



Data, Baseline and Predictability supporting the Runway Safety Team

ICAO Middle East Regional Runway Safety Seminar - Dubai

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EUROCONTROL Head of Airport Research
3rd June 2014

Scary!





ATC is

“an unpredictable yet safe aircraft separation system”

Thinking about Runway Safety Teams ...I will talk to ...

European strategic approach: top down meets bottom up!

Data Driven – finding and mitigating issues, setting targets.

Baseline the Concept of Operation – do what you said you would do!

ATC Safety Nets - a bottom up example of human system integration

Summary

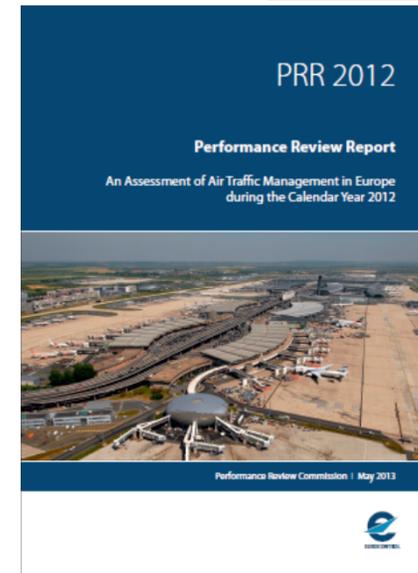
European strategic approach –
top down meets bottom up!

1460 Runway Safety Incidents in 2012. Europe
80 considered serious!

ICAO Global Runway Safety Symposium 2011

“rate of runway incursions has not decreased in more than 20 years!”

Two runway incursions every day in the
European Region!



European strategic approach – top down meets bottom up!

EUROCONTROL Strategic Approach

High Level Dash Board: 5 Safety Issues

“Occupied Runway “ “Landing without a clearance”

Safety issues lead to focused Action Plans and Local Mitigation

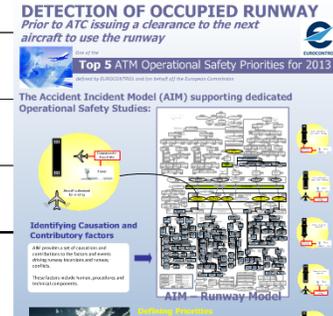
We model safety with IRIS – Incident, Risk Assessment Model

- Supports safety design
- Helps develop Target Levels of Safety
- Valid for Current Operations, and Deploying change

FAA – Integrated Safety Assessment Model (ISAM)

Top 5 Network Safety Risks

RISK	ACTION (Guidance)
 No Transponder	●
 Landing without clearance	●
 Detection of occupied runway	●
 Blind Spot	●
 Conflict with adjacent sectors	●



http://www.skybrary.aero/index.php/Category:Organisational_Defences_Against_Runway_Incursion



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EUROCONTROL runway safety site

<http://www.eurocontrol.int/articles/runway-safety>

EUROCONTROL Plan for the prevention of runway incursions

<http://www.eurocontrol.int/publications/european-action-plan-prevention-runway-incursions>

EUROCONTROL Plan for the prevention of runway excursions

<http://www.eurocontrol.int/publications/european-action-plan-prevention-runway-excursions>

IANAS: Aerodrome Resource Management - Runway Safety [APT-ARM]

