeff Cochrane (NAV CANADA)	Chairs: Stephane Durand (DSNA), Gotthard Boerger (Excelis)	Chair: Rob Thurgur (NAV CANADA)	Chair: Jorge Chades (FAA)

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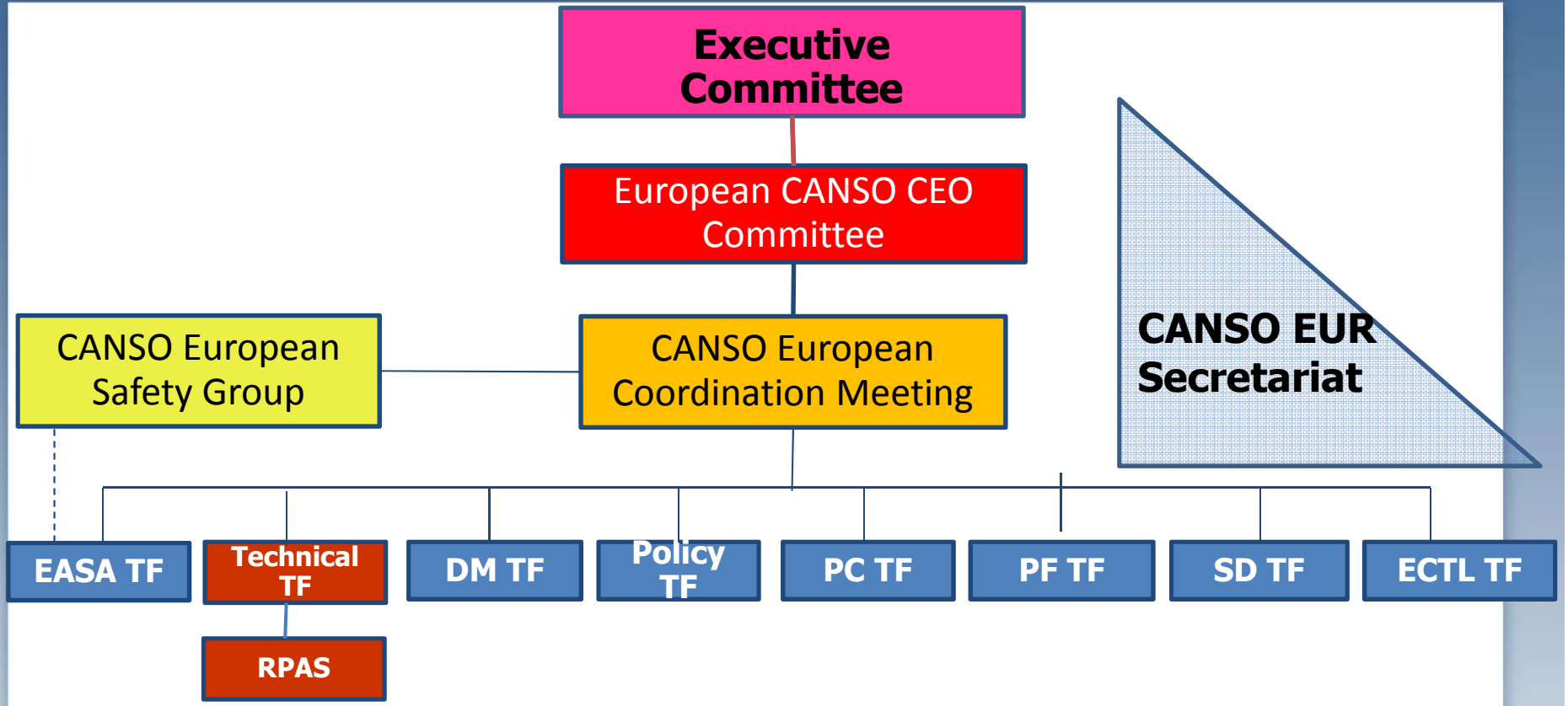
CANSO Europe structure



DM TF: Deployment Manager TF
EASA TF: EASA TF
ETCL TF: EUROCONTROL TF
SDTF-Social Dialogue TF

TF- Policy TF
PC TF-Planning and Coordination TF
PF TF-Performance and Financial TF
T TF- Technical TF

