SKYbrary
Safety Forum
Preventing Runway Collision
June 2017, Brussels

Findings, Strategies and Action Opportunities

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Executive Summary

This report describes the background, objectives, and outcomes of the SKYbrary Safety Forum: Preventing Runway Collision, initiated by the Flight Safety Foundation, The European Regions Airline Association and EUROCONTROL that took place on 6 and 7 of June 2017 in EUROCONTROL Brussels.

The Safety Forum targeted operational and safety professionals with the intention to hold a short event with the objectives of examining many of the safety aspects related to runway collision prevention and capturing the outcomes in an event report and supporting awareness material. The Safety Forum tagline was “An event from the industry for the industry”.

During the discussions it was widely accepted that although more than 2.8 million passengers per day are safely transported through European airports and the skies of Europe there is no place for complacency. Current records in safety are not a guarantee for future success; there is a need to continually assess safety performance and the annual Safety Forum helps fulfil this requirement.

Around 200 Safety Forum participants took an active part in the break-out session discussions and outlined a number of findings, strategies and action opportunities that could further enhance runway safety. Each Finding is one of the following:

- A current risk or a credible projection of one likely to be encountered in the near future in a given operational environment.
- A current risk factor or a credible projection of one for any unwanted outcome (both positive and negative influencers) in terms of their relative importance.
- A risk scenario that describes how risk factors combine in a sequence to create an unwanted outcome.

The Findings were then used to develop safety improvement Strategies which can prevent, contain or mitigate a specific risk illustrated by the 'Findings'.

Considering the Findings the Forum formulated a series of Action Opportunities to respond to the safety improvement strategies listed in chapter 3.

In addition, the Forum participants also validated the new candidate Recommendations that will appear in the new version of the European Action Plan for the Prevention of Runway Incursions (EAPPRI) that will be published later in the year.

The speaker briefings and final outcomes of the Forum are published on SKYbrary, shared freely with the global aviation community, in particular pilots and air traffic controllers, but also with managers, regulators and manufacturers.

Chapter 1
Introduction

1.1 What is the purpose of this report?

Documenting and communicating.

This report describes the background, objectives, and outcomes of the SKYbrary Safety Forum: Preventing Runway Collision, initiated by the Flight Safety Foundation, The European Regions Airline Association and EUROCONTROL. The Forum took place on 6 and 7 of June 2017 in EUROCONTROL Brussels.

1.2 The objectives of the Safety Forum: Preventing Runway Collision

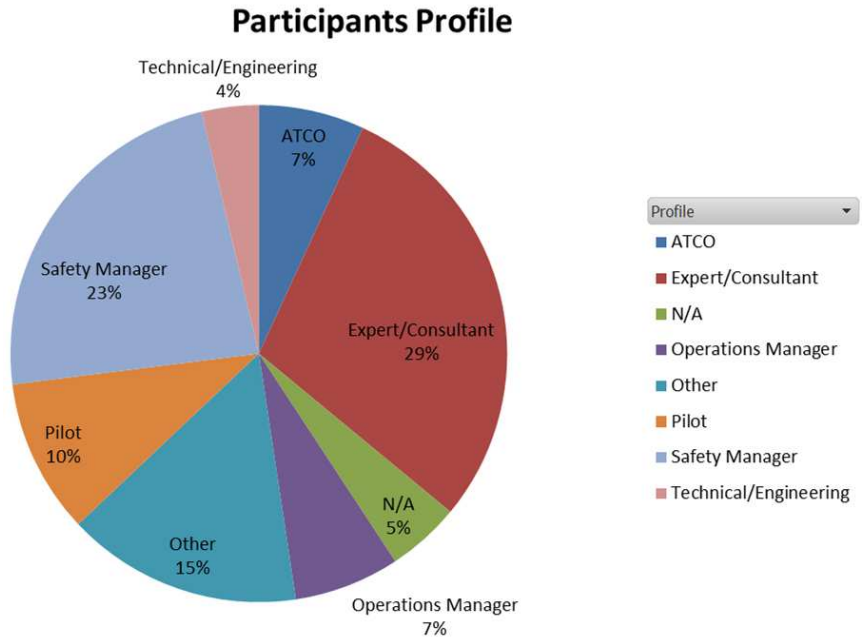
One Day, One Issue, One Co-ordinated Outcome Event.

The SKYbrary Safety Forum: Preventing Runway Collision targeted operational and safety professionals with the intention to hold a short event, with a clear focus on preventing runway collision safety aspects and to result in the creation of an event report and supporting awareness material.