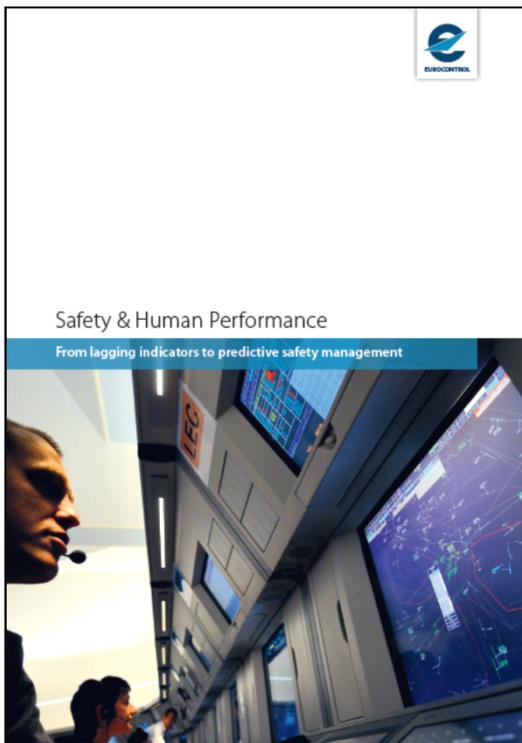
<http://www.eurocontrol.int/training>

European strategic approach – top down meets bottom up!



Future Integrated Capability

Integrated Risk Model - IRIS



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Integrated Safety Assessment Model (ISAM)



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Data Driven – finding and mitigating issues

Do you know your runway (s)?