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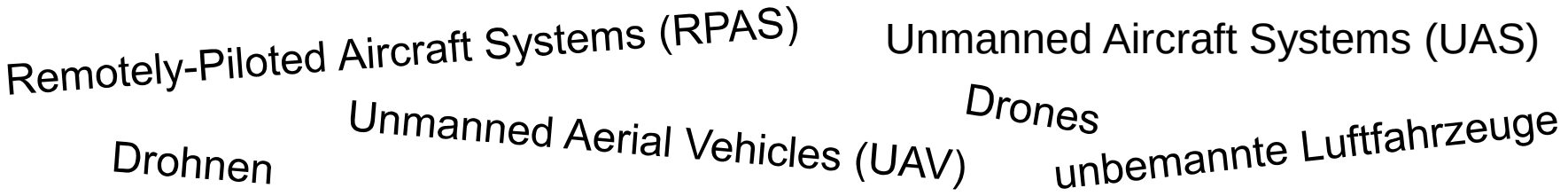
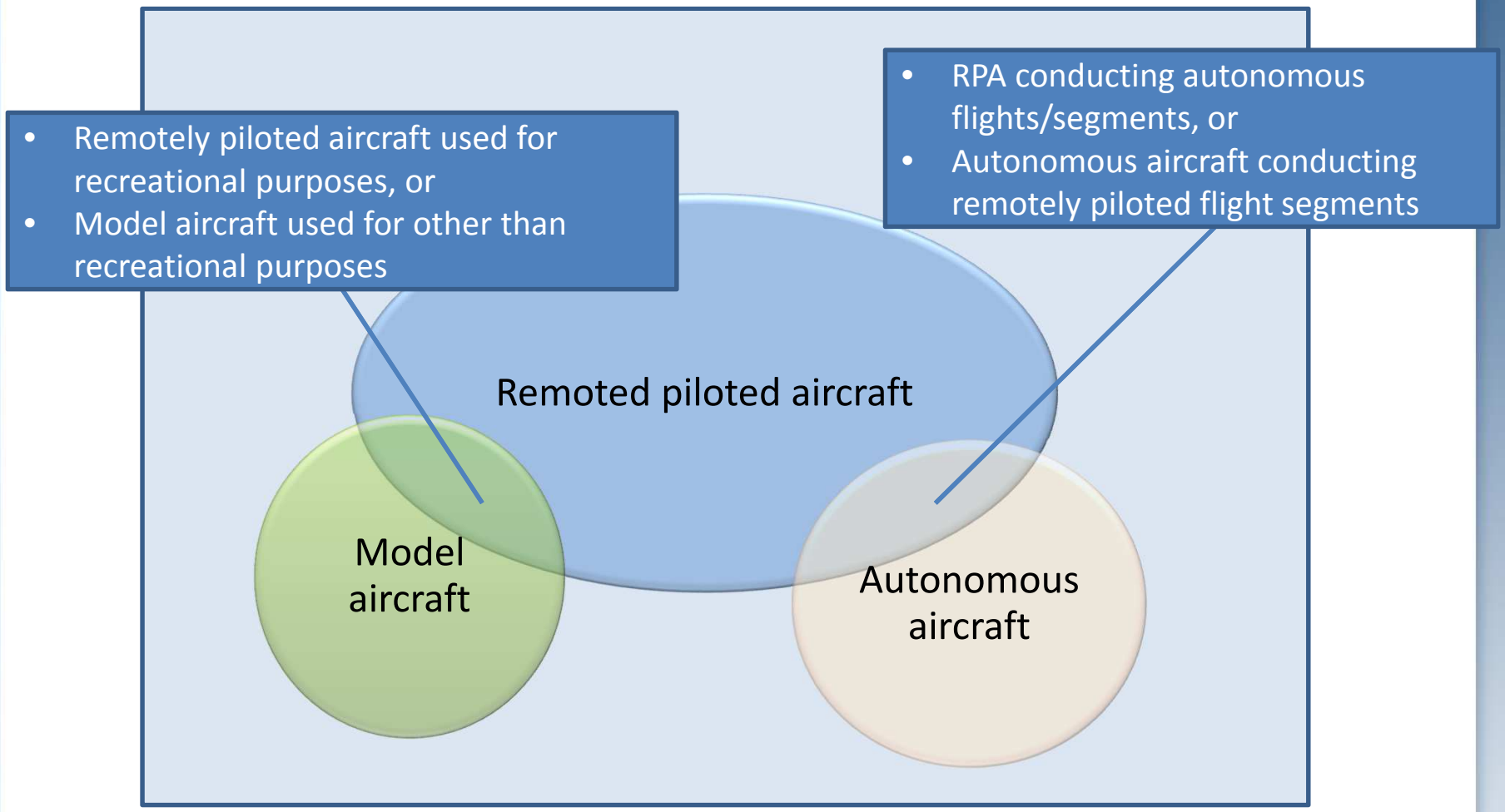
Definition

Definitionen und Sprachregelung



- Unmanned Aerial Vehicle (alt) und Unmanned Aircraft System (ICAO):
  Beinhalten sowohl gesteuerte als auch automatisch/autonom fliegende Geräte
- Remotely-Piloted Aircraft System (ICAO) und unbemannte Luftfahrzeuge (BMVI):
  Ein Pilot hat jederzeit die Möglichkeit auf das Flugzeug einzuwirken
- Drones (EC und EASA) oder Drohne:
  Beinhalten sowohl gesteuerte als auch automatisch/autonom fliegende Geräte, aber auch Flugmodelle
- Flugmodelle (BMVI):
  Werden nur zum Zwecke der Freizeitgestaltung und des Sports genutzt

Unmanned Aircraft



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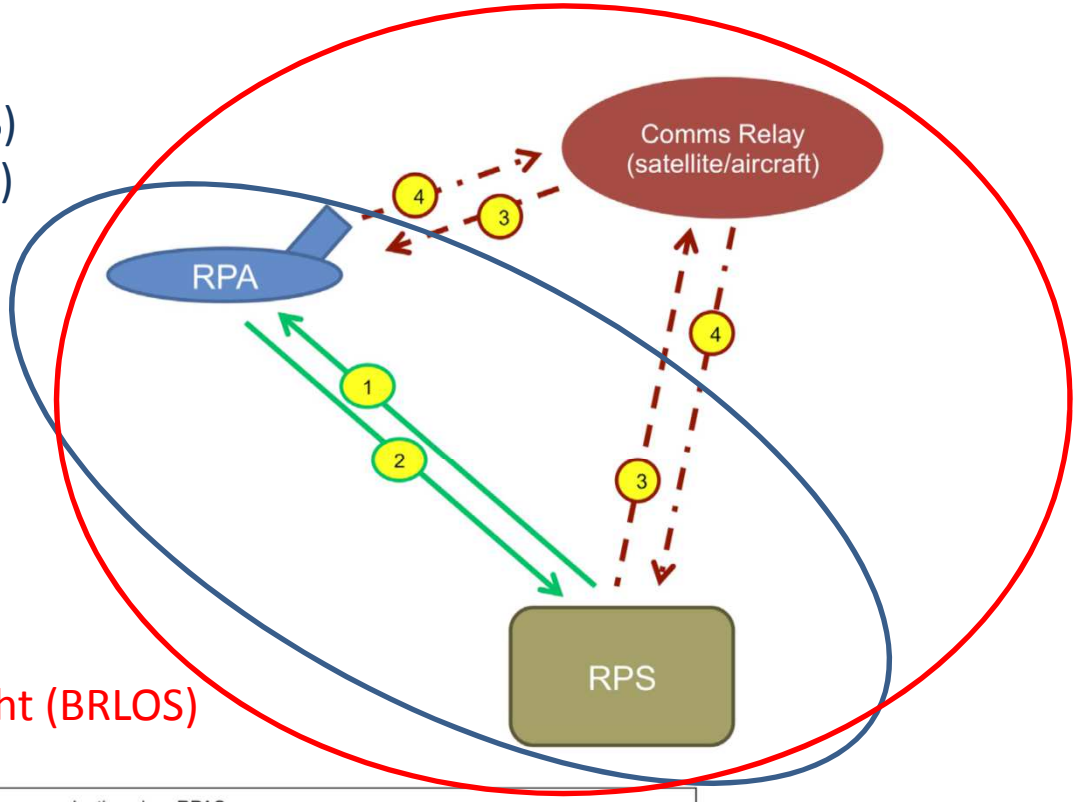
RPAS Basic communication

