EUROPEAN AVIATION SAFETY AGENCY
AGENCE EUROPÉENNE DE LA SÉCURITÉ AÉRIENNE
EUROPÄISCHE AGENTUR FÜR FLUGSICHERHEIT

European Union Agency for Railways

European Rail Human and Organisational Factors Seminar

14-15 Nov, Valenciennes, France

EASA Automation Policy

Bridging Design and Training Principles

M. Masson, PhD, Senior Safety Promotion Officer

EASA Safety Intelligence and Performance Department

Your safety is our mission.

easa.europa.eu

European Aviation for Aviation Safety (EASA)

Photo Martina Talacchia, EASA

European Aviation for Aviation Safety (EASA)

European Aviation Safety Agency (EASA)

EASA is the centerpiece of the European Union's strategy for aviation safety. Its mission is to promote the highest common standards of safety and environmental protection in civil aviation.

- EASA develops common safety and environmental rules at European Union level.
- It also monitors the implementation of standards through inspections at its Member States and provides the necessary technical expertise, training and research.

EASA works hand in hand with the European Union competent aviation authorities which continue to carry out many operational tasks, such as certification of individual aircraft or licensing of pilots.

Established **2002**

16 years in operation

800+ aviation experts & administrators

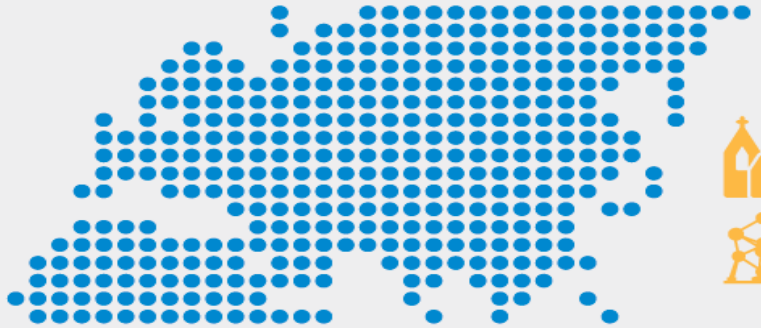
32 EASA member states

= 28 + 4

EU

+

Switzerland, Norway, Iceland, Liechtenstein



Headquarters in **COLOGNE**

Office in **BRUSSELS**

Quote

31 Aug 2011

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'Automation Addiction': Is Technology Weakening Pilots' Skills?

By: FRANCES ROMERO

Topics: ACCIDENTS, AIR FRANCE, AIRLINES, AIRPLANES, AUTOMATION, AUTOMATION ADDICTION, BUFFALO CRASH, CONTINENTAL AIRLINES, CONTROLS, FAA, FLYING, HIGH-ALTITUDE STALLS, INTERNATIONAL AIR TRANSPORT ASSOCIATION, LOSS OF CONTROL, PILOTS, SKILL, TRAVEL

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The tail of a Continental Airlines plane is visible as debris burns at the scene of a crash near Buffalo, N.Y., on February 13, 2009.

Stan Honda / Getty Images

EASA Automation Policy

Action in the
European Plan for Aviation Safety 2011-2014

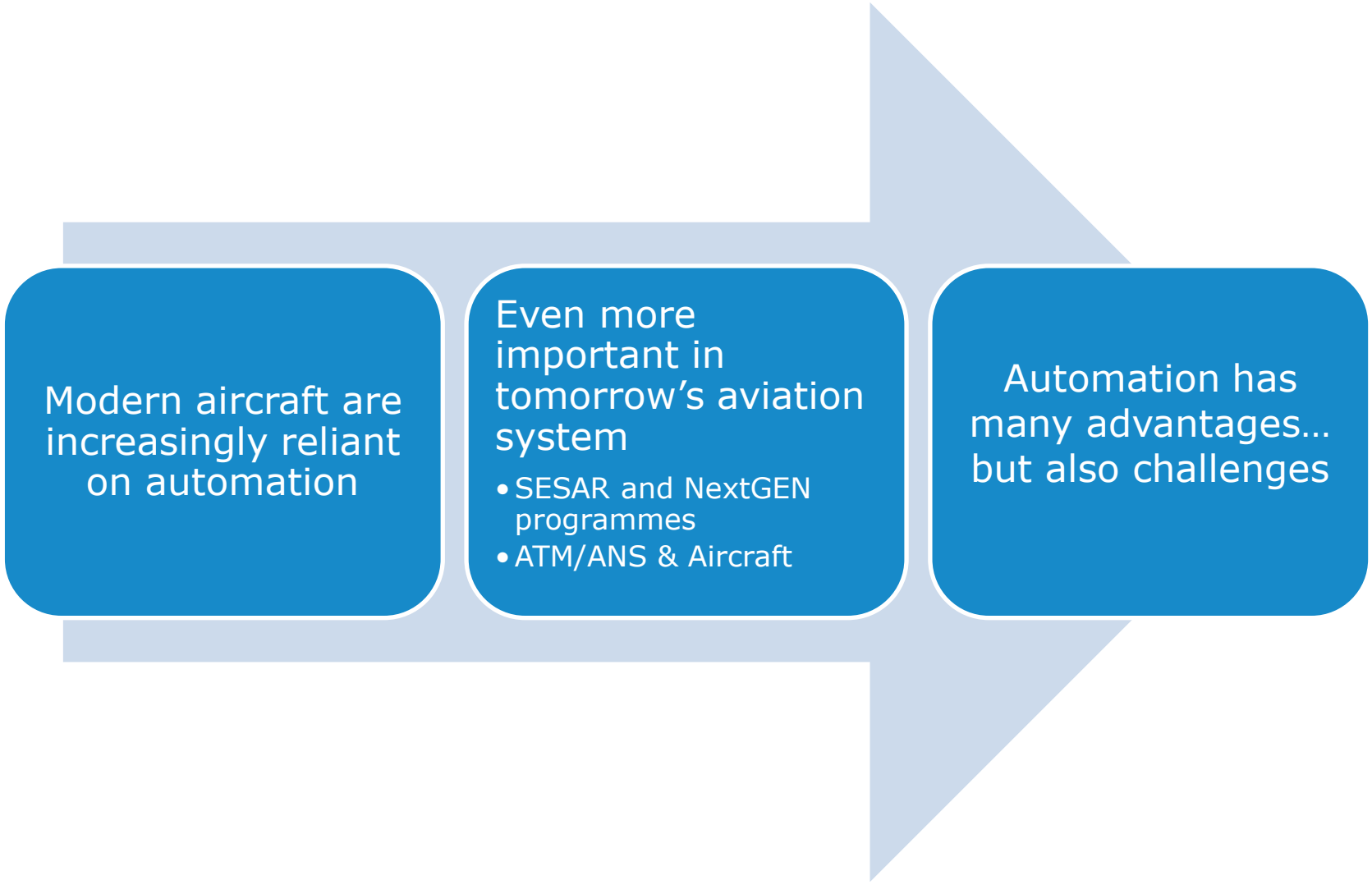
"Address the problem of increasing pilots' reliance on automation by developing an Automation Policy"
Allocated to EASA, Internal Group on Pilot Training (IGPT)

