Runway Incursion

Preventive measures at aircraft level

EAPPRI v3.0 Runway Safety Seminar
Lisbon, 18 October 2018

Daniel Lopez Fernandez
Product Safety Enhancement Manager

AIRBUS

1 Introduction

2 Currently available technologies

3 In-development technologies

4 Conclusions

AIRBUS

1 Introduction

2 Currently available technologies

3 In-development technologies

4 Conclusions

AIRBUS

Statistics

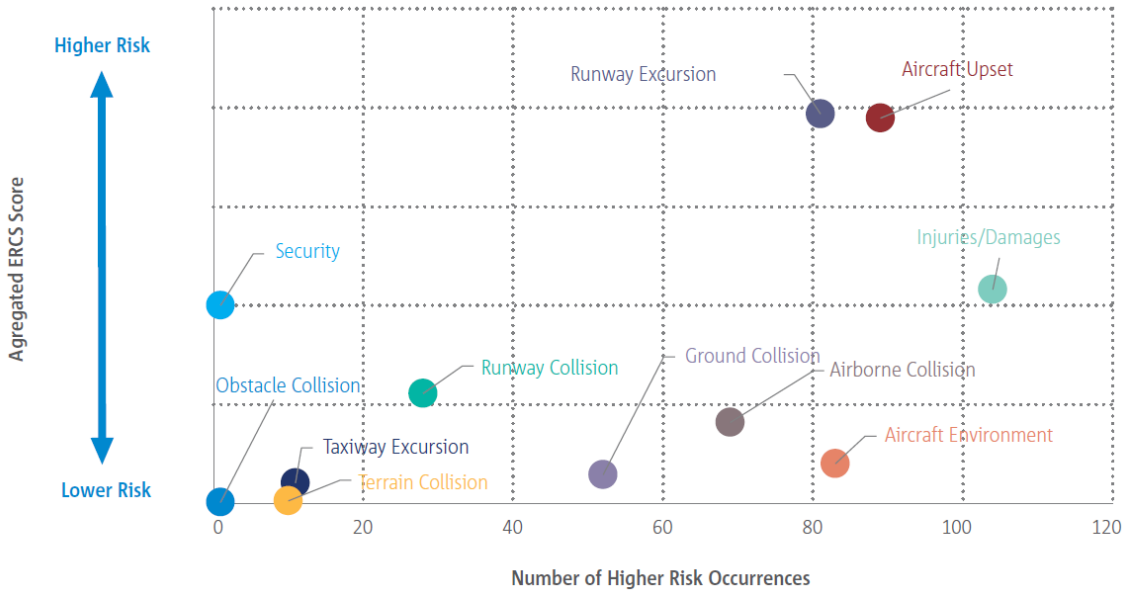
EASA Safety Review 2018

- Runway collisions account for **28 mid – high risk occurrences** recorded in the period 2013 – 2017.
- Despite low rate, real risk

IATA Safety Report 2017

- “ Accidents continue to occur on runways, and the **rate** and number of runway incursions **remain steady**. ”
- **1** runway incursion event **every day** average reported during period 2012 – 2016

Figure 16. Distribution of key risk areas by frequency and aggregated ERCS risk score for commercial air transport airlines and non-commercial complex business, 2013-2017