Visual Line of sight (VLOS)
Radio Line of Sight (RLOS)



Beyond Radio Line of Sight (BRLOS)

C2 radio communications in a RPAS
1. Uplink representing Line of Sight 'Command' in the C2 function
2. Downlink representing Line of Sight 'Control' in the C2 function
3. Relay of C2 communications from the RPS to the RPA
4. Relay of C2 communications from the RPA to the RPS

Sources: ANSP Considerations for RPAS Operations, CANSO 2014

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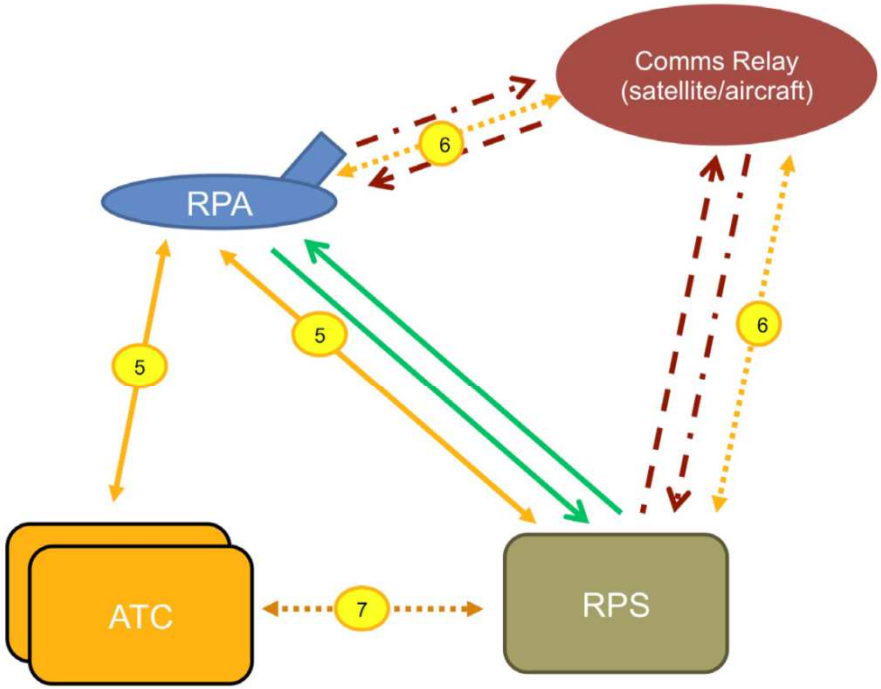
RPAS communication related ATC



RPA radio communications related to ATC
5. ATC communications relayed between ATC, the RPA and the RPS
6. ATC communications relayed between ATC, the RPA, a satellite and the RPS
7. alternative direct link between ATC and the RPS

Sources: ANSP Considerations for RPAS Operations, CANSO 2014

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Definitions

Autonomous operation. An operation during which a remotely-piloted aircraft is operating without pilot intervention in the management of the flight.
Command and Control link (C2). The data link between the remotely-piloted aircraft and the remote pilot station for the purposes of managing the flight.
Detect and avoid. The capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action to comply with the applicable rules of flight.
Lost link. The loss of command and control link contact with the remotely-piloted aircraft such that the remote pilot can no longer manage the aircraft's flight.
Operational control*. The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of safety of the aircraft and the regularity and efficiency of the flight.
Radio line-of-sight. A direct electronic point-to-point contact between a transmitter and a receiver.
Remote pilot. The person who manipulates the flight controls of a remotely-piloted aircraft during flight time.

Sources: ANSP Considerations for RPAS Operations, CANSO 2014

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RPAS C2 radio communication related ATC

Remote pilot station. The station at which the remote pilot manages the flight of an unmanned aircraft.
Remotely-piloted aircraft. An aircraft where the flying pilot is not on board the aircraft (Note: this is a subcategory of unmanned aircraft).
Remotely-piloted aircraft system. A set of configurable elements consisting of a remotely-piloted aircraft, its associated remote pilot station(s), the required command and control links and any other system elements as may be required, at any point during flight operation.
Visual line-of-sight operation. An operation in which the remote crew maintains direct visual contact with the aircraft to manage its flight and meet separation and collision avoidance responsibilities.

Sources: ANSP Considerations for RPAS Operations, CANSO 2014

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Challenge of RPAS Integration

