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D-6.2 – POLICY OPTIONS & RECOMMENDATIONS

IMPLEMENTATION OF THE AERODROME 'TRIPLE ONE' CONCEPT

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airsight GmbH
Gustav-Meyer-Allee 25
13355 Berlin
Germany
Telephone: +49 30 45803177
E-Mail: info@airsight.de
www.airsight.de

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Table of Contents

List of Figures	V
List of Tables	V
Part I Introduction	7
I.1 Objective and Scope of Task 6.2	7
I.2 What is the nature of the addressed problem?	7
I.3 Why is action on EU-level appropriate?	8
I.4 What should be achieved?	10
Part II Identification of policy options	10
II.1 Introduction	10
II.2 BL: Baseline scenario	12
II.3 Alternative policy options	15
II.3.1 Introduction	15
II.3.2 Assumptions	16
II.3.3 PO1 Common frequency and language	17
II.3.3.1 PO1 (a) Common frequency and language - without derogation	17
II.3.3.2 PO1 (b) Common frequency and language - with full derogation option	18
II.3.3.3 PO1 (c) Common frequency and language - with derogation on EN language proficiency level only	19
II.3.3.4 PO1 (d) Common frequency - with derogation on EN language (NAT possible)	21
II.3.4 PO2 Separate frequency and vehicles listen only	22
II.3.4.1 PO2 (a) Separate frequency with EN on TWR and vehicles listen only	22
II.3.4.2 PO2 (b) Separate frequencies with mixed languages on TWR and vehicles listen only (understanding EN)	24
II.3.4.4 PO2 (c) Separate frequencies with mixed languages on TWR and vehicles listen only (no further EN requirements)	25
II.3.5 PO3 Dependent on safety performance	26
II.3.6 Overview policy options	27
Part III Multi-criteria decision analysis	35
III.1 Methodology	35
III.2 Definition of Criteria	35

III.2.1	General	35
III.2.2	Safety	36
III.2.3	Economy	37
III.2.4	Social Impact	37
III.2.5	Implementation.....	38
III.3	Weighting	38
III.3.1	General	38
III.3.2	Weighting of Dimensions	39
III.3.3	Weighting of Criteria	39
III.4	Criteria Overview	41
III.5	Scoring System	42
III.6	Impact matrix	44
III.7	Sensitivity Analysis	52
III.8	Results	57
Part IV	Conclusive recommendations.....	59
Part V	Further recommendations.....	60
V.1	Implementation of a Runway Incursion Prevention Programme	60
V.2	Miscellaneous.....	64
	List of Abbreviations.....	67
	List of References	69

List of Figures

None

List of Tables

Table 1: Overview of relevant Key Risk Areas [1].....	8
Table 2: Overview of Safety Issues related to collision on Runways from the European Safety Risk Management (SRM).....	8
Table 3: Relevant EASA rules Baseline	13
Table 4: Policy Option 1 (a) Common frequency and language - without derogation	17
Table 5: Policy Option 1 (b) Common frequency and language - with full derogation option.....	18
Table 6: Policy Option 1 (c) Common frequency and language - with derogation on EN language proficiency level only	20
Table 7: Policy Option 1 (d) Common frequency - with derogation on EN language (NAT possible)...	21
Table 8: Policy Option 2 (a) Separate frequency with EN on TWR and vehicles listen only.....	23
Table 9: Policy Option 2 (b) Separate frequencies with mixed languages on TWR frequencies and vehicles listen only (understanding EN).....	24
Table 10: Policy Option 2 (c) Separate frequencies with mixed languages on TWR and vehicles listen only (no further EN requirements).....	25
Table 11: Policy Options 1 (a)-(d)	27
Table 12: Policy Options 2 (a)-(c).....	31
Table 13: Weighted Criteria Overview.....	41
Table 14: Scoring System.....	43
Table 15: Scoring matrix.....	45
Table 16: Impact matrix.....	50
Table 17: Impact matrix - Overview	51
Table 18: Sensitivity Analysis - Weight Variation	53
Table 19: Sensitivity Analysis - Impact matrix.....	54

Part I Introduction

I.1 Objective and Scope of Task 6.2

- I.1.1 This Report is the final report of the comprehensive study which evaluates the Triple One concept. The study entailed a regulatory assessment, an analysis of occurrences of runway incursions, an industry survey as well as a substantiation of the concept's safety benefits and safety risks.
- I.1.2 The subject is "identifying recommendations and policy options and preliminary assess their impact". The group of recommendations will be discussed and analysed using a multi-criteria decision analysis (MCDA) resulting in a ranked recommendation of different options.

I.2 What is the nature of the addressed problem?

- I.2.1 In its latest edition the European Plan for Aviation Safety (EPAS, 2023 – 2025) [1] highlights that the Union's goal remains to "*maintain collectively the pre-pandemic high aviation safety level throughout the recovery phase and improve safety post-recovery*".
- I.2.2 At the same time the Global Action Plan for the Prevention of Runway Incursions [2] notes that "*Runway incursions are among the most persistent threats to aviation safety*".
- I.2.3 However, the previous stages of this study showed, that runway incursions themselves are multi-faceted events with various contributing factors and several involved stakeholders. Local specific parameters influencing the risk of runway incursions are manifold.
- I.2.4 Runway incursions are not only one of the most critical safety-relevant events, but they are also characterised by a complex setting comprising human, technological, organisational and cultural challenges.
- I.2.5 Subsequently, a concept like Triple One and any potential policy options must be fit for purpose on many different levels and must cover several aspects, as already identified in the Regulatory Assessment (Task 1).

I.3 Why is action on EU-level appropriate?

I.3.1 One of the main objectives of regulating aviation (according to the Basic Regulation, Chapter I, Art. 1 Point 1) is “to establish and maintain a high uniform level of civil aviation safety” [3]. Therefore, any potential safety issues, hazards or risks associated with aviation shall be addressed.

I.3.2 The current EPAS [1] outlines different Key Risk Areas (KRA), which represent the worst credible outcome of an identified safety issue. One KRA is relevant to this study and listed in the table below:

Table 1: Overview of relevant Key Risk Areas [1]

#	Key Risk Area	Description
1	Collision on Runway	A collision between an aircraft and another object (other aircraft, vehicles, etc.) or person that occurs on a runway of an aerodrome or other predesignated landing area. This does not include collisions with birds or wildlife.

