



# AFI Flight Operations Safety Awareness Seminar (FOSAS)

Safety awareness

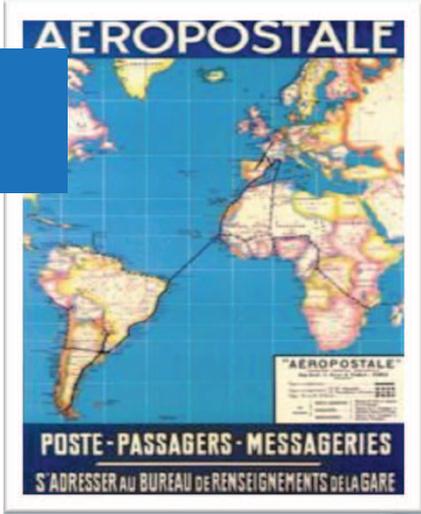
ICAO/Airbus  
Nairobi, 19-21 Sep. 2017

**AIRBUS**

# Safety in the past



Single Engine Aircraft,  
“Visual all weather flying”,  
Pioneers...



# Safety in the past

✈️ **Then came airliners ...**

**Aviation in style, but...**



# Evolution of Safety culture



*Technical*

**Mechanical  
Improvements,  
Better Technology**



*Human*

**CRM  
Human  
Performance**



*Organizational*

**SMS,  
Organizational  
Performance**

1950s

1970s

1990s

2000s

2010s

# Agenda

Safety Awareness

**Safety: the  
concept**

**Safety in aviation**

**Safety statistics**

**Safety  
information**

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Safety Awareness

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# What is Safety?

- + Collins dictionary: Freedom from danger or risk of Injury

## SAFETY ?

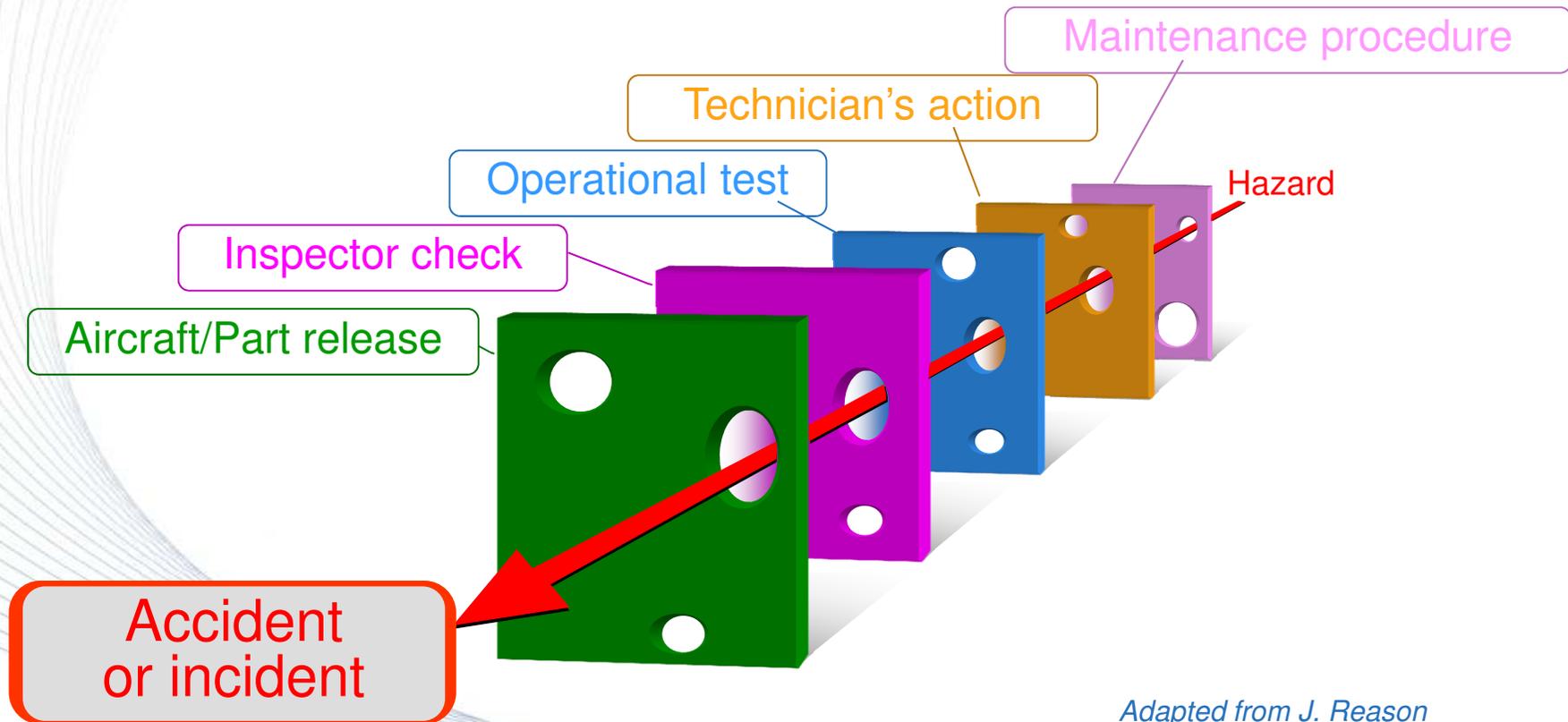
But:

- + The elimination of accidents (and serious incidents) is unachievable
- + Failures will occur, in spite of most preventative efforts (design, training, doc....)
- + No human activity (including human-made system) can be guaranteed to be absolutely free from hazard and operational errors
- + ICAO extract: The state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level ...



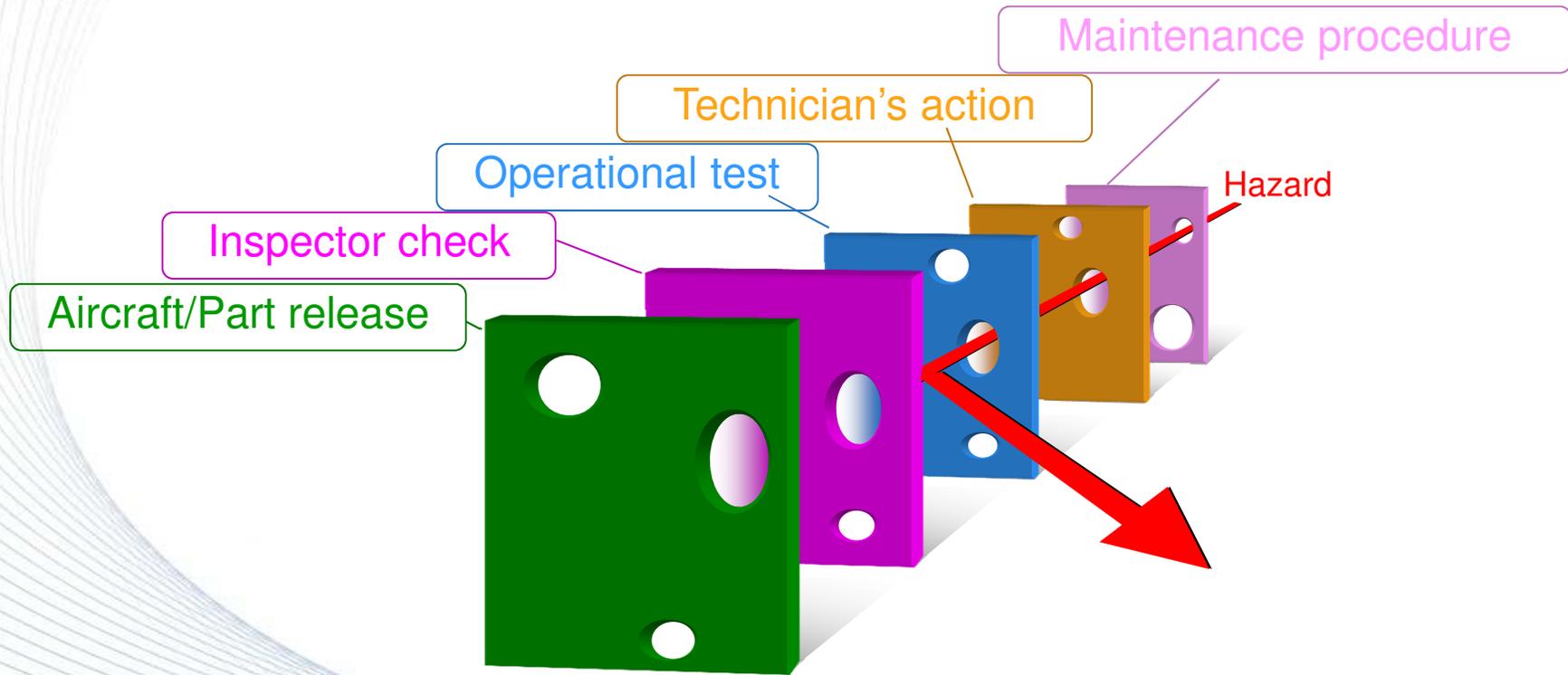
**Safety Management System**

# Genesis of an accident/incident



*Adapted from J. Reason*

# How to reduce the risk?



*Adapted from J. Reason*

# Hazards

**Hazard:** A condition or an object with the potential to cause injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.