Challenge of RPAS integration

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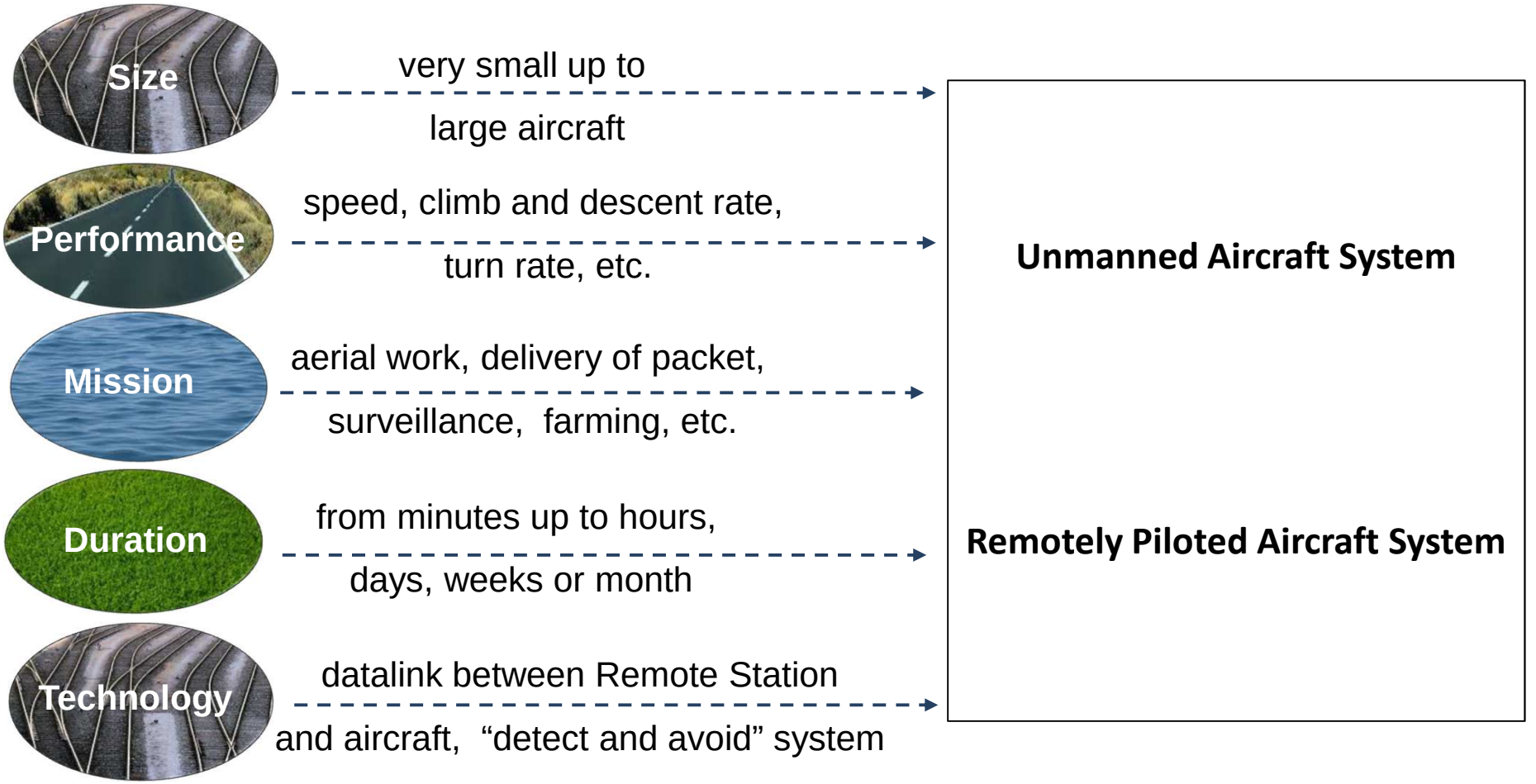
Challenge of RPAS integration