I.3.3 To each of the relevant KRAs, a number of Safety Issues¹ can be allocated, according to EPAS [1], Volume III, Appendix A. The table below lists the relevant SIs related to this study:

Table 2: Overview of Safety Issues related to collision on Runways from the European Safety Risk Management (SRM)

Portfolio	SI ID	SI Title (Category in SRM-Process)	SI Description
ADR/GH	SI-1018	Ground operations in low-visibility conditions (Monitor)	Negative effects of low visibility in ground operations may lead to unsafe situations in the airside operational environment, especially potential collisions on ground. In a well-functioning operational environment, the effective handling and management of ground operations in low-visibility conditions will mitigate the risks of unsafe situations.
ADR/GH	SI-1029	Poor or inadequate runway/taxiway design and layout (Assess – Normal-to-low priority index)	Complex runway/taxiway design and layouts may induce a higher probability of runway incursions or the potential for collisions and aircraft damage. In a well-functioning environment, the design of runways/taxiways minimises the likelihood of incursions and/or collisions.
ATM/ANS	SI-2005	High-energy runway conflict (Assess – Normal-to-low priority index)	A high-energy runway conflict occurs when there is little or no time for the ATCOs to react to a potential conflict between a high-energy landing (indicated airspeed (IAS) of 100 knots or more) or take-off (IAS of 80 knots or more) and an aircraft which has infringed an active runway, which is also known as a runway incursion. Runway incursion is defined as 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.

¹ “Safety issues are identified through the Agency’s analysis of aviation occurrence data and other safety-related information (such as hazards) or submitted as a safety issue through the CAGs, NoAs, EASA’s website or internal EASA stakeholders.” [1]

			Thus, this safety issue addresses a specific subset of runway incursions.
ATM/ANS	SI-2007	Landing/take-off/crossing without a clearance (Assess – Normal-to-low priority index)	Aircraft landing, taking-off and crossing runways without clearance from the ATCO poses a significant runway collision risk. Such events typically happen during critical and high-workload stages of the flight and can result in similar hazardous outcomes, such as runway incursion and runway collision. The safety issue covers contributory factors from both the flight crew and ATCOs ranging from call sign confusion, runway confusion, incorrect phraseology and expectation bias to cockpit overload.
ATM/ANS	SI-2006	Undetected occupied runway (Assess – Elevated priority index)	This safety issue pertains to runway incursions by an aircraft landing on or taking-off from an already occupied runway. This could be due to oversight by ATCOs, aerodrome design or other organisational factors. Especially during periods of high workload, the controller may accidentally clear an aircraft or a vehicle to enter a runway even though they had already cleared another aircraft to land on or take-off from the same runway. Aerodrome design is also another key contributor to this safety issue as flight crew or manoeuvring area vehicle drivers may navigate onto the wrong surface if the design of the aerodrome may lead to disorientation.
ATM/ANS	SI-2029	Use of more than one language on frequency (No category & priority defined in List 10-1. Not categorised in the Safety Risk Portfolio)	This safety issue refers to the risk that occurs when using different languages at the same time on the ATC frequency. Despite that the default language of international aviation worldwide is English, local languages are used concurrently for air-ground communication. Under certain circumstances, pilots might prefer to use their native language to address controllers and controllers might address ground personnel in their native language. Having several aircraft on one frequency, the result might be that certain aircrews do not understand clearances given to an aircraft in the same airspace and the responses of the aircrew. Therefore, the aircrew might not be aware of what the other aircrew is about to do. This can lead to the loss of situational awareness of the involved parties with regard to the respective other traffic in the same airspace. Note: No allocation to KRA in EPAS Appendix A, however deemed as relevant for the objective of this study.

I.3.4 The table above shows the safety issues and key risk areas related to runway incursions. Even though runway incursions are not reflected as a dedicated safety issue in the current EPAS the subject does represent a priority safety concern for EASA.

I.3.5 The Triple One concept is considered to be a way to approach this safety concern through mainly procedural measures, like ensuring language proficiency, radio frequency configuration and training.

I.3.6 However, the European multilingualism poses a special challenge towards implementing this concept.

I.4 What should be achieved?

- I.4.1 In the following parts different policy options related to the Triple One concept will be introduced and analysed. After the definition of those policy options which have proven to be viable, an MCDA will be performed to evaluate the options against pre-defined criteria and to identify the option which is expected to be most preferable:
- increase runway safety,
 - reduce risk of runway incursions by vehicles,
 - minimise high risk runway incursions in particular.
- I.4.2 All identified and analysed policy options in this report are geared towards the implementation of the Triple One concept or its components.
- I.4.3 Due to the complexity of the problem and the multitude of stakeholders and domains involved, different options were taken into consideration.

Part II Identification of policy options

II.1 Introduction

- II.1.1 The setting up of policy options associated with the Triple One concept has been conducted according to the "Better Regulation Guidelines" [4] [5] and related toolbox , which are provided by the European Commission.
- II.1.2 The identification of alternative policy options is an iterative process and four basic steps (according to tool #16 [4]):
1. Construct a baseline from which the impacts of the policy options will be assessed.
 2. Start by compiling a wide range of alternative policy options.
 3. Identify the most viable options; explain the discarded policy options.
 4. Describe in reasonable detail the key aspects of the retained policy options to allow an in-depth analysis of the associated impacts.
- II.1.3 The baseline (step 1) is the benchmark against which the impact of the policy options will be compared and is described as the 'no-policy-change' scenario. The scenario and the underlying assumptions are described in further detail in the following section II.2.
- II.1.4 The subsequent section II.3 introduces a variety of general policy options based on the baseline scenario, considering content, tools and instruments. The following instruments have been considered (according to tool #17 [4]):

1. 'hard law', legally binding rules; e.g. adjusting Implementing Rules;
2. 'soft law', means of compliance; e.g. adjusting Acceptable Means of Compliance (AMC) or Guidance Material (GM);
3. education and information; e.g. additional promotion activities;
4. economic instruments; e.g. economic incentives or penalties.

II.1.5 The formulation of policy options may consider either a single instrument or combination of different policy measures and will be generally outlined in section II.3. Alongside the description, established options will be screened in order to separate discarded options considering the following key criteria:

- Legal feasibility
- Technical feasibility
- Previous policy choices
- Coherence with other EU policy objectives
- Effectiveness and efficiency
- Proportionality
- Political feasibility
- Relevance
- Identifiability

II.1.6 The retained options will be subject to the subsequent MCDA in Part III.