Hazard ?



Event  
(Incident)



Event  
(Incident)



Event  
(Accident)

# Hazards

Hazard	Consequences		
Wind (X-Wind)	Loss of lateral control at TO or LDG	Lateral runway excursion	People injuries A/C damaged
Runway Signage damaged	- Use - Gro rest	Lateral runway excursion	People injuries A/C damaged
Regulatory change	Train upda	- Incorrect / negative training	Pilot error => incident / accident
New modification in ops doc	- Err	- Wrong operations	People injuries A/C damaged

Not always bad things!

Mitigation

Mitigation

Mitigation

Hazards must be detected, analyzed, mitigated for preventive safety management

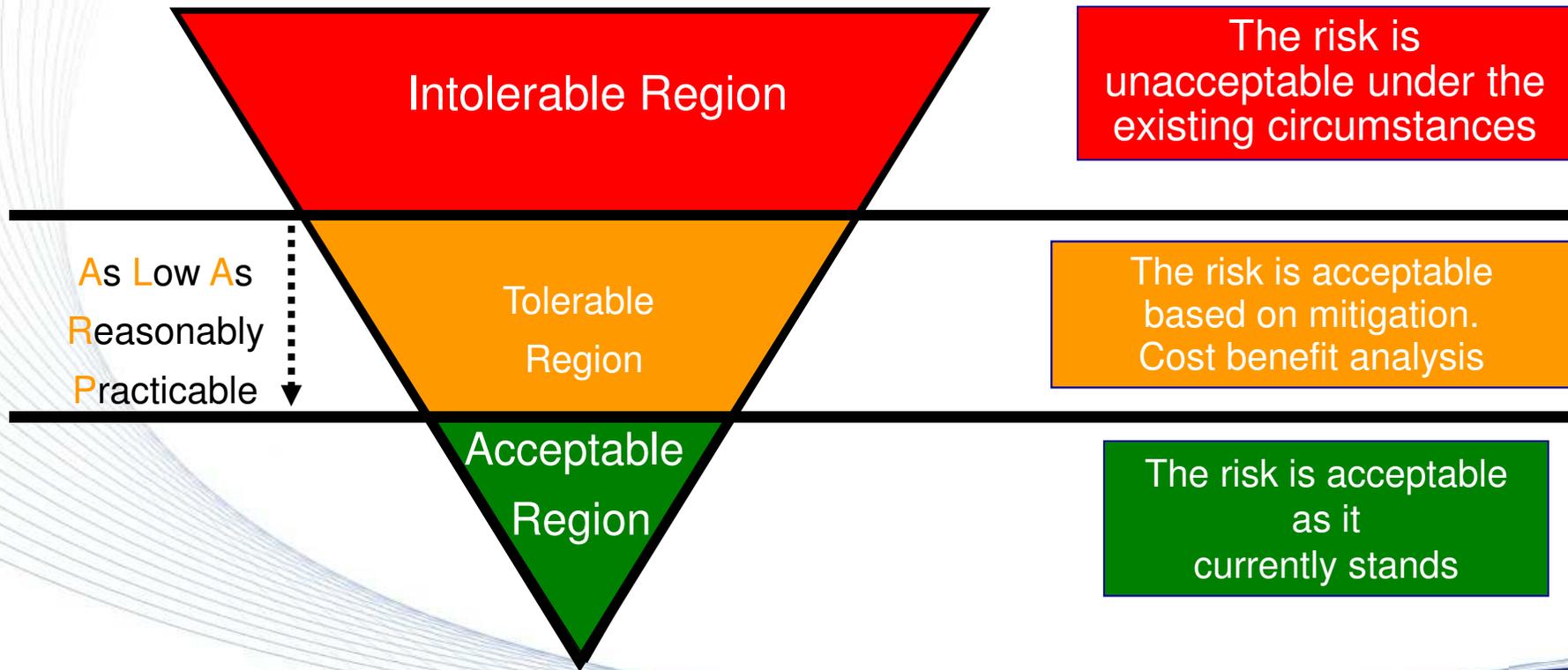
# Risk Assessment

**Safety Risk Assessment:** Expressed in terms of predicted probability and severity, of the consequences of a hazard, taking as reference the worst foreseeable situation.