The IGPT has since been disbanded

Plan

- The approach
- The survey
- Advantages
- Challenges
- Actions

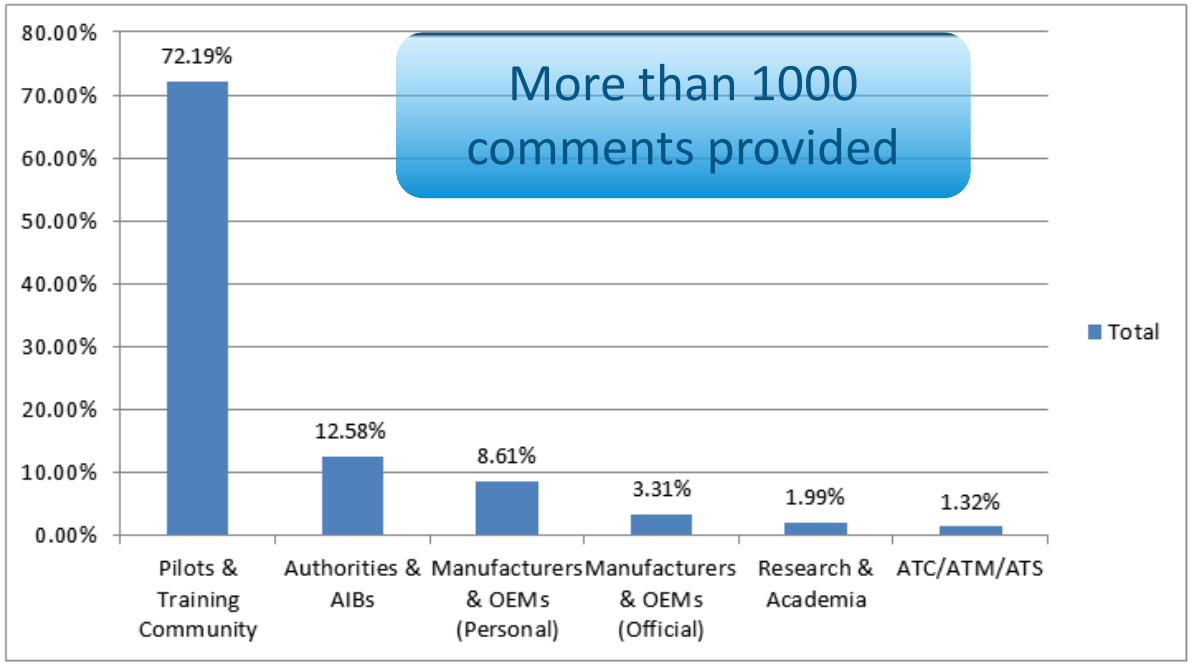
The approach



The survey

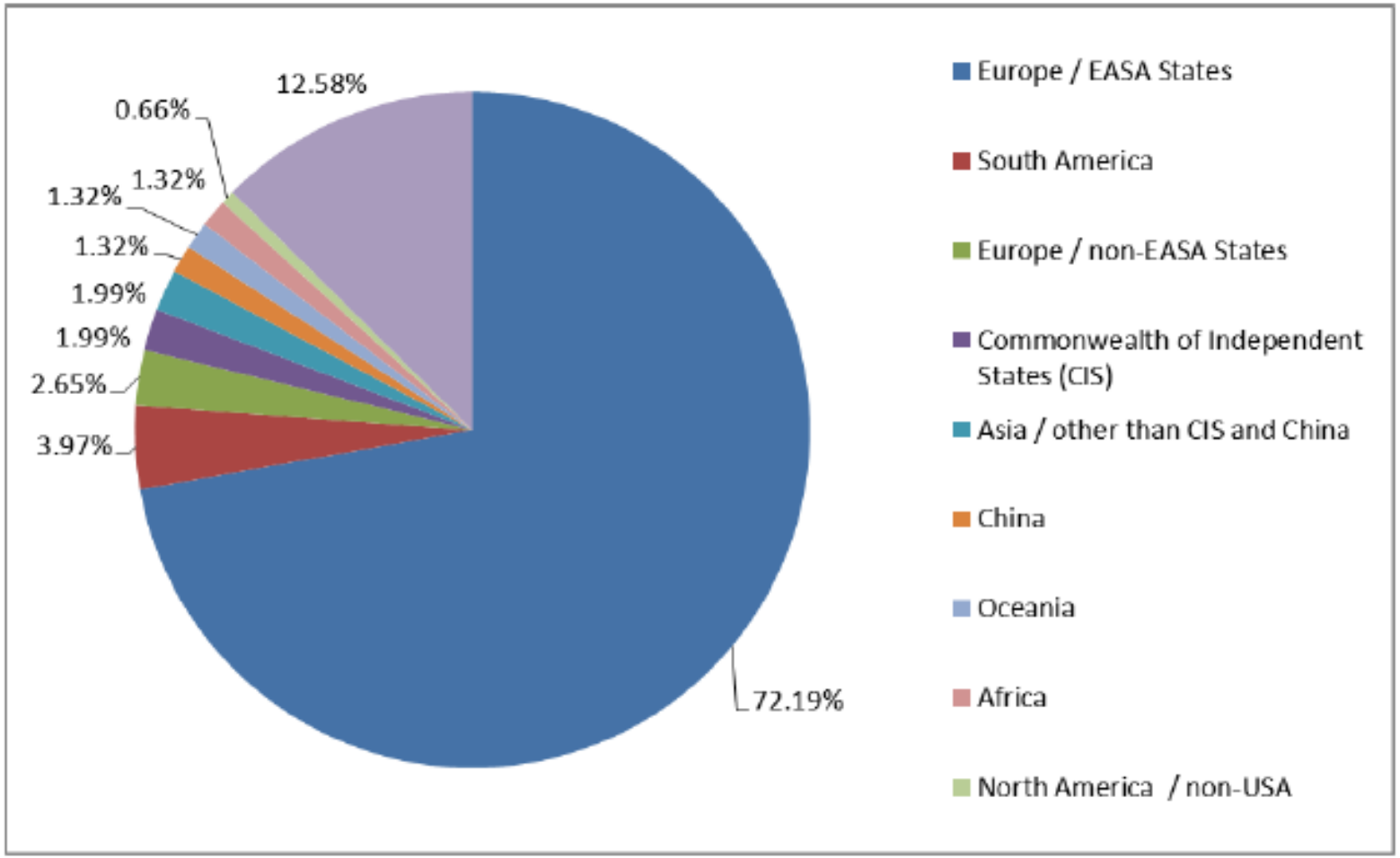
- Performed between April to July 2012, the survey addressed:
  - **Automation advantages and challenges**
  - **Action proposals** for consideration by EASA
- 151 respondents, mainly pilots