DFS Deutsche Flugsicherung

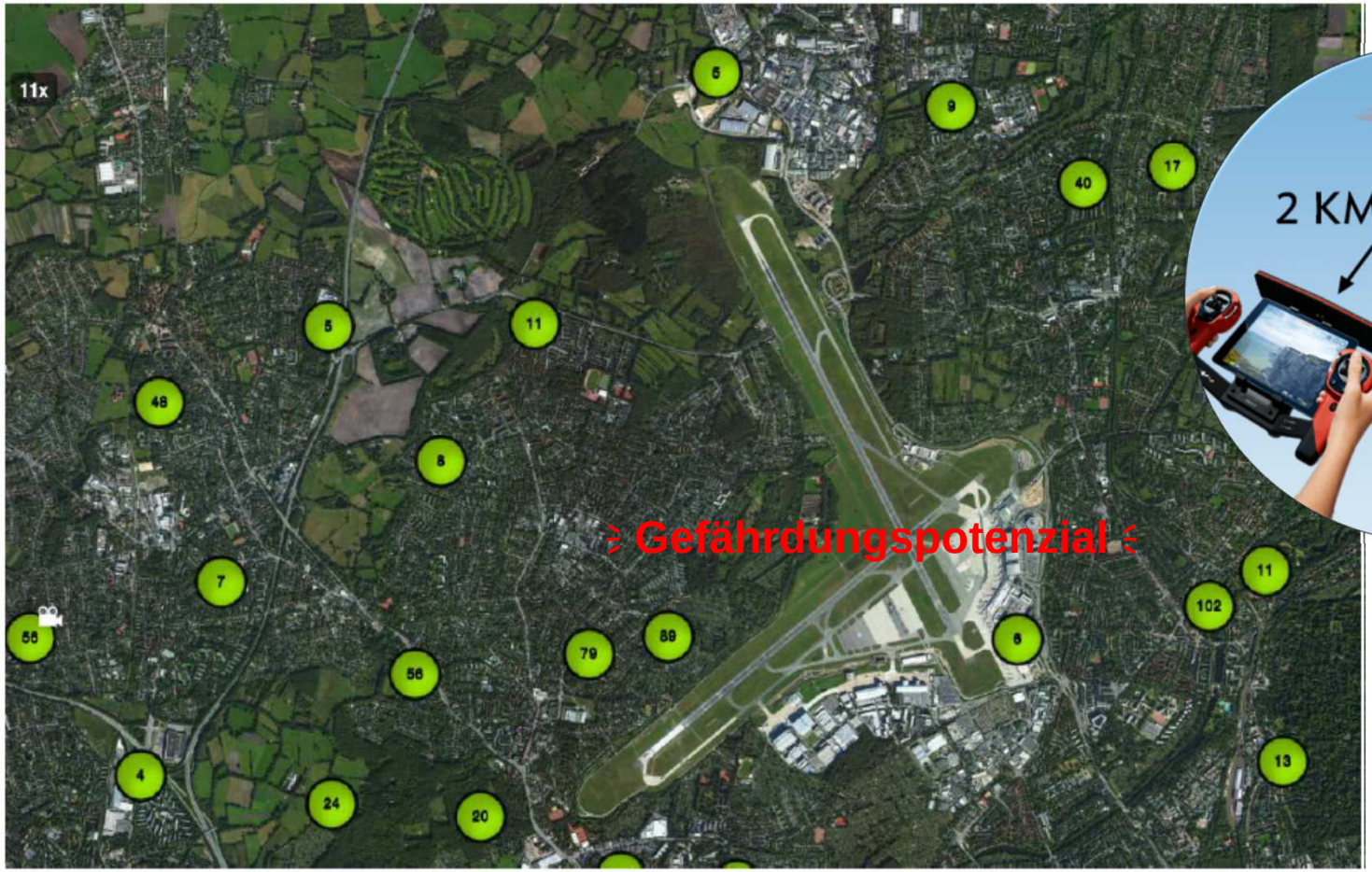
UAH1

Increasing RPAS safety incidents

- The growth in RPAS has coincided with a number of reports of RPAS operating dangerously near manned aircraft and airports. All countries have seen an increase in reported incidents:
- In New Zealand there were 14 safety occurrences 2001-2010 but since 2011 there have been 33 occurrences; since 1 June 2014, commercial airlines, private pilots and ATCOs have alerted FAA to 25 episodes in which small drones came within a few seconds or a few feet of crashing into larger aircraft.
- In July 2014, there was near miss between a drone and an Airbus 320 close to Heathrow; and in January this year, Dubai International Airport was closed temporarily due to an unknown drone operating in the vicinity of the airport.

Trotz bestehender Gesetzeslage und pro-aktiver Kommunikation durch die DFS, steigt das Gefahrenpotenzial kontinuierlich an

Eine Studie ermittelt über 5.000 Drohnen-Aufstiege in der Kontrollzone HAM (Hochrechnung anhand von 1.000 erfassten Aufstiegen des Drohnentyps Parrot innerhalb der Sicherheitszone (1,5 km) in 2014*



Parrot Bebop Drone
859,00 €

* UAV Aufstiegsanalyse für den Sicherheitsbereich des Hamburger Flughafens, Institut für unbemannte Systeme, Prof. Andreas Fischer

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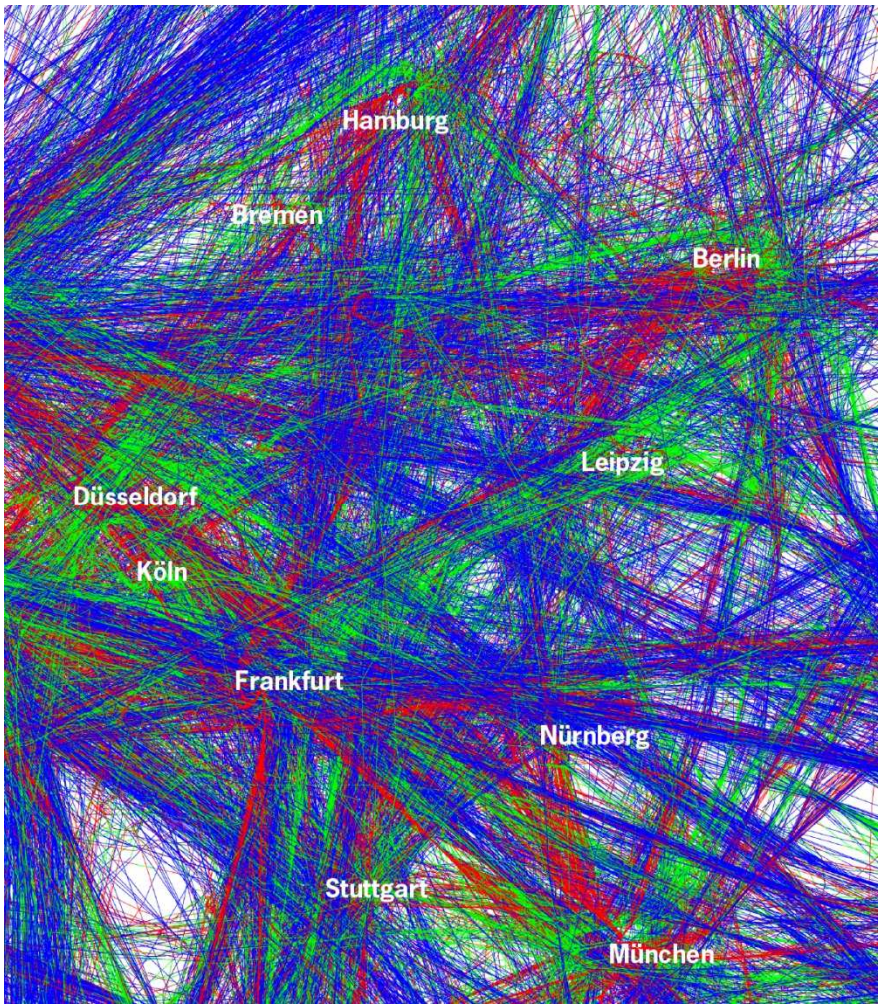
Flugbewegungen über Deutschland