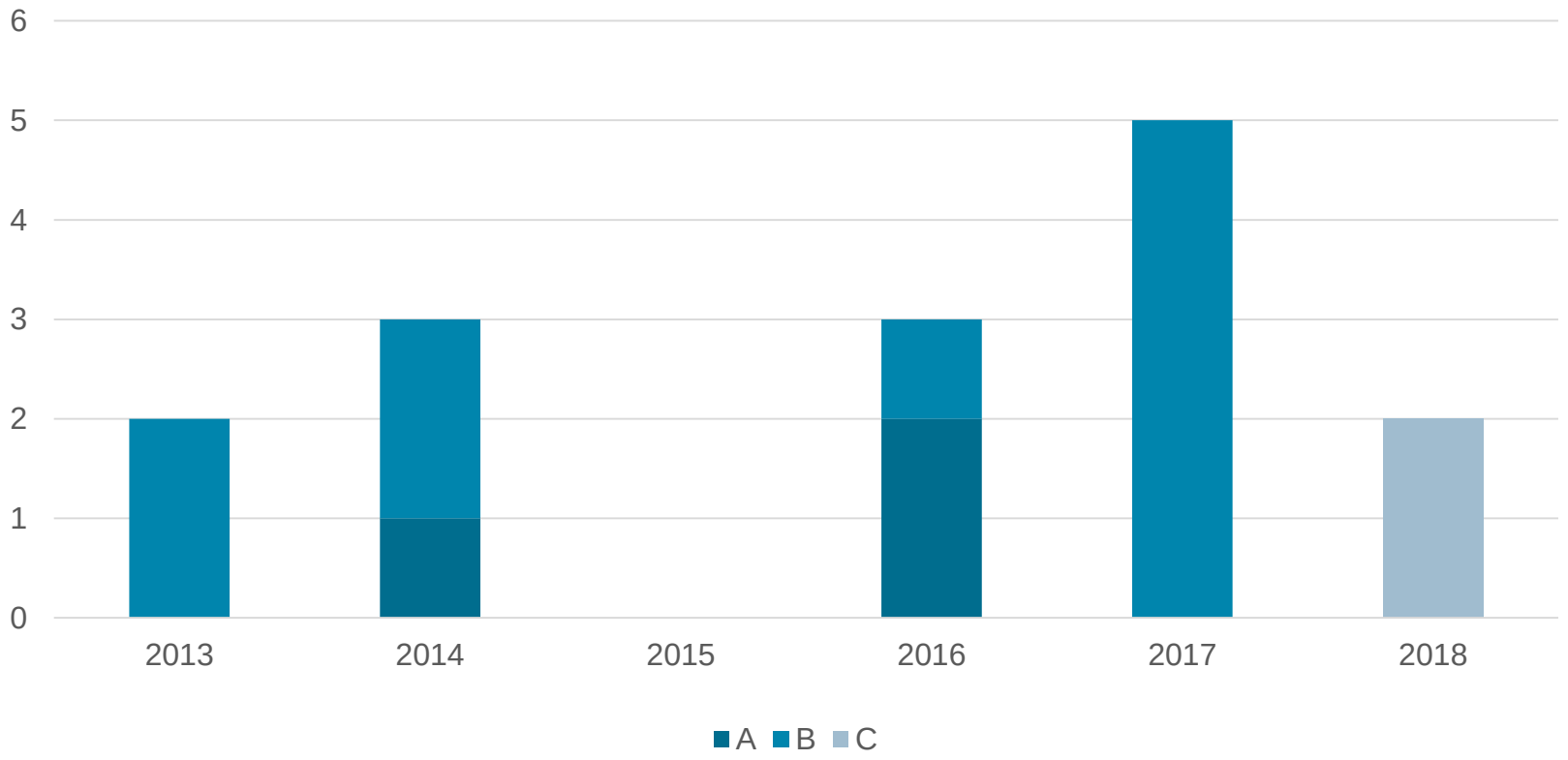


Runway Incursions & Collisions

- Runway Incursions & Collisions remain a reality
- Steady rates
- Mid - high risk occurrences

