



This project has received funding
from the European Union's Horizon Europe Programme



Summary of the Triple One Concept Study

October 2024

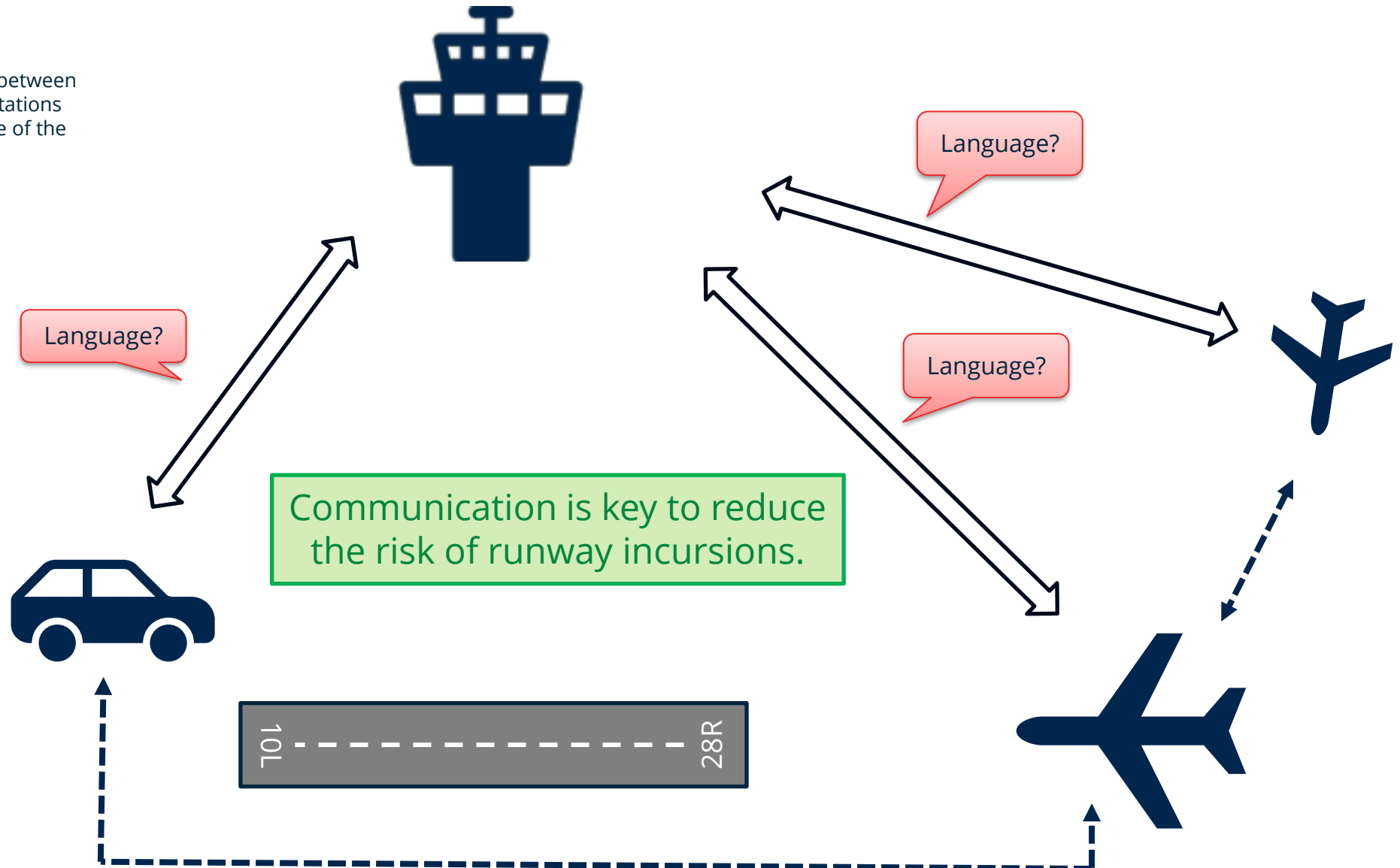
Jan Walther | Rainer Flicker | Rafael Zárate Cárdenas | Caroline Schlemmer
Andela Maslovara Antić | Abel Méndez Benítez | Nico Findling



Two-way communication between aircraft (or vehicles) and stations or locations on the surface of the earth



Listening capability



What is a runway incursion?

The ICAO runway incursion definition (also adopted by the EU) is “any occurrence at an aerodrome involving the **incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.**”

[EAPPRI V3.0]

What is an incorrect presence?

The failure of a pilot or vehicle driver to comply with a valid ATC clearance or compliance of a pilot or vehicle driver with an incorrect ATC clearance.

What could be an incorrect presence?

Operational Incidents

- Incorrect spacing between two or more aircraft or between an aircraft and obstacles
- Inappropriate clearances

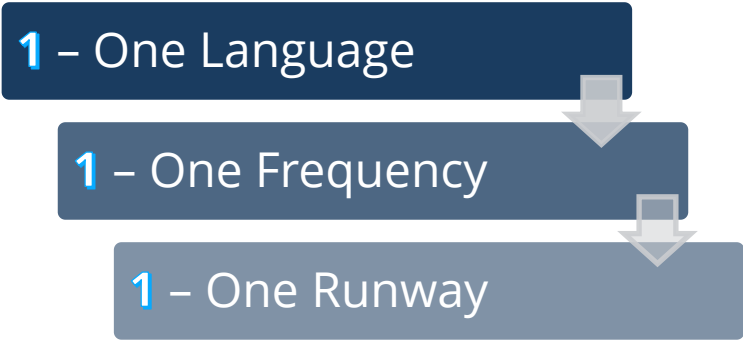
Pilot Deviations

- Landing without ATC clearance
- Take-off without ATC clearance
- Incorrect entry or crossing by an aircraft onto the runway protected area

Vehicle/Pedestrian Deviations

- Incorrect entry or crossing by pedestrians or vehicles onto the runway protected area

EAPPRI V3.0 – European Action Plan for the Prevention of Runway Incursions

Recommendations – 1.3 COMMUNICATIONS	APPENDIX A COMMUNICATIONS GUIDANCE
<ul style="list-style-type: none">1.3.4 Where practicable, improve situational awareness by conducting all communications associated with runway operations using aviation English.1.3.5 When practicable, improve situational awareness, by implementing procedures whereby all communications associated with runway operations are on a common or cross-coupled frequency.  <pre>graph TD; A[1 - One Language] --> B[1 - One Frequency]; B --> C[1 - One Runway];</pre>	<ul style="list-style-type: none">“Triple One”: One Runway, One Frequency, One Language (English) as a means to further improve communications/situational awareness for all operations on a runway.Use of Aviation English is proven to be a significant factor in the establishment and maintenance of situational awareness for all participants associated with runway operations.It is recommended that communications for all operations on a runway (landing, departing, crossing aircraft, vehicles crossing and runway inspections etc.) take place on the VHF frequency assigned for that runway; this will help to maintain high levels of situational awareness.

GAPPRI Part I – Recommendation

ADR25 and ANSP10 (Safe Runway Operations Communications)

Develop and implement a phased **plan for use of one frequency and English language for all communication associated with the operation of a runway**. The phased plan should aim at improving the shared situational awareness of all front-line operators and should provide realistic and practicable measures that ensure an adequate level of safety for each of its phases.



EPAS Volume II “EPAS Actions”

RES.0045 “Implementation of the ‘triple one’ concept for aerodromes”

The research project aims to:

Identify and understand the current application of the ‘triple one’ concept

Provide understanding of the safety benefits and safety risks of the implementation of the ‘triple one’ concept

Provide policy options in relation to the ‘triple one’ concept that may be pursued

Reduce the risk of runway incursions at European aerodromes



EPAS Volume II “EPAS Actions” – RES.0045 “Implementation of the ‘triple one’ concept for aerodromes”

The research project aims to:

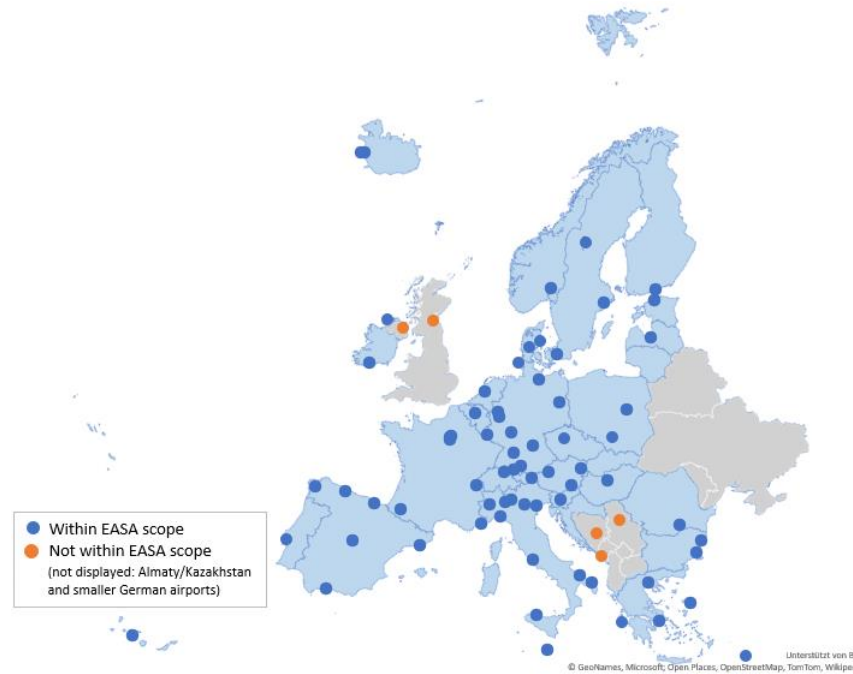
Identify and understand:

- Current application of **Triple One** or **variations** in use
 - Individual **rationales** and reasoning
 - Local **implementation solution**
 - **Costs** and **impact**

Provide understanding of the safety benefits and safety risks

Provide policy options

Online survey
04.-09.23



- ✓ Capture existing concepts and relevant aerodrome characteristics
- ✓ Distributed via ACI, ERAC, IDRF and aerodrome focal points

EPAS Volume II “EPAS Actions” – RES.0045 “Implementation of the ‘triple one’ concept for aerodromes”

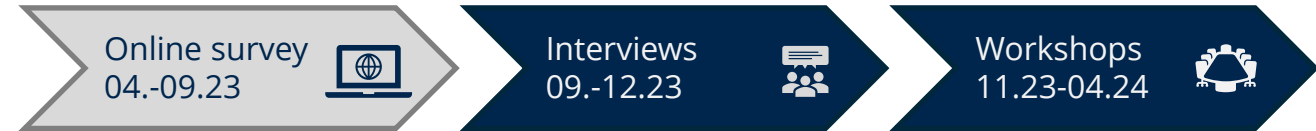
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 - **Costs** and **impact**

Provide understanding of the safety benefits and safety risks

Provide policy options



- ✓ Detailed of survey responses and local specific concept
- ✓ Involvement of all relevant stakeholders
 - Understanding of local concept, rationale, constraints and challenges
 - Identification of hazards and benefits
 - Pilot and TWR representatives

EPAS Volume II “EPAS Actions” – RES.0045 “Implementation of the ‘triple one’ concept for aerodromes”

The research project aims to:

Identify and understand the current application of the ‘triple one’ concept

Provide understanding of the safety benefits and safety risks, as well as all the reasons for implementing or not the ‘triple one’ concept

Provide policy options



Language

Language(s) to be used

Language proficiency

Proficiency checks

Radio communication procedures

Rules for communication

Phraseology

Call signs

Operation of vehicles

Frequency to be used

Operational requirements

SMGCS

Vehicle equipment requirements

Competence

Competence

Licenses

Training

Language

Language(s) to be used

Language proficiency

Proficiency checks



Operation of vehicles

Frequency to be used

Operational requirements

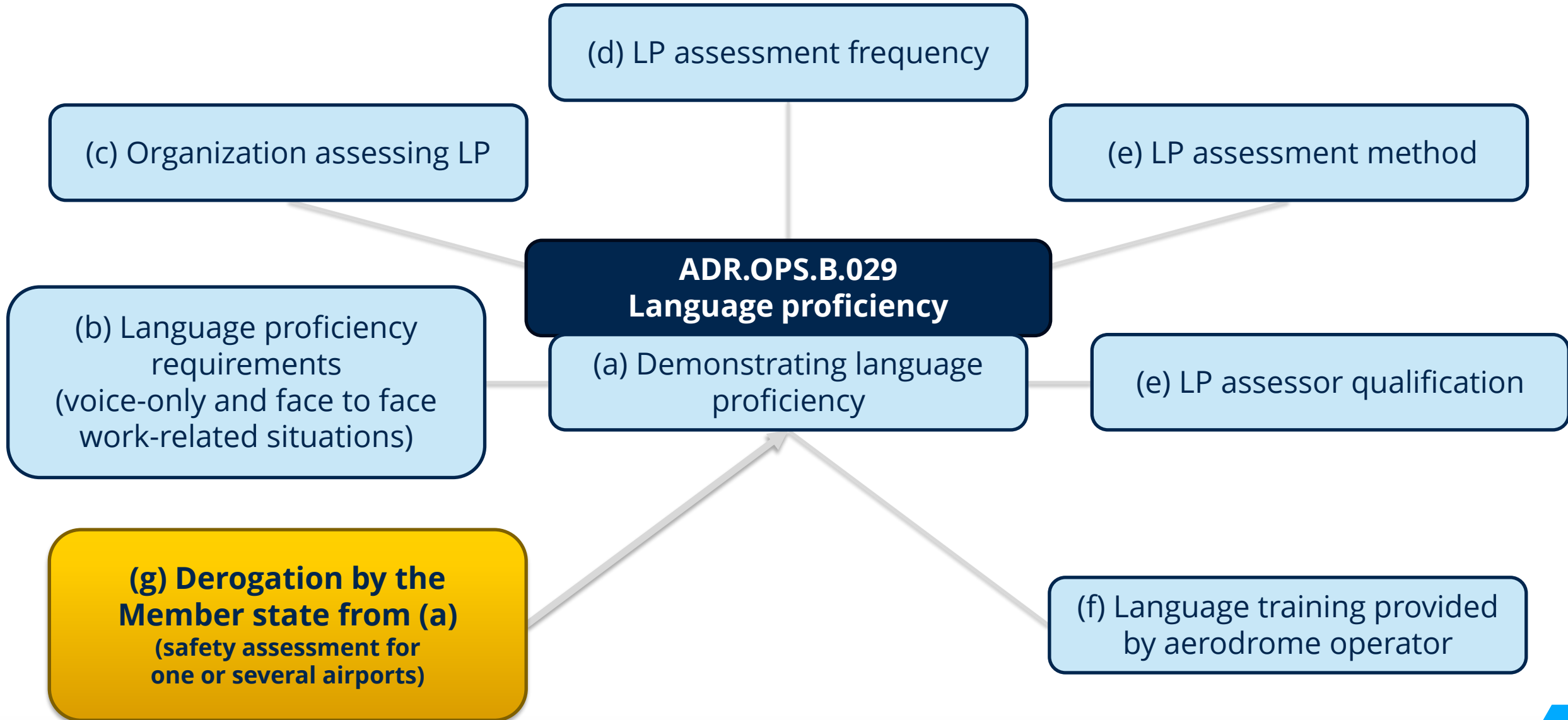
SMGCS

Vehicle equipment requirements

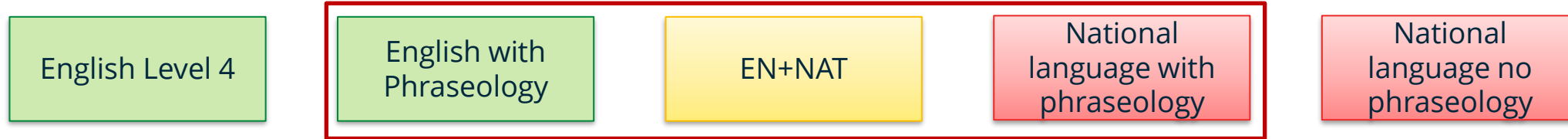
EAPPRI: Where practicable, [...] all communications associated with runway operations using aviation English.