Safety Assessment Matrix					
Risk Probability	Risk Severity				
	Negligible	Minor	Major	Hazardous	Catastrophic
Frequent	Green	Yellow	Red	Red	Red
Occasional	Green	Yellow	Yellow	Red	Red
Remote	Green	Yellow	Yellow	Yellow	Red
Improbable	Green	Green	Yellow	Yellow	Red
Extremely Improbable	Green	Green	Green	Yellow	Yellow

# Scope of this process

## Safety risk level and tolerability



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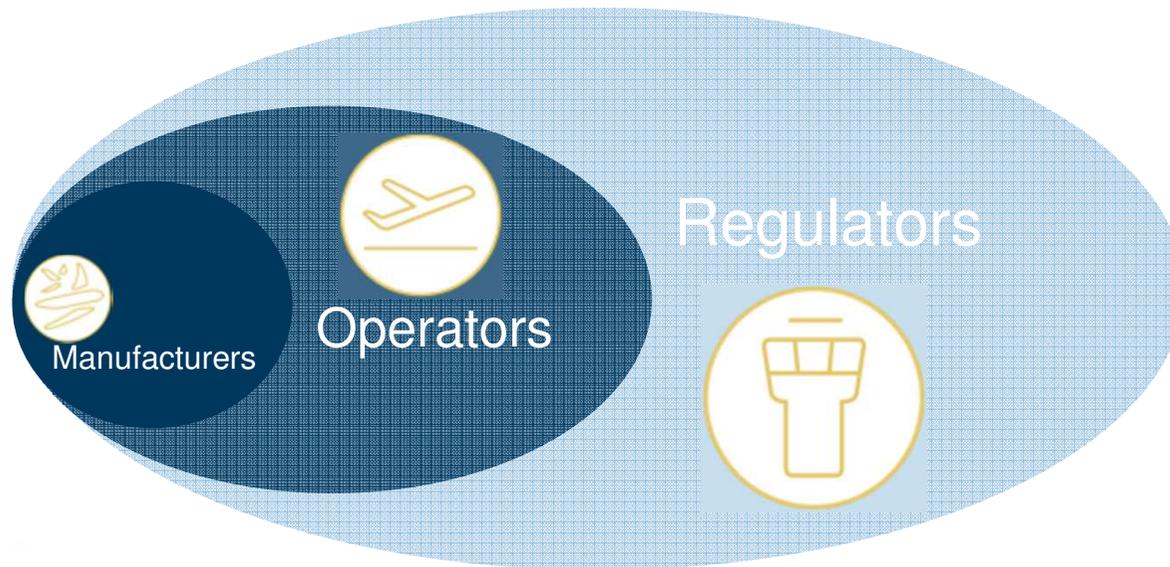
**Safety statistics**

**Safety  
information**

# Safety in aviation



# Safety at all levels....



**Everyone contributes to safety**

# Safety for an operator – Why?

The operator shall have a process to ensure dissemination of flight safety information to appropriate operational and other personnel to promote continuing education and interest

+ Goal:

- + Effective channels of communication are established to ensure the optimum distribution and availability of safety information, increasing awareness and developing a common understanding of safety and the nature of hazards

+ Key Safety Benefits:

- + Promotion of the airline's safety culture
- + Safety issues are proactively and openly discussed
- + Accident/incident prevention
- + Development of “common sense” regarding safety, threats, hazards and risks



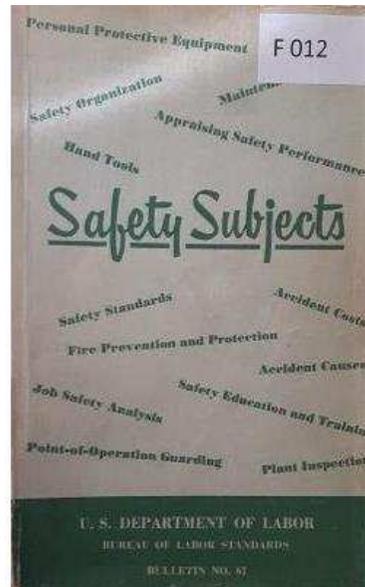
# Safety Culture

- + Positive Safety culture
  - + Develop your safety culture , be safety-minded
- + Active, effective and voluntary safety reporting
  - + Nobody is in a better place to report existence of any (potential) safety items than You
- + « Just culture » applies for self reporting
  - + Human errors are possible
  - + Different from violation: Intentional / deliberate act
- + Contribute in Safety initiatives