AIRBUS

Statistics

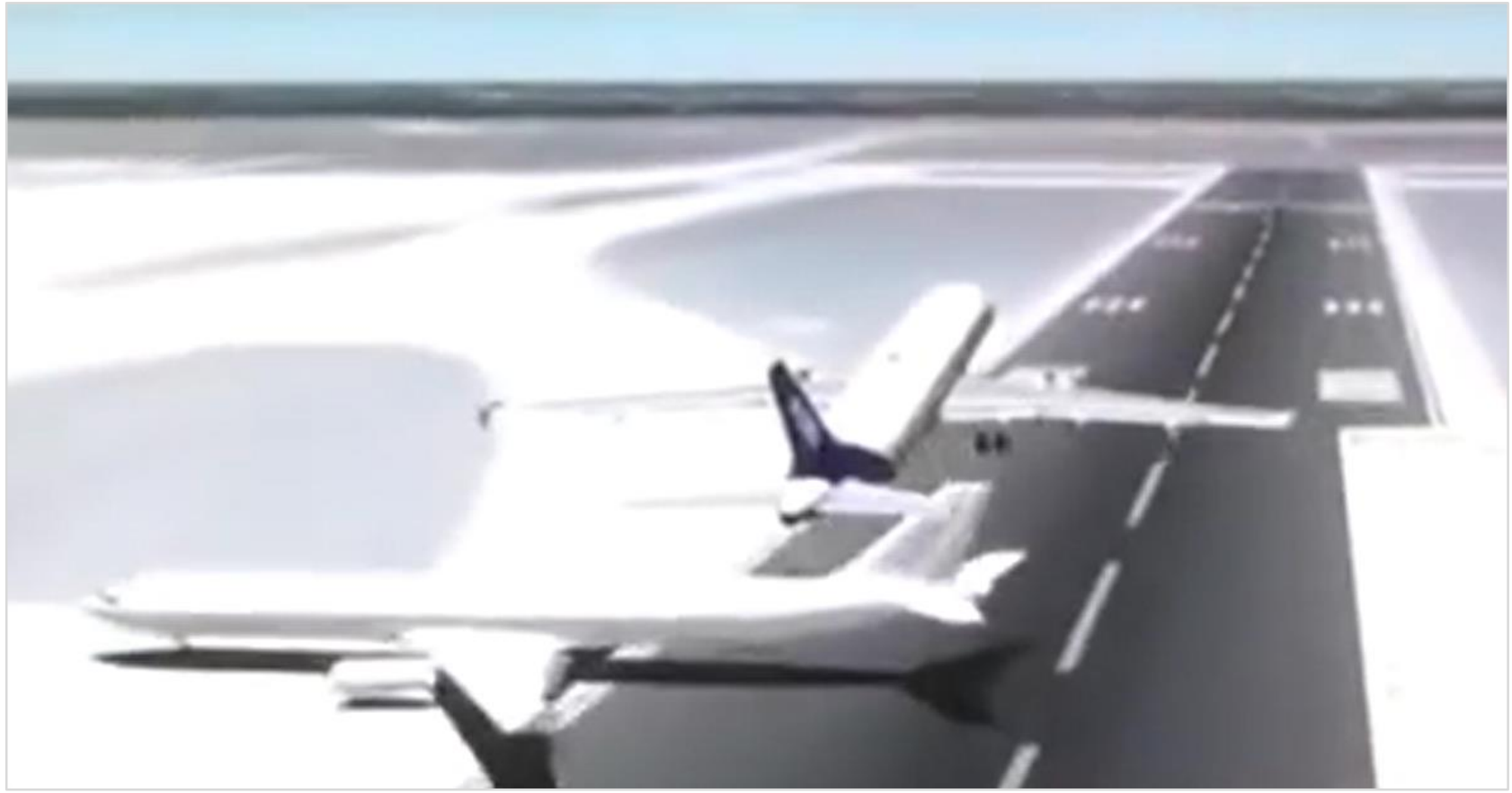


Events reported to Airbus

- Mainly linked to Annex 13 investigations
- Could be classified as being A to C category

AIRBUS

Reported RI event example



11 October 2016 Shanghai airport
A320-214 & A330-343

A330 RI during A320 T/O

- A320 cleared T/O on RWY 36L.
- 37” later:
  A320 initiating T/O &
  A330 cleared to cross 36L via H3
- 160kt GS, RTO initiated by FO: brakes for 9”
- Then TOGA & rotation by CAPT
- A320 crossed 36L/H3 at [86ft - 119ft]
- Flight continued uneventfully

AIRBUS

EAPPRI v3.0 recommendations

1.4.16 (Aircraft Operator)

Aerodrome charts or an equivalent electronic device should be displayed on the flight deck during taxi. This includes when operating at the home aerodrome.

1.9.1 (Technology)

Improve **situational awareness** by adopting the use of technologies that enable operational staff on the manoeuvring area to **confirm their location in relation to the runway** e.g. via GPS with transponder or airport moving maps, visual aids, signs etc.

1.9.2 (Technology)

Promote the integration of **safety nets** to provide **immediate and simultaneous runway and traffic proximity alerts** for pilots, air traffic controllers and manoeuvring area vehicle drivers.

EAPPRI v3.0 at A/C level

- Aerodrome charts displayed to crews
- Situational awareness: confirm A/C location vs. runways
- Runway traffic alerts