Distribution by Type of Organisation

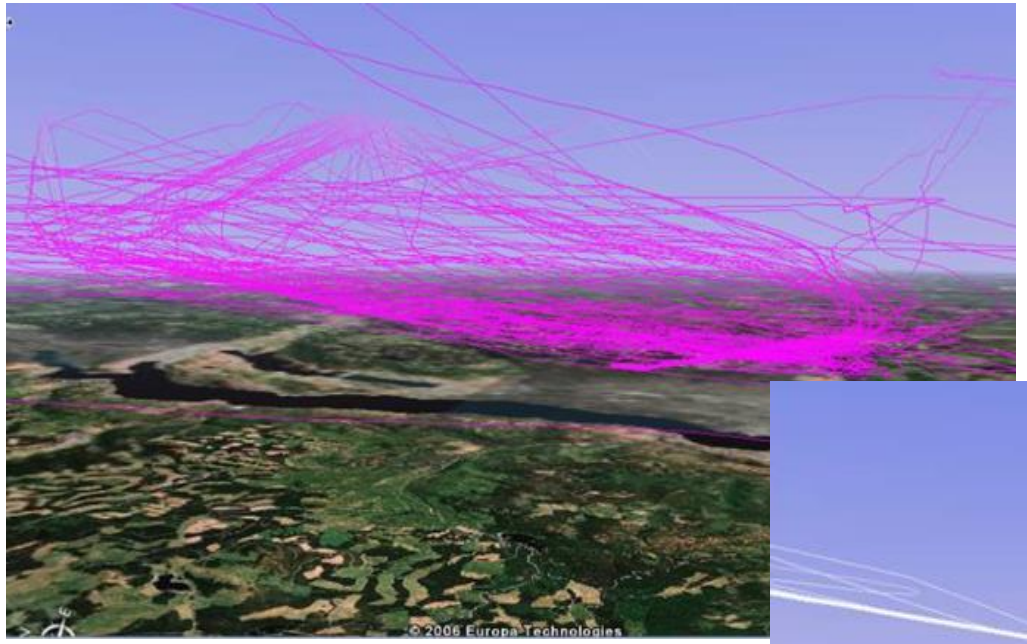


The survey

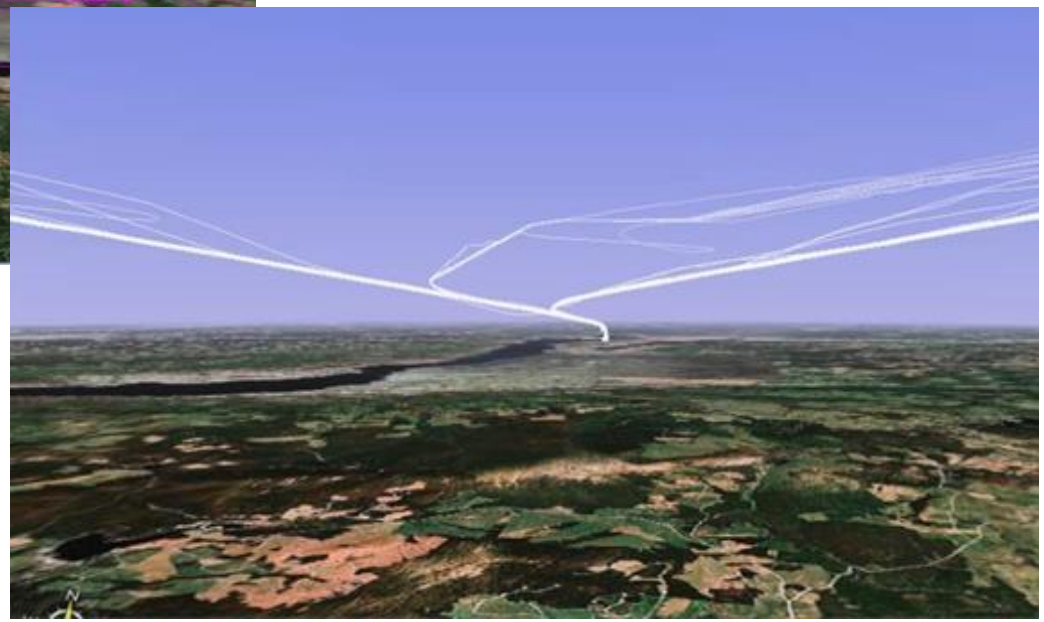
- Mainly from Europe



Advantages: Precision, Regularity

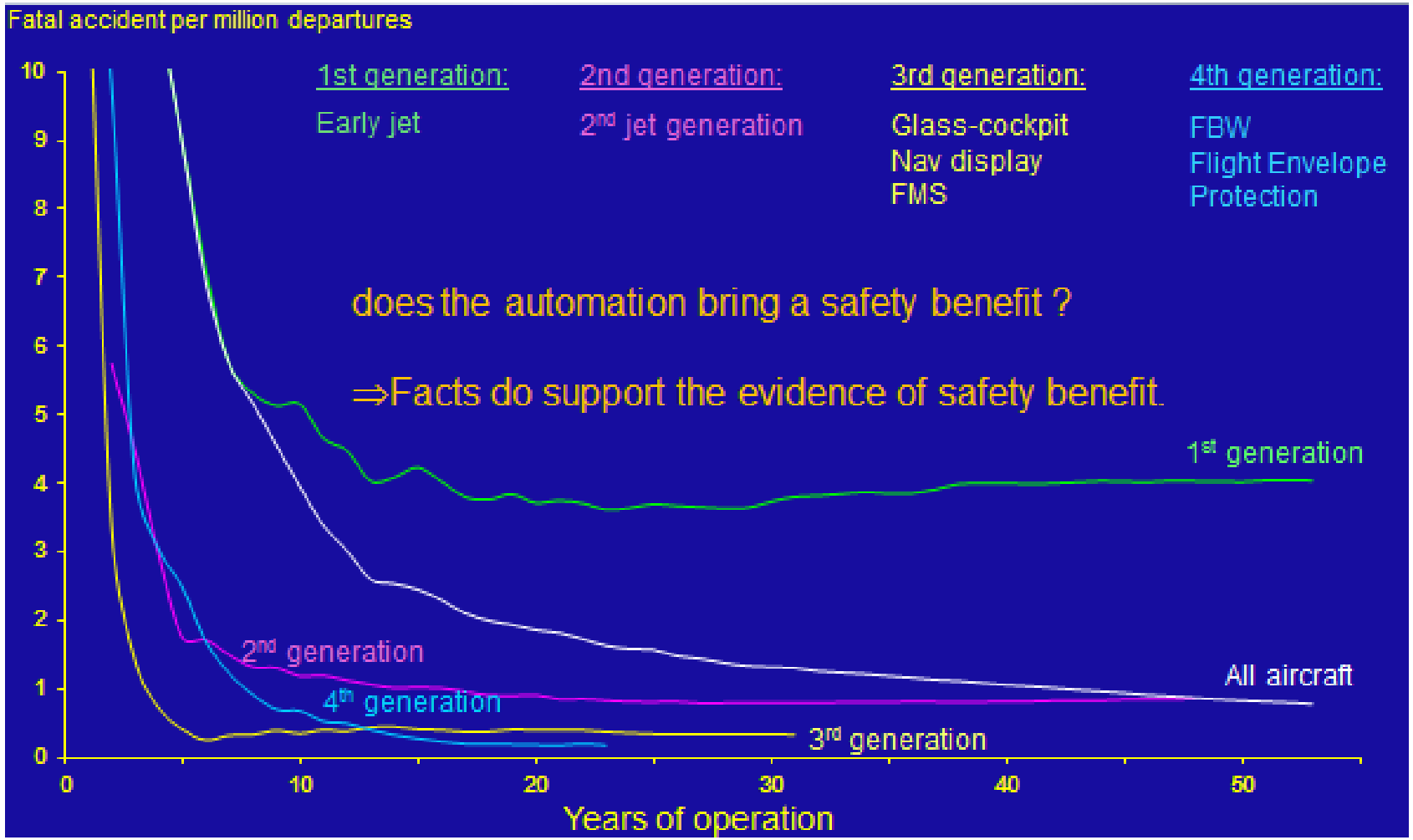


RWY 34, Kelowna, Canada,
RNP AR before GPS.
Source Airbus, 2011



RNP AR after GPS, Source Airbus, 2011

Advantages: Safety



Accident rate by aircraft generation. Source Ascend and Airbus, 2011

More advantages

- Improved flight path control, reduced weather minima, allows decommissioning land-based navigation aids
- Flight envelope protections
- Engine control (e.g. FADEC)
- Passenger comfort
- Family concept based on similarity of cockpit design and flight dynamics facilitates type transition
- Technical reliability and weight

More advantages

- Electronic Flight Information System (EFIS) enhances navigation awareness
- Electronic monitoring and alerting systems (ECAM / EICAS) enhance pilots' and mechanics' understanding of aircraft systems

More advantages

- Automation relieves pilots from repetitive or not rewarding actions

- Automation globally *substantially* reduces workload, free attentional resources and reinforces the gratifying parts of pilots' job, such as decision making