Aerodromes	Flight Crew	Air Traffic Services
ADR.OPS.B.029 Language Proficiency	FCL.055 Language proficiency	ATC.B.030 Language
<p>a) A person required under point ADR.OPS.B.024¹ [...] shall demonstrate proficiency, at least at an operational level both in the use of phraseologies and in plain language [...] in:</p> <ul style="list-style-type: none"> (1) the English language; and (2) any other language or languages used at the aerodrome for radio communication purposes with the air traffic services unit of the aerodrome. 	<p>a) [...] pilots required to use the radio telephone shall [...] have a language proficiency endorsement on their licence in either English or the language used for radio communications involved in the flight [...] The minimum acceptable proficiency level is the operational level (Level 4) [...]</p>	<p>Air traffic controllers and student air traffic controllers shall not exercise the privileges of their licences unless they have a valid language proficiency endorsement in English and, if applicable, in the language(s) imposed by the Member State [...]</p> <p>The applicant for any language proficiency endorsement shall demonstrate [...] at least an operational level (level four) of language proficiency.</p>

1 – ADR.OPS.B.024 Authorisation of vehicle drivers: ELP → Refers to driving of a vehicle on any part of the **manoeuvring area** or other operational areas of an aerodrome



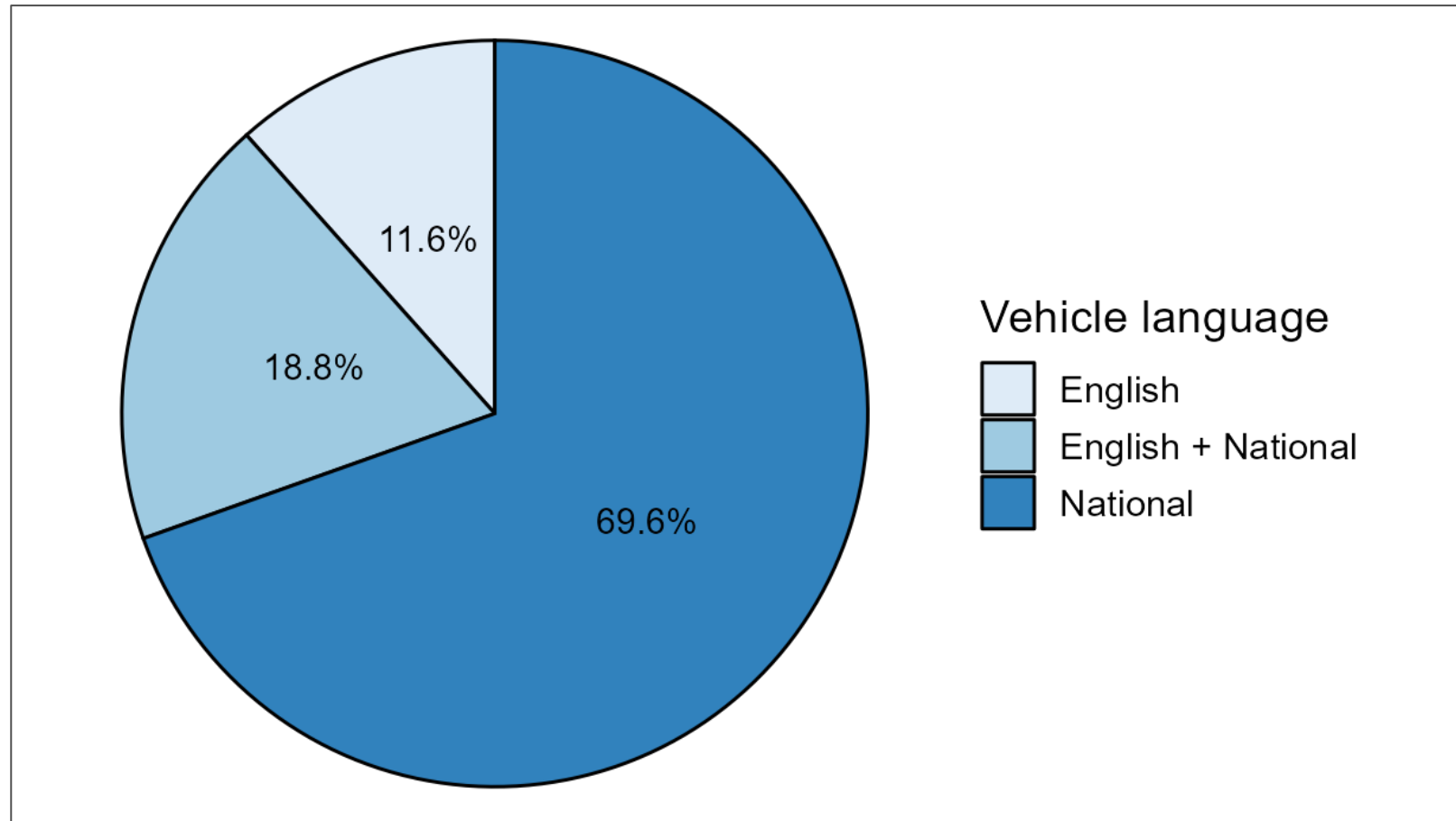
- Which language variations were considered?



- Which language variations were found?



○ Vehicle Driver's Communication Language

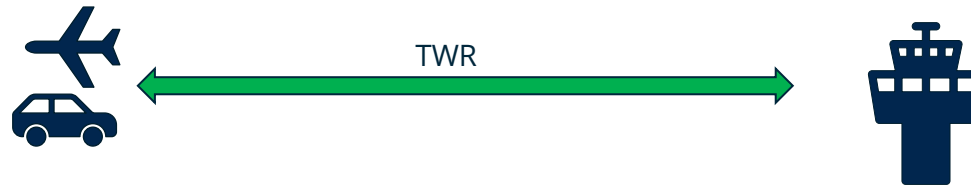


EAPPRI: When practicable [...] implementing procedures whereby all communications associated with runway operations are on a common or cross-coupled frequency.

Aerodromes	Air Traffic Services
<p data-bbox="346 496 794 529">ADR.OPS.B.031 Communications</p> <p data-bbox="346 594 690 626">GM1 ADR.OPS.B.031(b)</p> <p data-bbox="346 651 1212 1029">Improving the situational awareness of vehicle drivers operating on the maneuvering area is important, as it may also affect the situational awareness and decision-making of the air traffic services personnel and flight crews. Situational awareness is improved by conducting communications in a common frequency and language, whenever this is possible.</p>	<p data-bbox="1276 496 2130 529">SERA.14015 Language to be used in air-ground communication</p> <p data-bbox="1276 594 1531 626">GM1 SERA.14015</p> <ul data-bbox="1276 651 2173 968" style="list-style-type: none">a) use of a single frequency for all the safety-critical operations on a runway or a set of runways;b) the need to and feasibility of applying the requirement for English-only communications also to communications with vehicles in order to enhance situational awareness; and

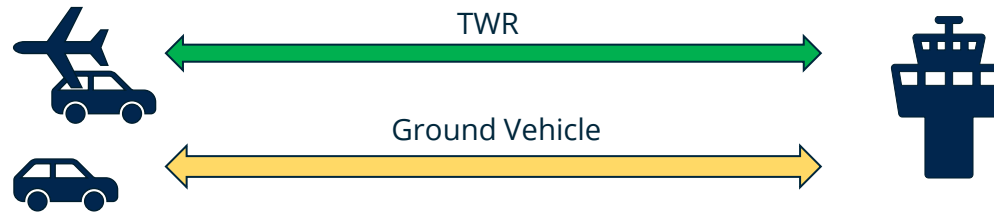
Common channel

1



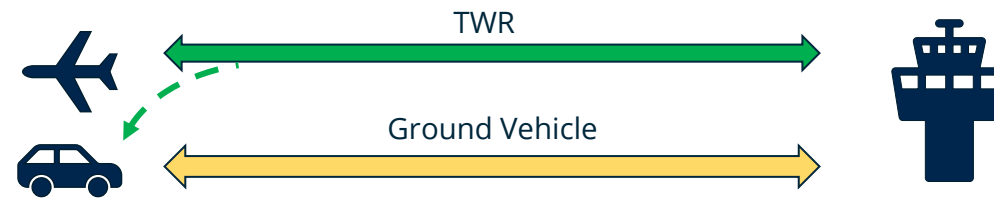
Vehicles partially on TWR freq.

2



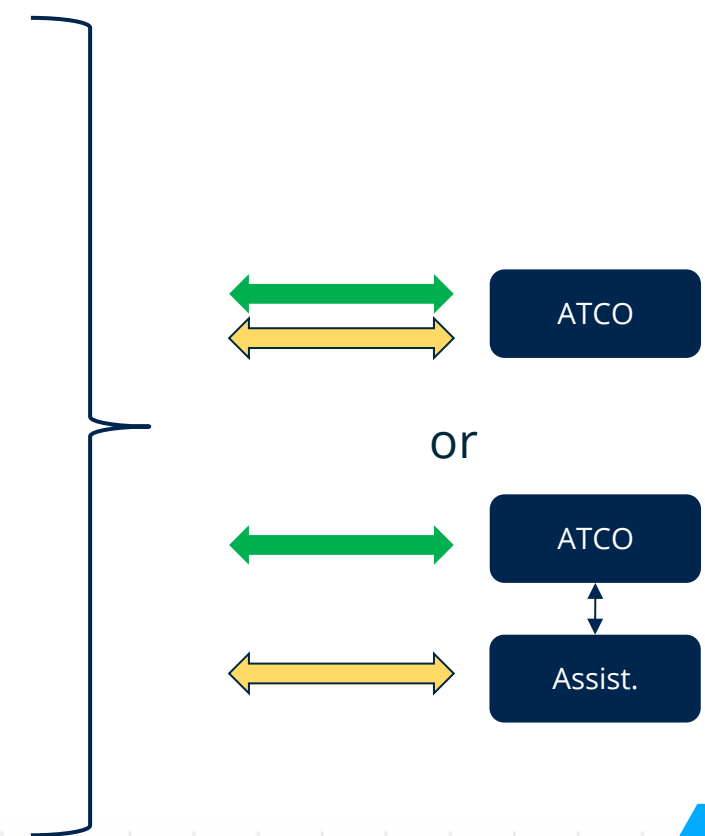
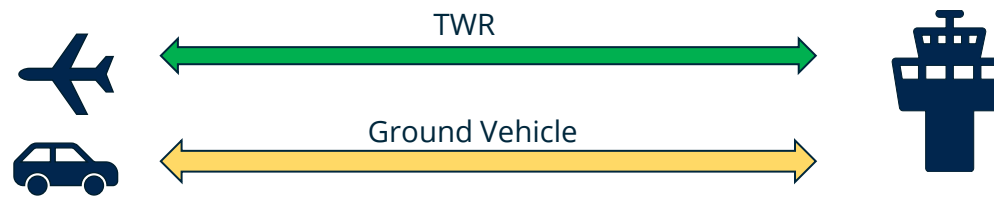
Separate channels
+ vehicles listen to TWR only

3

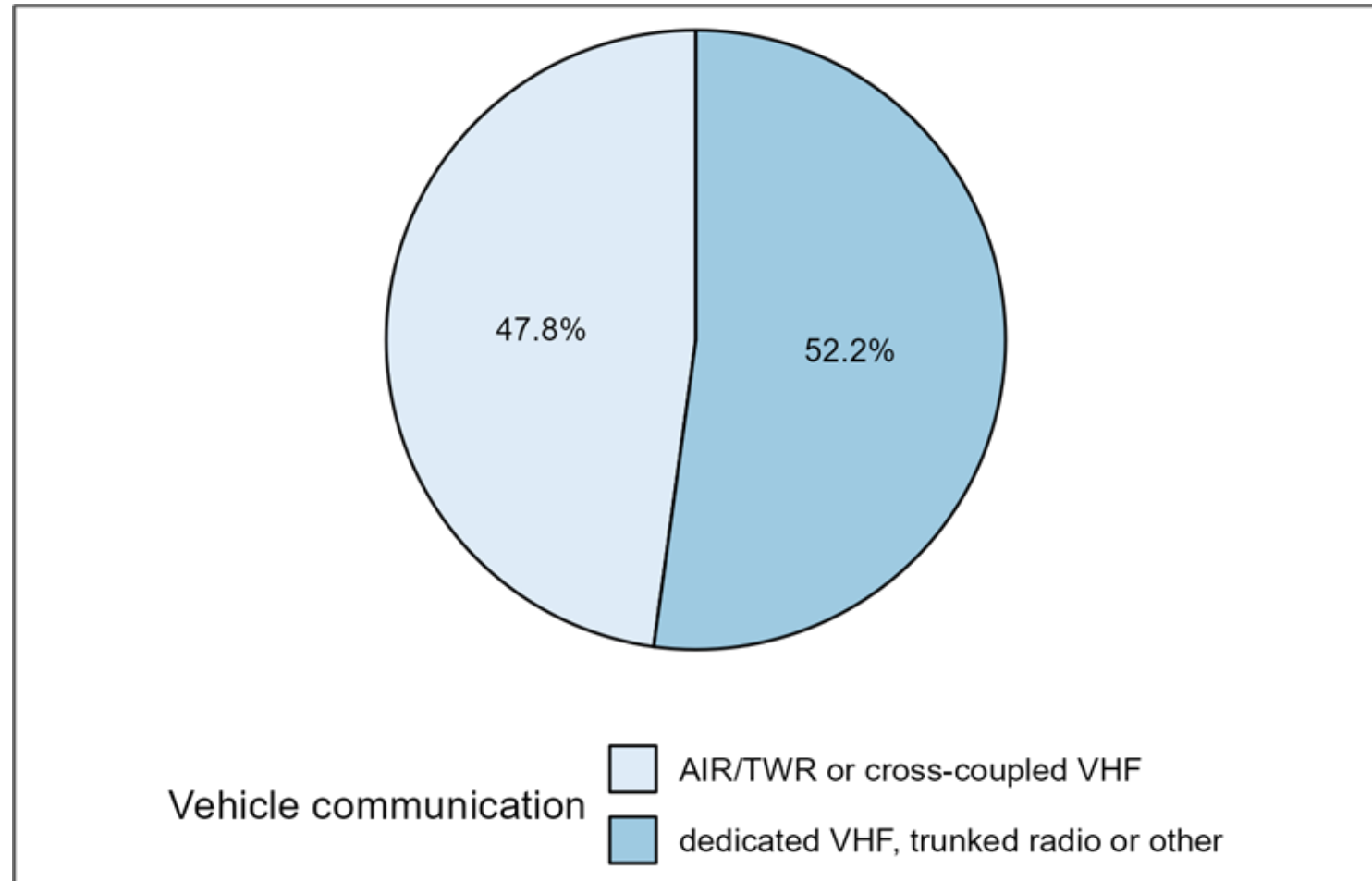


Separate channels

4



○ Vehicle Communication Frequency



On the runway

On RWY safety areas

Crossing the RWY

What about:

Emergency and abnormal situations?

Status of the runway?



RWY inspections (Airport OPS)



RFFS



Tows



Wildlife control



Winter service



CAA



ADR Maintenance

ANSP Maintenance

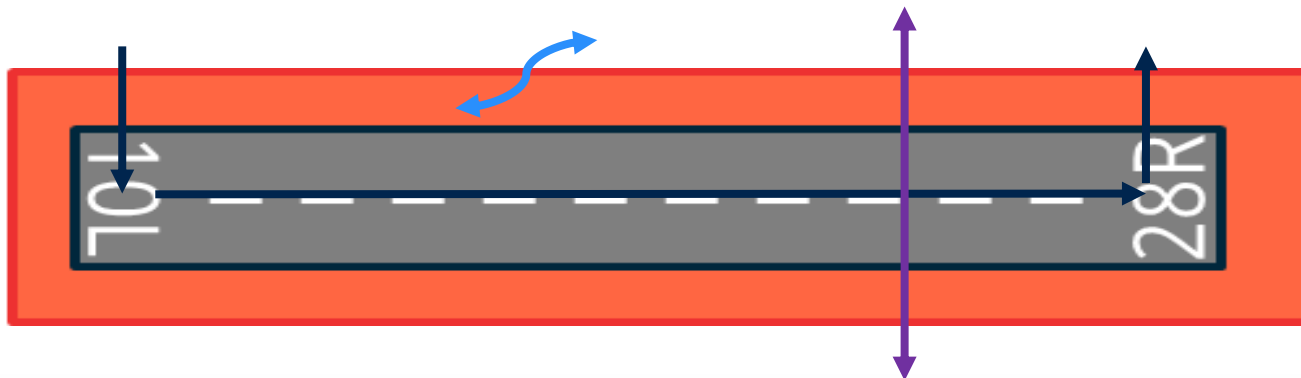
MET Maintenance



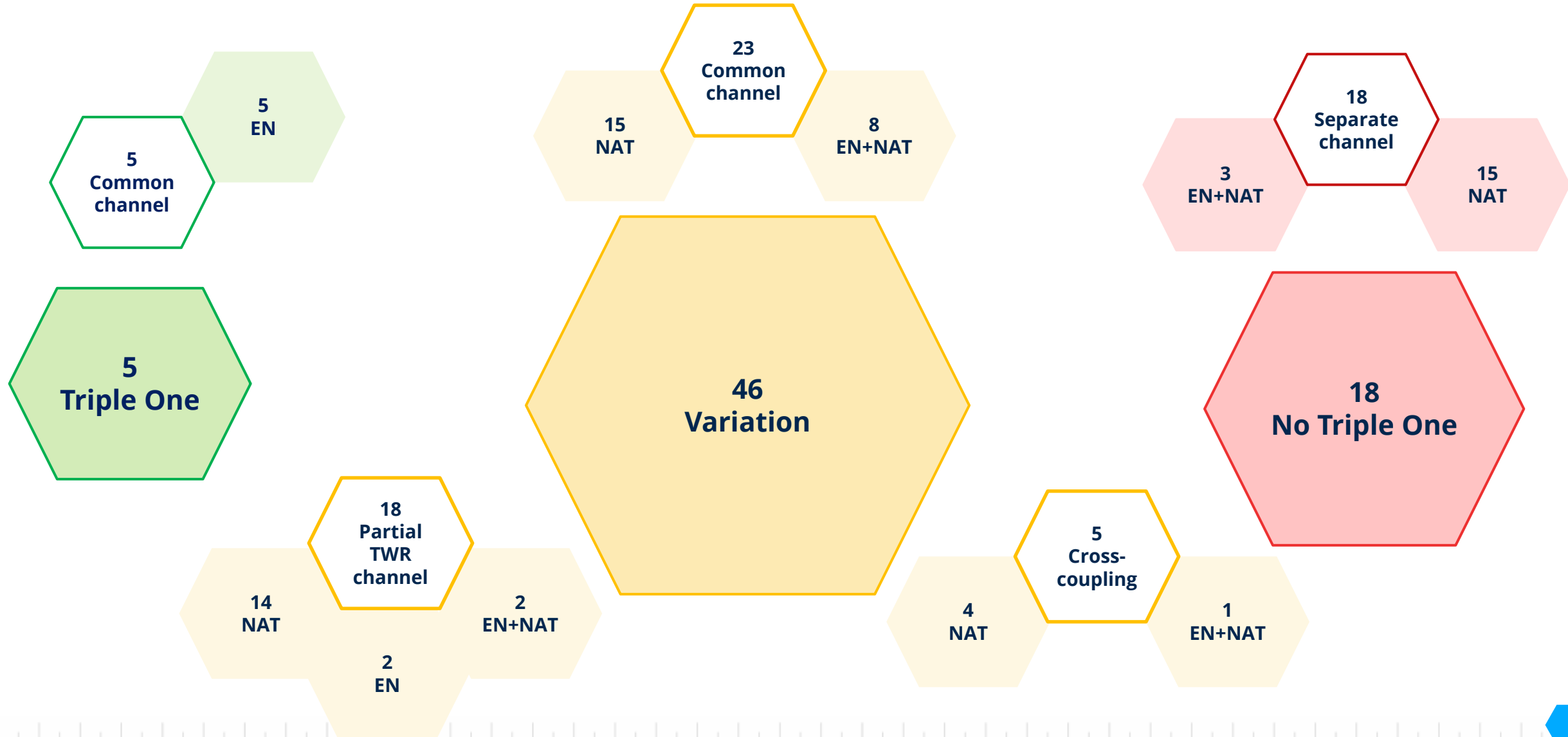
Grass mowers



Follow me



Triple One concept and observed variations



RI rate not indicative
of need for change

Implementation concerns regarding:

- Lack of English proficiency
- Lack of eligible applicants/staff members
- Frequency congestion
- Need for equipment change
- Information overload
- Insufficient phraseology to cover variety of vehicle OPS



Other safety measures in place:

- OPS limitation during low visibility or winter OPS
- Vehicle transponders, stop bars
- A-SMGCS
- Vehicle OPS scheduled at 'convenient' times

National carrier use national language¹

Higher recruitment requirements with respective higher salaries

Safety assessment proves ELoS with national language

Less misunderstanding

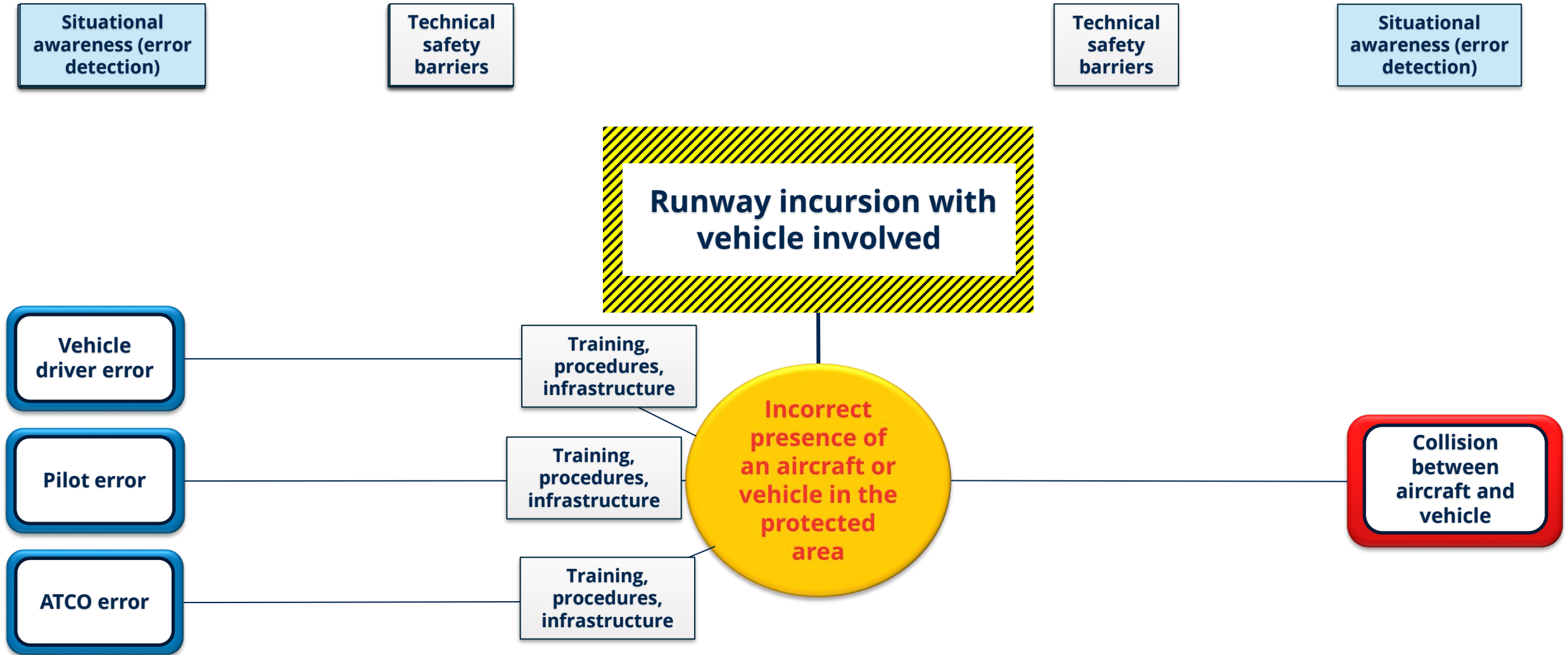
Recurring training/maintaining proficiency is ensured on an individual level

Established operational procedures and common understanding of conduct

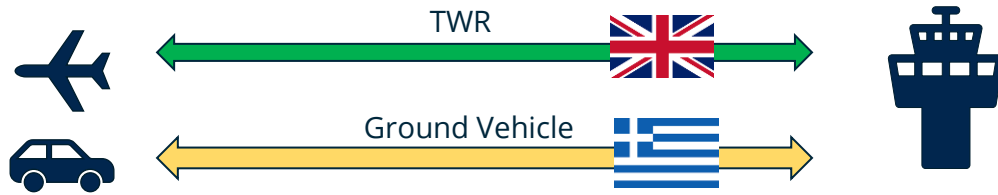


Implementation risks and operational constraints

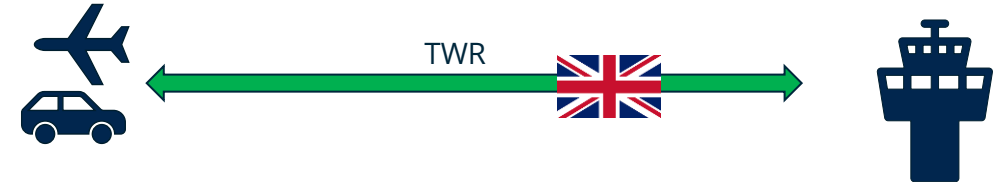




○ How to measure and anticipate safety benefits?



vs.



Risk Probability		Risk Severity				
		Catastrophic	Hazardous	Major	Minor	No Significant Effect
		A	B	C	D	E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely remote	1	1A	1B	1C	1D	1E



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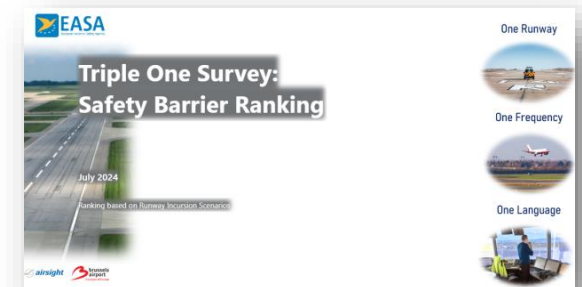
- How to measure and anticipate safety benefits?

Comparison safety performance
based on occurrence data

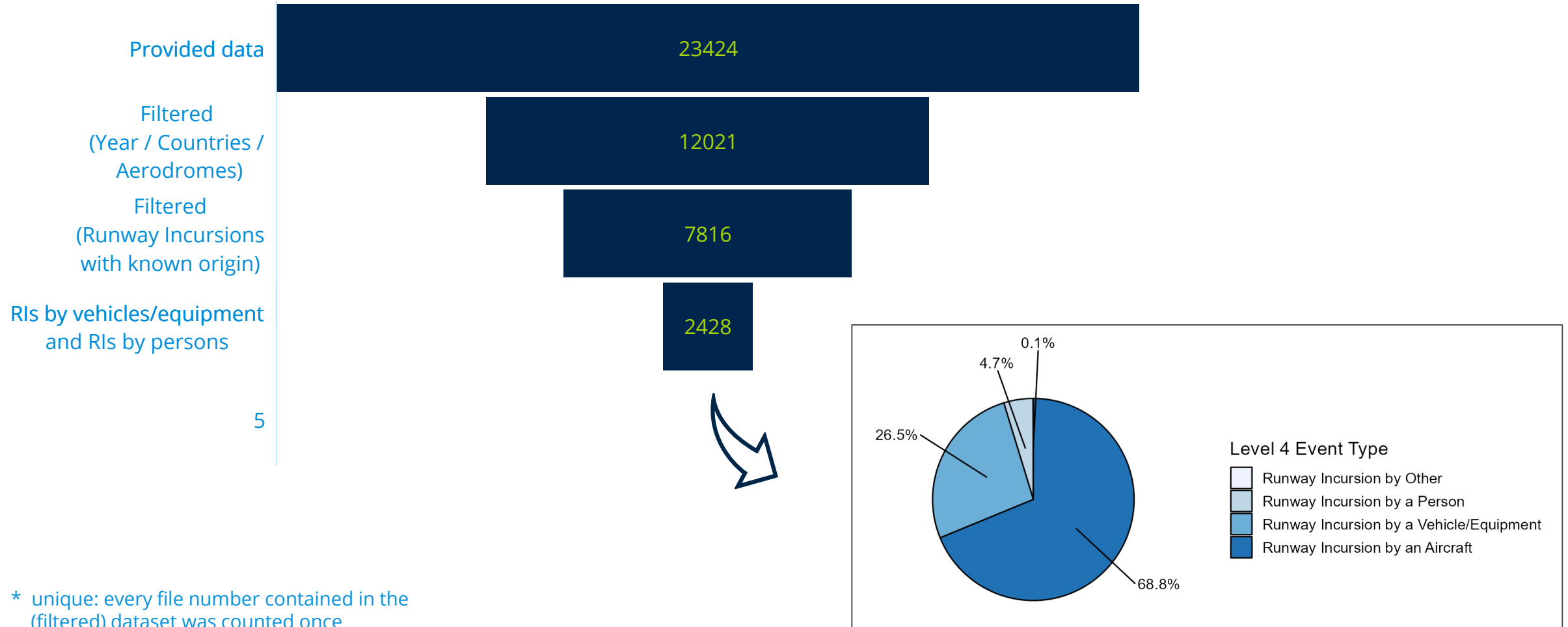
Analyse runway incursion scenarios
based on occurrence data

Effectiveness of safety barrier
based on survey

ECCAIRS2



Number of unique occurrences* depending on filtering level

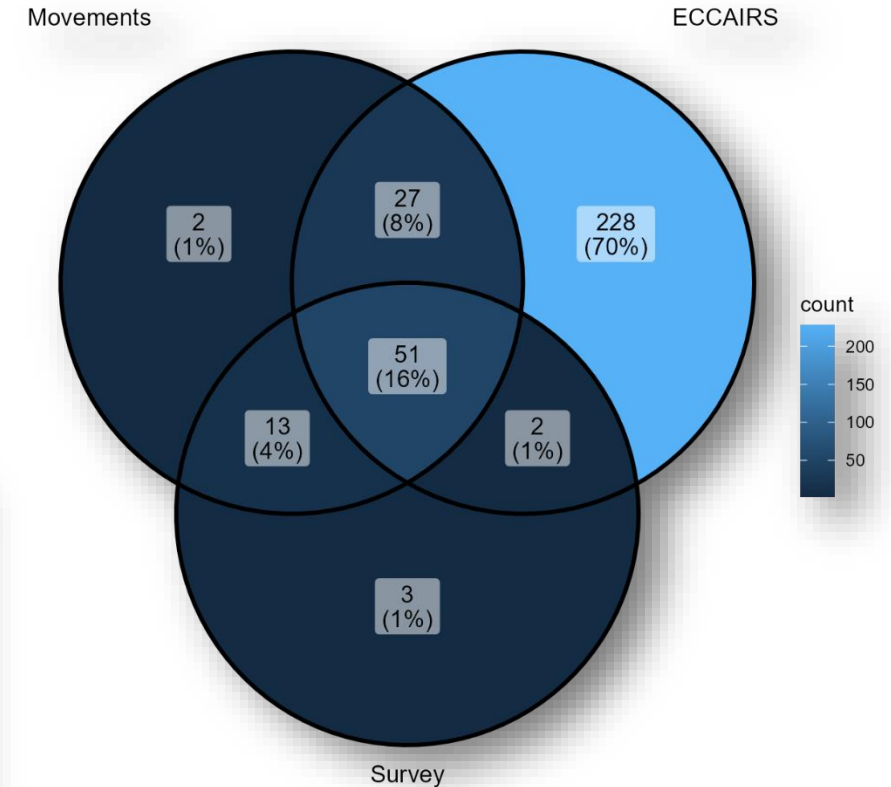
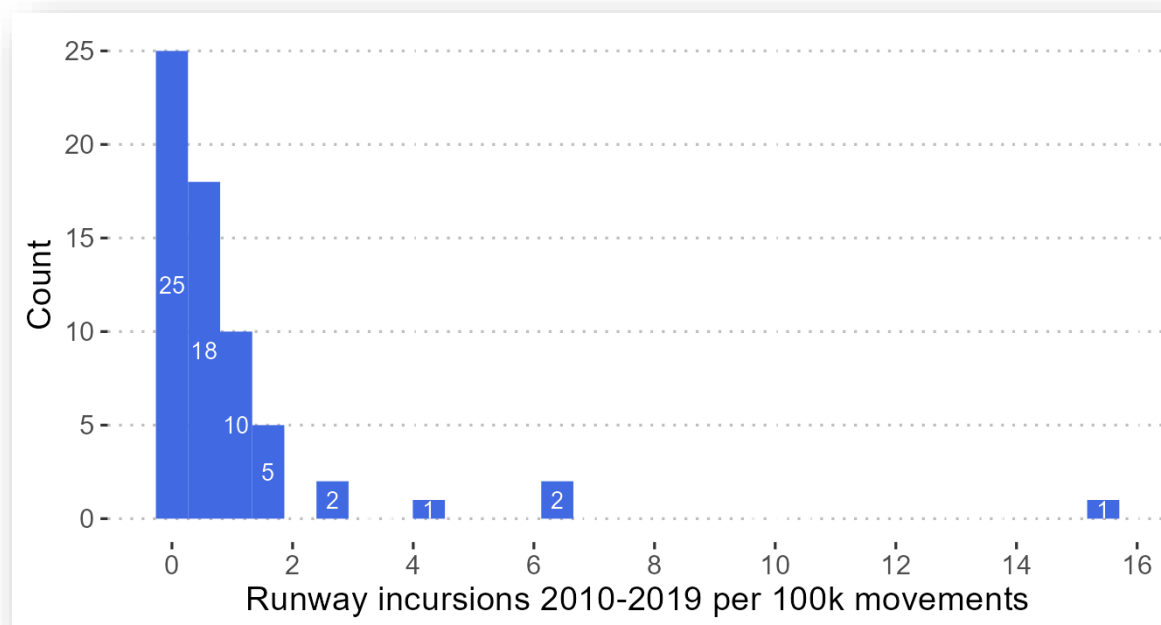


* unique: every file number contained in the (filtered) dataset was counted once

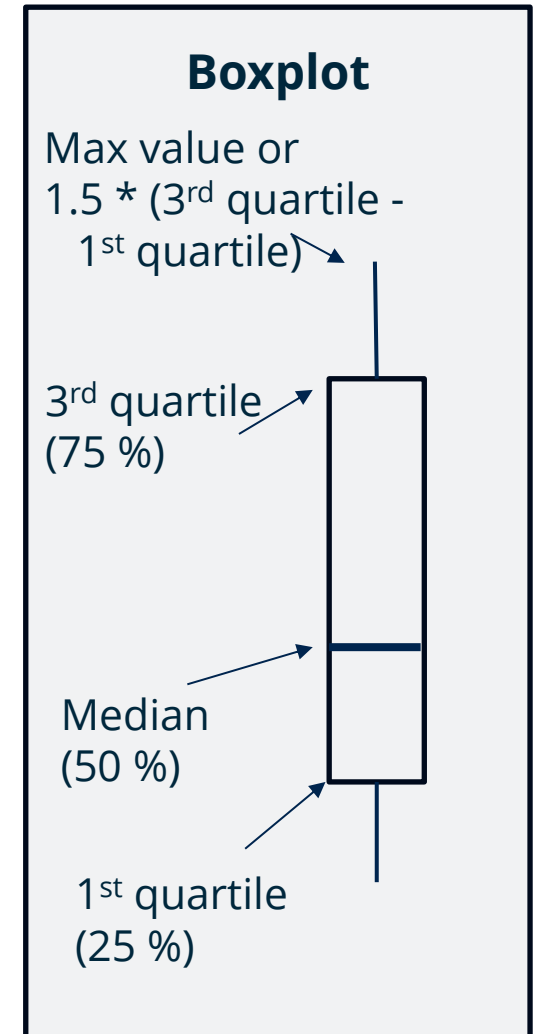
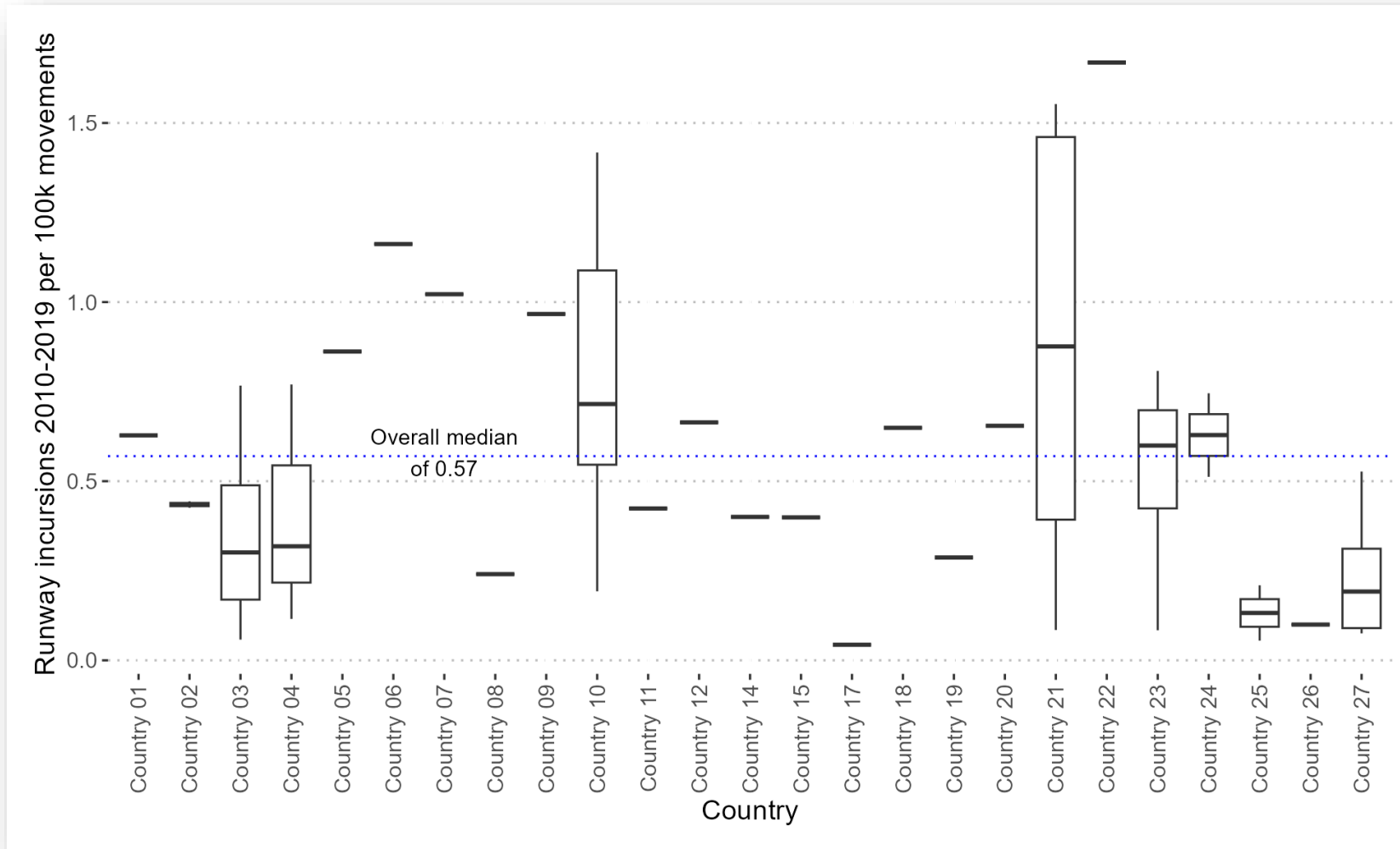
○ Analysis of Runway Incursions by combining:

- Number of runway incursions per aerodrome (ECCAIRS)
- Number of movements per aerodrome
- Data from the survey with information about aerodrome layout and infrastructure

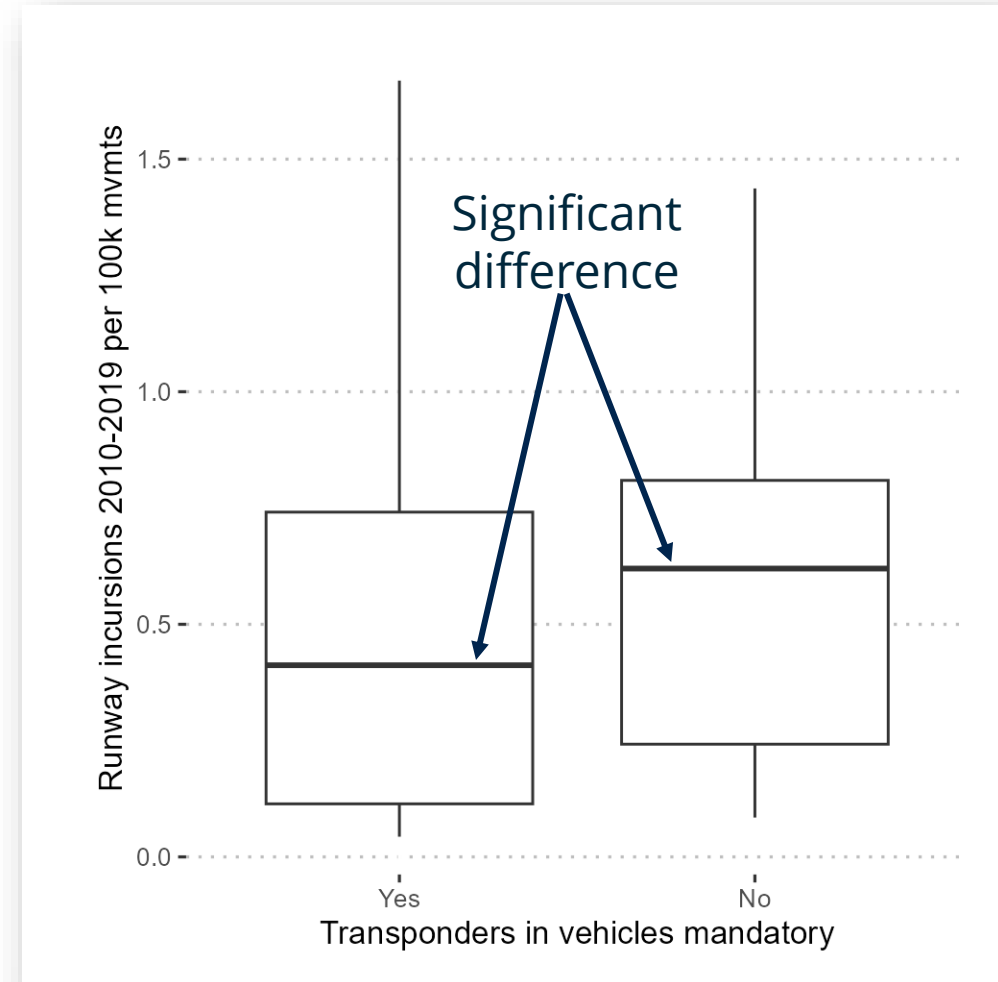
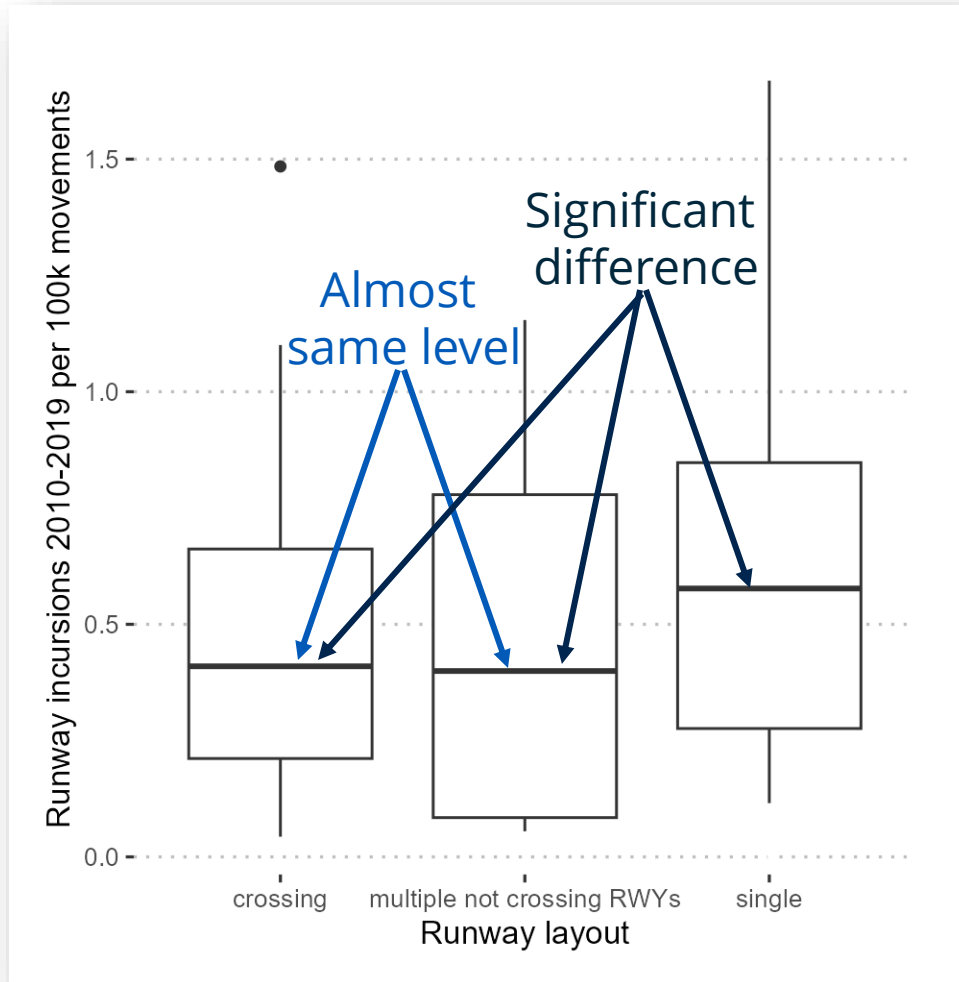
→ Median is **0.57** Runway incursion per 100k movements



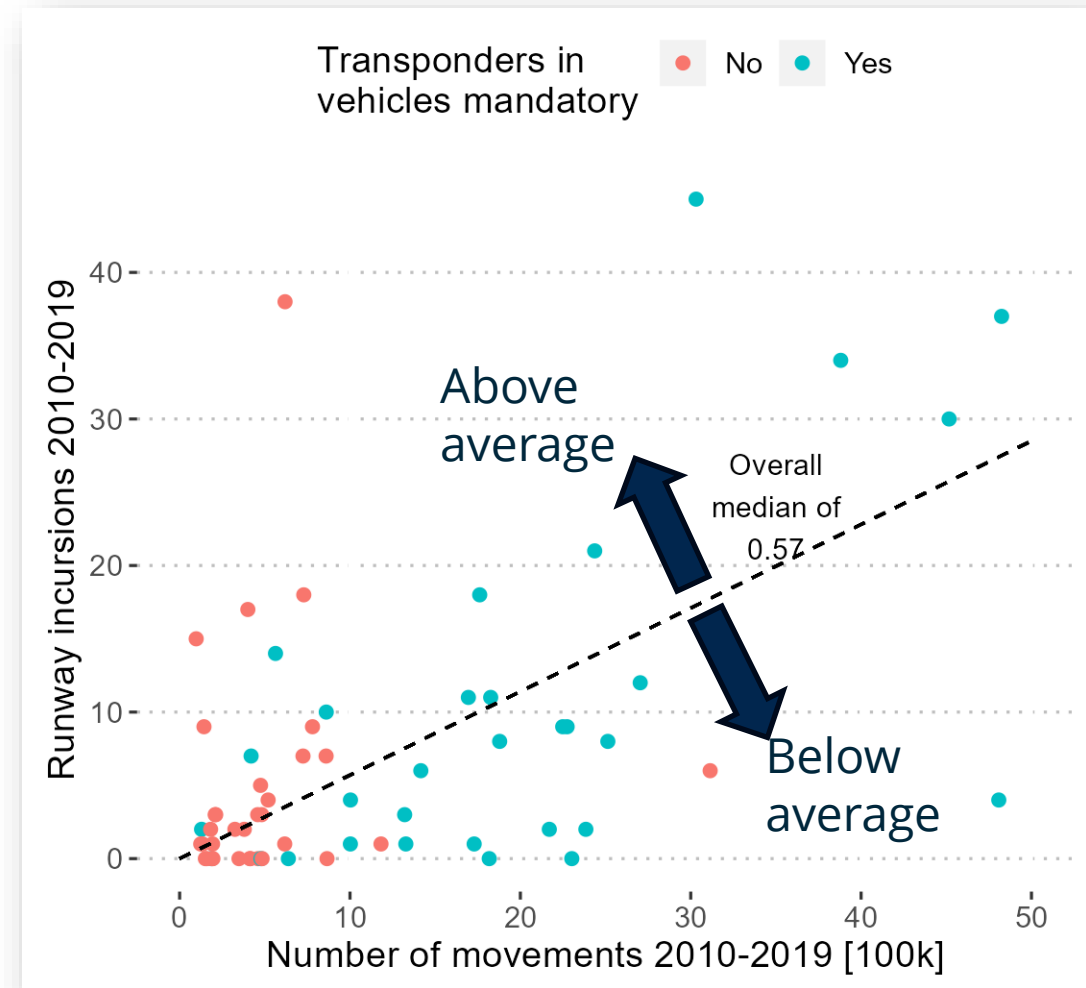
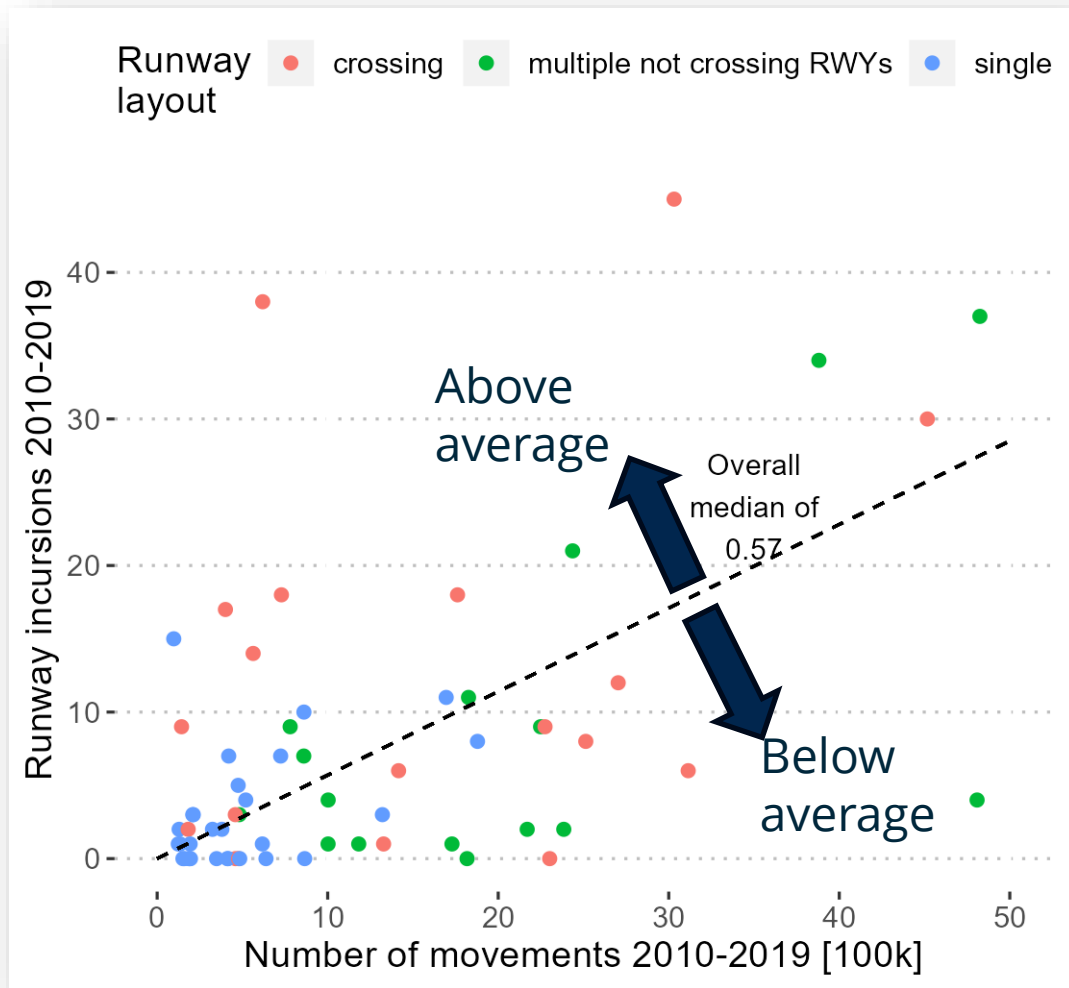
- Runway incursion rate different for each country (shown as boxplot)



- Runway incursion rate depending on RWY layout and technical safety barriers



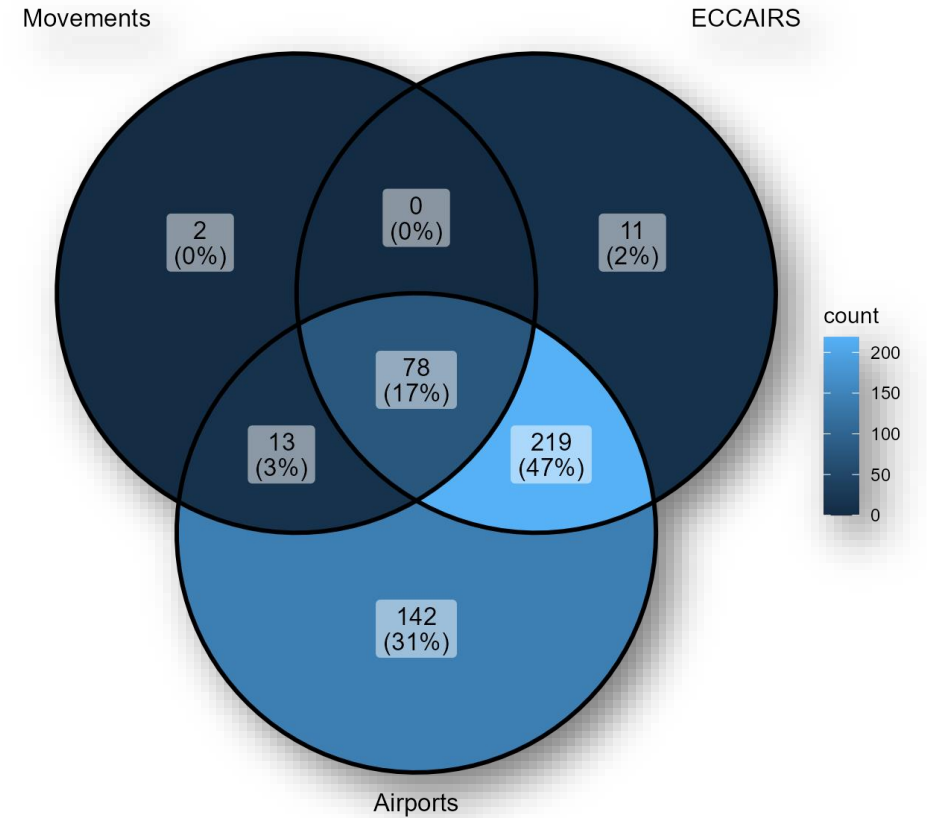
○ Runway incursion rate depending on RWY layout and technical safety barriers