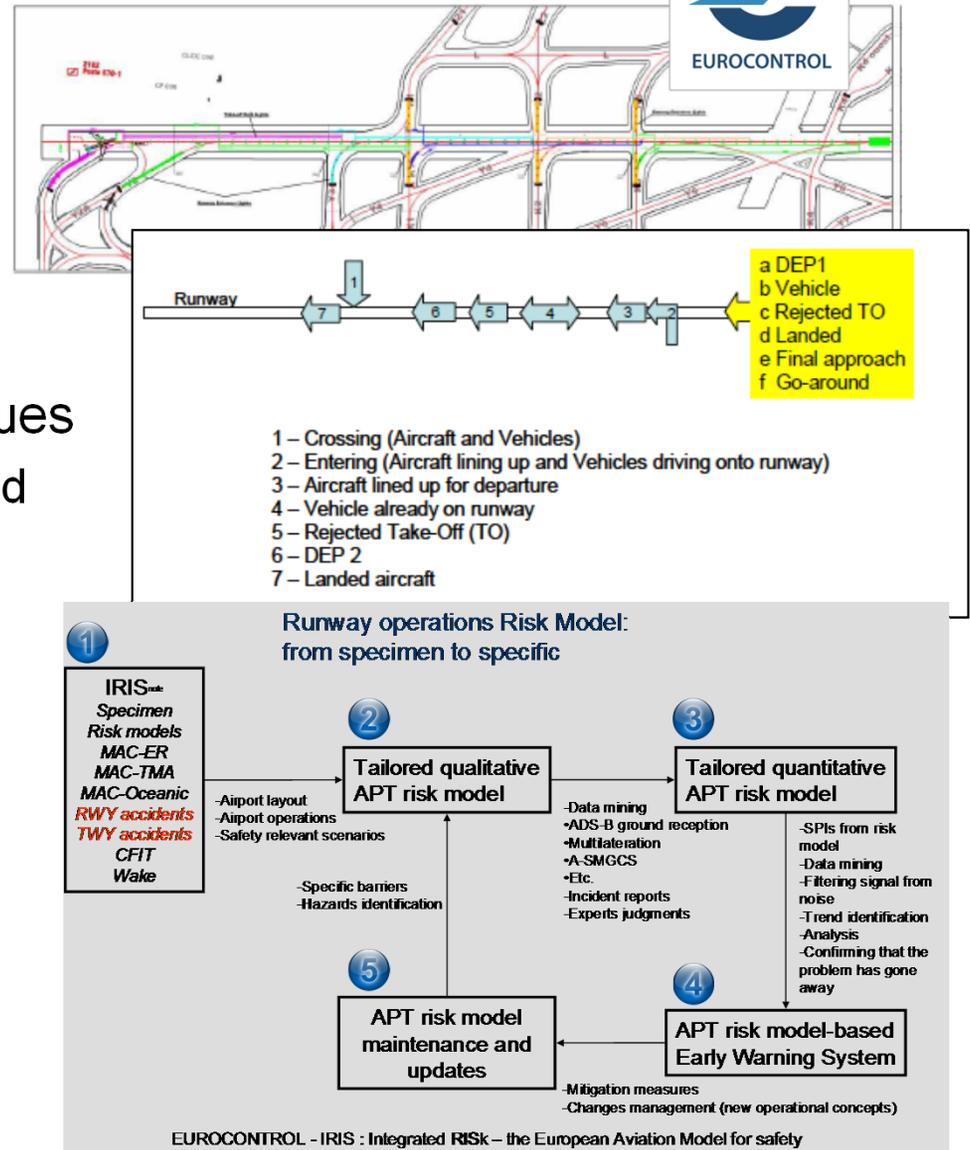
Data mining and big data techniques

- Key attributes, event paths and trend prediction

Prepare a baseline for:

- Safety issue detection
- Monitoring
- Change safety case and benefit assessment

Set and monitor safety targets



Baseline the Concept of Operation –
do what you said you would do!

Controller Hand Book or Local Manual of ATS

- Is it up to date? Do you do what you say you do?
- Baseline against the data!

Basis for safety assessment and deploying change

Opportunity to develop further to support safety arguments and change

- Use cases, Scenarios
- Models

Don't deploy change without validating what is happening today.

RST responsibility: safety continuity and early detection of deviation

ATC Safety Nets - building in Predictability



ATC Safety Nets - building in Predictability



Top 5 ATM Operational Safety Priorities for 2013

Our Mission

Contributing to safety management and operational safety across the Network, the Network Manager identifies Network safety issues to enable aviation stakeholders to mitigate existing hazards and anticipate new operational risks. Our ultimate goal is to keep the Network safe and able to increase capacity and efficiency.

The EUROCONTROL Safety Improvement Sub-Group (SIGS), reporting to the EUROCONTROL Safety Team, was tasked to identify the Top 5 ATM Operational Safety Priorities. In 2012, the SIGS followed a structured process of operational safety prioritisation. After further analysis, the Safety team agreed the following Top 5 ATM Operational Safety Priorities for 2013.

TOP 5 ATM OPERATIONAL SAFETY PRIORITIES FOR 2013:

1. **RISK OF OPERATIONS WITHOUT TRANSPONDER OR WITH A DYSFUNCTIONAL ONE**
Operators without transponder or with a dysfunctional one continue a single track with a potential of "passing" through all the existing safety barriers up to "see and avoid".
2. **LANDING WITHOUT CLEARANCE**
For various reasons, aircraft sometimes land without ATC clearance resulting in runway incursions that are often only resolved by "provisional".
3. **DETECTION OF OCCUPIED RUNWAY**
Some runway incursion incidents could have been prevented if controllers had better means to detect that the runway was occupied at the time of issuing clearance to the next aircraft to use the runway.
4. **"BLIND SPOT" - INSUFFICIENT CONFLICT DETECTION WITH THE CLOSEST AIRCRAFT**
Loss of separation "blind spot" events are typically characterised by the controller not detecting a conflict with the closest aircraft. They usually occur after a descent clearance and in the context of a rapidly developing situation - often when the conflicting aircraft are 1000m and 15 nm apart.
5. **CONFLICT DETECTION WITH ADJACENT SECTIONS**
Losses of separation in the In-Radar environment sometimes involve "inadequate coordination" of clearance with an adjacent sector. These typically involve either an early (premature) transfer of control to inform the neighbouring sector.

Our Process

The "Top 5" were identified after a detailed review of the high severity risk areas "runway incursion" and "Loss of Separation En-Route". The review was performed during summer 2012 and involved a series of dedicated workshops with a focus on safety barriers. The part of European Air Traffic, Comprehensive Safety Functions Maps (CSFMAPs) - were developed and populated with representative data from the participating ANSPs. The incident data was for high severity classified as "A" and "B" occurrences that had been thoroughly investigated. The data is highly informative because the incident occurred "past" the majority of the available safety barriers. The reliability of the results was ensured by a careful joint analysis of the investigation reports with the respective ANSPs. The analysis data forms a significant overall sample of European A and B incidents (i.e. 47% of all runway incursion and 77% of all Loss of Separation En-Route reported during 2011).

