NETWORK MANAGER

SAFETY STUDY

THE IMPACT OF AIRSIDE DRIVERS ON RUNWAY SAFETY

CONTENTS

1. EXECUTIVE SUMMARY

EUROCONTROL analysed Severity A and B Runway Incursion events reported by ANSPs as part of the derivation of the EUROCONTROL Network Manager 'Top 5' ATM Safety Priorities. Within the sample it was identified that 9 cases involved the incorrect presence of vehicles on the runway. Whilst this is not a high proportion, in 8 of those 9 cases there was no barrier available after the one that stopped the sequence and, what is more concerning, for 2 cases it was only the providence that prevented an accident.

In consequence the EUROCONTROL Safety Improvement Sub-Group (SISG) confirmed an action to carry out a study aimed at understanding the issues around airside vehicle drivers and their impact on safety. It was specified that the study should ensure the "incorrect presence of a vehicle" be considered in the context of all events where a vehicle is involved, whether or not the driver was a contributory factor. It was also specified that the study should seek to illicit industry best practice.

This study request, in the form of an e-survey, was sent in February 2015 to a widespread selection of ANSPs, Airport Authorities in Europe and several National Safety Agencies. Responses were also elicited and received from the USA and Australia for comparison at a global level. After a data validation exercise, which removed duplicate answers from the same area of each organisation, a total of 71 responses were included from European stakeholders (42 ANSPs and Regulators, and 29 Airport Authorities).

To ensure industry best value within the work of the SISG Runway Safety portfolio of activities, the scope of this study is considerably broader than the initial request to establish the current impact on safety of airside driving operations.

SISG's strong ethical reputation as a competent and trusted body which encourages the free exchange of flight safety information in a secure/confidential environment, resulted in an unprecedented level of response for a survey such as this. In keeping with normal SISG ways of working no ANSP, Airport, Airport Authority or National Safety Agency is named within the document, apart from one section where the information is already in the public domain.

As a guide to the tables below, the following baselines are given. A total of 28 organisations, both ANSP and Airport Authorities provided runway incursion data. Between them, 2526 Runway Incursions were reported during the 3-year period 2012-2014. This is the figure described as "All Runway Incursions" in the tables below. The data is considered by the SISG to be highly representative for the purposes of this study.

EUROCONTROL data for the year 2014 shows 16.37 million aircraft movements across all reporting States. An aircraft movement is defined as either a landing or a departure from an airport that has licensed ATC Aerodrome Control. This is the figure used in calculating rates per million movements.

The principal question posed by the study request was **"What is the current impact on runway safety of airside vehicle drivers?"**

The main results from the analysis of the data provided in response to this question are summarised in the tables below.

All Runway Incursions (2012-2014):

18.5 % of all Runway Incursions involve a vehicle regardless of contributing factors.

15.7 % of all Runway Incursions involve a vehicle AND where the driver has contributed to the event causal chain.

0.9% of all Runway Incursions involve a vehicle AND where the driver has contributed to the event causal chain AND are assessed as Severity A or B.

Runway Incursions 2014 only:
Normalised 2014 data gives 7.7 Runway Incursions caused by vehicle drivers per movements.

84% of Runway Incursions <u>do not</u> involve any contribution from airside drivers.

Severity A & B Runway Incursions (2012-2014):

A mean average of 6 % of all Runway Incursions across Europe are reported as Severity A or B. However, one state reported 12.5% of its events to be A or B. The median average is 4%.

19 % of Severity A or B Runway Incursions involve a vehicle regardless of contributing factors. This is similar to the proportion for all Runway Incursions (18.5%).

Airside drivers are a contributing factor in 14.6 % of Severity A or B events. This is similar to the proportion as for all Runway Incursions (15.7%).

Severity A or B Incursions 2014 only:
Normalised 2014 data gives 2.6 Severity A+B Runway Incursions per movements.
Normalised 2014 data gives 0.5 Severity A+B Runway Incursions caused by vehicle drivers per movements.

Airside drivers do not have any increased impact on safety in severity A/B events above that present across all Runway Incursions.

We seek to eliminate all Severity A or B Runway Incursion events, 85% of which do not involve a vehicle. Thus a study of the contributing factors within the other 85% is necessary to determine where the most productive safety gains may be found. It may be that, after breaking down all Severity A and B events into analytically useful categories, the 15% attributable to airside vehicles may be one of the highest groupings, or it may not.

The study asked many other questions about airside driving training and operations. Stakeholders were also asked to share industry best practice on how their best safety gains have been achieved and their recommendations for future safety improvements on the Manoeuvring Area. The essence of these responses have been grouped into the following categories.

a) Driver Training

b) Vehicle/Driver Equipment

c) Airport Layout/Signage and Lighting

d) ATC Equipment, Procedures and Training

e) Communication

f) Airside Procedures

g) Awareness Campaigns

h) Culture

i) Organisational Issues

The most common preventative measures cited as best practice concerned formal driving training, recurrent training and joint training with other airport stakeholders.

The most common grouping of recommendations was the installation of A-SMGCS, followed by the use of Stop bars H24 and a common frequency for all runway operations.

The complete set of responses to all of the questions are included as Appendices. They have been edited solely for typographical improvement and correct use of English.

The Study makes 3 Recommendations:

1. It is recommended that EUROCONTROL NM commissions a study of the 85% of Severity A and B Runway Incursions that do not involve airside drivers as contributing factors, to further understand the relative contributions from all players and infrastructures. The aim being to achieve clarity on where the most effective safety gains may be made.

2. It is recommended that European stakeholders review and consider the preventative measures cited as achieving a reduction in Runway Incursions and the recommendations made by their peers to further reduce runway incursions; in order to inform their future airside strategies.

3. It is recommended that EUROCONTROL NM facilitates a workshop with the FAA and selected European stakeholders to understand the reasons for the significant difference in the percentage of Runway Incursions being assessed as Severity A or B and, if necessary, assist in action to address inconsistencies.

2. SCOPE OF SAFETY STUDY

The scope of Safety Study included the following:

1. Runway Incursion data

- Total Number of Runway Incursions reported by respondents

- Runway Incursions involving vehicles

- Runway Incursions involving vehicles and where driver was a contributing factor

- Runway Incursions classified as Severity A or B

- Runway Incursions classified as Severity A or B involving vehicles and where driver was a contributing factor

- Comparison of data from Europe, USA and Australia

2. Airside Driver Training

3. Airside Driver Permits

4. Airside Driver Briefing

5. Airside Procedures

- Use of stop bars and airport signage

- Communication during runway operations

- Non-radio procedures

- Radio Fail procedures

- Use of English or native language

6. Safety Nets available to driver and to ATC

7. Airside Incident Reporting and Personnel Action

8. Lesson Dissemination

9. Approval and promulgation of procedure changes

10. Changes made providing most positive contribution in the prevention of Runway Incursions involving vehicles

11. Recommendations made by respondents to further prevent or mitigate Runway Incursions.

12. Selection of industry best practice

3. RUNWAY INCURSION DATA

A) TOTAL NUMBER OF RUNWAY INCURSIONS IN EUROPE 2012-2014, REPORTED BY RESPONDENTS

2526 Runway Incursions in Europe during the 3-year period 2012 - 2014 were reported by 28 organisations.

2014 only Incursions: Normalised data for 2014 gives a rate of 49 Runway Incursions per movements across reporting European states.

B) RUNWAY INCURSIONS 2102-2014 INVOLVING VEHICLES

467 of all Runway Incursions reported involved a vehicle, regardless of the contributing factors.

18.5 % of all Runway Incursions involve a vehicle regardless of contributing factors

C) RUNWAY INCURSIONS 2012-2014 INVOLVING VEHICLES AND WHERE DRIVER WAS A CONTRIBUTING FACTOR

396 Runway Incursions involved a vehicle and the driver was a contributing factor in the event.

15.7 % of all Runway Incursions involve a vehicle AND where the driver has contributed to the event causal chain.

84% of Runway Incursions <u>do not</u> involve any contribution from airside drivers.

2014 only Incursions:
Normalised 2014 data gives 7.7 Runway Incursions per million movements caused by vehicle drivers.

This is one of the answers to the principal question set to the study. To what degree does airside driving impact runway safety? The second answer (see (e) below) examines whether or not there is any significant difference when considering only Severity A & B events?

D) RUNWAY INCURSIONS 2012-2014 CLASSIFIED AS SEVERITY A OR B

151 Runway Incursions were classified as Severity A or B.

A mean average of 6 % of all Runway Incursions across Europe are reported as Severity A or B. However, one state reported 12.5% of its events to be A or B. The median average is 4%.

2014 only Incursions: Normalised 2014 data gives 2.6 Severity A+B Runway Incursions per million movements.

E)   RUNWAY INCURSIONS 2012-2014 CLASSIFIED AS SEVERITY A OR B INVOLVING VEHICLES AND WHERE DRIVER WAS A CONTRIBUTING FACTOR

22 Runway Incursions were classified as Severity A or B and where a vehicle driver was a contributing factor.

19 % of Severity A or B Runway Incursions involve a vehicle regardless of contributing factors. This is similar to the proportion for all Runway Incursions (18.5%).

14.6 % of Severity A or B events involve a contributing impact from vehicle drivers, and is a similar proportion as for all Runway Incursions (15.7%).

There is no evidence that airside drivers have any increased impact in severity A/B events above that across all Runway Incursions.

2014 only incursions:
Normalised 2014 data gives 0.5 Severity A+B Runway Incursions caused by vehicle drivers per million movements.

F)   COMPARISON OF EUROPEAN RUNWAY INCURSION DATA WITH USA AND AUSTRALIA

Data has been supplied by the FAA and Airservices Australia in order to compare and contrast against the data for Europe. There are both similarities and significant differences.

f1. Total number of Runway Incursions reported in 2014, normalised for airport movements*

Europe: 49 Runway Incursions per million movements

USA: 25 Runway Incursions per million movements

Australia: 14 Runway Incursions per million movements

* Note: The criteria for movements is all aircraft arrivals and departures at airports with licensed TWR ATC.

Comment: - Europe's reporting rate of Runway Incursions is double that of USA and four times that of Australia. The Study did not determine the reasons why there are differences in reporting rates but these may include variances in definitions, interpretations or reporting cultures.

f2. Ratio of Runway Incursions caused by airside drivers

Europe: 15.7 %

USA: 17.6 %

Australia: 7.3 %

Comment: The ratio of events involving airside drivers is similar in Europe and USA, but is twice that reported in Australia.

f3. Ratio of A or B severity events to all Runway Incursions

Europe: 6.0 % *

USA: 1.2 %

Australia: 4.2 %

* Note: Median 3.8 %

Comment: The ratio of A and B severity events to all Runway Incursions is similar in Europe and Australia (taking account of the median average for Europe), but it is significantly lower in USA.

This is one of the biggest differences. One state in Europe reports 12% of its events to be severity A or B. The rest of Europe averages around 4% and USA assesses only 1.2% of its events to be severity A or B. This may be due, inter alia, to differing interpretation and application of the ICAO and RAT severity definitions.

It is recommended that EUROCONTROL Network Manager facilitates a workshop with the FAA and selected European stakeholders to understand the reasons for the significant difference in the percentage of Runway Incursions being assessed as Severity A or B and, if necessary, assist in action to iron out inconsistencies.

f4. Ratio A or B severity events caused by airside drivers to all Runway Incursions

Europe: 0.9 %

USA: 0.08 %

Australia: 1.0 %

Comment: The figures shown in Point 3 above suggest the rate of A and B Runway Incursions in Europe and Australia is between 3 and 4 times more than the rate Runway Incursions assessed to be A or B in the USA. Given the data at Point F2 above gives a similar percentage of driver contribution to all Runway Incursions between Europe and USA, the expectation would be that this pointer would show the same relativity as Point 3 viz. about 3 times more in Europe. However the answer here is 10 times more in Europe (about 1 per 1100) than USA (1 per 12,000).

Q1. WHAT TYPE OF ORGANISATION DO YOU REPRESENT?

Type of organisation
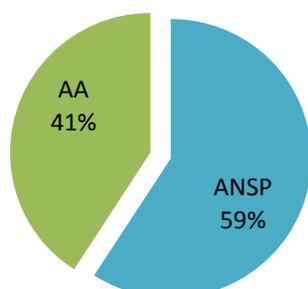
Air Navigation Service Provider	**42**
Airport Authority	**29**

Seventy one (71) organisations responded to the survey. The ANSPs are listed at Appendix A and Airport Authorities are listed at Appendix B. Additionally, a few National Safety Agencies responded, these are included in the ANSP data set and also listed at Appendix A.
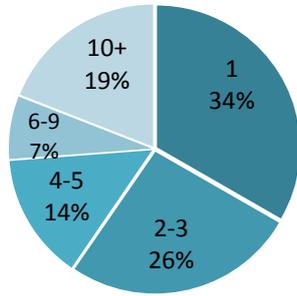
ANSP

1	**14**
2-3	**11**
4-5	**6**
6-9	**3**
10+	**8**

The majority of ANSPs are reporting for up to 3 airports each, however by extrapolation the total number of airports included in the ANSP responses is around 180.

Airport Authority
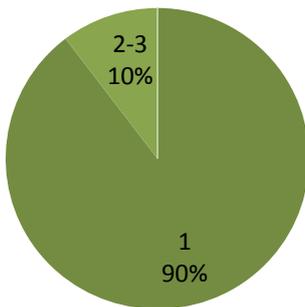
1	**26**
2-3	**3**
4-5	**0**
6-9	**0**
10+	**0**

Almost all of the Airport Authorities are reporting for only one airport. By extrapolation the total number of airports covered is around 33.

Some of the ANSP and Airport Authority airports may be the same. This has been included to allow the different perspectives on airfield operations, best practices and recommendations to be voiced.

Note that the data validation exercise removed multiple responses from the same area of one organisation.

Q3. WHAT WAS THE TOTAL NUMBER OF MOVEMENTS AT THESE AIRPORTS IN 2014?