- Comparison of Triple One vs. No-Triple One aerodromes

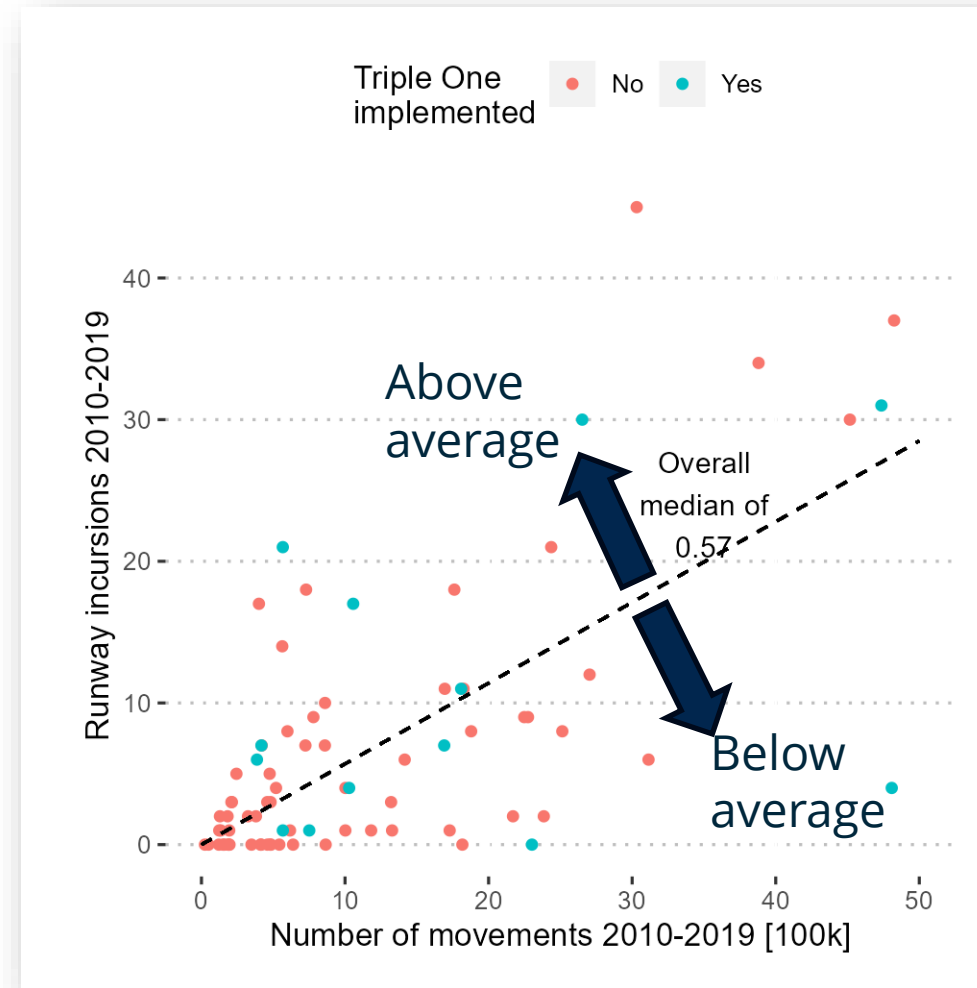
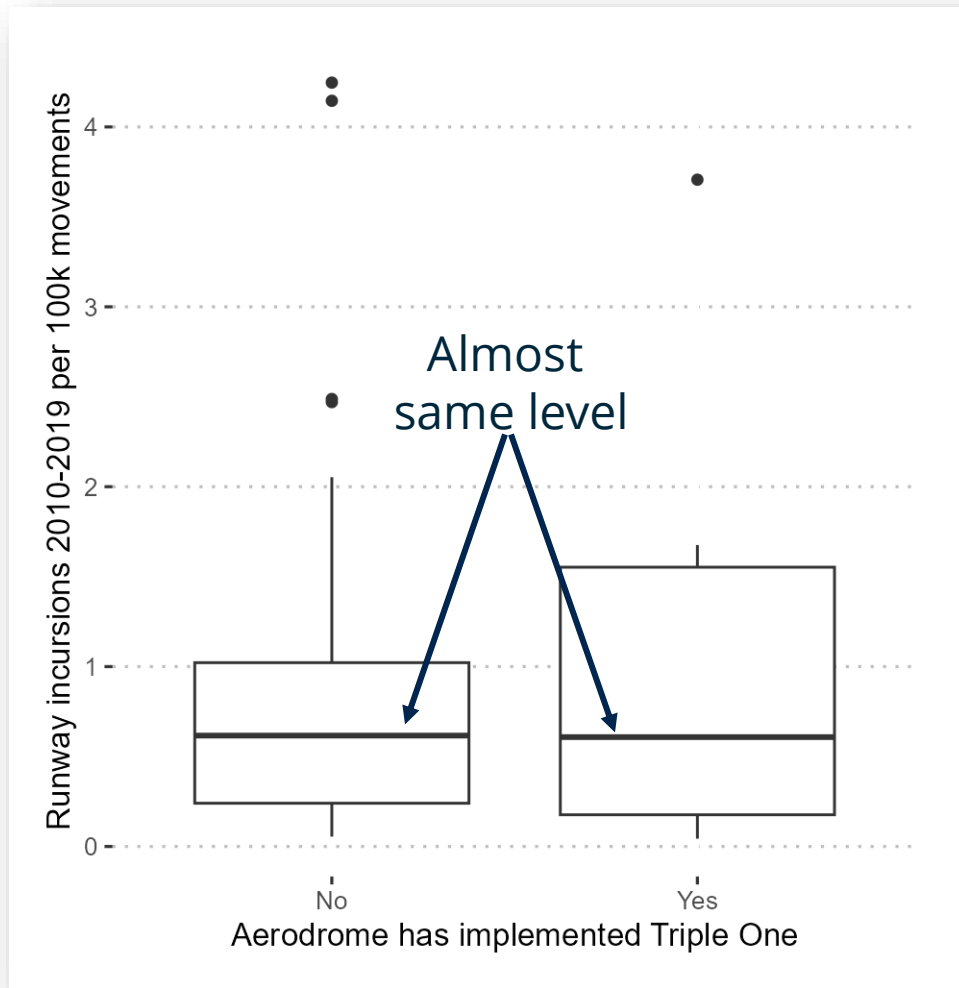
- 78 aerodromes considered

- 65 aerodromes with No-Triple One
- 13 aerodromes with Triple One



Statistics and correlations

Runway incursions and Triple One safety barrier



High
variation of
reported RI
rate across
aerodromes
and countries

Technical
safety
barriers can
reduce RWY
incursion rate

No effect of
Triple One on
the average
RI incursion
rate in the
data

Safety potential analysis

Considered dataset

- ECCAIRS Occurrence database for 15-year period from 2005 to 2019

- Aerodromes falling into the scope of regulation (EU) 2018/1139

- Unique occurrences

- Vehicle / equipment / personnel runway incursion

- Contains minimum wording for description

- With sufficient information to understand the events

- In an aerodrome without Triple One implemented



2428

513

323

257

Safety potential analysis

Evaluation methodology against situational questions

Could the implementation of the Triple One concept have potentially improved the **situational awareness of the vehicle drivers / equipment operators / personnel?**

Improvement of situational awareness	?
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Could the implementation of the Triple One concept have potentially improved the **situational awareness of the pilots?**

Could the implementation of the Triple One concept have potentially **prevented the occurrence?**

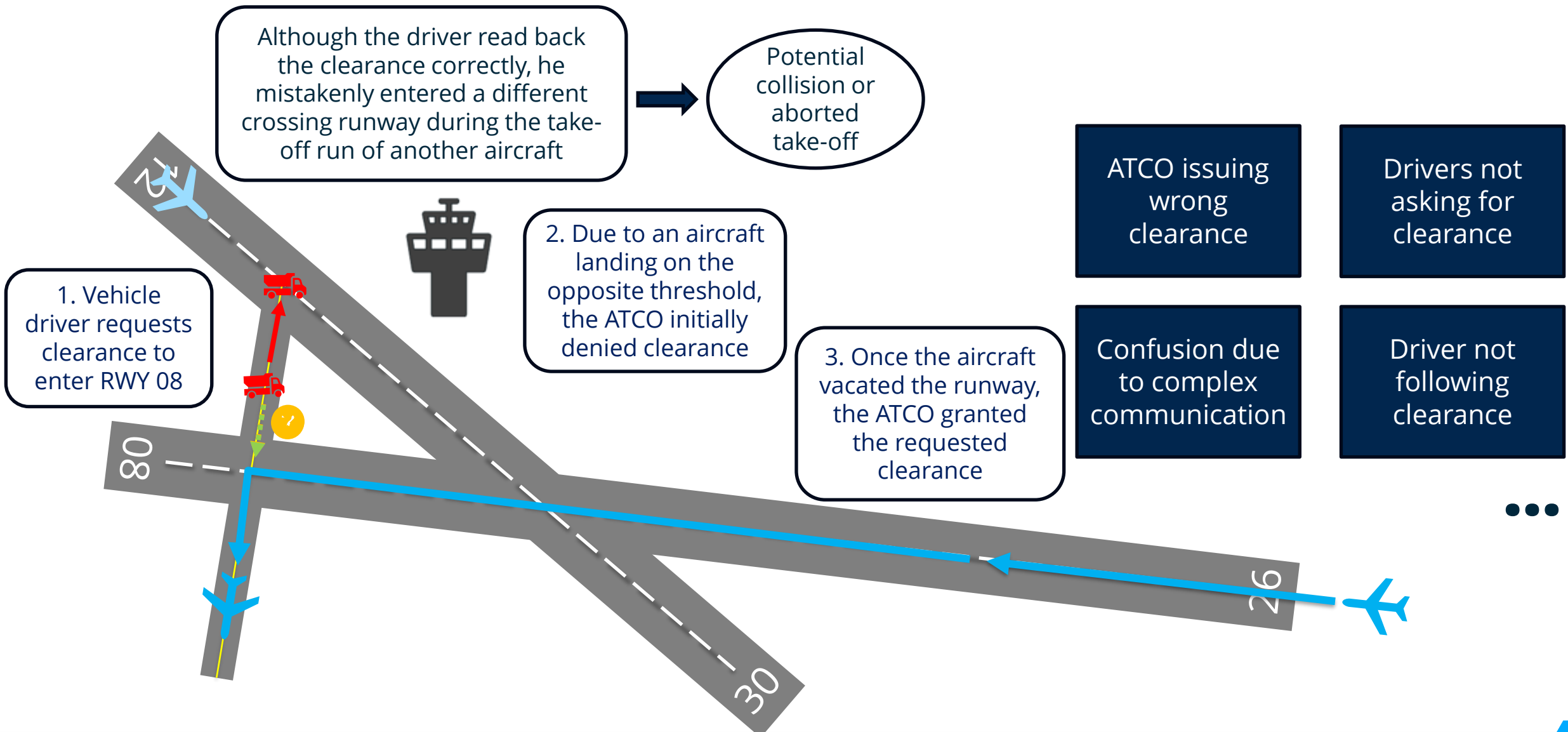
Preventive barrier	?
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Could the implementation of the Triple One concept have potentially **changed the consequences of the occurrence?**

Recovery barrier	?
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Safety potential analysis

Typical exemplary cases



Safety potential analysis

Typical exemplary cases



Nighttime

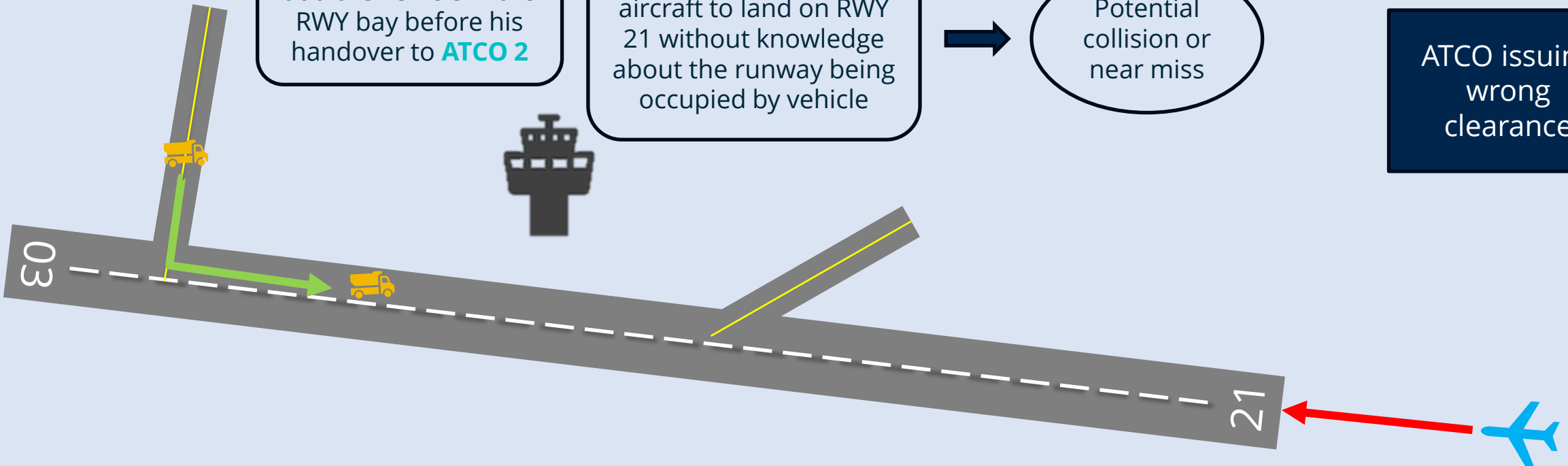
1. **ATCO 1** instructed the vehicle driver to enter the runway

3. **ATCO 1** forgot to add the vehicle in the RWY bay before his handover to **ATCO 2**

2. **ATCO 2** cleared an aircraft to land on RWY 21 without knowledge about the runway being occupied by vehicle

Potential collision or near miss

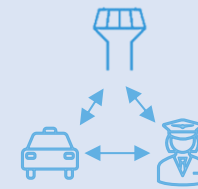
ATCO issuing wrong clearance



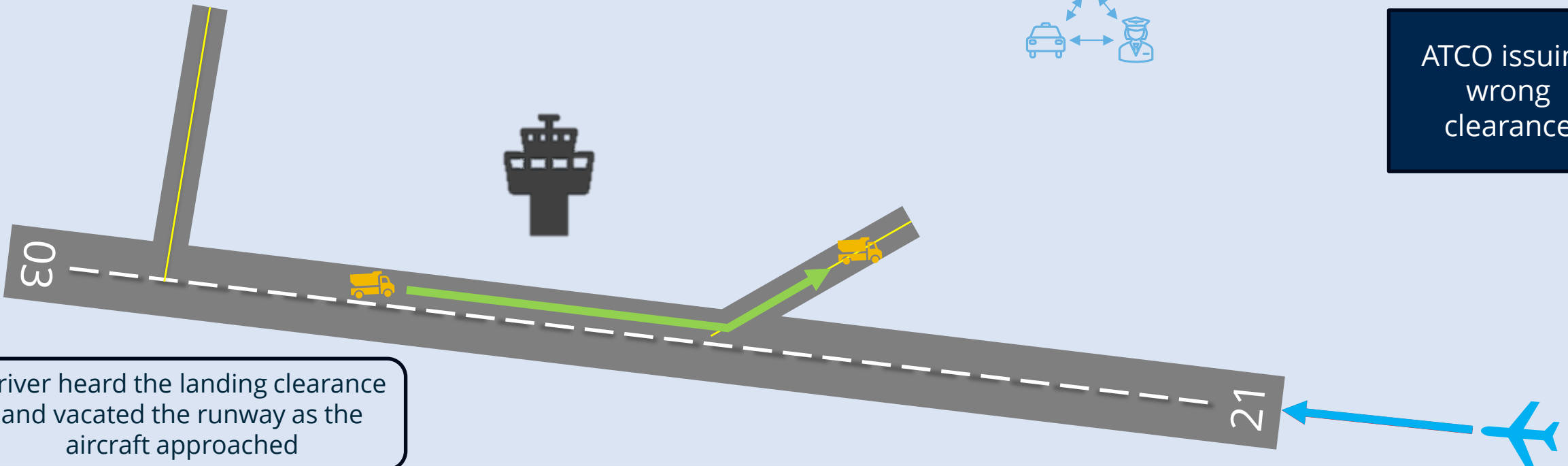


Nighttime

Triple One implemented

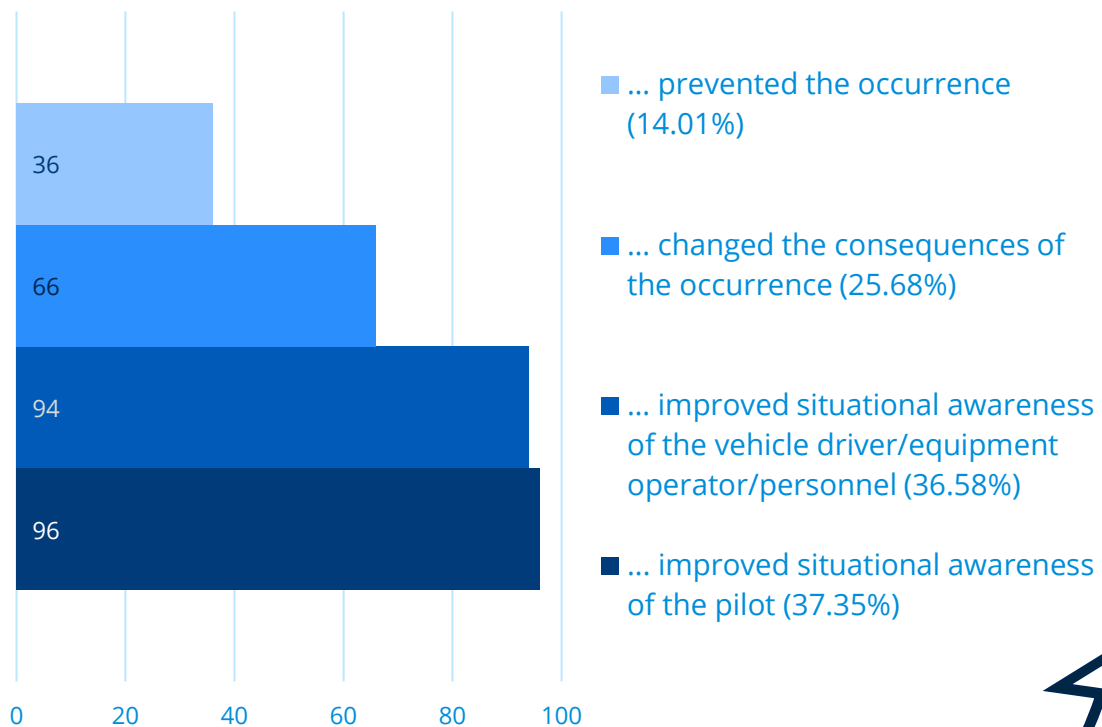


ATCO issuing wrong clearance



Driver heard the landing clearance and vacated the runway as the aircraft approached

Occurrences in which implementation of the Triple One concept could have potentially...