AIRBUS

1 Introduction

2 Currently available technologies

3 In-development technologies

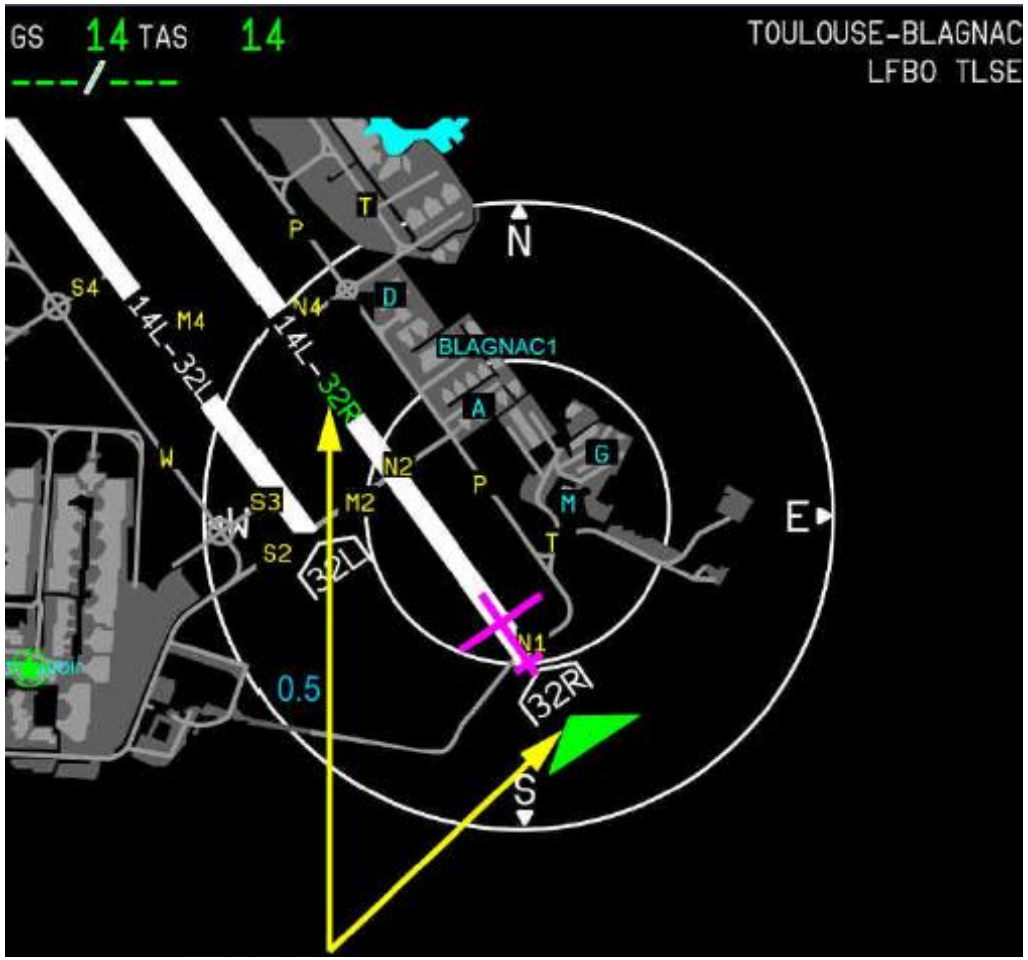
4 Conclusions

AIRBUS

Airport Navigation

Airport Moving Map

ROSE-NAV mode – 1 NM



PLAN mode – FMS selected runway highlighted

Airport Navigation

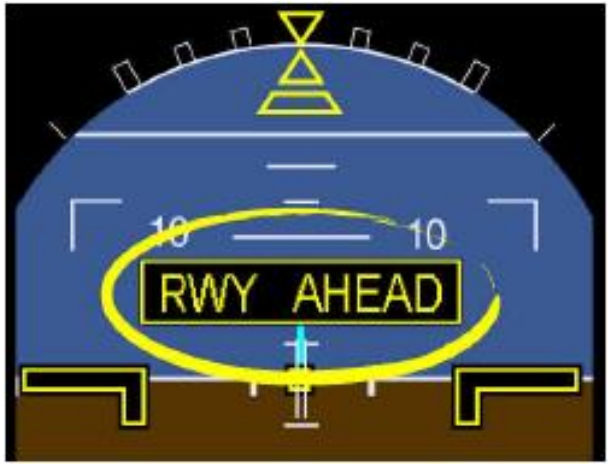
Airport Moving Map

- Moving airport navigation map with aircraft location
- Improves situational awareness
- Prevents navigation errors on airports
- Reduces Runway Incursion risk
- Basic on A380 & A350 aircraft. Option on A320 & A330.

AIRBUS

Airport Navigation

Approaching Runway Advisory



Airport Navigation

Approaching Runway Advisory

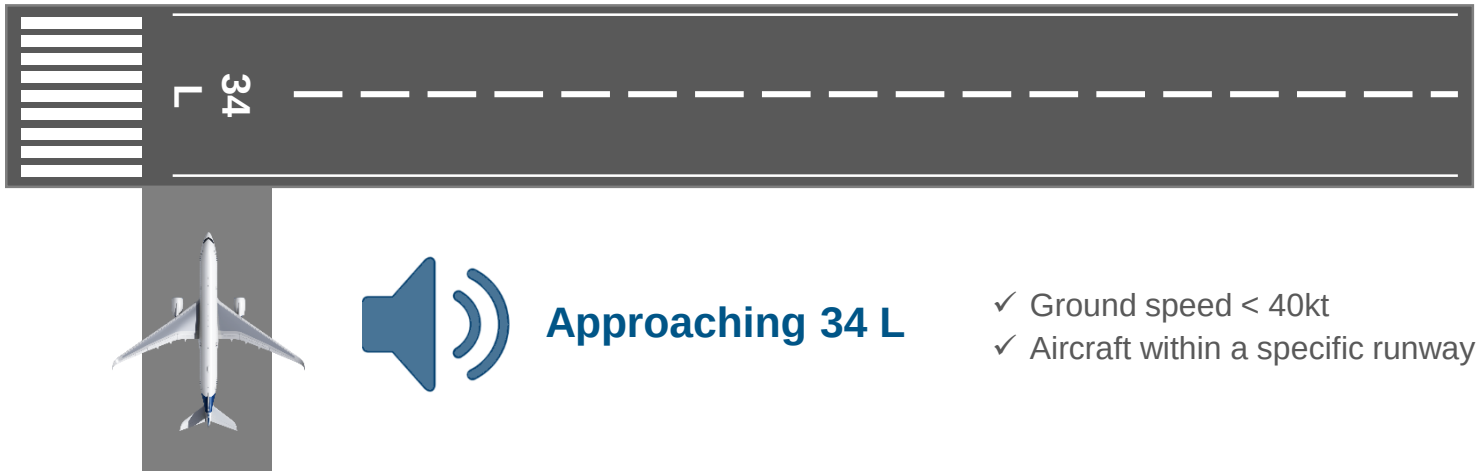
- Complements Airport Moving Map
- Visual advisory when approaching a runway
- Indication in Moving Map, Primary Flight Display & Head Up Display

AIRBUS

Runway Awareness & Advisory System

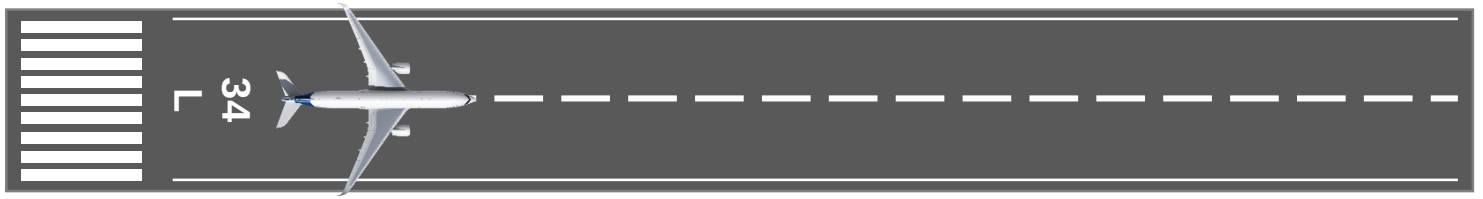
Honeywell RAAS

Audio advisories available on ground:



Approaching 34 L

- ✓ Ground speed < 40kt
- ✓ Aircraft within a specific runway distance



On Runway 34 L

- ✓ Aircraft enters the runway
- ✓ Aircraft heading within QFU +/- 20°

Honeywell RAAS

- Function implemented in Honeywell EGPWS
- Routine Advisories “Approaching Runway” and “On Runway”
- Certified on A320 & A330 aircraft

AIRBUS

1 Introduction

2 Currently available technologies

3 In-development technologies

4 Conclusions

AIRBUS

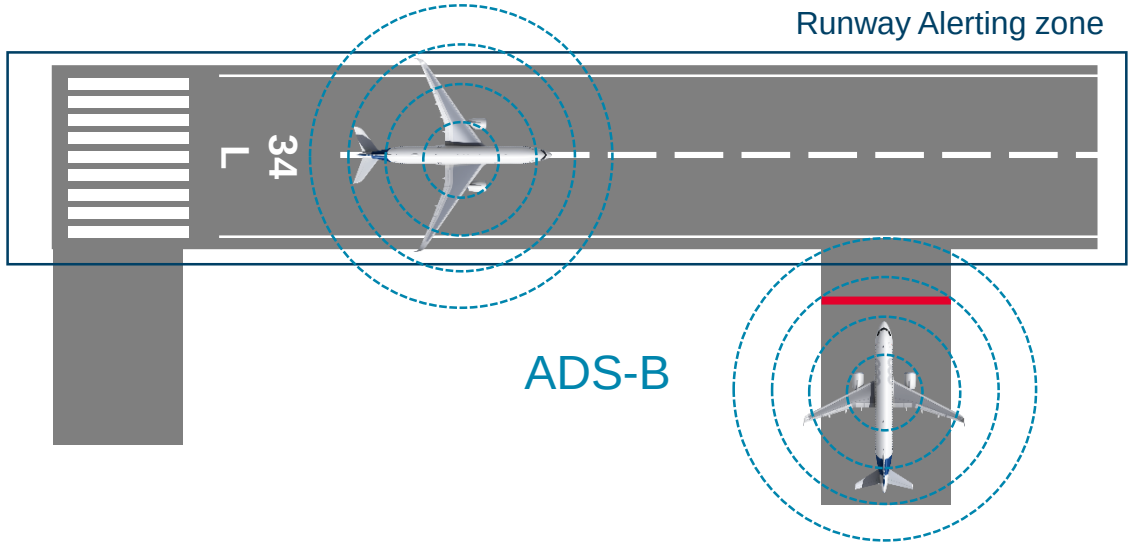
Surface Alerting (SURF-A)

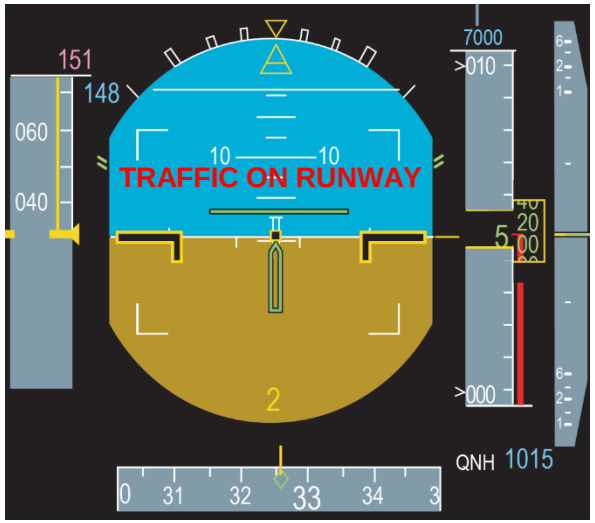
Purpose

- Provide an additional **on board** safety net for **prevention** of **aircraft collision** in the runway.
- Complements ground safety nets such as Runway Status Lights.

Principles

- Non Directive alerting function.
- Real time computation of runway collision risk with ADS-B capable aircraft within – or about to enter – the Runway Alerting zone.