II.2 **BL: Baseline scenario**

- II.2.1 The baseline represents the 'no-policy-change' scenario including all relevant EU-level and national policies which are assumed to be and remain in force. This contains existing regulations and any foreseeable policy options and developments in an appropriate time horizon.
- II.2.2 Task 1 of this study has thoroughly analysed the current implementation of the relevant elements at the European and national levels. This status is considered as a baseline. The requirements regarding the following relevant elements as defined in Task 1 Regulatory Assessment (paragraph I.4.5) were subject to the analysis:
- Language
 - Radio communication procedures requirements
 - Operation of vehicles on the manoeuvring area
 - Competence
- II.2.3 In particular with regards to language requirements, it is assumed that English language proficiency requirements for vehicle driver licences with access to the manoeuvring area become effective as of 2026 (ADR.OPS.B.029 [3]). However, the requirement of a common frequency for aircrew, air traffic services and vehicle drivers on the manoeuvring area is currently included as Guidance Material only.
- II.2.4 Table 3 outlines the most relevant EASA rules related to the aspects of language proficiency and operations of vehicles on the manoeuvring area, whereas the latter focusses on frequencies and languages to be used. These aspects and rules form the baseline for the development and illustration of the policy options.
- II.2.5 Currently, details on the implementation of Triple One or its elements are only available in ICAO manuals, EAPPRI [6] and GAPPRI [2] – see Report Regulatory Assessment (Task 1).
- II.2.6 Based on the trend analysis in Task 2 (namely section II.4.2 of the report), it can be assumed that the amount of runway incursions continues to follow the increasing trend which was observed between 2015 and 2019 (pre-Covid). For the runway incursions caused by vehicles or equipment, it is assumed that the ratio remains on a low level (about one fourth of all runway incursions) and the trend is assumed to follow only a slowly increasing trend (see Task 2 report, Figure 8).

Table 3: Relevant EASA rules Baseline

Aspect	Provision BL	Short description BL
Language proficiency (English)		
Flight Crew (FCL.055 [7])	(a) [...] language proficiency endorsement on their licence in either English or the language used for radio communications involved in the flight [...] (b) [...] at least an operational level of language proficiency [...]	English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights
ATCO (ATCO.B.030 [8])	(a) [...] language proficiency endorsement in English and, if applicable, in the language(s) imposed by the Member State for reasons of safety at the ATC unit as published in the Aeronautical Information Publications [...] (c) [...] at least an operational level (level four) of language proficiency [...]	English Level 4 language proficiency required
Vehicle Drivers (ADR.OPS.B.029 [3])	(a) [...] demonstrate proficiency, at least at an operational level [...] in: (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. [...] Note: This applies to persons subject to vehicle driving licences on the manoeuvring area (ADR.OPS.B.024 [3]) Possibility for derogation by the member state acc. to (g) and AMC1 ADR.OPS.B.029(g) [3] based on a safety assessment	English Level 4 language proficiency required; complete derogation possible (safety assessment)
Operation of vehicles on the manoeuvring area (use of frequency and language)		
Part-ADR (ADR.OPS.B.031 [3])	(b) The aerodrome operator shall [...] establish communication procedures, including: (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; [...] (3) dissemination of significant aerodrome-related information that may affect the safety of operations on the manoeuvring area, using radio communications; [...] <i>GM1(b): [...] Situational awareness is improved by conducting communications in a common frequency and language, whenever this is possible.</i>	Radiotelephony communication between ATC and vehicles shall be ensured. <i>GM: Common frequency and language as guidance</i> Note: English as common language is not specified
SERA (SERA.14015 [9])	(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. (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	English to be used above 50000 IFR movements, exceptions possible based on assessment <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>

Aspect	Provision BL	Short description BL
	<p>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>(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>	
Part-ATS (ATS.OR.445 [10])	(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)

II.3 Alternative policy options

II.3.1 Introduction

II.3.1.1 Based on the relevant inputs and results of the previous tasks, namely the stakeholder engagement process and the statistical analysis, policy options were derived in relation to the relevant rules as illustrated in Table 3.

- PO1 Common frequency and language
 - PO1 (a) Common frequency and language - without any derogation option
 - PO1 (b) Common frequency and language - with full derogation option
 - PO1 (c) Common frequency and language - with derogation on the EN² language proficiency level only
 - PO1 (d) Common frequency - with derogation on the EN language (NAT³ possible)
- PO2 Separate frequencies and vehicles listen only
 - PO2 (a) Separate frequency with one language on TWR and vehicles listen only
 - PO2 (b) Separate frequencies with EN+NAT⁴ on TWR and vehicles listen only (understanding EN)
 - PO2 (c) Separate frequencies with EN+NAT on TWR and vehicles listen only (no further EN requirements)
- PO3 Dependent on safety performance

II.3.1.2 It must be noted that for ATCOs language requirements already contain an English endorsement at operational level without exemptions. Therefore, no option will contain any upgrade or change on this aspect, and it will be therefore not shown in the subsequent sections.

II.3.1.3 All options are considered as viable based on the key criteria as stated in II.1.5, except for PO3. The reasons are further detailed in 0.

² English

³ National language

⁴ English and national language

II.3.2 Assumptions

- II.3.2.1 The study of the Triple One concept, its objectives, benefits and prerequisites require that assumptions for each of the policy options need to be made:
- II.3.2.2 **Focus on runway operations:** The objective of Triple One is *"to improve situational awareness, by implementing procedures whereby all communications associated with runway operations are on a common or cross-coupled frequency."* [6] Notably, all options focus on runway operations and exclude other parts of the manoeuvring area, such as taxiways. Additionally, the current situation (Baseline Scenario) imposes English Language proficiency requirements on vehicle drivers across the entire manoeuvring area. This includes many operators who never access the runway or the runway safety area. The assumption is that all options are focused on runway operations, while provisions like ADR.OPS.B.024 and B.029 [3] apply to the entire manoeuvring area. Regulations might be refined to differentiate between licensing for runway operations and the rest of the manoeuvring area, as each area has distinct benefits and risks.
- II.3.2.3 **Consideration of runway status:** Furthermore, Triple One benefits play a role when both, vehicle drivers and aircrew use the same runway. Closed runways are excluded, e.g. during times of major construction works or other operational constraints. There are often local procedures where the runway is not closed via visual aids and NOTAM but is not used or available to operations due to certain activities like light corrective and preventive maintenance or winter services. In these situations, Triple One would not realise any benefits and including the above-mentioned operators and activities might be inappropriate. Any viable policy options must consider the definition of an active runway and apply the Triple One concept only on active runways (see Part V.2.5).
- II.3.2.4 **Consideration of normal and abnormal operations:** In the same way, it is assumed that emergency situations are exempted from any Triple One policy option. The policy options should only focus on normal operations and allow for dedicated procedures for abnormal situations. In emergency situations, dedicated communication protocols and channels must exist which are not linked to the Triple One principle. It is also an established principle that in case the language skills of a person are not sufficient to communicate complex situations or are impaired e.g. during stress situations, a fallback to national language must be possible. This applies to vehicle drivers and flight crews (if possible in the respective country).
- II.3.2.5 **Implementation timeline:** The policy options are not differentiated regarding the timeline of implementation as it will not be subject to the option evaluation. However, depending on the complexity and anticipated challenges either a single effective date or a phased approach might be appropriate.