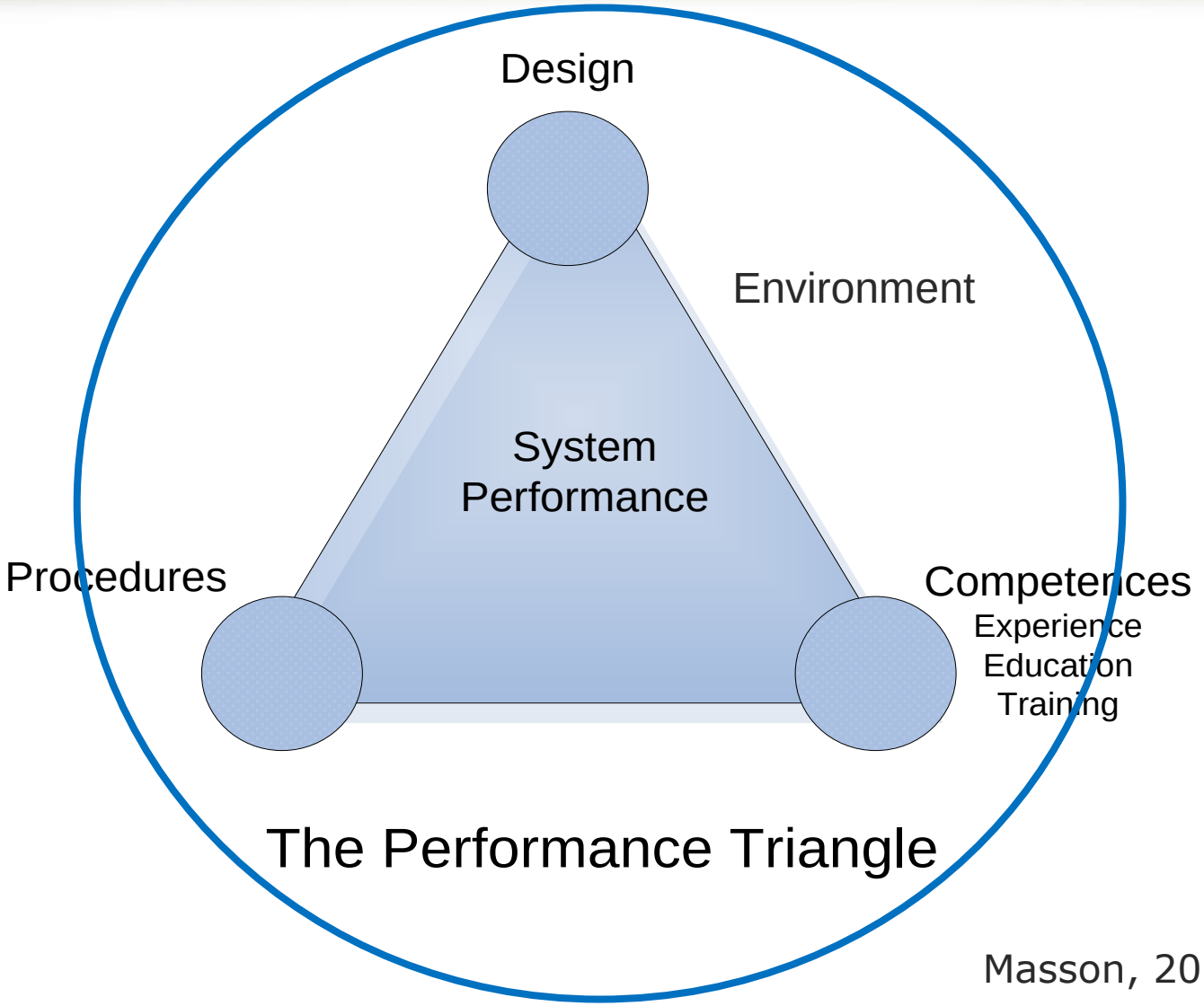
Challenges

- When systems are mainly operated in an automated manner, manual and cognitive skills involved in manual control tend to erode
- Difficult to monitor when “nothing happens”
- Automation and mode awareness, especially for un-commanded mode transitions (What is the system doing?...)
- Manual control skills are needed to manage automation breakdowns, but high automation usage and reliability give little opportunity to practice (except in the simulator)
- **It remains essential to control and monitor attitude, thrust, speed, altitude and flight path – and to recognise and manage impending stalls and upsets!**

Actions

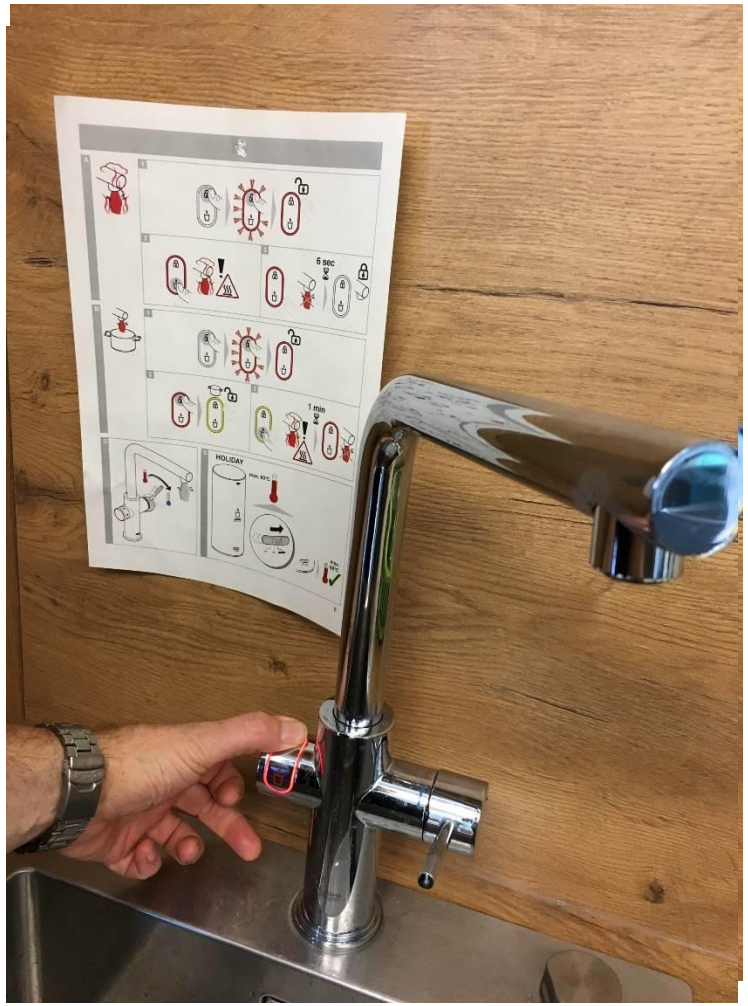
The Automation Policy published in 2014 has – among other sources – inspired various actions…

Design, Procedures and Competences



Masson, 2011, 2012, 2013

Everyday live example