ANSP
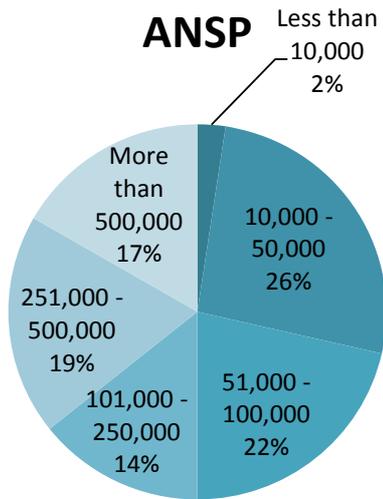
Less than 10,000	**1**
10,000 - 50,000	**11**
51,000 - 100,000	**9**
101,000 - 250,000	**6**
251,000 - 500,000	**8**
More than 500,000	**7**

There is a good mix of size of operation across the study. Comments on the questions to later questions will seek to tease out differences.

Airport Authority
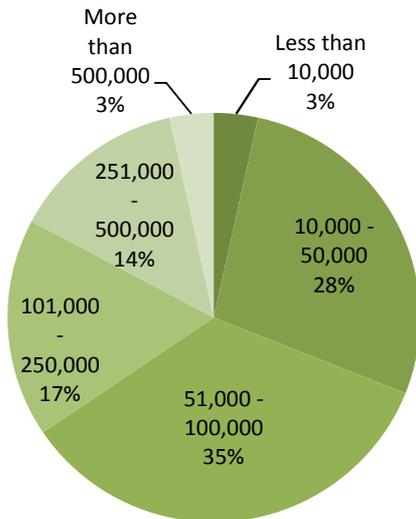
Less than 10,000	**1**
10,000 - 50,000	**8**
51,000 - 100,000	**10**
101,000 - 250,000	**5**
251,000 - 500,000	**4**
More than 500,000	**1**

There is a good mix of size of operation across the study, the majority of airports having between 10,000 – 100,000 movements. Comments on the questions to later questions will seek to tease out differences.

Q10A PLEASE STATE HOW AND WHY COMMUNICATIONS ASSOCIATED WITH RUNWAY OPERATIONS ARE CONDUCTED IF A COMMON FREQUENCY IS NOT USED.

28 responses were received. These responses are detailed at Appendix E.

13 of these responses specified that the lack of proficiency in ICAO English amongst the driver population was the principle reason for maintaining a division between runway operations conducted in English and ground operations in a native language.

Several respondents reported that the use of English for all airside operations was a goal but not yet achieved.

Some respondents reported that putting non-English speaking ground operators onto the English speaking TWR frequency would result in increased workload and reduced situational awareness.

Some respondents reported that the ground frequency was used primarily to reduce congestion and the risk of blockages on the TWR frequency.

Q10B PLEASE STATE HOW COMMUNICATIONS THAT ARE NOT DIRECTLY TO/FROM THE CONTROLLER RESPONSIBLE FOR THAT RUNWAY ARE CARRIED.

Only 8 responses to this question. These responses are detailed at Appendix F.

4 respondents indicated that a Planning or Co-ordinator Controller communicated with vehicles during runway operations. 2 respondents indicated that this action was carried out by a Ground Movement Controller.

2 respondents indicated that vehicle movements on the runway were in communication with a TWR assistant. Bear in mind that this is only 2 cases out of over 70 survey returns.

Q11. WHAT ARE THE PROCEDURES FOR AUTHORISING NON-RADIO DRIVERS TO ENTER THE PROTECTED AREA AND TO ENSURE THAT SUCH DRIVERS HAVE VACATED THE PROTECTED AREA?

31 responses were received to this question. These responses are detailed at Appendix G.

The responses were unanimous that access to the Manoeuvring Area to non-radio vehicles was only permitted with a radio-equipped escort vehicle. A few respondents indicated that non-radio vehicles were prohibited.

55 responses to this question were received. The responses are detailed at Appendix H.

The high response rate indicated great interest in this subject.

The majority of comments reported procedures to vacate the area as quickly as possible. Some reported that specific "radio fail" routes were established.

Many of the comments related to the use of mobile/cell phones to report position and vacation. Some reported that the carriage of a mobile phone was mandatory, others indicated that a mobile phone should be used if carried.

Other methods in use include waiting for a leader vehicle, flashing car headlights at Control Tower, the use of light signals from the Tower and flashing the runway lights on/off by ATC to alert the driver to vacate.

After vacating the area, most comments indicated a need to inform ATC.

HAS THE USE OF ENGLISH OR THE USE OF THE NATIVE LANGUAGE BEEN A CONTRIBUTING FACTOR IN ANY RUNWAY INCURSION EVENT SINCE JANUARY 2012?

ANSP
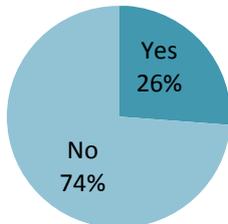
Yes	**11**
No	**31**

Airport Authority
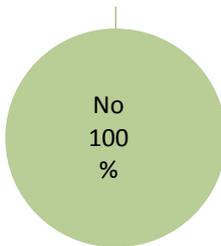
Yes	**0**
No	**29**

Only 11 out of 71 respondents reported that language had been a factor in Runway Incursions, and these were all ANSPs.

Only 9 textual responses were received to this question. These responses are detailed at Appendix I

Most of the responses cited poor English and a lack of standard phraseology by both ATC and pilot/driver as being contributing factors. Examples are given in the Appendix. The low response rate however indicates that the large majority of ANSPs and Airport Authorities have not experienced any significant problems concerning language.

This may equally reflect proficient training in the English language and/or keeping non-English speaking vehicle drivers on a separate frequency.

Question 18 asked "Which new procedure, equipment or training has made the most positive contribution to the prevention of Runway Incursions involving vehicles, since January 2012"

74 comments were received answering this question. Some respondents offering more than one topic. All responses are detailed at Appendix J. They have been grouped under the following headings:

a) Driver Training
b) Vehicle/Driver Equipment
c) Airport Layout/Signage and Lighting
d) ATC Equipment, Procedures and Training
e) Communication
f) Airside Procedures
g) Awareness Campaigns
h) Culture
i) Organisational Issues

a) Driver Training
Most comments relate to the gains seen from the introduction of formal Airside Driver training and recurrent training. Some mentioned the inclusion of ATC personnel in the recurrent training. Dissemination of Learning and Awareness from incidents was also mentioned.

Two respondents specified using a driving simulator had been beneficial in the number of scenarios that can be created and also time/cost savings from live training.
Phraseology and read backs was also a consistent comment.

b) Vehicle/Driver Equipment
4 comments related to the benefits gained by fitting all vehicles handled on the ATC frequencies with transponders. This requirement also reduced the number of active vehicles.

c) Airport Layout/Signage and Lighting

10 comments related to the installation and use of stop bars.

Other comments related to an increased use of "RWY AHEAD" or "STOP" markings

d) ATC Equipment, Procedures and Training

The most frequent comment related to the installation and use of A-SMGCS.

Specific training in Runway Incursion awareness was mentioned, some included joint sessions with airside ops and driving staff.

e) Communication

Use of a single frequency for all runway operations was mentioned as well as the importance of read backs and challenge.

f) Airside Procedures

Naming individual runway and intermediate holding points was mentioned as a means to improve spatial awareness and reduce confusion.

g) Awareness Campaigns

Several respondents included safety awareness programs including notices, posters and briefings.

A few mentioned the publication of runway hot spots.

There was also mention of using information about Runway Incursions at other airports.

h) Culture

Most responses highlighted the role of the Local Runway Safety Teams and how discussion across different stakeholders improved the overall culture.

i) Organisational Issues

Several respondents reported that reducing the number of airside driving permits and further reducing the number of vehicles and drivers authorised to enter runways has reduced incidents.

Q19. LESSON LEARNING DISSEMINATION

Question 19 asked "How are lessons learnt disseminated internally and externally?"

73 comments were received in response to this question. Some respondents offered more than one methodology. All responses are detailed at Appendix K

14 comments related to passive safety bulletins and information sheets.

10 comments related periodic live staff meetings.

10 comments concerned action taken by the Local Runway Safety Team.

8 comments concerned ATC refresher training, some including airside staff.

7 comments promoted the use of direct emails, group emails, intranet and extranet.

6 comments highlighted company wide and cross industry dissemination.

5 comments related to regular periodic digests or magazines.

Question 20 asked "What recommendation would be made by the respondents to the Survey make at a National or European level that could lead to a reduction in the frequency or severity of Runway Incursions?"

62 comments were received in response to this question. All responses are detailed at Appendix L.

a) Driver Training

Just a few comments here recommending that Airside Driving Permits should be mandatory and that recurrent/proficiency training should also be mandatory.
Simulator training is recommended.
Frequent training in LVP procedures to be held jointly with airport and ATC staff.

b) Vehicle/Driver Equipment

A small number of recommendations were made for transponders to be fitted to all cars, and also for GPS.

c) Airport Layout/Signage and Lighting

A small number of recommendations to accelerate the installation of stop bars.
Other recommendations include discrete names for holding points instead of alphanumeric and the installation of systems that provide visual warnings to pilots and drivers, rather than reliance upon ATC systems.

d) ATC Equipment, Procedures and Training

8 out of 10 recommendations promote the installation of Advanced-Surface Movement Guidance and Control System (A-SMGCS) or even simple surface Movement Radar (SMR) systems. The point was made by more than one respondent that the prime purpose is to prevent collisions.

e) Communication

The principal point was made that most Runway Incursion events are associated with Air/Ground or Ground/Ground.
Recommendations were made that a common frequency be used for all runway operations; that communications should be in English; and that a specific proficiency in English for drivers be introduced (not necessarily ICAO level 4).

f) Airside Procedures

10 recommendations were made, 5 of which promote the use of stop bars H24.

g) Awareness Campaigns

Only a few recommendations, which relate to better, possible mandatory, briefings for GA pilots using Air Transport airports and Hot spot awareness

h) Culture

Generic recommendations promoting Runway Safety Teams, continuous training including human factors and the investigation of all events in a just culture environment.

i) Organisational Issues

Several recommendations asked for one clear and explicit definition of Runway Incursion and what is a safety event but not a Runway Incursion.
Other recommendations promoted the application of ICAO Annexes, Commission Regulation (EU) 139/2014 (Certification of Aerodromes) and European Action Plan for the Prevention of Runway Incursion (EAPRRI).
Others recommended the reduction of vehicles and number of drivers with airside permits.

5. QUESTIONS FOR AIRPORT AUTHORITIES

Q4. WHAT WAS THE TOTAL NUMBER OF CURRENT AIRSIDE DRIVING PERMITS AT THESE AIRPORTS?

Less than 100	**4**
100 - 250	**5**
251 - 500	**6**
501 - 1,000	**2**
More than 1,000	**12**
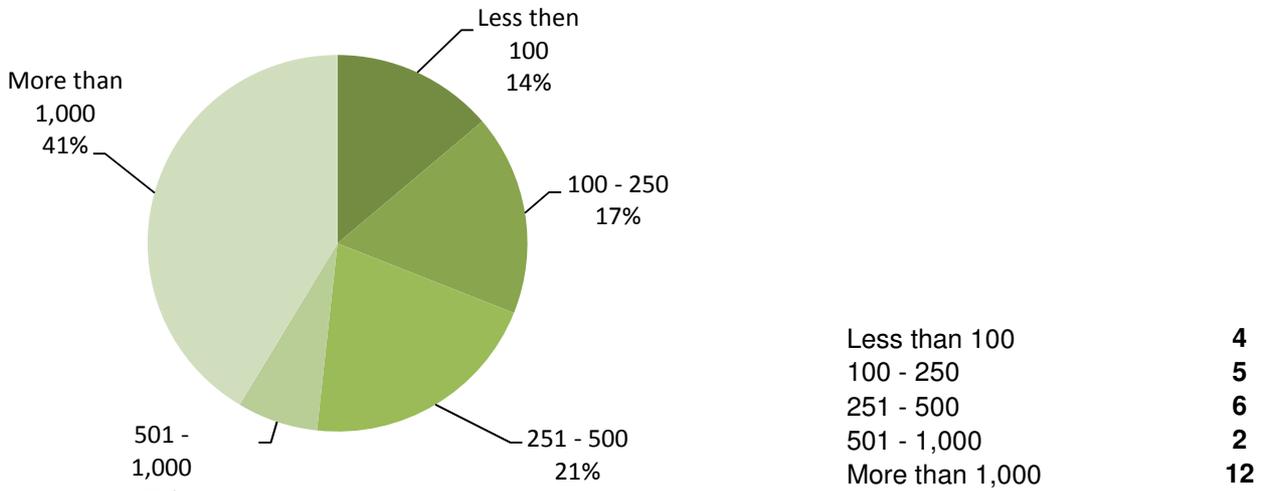
Further analysis considered how these figures were normalised against the number of airport movements.

27 Airports Authorities with one airport provided data on airside driving permits. The following table shows a generalised progressive economy of scale. Extrapolated is an average number of Airside Driving Permits (ADP) per 1000 movements, for each size grouping. This may be of use when Airport Authorities are considering future airside driving strategies.

Airport Movements	Airside Driving Permits		Mid-point movements / ADPs	Average ADPs per 1000 movements
< 10,000	< 100	x 1		Low data
10,000 – 50,000	< 100 100 – 250 250 – 500 > 1000	x2 x 3 x 2 x 1	240K / 2855	12 ADPs per 1000 movements
51,000 – 100,000	<100 100 – 250 250 – 500 > 1000	x 1 x 2 x 3 x 2	600K / 4555	8 ADPs per 1000 movements
101,000 – 250,000	250 – 500 500 – 1000 > 1000	x 1 x 2 x 2	875K / 4875	6 ADPs per 1000 movements
251,000 – 500,000	> 1000	x 4	1500K / 6000	4 ADPs per 1000 movements
> 500,000	> 1000	x 1		Low data

Airport Authorities were asked to describe how their Airside Driving Procedures are documented.

Almost all (93%) reported that all procedures relating to airside driving are documented in an official company document, which is subject to regulatory inspection and approval.

There was however some confusion in the responses as 34% later reported that all procedures relating to airside driving are documented in a controlled company document, but this is not subject to regulatory inspection or approval.