II.3.3 PO1 Common frequency and language

II.3.3.1 PO1 (a) Common frequency and language - without derogation

- II.3.3.1.1 In order to fully achieve the objective of increasing situational awareness during runway operations, one option is to consider the full implementation of the Triple One concept as mandatory for all relevant stakeholders, without any possibility for derogation by Member States or aerodromes within the scope of the basic Regulation.
- II.3.3.1.2 In particular, this policy option tightens the English language requirements for those pilot licence holders not yet covered, adds the requirement that all vehicles on the runway must be on a common tower frequency and removes the possibility of using languages other than English.

Table 4: Policy Option 1 (a) Common frequency and language - without derogation

Aspect	Short description BL Status Quo	Short description PO1 (a) Common frequency and language - without derogation
Language proficiency (English)		
Flight Crew (FCL.055 [7])	English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights	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.
Vehicle Drivers (ADR.OPS.B.029 [3])	English Level 4 language proficiency required; complete derogation possible (safety assessment) to use other English language training or national language	Language proficiency requirements (operational level) remain, as they are currently foreseen in ADR.OPS.B.029 [3], however without option for derogation on runways.
Operation of vehicles on the manoeuvring area (use of frequency and language)		
Part-ADR (ADR.OPS.B.031 [3])	Radiotelephony communication between ATC and vehicles shall be ensured. <i>GM: Common frequency and language as guidance</i> Note: English as common language is not specified	Upgrade of GM1 ADR.OPS.B.031(b) [3] as an IR and requirement English to be the common language.
SERA (SERA.14015 [9])	English to be used above 50000 IFR movements, exceptions possible based on assessment <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>	Upgrade of GM1 SERA.14015 [9] as an IR: All ground-air communication on active runways must only take place in English. Procedures to revert back to national language or separate communication channels for exemption / abnormal situations might be possible. Locally agreed languages and exemptions shall not be possible anymore, irrespective of traffic mix at aerodromes.

Aspect	Short description BL Status Quo	Short description PO1 (a) Common frequency and language - without derogation
Part-ATS (ATS.OR.445 [10])	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 based on a safety assessment. For other manoeuvring areas separate channels remain possible, based on a safety assessment.

II.3.3.2 PO1 (b) Common frequency and language - with full derogation option

II.3.3.2.1 The full implementation as proposed in PO1 (b) can be lifted at aerodrome or member state level for specific aerodromes using the same way of derogation as per the existing provisions. Notably, the derogation principle must be extended also to the frequency aspect, which is yet not included in existing regulations. In order to warrant that Triple One becomes effective at non-derogated aerodromes, it must be ensured that all pilots are proficient in English. Otherwise, the situation could occur that vehicle drivers communicate in English, but pilots are not able to communicate in English.

Table 5: Policy Option 1 (b) Common frequency and language - with full derogation option

Aspect	Short description BL Status Quo	Short description PO1 (b) Common frequency and language - with full derogation option
Language proficiency (English)		
Flight Crew (FCL.055 [7])	English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights	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.
Vehicle Drivers (ADR.OPS.B.029 [3])	English Level 4 language proficiency required; complete derogation possible (safety assessment) to use other English language training or national language	Language proficiency requirements (operational level) remain, as they are currently foreseen in ADR.OPS.B.029 [3]. The option for derogation on runways remains and will be linked to ADR.OPS.B.031 [3] (frequency and language to be used).
Operation of vehicles on the manoeuvring area (use of frequency and language)		
Part-ADR (ADR.OPS.B.031 [3])	Radiotelephony communication between ATC and vehicles shall be ensured. <i>GM: Common frequency and language as guidance</i> Note: English as common language is not specified	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].
SERA (SERA.14015 [9])	English to be used above 50000 IFR movements, exceptions possible based on assessment <i>GM: Exception must consider the use of a single frequency for safety-critical</i>	Upgrade of GM1 SERA.14015 [9] as an IR: All ground-air communication on active runways must only take place in English. Procedures to revert back to national language or separate communication channels for

Aspect	Short description BL Status Quo	Short description PO1 (b) Common frequency and language - with full derogation option
	<i>operations on the runway and the need and feasibility for English with vehicle drivers</i>	exemptions / abnormal situations might be possible. 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.
Part-ATS (ATS.OR.445 [10])	Separate channels must be subject to Safety Assessment (by the ATS organisation)	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) [3]. For other manoeuvring areas separate channels remain possible, based on a safety assessment.

II.3.3.3 PO1 (c) Common frequency and language - with derogation on EN language proficiency level only

- II.3.3.3.1 In order to meet the challenges identified in large parts of the industry with regard to high language requirements for airport personnel, a lower level of language certification for vehicle drivers could be considered as a viable approach. The stakeholder consultation clearly revealed that the level of language proficiency (operational level) as currently foreseen in ADR.OPS.B.029 [3] is in many cases deemed as too high and inappropriate for the group of vehicle drivers. The language proficiency scheme as per ICAO and also included in SERA has been developed for the required radio communication between ATS stations and flight crew. It is, however, clear that radio communication participants must be able to follow the principles of aviation radio communication and comprehend and express themselves in English using the appropriate phraseology.
- II.3.3.3.2 It is common practice at aerodromes that have already implemented Triple One to have a specific set of phrases to be performed and trained; however, no aerodrome operator has implemented English language proficiency (ELP) at level 4 and only one is planning to do so. The current provisions do not encourage aerodrome operators and competent authorities to consider the implementation of an appropriate set of English phraseologies compatible with the standard phraseologies used on tower (TWR) frequencies.
- II.3.3.3.3 If the rules mandate the use of a common frequency and English as language, but allowing an alternative training and language qualification scheme, the derogation principle must be adjusted. This allows to lower the hurdle for language training and qualification.

II.3.3.3.4 Notably, additional provisions must support that the English language level is appropriate for local operations and consider standard phraseologies and must ensure not impede safety and limit additional risks. A reduced or minimum set of required phrases and corresponding language level should be defined. For instance, the GAPPRI [2], suggests a set of four runway phraseologies ('4-4 safety') which could be defined as a minimum set as implementing rule, whereas an extension of this could be recommended e.g., depending on operational needs.