Ein Tag im Januar 2016

Steigflug

Überflug

Sinkflug



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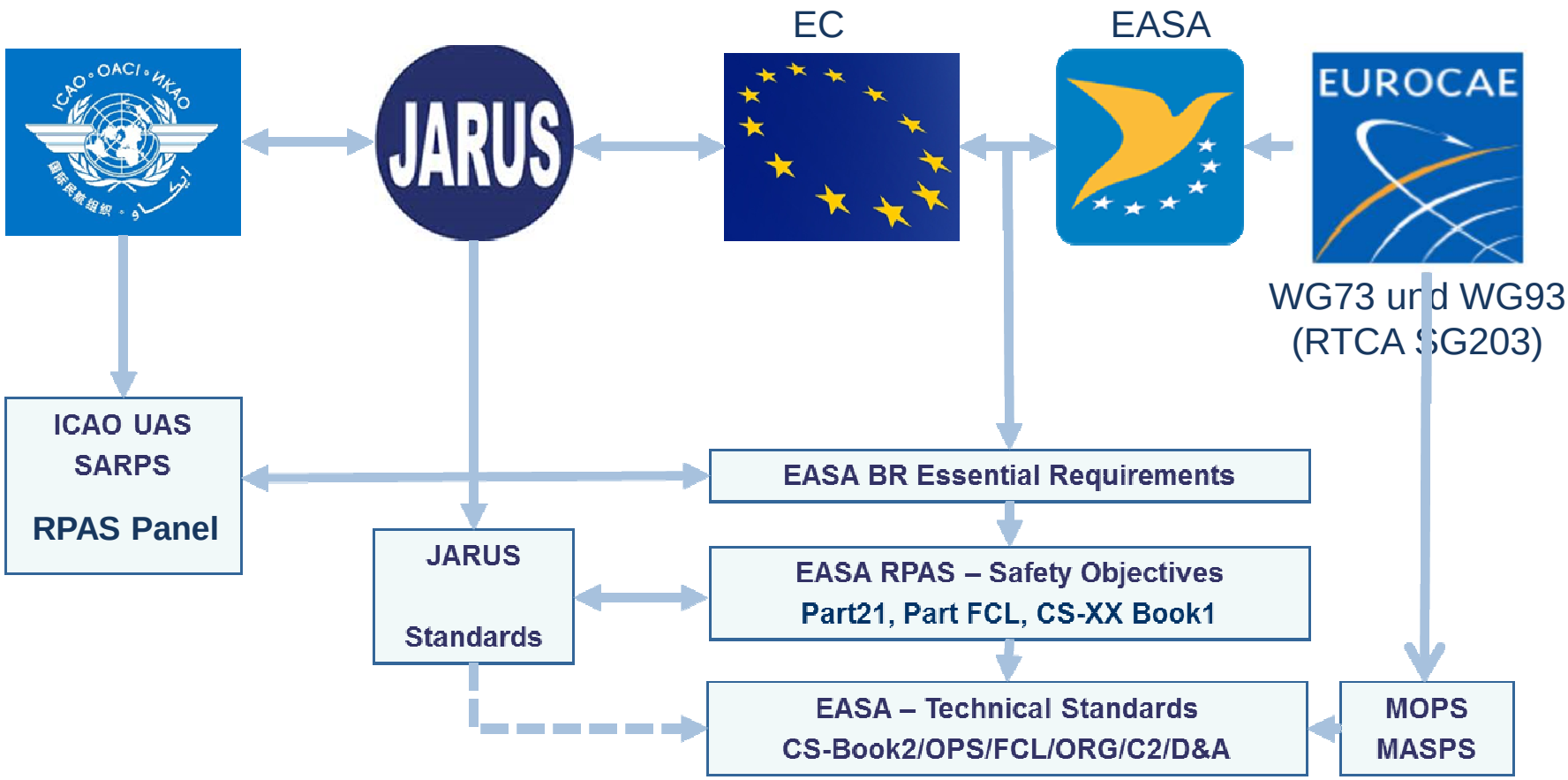
International RPAS activities

Überblick internationale Gremien

- ICAO:
  - Unmanned Aircraft System Study Group (UASSG), beendet
  - Remotely Piloted Aircraft System Panel (RPASP)
- CANSO:
  - RPAS and Emerging Technologies WG
- EC und EASA:
  - Advance Notice of Proposed Amendment (A-NPA) 216/2008
  - A-NPA 2015-10
- Joint Authorities for Rulemaking on Unmanned Systems (JARUS):
  - Zusammenschluss von Zulassungsbehörden
- International Telecommunication Union (ITU)
  - Frequenzvergabe für den „Command and Control Link“
- EUROCAE:
  - Working Group 73 „Unmanned Aircraft Systems“ und Working Group 93 für „Light RPAS“ (bis 150kg)
- DIN, DKE, ETSI, CEN, CENELC, ISO, IEC:
  - Normierung von Unbemannten Luftfahrtsystemen

Übersicht internationale Organisationen



Quelle: EASA 2015
JARUS - Joint Authorities for Rulemaking on Unmanned Systems

JARUS

The Joint Authorities for Rulemaking on Unmanned Systems (JARUS) is currently developing recommended requirements for:

- Licensing of remote pilots;
- RPAS operations in Visual Line-of-Sight (VLOS) and beyond (BVLOS);
- Civil RPAS operators and Approved Training Organisations for remote pilots (JARUS-ORG);
- Certification specifications for light unmanned rotorcraft (CS-LURS) and aeroplanes (CS-LURS) below 600 Kg;
- Performance requirements for 'detect and avoid' to maintain the risk of mid-aid collision below a tolerable level of safety (TLS) and taking into account all actors in the total aviation system;
- Performance requirements for command and control data link, whether in direct radio line-of-sight (RLOS) or beyond (BRLOS) and in the latter case supported by a Communication Service Provider (COM SP);
- Safety objectives for airworthiness of RPAS ('1309') to minimise the risk of injuries to people on the ground; and
- Processes for airworthiness.

EUROCAE

There are 2 active working groups in EUROCAE dealing with RPAS:

- WG-73 / Unmanned Aircraft Systems (UAS): it is tasked to deliver standards and guidance that will ensure the safety and regularity of UAS missions. WG-73 works in coordination with RTCA SC-228 MOPS for Unmanned Aircraft Systems.
- WG-93 / Light Remotely Piloted Aircraft Systems Operations: it is tasked to develop standards and recommendations for guidance material for the safe operation of Light RPAS, sequenced in order of priority for the community, and primarily directed towards National Aviation Authorities.