72% reported that their Airside driving procedures are promulgated or are available externally e.g. Extranet.

83% of Airport Authorities had specific procedures in addition to embedding EAPPRI. At the very least everybody imported and published EAPPRI as the procedures that were in operation.

5-1	All procedures relating to airside driving are documented in an official company document, which is subject to regulatory inspection and approval.
5-2	Airside driving procedures are promulgated or are available externally e.g. Extranet
5-3	All procedures relating to airside driving are documented in a controlled company document, but this is not subject to regulatory inspection or approval
5-4	Only procedures relating to airside driving, specific to each airport are documented in a controlled company document.
5-5	Only external guidance material and EAPRII is used to form procedures
5-6	No specific documentation other than reference to EAPRII
5-7	Procedures are immediately updated following changes to airport layout, equipment, signage etc.
5-8	Procedures are updated as necessary following investigation into events on the Manoeuvring Area

		0%	100%
5.1	Applies		93%
	Doesn't Apply	7%	
5.2	Applies		72%
	Doesn't Apply	28%	
5.3	Applies	34%	
	Doesn't Apply		66%
5.4	Applies	48%	
	Doesn't Apply		52%
5.5	Applies	17%	
	Doesn't Apply		83%
5.6	Applies	0%	
	Doesn't Apply		100%
5.7	Applies		93%
	Doesn't Apply	7%	
5.8	Applies		83%
	Doesn't Apply	17%	

Q5A PLEASE STATE HOW CHANGES TO AIRSIDE DRIVING PROCEDURES ARE APPROVED:

20 responses were received. These responses are detailed at Appendix C.

4 responses specified that all proposed changes to airside procedures had to be submitted to, and approved by, the relevant National Supervisory Authority (NSA). Conversely, 2 responses specified that changes to airside procedures did not require approval by the NSA.

Most responses alluded to processes that involved a local safety committee or board.
5 responses specified that all proposed changes were subject to a risk or safety assessment.

Q5B PLEASE STATE HOW CHANGES TO AIRSIDE DRIVING PROCEDURES ARE PROMULGATED:

22 responses were received. These responses are detailed at Appendix D.

7 responses indicated various uses of intranet and extranet. 4 responses specified use of individual email notifications to all drivers and other stakeholders. Whilst 3 others mentioned distribution to heads of airport operators only with internal distribution expected.

7 responses indicated use of various notices and bulletins

9 responses indicated a programme of training where required prior to changes becoming operational.

Q6. AIRSIDE VEHICLE DRIVER TRAINING – DO YOU INCLUDE THE FOLLOWING SUBJECTS AND REQUIREMENTS IN YOUR DRIVER TRAINING PROGRAMME?

All except 2 Airport Authorities have a formal classroom Airside Driver training course. All courses included the basics of the Permit permissions, personal responsibilities, airfield layout, ILS and runway protected areas, Low Visibility Procedures, Emergency Procedures, ATC and airfield rules.

72% of Airport Authorities provided additional training for those drivers that might be involved in runway operations. 5 Airport Authorities reported that they used some degree of simulator training. Conversely 2 Airport Authorities reported no practical training at all.

83% of Airport Authorities reported that training was completed in their national language. 31% reported that training was also in English. Only 17% reported training in English ICAO Level 4.

86% of Airport Authorities reported that a written examination pass was required at the completion of airside driving training. 76% also required a practical examination pass.

6-1	The Airside Driving Permit (ADP) – what is it, what does it permit and what are its limits
6-2	Completion of a standard classroom course
6-3	Local Organisations – who is who on the airport
6-4	ATC and Local Aerodrome Regulations and Rules
6-5	Rights of Way
6-6	Personal Responsibilities
6-7	General Aerodrome Layout Inc. signs and markings
6-8	Aircraft Familiarisation. Knowledge of local types and call signs
6-9	Protected runway and ILS areas
6-10	Low Visibility Procedures
6-11	Emergency Procedures
6-12	Communications
6-13	Briefing Procedure before driving
6-14	Practical Training - Simulator
6-15	Practical Training – On airfield
6-16	Additional Training for drivers that may enter or cross runways
6-17	RTF Training
6-18	Training completed in national language
6-19	Training completed in national language and in English
6-20	Aviation English to ICAO level 4
6-21	Written Examination on completion of training
6-22	Practical Examination on completion of training

Item	Yes	No
6.1	100%	0%
6.2	93%	7%
6.3	86%	14%
6.4	97%	3%
6.5	100%	0%
6.6	100%	0%
6.7	100%	0%
6.8	76%	24%
6.9	97%	3%
6.10	97%	3%
6.11	100%	0%
6.12	97%	3%
6.13	76%	24%
6.14	21%	79%
6.15	93%	7%
6.16	72%	28%
6.17	83%	17%
6.18	83%	17%
6.19	31%	69%
6.20	17%	83%
6.21	86%	14%
6.22	76%	24%
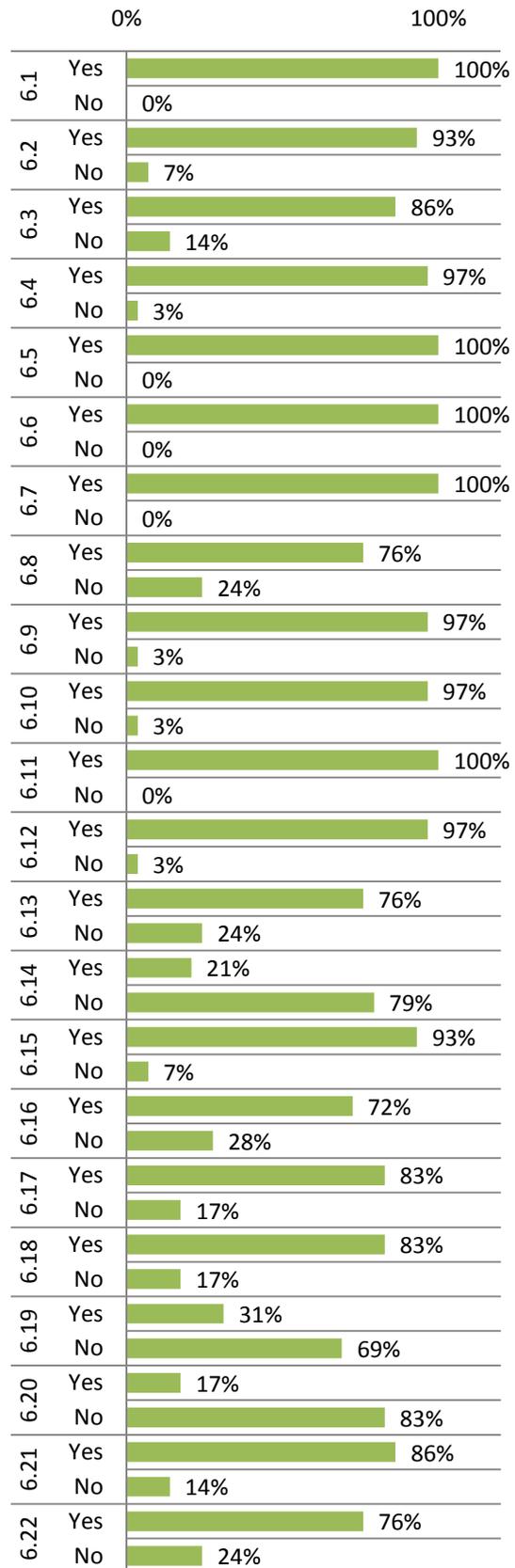
Q7. WHAT IS THE PERIOD OF VALIDITY OF AN AIRSIDE DRIVING PERMIT?

The majority of Airport Authorities reported that Airside Driving permits are valid for 2 years or more.
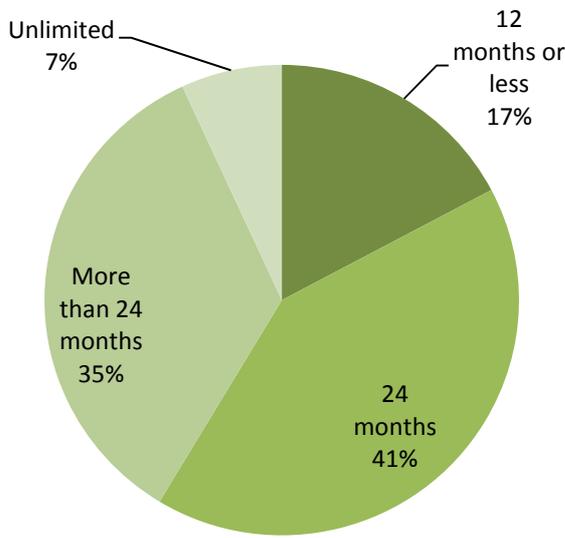
12 months or less	**5**
18 months	**0**
24 months	**12**
More than 24 months	**10**
Unlimited	**2**

Q8. WHAT IS THE REQUIREMENT FOR RENEWAL OF AN AIRSIDE DRIVING PERMIT?

79% of Airport Authorities reported a requirement to pass a medical examination. 72% reported a requirement to pass a written test and 62% also required a practical exercise pass.

Only half of Airport Authorities reported that lessons from previous safety events were included.

8-1	No reported or observed changes in medical condition
8-2	Medical fitness examination
8-3	Formal written test
8-4	Formal practical test
8-5	Continuous assessment based on satisfactory performance
8-6	Interview involving random questions selected by interviewer
8-7	Discussion on learning points from safety events since last renewal of ADP
8-8	None of the above if performance is satisfactory
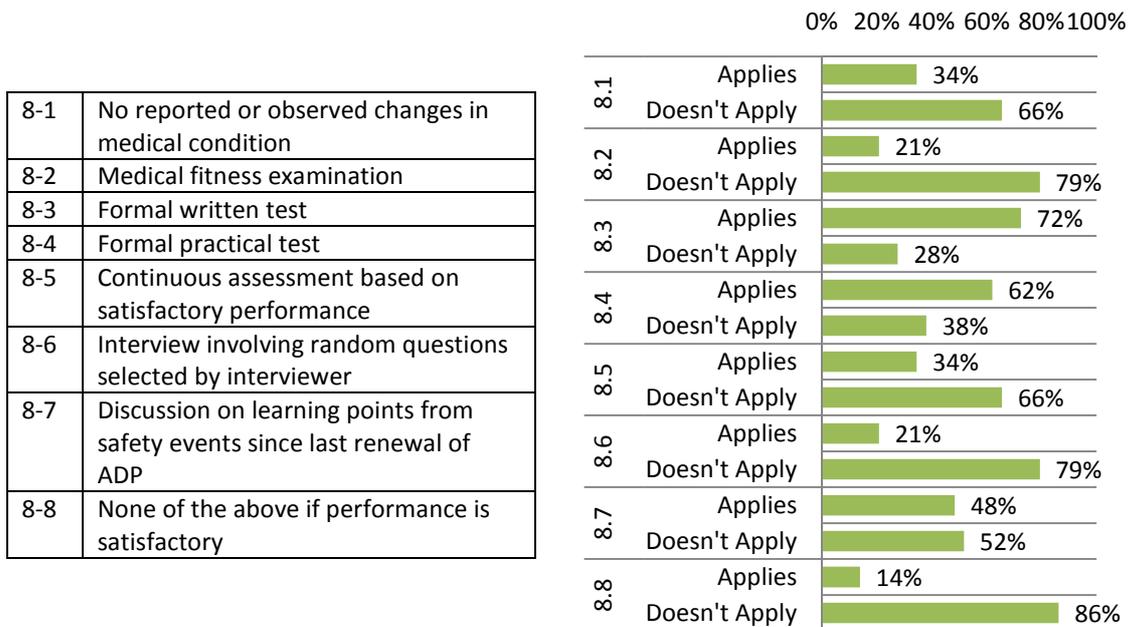
Three quarters of Airport Authorities reported that drivers must acknowledge that they have been briefed before commencing daily operations. Around 70% provide static briefing material and 60% provide personal briefings.

83% reported that significant changes during the shift are updated in real-time by radio.

9-1	Significant aerodrome information which may affect operations on or near the runway, is provided to Manoeuvring Area drivers reporting for duty by individual briefing
9-2	Significant aerodrome information which may affect operations on or near the runway is provided to Manoeuvring Area drivers reporting for duty by static briefing material.
9-3	Manoeuvring Area drivers reporting for duty must sign or mark that they have been briefed on significant aerodrome information before commencing work.
9-4	Significant aerodrome information which may affect operations on or near the runway is updated to Manoeuvring Area drivers 'real-time' using radio communication.

9.1 Applies 59%
9.1 Doesn't Apply 41%
9.2 Applies 69%
9.2 Doesn't Apply 31%
9.3 Applies 24%
9.3 Doesn't Apply 76%
9.4 Applies 83%
9.4 Doesn't Apply 17%
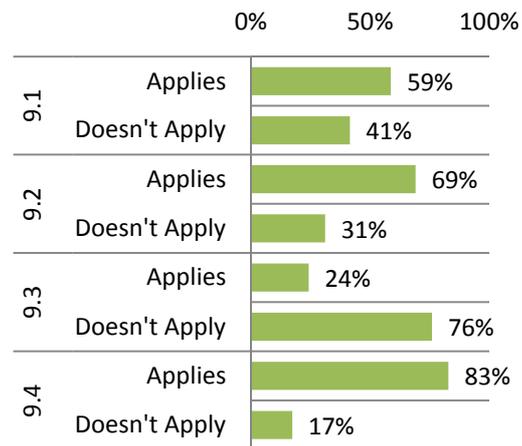
Q10. MANOEUVRING AREA PROCEDURES

93% of Airport Authorities reported that all communications involving runway operations are direct to the executive controller for that runway. 72% reported that all operations were conducted on a single frequency (including cross-coupling) but only 28% reported that all communications were in English.

79% of Airport Authorities reported that stop bars were in use H24. Half of the airports also protected available but inactive runways.

Note: Whilst a quarter of airports responded "does not apply" to Q10.9 that aircraft/vehicles are not allowed to cross illuminated stop bars, with an ATC clearance ,subsequent checking with respondents shows that the answers had more to do with not having stop bars, and therefore a "not applicable" option would have been helpful.