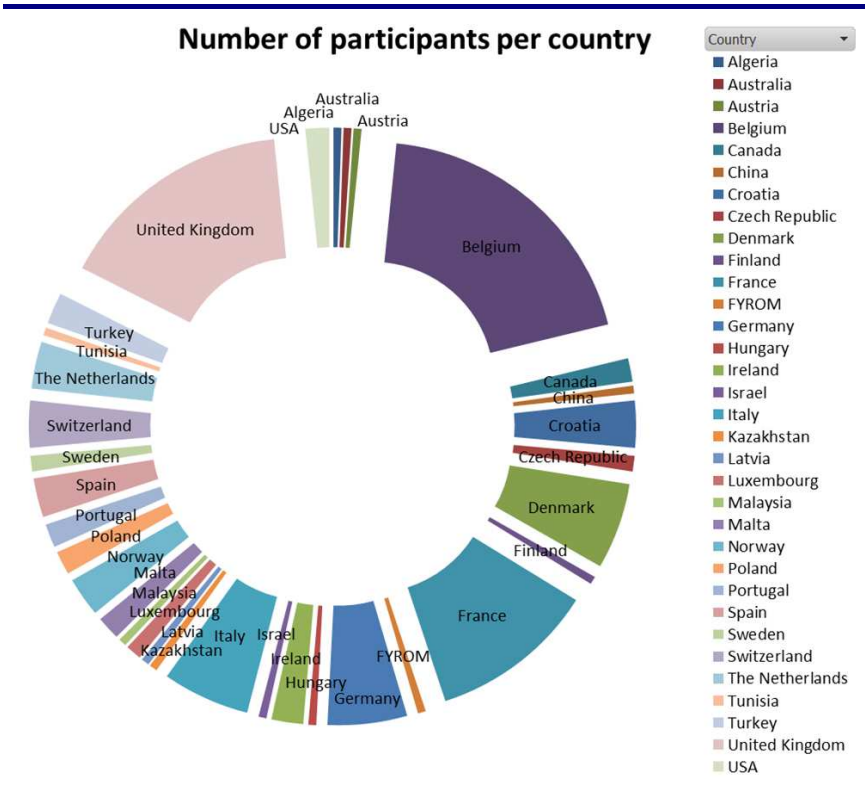
It is an event from the industry for the industry.

1.3 Participants

The Forum attracted the attention of around 200 aviation professionals representing various stakeholders.



Participants to the Forum came from 33 countries.



1.4 Outline of the results

Findings, Strategies and Action Opportunities

The Forum outlines a number of Findings. Each Finding is one of the following:

- A current risk or a credible projection of one likely to be encountered in the near future in a given operational environment.
- A current risk factor or a credible projection of one for any unwanted outcome (both positive and negative influencers) in terms of their relative importance.
- A risk scenario that describes how risk factors combine in a sequence to create an unwanted outcome.

The Findings were then used to develop safety improvement Strategies which can prevent, contain or mitigate a specific risk illustrated by the 'Findings'.

Considering the Findings and Strategies the Forum formulated a series of Action Opportunities. These Action Opportunities were grouped according to their predominant relevance for a particular audience and are addressed to the industry in general, to aircraft operators, to ANSPs, to manufacturers, to airport operators, to local runway safety teams, to international bodies and to regulatory authorities.

1.5 SKYbrary knowledge management

Promoting the results

The speaker briefings and final outcomes of the Forum are published on SKYbrary, shared freely with the global aviation community, in particular pilots and air traffic controllers, but also with managers, regulators and manufacturers.

Chapter 2
Findings

REF	FINDINGS
F1	***Even if much better reporting tools are now available in the industry to help identify hazards, stronger analytical tools remain necessary to review those events that will release these hazards by digging into "big data" generated by ADS-B ground tracks notwithstanding the limited availability of this data below 1000').*** ***Real-time processing & analysis of these big data in normal operations is hence likely to be over-demanding compared to reactive analysis so a more proactive and preventive posture remains in demand. An alternative is to concentrate on rigorous analysis.***
F2	***Complex 'system' problems need adequate tools that approach the problems holistically by considering both logical and stochastic relationships between controllers, operators, humans and infrastructures. Denying this may lead to oversee where the real problems and risks reside.***
F3	***Ground vehicles are operating at a deficit of collision risk awareness.*** ***It is therefore better to advise drivers directly of impending conflicts by means of a variety of traffic alerts.***
F4	***Sudden High Energy Runway Collision events still exist where the last resource is "last minute" pilot collision avoidance or providence (which can work both ways...). Even if detected, ATC may not be able to advise pilots and drivers in time for them to act when runway occupancy occurs immediately before an incursion.***
F5	***An alternative or addition to familiarisation/training by airport staff, ANSP and airlines can be obtained using detailed images of the airfield taken from different heights (some signs***