Table 6: Policy Option 1 (c) Common frequency and language - with derogation on EN language proficiency level only

Aspect	Short description BL Status quo	Short description PO1 (c) Common frequency and language - with derogation on EN language proficiency level only
Language proficiency (English)		
Flight Crew (FCL.055 [7])	English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights	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.
Vehicle Drivers (ADR.OPS.B.029 [3])	English Level 4 language proficiency required; complete derogation possible (safety assessment) to use other English language training or national language	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 of having no English training or no qualification for trainers.
Operation of vehicles on the manoeuvring area (use of frequency and language)		
Part-ADR (ADR.OPS.B.031 [3])	Radiotelephony communication between ATC and vehicles shall be ensured. <i>GM: Common frequency and language as guidance</i> Note: English as common language is not specified	Upgrade of GM1 ADR.OPS.B.031(b) [3] as an IR and requirement that English is the common language.
SERA (SERA.14015 [9])	English to be used above 50000 IFR movements, exceptions possible based on assessment <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>	Upgrade of GM1 SERA.14015 [9] as an IR: All ground-air communication on active runways must only take place in English. Procedures to revert back to national language or separate communication channels for exemptional / abnormal situations might be possible. Locally agreed languages and exemptions shall not be possible anymore, irrespective of traffic mix at aerodromes.
Part-ATS (ATS.OR.445 [10])	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 based on a safety assessment. For other manoeuvring areas

Aspect	Short description BL Status quo	Short description PO1 (c) Common frequency and language - with derogation on EN language proficiency level only
		separate channels remain possible, based on a safety assessment.

II.3.3.3.5 Note: The guidelines for frequency and language usage match those of PO1 (a), using a common frequency.

II.3.3.4 PO1 (d) Common frequency - with derogation on EN language (NAT possible)

II.3.3.4.1 In contrast to the previous options, the use of mixed languages – English and national language, is permitted. Thereby, a benefit can be achieved at least at those aerodromes, where a significant number of local or national pilots operate, so that there is a high chance that they can understand communication with vehicle traffic. As identified in the study, it is also common in many aerodromes, that pilots communicate in national language. In these cases, the 'one language' principle is ensured without using English and flight crews do not have to have achieved an ELP of level 4 or more.

Table 7: Policy Option 1 (d) Common frequency - with derogation on EN language (NAT possible)

Aspect	Short description BL Status quo	Short description PO1 (d) Common frequency - with derogation on EN language (NAT possible)
Language proficiency (English)		
Flight Crew (FCL.055 [7])	English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights	Unchanged
Vehicle Drivers (ADR.OPS.B.029 [3])	English Level 4 language proficiency required; complete derogation possible (safety assessment) to use other English language training or national language	Unchanged (derogation as per AMC 1 ADR.OPS.B.029 (g) [3] considers already national traffic ratio)
Operation of vehicles on the manoeuvring area (use of frequency and language)		
Part-ADR (ADR.OPS.B.031 [3])	Radiotelephony communication between ATC and vehicles shall be ensured. <i>GM: Common frequency and language as guidance</i> Note: English as common language is not specified	ADR.OPS.B.031 [3] must be adjusted to mandate the use of a common frequency.
SERA (SERA.14015 [9])	English to be used above 50000 IFR movements, exceptions possible based on assessment	Unchanged (only refers to language) GM1 SERA.14015 [9] might be adjusted to refer to the required use of a common frequency.

Aspect	Short description BL Status quo	Short description PO1 (d) Common frequency - with derogation on EN language (NAT possible)
	<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>	
Part-ATS (ATS.OR.445 [10])	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.

II.3.4 PO2 Separate frequency and vehicles listen only

II.3.4.1 PO2 (a) Separate frequency with EN on TWR and vehicles listen only

II.3.4.1.1 Another alternative option to the common frequency variants is to only establish listening and understanding capabilities for vehicle drivers on the local runway frequency ('vehicle listening-watch'). This approach can be found already at many aerodromes and is chosen based on the following rationales:

- Avoid frequency congestion as there is no additional active vehicle communication on the runway frequency used between ATS and flight crews (tower frequency);
- situational awareness by listening-watch of the tower frequency by vehicle drivers can be realized;
- Can be implemented with reasonably low efforts and changes to the operational environment.

II.3.4.1.2 Even though there can still exist two separate frequencies for aircraft movements and vehicle traffic, a crucial point is the language used on the tower frequency and as to what level vehicle drivers are in the position to comprehend the conversation and build up situational awareness. This directly impacts the pre-requisites for language proficiency or training.

II.3.4.1.3 This first sub-option aims at making English the common language on the tower frequency, so that no mixed language is allowed. This will also increase the situational awareness of pilots. To achieve this, it is necessary to ensure that all pilots authorised to operate at the aerodromes concerned are proficient in English and that there are no longer any exceptions to the use of the national language on these frequencies.

II.3.4.1.4 Furthermore, vehicle drivers must be in the position to comprehend sufficiently radio communication in English. Based on the existing structure of language proficiency

requirements in ADR.OPS.B.029 [3], the only way to implement this approach is to restrict any derogation from English proficiency at operational level so that it includes at least some proficiency level in English as a minimum, in the same way as in PO1 (c).

Table 8: Policy Option 2 (a) Separate frequency with EN on TWR and vehicles listen only

Aspect	Short description BL Status quo	Short description PO2 (a) Separate frequency with EN on TWR and vehicles listen only
Language proficiency (English)		
Flight Crew (FCL.055 [7])	English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights	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.
Vehicle Drivers (ADR.OPS.B.029 [3])	English Level 4 language proficiency required; complete derogation possible (safety assessment) to use other English language training or national language	Language proficiency requirements (operational level) remain, as they are currently foreseen in ADR.OPS.B.029 [3]. The option for derogation on runways must at least be restricted and must require English radio communication comprehension training.
Operation of vehicles on the manoeuvring area (use of frequency and language)		
Part-ADR (ADR.OPS.B.031 [3])	Radiotelephony communication between ATC and vehicles shall be ensured. <i>GM: Common frequency and language as guidance</i> Note: English as common language is not specified	ADR.OPS.031 [3] 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.
SERA (SERA.14015 [9])	English to be used above 50000 IFR movements, exceptions possible based in assessment <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>	Upgrade of GM1 SERA.14015 [9] as an IR: All ground-air communication on active runways must only take place in English. Separate frequency for the control of vehicles remains possible. Locally agreed languages and exemptions on the TWR frequency shall not be possible anymore, irrespective of traffic mix at aerodromes.
Part-ATS (ATS.OR.445 [10])	Separate channels must be subject to Safety Assessment (by the ATS organisation)	Unchanged

II.3.4.2 PO2 (b) Separate frequencies with mixed languages on TWR and vehicles listen only (understanding EN)

II.3.4.3 This sub-option still allows the use of mixed languages on the tower frequency, as it is currently foreseen. This means, that there won't be any changes to the ground-pilot communications and no changes in the language requirements for pilots. It is expected that communication between ATS and aircraft will often occur in English. Therefore, vehicle drivers must be able to understand English radio communication. This is a minimum language requirement, similar to the requirements in PO1 (c) and PO2 (a), as part of the derogation option.