Design and Certification

- Proposal to develop the equivalent of CS 25.1302 and AMC **"Installed Systems and Equipment for Use by the Flight Crew"**

  for other aircraft than Large Aeroplanes (object of CS.25)

Certification Specifications (CS)
Acceptable Means of Compliance (AMC)


Annex to ED Decision 2018/010/R

European Aviation Safety Agency

Certification Specifications

and

Acceptable Means of Compliance

for

Large Aeroplanes

CS-25

Amendment 22

5 November 2018[1]

Bridging Design and Training

- Includes **Training Areas of Special Emphasis (TASEs)** addressing specific competences required for the safe operation of an aircraft, use of equipment, application of procedures or performance of operations

Training and Licensing

- **Upset Prevention and Recovery Training (UPRT),** planned to become mandatory in (April) 2019

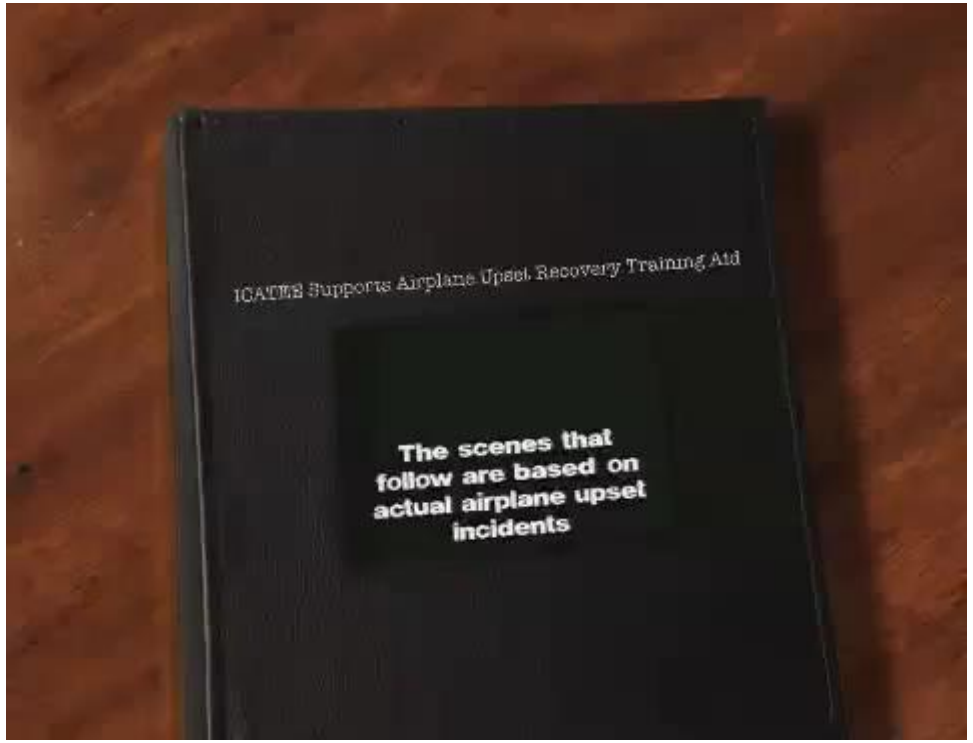
EASA FAQ page:

UPRT stands for aeroplane 'upset prevention and recovery training' and constitutes a combination of theoretical knowledge and flying training with the aim of providing flight crew with the required competencies to both prevent and to recover from situations in which an aeroplane unintentionally exceeds the parameters for line operation or training (aeroplane upsets).

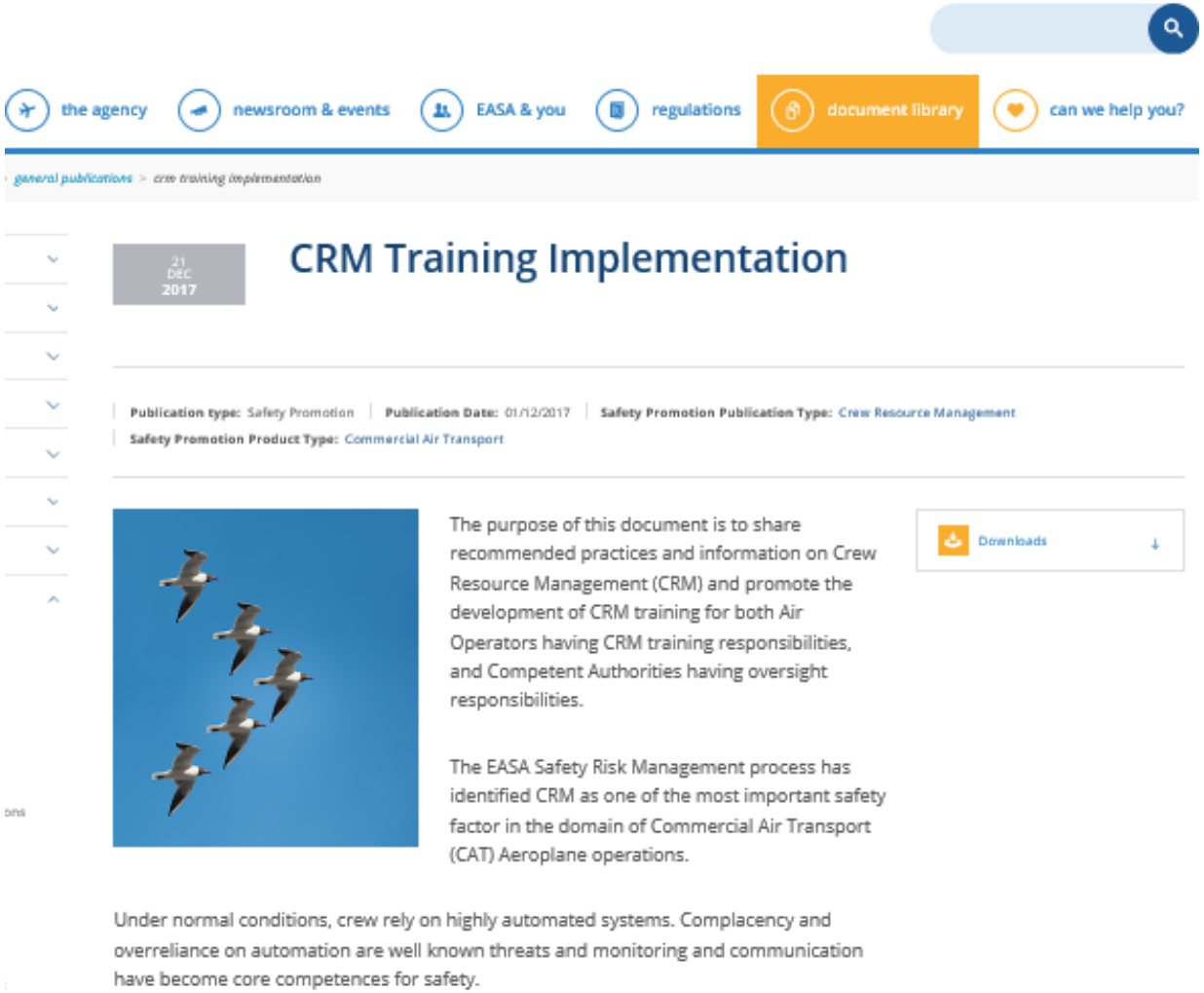
With the objective to introduce different 'levels' of UPRT at various stages of a professional pilot's career, EASA has published its Opinion No 06/2017 and is currently revising the existing acceptable means of compliance (AMC) and guidance material (GM) published with regard to the provisions of Annex I (Part-FCL) to Regulation (EU) No 1178/2011 as follows:

- **Basic UPRT** will exercises to be integrated in all CPL and ATPL training courses as well as the MPL training course.
- An **'advanced UPRT course'** will include at least 5 hours of theoretical instruction as well as at least 3 hours of dual flight instruction in an aeroplane, with the aim to enhance the student's resilience to the psychological and physiological aspects associated with upset conditions.
- **Class- or type-related UPRT** during class or type rating training will address the specificities of the relevant class or type of aeroplane.