# Safety Promotion

- + Internal Communication / Promotion Means
  - + Safety Newsletters
  - + Internal notice



Propose  
**SUBJECTS!**

**Everyone on board Safety!**

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# Review of Accident Statistics

## The accident statistics:

Include all known hull losses & fatal accidents during revenue flights

Include western built airplanes (>100pax) only

Exclude test flights, training flights, terrorism & acts of war

# Review of Accident Statistics - Valid as of 2016

## 1 Early commercial jets

### From 1952

Dials & gauges in cockpit. Early auto-flight systems  
Comet, Caravelle, BAC-111, Trident, VC-10, 707, 720, DC-8, Convair 880/890



## 2 More integrated auto-flight

### From 1964

More elaborate auto-pilot and auto-throttle systems  
Concorde, A300B2/B4, Mercure, F-28, BAe146, VFW 614  
727, 737-100 & -200, 747-100/200/300/SP, L-1011, DC-9, DC-10



## 3 Glass cockpits & FMS

### From 1980

Electronic cockpit displays, improved navigation performance and Terrain Avoidance Systems, to reduce CFIT accidents

A300-600, A310, Avro RJ, F-70, F-100, 328JET, 717, 737 Classic & NG, 757, 767, 747-400/-8, Bombardier CRJ, Embraer ERJ, MD-80, MD-90



## 4 Fly-by-wire

### From 1988

Fly-by-wire technology enabled flight envelope protection, to reduce LOC-I accidents

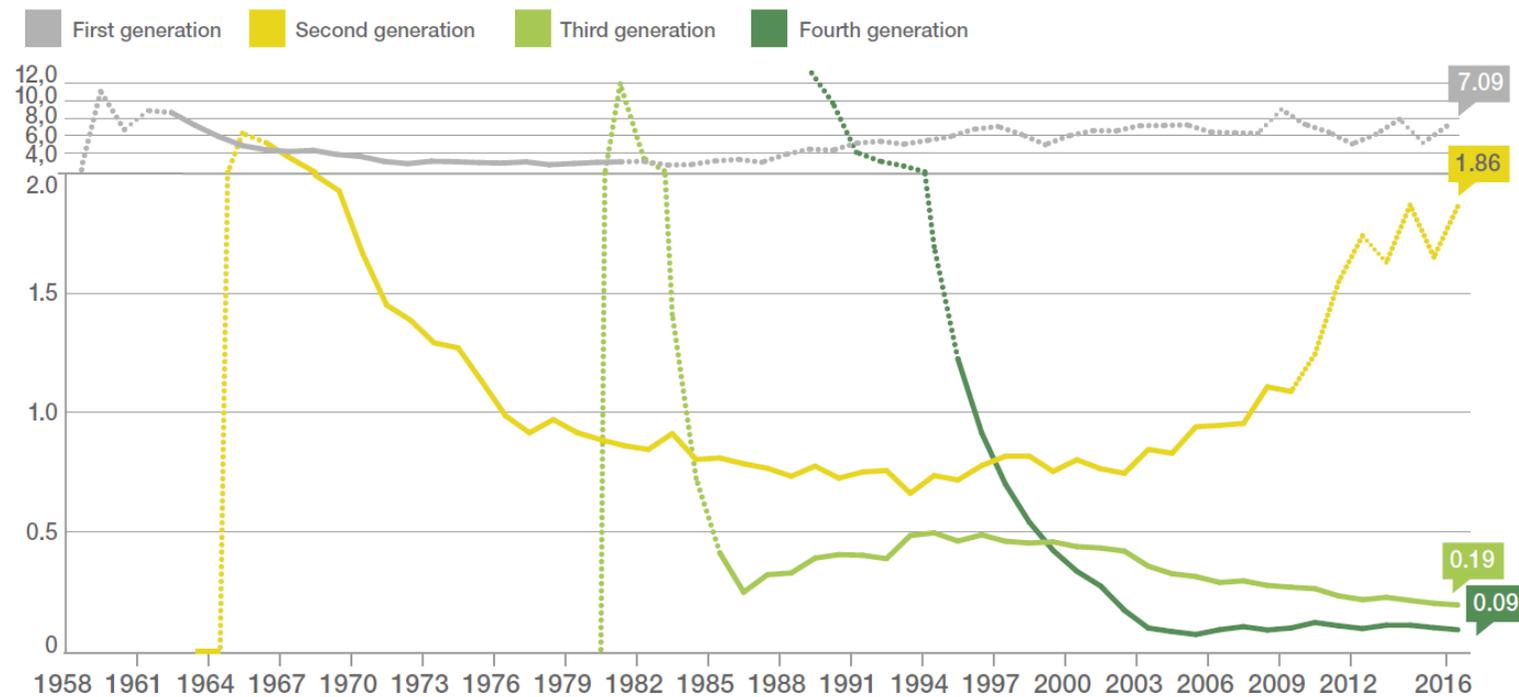
A318/A319/A320/A321, A330, A340, A350, A380  
777, 787, Embraer E-Jets, Bombardier C-Series