Table 9: Policy Option 2 (b) Separate frequencies with mixed languages on TWR frequencies and vehicles listen only (understanding EN)

Aspect	Short description BL	Short description PO2 (b) Separate frequencies with mixed language on TWR and vehicles listen only (understanding EN)
Language proficiency (English)		
Flight Crew (FCL.055 [7])	English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights	Unchanged
Vehicle Drivers (ADR.OPS.B.029 [3])	English Level 4 language proficiency required; complete derogation possible (safety assessment) to use other English language training or national language	Language proficiency requirements (operational level) remain, as they are currently foreseen in ADR.OPS.B.029 [3]. The option for derogation on runways must at least be restricted and must require English radio communication comprehension training.
Operation of vehicles on the manoeuvring area (use of frequency and language)		
Part-ADR (ADR.OPS.B.031 [3])	Radiotelephony communication between ATC and vehicles shall be ensured. <i>GM: Common frequency and language as guidance</i> Note: English as common language is not specified	ADR.OPS.031 [3] 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.
SERA (SERA.14015 [9])	English to be used above 50000 IFR movements, exceptions possible based in assessment <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>	Unchanged
Part-ATS (ATS.OR.445 [10])	Separate channels must be subject to Safety Assessment (by the ATS organisation)	Unchanged

II.3.4.4 PO2 (c) Separate frequencies with mixed languages on TWR and vehicles listen only (no further EN requirements)

II.3.4.4.1 This policy option is based on the previous PO1 (b), with the difference to allow a full derogation of the language proficiency requirements for vehicle drivers as per baseline. As such, it cannot be assured that vehicle drivers can comprehend English radio communication.

Table 10: Policy Option 2 (c) Separate frequencies with mixed languages on TWR and vehicles listen only (no further EN requirements)

Aspect	Short description BL	Short description PO2 (c) Separate frequencies with mixed languages on TWR and vehicles listen only (no further EN requirements)
Language proficiency (English)		
Flight Crew (FCL.055 [7])	English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights	Unchanged
Vehicle Drivers (ADR.OPS.B.029 [3])	English Level 4 language proficiency required; complete derogation possible (safety assessment) to use other English language training or national language	Unchanged
Operation of vehicles on the manoeuvring area (use of frequency and language)		
Part-ADR (ADR.OPS.B.031 [3])	Radiotelephony communication between ATC and vehicles shall be ensured. <i>GM: Common frequency and language as guidance</i> Note: English as common language is not specified	ADR.OPS.031 [3] 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.
SERA (SERA.14015 [9])	English to be used above 50000 IFR movements, exceptions possible based in assessment <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>	Unchanged
Part-ATS (ATS.OR.445 [10])	Separate channels must be subject to Safety Assessment (by the ATS organisation)	Unchanged

II.3.5 P03 Dependent on safety performance

- II.3.5.1.1 This policy option follows a risk-based approach by making the decision to implement Triple One, or elements of it, dependent on the actual safety performance of the aerodrome in terms of runway incursions by vehicles. For example, the runway incursion rate in combination with the severity category could be used as a safety performance indicator, similar to the analysis performed in this study (Task 4).
- II.3.5.1.2 Therefore, sufficient data of appropriate quality must be available to the competent authority and/or organisation. The data are assumed to be available from aerodrome operators and relevant stakeholders (ATS and aircraft operators) as outputs of the individual occurrence reporting systems. For this approach to work, a strong emphasis must be placed on the reporting culture and the quality of the reports. Appropriate thresholds or targets, e.g. based on European statistics, would need to be established to allow informed decisions for or against the implementation of Triple One.
- II.3.5.1.3 The feasibility of this option is assessed as negative. The main reason for this is the availability of safety data of sufficient quality to support the process of setting targets and evaluating actual performance, so that technical feasibility cannot be guaranteed. At the European level, information is available that may allow a target or reference level to be set (e.g. runway incursions with vehicles per 10,000 movements). The analysis in Task 2 and Task 4 clearly showed that the quality of reporting varies considerably between countries and aerodromes. An approach where the decision to require the implementation of Triple One is based solely on the data generated by the local reporting system, and thus strongly dependent on its maturity, may not lead to an equal treatment of different aerodromes. Organisations with a better functioning reporting system, and therefore generating more reports, would then be subject to the Triple One requirement.
- II.3.5.1.4 In addition, the local characteristics of each aerodrome and the individual parameters directly affecting safety performance should be taken into account. Therefore, the quality of safety data at European level is not considered sufficient, especially when decisions of this importance have to be taken.
- II.3.5.1.5 At the political level, it can be expected that Member States with a well-established reporting culture would be opposed to this approach. The legal feasibility of an approach based solely on global safety data may also be questioned.