	are difficult to read from different heights), during day/night and different times of day, weather conditions and runway conditions. This could also be useful for incident investigation.
F6	*Airfield works represent a significant threat. In particular, transition into and out of any airfield work period needs to be specifically managed.*
F7	*NOTAMs are often too complex and difficult to assimilate.*
F8	*It is a financial and practical impossibility to demand the same standards at all airfields.*
F9	*The risk status of an aerodrome, at any given time, is unknown.*
F10	*There is a lack of 'system' support for ground vehicle movement and safety is still largely driver dependent.*
F11	*There is no common standard or operational policy for the use of stop bars.*
F12	*The 'Follow the greens' approach to taxiway lighting has become an accepted and trusted standard.*
F13	*Runway incursion investigations tend to be limited to one or two stakeholders often with a lack of feedback to airlines.*
F14	*There is a lack of a standard with regards to local runway safety.*
F15	*There is no "regulated" and universally applied standard for adverse weather and low visibility operations.*
F16	*Safety meetings are an opportunity for all stakeholders to get involved.*
F17	*There is a lack of "systemic" thinking as regards many of the initiatives related to runway incursions.*
F18	*Runway incursions can be caused by poor Flight Deck CRM.*
F19	*Runway Incursions can be caused by incomplete or incorrect RTF communication.*
F20	*Runway incursions can be caused by incorrect spatial orientation/situational awareness.*
F21	*A runway incursion may be initiated by an incorrect vacation of a runway following incomplete ATC instruction and/or incorrect pilot orientation.*
F22	*The use of intersecting or interacting runways, sometimes involving more than one controller, have been a precursor factor in some serious runway incursions.*
F23	*Incorrect ATC clearances to cross, land or take-off on an occupied runway may cause runway incursions.*
F24	*Poor Air Traffic Control Team Resource Management can be a precursor to ATC-induced runway incursions.*
F25	*Runway safety may be improved by having a strategic plan that is informed by a runway*

	safety metric based on weighted historical data.
F26	***Safety Culture (the way we want people to behave) is important to maintain runway safety.***
F27	***Local runway safety teams often lack an effective representation of non home-based aircraft operators.***
F28	***Local runway safety teams often lack a clear link to post holding decision makers whose responses to any proposals made are documented.***
F29	***On some airports vehicles entering the runway are on a different frequency than the aircraft operating on that same runway.***
F30	***On some airports several languages are used on any frequency used for active runway control.***
F31	***Towed aircraft are not always illuminated to the same standard as aircraft moving under their own power.***
F32	***Vehicles towing aircraft are not always in two way contact with ATC and the aircraft.***
F33	***'Runway Ahead/No Entry' surface markings at runway access/egress points are not available at all airports.***

Chapter 3
Strategies

Strategy 1

Use ADS-B data (which although it may be limited below 1000') to envisage ergonomic visualization of ground movements, critical crossings and remaining runway lengths between potential conflict aircraft.

ICAO's 2015 High-Level Safety Conference requires that systemic safety issues be highlighted in Safety Information Management Systems (SIMS) with key performance issues developed for State Safety Plans (SSP) and SMS and with applications and visualizations of indicators and metrics to feed SIMS for predictive safety.

An alternative strategy is to concentrate on prevention by doing post event analysis of remaining runway and critical crossings per airport and time of day/season to extract critical airports.

Strategy 2

Derive potential dangerous situations by modelling hazard nodes of airport areas which are risk prone with regard to incursions and crossings.

Pinpoint those areas that need to invest in automation

	resources to reduce risk.
Strategy 3	Have a list of hazards that should be considered as a minimum to review for each airport. When the list grows, compare airports and share.
Strategy 4	Integrate visual and sound alerts (with several cases in point and proper visualisations) in the airport moving map which depicts all aircraft and vehicles in a better ergonomic way (AVD).
Strategy 5	Use risk models to understand scenario sources, contributing factors and generic situations with prevention and mitigation barriers to constitute risk matrices and frequencies.
Strategy 6	Use other sources of data (like detailed images) in addition to maps to facilitate aerodrome familiarisation/training of airport staff, ANSPs and aircraft operators.
Strategy 7	Some data isn't recorded but are human factors related and should be captured by other means. E.g. personal account, testimony, reporting…
Strategy 8	Threat and error management policy: Better inform actors and signal pro-actively hot spots or areas of interest in order to reduce mistakes. Acceptance of the transition threat (e.g. into and out of a work period) which then requires a recognition of the need for action.
Strategy 9	A revised NOTAM format (cover aerodrome operations) should include classification into groups linked to the changes in operating structure (i.e. the variation from routine operating standards)
Strategy 10	Define a categorization system (in regards to safety level) of airports.
Strategy 11	A common standard and taxonomy related to airfield risk status would provide a basis for common understanding amongst airfield users.
Strategy 12	Provide technical solutions to allow vehicles on the manoeuvring area to be more conspicuous to ATC.
Strategy 13	Review current lighting initiatives, in regards to stop bars, with a specific focus on LVP and Night operations.
Strategy 14	Review current lighting initiatives with a specific focus on LVP

