### Closing the loop on Runway Safety



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Logan Jones – Runway Safety Specialist

#### 2017Jet aircraft accidents



### Safety during approach and landing in figures (Yearly on average)



EUROCONTROL – Annual Safety Report 2017





# Preparation

ROPS



### **Prepare the Approach**

#### Situational Awareness

- Anticipate
- Detect
- Correct
- Decide



🗹 AIB Manager 🤤		17:48				70 % 🗖			
🗙 My Flight	LANDING	F-A320	A320	-214		Ģ	*	₿	
IN-FLIGHT	09L								
EGLL/LHR HEATHF	Row						13		
RWY	09L	ONF	CONF F	ULL		1			
WIND °/kt (12	20/2) VAPP		136	kt		1			
OAT °C 5 (ISA	-10) EO GA	SPEED	135	kt		I			
QNH hPa 1	1010 FO GA	GRADIENT	6.9	%			ma		
RWY COND 2-Medium to	poor AT 158	3 ft	010				202	20 m	
LW T	60 MLW (	PERF)	90	Т					
LDG CG Basic (S	STD)								
LDG CONF AUTO C	ONF					Ē			
AIR COND Off (S	STD)				F-LD	901	-	50 m	
A-ICE	Off				1881 m	ŝ		•	
APPR TYPE Normal (S	STD)							•	
GA GRADIENT % 2.1 (	STD)						14		
VPilot kt	0							¥ 2	
LDG TECH MAN-A/THR on (	STD)								
BRK MODE Manual (S	STD)								
REV Yes (S	STD)								
MELO CDLO E	GAM 0					091			
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		_				SX			

## Technologies for Improving Safety at Landing

SAFETY NETS



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### Runway Overrun Prevention System (ROPS) Designed to prevent overruns at landing

#### **3+ million** landings with ROPS

## 1,500+ aircraft

#### equipped with ROPS

#### 90+ operators trust ROPS



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#### How does an overrun occur?

Small deviations can have large impacts on the landing distance



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	I	I	I	I
Nominal In-Flight Landing Distance		15% safe	ety factor	
5kt Tail-Wind (additional ground speed)				
Each additional 10ft above threshold over 50ft				
Each additional 1s of flare over 7s				
Each additional 1s delay of pedal braking			I	I
Each additional 3s delay applying max reverse		I.		
Runway Friction 10% worse than expected				
			'	

5%

10 %

Т

Т

15 %

o %

Т



### Enhanced safety throughout the approach...and more



### Combination of 2 on-board technologies to enhance runway safety

#### **SmartLanding**®

#### Increased crew situational awareness

- Preventive alerts allowing corrections during final approach phase
- Enhanced detection of unstabilized approaches by the crew (unstable)
- > Monitoring of erroneous altimeter setting
- Alerting when the aircraft is not aligned with the runway

# Performance-based runway overrun protection

**ROPS+** 

- > Protective alerts during the landing phase
- Real time landing distance assessment for stopping distances
- > Compatible with foreseen EASA mandate for ROAAS ref. NPA\_2018\_12 <u>link</u>





# Braking Action Computation Function (BACF) & RunwaySense<sup>by NAVBLUE</sup>

IMPROVING INFORMATION ON RUNWAY CONDITIONS





#### Improve runway conditions awareness together ... but how?



### **Braking Action Computation Function (BACF)**

Use the data measured by the aircraft during its deceleration roll to identify the braking action level...

#### Actual braking performance



#### Reference Aircraft Performance Model





...and make it available to the airspace users to improve runway condition awareness



## Conclusion – Closing the Loop



### Provide the **right** tools and information to the flight crew, to make the **right** decision at the **right** time





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