ICATEE video



Training and Licensing



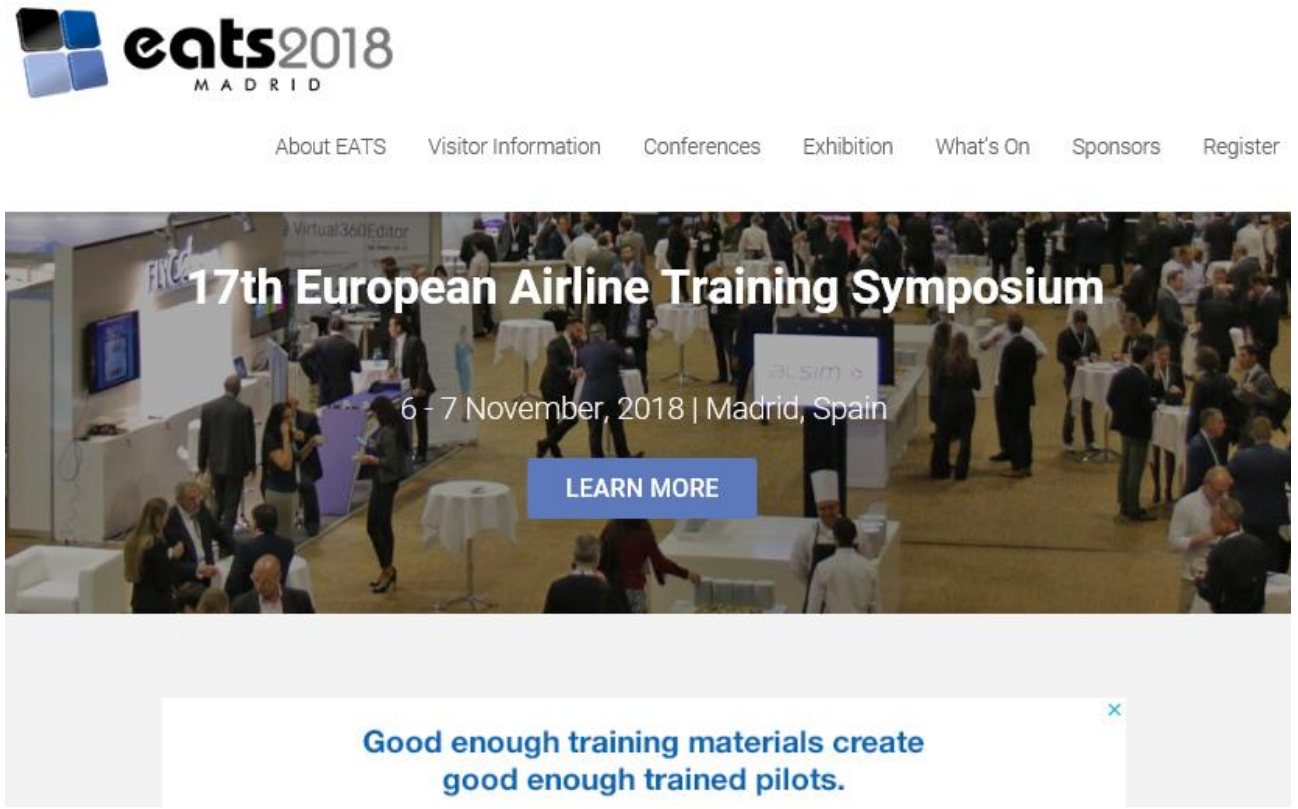
- Amended AMC/GM (2015, 2016) includes **Resilience** and **Startle and Surprise** as new training topics

Acceptable Means of Compliance (AMC)

Guidance Material (GM)

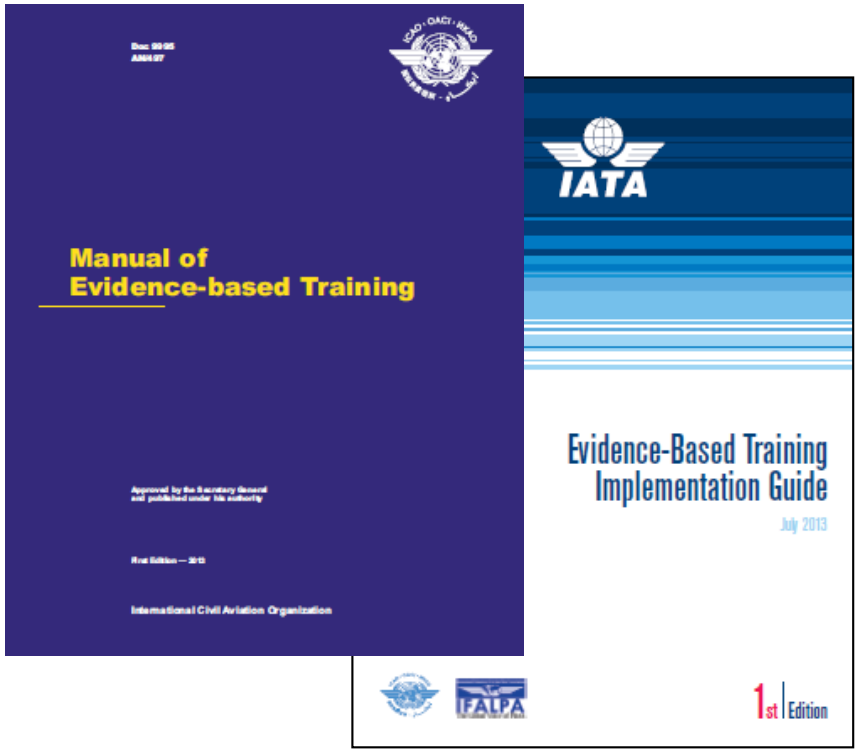
Training and Licensing

- Introducing **Competency Based Training and Assessment (CBTA)**
  See this EASA Leaflet, prepared for EATS, Nov 2018



Training and Licensing

- 2 principles (transferable outside aviation):
  - Train to Competency
  - Train based on evidence