Number of occurrences	Percentage out of the total analyzed	... prevented the occurrence	... changed the consequences of the occurrence	... improved situational awareness of vehicle drivers	... improved situational awareness of pilots
25	9.73%	■	■	■	■
11	4.28%	■	■	■	■
22	8.56%	■	■	■	■
4	1.56%	■	■	■	■
4	1.56%	■	■	■	■
19	7.39%	■	■	■	■
13	5.06%	■	■	■	■
26	10.12%	■	■	■	■

124 ≈ 48 % of number of occurrences analysed (257)

➤ Triple One could have potentially been beneficial in 48% of the analysed occurrences

➤ One occurrence can have multiple positive answers





Survey distributed to:

- Points of contacts at ADRs
- Air Navigation Service Providers
- Individuals and associations of ATCOs and pilots

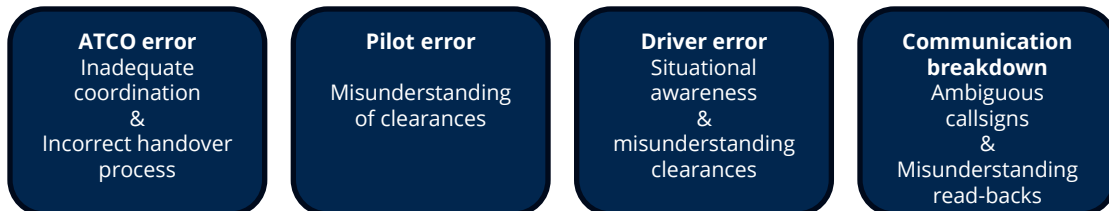
➤ Familiarity with Triple One and runway incursion issues expected

July 2024

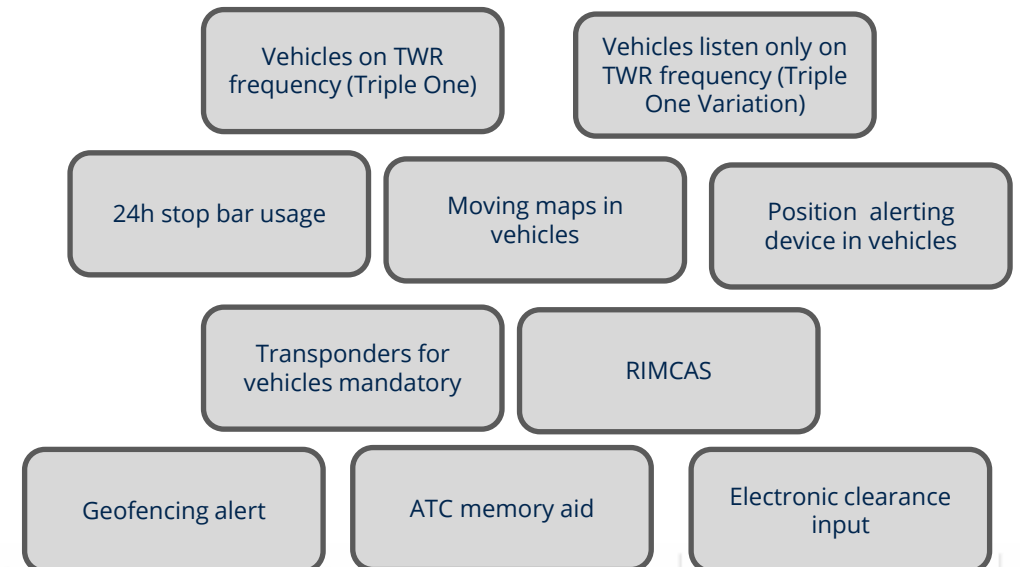
 51 responses

8 scenarios

- Based on ECCAIRS database
 - Recurrent and typical situations
 - Common sources of error
 - Systemized to address errors from relevant stakeholders

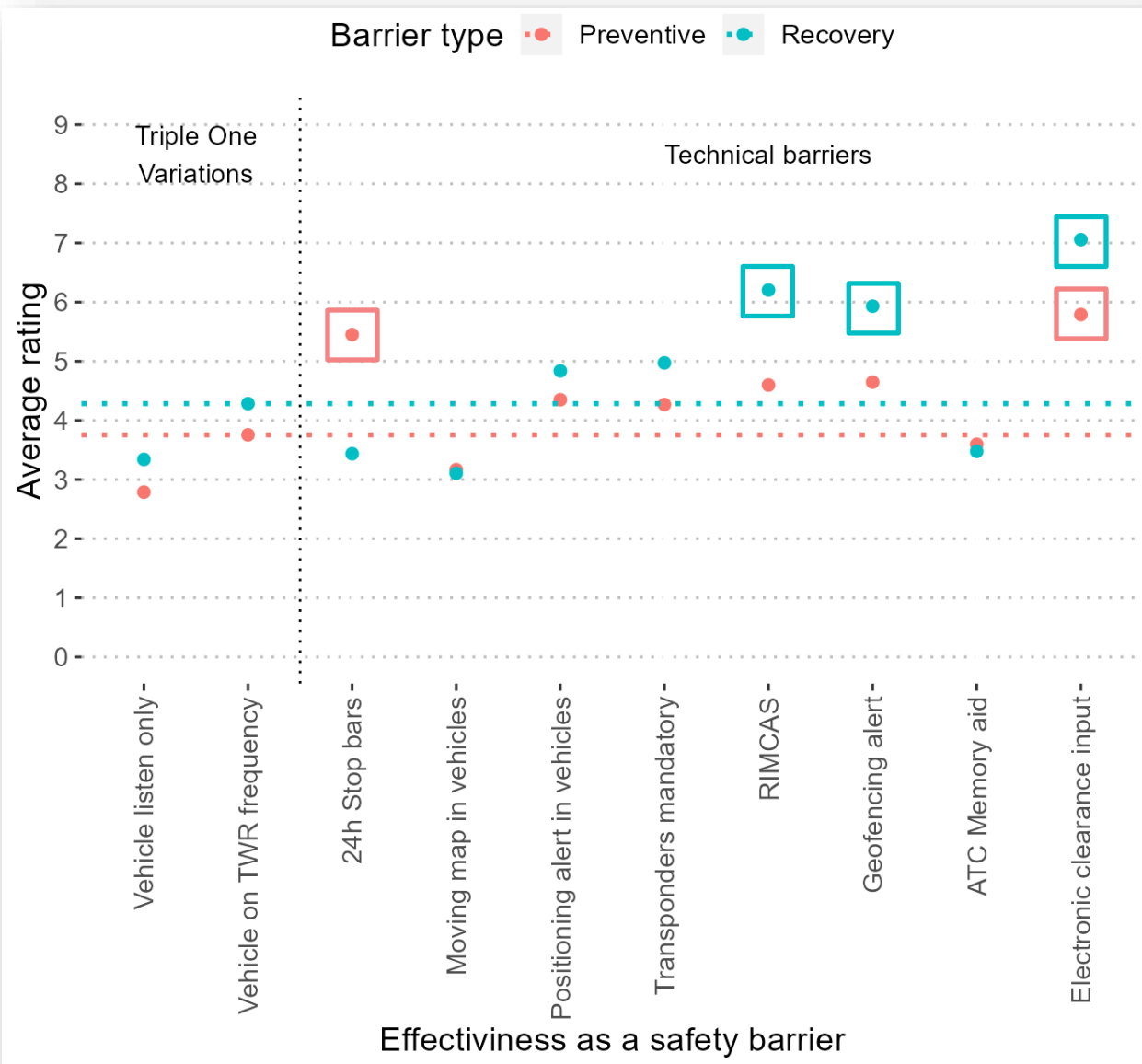


10 safety barriers



Safety barrier analysis

Survey results



- **Most effective preventive barriers**
 - Electronic clearance input
 - 24 hours stop bars
- **Most effective recovery barriers**
 - Electronic clearance input
 - RIMCAS
 - Geofencing alert
- **Conclusion**
 - Technical safety barriers considered more effective than Triple One
 - High rating for Triple One only in some ATC error and pilot error scenarios



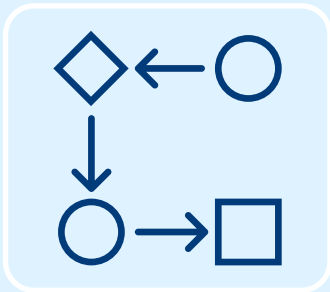
Language proficiency

- Common language application: Aviation English
- Language proficiency
 - ATCOs & commercial pilots already provide ELP
 - Non-commercial VFR pilots and vehicle drivers



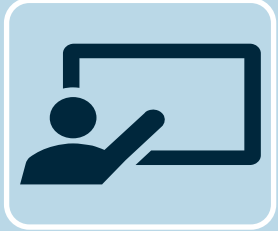
Infrastructure

- VHF capable radio systems
- Line-of-sight (if required relay)
- ATC workplace



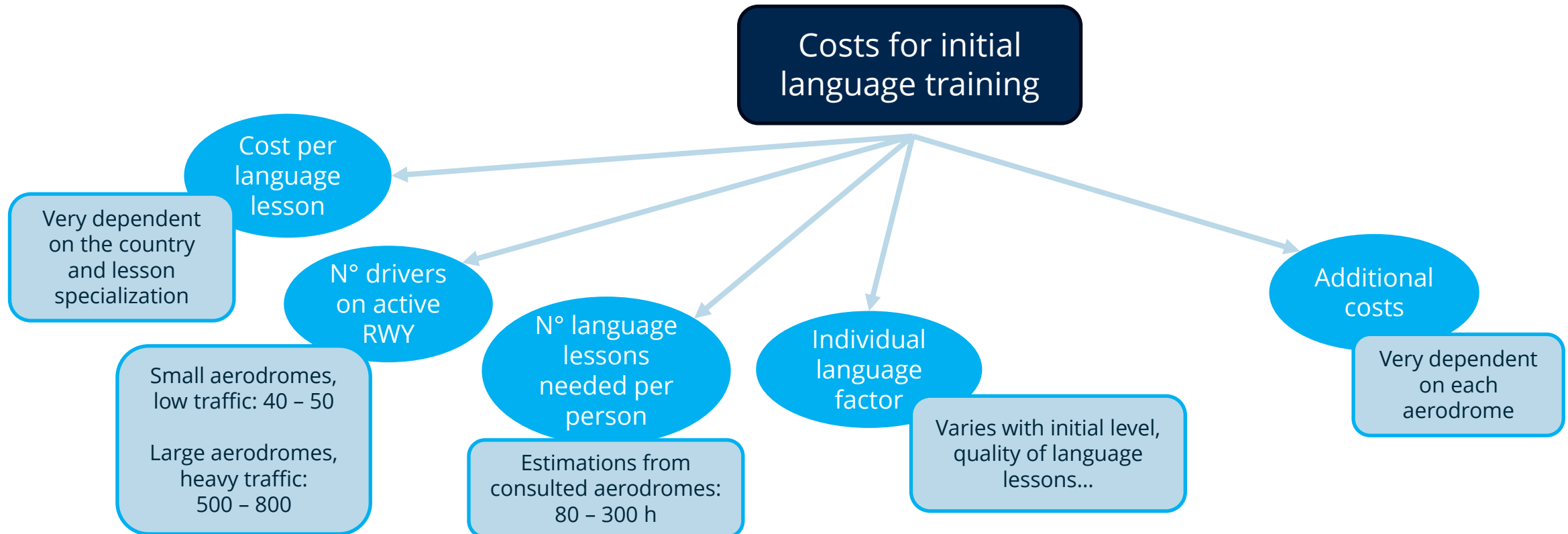
Change management

- Procedures
- Feasibility & Risk Assessment



Training

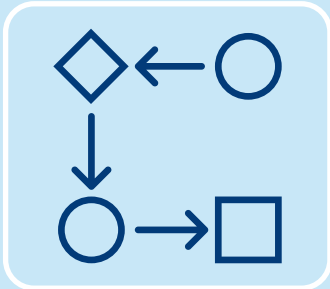
- Initial language training for vehicle drivers (& non-commercial VFR pilots)
- Recurrent language training
- Initial and recurrent radio certification for vehicle drivers





Equipment

- Purchase of VHF capable radios
- Purchase of VHF repeaters
- Maintenance



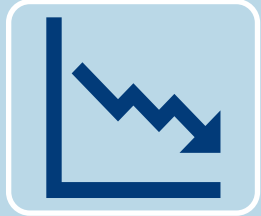
Change Management

- Implementation planning and maintaining process
- ATC workflow preparation

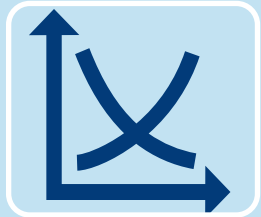


Personnel

- Recruiting
- Salary rise
- Turnover rates
- Substitution of missing work capacity during training



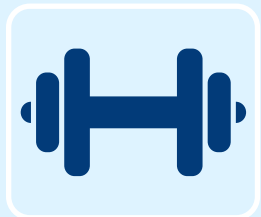
Less capacity, e.g. due to missing work force after transfer of employees with less English skills



Missing budget elsewhere, e.g., for technical runway incursion mitigation measures



Impact on General Aviation



Delay of other professional training

Hazard 1

More transmissions on TWR frequency

Undesirable event: **Frequency overload**

Consequence 1

Increase in workload for ATCOs and pilots result in neglect of safety critical tasks

Consequence 2

Delaying of safety critical messages / information leading to near miss



Hazard 2

Insufficient English language skills

Undesirable event: **Miscommunication**

Consequence 1

Misunderstandings or loss of situational awareness resulting in a RI caused by vehicle driver

Consequence 2

Misunderstandings or loss of situational awareness resulting in a RI or near miss caused by pilot

Consequence 3

Neglect of tasks by vehicle driver

Consequence 4

Neglect of tasks by pilot

Consequence 5

Failure to provide safety relevant information

Consequence 6

Extended or repeated transmissions and inefficient communication resulting in an increase in workload

Consequence 7

Pilot confusion resulting in a go-around and an increase in workload



Hazard 3

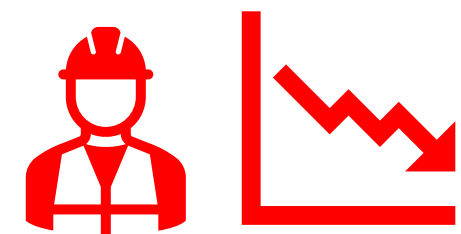
Higher training / qualification requirements



Undesirable event: **Lack of aerodrome personnel operating on RWY**

Consequence 1

Insufficient conduction of safety related activities



Hazard 4

More stakeholders on TWR frequency

Undesirable event: **Too much information and / or information overload**

Consequence 1

Higher workload for ATCOs due to more communication on the TWR frequency

Consequence 2

Too much information leading to higher workload and neglect of safety critical tasks by vehicle drivers

Consequence 3

Too much information leading to higher workload and neglect of safety critical tasks by pilots

Consequence 4

Callsign confusion resulting in RI



- Different safety risks the for each aerodrome dependent on characteristics:



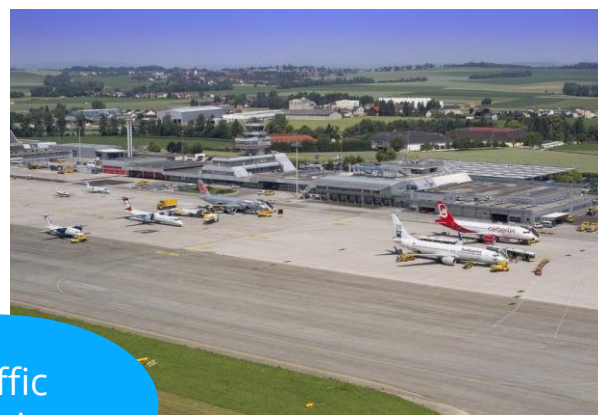
Runway complexity



Actors on the runway



Traffic density



- Six representative aerodromes with different parameters
- **Severity** of the consequences of each hazard → equal for all aerodromes
- **Probabilities** → analysed depending on the specific characteristics of each aerodrome

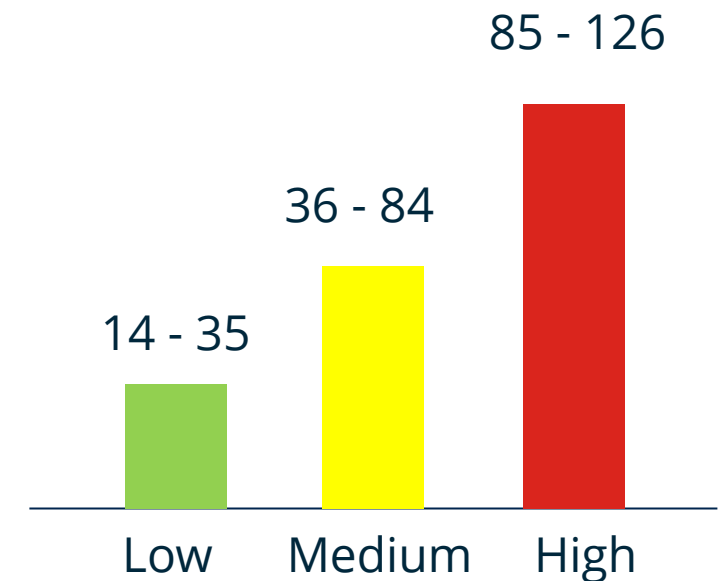
- Not enough information to use the standard 5x5 risk matrix
 - In-depth workshops with aerodrome stakeholders required to use the 5-class probability classification
- Evaluation based on a 3x3 risk matrix