→ What will the Network Manager do and deliver?

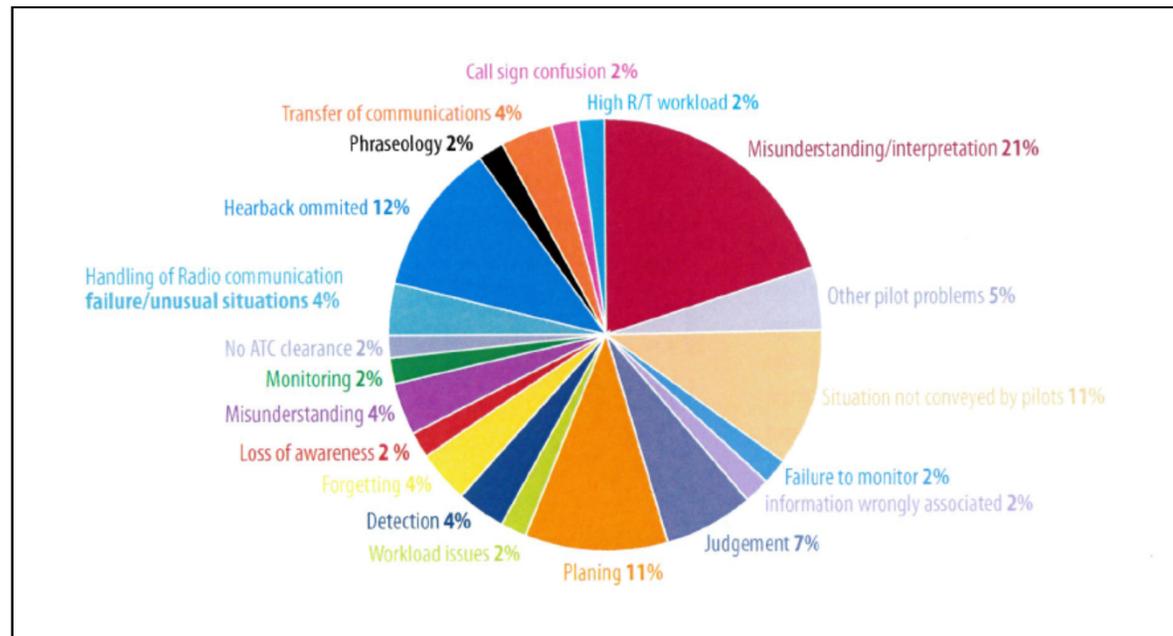
- Each "Top 5" priority will be subject of a dedicated Operational Safety Study during 2013 that will aim to:
 - Provide additional insight on causal/contributory factors.
 - Suggest actions to reduce or eliminate risk factors.
 - Identify industry "best practice" and lessons learned for sharing amongst affected stakeholder groups.
 - Inform development of regulatory measures, as far as all of the above.

For more information, please contact: tzvetomir.blazev@eurocontrol.int

Closer analysis of the safety data shows different aspects to runway safety

Top down meets bottom up Our Runway Safety Issues:

- "Landing without a Clearance"
- "Detection of Occupied Runway"



ATC Safety Nets - building in Predictability

“Landing without a Clearance” and “Detection of Occupied Runway”

Traditional mitigation

- Training
- Education
- Procedures

System support mitigation:

- Safety Nets
 - Dependent on A-SMGCS Surveillance
 - Routing and Planning
 - Electronic strip systems
- Conformance Monitoring for Controllers - Alerts and Alarms



ATC Safety Nets - building in Predictability

SESAR ATC Safety Nets - targeting 24 Airports

Conformance Monitoring for Controllers - Alerts and Alarms

- Compares planned/cleared to actual
- Identifies unauthorised movement or errors
- Brings predictability to operations
- Is validated through human in the loop real time simulation
- Is safety assessed by IRIS
- Will go to live trials in 2015
- Deployment through to 2023