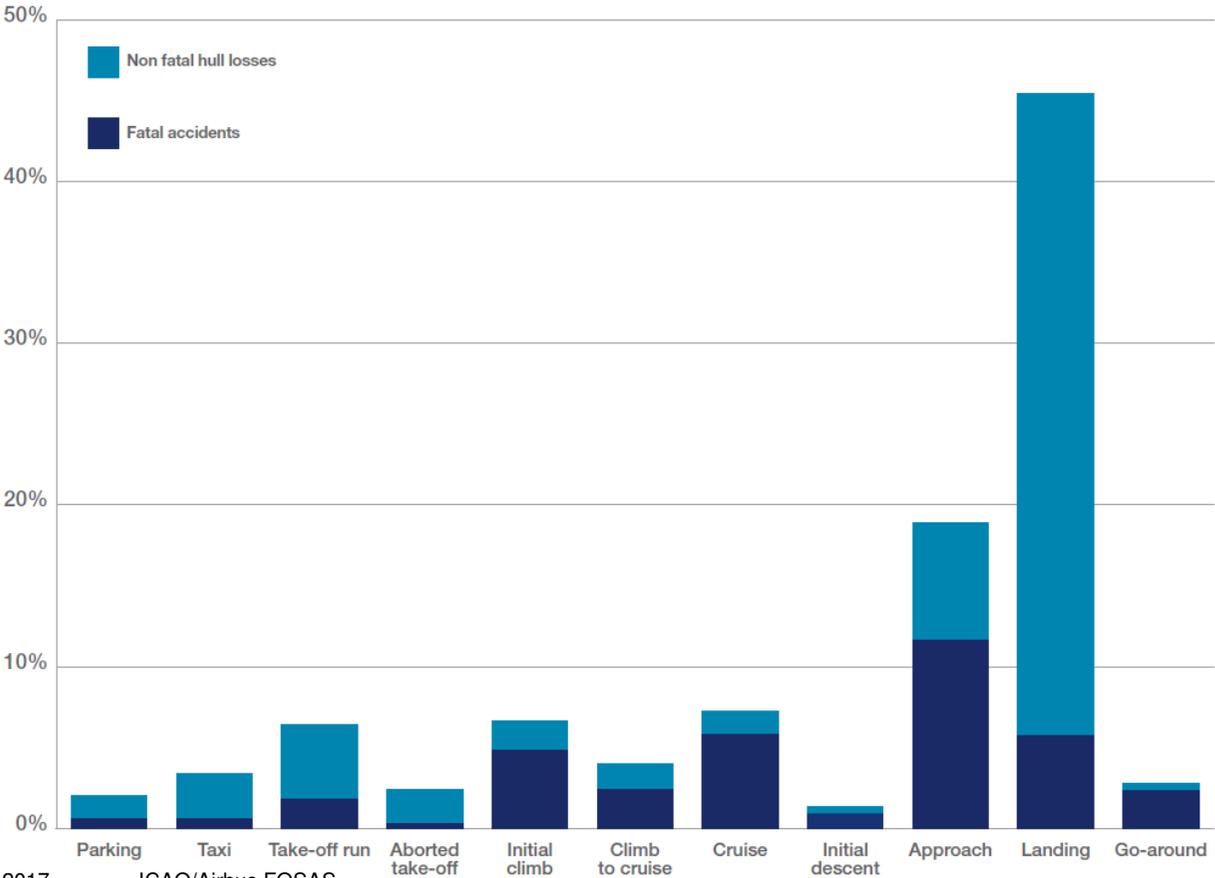
# FATAL accidents (1958→2016)