		Risk severity		
		High	Medium	Low
Risk probability		A (3)	B (2)	C (1)
High	3	9	6	3
Medium	2	6	4	2
Low	1	3	2	1

4 Hazards
14 Consequences



Aggregated risk rating



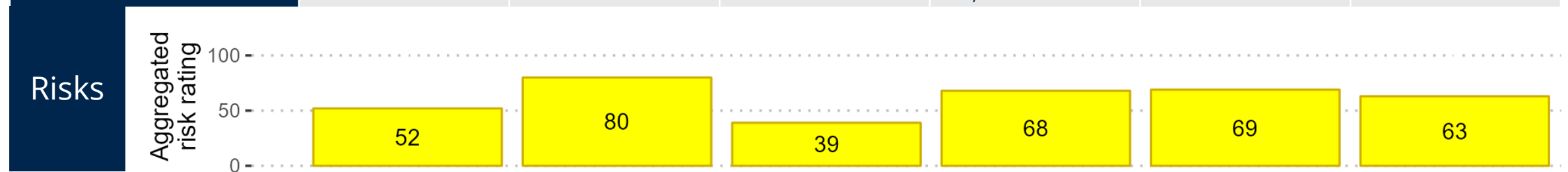
Safety risks

Risks per aerodrome



Scenario no.	1	2	3	4	5	6
Runway complexity	single	single	crossing	crossing	complex	complex
Traffic density	light	medium	medium	heavy	medium	heavy
Number of runways	1	1	2	2	3	3
ATCO / Assistant	ATCO	Assistant	ATCO	Assistant	ATCO	ATCO
Actors on the RWY ¹	I, W, T, F, R	I, W, T, R	I, W, F, R	I, W	I, W, F, R	I, W, T, R
Communication language between vehicle drivers and ATC	NAT	EN+NAT	EN	NAT	NAT	NAT
Communication between vehicle drivers and ATC	Dedicated VHF	Dedicated VHF	TWR frequency	Dedicated VHF	Ded. VHF, cross-coupled with TWR	Ded. VHF, cross-coupled with TWR
English language proficiency	Low	Low	High	Low	Low	Medium
Technical safety barriers	RWY guard lights, stop bars	RWY guard lights, stop bars, RWY barrier (e.g. microwave, induction loop), SMR, MLAT, Transponders on vehicles mandatory	RWY guard lights, stop bar	RWY guard lights, 24h stop bars, SMR, MLAT, Transponders on vehicles mandatory, EFS, moving maps, vehicle geofencing alert, RIMCAS	RWY guard lights, 24h stop bars, SMR, MLAT, Transponders on vehicles mandatory, EFS, RIMCAS	RWY guard lights, 24h stop bars, SMR, MLAT, Transponders on vehicles mandatory, EFS, RIMCAS

¹: I – Inspection, W – Wildlife, T – Towing, F – Follow Me, R – RFFS, M – Miscellaneous



Risks

Aggregated risk rating



Initial risk is lower for the smaller airports compared to larger airports



English language proficiency of the vehicle drivers has the highest impact on the risks



Highest risks arise for complex aerodromes with low English language proficiency of the vehicle drivers

- In order to reduce some of the identified risks, the following variations are proposed:

Mitigations

Frequency cross-coupling

Development and publishing of vehicle driver related standard phraseology

English language usage exemptions for abnormal situations

Intensive radiotelephony training for vehicle drivers

Exemptions for runways that are inactive for maintenance (not per NOTAM)

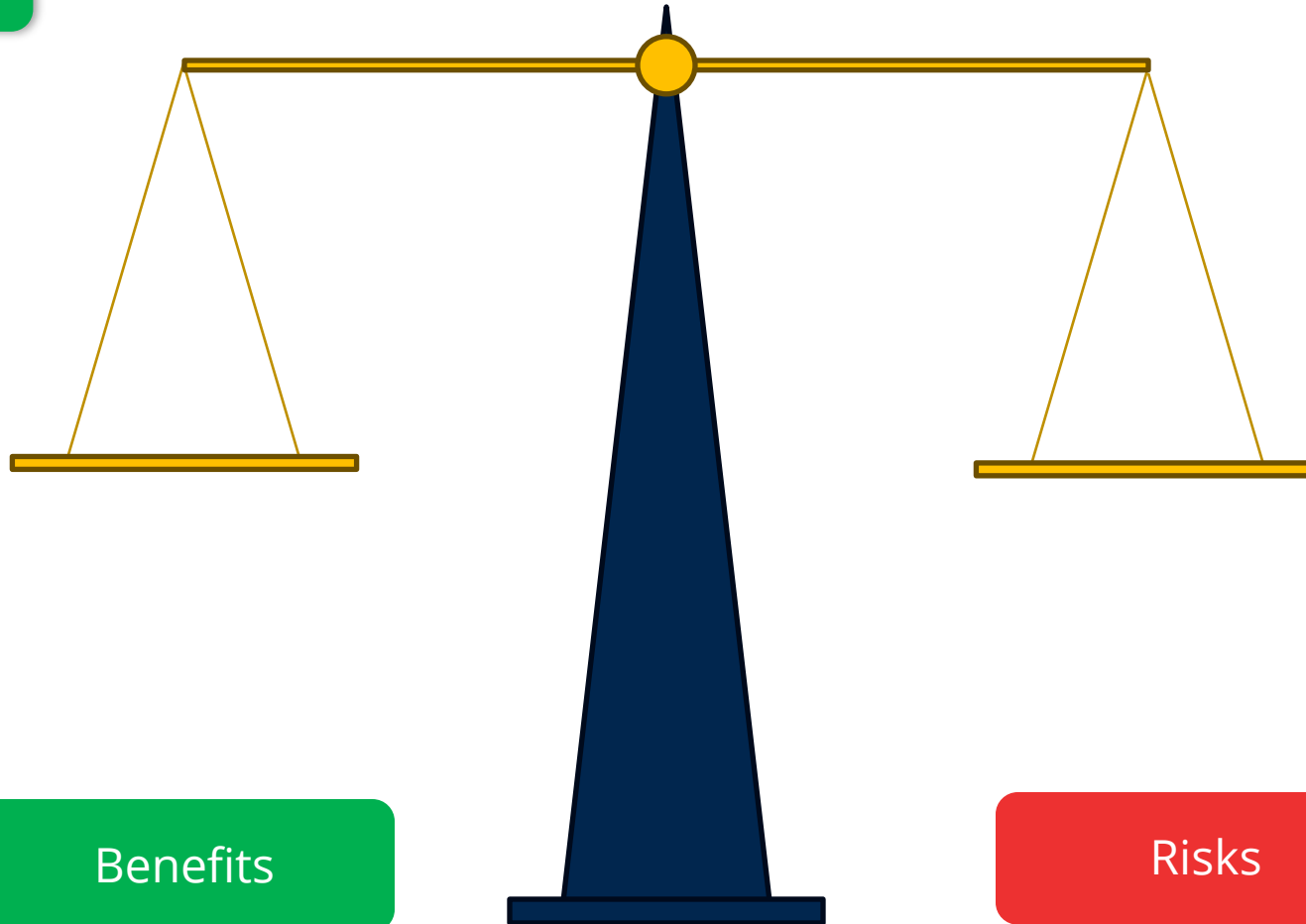
One frequency usage exemptions for abnormal situations



Safety benefits and risks

What weighs more?

Situational awareness



More Transmissions on TWR freq.

Insufficient English language skills

Higher Training qualification req.

More stakeholder on TWR freq.

Benefits

Risks

Significant staffing challenge for ADRs

Yes, but mostly as recovery barrier

Can partly be mitigated

- **Baseline existing (and foreseeable future) European and national legislation: “No-policy-change”**
- **The requirements regarding the following relevant elements were subject to the regulatory analysis:**
 - Language
 - Radio communication procedures requirements
 - Operation of vehicles on the manoeuvring area
 - Competence
- **Policy options focused on Language Proficiency and Operation of vehicles on the manoeuvring area**
(use of frequency and language)
- **Assumptions:**
 - Focus on runway operations – not the whole manoeuvring area
 - Consideration of runway status
 - Consideration of “normal” and “abnormal” operations

Provision Baseline	Short description Baseline	Short description PO1 (a) Common frequency and language - without derogation	Short description PO1 (b) Common frequency and language - with full derogation option	Short description PO1 (c) Common frequency and language - with derogation on EN language proficiency level only	Short description PO1 (d) Common frequency - with derogation on EN language (NAT possible)
Language proficiency (English)					
Flight Crew (FCL.055)					
<p>(a) [...] language proficiency endorsement on their licence in either English or the language used for radio communications involved in the flight [...]</p> <p>(b) [...] at least an operational level of language proficiency [...]</p>	<p>English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights</p>	<p>Language proficiency requirements for certain group of licence holders must be tightened to assure that all pilots operating at aerodromes in the scope of the Basic Regulation must be proficient in speaking Aviation English. Therefore, the possibility to have proficiency only in any language other than English which is required for the flight (e.g. within the borders of the state) must be excluded.</p>	<p>Language proficiency requirements for certain group of licence holders must be tightened to assure that all pilots operating at aerodromes in the scope of the Basic Regulation must be proficient in speaking Aviation English. Therefore, the possibility to have proficiency only in any language other than English which is required for the flight (e.g. within the borders of the state) must be excluded.</p>	<p>Language proficiency requirements for certain group of licence holders must be tightened to assure that all pilots operating at aerodromes in the scope of the Basic Regulation must be proficient in speaking Aviation English. Therefore, the possibility to have proficiency only in any language other than English which is required for the flight (e.g. within the borders of the state) must be excluded.</p>	<p>Unchanged</p>
Vehicle Drivers (ADR.OPS.B.029 [3])					
<p>(a) [...] demonstrate proficiency, at least at an operational level [...] in:</p> <p>(1) the English language; and</p> <p>(2) any other language or languages used at the aerodrome for radio communication purposes with the air traffic services unit of the aerodrome. [...]</p> <p>Note: this applies to persons subject to vehicle driving licences on the manoeuvring area (ADR.OPS.B.024)</p> <p>Possibility for derogation by the member state acc. to (g) and AMC1 ADR.OPS.B.029(g) based on a safety assessment</p>	<p>English Level 4 language proficiency required; complete derogation possible (safety assessment) to use other English language training or national language</p>	<p>Language proficiency requirements (operational level) remain, as they are currently foreseen in ADR.OPS.B.029, however without option for derogation on runways.</p>	<p>Language proficiency requirements (operational level) remain, as they are currently foreseen in ADR.OPS.B.029. The option for derogation on runways remains and will be linked to ADR.OPS.B.031 (frequency and language to be used).</p>	<p>Language proficiency requirements (operational level) remain, as they are currently foreseen in ADR.OPS.B.029 [3]. The option for derogation on runways must be restricted and must exclude the option that of having no English training or no qualification for trainers.</p>	<p>Unchanged (derogation as per AMC 1 ADR.OPS.B.029 (g) considers already national traffic ratio)</p>

Provision Baseline	Short description Baseline	Short description PO1 (a) Common frequency and language - without derogation	Short description PO1 (b) Common frequency and language - with full derogation option	Short description PO1 (c) Common frequency and language - with derogation on EN language proficiency level only	Short description PO1 (d) Common frequency - with derogation on EN language (NAT possible)
Operation of vehicles on the manoeuvring area (use of frequency and language)					
Part-ADR (ADR.OPS.B.031)					
<p>(b) The aerodrome operator shall [...] establish communication procedures, including:</p> <p>(1) the frequencies and the language or languages to be used for communication between the air traffic services unit and vehicles that intend to operate or are operating on the manoeuvring area; [...]</p> <p>(3) dissemination of significant aerodrome-related information that may affect the safety of operations on the manoeuvring area, using radio communications; [...]</p> <p><i>GM1(b): [...] Situational awareness is improved by conducting communications in a common frequency and language, whenever this is possible.</i></p>	<p>Radiotelephony communication between ATC and vehicles shall be ensured.</p> <p><i>GM: Common frequency and language as guidance</i></p> <p>Note: English as common language is not specified</p>	<p>Upgrade of GM1 ADR.OPS.B.031(b) [3] as an IR and requirement that English is the common language.</p>	<p>Upgrade of GM1 ADR.OPS.B.031(b) [3] as an IR and requirement that English is the common language. In addition, the option for derogation will be foreseen, linked to the principles laid down in ADR.OPS.B.029(g) [3].</p>	<p>Upgrade of GM1 ADR.OPS.B.031(b) [3] as an IR and requirement that English is the common language.</p>	<p>ADR.OPS.B.031 [3] must be adjusted to mandate the use of a common frequency.</p>

Provision Baseline	Short description Baseline	Short description PO1 (a) Common frequency and language - without derogation	Short description PO1 (b) Common frequency and language - with full derogation option	Short description PO1 (c) Common frequency and language - with derogation on EN language proficiency level only	Short description PO1 (d) Common frequency - with derogation on EN language (NAT possible)
Operation of vehicles on the manoeuvring area (use of frequency and language)					
SERA (SERA.14015)					
<p>a) The air-ground radiotelephony communications shall be conducted in the English language or in the language normally used by the station on the ground.</p> <p>(b) [...] English language shall be used for communications between the ATS unit and aircraft, at aerodromes with more than 50000 international IFR movements per year.[...] Member States, where at the date of entry into force of this Regulation, the English language is not the only language used for communications between the ATS unit and aircraft at such aerodromes, may decide not to apply the requirement to use the English language and inform the Commission accordingly.</p> <p>AMC1: In any case, deviation from the requirement should be limited to exceptional cases and should be accompanied with a safety assessment</p> <p><i>GM1: [...] This consideration would in particular encompass:</i></p> <p><i>(a) use of a single frequency for all the safety-critical operations on a runway or a set of runways;</i></p> <p><i>(b) the need to and feasibility of applying the requirement for English-only communications also to communications with vehicles in order to enhance situational awareness; [...]</i></p>	<p>English to be used above 50000 IFR movements, exceptions possible based on assessment</p> <p><i>GM: Exception must consider the use of a single frequency for safety-critical operations on the runway and the need and feasibility for English with vehicle drivers</i></p>	<p>Upgrade of GM1 SERA.14015 [9] as an IR: All ground-air communication on active runways must only take place in English.</p> <p>Procedures to revert back to national language or separate communication channels for exemptional / abnormal situations might be possible.</p> <p>Locally agreed languages and exemptions shall not be possible anymore, irrespective of traffic mix at aerodromes.</p>	<p>Upgrade of GM1 SERA.14015 [9] as an IR: All ground-air communication on active runways must only take place in English.</p> <p>Procedures to revert back to national language or separate communication channels for exemptional / abnormal situations might be possible.</p> <p>In addition, the option for derogation will be foreseen, linked to the principles laid down in ADR.OPS.B.029(g) [3]. However, the criteria around the number of IFR movements might be removed.</p>	<p>Upgrade of GM1 SERA.14015 [9] as an IR: All ground-air communication on active runways must only take place in English.</p> <p>Procedures to revert back to national language or separate communication channels for exemptional / abnormal situations might be possible.</p> <p>Locally agreed languages and exemptions shall not be possible anymore, irrespective of traffic mix at aerodromes.</p>	<p>Unchanged (only refers to language)</p> <p>GM1 SERA.14015 [9] might be adjusted to refer to the required use of a common frequency.</p>

Provision Baseline	Short description Baseline	Short description PO1 (a) Common frequency and language - without derogation	Short description PO1 (b) Common frequency and language - with full derogation option	Short description PO1 (c) Common frequency and language - with derogation on EN language proficiency level only	Short description PO1 (d) Common frequency - with derogation on EN language (NAT possible)
Operation of vehicles on the manoeuvring area (use of frequency and language)					
Part-ATS (ATS.OR.445)					
(b) The need for separate communication channels for the control or for the management of the vehicles on the manoeuvring area shall be determined subject to a safety assessment .	Separate channels must be subject to Safety Assessment (by the ATS organisation)	Must be adjusted to mandate the same frequency on runways without the option for separate channels that are based on a safety assessment. For other manoeuvring areas separate channels remain possible, based on a safety assessment.	Must be adjusted to mandate the same frequency on runways with the option for separate channels linked to the derogation as per the principles laid down in ADR.OPS.B.029(g). For other manoeuvring areas separate channels remain possible, based on a safety assessment.	Must be adjusted to mandate the same frequency on runways without the option for separate channels that are based on a safety assessment. For other manoeuvring areas separate channels remain possible, based on a safety assessment.	Must be adjusted to mandate the same frequency on runways without the option for separate channels that are based on a safety assessment. For other manoeuvring areas separate channels remain possible, based on a safety assessment.