II.3.6 Overview policy options

Table 11: Policy Options 1 (a)-(d)

Provision BL	Short description BL	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 [7])					
(a) [...] language proficiency endorsement on their licence in either English or the language used for radio communications involved in the flight [...] (b) [...] at least an operational level of language proficiency [...]	English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights	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.	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.	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.	Unchanged
Vehicle Drivers (ADR.OPS.B.029 [3])					
(a) [...] demonstrate proficiency, at least at an operational level [...] in: (1) the English language; and (2) any other language or languages used at the aerodrome for radio	English Level 4 language proficiency required; complete derogation possible (safety assessment) to	Language proficiency requirements (operational level) remain, as they are currently foreseen in	Language proficiency requirements (operational level) remain, as they are currently foreseen in	Language proficiency requirements (operational level) remain, as they are currently foreseen in	Unchanged (derogation as per AMC 1 ADR.OPS.B.029 (g) [3] considers already national traffic ratio)

Provision BL	Short description BL	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)
<p>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 [3])</p> <p>Possibility for derogation by the member state acc. to (g) and AMC1 ADR.OPS.B.029(g) [3] based on a safety assessment</p>	<p>use other English language training or national language</p>	<p>ADR.OPS.B.029 [3], however without option for derogation on runways.</p>	<p>ADR.OPS.B.029 [3]. The option for derogation on runways remains and will be linked to ADR.OPS.B.031 [3] (frequency and language to be used).</p>	<p>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>	
Operation of vehicles on the manoeuvring area (use of frequency and language)					
Part-ADR (ADR.OPS.B.031) [3]					
<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</i></p>	<p>Radiotelephony communication between ATC and vehicles shall be ensured.</p> <p><i>GM: Common frequency and language as guidance</i> 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 BL	Short description BL	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)
<i>communications in a common frequency and language, whenever this is possible.</i>					
SERA (SERA.14015 [9])					
<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>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 BL	Short description BL	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)
<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>					
Part-ATS (ATS.OR.445 [10])					
<p>(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.</p>	<p>Separate channels must be subject to Safety Assessment (by the ATS organisation)</p>	<p>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.</p>	<p>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) [3]. For other manoeuvring areas separate channels remain possible, based on a safety assessment.</p>	<p>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.</p>	<p>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.</p>

Table 12: Policy Options 2 (a)-(c)

Provision BL	Short description BL	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 [7])				
(a) [...] language proficiency endorsement on their licence in either English or the language used for radio communications involved in the flight [...] (b) [...] at least an operational level of language proficiency [...]	English Level 4 language proficiency required except certain licence groups (general aviation, VFR) with only national flights	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.	Unchanged	Unchanged

Provision BL	Short description BL	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)
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 [3])</p> <p>Possibility for derogation by the member state acc. to (g) and AMC1 ADR.OPS.B.029(g) [3] 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 [3]. 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 [3]. The option for derogation on runways must at least be restricted and must require English radio communication comprehension training.</p>	<p>Unchanged</p>
Operation of vehicles on the manoeuvring area (use of frequency and language)				
Part-ADR (ADR.OPS.B.031 [3])				
<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> Note: English as common language is not specified</p>	<p>ADR.OPS.031 [3] 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 [3] 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 [3] 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>

Provision BL	Short description BL	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)
SERA (SERA.14015 [9])				
<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>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 BL	Short description BL	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)
Part-ATS (ATS.OR.445 [10])				
(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

Part III Multi-criteria decision analysis

III.1 Methodology

III.1.1.1 For identifying the preferred policy option and recommendation in respect to the Triple One concept, it is necessary to compare the most viable policy options, as introduced in Part II. This comparison shall be conducted in line with the provided "Better Regulation Toolbox" [4] by the EU.

III.1.1.2 Consequently, a multi-criteria decision analysis (MCDA) has been conducted according to tool #62 [4] and the "Notice of Proposed Amendment 2018-14" (NPA) [11], where the EASA utilised the MCDA for an impact assessment. In contrast, a cost-benefit analysis or simulation models are not feasible to be conducted in this case, since most criteria scores can assess impacts only by using qualitative information (i.e. most criteria are not quantitatively measurable).

III.1.1.3 According to the referenced approaches, the MCDA is conducted in the following steps:

1. Definition of criteria (section III.2),
2. Weighting of defined criteria (section III.3),
3. Establishing a scoring system (section III.5),
4. Evaluating policy options (section III.6).

III.1.1.4 In addition to the suggested steps according to referenced methodologies, a sensitivity analysis shall be conducted after evaluation of the policy options to challenge the results by changing the criteria associated weights (section III.7).

III.2 Definition of Criteria

III.2.1 General

III.2.1.1 Although the procedural methodology of both referenced approaches is similar, the definition of the criteria, differs significantly regarding the level of detail. While the NPA suggests defining the criteria directly as overall subjects on one high level [11], the tool #62 establishes in-depth criteria by using a "Top-Down" approach [4].

III.2.1.2 In detail, this "Top-Down" approach considers initially the selection of dimensions (or broad categories), within which specific objectives are set (serving as indicators for the preferred direction of policy change). Subsequently, these objectives are further broken down into various criteria, each implying a variable that links every policy option to its anticipated outcomes (three levels of definition). [4]

- III.2.1.3 For this MCDA, the criteria are established by integrating two proposed methodologies, which involve one and three levels of criteria definition. This process includes identifying relevant dimensions and then determining the associated criteria. These criteria are articulated as objectives to reflect the desired changes. However, further breaking down these objectives and criteria could become so detailed that it may complicate the comparison and ranking of policy options.
- III.2.1.4 In the context of the Triple One concept, the theoretical framework for defining criteria for policy options can be adapted, considering previous tasks and associated reports (especially Task 4 and 5). This approach reveals the following dimensions as categories that warrant a thorough evaluation, which will be explored in dedicated sections:
- Safety
 - Economy
 - Social Impact
 - Implementation

III.2.2 Safety

- III.2.2.1 The adoption of the Triple One concept, or a variant thereof, is anticipated to positively affect runway safety. Its implementation is driven by the potential it holds for improving runway safety (i.e. maximising safety benefits), as detailed in the Task 4 report. However, it is equally important to consider the associated additional risks, which are outlined in the Task 5 report.
- III.2.2.2 The implementation of additional runway incursion mitigation measures, such as the full or partial application of the Triple One concept, enhances safety. This safety benefit is accomplished by improving the situational awareness of involved stakeholders (incl. pilots and vehicle operators) as well as by increased operational harmonisation. These advancements serve as an additional barrier of prevention and recovery to counteract human errors and reduce runway incursions.
- III.2.2.3 Conversely, it is essential to mitigate risks introduced by the adoption of new runway incursion prevention strategies to guarantee that their advantages outweigh the potential hazards. Consequently, it is imperative to diminish the chances of confronting these emergent risks.
- III.2.2.4 Thus, following criteria can be associated to the dimension 'Safety':
- Maximise safety benefits
 - Minimise risks

III.2.3 Economy

- III.2.3.1 While enhancing runway safety is crucial, it is equally important to consider the economic implications of any policy option. To ensure widespread stakeholder approval and justify the feasibility and appropriateness of a Triple One implementation, the associated costs must be considered and as far as possible minimised. This is especially pertinent when other technical solutions may exist that are more cost-effective and potentially more impactful in improving runway safety.
- III.2.3.2 The economic criteria aim to diminish both the initial and recurring expenses, including training, equipment, change management, and personnel costs, as detailed in the Task 5 report. Moreover, it is essential to minimise any negative impacts on the aerodrome's revenue, which could stem from a reduction in air traffic capacity or the displacement of its client base, such as the migration of general aviation.
- III.2.3.3 Thus, following criteria can be associated to the dimension 'Economy':
- Minimise implementation and on-going costs
 - Minimise negative revenue impact