	and Night operations. Especially, review illuminated signage from 'representative' heights e.g. pilot's eye view, drivers' eye view.
Strategy 15	Review current lighting initiatives, in regards to 'follow the greens', with a specific focus on LVP and Night operations.
Strategy 16	Encourage collaborative runway safety actions between stakeholders. .
Strategy 17	Understand how different airfields apply operational procedures regarding adverse weather and low visibility operations.
Strategy 18	Manage, between stakeholders, a collective acceptable level of risk concerning ground movements which can be fully adapted when environmental degradations occur. The presence of the operators at significant airfield safety meetings is needed.
Strategy 19	Understanding on how to progressively adopt an inclusive systems approach to risk analysis and management.
Strategy 20	The use of a sterile cockpit and professional challenge can significantly reduce the frequency of runway incursions.
Strategy 21	The use of stop bars at all runway entry points together with procedures never to cross illuminated stop bars can prevent runway incursions.
Strategy 22	The operation of a Runway Incursion Monitor (RIM) function for ATC can reduce the impact of a runway incursion.
Strategy 23	The use of clear and unambiguous phraseology by ATC, pilots and ground operators can significantly reduce the frequency of runway incursions.
Strategy 24	Clear and unambiguous signage and lighting at runway entry/exit points, with particular reference to known hot spots can reduce likelihood of runway incursions.
Strategy 25	Precise phraseology and deliberate routine observation of vacating aircraft by ATC can prevent a subsequent runway incursion.
Strategy 26	Enhanced Flight Deck orientation of the airport can reduce the likelihood of a runway incursion e.g. Moving Maps, e-flight bag …

Strategy 27	Functionality to input of ATC clearances and provide alerts on conflicting clearances can prevent or reduce the impact of runway incursions.
Strategy 28	Functionality to ensure clear understanding of which controller has executive control of the runway can prevent misunderstandings that, in turn, result in runway incursions.
Strategy 29	Strict adherence to the correct use of ATC memory aids for runway occupancy and maintaining visual vigilance will reduce the frequency of ATC-induced runway incursions.
Strategy 30	Increased understanding of how colleagues behave normally and thus abnormally in alertness and/or presentation may, combined with professional challenge, prevent an ATC error that leads to a runway incursion.
Strategy 31	Develop a runway safety metric including data from accidents, runway excursions, runway incursions, and surface incidents. The metric should be weighted for severity of outcome.
Strategy 32	Safety behaviours should be considered as an important part in runway safety.
Strategy 33	Good coordination with and integration of non home-based aircraft operators may enhance the effective work of local runway safety teams.
Strategy 34	A link to post holding decision making may enhance the effective implementation of actions discussed in local runway safety teams.
Strategy 35	The use of a single frequency to control access to an active runway may reduce the number of misunderstandings which can lead to runway collision risks.
Strategy 36	The use of a single language on any frequency used for active runway control may reduce the number of misunderstandings which can lead to runway collision risks.
Strategy 37	Proper illumination of towed aircraft improves their visibility.
Strategy 38	Two-way communication with ATC and the aircraft is an essential part of a safe towing operation.
Strategy 39	'Runway Ahead/No Entry' ground markings enhance the situational awareness of staff operating near or on runways.

Chapter 4
Action Opportunities

4.1 General industry action opportunities

REF	Strategy	Finding	ACTION OPPORTUNITY
GI1	S19	F17	All stakeholders should be encouraged to participate in risk analysis and management initiatives in order to reach a 'systemic' thinking in regards to runway incursions.
GI2	S23	F19	All stakeholders who have a role in radio communications close to or on the runway should have specific training in the meaning of and the phraseology to be used. Such training should include the opportunity to understand the other person's perspective. (ANSPs, Aircraft Operators, Airport Operators, Airport Ground Service Operators and LRSTs). English language should be used for all RTF communications. Promoting and facilitating one frequency one language.
GI3	S32	F26	Runway safety should be a specific subject in the promotion of safety behavior in the scope of developing a positive safety culture.

4.2 Aircraft operator action opportunities

REF	Strategy	Finding	ACTION OPPORTUNITY
ACF1	S5	F4	Focus should be on memory aids; correct and precise phraseology for precise ATC clearances; visual vigilance by ATC, pilots and drivers.
ACF2	S20	F18	Aircraft operators should initiate sterile cockpit procedures and actively encourage challenge by junior flight deck members.
ACF3	S21	F18	Aircraft operators should agree controller and pilot procedures whereby a clearance to cross an illuminated stop bar is never given and pilots do not cross an illuminated stop bar.
ACF4	S21	F18	Aircraft operators should initiate sterile cockpit procedures and actively encourage challenge by junior flight deck members.
ACF5	S25	F21	Aircraft operators should promote unambiguous phraseology and the routine observation of aircraft vacating the runway to ensure that initial taxi instructions/expectations are being fulfilled. This action should be embedded in training and in competency checking.
ACF6	S26	F21	Aircraft operators should consider and evaluate the options available in providing flight crew with enhanced airport orientation e.g. moving maps.
ACF7	S36	F30	Aircraft operators should promote the use of a single language on any frequency used for active runway control with language competency requirements to match.
ACF8	S37	F31	Aircraft operators should have a procedure to ensure that their aircraft are properly illuminated during towing.
ACF9	S38	F32	Aircraft operators should have a procedure to ensure that their crews/staff have two way communication with the tow truck and that they do at least monitor the ATC frequency.