10 year moving average fatal accident rate by aircraft generation

Accidents per million flight departures



# Accidents by flight phase last 20 years



# Distribution of accidents by accident category - Last 20 Years

## Fatal accidents



### + Loss of Control in Flight (LOC-I):

*Loss of aircraft control while in flight not primarily due to malfunction*

### + Controlled Flight Into Terrain (CFIT):

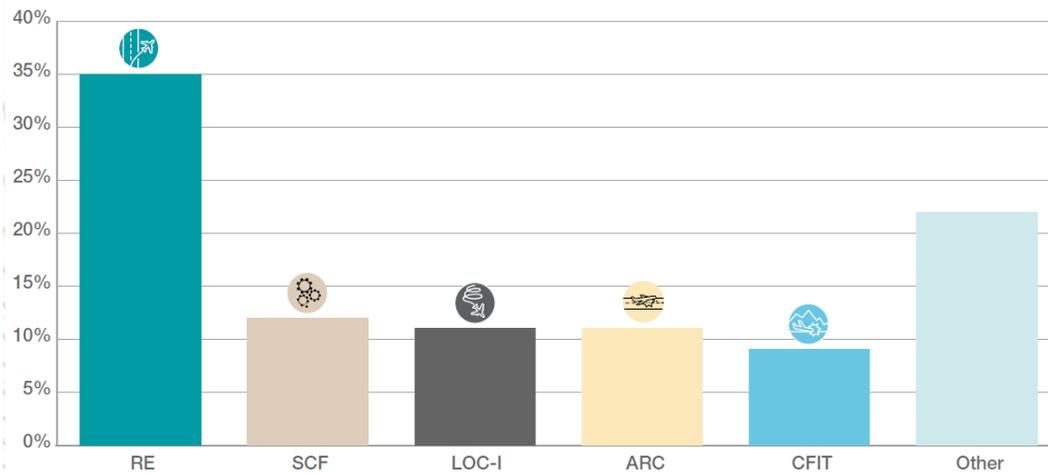
*In-flight collision with terrain, water, or obstacle without indication of loss of control*