TRAFFIC ON RUNWAY

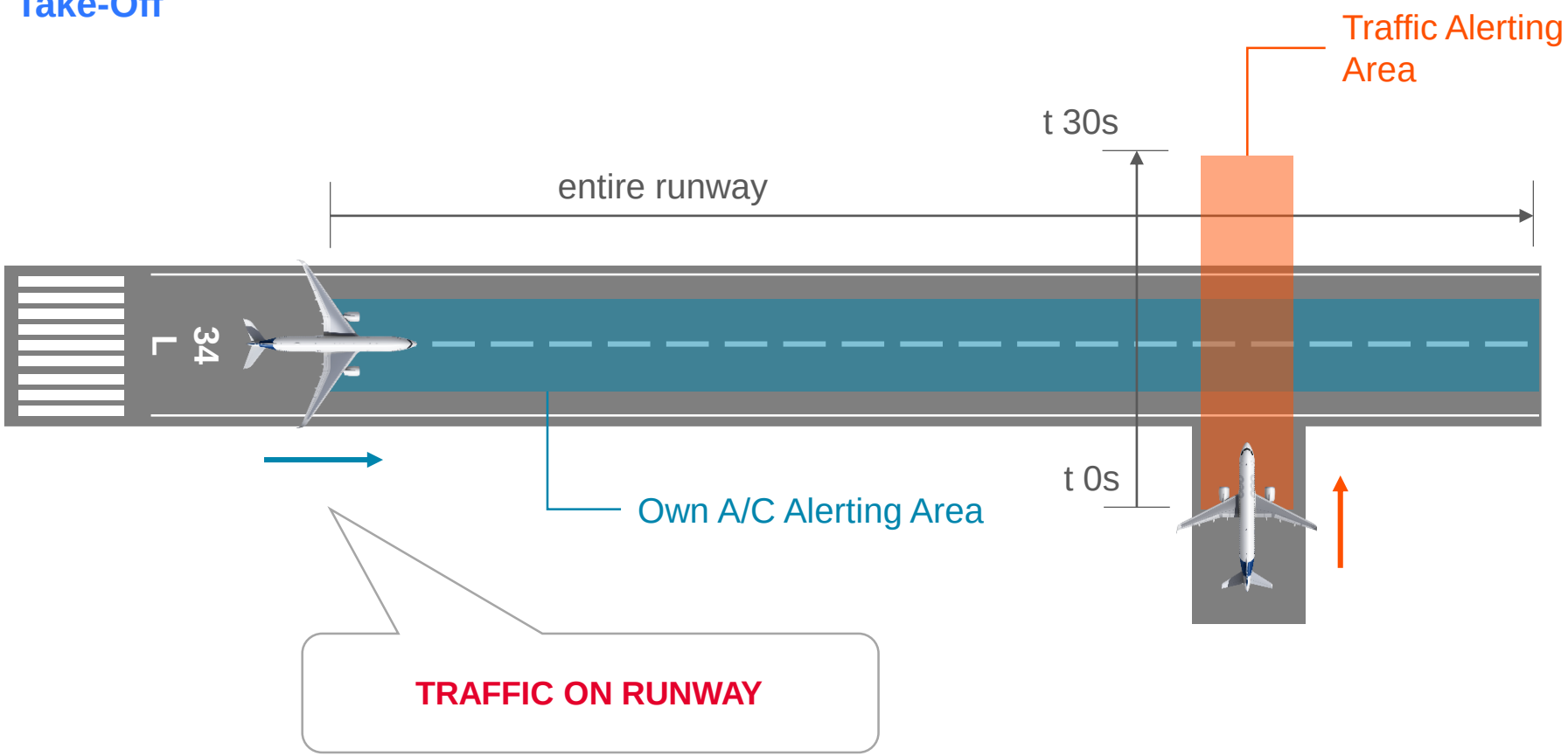
Purpose & Principles

- Stand-alone on board safety net
- Prevention risk of collision with Aircraft
- Based on ADS-B
- Detection algorithm in TCAS computer
- Triggers cockpit audio and visual alerts
- Forward fit & retrofit

AIRBUS

Surface Alerting (SURF-A)