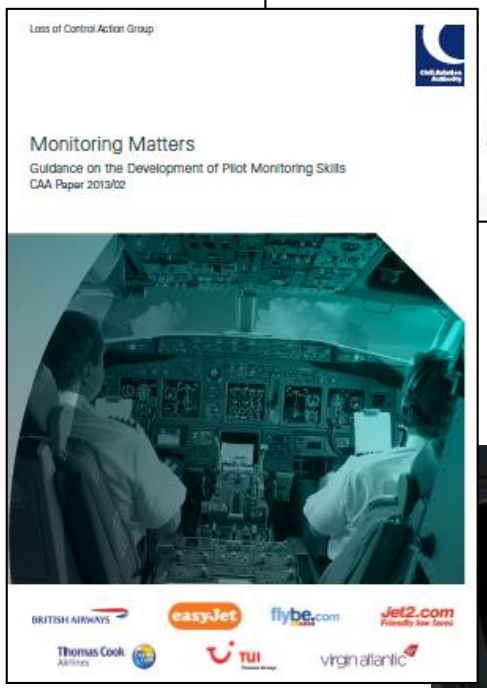
Training and Licensing

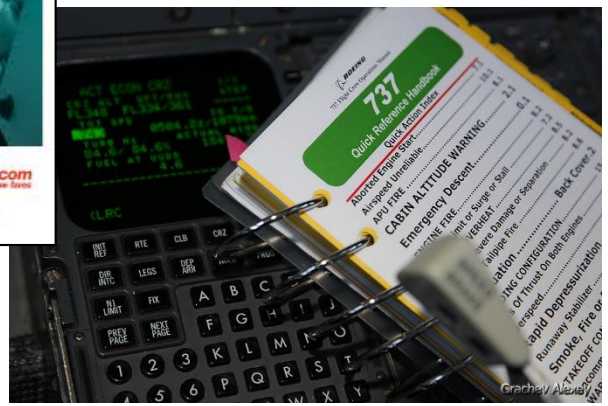
- EASA Task Force to develop flexibility in the use of training devices to:
  - Enhance the use of available training tools
  - Adapt to training needs
  - Determine the most appropriate devices for each training objective

- Training aircraft for advanced UPRT

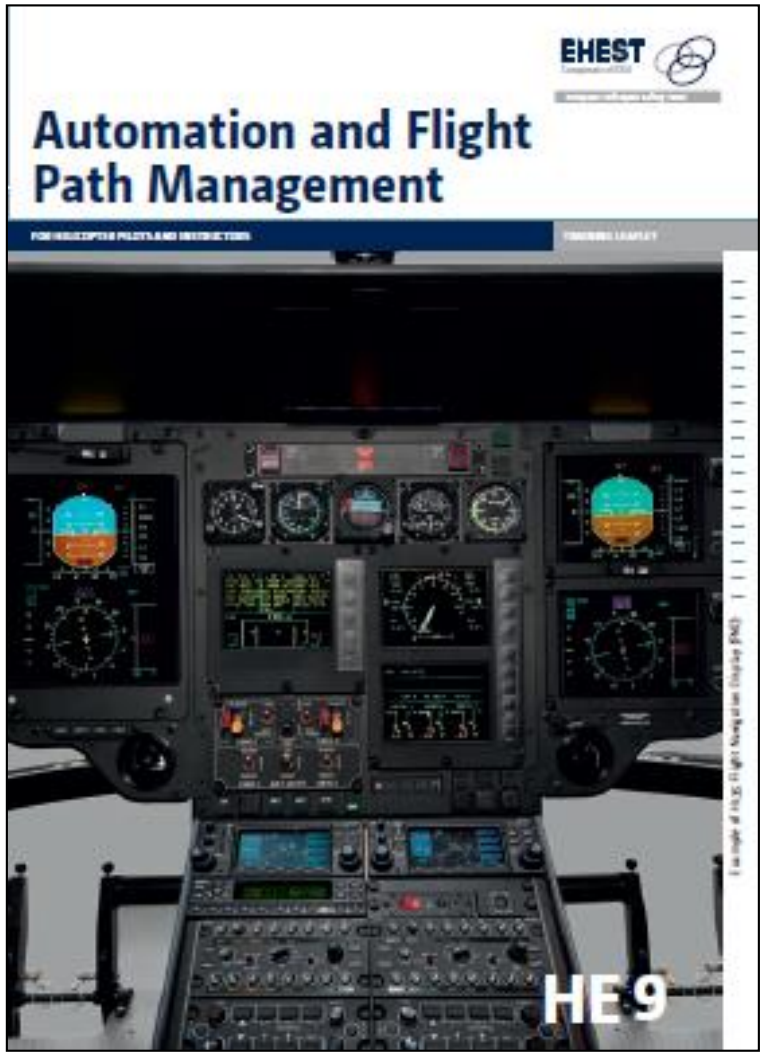
Procedures

- Procedures = Reference for action
- Individual and crew action
  - Capt. vs First Officer
  - Pilot Flying vs. Pilot Monitoring
- Procedures also in electronic format
- Airlines have their own Automation Policy
  (helps flying with someone you never flew with before)





Rotorcraft



HeliOffshore
Safety Through Collaboration

HeliOffshore Automation Guidance

V1.0 December 2016

These guiding principles are offered to ensure effective use of automation. Standard Operating Procedures based on these principles will help to mitigate the risks of interacting with cockpit automation and improve safety performance in usage and monitoring.

Know how and when to use your automation

- Understand when and how your AP is designed to protect the flight envelope
- Understand the functional capabilities and authority of your AP
- Clarify use of automated modes during in-flight crew briefings

Follow your SOPs for autopilot mode selection and deselection

- Ensure the aircraft is properly trimmed and power applied with an appropriate attitude
- Consider and manage AP usage in 3 stages: (1) pilot intention (2) mode selection, (3) aircraft reaction
- Use clear and consistent language to announce, confirm and acknowledge AP mode changes and FMS programming updates
- Communicate misunderstandings or knowledge gaps around mode display symbology

Use the appropriate level of automation for the situation and be prepared to change as necessary

- Use the AP as an aid to flight; step up and down between levels of automation, as required
- Be prepared to fly manually if it reduces workload
- Avoid manual control inputs when AP is engaged
- Use 4-axis coupling where possible for all climbs, descents and approaches
- Select a target altitude when making significant level changes

Be aware of autopilot functional limitations during mixed-mode and degraded operations

- Be clear which channels are controlled through the AP or manually by the PF
- Speed will always be a function of the helicopter's attitude in pitch; be aware of undesired speed changes when IAS mode is not coupled or is degraded

Take appropriate and timely action when deviations from the desired aircraft state are observed

- Integrate the AP mode indications into your routine scan as PF and PM
- Clearly announce observed deviations from the intended flightpath and intervene as required.

Take away

- Automation has proven safety and operational advantages
- And a number of challenges
- Actions ongoing in the areas of:
  - Design and Airworthiness
  - Training
  - Policies and procedures
- The aviation experience can inspire other transportation modes

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Thank you for your attention!

Questions?

michel.masson@easa.europa.eu

Your safety is our mission.
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