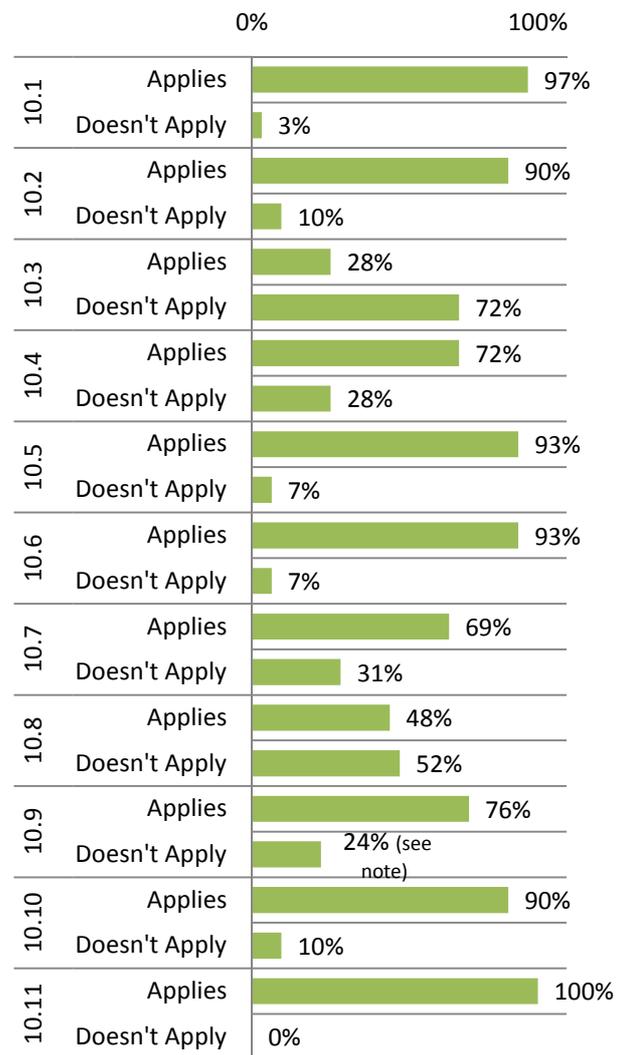|		
10-1	All vehicles on the Manoeuvring Area are in radio contact with the appropriate Air Traffic Control service, i.e. ground and/or tower either directly or through an escort	
10-2	The ICAO read-back procedure is used for all instructions relating to an active runway	
10-3	All communications associated with runway operations are conducted in aviation English	
10-4	All communications associated with runway operations are on a common frequency. This may include the use of Cross-coupled frequencies	
10-5	All communications associated with runway operations are directly to/from the controller responsible for that runway	
10-6	Call sign confusion at an aerodrome is minimised by giving discrete RTF call signs to Manoeuvring Area vehicles	
10-7	Runway stop bars are employed on active runways H24	
10-8	Runway stop bars are employed on inactive, but available, runways H24	
10-9	Aircraft or vehicles are not instructed to cross illuminated red lights, e.g. stop bars when entering or crossing a runway unless contingency procedures are in force, e.g. to cover cases where the stop bars or controls are unserviceable	
10-10	Stop Bars that protect the runway are controlled by the controller responsible for that runway	
10-11	Air Traffic Control procedures contain a requirement to issue a specific clearance to enter or cross any runway. (*Includes non-active available runways*)	

10.1	Applies	97%
	Doesn't Apply	3%
10.2	Applies	90%
	Doesn't Apply	10%
10.3	Applies	28%
	Doesn't Apply	72%
10.4	Applies	72%
	Doesn't Apply	28%
10.5	Applies	93%
	Doesn't Apply	7%
10.6	Applies	93%
	Doesn't Apply	7%
10.7	Applies	69%
	Doesn't Apply	31%
10.8	Applies	48%
	Doesn't Apply	52%
10.9	Applies	76%
	Doesn't Apply	24% (see note)
10.10	Applies	90%
	Doesn't Apply	10%
10.11	Applies	100%
	Doesn't Apply	0%

Q13. SAFETY AIDS AVAILABLE TO AIRSIDE DRIVERS

79% of Airport Authorities reported that airside drivers have headsets and that sterile cab procedures are practiced.

Two-thirds of vehicles have transponders but only 2 Airport Authorities reported that vehicles are equipped with GPS and moving maps.

13-1	Vehicles have GPS/SATNAV with moving airfield maps
13-2	Vehicles have transponders
13-3	Vehicles have headsets for drivers
13-4	Front seat passengers that have an ADP have specific responsibilities
13-5	Sterile vehicle cab procedures are practiced when there are passengers
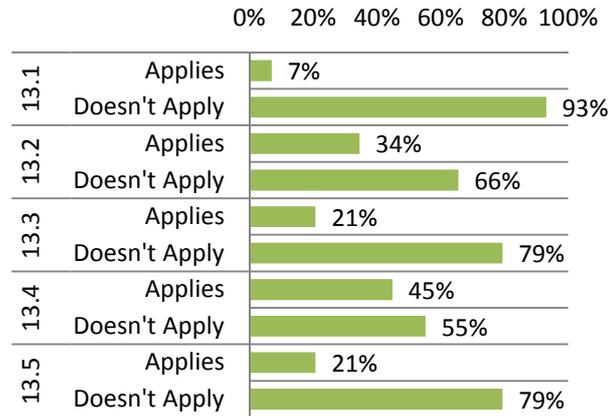
13.1	Applies	7%
	Doesn't Apply	93%
13.2	Applies	34%
	Doesn't Apply	66%
13.3	Applies	21%
	Doesn't Apply	79%
13.4	Applies	45%
	Doesn't Apply	55%
13.5	Applies	21%
	Doesn't Apply	79%

All except one Airport Authority reported that airside drivers are required to make a written report if they have been involved in a safety event on the Manoeuvring Area.

There is some confusion of responses to this question. 60% reporting that after an incident the ADP is retained and 60% reporting that the ADP is temporarily suspended.

28% reported that being found responsible for a safety event would result in the driver being banned from the Manoeuvring Area, which may result in loss of employment.

15-1	Vehicle drivers are required to file a written report whenever they become aware that they have been involved in a safety event on the Manoeuvring Area
15-2	Vehicle drivers are required to make a verbal report whenever they become aware that they have been involved in a safety event on the Manoeuvring Area
15-3	Vehicles drivers are NOT required to report events unless the vehicle is damaged or a third party claim may be involved
15-4	When a vehicle driver is found to be wholly or partly responsible for an event – the ADP is normally retained and a lesson learning discussion is with a direct supervisor
15-5	When a vehicle driver is found to be wholly or partly responsible for an event – the ADP is normally retained but driver is interviewed by a company investigator
15-6	When a vehicle driver is found to be wholly or partly responsible for an event – the ADP is temporarily suspended until investigation complete and feedback given
15-7	When a vehicle driver is found to be wholly or partly responsible for an event – the ADP is revoked with re-training required before re-issue
15-8	When a vehicle driver is found to be wholly or partly responsible for an event – the driver is banned from the manoeuvring area, which may mean termination of employment

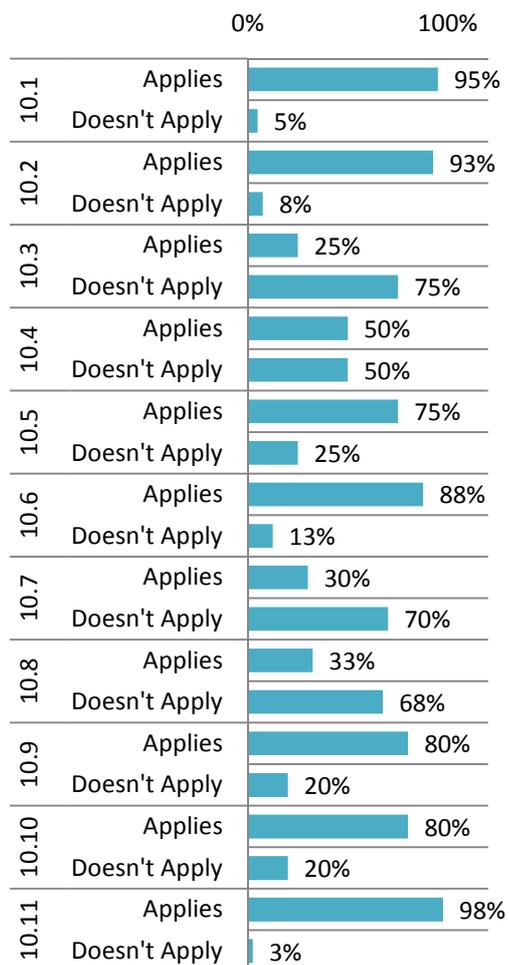|		0%	100%
15.1	Applies		97%
	Doesn't Apply	3%	
15.2	Applies		62%
	Doesn't Apply		38%
15.3	Applies	0%	
	Doesn't Apply		100%
15.4	Applies		59%
	Doesn't Apply		41%
15.5	Applies		59%
	Doesn't Apply		41%
15.6	Applies		69%
	Doesn't Apply		31%
15.7	Applies		66%
	Doesn't Apply		34%
15.8	Applies	28%	
	Doesn't Apply		72%
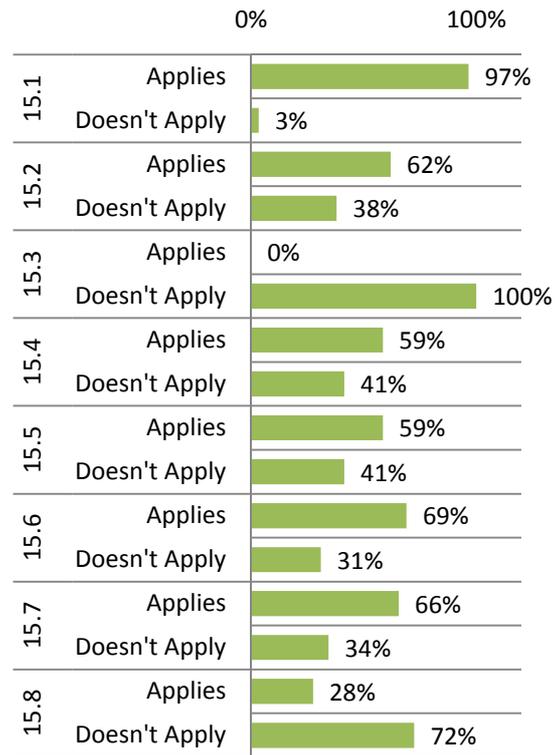
6. QUESTIONS FOR AIR NAVIGATION SERVICE PROVIDERS

Q10. MANOEUVRING AREA PROCEDURES

75% of ANSPs reported that all runway communications went directly to the controller responsible for the runway, which is less than the 93% reported by Airport Authorities. 50% of ANSPs reported that all runway communications were on a common frequency (including cross-coupling), which again is less than the 72% reported by Airport Authorities. However there is general agreement concerning the use of English at around 25%-30%.

Only 30% of ANSPs reported that stop bars are in use H24, this however may be due to the wider spread of ANSPs to smaller, less well-equipped airports.

10-1	All vehicles on the Manoeuvring Area are in radio contact with the appropriate Air Traffic Control service, i.e. ground and/or tower either directly or through an escort	
10-2	The ICAO read-back procedure is used for all instructions relating to an active runway	
10-3	All communications associated with runway operations are conducted in aviation English	
10-4	All communications associated with runway operations are on a common frequency. This may include the use of Cross-coupled frequencies	
10-5	All communications associated with runway operations are directly to/from the controller responsible for that runway	
10-6	Call sign confusion at an aerodrome is minimised by giving discrete RTF call signs to Manoeuvring Area vehicles	
10-7	Runway stop bars are employed on active runways H24	
10-8	Runway stop bars are employed on inactive, but available, runways H24	
10-9	Aircraft or vehicles are not instructed to cross illuminated red lights, e.g. stop bars when entering or crossing a runway unless contingency procedures are in force, e.g. to cover cases where the stop bars or controls are unserviceable	
10-10	Stop Bars that protect the runway are controlled by the controller responsible for that runway	
10-11	Air Traffic Control procedures contain a requirement to issue a specific clearance to enter or cross any runway. (*Includes non-active available runways*)	

Chart (0% – 100%):

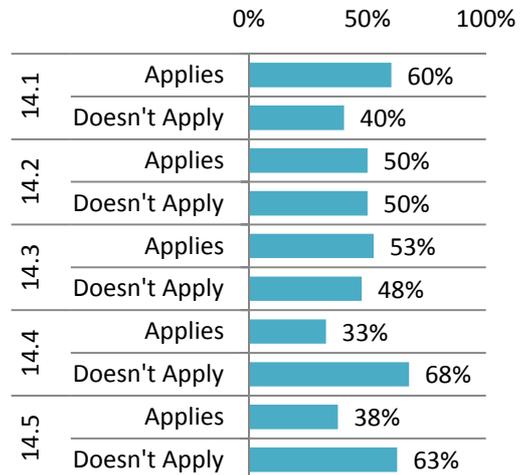|	Applies	Doesn't Apply
10.1	95%	5%
10.2	93%	8%
10.3	25%	75%
10.4	50%	50%
10.5	75%	25%
10.6	88%	13%
10.7	30%	70%
10.8	33%	68%
10.9	80%	20%
10.10	80%	20%
10.11	98%	3%

Q14. SAFETY NETS AVAILABLE TO ATC

The wide range of airports served by some ANSPs appears to be a factor in the Safety Aids available.

Only 38% of ANSPs report the usage of A-SMGCS. 33% report the usage of basic SMR and 53% also report using visual means only. These answers combine to more than 100%, so this question needs more granulation.