4.3 ANSP action opportunities

REF	Strategy	Finding	ACTION OPPORTUNITY
AN1	S1	F1	ANSP's and other involved stakeholders should meet and jointly share hazards and develop appropriate indicators & metrics for ATM at airports. Results should be shared at the LRST. Regulatory Aviation authorities should support approaches to take into account needs to feed ICAO SIMS.
AN2	S1,S7	F1	ANSP's should develop the installation of Airport Movement Area Safety Systems to advise ground and air traffic controllers of potential incursions and taxiway intersections using airport radars, state of the art signal processing and advanced computer technology to provide automatic visual and audio alerts to controllers when it detects these potential hazards. Recorded and non-recorded testimony should be collected under a just culture.
AN3	S2	F2	ANSPs should allocate resources and collaborate with academia and/or research organisations to understand the information in the airport hazard modelling data, especially when change is involved, risk factors increase or issues become more complex.
AN4	S3	F2	Identify hazards and risks for specific airports to evaluate maturity of safety actions. Local runway safety teams should jointly share and discuss hazards.
AN5	S4	F3	Regulator – EC should regulate to stimulate political discussion for funding and EASA should reinforce 1.9.1 EAPPRI recommendation. Encourage airports to have surveillance systems to provide a ground picture. Encourage the deployment of moving maps. Encourage vehicle detection capabilities and use technical action opportunities to integrate ground vehicles. Ergonomics of AVD should be improved to endow it with better abilities to avoid false warnings. Learn lessons from moving map in aircraft experience from aircraft manufacturers. Discuss research & development possibilities with self-driving car industry and mining industry.
AN6	S5	F4	Multiple layers of protection can provide an effective response to 'Sudden High Energy Runway Conflicts' (SHERC); however, no barrier by itself has the potential to prevent more than 35% of the identified potential scenarios for SHERCs. Proliferation and dissemination of the results of the 'Sudden High Energy Runway Conflict' study should be done for European ANSP's and Airport authorities in order to be aware of potential barriers and conclusions.
AN7	S5	F4	Focus should be on memory aids; correct and precise phraseology

			for ATC clearances; and visual vigilance by ATC, pilots and drivers.
AN8	*S5*	*F4*	*Where appropriate, Stop Bars should be used 24/7.* *Where appropriate, Autonomous Runway Incursion Systems should be installed.*
AN9	*S21*	*F18*	*Aircraft operators and ANSPs should agree controller and pilot procedures whereby a clearance to cross an illuminated stop bar is never given and pilots do not cross an illuminated stop bar. Also stop bars should be aligned with holding points.*
AN10	*S22*	*F18*	*Airport operators and ANSPs should install functionality to provide runway incursion alerts to ATC and train controllers in procedures in their use and reaction required.*
AN11	*S25*	*F21*	*ANSPs and aircraft operators should promote unambigous phraseology and the routine observation of aircraft vacating the runway to ensure that initial taxi instructions/expectations are being fulfilled. This action should be embedded in training and in competency checking.*
AN12	*S27*	*F22*	*ANSPs should consider and evaluate the options available or in development that include the input of ATC clearances into their e-flight data systems. This should take account of ATC personnel workload and tasks.*
AN13	*S28*	*F22*	*ANSPs should consider and evaluate options available, both procedures and tools, which could enhance the understanding between two controllers, as to who has control of a runway.*
AN14	*S29*	*F23*	*ANSP competency schemes should make specific reference to the correct use of memory aids and visual vigilance to prevent ATC-induced runway incursions*
AN15	*S30*	*F24*	*ANSPs should develop and deliver an ATC team resource management programme. This should raise awareness of fatigue and unusual activity in colleagues. It should also include and promote the delivery and receipt of professional challenge.*
AN16	*S16*	*F16*	*ANSPs and airport operators should involve the operational staff in the design and implementation of controller working positions.*
AN17	*S35*	*F29*	*ANSPs should promote the use of a single frequency for the control of access to an active runway including the request for and issue of all clearances.*
AN18	*S36*	*F30*	*ANSPs should promote the use of a single language on any frequency used for active runway control with language competency requirements to match.*

4.4 Aircraft/system manufacturers action opportunities

REF	Strategy	Finding	ACTION OPPORTUNITY
ASM1	S4	F3	Regulator – EC should regulate, to stimulate political discussion for funding and EASA to reinforce 1.9.1 EAPPRI recommendation. Encourage airports to have surveillance systems to provide a ground picture. Encourage the deployment of moving maps. Encourage vehicle detection capabilities. And use technical action opportunities to integrate ground vehicles. Ergonomics of AVD to improve to endow it with better abilities to avoid false warnings. Learn lessons from moving map in aircraft experience from aircraft manufacturers. Discuss Research & Development possibilities with self-driving car industry and mining industry.
ASM2	S27	F22	ATC system manufacturers should consider and evaluate the options available or in development that include the input of ATC clearances into their e-flight data systems. This should take account of ATC personnel workload and tasks.