Take-Off



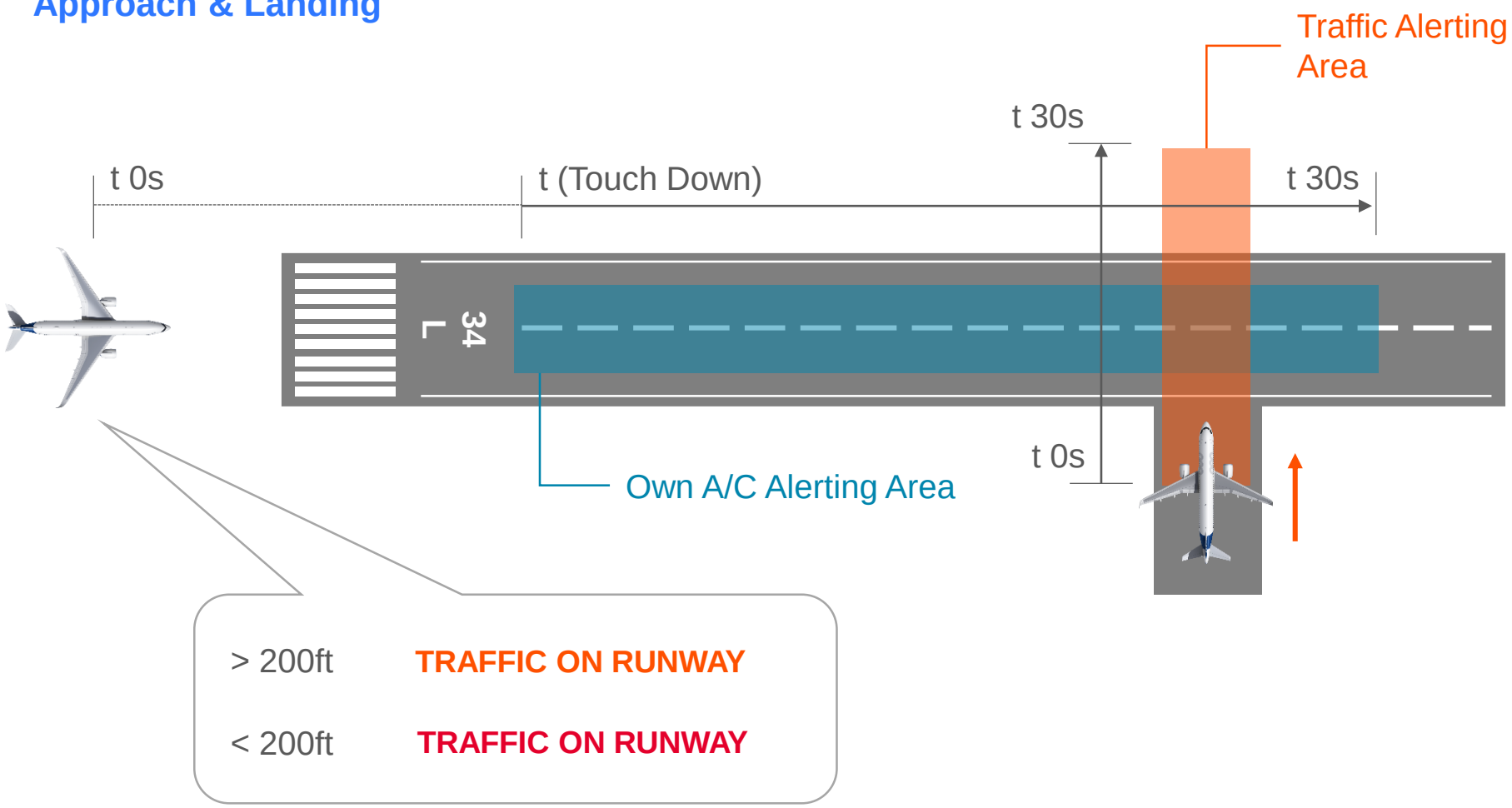
Operational Scenarios: Take-Off

- Take-off detection through Throttle position
- Look ahead: entire runway
- In case of conflict: Warning
- RTO expected

AIRBUS

Surface Alerting (SURF-A)

Approach & Landing



Operational Scenarios: Approach & Landing

- Look ahead: 30”
- In case of conflict:

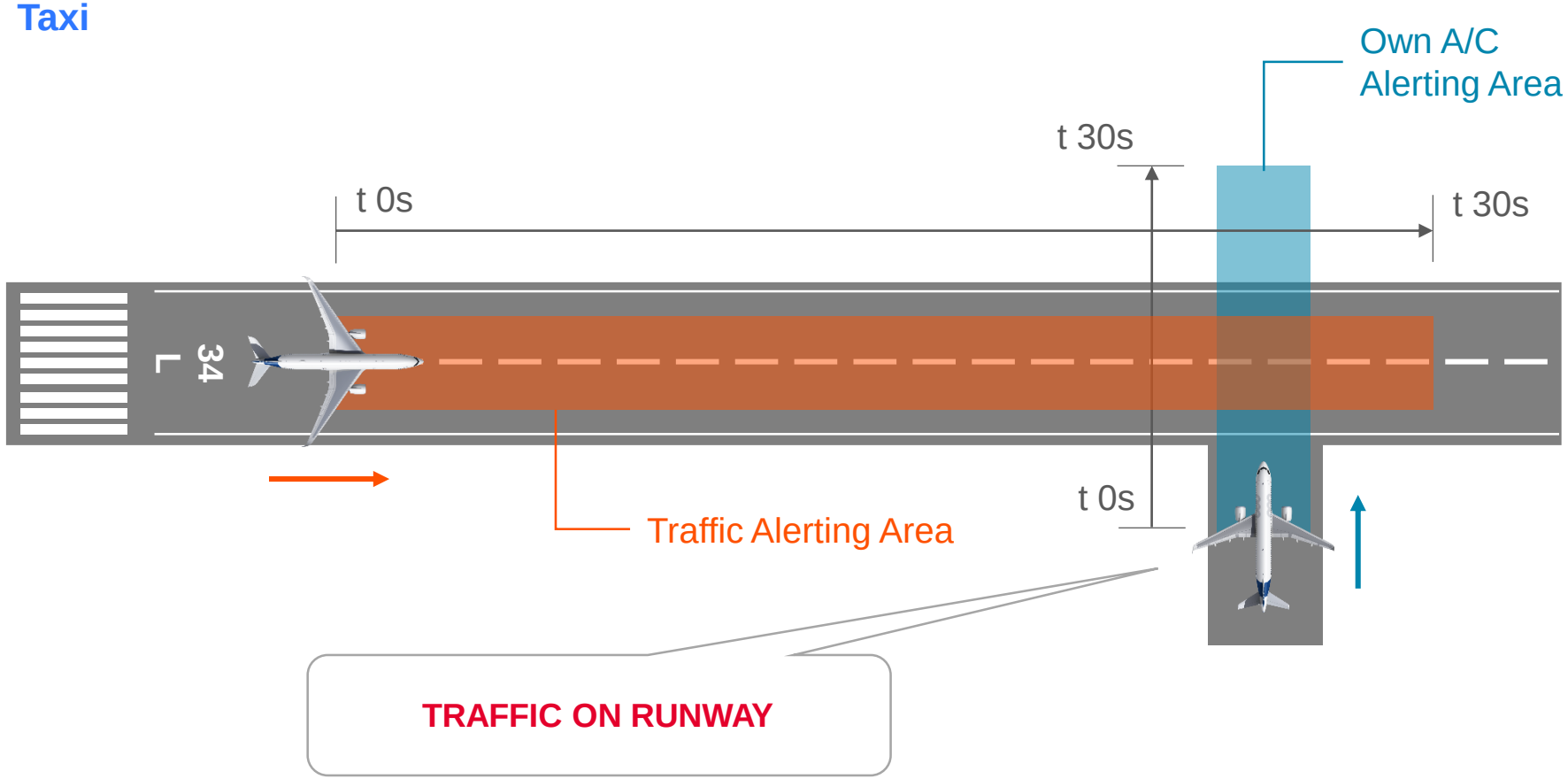
  > 200ft RA: Caution

  < 200ft RA: Warning
- GA expected

AIRBUS

Surface Alerting (SURF-A)