14-1	All areas of the Manoeuvring Area are visible directly from the VCR
14-2	All areas of the Manoeuvring Area are visible from the VCR with assistance from cameras.
14-3	Vehicles are tracked solely by visual and RTF methods
14-4	Vehicles are tracked with the assistance of basic Surface Movement Radar/Display
14-5	Vehicles are tracked with the assistance of Advanced SMR including labelling and Runway Incursion alerts

14.1	Applies	60%
	Doesn't Apply	40%
14.2	Applies	50%
	Doesn't Apply	50%
14.3	Applies	53%
	Doesn't Apply	48%
14.4	Applies	33%
	Doesn't Apply	68%
14.5	Applies	38%
	Doesn't Apply	63%

Q16. REPORTING OF SAFETY INCIDENTS – ANSP

ANSPs report 100% requirement to report Runway Incursions and greater than 90% for other safety events.

16-1	Controllers are required to file a written report whenever they become aware of a Runway Incursion
16-2	Controllers are _required_ to make a written report whenever they become aware of a safety event on the Manoeuvring Area, which involved any party operating with an ATC clearance.
16-3	Controllers are _encouraged_ to make a written report whenever they become aware of a safety event on the Manoeuvring Area, which involved any party operating with an ATC clearance.

16.1	Applies	100%
	Doesn't Apply	0%
16.2	Applies	98%
	Doesn't Apply	3%
16.3	Applies	95%
	Doesn't Apply	5%
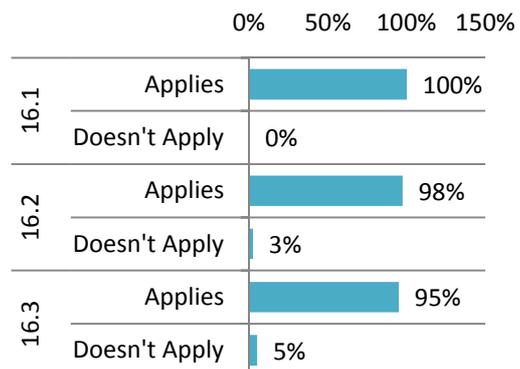
SELECTED FROM ACI EUROPE - AIRSIDE SAFETY SURVEY 2014

Note: Airports are identified in this section, as the ACI Europe – Airside Safety Survey is already in the public domain.

Aberdeen
Reporting: Near Miss cards, confidential email addresses.

Amsterdam
At Schiphol we have a zero tolerance for runway incursions of Cat. A. Next to that we are trying to decrease the overall number of incursions by investigation to find out the root cause. After investigation there could be recommendations to take infrastructural measures or changes in procedures/communication. AMS is installing Runway Guard Lights where extra conspicuousness is needed and implementing special switchable signs for the co-ordination of tow-traffic in a later stadium. Any measure that could prevent a pilot or vehicle driver making a runway incursion should be used. No matter if it is high or low tech.
Training for all vehicle drivers who operate in the manoeuvring area, extra training for those who have to cross runways. Recurrent training after a period of one year for those who drive in the manoeuvring area. Apron controllers are certified.
All organisations have their own responsibilities for reporting incursions and investigation. There is not a specific reporting tool. Every runway incursion gets discussed in the Runway Safety Team. Most investigations are jointly done. Investigations are to learn and not to punish. We strive to become a High Reliability Organisation and are becoming more aware of the potential dangers surrounding us combined with a Just Culture.

Belgrade
Traffic lights are used for one of the service roads (called controlled service road) which cuts TWYs.
Every driver must pass a special driving test designed for the airport. The Airport Safety Office conducts the training. There are two types of driver training, for drivers who work at the apron and for drivers who work on apron and manoeuvring areas. These tests are obligatory for airport staff and third parties.
A reporting system is established according the national law (every aviation subject in the Republic of Serbia must have one). Nikola Tesla Airport has established a "no blame policy".

Bologna
New RHP A1 e A2 to prevent runway incursion.
Hot spot maps for RHP A, specific training for operators.
All runway safety incidents are discussed on the Local runway safety team, coordinated by the SMS. For every incident a report is required.

Bremen
Taxi lanes on apron are named 'November' (northern lane) and 'Sierra' (southern lane), without affixes 'lane' or 'gap' to avoid confusion with ATC-clearances.

Yearly training for airport vehicle operators and other people who work at the airport (instructions, wireless-communications etc.). Airport Duty Manager at the airport traffic centre performs yearly training sessions on airport movement areas for authorities like the police, MET service personnel and other service personnel

Written reports by Airport Duty Managers and/ or ATC on any incidents. Immediate investigation of incidents done by Safety Office with resulting safety advices according to the 'no blame' rules predicted by SMS.

Brussels

Vehicles entering manoeuvring area are transponder equipped. Implementation of a definition for the protected area of a runway and specific chart of this area, which is available to all users via courses and documentation. Additional painted markings and signs to avoid RWY line-up confusion between RWY 25R and RWY 20. New stop bar introduced at TWY B5 to avoid small aircraft looking over the existing one. Use of stop bars 24 hours. TORA indications on TWY used for intersection take-off.

R/T and standard ICAO phraseology course in aviation English for vehicle drivers.

Training program for situational awareness and runway incursion prevention; airside vehicle driver training simulator with full airport 3D model, local procedures, standard ICAO R/T, human factors integration. Refresher courses and awareness campaigns, safety newsletters, implementation of the European Guidelines for the Prevention of RWY Incursions, monthly Local RWY Safety Team meetings, airside vehicle driver training simulator.

The 'just culture' concept has been adopted by the "Independent Investigation Cell for Air Accidents and Incidents" of the Ministry of Transportation. Brussels Airport has implemented a voluntary reporting system.

Budapest

All runway holding points are indicated by runway guard lights and stop bars. The RETs are equipped with permanent stop bars. The safety strips of runways are marked by retroflective poles indicating the limit for drivers and workers close to runways. A new illuminated mobile closing sign is tested to indicate the closed areas more accurately for aircrew.

Airfield safety publications; High visible signs; NO ENTRY markings; H24 operations of RGLs; permanent stop bars on RETs; a RWY AHEAD sign was painted at the most critical RWY holding point (A1).

All relevant companies, including ANSP and handling companies, underline the importance of runway safety. Awareness campaigns for all airside workers is regularly organised.

Data sharing and a joint investigation process are established. The information is continuously shared between partners as part of the regular LRST meetings.

Frankfurt

FRA requires all vehicles that are designated to drive in the manoeuvring area to be equipped with Mode-S Transponders.

FRA has installed RWY vacated signs at the RWY turn offs that illuminate when aircraft have vacated the RWY and are a visual for the pilots

FRA Airside Operations regularly reviews standard operating procedures and conducts runway safety workshops with German ATC and airlines to find solutions designed to reduce the risk of runway incursions.

FRA Airside Operations has a good working relationship with German ATC and airlines concerning reporting procedures and finding solutions. FRA in general cultivates a "No Blame" culture unless naturally the incursion or incident demands disciplinary action.

Geneva

On the two north taxiways (Y and Z), wig-wags have been installed. Due to proximity between the runway and the apron, stop bars on taxiways C, D and E are always illuminated.
Two specific programmes for drivers are in place (apron and manoeuvring area)
All incidents on the manoeuvring area are reported and analysed by the Safety Office according to the directives of the Swiss regulatory authority (FOCA) based on ESARR.

Glasgow-Prestwick

Training on risks included within driver training program. Airside Safety Awareness Training (ASAT) as a requirement prior to issue of a security pass and part of the induction process. Standing agenda item at relevant safety related committees.

Mandatory Occurrence Reports filed as per UK CAA requirements. An airport-wide incident and occurrence-reporting scheme is being widened to contain more input and scope as part of SMS. Principles based on post-incident investigation, learning and education.

Hamburg

All activities are based on the European Action Plan for the Prevention of Runway Incursion and carried out jointly with DFS and pilots (Runway safety team Hamburg). Regular meetings (four times a year) take place. "Hot Spot" map published.

London Gatwick

Vehicles are fitted with transponders for operating on the runway. Installation of TUBS (Taxiway Unavailable Bar System) has been made on the RETs. LED lighting on runway 08R/26L, taxiways and hold points. 'Runway Ahead' sign at holding point Bravo 1.

Airside Driving and Vehicle Operation details the three types of airside driving permit: A Zone – Aprons, Stands and Airside roads; M Zone – the Manoeuvring Area excluding Runways, but including Taxiways; M + R Zone - the Manoeuvring Area including Runways.

Driver trainers must be registered and approved by the Gatwick Airport (GAL) Training Manager. They must use training materials provided by GAL to ensure consistency. Specialist airfield driving maps, clearly showing the manoeuvring area (maps updated every six months). Maps must be carried in every vehicle. Flight Ops Performance Committee, hosted by GAL, every two months. Local Runway Safety Team, jointly hosted by GAL and NATS, every two months.

Local Runway Safety Team airfield van tours carried out in daylight and darkness during the year. NATS have delivered a number of Airfield Resource Management courses. NATS provides an airline briefing pack for airlines new to Gatwick.

Runway safety incidents are discussed jointly between GAL and NATS and shared with members of the Local Runway Safety Team, which also includes representation from airlines, handling agents and the UK Flight Safety Committee. Those involved in a runway safety incident will be invited to complete a joint GAL/NATS Human Factors Questionnaire. The aim of any investigation is to promote and share learning and identify any contributory issues, i.e. training airfield infrastructure or procedures, which may need to be addressed to try and prevent a recurrence. All runway incursion investigations include a playback of RTF comms and ground radar images and these are shared at the Local Runway Safety Team meetings. Sharing of safety reports between third parties is positively encouraged and discussed to identify any lessons learnt and raise awareness.

London – Stansted

NATS in conjunction with Stansted Airport (STAL) has held a number of formal forums and drop-in briefings around runway incursion awareness. The target audience has been pilots, handling agents, controllers and the like. This process is set to continue as new learning comes from the statistical data and any local incident reviews. There is also a quarterly Manoeuvring Area Safety Team chaired by STAL. Beyond these forums, the driver training packages contain content around incursion awareness for staff that operate on the Manoeuvring Area. 'Runway' driving permits are only issued if the need is legitimate. All staff nominated to attend these specific driving courses are chosen after careful selection and sign-off process.

STAL has engaged a number of key airport companies in the area of runway incursion preventative measures and reporting. We have developed an incident review process whereby we share the high level details of all airside incidents with the airport community. The key objective of this process is that we all work towards introducing key learning points to reduce the probability of re-occurrences. We have for many years instilled a just culture amongst the airport community and see that a shared and open learning ethos improves reporting quality.

Lyon

Vehicles equipped with a geo-localisation system called MOSQUITO. Training for all vehicle drivers who operate in the manoeuvring area, extra training for those who have to cross runways. Recurrent training after a period of 3 years for those who drive in the Manoeuvring Area.

All activities are based on the European Action Plan for the Prevention of Runway Incursion, and carried out jointly with the ATC and pilots. Regular meetings take place (Local Runway Safety Team/Safety Promotion Committee).

Madrid

Developing of an on-board airport vehicles device with alarm of runway incursion and other sensible areas

Milan-Linate

Lighting red bars together with microwaves anti-intrusion systems are used. There are sign markings like Runway Head and No Entry in additional of anti-intrusion system (microwave) for each Taxiway serving Runway. Besides, a lighting system for pilots is under investigation.

There is a Local Runway Safety team in charge of evaluating events/hazards. Monthly, during the Safety Committee, the reports on runway safety events are discussed with the airport operators involved. These procedures are managed by ATS.

Ostrava

RWY guard markings on every TWY, RWY guard lights on every TWY, stop bars and elevated stop bars on TWYs. Crossing service roads equipped with elevated stop bars, markings and stop signs.

Airport staff are trained every two years. Rules are defined in airport guidelines. Every third month a RWY safety team take place. Meeting with local aircraft operators, airport and ATC representatives.

Safety boxes are installed at airport. Non-punitive principles are applied.

Podgorica

The airport operator has organised safety awareness training for all staff working at the airport (ATC staff, military staff, refuelling company staff, catering suppliers etc.) through airport's training centre. Safety alerts booklets have also been introduced for all present staff at the airport, and also an SMS box is available for safety matters which occur at the airport.

Safety awareness is promoted for all staff employed at the airport, encouraging people to report occurrences dealing with safety personally, by phone or in written reports which can be submitted anonymously through the installed SMS box. Accordingly, we apply no penalty reporting.

Prague

RWY: All CAT I holding points are equipped with guard lights and large inscriptions – 'RWY AHEAD' – on the red background behind all the last RWY holding point markings. All CAT II/III holding points are equipped with guard lights and stop bars. RWY 06/24 has markings with black borders to highlight the markings on the concrete surface. TWY and apron: TWY centre line marking has been widened to 30cm; where an information sign would normally be installed, but where is impractical to do so, information markings have been painted on the TWY centre line, prior to TWY intersection. TWYs with concrete surface have markings with black borders. There are illuminated 'Low Visibility Operations' signs on the apron area.

All drivers permitted to drive a car on the movement area have to have had special training provided by the ATC training centre and have to pass an examination. After that, they get a special license valid for three years.

Prague Airport has a common reporting system for Runway Safety Incidents. The system (web reporting) is able to safeguard the identity of reporting persons. The Civil Aviation Authority and Air Accidents Investigation Institute have a web-based online reporting system, where reporting of all personal information is voluntary. A committee of czALPA has a no-penalty Safety Reporting System. Pilots are asked to report accidents, incidents, extraordinary steps of flight crews or ATC or imperfections of navigation aids or airport equipment that are dangerous to the safety of aircraft operations.

Pula
Airport staff participate in safety refreshment trainings courses on a constant basis.
The reporting procedures for safety incidents were set up jointly with the other parties active in the process and 'no-penalty' principles are ensured.

Riga
Guard lights and stop bars are installed on RTHPs, signs for vehicles entering the manoeuvring area and ILS critical area are installed. All ground staff performing works on runway use Tower VHF frequency and ICAO English phraseology for clearances.
Special marking is in place where apron borders ATC control area. The runway protected area border on grass is marked with plastic markers every 50m.
All incursions are communicated between ATC and Airport Authority and investigated by Safety Management team. Anonymous reporting option is available. All safety information is also relayed to the CAA.

Warsaw

RWY AHEAD markings, and continuously illuminated stop-bars implemented in the most dangerous areas (hot spots) – several times they were ignored by pilots.