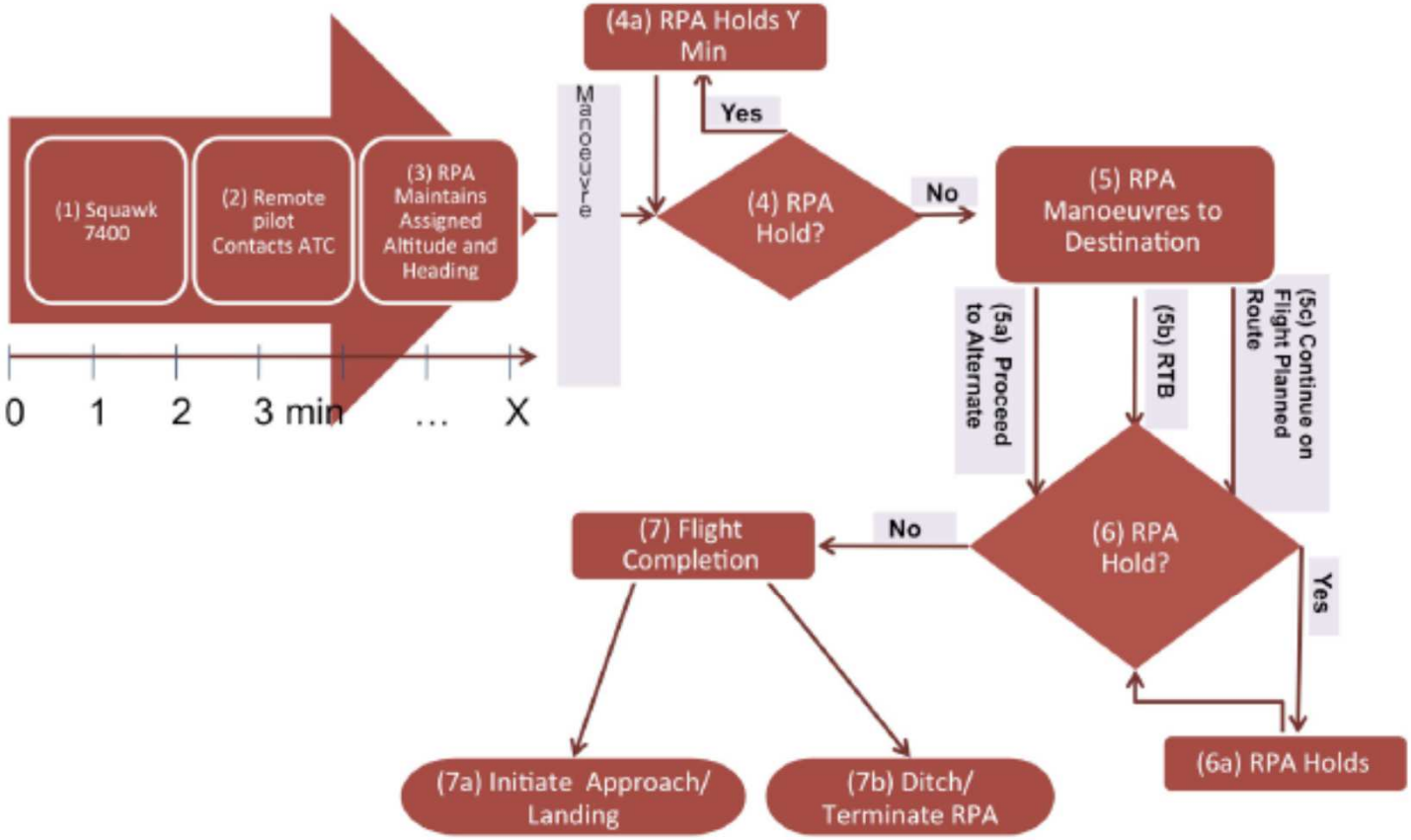
CANSO RPAS activities

Global RPAS Activities

- **RPAS and Emerging Technologies WG (Global)**
  - We have published "***ANSP Considerations for RPAS Operations***" *(Feb 2014)*
  - Represent CANSO at the ICAO Remotely Piloted Aircraft Systems Panel (RPASP)
  - Develop generic **ATC training material on RPAS for ANSPs**, which serves as an introduction to many in the work force who are new to RPAS operations
  - Software changes to the ATM system generally take some time and are costly, so the WG is exploring the opportunities to make RPAS changes or adaptations when the timing permits
  - Draft a paper on ANSP concerns with regard to the proliferation of small RPAS operating at VLL, especially those operating close to the aerodrome environment
  - Propose the establishment of a unique secondary surveillance beacon code assignment in the event of a lost link; and we need to work out a way to standardise lost link procedures

ANSP Considerations for RPAS Operations

Loss of Link Procedure



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RPAS Activities in EUROPE

- **CANSO participated in the SESAR2020 RPAS Definition Phase** (leading Activity 3–IFR/VFR&BVLOS-Airspace Access and Airport Operations)
- **CANSO contribute to the ATM Master Plan Edition 2015,** which for the first time makes explicit reference to (RPAS) and rotorcraft as airspace users**.** The SESAR 2020 programme also includes R&D activities to be conducted to support the integration of civil RPAS into the European Aviation System.
- **CANSO will participate in the "Drones / RPAS Coordination Group" of the European Commission.** The European Commission is planning to strengthen this working group with the final goal of updating the Roadmap for the Integration of civil RPAS into the European Aviation System , whose first edition was published in June 2013.
- **CANSO will contribute to Drones Outlook Study,** which has been launched by the SESAR Joint Undertaking (SJU) to further demonstrate the need to act at all levels in order to boost and integrate Research & Innovation forces in Europe to leverage the broad range of industrial opportunities linked to drones integration in the aviation industry.