4.5 Airport operators action opportunities

REF	Strategy	Finding	ACTION OPPORTUNITY
APT1	S2	F2	Airport operators should allocate resources and collaborate with academia and/or research organisation to understand the information in the data, especially when change is involved, risk factors increase or issues become more complex.
APT2	S3	F2	Identify hazards and risks for specific airports to evaluate maturity of safety actions. Local runway safety teams should jointly share and discuss hazards.
APT3	S4	F3	Regulator – EC should regulate, to stimulate political discussion for funding and EASA to reinforce 1.9.1 EAPPRI recommendation. Encourage airports to have surveillance systems to provide a ground picture. Encourage the deployment of moving maps. Encourage vehicle detection capabilities. And use technical action opportunities to integrate ground vehicles. Ergonomics of AVD to improve to endow it with better abilities to avoid false warnings. Learn lessons from moving map in aircraft experience from aircraft manufacturers. Discuss Research & Development possibilities with self-driving car industry and mining industry.
APT4	S5	F4	Multiple layers of protection can provide an effective response to 'Sudden High Energy Runway Conflicts' (SHERC); however no barrier by itself has the potential to prevent more than 35% of the identified potential scenarios. Proliferation and dissemination of the results of the 'Sudden High Energy Runway Conflict' study should be done for European ANSP's and Airport authorities in order to be aware of potential barriers and conclusions.
APT5	S5	F4	Focus should be put on memory aids; correct and precise phraseology for precise ATC clearances; and visual vigilance by ATC, pilots and drivers.
APT6	S6	F5	Airport operators should consider if detailed images would be beneficial, to AVD training and ANSP local training for all stakeholders as part of their hazard identification process.
APT7	S8	F6	Specific signs (for aerodrome works in progress)should be made clearer and better adapted to the crews needs. Transitions into and out of any airfield work period require specific focus. The aerodrome NOTAM process should be reviewed. New layout plans should be provided for significant works when there is an impact on normal operations.

APT8	***S9***	***F7***	***A new global standard aerodrome NOTAM system should be developed.*** ***Standard airport briefs (similar to met briefings e.g. symbology) should be developed.***
APT9	***S11***	***F9***	***Common standards and taxonomy for airfield risk status should be defined.*** ***Regulators and airport operators should set risk standards for airfields.***
APT10	***S12***	***F10***	***Mandating transponders and other options (for runway access) should be considered.***
APT11	***S15***	***F12***	***Identify the "best in class" airfield lighting devices and policies in regards to 'follow the greens'. Implemented and proven ideas should be followed where appropriate.***
APT12	***S13***	***F11***	***A common standard for stop bars and their operational use should be defined.***
APT13	***S14***	***F5***	***Photos of aerodrome signs for briefings (day/night and at different heights) should be produced.***
APT14	***S16***	***F14***	***Support that local initiatives should be harmonized through the respective local runway safety teams in order to include local stakeholders and stakeholders from different airfields.***
APT15	***S18***	***F16***	***A complete taxiing and driving management "ground plan" (complementary with flight plan) should be established.*** ***The presence of the operators at significant airfield safety meetings should be recommended.***
APT16	***S21***	***F18***	***Where appropriate, airport operators should install stop bars at all runway entry points.***
APT17	***S22***	***F18***	***Airport operators and ANSPs should install functionality to provide runway incursion alerts to ATC and train controllers in procedures in their use and reaction required.***
APT18	***S24***	***F20***	***Airport Operators should examine evidence of reported Hot Spots and, as reported via the LRST, consider improvements in clarity and visibility of signage and lighting.***
APT19	***S16***	***F16***	***Airport operators should involve the operational staff in the design and implementation of controller working positions.***
APT20	***S39***	***F33***	***Where appropriate, Aerodrome operators should install 'Runway Ahead/No Entry' surface markings in order to raise the attention of staff operating near or on runways.***

4.6 Local runway safety team action opportunities

REF	Strategy	Finding	ACTION OPPORTUNITY
LR1	S3	F2	Identify hazards and risks for specific airports to evaluate maturity of safety actions. Local runway safety teams should jointly share and discuss hazards.
LR2	S16	F13	Feedback on runway incursion investigation results should be provided to all stakeholders through local runway safety teams.
LR3	S16	F14	Local initiatives to improve runway safety should be harmonized through the respective local runway safety teams in order to include local stakeholders and stakeholders from different airfields.
LR4	S24	F20	Local runway safety teams should examine evidence of reported hot spots and together with airport operators consider improvements in clarity and visibility of signage and lighting.
LR5	S33	F27	Local runway safety teams should invite non home-based aircraft operators to their meetings in order to involve all relevant stakeholders.
LR6	S34	F28	Local runway safety teams should promote and establish clear links to post holding decision makers to improve implementation of identified solutions.
LR7	S35	F29	Local runway safety teams should promote the use of a single frequency for the control of access to an active runway including the request for, and issuance of, all clearances.
LR8	S36	F30	Local runway safety teams should promote the use of a single language on any frequency used for active runway control with language competency requirements to match.
LR9	S37	F31	Local runway safety teams should promote the proper illumination of towed aircraft.