The Manual on Vehicular and Personnel Movement Regulations at Warsaw Airport describes the rules for vehicular and pedestrian traffic – which applies to all airport vehicle operators as well as mechanics, controllers and every person working at the movement area.

Reporting system established according to national regulations and State Commission on Aircraft Accident Investigation. All runway-related reports are subject to investigation by the Runway Safety Team established at the aerodrome. Non-punitive principles are implemented by national regulations regarding aviation accident investigation.

Zurich
Taxi routes are assigned in such a manner as to reduce the risk of runway incursions. All crossing taxiways/runway entrances have been marked with enhanced taxiway centreline markings and mandatory instruction markings according to ICAO Annex 14, AMDT10. A bypass taxiway around the main departure runway is currently being planned to reduce the number of runway crossings.

All runway holding positions are marked according to ICAO Annex 14 (including enhanced taxiway centreline markings and mandatory instruction markings), and equipped with red stop bars and wig-wags. RWY stop bars are operated (except line-up positions) during the entire airport operation time (also in good weather and daylight conditions).

The Local Runway Safety Team is organising awareness campaigns (such as movies, flyers and the runway safety reports) to address identified hazards and to promulgate incident investigation findings. Furthermore, licensing requirements were introduced for all vehicle drivers on the airfield (including initial training, skills test and a periodical refresher).

The Local Runway Safety Team has established a common runway incursion database. Furthermore, a Runway Safety Report takes place every three years to monitor trends in runway incursion numbers and effectiveness of measures is published. Additionally, the Runway Incursion Investigation Team investigates every single runway incursion event and interviews involving partners on a voluntary basis.

8. STUDY RECOMMENDATIONS

1. It is recommended that EUROCONTROL NM commission a study of the 85% of Severity A and B Runway Incursions that do not involve airside drivers as contributing factors, to further understand the relative contributions from all players and infrastructures. The aim being to achieve clarity on where the most effective safety gains may be made.

2. It is recommended that European stakeholders review and consider the preventative measures cited as achieving a reduction in Runway Incursions and the recommendations made by their peers to further reduce runway incursions; in order to inform their future airside strategies.

3. It is recommended that EUROCONTROL NM facilitates a workshop with the FAA and selected European stakeholders to understand the reasons for the significant difference in the percentage of Runway Incursions being assessed as Severity A or B and, if necessary, assist in action to address inconsistencies.

1. Aerodrome Safety for Airside Drivers: Airservices Australia 13-140SEP Corporate Communication.

2. Airports Council International – Airside Safety Handbook, 4th Edition, 2010.

3. An Airside Driver's Guide to Runway Safety – safe surface operations at controlled aerodromes: Airservices Australia, 4th Edition, December 2013.

4. Airside Traffic Rules & Local Runway Safety Team: Brussels airport at www.brusafety.be.

5. CAP790 UK Requirement for an Airside Driving Permit (ADP) Scheme: CAA February 2012.

6. European Action Plan for the Prevention of Runway Incursions (EAPPRI): SKYbrary at http://www.skybrary.aero/index.php/European_Action_Plan_for_the_Prevention_of_Runway_Incursions_ (EAPPRI).

7. Guide to Ground Vehicle Operation – the complete guide to safe driving on the airport surface: FAA.

8. ICAO Doc9870 Manual on the Prevention of Runway Incursions.

9. Runway Incursion Prevention – Movie: Email safetyoffice@zurich-airport.com.

www.Zurich-airport.com/business-and-partners/safety-and-security/runway safety .

10. SKYbrary pages on Runway Incursions - Portal: Operational Issues at http://www.skybrary.aero/index.php/Portal:Runway_Incursion.

ANSP	Country
Administration de la navigation aérienne	Luxembourg
Airservices Australia	Australia
Albcontrol	Albania
ANS of the CR	Czech Republic
ARMATS	Armenia
Austro Control	Austria
Avinor	Norway
Belgocontrol	Belgium
BHANSA	Bosnia-Herzegovina
BULATSA	Bulgaria
CAA	United Kingdom
CroatiaControl	Croatia
DFS Gmbh	Germany
DFS Stuttgart Airport	Germany
DGAC	France
DHMI	Turkey
DSNA	France
ENAIRE	Spain
ENAV	Italy
ENAV HQ	Italy
Estonia Air Navigation Services	Estonia
FAA	United States
Finavia Oyj	Finland
Hellenic CAA	Greece
HungaroControl	Hungary
LFV	Sweden
LGS	Latvia
LPS SR	Slovak Republic
LVNL	Netherlands
Malta ATS	Malta
MNAV	Macedonia
MoldATSA	Moldova
NATS Ltd	United Kingdom
NATS Aberdeen Airport	United Kingdom
NATS London Gatwick Airport	United Kingdom
Naviair	Denmark
Naviair Copenhagen Airport	Denmark
NAV Portugal EPE	Portugal
NAV Portugal Porto Airport	Portugal
Oro Navigacija	Lithuania
Sakaeronavigatsia	Georgia
SMATSA	Serbia
Skyguide	Switzerland
Sloveniacontrol	Slovenia

Airport	Country
Barcelona	Spain
Basle	France/Switzerland
Belfast Int.	United Kingdom
Bologna	Italy
Brussels	Belgium
Bucharest	Romania
Catania	Italy
Erfurt	Germany
Dublin	Ireland
Geneva	Switzerland
Heraklion	Greece
Hermes Airports (Larnaca & Paphos)	Cyprus
Ljubljana	Slovenia
London City	United Kingdom
London Heathrow	United Kingdom
Munich	Germany
Prague	Czech Republic
Salonika	Macedonia
Santorini	Greece
Southampton	United Kingdom
Tbilisi	Georgia
Toulouse-Blanca	France
Turin	Italy
Warsaw Chopin	Poland
Yerevan	Armenia
Zurich	Switzerland

Editorial note to Appendices C to L

All comments received have been included. Some text has been edited to improve the grammar and syntax and to eliminate typographical errors.

APPENDIX C   HOW CHANGES TO AIRSIDE DRIVING PROCEDURES ARE APPROVED

- Via formal management of change process. Proposed changes are validated by LRST and NSA.
- Safety control measures identified following relevant investigations are agreed between the airport operator and the NSA.
- All changes are proposed to the NSA .
- Changes are proposed by interested parties (ATC, Airport Authority, Aircraft Operators etc.). Airport Manager, Airport Authority and ANSP review the proposed change. The change is submitted to the NSA.
- Issued by Aerodrome Operator and approved by NSA.

- Derived from Findings out of the Runway Incursion Investigation Team. They are integrated in the new versions of the syllabus for airside training. There is no approval by the NSA.
- Any changes are constructed internally and only those relating to policy or standards are referred to the Airport Users Committee (AUC) for comment prior to implementation. All safety initiated changes are made without consultation with NSA.

- As per our change control process which received final approval from the Director of Safety and Airfield Ops.
- Approved by Ops Department Manager.
- Following an investigation a recommendation is made to airside driving rules, a new amendment is proposed, and approved by Airport and ANSP. All changes are subject to safety assessment.

- Risk Assessment.
- Internal approval process taking into account the results of the risk assessment.
- A risk assessment is undertaken and the relevant corrective actions taken.
- All changes are subject to safety assessment.

- Executive Safety Group approve updates & changes submitted through Safety Action Group and Airside Safety Committee.
- Local Safety committee.
- The changes are approved in a local safety committee.
- They are approved within Airport Safety Board.
- Implementing EASA certificate, changes are approved by a hierarchical validation within an extranet quality system.
- The procedures are created by the working group intermediary bringing together different actors of airside.
- Airside driver trainer will be asked to update the presentation following any incident learning. The driver trainer will consult Operations Management prior to introducing new changes to ensure relevance.

- The new amendment or new edition is distributed to all parties involved and will be in force in due time in order to permit training of all personnel about modifications, put in place changes.

- Through various communication channels (Internet = web based training for example).
- Information on intranet and extranet.
- Promulgation by the extranet system.
- Procedure changed is sent to everyone by e-mail and it´s published on intranet.
- All changes are promulgated via email to the approved Airside Driving Trainers.
- Policy changes are also promulgated via Operational Safety Instructions (OSI) which are distributed via email and published on the Airside Operations website.
- By e-mail, newsletter, training centre, work instruction.

- On initial review changes are promulgated through an Operational and Safety Information Notice, when the Airside Driving Code Handbook is reviewed these changes will be incorporated into the handbook.
- Changes to Airside driving Manual are promulgated to all personnel and training programmes and tests are updated accordingly.
- First of all changes are announced and discussed within the Safety Committee; if they are particularly challenging, every airside Operator is asked to attend a training session and then to spread changes among their drivers. In the end, changes are published/promulgated as a revision of the Airport Manual.

- Operational Safety notices and Directors Notices.
- Internal publication is amended.
- Update of controlled document and/or Safety Briefs publication.
- Safety Information Bulletins, course updates and refreshers.
- Airside Safety Bulletins. A period of time for provision of training/information to employees is provided before actual implementation.
- Airside Safety Notices, Airside Operations Notices, Airside Safety Committee meetings, poster campaigns
- AOM amendments, memos, classroom and on the job training.

- Any change to the any airside procedure is communicated to the head of all involved tenants and is mentioned within all airside committees. Also all changes are indicated within all relevant trainings.
- Driver trainers qualified to deliver training create new presentations and circulate along with lesson plans.
- Safety letter is published within the airport to inform about the change.

- By the airport company.
- By the airport authority.

- Common frequency (TWR) is not used due to lack of English language proficiency of vehicle drivers.
- Main reason is because they are NOT able to use English ICAO phraseology.
- Main question is usage of English language for drivers.
- We use different frequency for the flights and different for the ground services. As not standard phraseology used with ground services and not in English language.
- The drivers are not trained to speak good general English or to understand aviation English. In these circumstances, putting them on the "English-speaking" frequency would not have raised situational awareness of either party (pilots/drivers). Potentially, this would have created ground for numerous misunderstandings, wrong perception of the situation by drivers, and would have raised the need for explanations "what is going on" ("ATCO – Driver" segment). This, in turn, would have increased the workload and probability for unjustified actions. Today it is not feasible to train all drivers to a good level of aviation English.
- It's the languages used for communications. While 90 % of air-ground communications are conducted in English, all 100 % of ground-ground communications between ATC controllers and drivers are conducted in native language.
- A defined phraseology between the vehicle drivers and ATC is used but in native language, because the vehicles use a separate Ground frequencies dedicated for the Ground vehicles.
- Because communication with vehicles is not conducted in English language, therefore there would be no benefit to put this communication on TWR frequency - no situation awareness.
- The drivers are also being trained for ICAO phraseology but it is a long-term task so a native language is being used on the vehicle frequency.
- We are using different frequency for communication between drivers and TWR (for RWY crossing) and Ground (TWY movements) controllers. The issue to use a common frequency for TWR under discussion with airport authority. Main question is usage of English language for drivers.
- Aircraft movements are controlled on a frequency different from the frequency used to control ground vehicles. The reason is twofold. First, it's to reduce probability of congestion and blockage. Second is lack of proficiency in English language.
- Vehicles always use a separate UHF frequency whether they operate on a runway or in another part of the manoeuvring area. They never share aircrafts (VHF) frequencies. Their radios usually are not able to engage VHF frequencies but main reason is because they are NOT able to use English ICAO phraseology.

- Every communication regarding vehicles, on the runway or not, is made in native language..
- There is different frequency dedicated for the comms with transport.
- Communication takes place on a discrete frequency used by TWR and drivers.
- Communications with vehicles occurs in a "ground radio" operated by tower.
- Surface Movement Controller may have control of runways not in use. In high traffic environment (particularly with crossing runways) this reduces frequency congestion and pilot / controller workload.
- At some airports, the ground control frequency is utilized to conduct runway crossings. These crossings are coordinated with local control or the local facility SOP may dictate other requirements.
- ATC-vehicles communications are on a different frequency from the one used by ATC-pilots.
- Because of the prevention of congestion on the frequency, a common frequency is not used.

- Communications are conducted on totally different radio stations. Sometimes they even use different channels of this which are not monitored by ATCO.
- Trunk radio systems are used by vehicles which are standing by on the tower/ground frequency.
- Aircraft, as well as some of the vehicles are using the published TWR A/G frequency, while some of the vehicles are using the g/g frequency reserved for this particular purpose, or in some very rear circumstances via telephone line.
- Vehicles are on another frequency than the aircrafts in order not to disturb and overload the operational frequency and to avoid crossed transmissions.
- The different frequency is being used for vehicles so that the main frequency for aircraft would not be blocked by vehicles.

- Aircraft and vehicles moving on the manoeuvring area are not on the same frequency, vehicles are on a dedicated frequency. There is a frequency separation between vehicle and aircraft on the manoeuvring area.
- These frequencies are specific by the controllers' area of responsibility (runways/taxiways). The only exception is the marshaller's (follow me) operation during which also the vehicle is on the "aircraft" frequency.
- Some of the communications are done by means of an alternative radio. It is the case for Police vehicles at airport.