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A-SMGCS RIMS

CONFLICT

CMAC: Alerts

ROUTE DEV

RWY/TWY TYPE

STATIONARY

RWY CLOSED

TXY CLOSED

NO PUSH/TAXI CLR

NO CONTACT/TNR

HIGH SPEED

A-SMGCS RIMS

CONFLICT

CMAC: Alarms

RWY INCURSION

ROUTE DEV

NO TOF CLR

NO LND CLR

STATIONARY IN RPA

RED STOP CROSSED

CATC – Alerts

TOF/LUP

CROSS/TOF

ENTER/TOF

CROSS/LND

ENTER/LND

TOF/LND

LUP/LND

TOF/TOF

LUP/LUP

LND/LND

Different Safety Nets Available

ATC Safety Nets - building in Predictability

No Landing Clearance (Alarm)

ITWP Runway Controller

MAP ZOOM OVERLAP HEIGHT R&B LABEL

RW27R **GOBOB** **NO LND CLR** **ACK**

08:19:43

PENDING ARR RW27R			
<input type="checkbox"/>	E0828	COA56	B772/H ROF ▼
<input type="checkbox"/>	E0826	AFR1680	A321/M ROF ▼

FINAL RW27R			
<input type="checkbox"/>	00:14	GOBOB	A343/H LND ▼

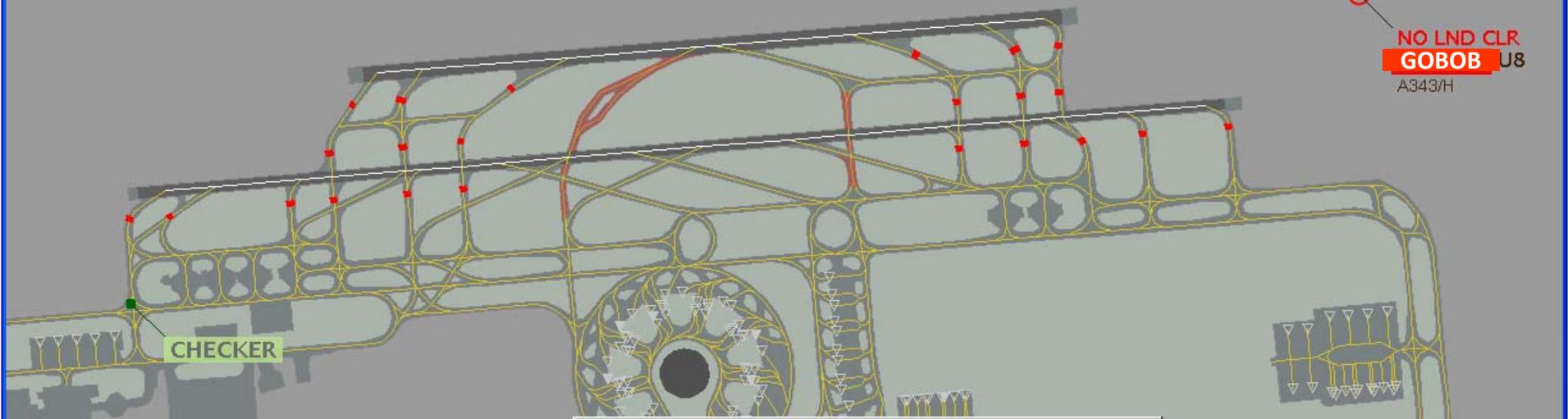
(TD 320/020) RW27R (SE 320/20)