Provision Baseline	Short description Baseline	Short description PO2 (a) Separate frequency with EN on TWR and vehicles listen only	Short description PO2 (b) Separate frequencies with mixed language on TWR and vehicles listen only (understanding EN)	Short description PO2 (c) Separate Frequencies with mixed languages on TWR and vehicles listen only (no further EN requirement)
Language proficiency (English)				
Flight Crew (FCL.055)				
<p>(a) [...] language proficiency endorsement on their licence in either English or the language used for radio communications involved in the flight [...]</p> <p>(b) [...] at least an operational level of language proficiency [...]</p>	<p>English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights</p>	<p>Language proficiency requirements for certain group of licence holders must be tightened to assure that all pilots operating at aerodromes in the scope of the Basic Regulation must be proficient in speaking Aviation English. Therefore, the possibility to have proficiency only in any language other than English which is required for the flight (e.g. within the borders of the state) must be excluded.</p>	<p>Unchanged</p>	<p>Unchanged</p>
Vehicle Drivers (ADR.OPS.B.029)				
<p>(a) [...] demonstrate proficiency, at least at an operational level [...] in:</p> <p>(1) the English language; and</p> <p>(2) any other language or languages used at the aerodrome for radio communication purposes with the air traffic services unit of the aerodrome. [...]</p> <p>Note: this applies to persons subject to vehicle driving licences on the manoeuvring area (ADR.OPS.B.024)</p> <p>Possibility for derogation by the member state acc. to (g) and AMC1 ADR.OPS.B.029(g) based on a safety assessment</p>	<p>English Level 4 language proficiency required; complete derogation possible (safety assessment) to use other English language training or national language</p>	<p>Language proficiency requirements (operational level) remain, as they are currently foreseen in ADR.OPS.B.029. The option for derogation on runways must at least be restricted and must require English radio communication comprehension training.</p>	<p>Language proficiency requirements (operational level) remain, as they are currently foreseen in ADR.OPS.B.029. The option for derogation on runways must at least be restricted and must require English radio communication comprehension training.</p>	<p>Unchanged</p>

Provision Baseline	Short description Baseline	Short description PO2 (a) Separate frequency with EN on TWR and vehicles listen only	Short description PO2 (b) Separate frequencies with mixed language on TWR and vehicles listen only (understanding EN)	Short description PO2 (c) Separate Frequencies with mixed languages on TWR and vehicles listen only (no further EN requirement)
Operation of vehicles on the manoeuvring area (use of frequency and language)				
Part-ADR (ADR.OPS.B.031)				
<p>(b) The aerodrome operator shall [...] establish communication procedures, including:</p> <p>(1) the frequencies and the language or languages to be used for communication between the air traffic services unit and vehicles that intend to operate or are operating on the manoeuvring area; [...]</p> <p>(3) dissemination of significant aerodrome-related information that may affect the safety of operations on the manoeuvring area, using radio communications; [...]</p> <p><i>GM1(b): [...] Situational awareness is improved by conducting communications in a common frequency and language, whenever this is possible.</i></p>	<p>Radiotelephony communication between ATC and vehicles shall be ensured.</p> <p><i>GM: Common frequency and language as guidance</i></p> <p>Note: English as common language is not specified</p>	<p>ADR.OPS.031 must be amended to require the obligation for drivers to listen to the TWR frequency when accessing the runway safety area, clearances and instructions to vehicle drivers can still be issued via a separate frequency and also in local language.</p>	<p>ADR.OPS.031 must be amended to require the obligation for drivers to listen to the TWR frequency when accessing the runway safety area, clearances and instructions to vehicle drivers can still be issued via a separate frequency and also in local language.</p>	<p>ADR.OPS.031 must be amended to require the obligation for drivers to listen to the TWR frequency when accessing the runway safety area.</p> <p>Clearances and instructions to vehicle drivers can still be issued via a separate frequency and also in local language.</p>

Provision Baseline	Short description Baseline	Short description PO2 (a) Separate frequency with EN on TWR and vehicles listen only	Short description PO2 (b) Separate frequencies with mixed language on TWR and vehicles listen only (understanding EN)	Short description PO2 (c) Separate Frequencies with mixed languages on TWR and vehicles listen only (no further EN requirement)
Operation of vehicles on the manoeuvring area (use of frequency and language)				
SERA (SERA.14015)				
<p>a) The air-ground radiotelephony communications shall be conducted in the English language or in the language normally used by the station on the ground.</p> <p>(b) [...] English language shall be used for communications between the ATS unit and aircraft, at aerodromes with more than 50000 international IFR movements per year.[...] Member States, where at the date of entry into force of this Regulation, the English language is not the only language used for communications between the ATS unit and aircraft at such aerodromes, may decide not to apply the requirement to use the English language and inform the Commission accordingly.</p> <p>AMC1: In any case, deviation from the requirement should be limited to exceptional cases and should be accompanied with a safety assessment</p> <p>GM1: [...] This consideration would in particular encompass:</p> <p>(a) use of a single frequency for all the safety-critical operations on a runway or a set of runways;</p> <p>(b) the need to and feasibility of applying the requirement for English-only communications also to communications with vehicles in order to enhance situational awareness; [...]</p>	<p>English to be used above 50000 IFR movements, exceptions possible based on assessment</p> <p><i>GM: Exception must consider the use of a single frequency for safety-critical operations on the runway and the need and feasibility for English with vehicle drivers</i></p>	<p>Upgrade of GM1 SERA.14015 [9] as an IR: All ground-air communication on active runways must only take place in English.</p> <p>Separate frequency for the control of vehicles remain possible.</p> <p>Locally agreed languages and exemptions on the TWR frequency shall not be possible anymore, irrespective of traffic mix at aerodromes.</p>	<p>Unchanged</p>	<p>Unchanged</p>

Provision Baseline	Short description Baseline	Short description PO2 (a) Separate frequency with EN on TWR and vehicles listen only	Short description PO2 (b) Separate frequencies with mixed language on TWR and vehicles listen only (understanding EN)	Short description PO2 (c) Separate Frequencies with mixed languages on TWR and vehicles listen only (no further EN requirement)
Operation of vehicles on the manoeuvring area (use of frequency and language)				
Part-ATS (ATS.OR.445)				
(b) The need for separate communication channels for the control or for the management of the vehicles on the manoeuvring area shall be determined subject to a safety assessment .	Separate channels must be subject to Safety Assessment (by the ATS organisation)	Unchanged	Unchanged	Unchanged

Multi-Criteria Decision Analysis

Criteria Overview



Dimension	D-Weight	Criteria	Description	C-Weight	Desired Direction	Total Weight
Safety	0.5	Maximise safety benefits	A novel runway incursion mitigation measure offers significant benefits, enhancing situational awareness of stakeholders and operational harmonisation.	0.4	↑	0.2
		Minimise risks	The implementation of a new runway incursion mitigation measure shall not induce additional risks, which are further required to be mitigated or increase the overall risk also in other areas. The probability of the necessity to mitigate induced risks shall be minimised.	0.6	↓	0.3
Economy	0.3	Minimise implementation and on-going costs	Costs for implementation and maintenance (e.g. for training, equipment, change management or personnel) shall be minimised.	0.7	↓	0.21
		Minimise negative revenue impact	Reduction of air traffic capacity or migration of aerodrome users (i.e. general aviation), causing negative revenue impact, shall be avoided.	0.3	↓	0.09
Social Impact	0.1	Minimise impact on vehicle drivers	Alterations in job conditions, variations in workload, and heightened demands for language skills do not detract from the job's appeal or affect the rate of employee turnover.	0.7	↓	0.07
		Minimise impact on general aviation	Adjustments in language prerequisites, variations in workload, and shifting conditions do not reduce general aviation operation (incl. flight schools and non-commercial pilots) and use of EASA aerodromes.	0.3	↓	0.03
Implementation	0.1	Harmonising new/additional rules with existing rules	Efforts for rulemaking and issues with enforcement of governmental organisations through additional regulations shall be minimised.	0.5	↓	0.05
		Maximise stakeholder acceptance	New regulations shall be accepted by member states and by operational stakeholders (e.g. aerodrome operator, pilots, third-party contractors, ANSPs, etc.) through consideration of concerns.	0.5	↑	0.05

Multi-Criteria Decision Analysis

Scoring System



Criteria	-10	-8	-6	-4	-2	0	+2	+4	+6	+8	+10	Remark
Maximise safety benefits	Very high reduction	High reduction	Moderate reduction	Low reduction	Very low reduction	No change	Very low increase	Low increase	Moderate increase	High increase	Very high increase	Only positive effect (positive change) expected.
Minimise risks	Very high increase	High increase	Moderate increase	Low increase	Very low increase	No change	Very low reduction	Low reduction	Moderate reduction	High reduction	Very high reduction	Induction of additional risks expected, positive change possible if risks are lower assumed.
Minimise implementation and on-going costs	Very high increase	High increase	Moderate increase	Low increase	Very low increase	No change	Very low reduction	Low reduction	Moderate reduction	High reduction	Very high reduction	Increase of costs (only negative change) expected.
Minimise negative revenue impact	Very high increase	High increase	Moderate increase	Low increase	Very low increase	No change	Very low reduction	Low reduction	Moderate reduction	High reduction	Very high reduction	Increase of migration of aerodrome users and reduction of air traffic capacity (negative change) expected.
Minimise impact on vehicle drivers	Very high reduction	High reduction	Moderate reduction	Low reduction	Very low reduction	No change	Very low increase	Low increase	Moderate increase	High increase	Very high increase	Reduction of the job's appeal (negative change) expected.
Minimise impact on general aviation	Very high increase	High increase	Moderate increase	Low increase	Very low increase	No change	Very low reduction	Low reduction	Moderate reduction	High reduction	Very high reduction	Reduction of general aviation operation (negative change) expected.
Harmonising new/additional rules with existing rules	Very high increase	High increase	Moderate increase	Low increase	Very low increase	No change	Very low reduction	Low reduction	Moderate reduction	High reduction	Very high reduction	Additional rulemaking tasks related to other than ADR-rules (negative change) expected.
Maximise stakeholder acceptance	Very low acceptance	Low acceptance	Moderate-ly low acceptance	Lower acceptance	Slightly negative acceptance	No change/ Neutral	Slightly positive acceptance	Higher acceptance	Moderate-ly high acceptance	High acceptance	Very high acceptance	Moderate acceptance expected, positive change possible, if acceptance is assumed higher.

Multi-Criteria Decision Analysis

Impact matrix - results



Criteria	Total Weight	PO1 (a)	PO1 (a) (weighted)	PO1 (b)	PO1 (b) (weighted)	PO1 (c)	PO1 (c) (weighted)	PO1 (d)	PO1 (d) (weighted)	PO2 (a)	PO2 (a) (weighted)	PO2 (b)	PO2 (b) (weighted)	PO2 (c)	PO2 (c) (weighted)
Maximise safety benefits	0.2	+6	1,2	+2	0,4	+5	1	+4	0,8	+3	0,6	+2	0,4	+1	0,2
Minimise risks	0.3	-8	-2,4	-1	-0,3	-5	-1,5	-9	-2,7	-2	-0,6	-2	-0,6	-6	-1,8
Minimise implementation and on-going costs	0.21	-10	-2,1	-2	-0,42	-7	-1,47	-5	-1,05	-4	-0,84	-3	-0,63	-1	-0,21
Minimise negative revenue impact	0.09	-6	-0,54	-2	-0,18	-6	-0,54	0	0	-6	-0,54	0	0	0	0
Minimise impact on vehicle drivers	0.07	-10	-0,7	-1	-0,07	-6	-0,42	-2	-0,14	-4	-0,28	-4	-0,28	0	0
Minimise impact on general aviation	0.03	-4	-0,12	-4	-0,12	-4	-0,12	0	0	-4	-0,12	0	0	0	0
Harmonising new/additional rules with existing rules	0.05	-8	-0,4	-4	-0,2	-6	-0,3	-1	-0,05	-4	-0,2	-2	-0,1	0	0
Maximise stakeholder acceptance	0.05	-10	-0,5	-2	-0,1	-8	-0,4	-6	-0,3	-4	-0,2	-2	-0,1	0	0
Total score	1		-5,56		-0,99		-3,75		-3,44		-2,18		-1,31		-1,81
Rank			7		1		6		5		4		2		3

Multi-Criteria Decision Analysis

Impact matrix - results



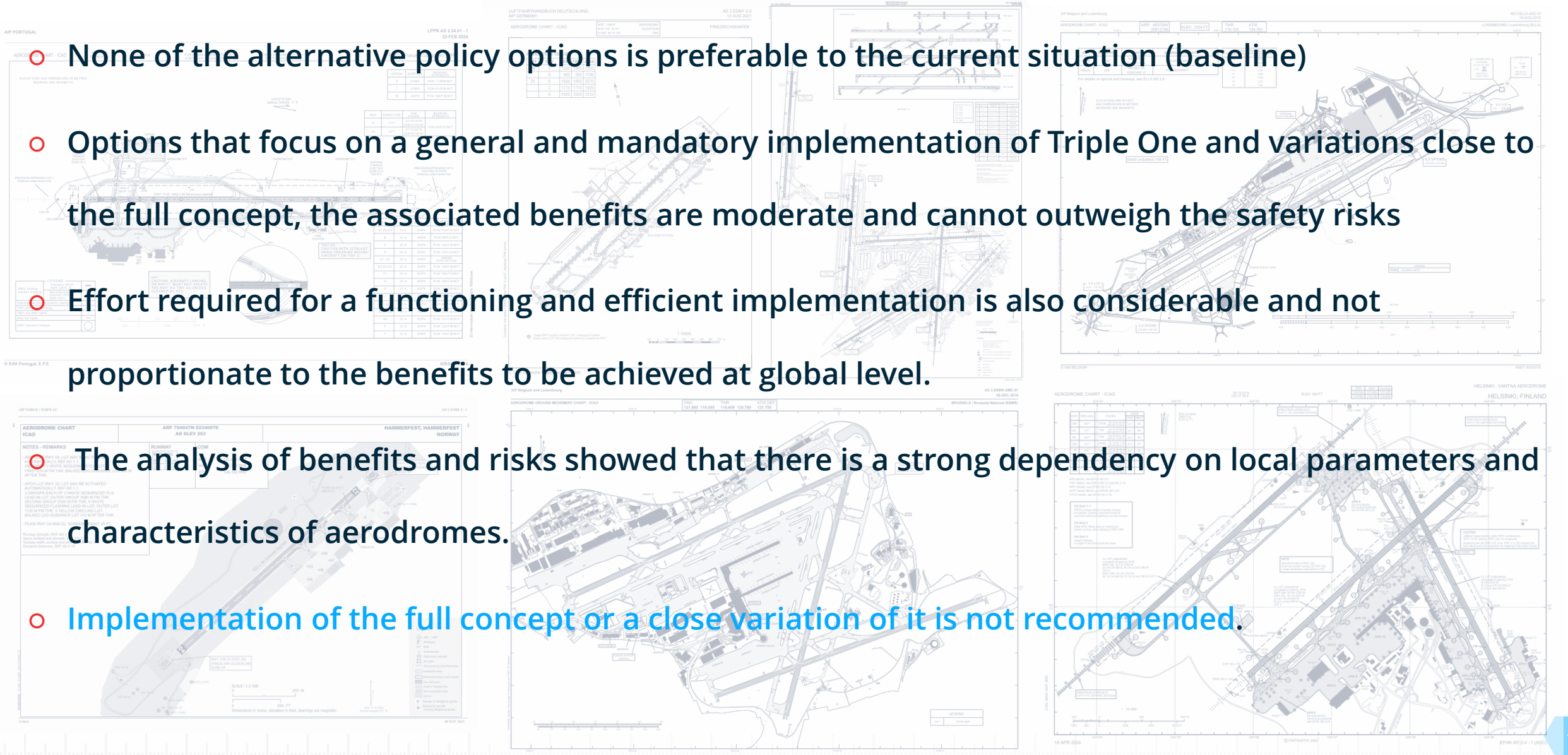
Dimensions	D-Weight	PO1 (a) (weighted)	PO1 (b) (weighted)	PO1 (c) (weighted)	PO1 (d) (weighted)	PO2 (a) (weighted)	PO2 (b) (weighted)	PO2 (c) (weighted)
Safety	0.5	-0,6	-0,4	-0,3	-1,1	-0,1	-0,1	-0,9
Economy	0.3	-1,32	-0,51	-1,11	-0,63	-0,69	-0,42	-0,21
Social Impact	0.1	-0,44	-0,23	-0,3	0	-0,23	-0,14	0
Implementation	0.1	-0,45	-0,15	-0,35	-0,15	-0,2	-0,1	0
Total score	1	-5,56	-0,99	-3,75	-3,44	-2,18	-1,31	-1,81
Rank		7	1	6	5	4	2	3

- All alternative policy options are expected to relate to a negative impact, if implemented.
- Best scoring: PO1 (b) “Common frequency and language - with full derogation option”, even though negative, achieving a weighted total score of **-0.99**. This indicates only **neutral to very low negative effects** (overall negligible negative impacts).
- POs that consider a “vehicle listening only” solution, i.e. PO2 (a), (b) and (c), exhibit only **minimal to low negative effects**
- PO1 (a) “Common frequency and language - without derogation option”, implying a **full implementation** of the Triple One concept, is **ranked the lowest with a score of -5.56**

- None of the alternative policy options is preferable to the current situation (baseline)
- Options that focus on a general and mandatory implementation of Triple One and variations close to the full concept, the associated benefits are moderate and cannot outweigh the safety risks
- Effort required for a functioning and efficient implementation is also considerable and not proportionate to the benefits to be achieved at global level.

○ The analysis of benefits and risks showed that there is a strong dependency on local parameters and characteristics of aerodromes.

- Implementation of the full concept or a close variation of it is not recommended.



○ Implementation of a Runway Incursion Prevention Programme

- Should be set up for each aerodrome
- Must consider local characteristics and involve all relevant stakeholders
- Must consider all available mitigations
 - Technology, like modern and integrated A-SMGCS, memory aids, „TCAS on the ground“, use transponders
 - Communication protocols
 - Procedures
 - Infrastructure
 - Change management
- Triple One can be one of the possible solutions
- Partially visible as „so-called Safety Programmes (ADR.OR.D.027) and in future amendments, however still too general
- Aim must be to identify the most effective solutions (set of mitigations) for each aerodrome

- **As a result of these considerations, it is recommended that further efforts by EASA are put in place to:**
 - Foster a system-wide, overarching approach dedicated especially on runway incursion prevention as a “Runway Incursion Prevention Programme”
 - Promote a consistent way of addressing risks and define solutions with emphasis on the prevention of runway incursions as primary objective
 - Support aerodrome operators but also airlines, pilots and ANSPs in understanding risks but also benefits of the different solutions
 - Provide guidance on how to identify the most efficient, reliable and future-proof solutions and how the results can be demonstrated in the course of compliance verification.



airsight GmbH | Gustav-Meyer-Allee 25, 13355 Berlin, Germany
info@airsight.de | www.airsight.de | +49 30 45 80 3177