- Communications are managed by TWR-assistant sitting next to the TWR controller(s).
- Issued from assistant controller asking responsible controller for permission.
- The Planner ATCO can be responsible to carry some communications.
- By other person (DVM) sitting next to the controller and after approval from that ATCO.
- If there is a driver who wants to cross/enter RWY then he has to ask ATCO-PC for permission. Then PC co-ordinates the permission with EC.
- Vehicles frequency is handled by coordinator/Supervisor. Coordination with TWR ATCO s made every time runway is requested by vehicles movement. Our TWR internal small dimensions make this coordination method fast and reliable.
- They are carried by the GND controller sitting just next to the ADC controller.
- Vehicles of the aircraft Operator, including Runway Checker, are using internal radio communication equipment. This is mainly operated by the ground controller because otherwise there would be too much calls of vehicles which are not relevant for the runway control

APPENDIX G PROCEDURES FOR NON-RADIO OPERATION ON THE MANOEUVRING AREA

- Only with follow-me cars.
- Such vehicles are always accompanied by vehicle with radio connection with TWR.
- They have to be escorted by a driver with a Manoeuvring Area licence.
- They must be accompanied by follow-me car at all times.
- Non-radio drivers enter the protected area only if escorted by a radio equipped vehicle. The escort is responsible to report number of vehicles and ensure the all drivers vacate the protected area.
- Non-radio drivers are not allowed in the protected area unless escorted. The escort is responsible to report that the protected area has been vacated.
- They must follow the marshaller or any authorised radio driver.
- Vehicles that have to affect the manoeuvring area are being escorted by F/M car with trained airport authority drivers who use RTF communication with ATC.
- All non-RDO equipped vehicles require a Leader Escort that is in direct comms with ATC.
- Always escorted by aerodrome vehicle equipped with radio and manned with trained driver.
- Non-radio drivers are not allowed to enter to the aircraft operations area. They are only allowed to go there when escorted.
- Non-radio equipped vehicles not allowed without proper follow-me guidance.
- Escorted by trained R/T drivers.
- They would not be permitted access unless they were under escort.
- Non-radio drivers can enter the protected area only with assistance of air side operations / duty manager radio equipment car. Mandatory radio com procedures are in force. Entering and vacating is subject to reporting.
- The escort of vehicle with radio contact with ATS.
- They can enter the Manoeuvring Area only escorted by radio equipped drivers.
- They can enter the protected area only if they are escorted by a vehicle radio provided.
- Non - radio drivers are obliged to contact the authorized person from the aerodrome department for escorting them to the protected area.

- No access permitted for non-radio drivers or vehicles unless under escort with radio driver/vehicle and transponder.
- At least one driver (driver permit + radio) is mandatory, we provide if necessary an escort.
- All non-radio drivers are accompanied by a persons with radio.
- Non-radio drivers must be escorted by someone authorised and in charge of radio communications. If the escort is driving another vehicle, the two vehicles are regarded as one (such as a follow-me car and an aircraft).
- They are to be followed by a car with someone who is in radio contact with the ATCO.

- Non-radio drivers is not allowed. "Follow-me" car if necessary.
- A radio equipped vehicles driver by a suitably authorised permit holds to escort a visiting vehicle within ATC Controlled zone.
- Non radio driver are preceded by an authorized vehicle establishing two-way communication with ATC/TWR.

- No drivers are allowed on the protected area without radio communication.
- No vehicle can enter the taxiways etc. without the use of a radio.
- All drivers have radio permit.
- It's forbidden.

Reporting and Vacation
- Leave the manoeuvring area via the shortest routing to an apron or to the ring road.
- Drivers instructed to vacate immediately whilst maintaining blind calls.
- He has to leave the area immediately by taking the shortest (safe) way and taking care about the traffic around
- If he has enter the runway, he will leave immediately the runway, if he has left the runway, he will leave taxiway as soon as possible and inform tower by a phone call.

- To vacate manoeuvring area, if possible not using RWY or TWY and preferably using non-paved surfaces.
- Vacates via quickest way and report.
- If there is no response from ATS the procedure is to vacate the protected area instantly.
- Vacate the protected area ASAP.
- Continue as per last clearance and once clear of the runway strip, contact ATC Tower by mobile phone or await Leader escort.

- Transmit blind your position and intention. Once you have left the manoeuvring area transmit blind your position
- Immediately vacates the protected area.

- He/she should use the mobile phone .
- If the driver has a radio failure must contact to an emergency phone number and communicate their position or leaves the protected area ASAP while looking out for other traffic around.

- Specific areas are defined for the driver to vacate (areas which do not interfere with traffic).
- Special predefined areas for drivers to vacate the runway, exist in cases of radio failure. The specific areas do not interfere with aircraft operations and provide required clearances form protected areas.
- Drivers on the protected area must be equipped with a radio installed on the vehicle, a portable radio and a cell phone. In case of failure of the radio system, the cell phone will be used to call the safety supervisor who will be the intermediary between tower and driver.
- Flash headlights at ATC Tower. ATC will send another driver.

After Vacation
- Call the tower directly on mobile phone after leaving the protected area.
- After vacation as soon as possible and inform tower by a phone call.
- After vacation inform TWR by the quickest mean available i.e. Portable phone.
- Call TWR by phone or call the Airside Inspection ASAP to report your situation and position.
- They must vacate the protected area and call ATC by telephone.
- ATC must be informed as soon as practically possible.
- Vacates via quickest way and report.

- A RWY inspection is compulsory after such an event before any landing/take-off.
- In exceptional situations ATC request to airport duty officer to make a quick inspection the RWY/TWY.

Mobile Phone
- A cell phone is required and will be used to call the safety supervisor who will be the intermediary between tower and driver.
- He/she should use the mobile phone.
- Use the mobile phone.
- Calling from mobile phone to driver.
- Fall back to telephone contact with TWR or dispatch another vehicle to pick up the first vehicle.
- Contact ATC Tower by mobile phone or await Leader escort.
- If you have a mobile phone on your person you could phone ATC.
- Make use of their cellular phone if available or otherwise observe ATC flare signalling as a redundancy.

- Drive should inform ATC and/or Air Side Ops imm.by any possible way about the situation and intentions for example mob phone.

Radio
- A spare radio or a cellular phone is mandatory.
- Use of the handy.
- Try radio communications to AOSU to alert them to your problem.
- Driver tries 2nd radio.

Follow me
- Radio equipped vehicles driver permit holds to escort the radio failure vehicle.
- Fall back to telephone contact with TWR or dispatch another vehicle to pick up the first vehicle.
- Contact ATC Tower by mobile phone or await Leader escort.
- Send a follow me car to take out.

Other means
- If all alternatives have failed, try to attract ATC attention by waving your high Vis vest/coat.
- Observe ATC flare signalling as a redundancy.
- Driver should direct car lights to ATC Control Tower and wait for light gun signals.

ATC
- Signals used if radio contact ceases.
- Use of ALDIS lamp.
- The light signals are used by ATC.
- In case of radio failure we use light signals.
- It may be necessary for ATC to give pyrotechnic signals in the form of light signals from the Tower.
- ATC provide visual signals using special beacon or RWY/TWY lighting.
- Flashing of the edge lights is performed as for the driver to vacate the area.
- Runway edge lights are switched on/off as a visual indication to vacate runway.
- In case of total failure of communication system, tower will repeatedly turn on and off the runway and taxiway lighting.

- In night time conditions, the ATCO suspected a wrong positioning of an aircraft in respect of lit stop-bar on a taxiway holding point. It seemed that the aircraft had crossed the stop-bar. The pilots and the ATCO where Lithuanians. The communication was conducted in English. The ATCO was not able to properly question the crew in English in order to determine the position: "Report position", "Are you on taxiway?" (Instead of "Have you crossed the stop bar?"). The crew replied directly to the questions asked. However it didn't help to clarify the situation.
- Still being not sure about the position of that aircraft, the ATCO gave landing clearance to another aircraft on final. The incursion was detected by the crew of a third aircraft which was taxiing to the apron and could see the situation from a different perspective. The crew reported to the Tower and the ATCO immediately gave go around instruction to the landing aircraft.

- "Informal" communication has led to misunderstood between ATC and pilot.
- There are several cases, and as there are always discrepancies in using aviation RTF it is always a contributing factor.
- In exceptional cases (i.e. Bird Strike, short term need for an inspection) Follow Me cars with native language may be accepted. They operate on a special drivers' frequency which is very congested with unimportant chatter.
- This led to a severe Runway Incursion in 2014 where an inspection car entered the runway when an aircraft was on short final.
- In most cases misunderstanding or not correct use of standard phraseology both by controllers or pilots have been the contributory factors in RWY or TWY incursions.
- A VFR flight (German Pilot) was asked in English, if he would be ready for an immediate take-off). The Pilot misinterpreted that as a clearance for an immediate take-off.
- Misunderstanding of "holding point" by North-American crew.
- TWR asked Spanish pilot approaching holding point, in English, if he needed "run-up", in order to manage his next departure with another arriving aircraft on final on the same runway. Pilot mismatched "run-up" with "line-up" and crossed the stop-bar.
- Without any clue even after twice correctly executed read backs of an instruction for "not entering the RWY due landing traffic" the aircraft passes the holding point towards the RWY.

Driver Training

- Decision of Airport Provider to issue a special "driver's certificate" to all drivers that are using Manoeuvring Area of particular Airport.
- Joint annual classroom training and discussion of all persons driving in the manoeuvring area and ATC personnel.
- Recurrent Driver training is prescribed and conducted.
- Training for all after all safety occurrences.
- Using a driving simulator to train personnel in different situations and weather conditions.
- Training programme (theoretical and practical) associate with a strong commitment of all personnel involved in airside safety.
- Training of vehicle drivers.
- Introduction of NSA compliant training and qualified trainers now deliver a refreshed course in line with new legislation.
- Vehicle driver training simulator with full Airport 3D picture including stop bar management system.
- The combination of equipment (ASMGC-S, vehicle tracking) and driver training are factors for success.
- The constant and continuous training of all personnel every 2 years.
- Airside Driving Training and Aircraft Marshalling according to the National Basic Handling Regulation, is the key factor for preventing Runway Incursions.

- Phraseology refreshment for vehicle drivers and explanation how to communicate in a simple way - KEEP IT SIMPLE - YOU say who you are, where you are and where you want to go. WE say which way you get there.
- Readback are crucial.
- Vehicle drivers outside apron moving on the manoeuvring area received systematically a dedicated training on how to move on the manoeuvring area and about phraseology.

Vehicle / Driver Equipment and Procedures

- Transponders on all cars handled on ATC frequency.
- Transponders mandatory for all the vehicles operating on the movement area, since when the tower controller has always had an electronic strip and an A-SMGCS label available for all the vehicles operating at the movement area.
- Individual fitment of transponders in vehicles has led to further rationalisation of vehicles on manoeuvring areas.
- The use of transponders.
- Follow me inspections made by a car equipped with VHF frequency with the tower air-ground freq selected.
- Every vehicle is equipped with squitter. If the controller sees the squitter on the SMR screen, then give clearance for them.

Airport Layout, Signage and Lighting

- Highlight the taxiway involved in RWY incursion by the marking "RWY AHEAD".
- New paintings on TWY's with the expression "RWY AHED.
- Decided to place the warning sign ""RWY Ahead".

- The installation of guard lights at holding positions where stop bars are not provided.
- H24 Runway Guard Bars.
- H24 stop bars.
- Installation and operation of stop-bars on all taxiways that lead on to runways.
- The implementation of the red stop bars was the "ground-breaking" support to avoid RWY incursions
- RWY stop bar installation.
- Stop bars.

Awareness Campaigns

- Safety notices and hot spot maps to pilots to warn them about the critical RHP ALFA where most of our Runway Incursions occur.
- Safety awareness programs in place but the benefits are not easily measurable.

- Publication of hot-spots in the AIP, Safety Briefs.
- Awareness campaign for airside drivers or workers with emphasis on procedures and phraseology used in communications with ATC.
- The information about Runway Incursions abroad was very helpful for recurrent training and Safety WS.
- Continual update of runway safety guidance material (Airside Drivers' Guide).

ATC Equipment and Procedures
- SMR. Across the airports where we provide ATC services, the major airports have had surface movement radars and associated safety alerting installed.
- Updated SMR system and TWR systems (radar displays, radio transmitters etc.).
- The combination of equipment (ASMGC-S, vehicle tracking) and driver training are factors for success.
- Transponders mandatory for all the vehicles operating on the movement area, since when the tower controller has always had an electronic strip and an A-SMGCS label available for all the vehicles operating at the movement area.
- At the major airport we do have A-SMGCS Level II in place.
- Introduction of A-SMGCS.
- Planning to implement A-SMGCS.
- A-SMGCS.

- TRM sessions with TWR controllers on RWY incursions issues.
- Runway Incursion Awareness training.
- Training for ATCOs (using adapted recommendations from EAPRRI).
- Joint annual classroom training and discussion of all persons driving on the manoeuvring area and ATC personnel.
- Guidance to separate clearances on runway crossings, ensure explicit runway crossing clearance taxi to departure runway holding position, line up clearance and take-off clearance.
- Use the RWY Status Panel. Using it and the Voice Communication between GRC and ADC guarantee the safety of the RWYs.
- Reviewing Local procedures in APP and TWR about use of opposite RWY.
- Installing cameras to improve manoeuvring area view from TWR.

Communication
- Use of a single-frequency for runway crossing avoiding coordination between tower ATM positions and guaranteeing situational awareness for the responsible ATCO.
- Read backs are crucial.
- Unification of phraseology for all airport users.

Airside Procedures
- Modifications of selected locations, common holding positions, stop bars, signs.
- Low visibility procedure has been introduced.
- Review of LOA with airport have clarified some issues derived by safety investigations.
- H24 stop bars.
- H24 Runway Guard Bars.
- Better supervision of the work on runways.

Culture
- Active role of Runway Safety Teams with immediate action to all parties involved.
- LRSTs, Runway Safety Group.
- Work within Runway Safety Team.
- Runway safety team meetings.
- Supervision to detect personnel who violate the driving rules and to apply an equitable punishment to organisation from those persons belong and suspend ADP gradually.

Organisational issues
- The reduction of the number of airside driver permits crossing runways was very effective.
- Reduction of number of vehicles authorised to enter active RWY to absolute minimum.
- Withdrawal of runway access privileges to all but key personnel (typically Airport Authority staff).
- Airside permit limitation by task. Permit allowing to drive on rwy are given only for those who needs to work on. Drivers who don't work on rwy have a limited permit.

- The Dissemination of EAPPRI, to all national Units
- A set of rules and procedures which are being regulated in letters of agreement between all stakeholders using manoeuvring area.
- Agreed with airport managing company that airport closure (usually for maintenance works) can only be formally stated with a radio communication by personnel physically on place among the vehicles about to enter the runway.
- More strict controls are applied to government/police vehicles access; drivers of governmental corps must show their ADP to be granted access to airside, unless they are escorted by a vehicle driven by someone holding ADP.

