EASA
European Aviation Safety Agency

European Risk Classification Scheme Development

John Franklin

Safety Analysis and Performance Section

Your safety is our mission.

An agency of the European Union

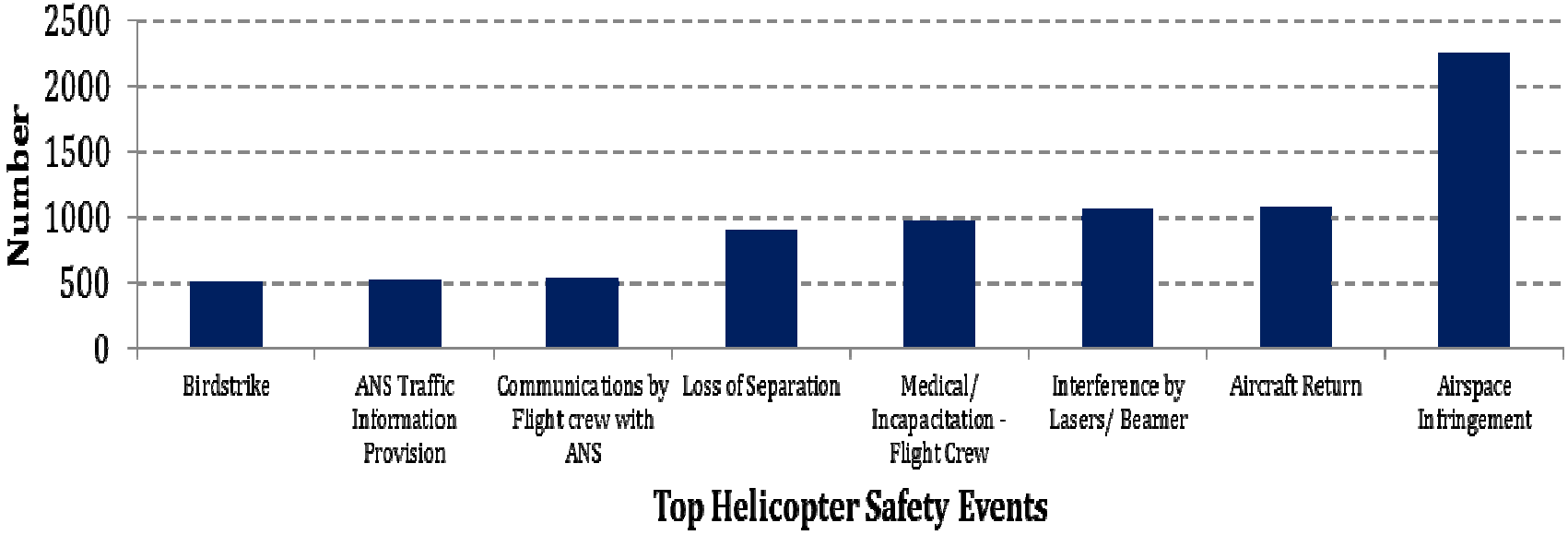
TE.GEN.00409-001

EU Risk Classification Scheme - Intro

- From Reg 376 -to be implemented by May 2017
- Development tasked to EASA from the European Commission
- Development Group established and held 6 meetings in 2015
- Task 1 for 2015 now complete and report has been provided to the European Commission
- Task 2 to finalise the development has now started and will provide chance for greater involvement from others organisations

Why Risk Classification?

- Reg 376 will also introduce occurrence risk classification to help identify the most important safety issues
- This is important because the things that happen the most are not the most likely accidents



Process – 2 Questions – Question 1

- What is the most credible accident outcome?
  - For the occurrence being scored, if it had escalated into an accident, what type of accident would it have been? (Importantly, this is an accident outcome and not what actually happened – the ERCS is designed to address potential risk)
  - Use a look up table based on list of reportable occurrence to identify the accident outcome
  - To allow for proportionality in the safety system choose the row in the matrix based on the aircraft involved (Large CAT, Small CAT, GA etc)

Process – 2 Questions – Question 2

- What is the likelihood of the occurrence escalating into the potential accident outcome
  - Based on the remaining barriers/ failed barriers
  - Use the barrier model based on the relevant accident outcome
  - Standard barriers for all models but with guidance depending on the situation
  - Evaluate the barriers to determine final ERCS Score
  - Further work needed to final the barrier models