ITWP Runway Controller / VIEW_2

MAP ZOOM OVERLAP HEIGHT R&B LABEL



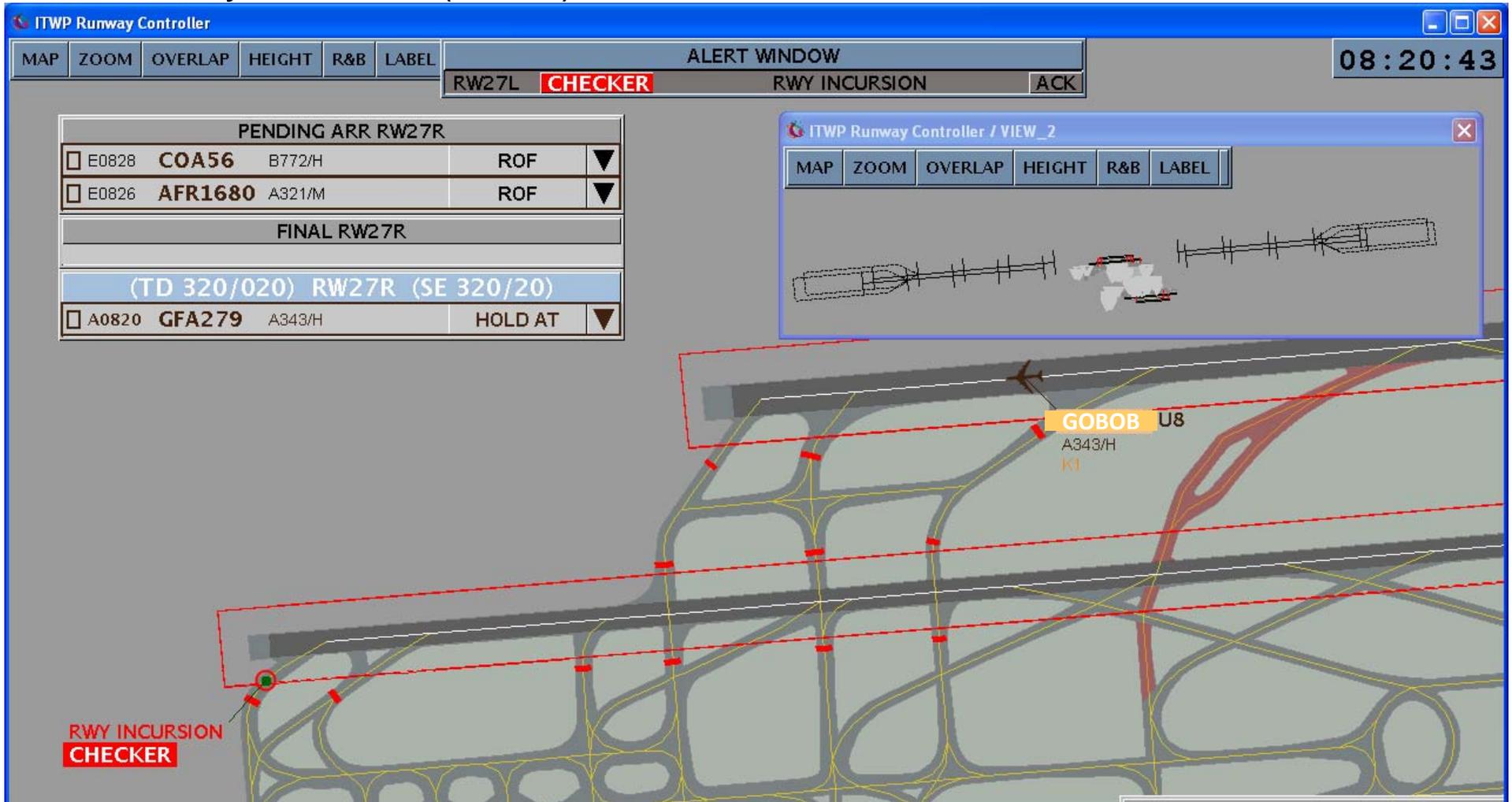
NO LND CLR
GOBOB U8



NO LND CLR
GOBOB U8
A343/H

ATC Safety Nets - building in Predictability

Runway Incursion (Alarm)