Publications – Bulletins/Newsletters
- Safety Information Bulletins.
- Safety bulletins.
- Safety bulletins.
- Safety Bulletin.
- Safety Bulletins.
- Safety information.
- Safety Newsletter.
- Safety notices, bulletins and key messages.
- Safety fact sheets.
- Safety alerts.
- With communication flash.
- From every R.I event we disseminate lessons learnt through ATCOs.
- If it appears to be needed, a safety reminder is released and pushed to ATCO's in order to raise awareness.
- Notes to ATS or refresher courses for major changes.

Publications – Reports/Magazines
- Annual RWY Safety Report.
- We publish quarterly internal magazine.
- Safety magazine.
- Quarterly bulletin where all investigated occurrences are brought out anonymously for every ATCO to read.
- Company Risk Management Division provides a monthly report covering the whole country Safety (including runway safety) status.

- All reports are disseminated to every controllers on a monthly basis and are accessible on intranet.
- The actions taken by the management based on these reports are disseminated to the controllers as feedback.
- We produce lessons learned articles in our intranet whenever deemed necessary.

e- Dissemination
- We are using internal e-learning module for lesson learning and dissemination.
- Direct emails.
- Web-sites.
- Via intranet and extranet.

- Information leaflets from Airport and Runway Safety Teams.
- Booklets, videos and other products and forums.
- RWY Safety Video by airport.

Briefings
- Safety Briefings to all ATCO.
- Highlighting these issues to staff at meetings etc.
- Safety Briefs.
- Local briefings.
- We talk with controllers directly.
- Workshops for operational staff.
- Monthly controllers meetings.
- Information has been disseminated within ATC safety meeting held periodically.
- Meetings/seminars are arranged internally and externally for discussing and sharing the positive information,
- The positive information are published on our web sites.
- Discuss all incidents at special Safety Management Awareness sessions, which are conducted periodically according to the internal recurrent training plan.
- Dissemination of occurrences by means of the periodical feedback sessions to ATCO's by the safety unit.

Training

- TRM sessions with TWR controllers on RWY incursions issues.
- Refresh training for controllers on Local procedures and LOA with airport authority.
- New and recurrent training.
- Training, after each safety occurrence.
- Continuous Training.
- ATC refresh training.
- ATC training (min 2 times per year).
- Via training courses and refresh courses.
- Workshops/Briefings to drivers and ATC. In the past drivers used to request very complex clearances together with route description, many times forgetting to state where they are or which point they want to start from.
- Meeting with person in command of every governmental organisation working at the airport.
- The Airport Providers are providing a refresher courses and briefings to the drivers on annual bases, especially before winter season when snow removal team of drivers is activated...
- All drivers have gone through refresher training regardless of level of license and renewal date. New permits issued to indicate that they have been through refresher training.
- We send all investigation reports and recommendations to all ATC units.

Runway Safety Teams/Groups

- LRST.
- Local Runway Safety Team.
- Runway Safety Team agenda.
- In LRST and other safety groups.
- Frequent meetings with airport authority, we have a Runway Safety committee.
- Airport SAFETY TEAM meeting.
- Implementation and facilitation of Local Runway Safety Teams.
- During meetings concerning Safety (Safety Committee, Local RWY Safety Team).
- From within the RWY safety team the airport authority issues safety magazine almost every month.
- Runway Safety Team.

Other

- Publication of hot-spots in the AIP.
- European Safety Conference.
- SISG experience exchange.
- Internal lesson learning through specific company-wide runway safety work stream.
- Outreach, and industry collaboration to disseminate information.
- With LOA-s.
- Wide dissemination of all lessons learning to all aviation entities.
- Lesson Dissemination Procedure which is in place all over the area of responsibility from the ANSP. This can be either electronically or in written form by report.
- All lessons learnt widely disseminated to all aviation subjects.

Driver Training

- Mandatory Airport driving licence.
- Recurrent/Proficiency Training suggested to be mandatory.
- Simulator training.
- Frequent LVP trainings with involvement of aerodrome and ANSP staff (TWR controller and safety staff).

Airfield Layout, Signage and Lighting

- Rename every Holding Position with a discrete name, as usually made with IHPs.
- Find a way to further emphasize the significance of STOP.
- Red stop bars.
- At National level - to accelerate the process of stop bar installation.
- Airport layout.
- Less complicated aerodrome layouts.
- The installation of Runway Incursion systems which visually warn the pilot of the aircraft/vehicle to stop (rather than systems which warn ATC and then rely on ATC to identify transgressor and tell them to stop), provide significant mitigation to reduce the severity of an incursion.

Airside Procedures

- Exhort all airport actors, even in distress or unusual situation, to make operative co-ordinations using radio as much as they can and to avoid point to point phone calls.
- Strict usage of stop bars 24/7, wherever they are installed would definitely reduce the number of RWY incursions of vehicle drivers or aircraft. The crews' and drivers' doubts "Where is the holding point" would definitely disappear in several cases, especially during night time and during wet TWY and RWY conditions, when the ground markings are not clearly visible and several reflections of the airport's lights are present.
- Use of stop-bars H24.
- H24 stop bar use both on active AND inactive runways.
- Make the usage of the stop Bars as user friendly as possible for the controllers.
- Stop bars H24.
- Extreme attention from all stakeholders when adverse weather conditions.
- A standard method of managing vehicles for runway inspections.
- Mandatory risk assessment for all activities near runways.
- If possible to organise construction works on the traffic-free periods.

Communications

- Air Ground Communications is still the TOP ONE Issue. Most of the RI Events are associated (normally as a direct cause) with Communication issues
- No compromises between the vehicle drivers and controllers in the manoeuvring area i.e. no generic long lasting clearances, such as cleared to all runways until further notice. Only specific taxi to holding points and clearances to enter/cross runways.
- Have all the vehicles and aircraft on the manoeuvring area on the same frequency.
- Common frequency for communications associated with runway operations should be compulsory.
- Manage all cars on ATC frequency.
- Communicate R/T in English language.
- If the Triple ONE rule is intended to be implemented it might be useful to introduce a specific level of proficiency in English for drivers. Level 4 maybe be too much for some drivers, especially for non-English native speakers.
- Strict English Language Proficiency for all stakeholders (pilots, ATC, drivers)
- All communication in manoeuvring area with vehicles should be conducted by ATC responsible for RWY operations, on one frequency in English.
- Pilots should receive and readback clearances before taxing.
- Improving communication issues. Clear and unambiguous.

Vehicle/Driver Equipment and Procedures
- Install scanners on vehicles used on manoeuvring area, for the operators are aware of the traffic approaching the runway.
- Transponders on all cars
- Install Transponders on all cars.
- The implementation of the new technologies on the airside drivers equipment GPS warnings in cars/trucks for approaching intersections/holding points/areas or other sophisticated system.

ATC Equipment and Procedures
- Only automatic ground based Safety Nets could really effectively improve the situation in the loop "runway-vehicle-aircraft-controller". However, technical/operational status of any automatic or surveillance equipment (SMR etc.) and modes of its operation, as well as responsibility for its usage/not usage in certain circumstances, shall be very well formulated and clearly described. This is very important.

- Increase passive systems like alerts based on SMR with more standardisation in the sense of A-SMGCS level II.
- A-SMGCS level II implementation. We must not lose sight of the fact that the key aim is to stop a collision, and whilst these warning systems don't stop the incursion, they do make a difference in stopping the collision.
- A-SMGCS.
- Installation of new equipment for ground movement monitoring if this is justified from economic point of view.
- Implement an A-SMGCS system.
- It´s not understandable why, in 2015, there are still TWR´s without any kind of ground movement surveillance.
- Frequent LVP trainings with involvement of aerodrome and ANSP staff (TWR controller and safety staff).
- Only ONE OWNER of the RWY at ONE TIME. At our airport ATC is preparing to implement electronic indication of RWY occupation (APP-TWR-DVM), that will clearly state who uses the RWY at given time. This will also reduce coordination.

Culture
- Pilots should be subject to same sanction (interview, suspension, retraining etc.), as vehicle drivers for Runway Incursions.
- Training for human factors and monthly meetings of aerodrome safety committee.
- Constant and continuous training of all personnel involved in airside.
- Better safety learning internal, about safety culture and Air Side Safety.
- Investigate every single case no matter of the severity and distribute the findings and learnings in just culture environment to the different stakeholders.

- Continuous improvement of Runway Safety Team and its member role.
- Active role of Runway Safety Teams with immediate action after an incursion occurs.
- Improvement of inter cooperation of all stakeholder's SMSs under the umbrella of the NSA.

Awareness
- Better preparation of GA pilots: For us it will be mandatory from 2016 to go through a PIL Briefing when flying to this airport.
- Never ending effort for raising of safety awareness.
- Make pilots aware of "hotspots" on the airfield.

Organisational
- More specific and clear classification of Runway Incursions and runway separations.
- First, make a clear and only one definition what a RI is and then go from that point further in the development of tools and procedures.
- Standard definitions for, and understanding of requirements for Runway Safety Areas/protected areas need to be in place.
- Apply seriously the ICAO Annexes 14 and EASA EU No 139/2014 regulations.
- Implementation of all recommendations from EAPRRI.
- Strict English Language Proficiency for all stakeholders (pilots, ATC, drivers)
- Reduce the number of non-aircraft movement.
- Reduce the number of Airside Driving permits .
- Review Manual of ATS to ensure it is consistent with stabilised approach guidance material from CANSO.

	Airservices Australia	FAA
10.1 All vehicles on the Manoeuvring Area are in radio contact with the appropriate Air Traffic Control service, i.e. ground and/or tower either directly or through an escort	Applies	Applies
10.2 The ICAO read-back procedure is used for all instructions relating to an active runway	Applies	Applies
10.3 All communications associated with runway operations are conducted in aviation English	Applies	Applies
10.4 All communications associated with runway operations are on a common frequency. This may include the use of Cross-coupled frequencies	Doesn't apply	Doesn't apply
10.5 All communications associated with runway operations are directly to/from the controller responsible for that runway	Applies	Applies
10.6 Call sign confusion at an aerodrome is minimised by giving discrete RTF call signs to Manoeuvring Area vehicles	Applies	Applies
10.7 Runway stop bars are employed on active runways H24	Applies	Doesn't apply
10.8 Runway stop bars are employed on inactive, but available, runways H24	Applies	Doesn't apply
10.9 Aircraft or vehicles are not instructed to cross illuminated red lights, e.g. stop bars when entering or crossing a runway unless contingency procedures are in force, e.g. to cover cases where the stop bars or controls are unserviceable	Applies	Doesn't apply
10.10 Stop Bars that protect the runway are controlled by the controller responsible for that runway	Applies	Applies
10.11 Air Traffic Control procedures contain a requirement to issue a specific clearance to enter or cross any runway. (Includes non-active available runways)	Applies	Applies
Please state how communications associated with are conducted and why a common frequency is not used	Surface Movement Controller may have control of runways not in use. In high traffic environment (particularly with crossing runways) this reduces frequency congestion and pilot / controller workload. Where parallel runways exist separate runway frequencies may be used.	At some airports, the ground control frequency is utilized to conduct runway crossings. These crossings are coordinated with local control or the local facility SOP may dictate other requirements.
11. What are the procedures for authorising non-radio drivers to enter the protected area and to ensure that such drivers have vacated the protected area?	Through use of the Airport Safety Officer who has radio comms at all times and is appropriately trained in ground operations around the airport.	If escort vehicles are not used, telephone coordination will take place prior to the vehicles entering the movement area and after exiting the movement area.
12. What are the procedures if a driver on the protected area or who has a clearance to enter or vacate the protected area experiences a radio failure?	Local procedures apply based on AIP and involve use of lights. Some make use of mobile phones.	Tower will utilize light gun signals to communicate a clearance to the vehicle. If a radio failure in the vehicle

		occurs, drivers typically utilize a mobile phone to communicate with the airport authority to coordinate an escort or a clearance.
14.1 All areas of the Manoeuvring Area are visible directly from the VCR	Doesn't apply	Applies
14.2 All areas of the Manoeuvring Area are visible from the VCR with assistance from cameras	Applies	Applies
14.3 Vehicles are tracked solely by visual and RTF methods	Doesn't apply	Doesn't apply
14.4 Vehicles are tracked with the assistance of basic Surface Movement Radar/Display	Doesn't apply	Applies
14.5 Vehicles are tracked with the assistance of Advanced SMR including labelling and Runway Incursion alerts	Applies	Applies
16.1 Controllers are required to file a written report whenever they become aware of a Runway Incursion	Applies	Doesn't apply
16.2 Controllers are required to make a written report whenever they become aware of a safety event on the Manoeuvring Area, which involved any party operating with an ATC clearance	Applies	Doesn't apply
16.3 Controllers are encouraged to make a written report whenever they become aware of a safety event on the Manoeuvring Area, which involved any party operating with an ATC clearance	Doesn't apply	Applies
17. Has the use of English or the use of a native language been a contributing factor in any Runway Incursion event since 2012?	Yes	Yes
If YES, please provide enough detail for lesson dissemination purposes	Foreign students learning to fly at general aviation airports.	There have been numerous Runway Incursions, including a Category B Runway Incursion, with causal factors related to foreign pilots using English as a second language and misunderstanding clearances from the ATCT. At several smaller airports in the US with intense foreign pilot training activities, English language skill level issues have contributed to numerous Runway Incursions.

18. Please state which new procedure, equipment or training has made the most positive contribution to the prevention of Runway Incursions involving vehicles, since January 2012	Runway Crossing on tower frequency trial led to a rationalising of vehicles operating on the runway, although the trial itself did not support single frequency ops. Introduction of A-SMGCS required individual fitment of transponders in vehicles which has led to further rationalisation of vehicles on manoeuvring areas. Continual update of runway safety guidance material (Airside Drivers Guide), LRSTs, Runway Safety Group	Improved driver and controller training; identification of hot spots on airport diagrams; improved driver and controller awareness; improved signage, lighting and markings on the airport
19. Please state how you have disseminated this positive information internally and externally	Implementation and facilitation of Local Runway Safety Teams, direct emails, safety fact sheets, booklets, videos and other products and forums.	The FAA uses web-sites, new and recurrent training, bulletins, outreach, and industry collaboration to disseminate information.