Taxi



Operational Scenarios: Taxi

- Look ahead: 30”
- In case of conflict: Warning
- Stop or expedite runway crossing

AIRBUS

Surface Alerting (SURF-A)

2017 | 2018 | 2019 | 2020 | 2021 | 2022

ADS-B OUT mandate US/EU

Prototype development

ADS-B data collection

AIRBUS Honeywell

Simulator

AIRBUS DASSAULT AVIATION Honeywell

Flight Tests

Feasibility | **Development & Certification** | **Very Large Demonstrator**

Current Schedule

- Validation :
  - Desktop simulations
  - Simulator & Flight tests
- Certification target 2021
- Very Large Demonstrator under SESAR WAVE 2

AIRBUS

Taxi Routing

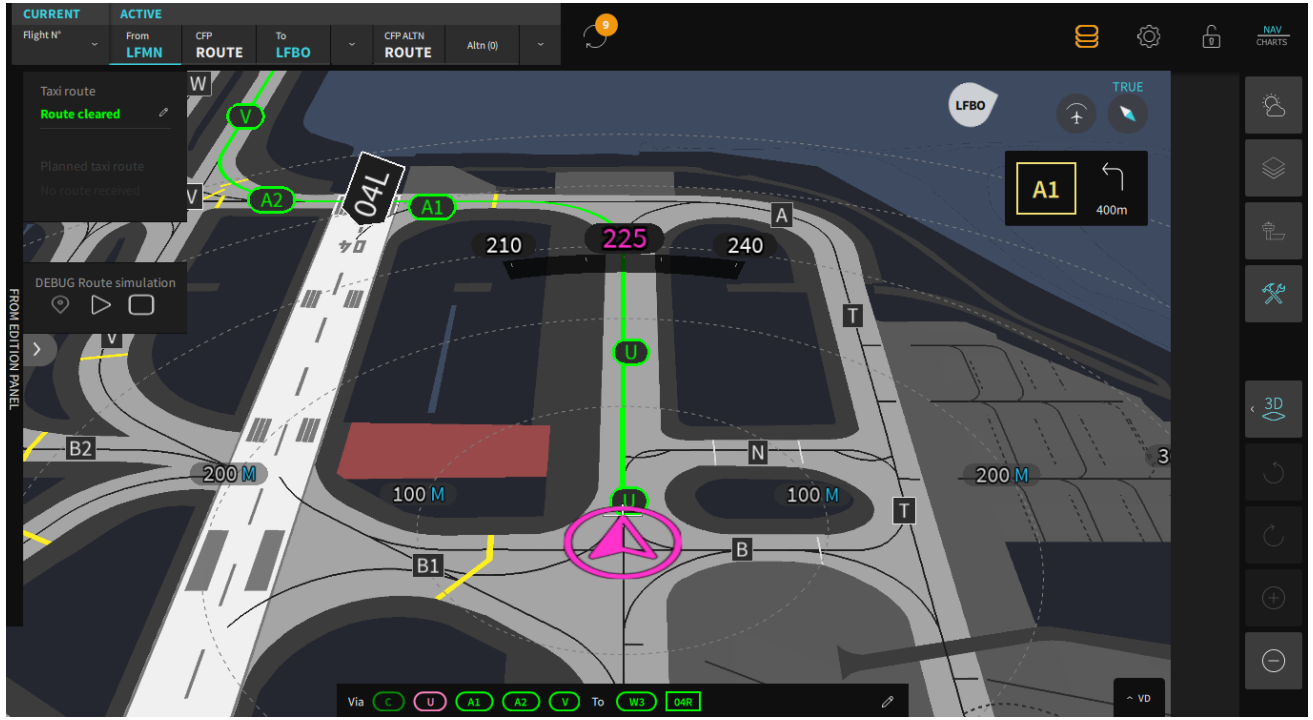
Taxi-route uplink to EFB

Crew assessment

Guidance

Turn-around

Taxi



EFB solution

Airbus & NAVBLUE

- Easier taxiing
- Increased situation awareness
- Runway incursion risk alleviation
- Currently under development & testing

AIRBUS

1 Introduction

2 Currently available technologies

3 In-development technologies

4 Conclusions

Conclusions

- Runway Incursion & Collision: **risk** with **steady rates**
- Technologies at **aircraft level** to mitigate the risk
- Airport Navigation, RAAS & Taxi Routing: reduce RI risk by improving **situational awareness** & preventing navigation errors on airports.
- SURF-A: **on board** safety net for **prevention** of **aircraft collision** in the runway through ADS-B data

AIRBUS