ITWP Runway Controller

MAP ZOOM OVERLAP HEIGHT R&B LABEL

ALERT WINDOW

RW27L **CHECKER** RWY INCURSION ACK

08:20:43

PENDING ARR RW27R			
<input type="checkbox"/>	E0828	COA56	B772/H ROF ▼
<input type="checkbox"/>	E0826	AFR1680	A321/M ROF ▼
FINAL RW27R			
(TD 320/020) RW27R (SE 320/20)			
<input type="checkbox"/>	A0820	GFA279	A343/H HOLD AT ▼

ITWP Runway Controller / VIEW_2

MAP ZOOM OVERLAP HEIGHT R&B LABEL

GOBOB U8
A343/H
KI

RWY INCURSION CHECKER

ATC Safety Nets - building in Predictability

RED Stop Bar Crossed (Alarm)

ITWP Runway Controller

MAP ZOOM OVERLAP HEIGHT R&B LABEL

ALERT WINDOW

GOBOB RED STOP BAR CROSSED ACK

08:22:18

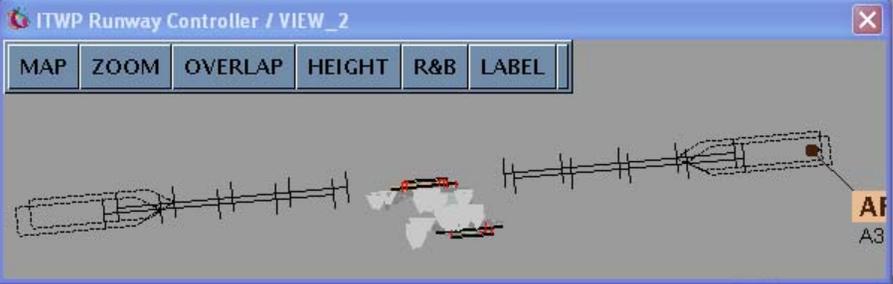
PENDING ARR RW27R			
<input type="checkbox"/>	E0828	COA56	B772/H ROF ▼
<input type="checkbox"/>	E0826	AFR1680	A321/M ROF ▼

FINAL RW27R

(TD 320/020) RW27R (SE 320/20)

ITWP Runway Controller / VIEW_2

MAP ZOOM OVERLAP HEIGHT R&B LABEL



RED STOP BAR CROSSED
GOBOB U8
A343/H

CHECKER RWY

(TD 320/020) RW27L (SE 320/20)			
<input type="checkbox"/>	CHECKER	<>	VAC ▼

TAXI IN RW27L			
<input type="checkbox"/>	A0820	GOBOB	A343/H ⊗ CROSS ▼



ATC Safety Nets - building in Predictability

An integrated approach to safety:

- Top down strategic goals (our issue) and State Targets
- Integrates system capability and the controller
- An “airport by airport” basis – tuning, reflects local concept
- Requires a change to traditional operations – concept & culture change
- Validated through scenarios, update of concept of operation
- Can be measured so is subject to Target Levels of Safety
- TLS feed back to the airport and the strategic goals

Runway Change should be owned by the Runway Safety Team

ATC Safety Nets - building in Predictability



ATC Safety Nets

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SESAR Joint Undertaking

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Summary



My Aim was to “provide a European view of an integrated top down, bottom up approach to runway safety, owned by the Runway Safety Team.”

Summary



- EUROCONTROL **strategic approach** – monitoring and capturing top safety issues;
- development of action plans and local mitigation, resources available on the web to the RST;
- do you know your runway – need for **data assessment** and introduced **IRIS**, a resource also available to the RST
- pleaded that you ensure you have an **up to date concept** and that you do what you said you would do;
- suggested that you **baseline your concept** and data to support **safety targets** and **operational change**;
- provided an example of an integrated system controller change

observed that “**safety is part of our business, it has a value** and investment in safety will bring a return on investment.”

consider that for an individual airline:

... average cost of a go-around is between 1000 and 1500 Euros

... 1 minute of delay costs in the region of 90 to 113 Euros

Having a motivated multi-disciplined Runway Safety Team pays!!

Thank you.