4.7 Regulatory authorities action opportunities

REF	Strategy	Finding	ACTION OPPORTUNITY
REG1	S4	F3	Regulator – EC should regulate, to stimulate political discussion for funding and EASA to reinforce 1.9.1 EAPPRI recommendation. Encourage airports to have surveillance systems to provide a ground picture. Encourage the deployment of moving maps. Encourage vehicle detection capabilities. And use technical action opportunities to integrate ground vehicles. Ergonomics of AVD to improve to endow it with better abilities to avoid false warnings. Learn lessons from moving map in aircraft experience from aircraft manufacturers. Discuss Research & Development possibilities with self-driving car industry and mining industry.
REG2	S10	F8	Various safety related categories for aerodromes (same as fire categorization) should be defined.
REG3	S11	F9	Common standards and taxonomy for aerodrome risk status should be defined. Regulators and airports should set risk standards for aerodromes.
REG4	S16	F14	Support that local initiatives should be harmonized through the respective local runway safety teams in order to include local stakeholders and stakeholders from different airfields.
REG5	S17	F15	Regulators should analyze data and define a standard to be applied when adverse weather and low visibility operations are in force.
REG6	S18	F16	A complete taxiing and driving management "ground plan" (complementary with flight plan) should be established. Support that the presence of the operators at significant airfield safety meetings should be recommended.
REG7	S22	F18	Regulators should monitor that airport operators and ANSPs install functionality to provide runway incursion alerts to ATC and train controllers in procedures in their use and reaction required.
REG8	S31	F25	Regulators and international bodies should work together to promote and further develop runway safety strategic plans. These strategic plans should be informed by a common runway safety metric.
REG9	S35	F29	Regulators should encourage the use of a single frequency for the control of access to an active runway including the request for and issue of all clearances.
REG10	S36	F30	Regulators should encourage the use of a single language on any frequency used for active runway control with language competency requirements to match.

4.8 International bodies action opportunities

REF	Strategy	Finding	ACTION OPPORTUNITY
IB1	S9	F7	A new global standard aerodrome NOTAM system should be developed. Standard airport briefs (similar to meteorology briefings e.g. symbology) should be developed.
IB2	S10	F8	Various safety related categories for aerodromes (same as fire categorization) should be defined.
IB3	S31	F25	Regulators and international bodies should work together to promote and further develop runway safety strategic plans. These strategic plans should be informed by a common runway safety metric.

Chapter 5
EAPPRI

The new candidate EAPPRI v3.0 recommendations were presented at the Safety Forum. A copy of the posters showing the different recommendations can be found on the next pages.

Furthermore, a specific survey on the new candidate EAPPRI recommendations was done. 106 responses were received. All recommendations achieved a score of more than 4 out of 5. It can thus be concluded that:

The Safety Forum has validated the new candidate EAPPRI v3.0 recommendations.

European Action Plan for the Prevention of Runway Incursions v3.0 (EAPPRI v3.0) new candidates Recommendations

EUROCONTROL

SECTION 1

General Principles

(applies to Air Navigation Service Provider, Aircraft Operator, Aerodrome Operator)

GP1

Assess effectiveness of SMS

(with regard to runway safety/ runway incursion prevention)

Rationale:

SMS should have been implemented law ICAO and EU provisions; however, in spirit of continuous improvement, re-assess all aspects of SMS related to runway safety (in particular runway incursion prevention) and ensure optimisation

GP2

Continue to develop components of SMS and move towards a data driven, performance based safety-system approach with an emphasis on safety assurance and identifying best practice and signs of excellence

Rationale:

Ensure a proactive approach; learn from "what goes right" as well as "what goes wrong" in line with Safety-II philosophy

GP3a

Assess effectiveness of aerodrome local Runway Safety Team (RST), how it works and consider how it can be improved

Rationale:

Aerodrome local RST should have been established law with ICAO guidance and EU regulation; however, in the spirit of continuous improvement, confirm that working arrangements are optimal. Check role, terms of reference, composition, frequency, tasks and outputs

GP3b

Assess effectiveness of runway safety awareness campaigns

Rationale:

In conjunction with GP3a above, specifically re-assess safety awareness campaigns established at each aerodrome. Consider format, method of delivery, frequency and feedback

GP4

European stakeholders should work together to study the interpretation of the ICAO runway incursion definition with the aim of improving the consistency and credibility of runway incursion reporting via appropriate regulatory channels

Rationale:

Still widespread disparity in interpretation of ICAO runway incursion definition. Improve consistency and credibility of runway incursion reporting

Note:

All runway safety related events should be reported and investigated as necessary

EUROCONTROL

SECTION 2
Aerodrome Operator (Ad Op)

Ad Op 1

Ensure briefing and supervision of external aerodrome construction contractors' drivers and other personnel working on the airfield

Rationale:
External contractors may not be runway safety 'aware'; important to ensure that they are properly briefed and supervised

Ad Op 2

Carry out regular audits of airside driving permits (e.g. check 'recency' of use) in particular those allowing access to the runways, which should be as few as possible