### + Runway Excursion (RE):

*A veer off or overrun off the runway surface*

# Distribution of accidents by accident category- Last 20 Years

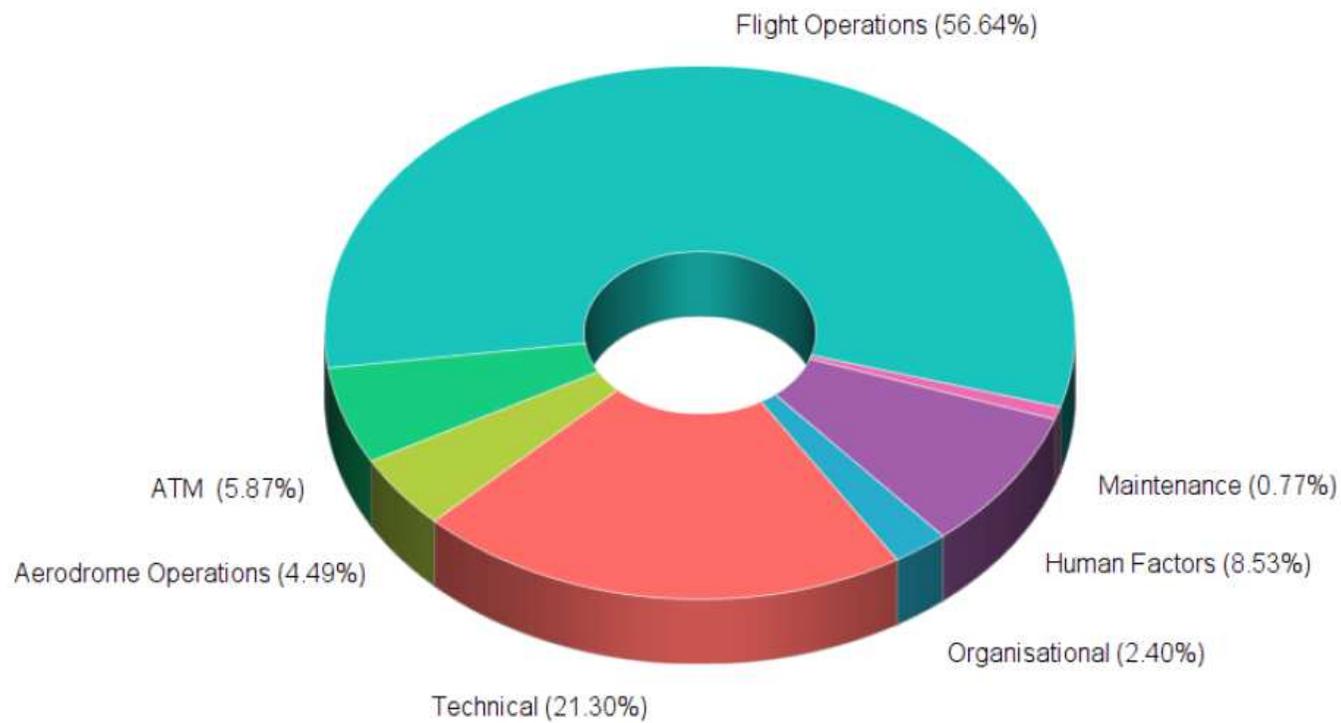
## Hull loss



- + Runway Excursion (RE):  
*A veer off or overrun off the runway surface*
- + Loss of Control in Flight (LOC-I):  
*Loss of aircraft control while in flight not primarily due to malfunction*
- + System/Component Failure or malfunction (SCF):  
*Failure or malfunction of an aircraft system*
- + Controlled Flight Into Terrain (CFIT):  
*In-flight collision with terrain, water, or obstacle without indication of loss of control or component*
- + Abnormal Runway Contact (ARC):  
*Hard or unusual landing including Tail strikes*

# Causes of accidents – Last 10 years

Source: Accidents and Serious Incidents involving EASA Member State Operators between 2007 and 2016.



# Flight Operations: which solutions?

- + The solution is not only technical
- + But is also operational



# New threats and associated enhancements

Flying skills

Weather

Systems  
knowledge

Enhanced  
training

Enhanced  
systems

Better use of  
Flight data  
Monitoring

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# Where to find Airbus Safety Awareness Information?

+ Information available on



## Flight Operations

### Manuals

Additional Info - Main FCOM - FCTM - MMEL Changes  
 Additional Info - Modification Documentary Impact  
 Airplane Flight Manual  
 Flight Crew Operating Manual

Flight Crew Training Manual  
 Generic CCOMs - Generic Cabin Crew Operating Manuals  
 In-Service Aircraft Technical Flight Manual  
 MMEL Maintenance Procedure

Master Minimum Equipment List  
 Quick Reference Handbook  
 Weight and Balance Manual

### Operational Expertise

Digest of available enhancements  
 FOBN - Flight Operations Briefing Notes  
 Flight Deck and Systems Briefing For Pilots

Getting to Grips

### Operational Material

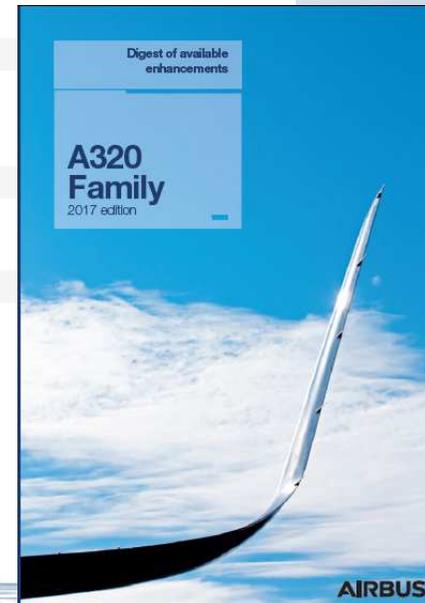
ATQC - Airbus Temporary Quick Change  
 Communication Navigation and Surveillance - Air Traffic Management

### Specific Flight Operations Topics

Abnormal V Alpha Prot  
 Airplane upset recovery  
 Golden rules

High AOA Protection  
 Incorrect Vertical Profile during non precision approaches  
 Stall recovery

Takeoff Safety



# D10X APP + Website

+Airbus “Air Transport Safety Destination 10X Together”



D10X App



# Subjects selected – Safety Threats topics



## Subjects selected – Exchange Enhancement topics



# Flight Operations Safety Awareness Seminar

- + Address main threats and hazards to flight operations safety
- + Deliver Safety Awareness Information  
Practical, ready and easy to use
- + Support Incident/accident Prevention within an Airline's Safety Management System