Draft Full Matrix

	CLASSIFICATIONS									
Potential Accident Outcome										
Extreme catastrophic accident with significant potential fatalities (100+)	X/10	X/9	X/8	X/7	X/6	X/5	X/4	X/3	X/2	X/1
Significant accident with significant potential for fatalities and injuries (19-100)	S/10	S/9	S/8	S/7	S/6	S/5	S/4	S/3	S/2	S/1
Major accident with potential for some fatalities/life changing injuries (2-19) or major aircraft destroyed	M/10	M/9	M/8	M/7	M/6	M/5	M/4	M/3	M/2	M/1
Single Individual fatality/life changing injury or substantial damage accident	I/10	I/9	I/8	I/7	I/6	I/5	I/4	I/3	I/2	I/1
Minor and Serious Injury (not life changing) accidents and Minor Damage	E/10	E/9	E/8	E/7	E/6	E/5	E/4	E/3	E/2	E/1
	A/0									
	remaining barriers predicted to fail 1 in 1,000M times	remaining barriers predicted to fail 1 in 100M times	remaining barriers predicted to fail 1 in 10M times	remaining barriers predicted to fail 1 in 1M times	remaining barriers predicted to fail 1 in 100,000 times	remaining barriers predicted to fail 1 in 10,000 times	remaining barriers predicted to fail 1 in 1,000 times	remaining barriers predicted to fail 1 in 100 times	remaining barriers predicted to fail 1 in 10 times	Realised accidents

LIKELIHOOD OF ACCIDENT OUTCOME CATEGORIES

Question 1 – Example Demonstration

Airbus A320 - During ILS approach configuration selected to Flaps 2 + Gear down. PF requested FLAP 3 and FLAP FULL to be selected, however PM selected FLAP LEVEL 0 position. PF noticed raise of VLS (lowest selectable speed) and applied TOGA power and initiated missed approach manoeuver. The initial energy loss of the aircraft had been adjusted, therefore PF selected CLIMB thrust. At this time PF noticed on PFD that aircraft speed started to reduce and aircraft lost altitude. GPWS "SINK RATE" warning sounded, therefore PF decided to apply TOGA thrust. Crew deselected FD and stabilized aircraft.

X	Involving at least one large commercial aircraft (CS25 with >100 potential passengers or equivalent size for cargo aircraft) or all types of aircraft in a heavily populated area.
S	Involving at least one small commercial aircraft or helicopter (CS25 or CS29 with between 19 and 100 potential passengers or equivalent size for cargo aircraft)
M	Involving at least one small aircraft or helicopter (CS23 or CS27 with up to 19 potential passengers or equivalent size for cargo aircraft)
I	Involving at least aircraft not falling into a Certification Specification (e.g. Annex II) or Ultralight or RPAS)

Question 2 – Weighted Barrier Model

Aircraft Upset (LOC-I) due to Crew Factors				
Barrier Definition in Context of the Accident Outcome	**Barrier Name**	**Actor/s**	**Weighting**	**Potential Linear Scoring**
Fight operations management of the aircraft flight path (use of automation/ manual handling or awareness of flight crew incapacitation) through the correct operation of the aircraft to prevent loss of control situations.	Acting on Information	Flight Ops	20	10
ATC Conflict detection and resolution during the controlling of aircraft once to identify and prevent potential terrain collisions and resolve them effectively. (MSAW, APW, APM)	Operational Threat Awareness and Management	ATM	10	9
Aircraft design tolerance to mishandling by the flight crew and crew/ passenger protection afforded by the design. Availability and accuracy of aircraft upset warning equipment or automatic prevention systems (e.g. stall warnings and envelope protection systems).	Design	Aircraft	20	7
Operation & flight crew compliance with aircraft upset warning equipment (e.g. stall warnings and envelope protection systems) to prevent an actual loss of control once the potential for such a situation arises.	Warning System and Resolution Action	Flight Ops	20	5
Flight crew detection & recovery from upset conditions to prevent an actual loss of control or recover from such a situation.	Operational Threat Awareness and Management	Flight Ops	20	3
Actual Loss of Control Accident with Fatalities/ Life Changing Injuries	Accident Outcome	Flight Ops	10	1

Task 2 Activities

- A great deal of work to be completed in 2016
- Part 1 – Completion of Matrix and Process
- Part 2 – Translation from other Risk Classification Processes (e.g. ARMS/ RAT)
- Part 3 – Development of Guidance Material
- Part 4 – Development of Training Material
- Part 5 – Technical Implementation in ECCAIRS, Other SMS Software and Standalone Tools
- Part 6 – Long Term Reporting Improvements

Key Challenge of ERCS Scoring

- How to get enough information to make both an initial and then final ERCS Score
  - Currently we assume people know what to tell us in their occurrence report – develop focussed reporting depending on the occurrence type
  - Provide structure for occurrence investigations (e.g. airlines) - based on weighted barrier models – help needed for a couple of AIBs later in 2016
  - Structured final occurrence reports with ERCS scoring encouraged with organisations (although not mandatory)

CASIA Questions/ Thoughts

- Process and data quality improvement of accident/ serious incident reporting for Reg 376
  - How can we help support Reg 376 compliant reporting of accidents/ serious incidents to ECR
  - Especially needed to support ERCS scoring at NAAs
  - NoA and CASIA could work together
- Learning lessons from accident reports
  - Many reports are very long and summarised by well meaning people on the internet
  - How can we work together to make summaries?
  - Propose EASA and a selected AIB develop concept

EASA
European Aviation Safety Agency

Comments or Questions?

Your safety is our mission.

An agency of the European Union