Rationale:
Best practice to ensure access to runways is kept as low as possible

Ad Op 3

Promote the adoption of 'sterile cab' procedures when on the manoeuvring area

Rationale:
Aerodrome local RST should have been established law with ICAO guidance and EU regulation; however, in the spirit of continuous improvement, confirm that working arrangements are optimal. Check role, terms of reference, composition, frequency, tasks and outputs

Ad Op 4

Identify aerodrome Protected Areas and produce a map for drivers

Rationale:
Improve drivers' situational awareness. Assist in interpretation of runway incursion definition

Ad Op 5

Assess the numbering/naming policy for aerodrome vehicles and consider assignment of unique numbers/ names for each airside vehicle

Rationale:
Best practice measure to clarify the role of airside vehicles (e.g. Fire One (or similar) is always the Chief Fire Officer) and reduce risk of vehicle related call sign confusion

Ad Op 6

Recommendation AD Op 6 :
Large multi-line pads in the immediate vicinity of the runway should be avoided

Rationale:
Wide (nonstandard) taxiway entrances reduce the effectiveness of signs and markings as aids to prevent ground routing error and the infringement of the runway protections

European Action Plan for the Prevention of Runway Incursions v3.0 (EAPPRI v3.0) new candidates Recommendations

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SECTION 3

ANSPs

(also applies to Aerodrome Operator for ANSP 1, 2 and 3)

ANSP 1

Consider implementation of H24 stop bars
(and associated no crossing illuminated stop bar procedures)

Rationale:
They work!! SISG studies consistently show that if H24stop bars available then many reported RIs could/would most likely have been avoided

Note:
Important to acknowledge potential cost and drawbacks, e.g. potential increase in controller workload (Tower ergonomics and stop bar ops need to be optimised/automated)

ANSP 2

Assess conditional clearance operational procedures and practices. Consider if the operational use of conditional clearances can be removed or reduced

Rationale:
Safety studies have demonstrated that the misapplication and misinterpretation of conditional clearances can be a contributing factor in runway incursions

ANSP 3

Controllers should only issue line-up and/or take-off or crossing clearance when the aircraft is approaching the runway holding point

Rationale:
Early passing of line-up and/or take-off clearance, which has no capacity related benefits, has been a contributing factor in some RIs

ANSP 4

Controllers should avoid issuing landing clearance earlier than necessary

Rationale:
Early passing of landing clearance has been a contributing factor in some RIs

Note:
This should be established as local best practice and can normally be defined as a distance from touchdown

European Action Plan for the Prevention of Runway Incursions v3.0 (EAPPRI v3.0) new candidates Recommendations

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SECTION 4

Regulator

(also applies to Aerodrome Operator for ANSP 1, 2 and 3)

Reg 1

National agencies charged with the oversight of aviation safety should consider how they discharge their responsibilities for runway safety which may include:

1a
The establishment and coordination of a national/state runway safety group/team

1b
Including prevention of runway incursions in national runway safety plans/State Safety Plans

1c
Supporting the state-wide promotion and coordinated implementation of (EAPPRIv3.0)

1d
Participating in aerodrome local Runway Safety Teams (at their invitation)

Rationale:
Regulator involvement bolsters support and improves coordination of national runway safety activities

Reg 2

Assess the operator's SMS performances and its risk exposure related to runway incursions and use this assessment to adjust the oversight accordingly on a risk and performance-based approach

Rationale:
Improve national oversight of runway incursion prevention activities of all stakeholders.

European Action Plan for the Prevention of Runway Incursions v3.0 (EAPPRI v3.0) new candidates Recommendations

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SECTION 5

AIM

(Applies to AIM Providers, ANSPs, Aircraft Operators, Aerodrome Operators)

AIM 1

Provide information on aerodrome conditions that is simple to understand and focused on what is operationally usable, expressed in a standardised manner on format and content

AIM 2

Provide information on temporary changes to operating conditions at the aerodrome that is optimized/ focussed to increase the situational awareness of the most critical changes. When needed, AIP Supplement with graphics and charts should be published. For planned temporary changes, issuance of NOTAM with short notice ahead of the effective date or non-AIRAC publications should be avoided

Rationale:

Ever expanding volume of aerodrome AIM data created. Need to simplify and better target safety critical information for flight crews

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SECTION 6
Future Work

(Applies to EUROCONTROL but other stakeholders' views are welcome)

FW 1

Monitor and evaluate emerging technologies that may affect future aerodrome operations. Consider potential implications concerning runway safety and provide appropriate guidance, for example

FW 1a

Authorised Remotely Piloted Aerial Systems (RPAS)/'drone' and autonomous vehicle operations on and around the aerodrome

FW 1b

Remote Tower (rTWR) operations

Rationale:

Emerging technologies may impact on runway incursion prevention. There is a need to monitor potential effects, e.g. enhanced rTWR sensors may benefit controllers but how will rTWR operations affect ANSP participation in local RST?

How might future 'authorised' drone use, e.g. for infrastructure inspections, including aerodrome surfaces, and instrument flight checks/ calibrations affect runway safety/runway incursion prevention?