DFS RPAS activities

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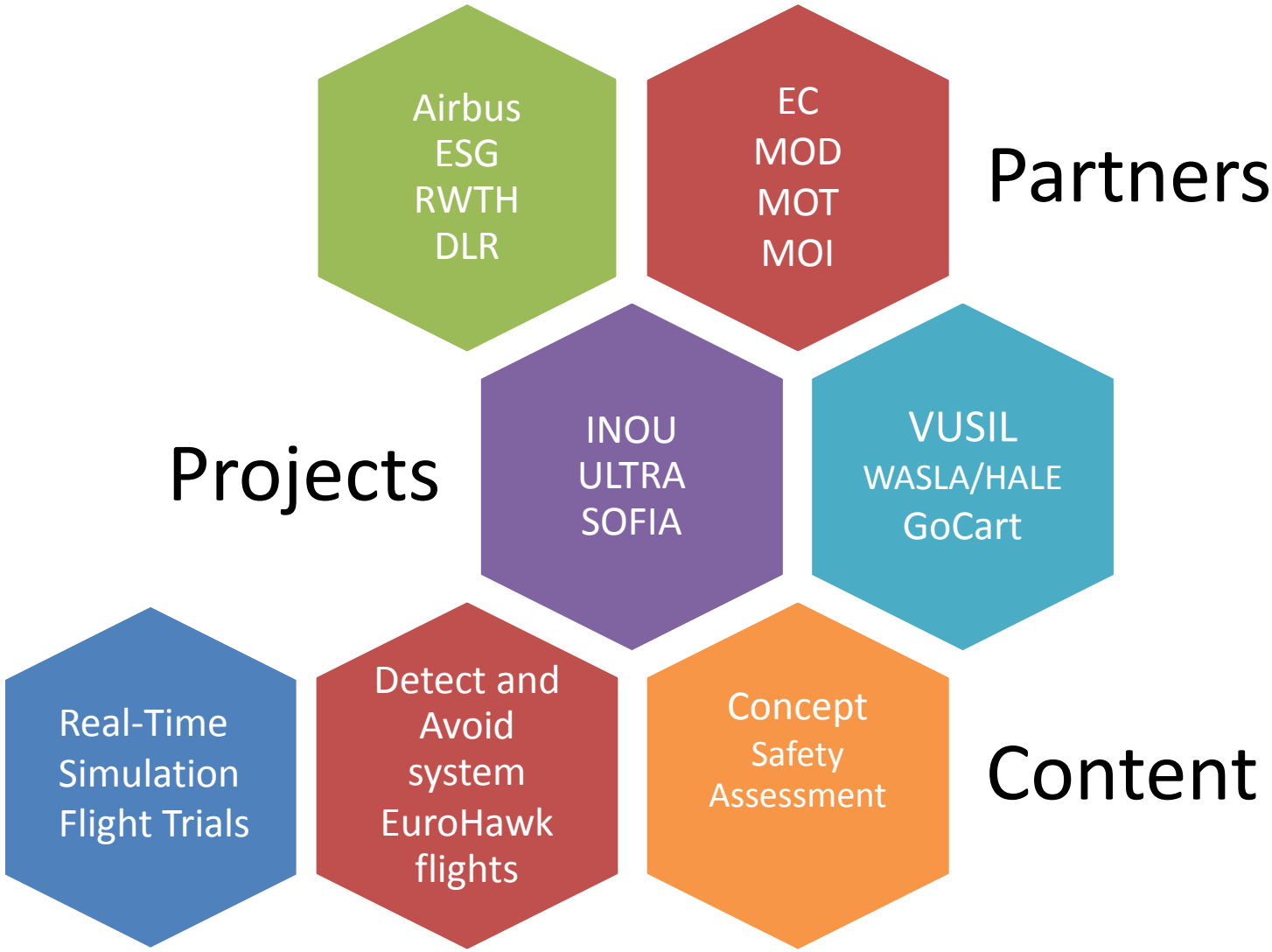
DFS experience with RPA System



DFS Deutsche Flugsicherung

Auswahl an Projekte mit DFS Beteiligung

- Internationale Projekte:
  - Safe automatic flight back and landing (SOFIA, 2006 - 2009)
  - Innovative Operational UAV Integration (INOUI, 2007 – 2010)
  - Unmanned Aerial Systems in European Airspace (ULTRA, 2012 – 2013)
- Nationale Projekte:
  - Weitreichendes Abbildendes Signalerfassendes Luftgestütztes Aufklärungssystem/High Altitude, Long Endurance I - III (WASLA/HALE, 2003 - 2007)
  - Sicherheitsbewertung Euro Hawk (Sibe EH, 2007 - 2010)
  - Validierung von UAS zur Integration in den Luftraum (VUSIL I und II, 2007 - 2010)
  - Kollisionswarnung und Kollisionsvermeidung (KoKo, 2012 - 2015)
  - [DHL Paketkopter (laufend)]

Ergebnisse

- **IFR Integration**
  - Normale „operation“ problemlos möglich
  - „herkömmliche“ Notverfahren (z.B. Funk) können angewandt werden
  - Sprechfunk max. 2 Sekunden Verzögerung
  - Kapazitätseinbußen durch Leistungsunterschiede (Geschwindigkeit)
  - Höhere Arbeitslast beim Lotsen durch geringere Leistung (z.B. Sink- und Steigraten)
- **VFR Integration**
  - Bodengestütztes „Detect and Avoid System“ erfolgreich getestet
  - Problem: Sichtbarkeit des RPA durch Piloten in bemannten Lfz
- **Flughafenintegration**
  - Erkennung von visuellen Signalen
  - Erkennung von Hindernissen (z.B. Personen, Autos)

Perspective

Geht der Markt für UAS in seinen Dimensionen weit über den bemannten Luftverkehr hinaus?

Service & Infrastruktur

Mit zunehmender Nutzung von UAS verändern neue Technologien, Konzepte und Verfahren auch das System Flugsicherung!

Hersteller/ Systeme

- ➔ **Gewicht 16 gr – 20 t**
- ➔ **geringe Höhen bis 28 km**
- ➔ **Verweildauer in der Luft von wenigen Minuten bis mehrere Wochen**
- ➔ **Anschaffungskosten € 19,99 – US$ 218 Mio. (Global Hawk)**

UAS Markt

- ➔ **Marktvolumen US$ 89 Mrd. bis 2023***
- ➔ **150.000 neue Jobs in Europa bis 2050****

Kunden

- ➔ **1708 unterschiedliche UAS Typen (566 in EU)***
- ➔ **471 Unternehmen (176 in EU)*****
- ➔ **2500 offiziell bekannte zivile Betreiber in EU – ohne private Nutzung******

Anwendungen

Der europäische Interessenverband „UVS International“ hat über 100 Anwendungsfelder für den Einsatz von UAS identifiziert.

Öffentlich-rechtlich | **Kommer-ziell** | **Militärisch** | **Privat**

* Teal Group's 2013 market study
** Europ. Kommission 2014
*** Quelle UVSI, Stand 2013
**** Europ. Parlament 2015

DFS Deutsche Flugsicherung

Zusammenfassung

Negativ:

- Technische Probleme (e.g. Detect and Avoid) noch nicht gelöst
- Verfahren (e.g. Data Link Loss, Squawk) noch nicht abgestimmt
- Gefahren durch RPAS nehmen zu (insbesondere durch kleine RPAS)

Positive:

- Auf internationaler Ebene ist der Abstimmungsprozess angelaufen (ICAO, EASA, JARUS)
- Einsatz von RPAS bereits heute möglich
- Neuer Markt mit Chancen wird sich etablieren

Vielen Dank für die Aufmerksamkeit

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