III.2.4 Social Impact

- III.2.4.1 The adoption of various policy options could significantly influence stakeholders on a social level. The objective must be to avoid a negative impact on the social welfare of employees or aviation stakeholders. Notably vehicle drivers and the general aviation community may be affected, due to alterations in task execution (i.e. changing circumstances), additional workload and elevated language proficiency demands.
- III.2.4.2 Nevertheless, it is crucial to mitigate these effects to prevent the decline of job attractiveness and high turnover rates at aerodromes, as well as to ensure the appropriate entry-requirements to general aviation (incl. flight schools and non-commercial pilots), preserving consistent aerodrome usage within the EASA scope.
- III.2.4.3 Thus, the following criteria can be associated to the dimension 'Social Impact':
- Minimise impact on vehicle drivers
 - Minimise impact on general aviation

III.2.5 Implementation

- III.2.5.1 Despite the complexities involved in adopting the Triple One concept, integrating the policy option into the EU/EASA framework remains crucial. The aim is to achieve a seamless integration of the proposed policy, including any new or additional regulations, with the existing regulatory structure.
- III.2.5.2 This approach suggests a reduction in the efforts required for rulemaking and anticipates fewer complications in the enforcement at governmental organisations, namely national rescue and firefighting services or the military. Moreover, for the policy to be effective, it should gain broad acceptance among all stakeholders, including EU/EASA member states, by addressing their concerns, as well as operational stakeholders like airport operators, pilots, third-party contractors, ANSPs, and others.
- III.2.5.3 Lastly, the implementation must be overseen by the National Aviation Authorities. This means that the relevant oversight programmes might need to be adjusted.
- III.2.5.4 Thus, following criteria can be associated to the dimension 'Implementation':
- Harmonising new/additional rules with existing rules
 - Maximise stakeholder acceptance

III.3 Weighting

III.3.1 General

- III.3.1.1 To compare the policy options with each other, it is important to weight the criteria and pinpoint their importance and impact to evaluate the preferred policy option.
- III.3.1.2 While it is possible to assess the overall criteria weights by direct comparison of each criterion with the others, pairwise comparisons will be conducted in this MCDA to discern priorities more effectively.
- III.3.1.3 This approach involves initially determining the weights of the dimensions by comparing them against each other. Subsequently, the weights of all criteria within each dimension are established in a similar manner. The total criteria weights are then derived by multiplying the weight of each criterion with the weight of its corresponding dimension, as follows:

$$\text{Total weight} = \text{Weight}_{\text{Dimension}} \cdot \text{Weight}_{\text{Criterion}} \text{ with}$$

$$\text{Total weight: Total weight of each criterion; } [0, 1]$$

$$\text{Weight}_{\text{Dimension}}: \text{Weight of each dimension} \\ \text{compared to the other dimensions; } [0, 1]$$

Weight_{Criterion}: Weight of each criterion within one dimension, compared to the criteria of the same dimension; [0, 1]

III.3.2 Weighting of Dimensions

- III.3.2.1 The sum of all weights is equal to 1, which is equivalent to 100%. Consequently, the weight assigned to each dimension will range from 0 to 1. Based on this, the following weight allocations can be determined:
- III.3.2.2 **Safety:** Aviation safety and the prevention of any accidents is paramount, particularly when considering a potential adoption of an additional runway incursion mitigation measure. As such, it is essential to give the safety aspect a higher priority than other dimensions. Consequently, the weight assigned to safety will be 50% (0.5) to reflect its critical importance.
- III.3.2.3 **Economy:** While safety considerations are paramount, the economic feasibility of a policy option is also crucial. It should not necessitate substantial investments for realisation. While low efforts and related costs may raise the acceptance of stakeholders, high implementation and on-going costs or even a negative revenue impact might outweigh related benefits. Therefore, economic aspects will be assigned a weight of 30% (0.3) in the evaluation process.
- III.3.2.4 **Social Impact and Implementation:** In the evaluation of the preferred policy option, both dimensions are essential, each carrying a weight of 10 % (0.1) to reflect their equal significance. It is imperative that policy options do not have adverse effects on stakeholders (social impact) and integrate smoothly with the existing legal framework, ensuring wide acceptance of new regulations.

III.3.3 Weighting of Criteria

- III.3.3.1 The criteria within each dimension are weighted through a pairwise comparison, leading to each dimension's total weight summing up to 1 (100%). Consequently, the weight of each individual criterion will vary between 0 and 1. This method allows for the subsequent determination of specific weight allocations:
- III.3.3.2 **Safety:** While it is essential to enhance the safety benefits of a policy option, it is paramount to ensure that the associated risks are minimised to the greatest extent. Thus, stronger emphasis is put on risk reduction, which is assigned a weight of 60% (0.6), compared to the 40% (0.4) allocated for the enhancement of safety benefits.

This weighting reflects the priority of preventing any risks that may be introduced by the implementation of a policy option.

III.3.3.3 **Economy:** On the basis of the Task 5 report, the implementation and running costs of a policy option are expected to significantly outweigh any possible negative impact on long-term revenues. However, even a small reduction in revenue can lead to significant financial losses over time. Therefore, greater emphasis is placed on reducing implementation and running costs, which is given a 70% (0.7) importance compared to the 30% (0.3) importance given to reducing any negative impact on revenue.

III.3.3.4 **Social Impact:** When assessing the social impact on both vehicle drivers and those involved in general aviation, it is essential to consider the number of individuals affected and the extent of the impact. Aerodromes generally have a much larger population of vehicle drivers compared to non-commercial pilots or flight school staff, making the social impact on these drivers more significant. Additionally, vehicle drivers must adapt to new regulations and job descriptions to retain their employment. In the overall assessment, GA pilots are not considered as crucial as aerodrome employees, since their interests are primarily related to leisure activities. Therefore, the social impact on vehicle drivers is given a greater weight of 70% (0.7), while the impact on general aviation is assigned a weight of 30% (0.3).

III.3.3.5 **Implementation:** To identify the preferred policy option, it is essential to consider the harmonisation of new/additional regulations with the existing legal framework and stakeholder acceptance. Due to their equal significance in the decision-making process, each criterion is assigned an equal weight of 50% (0.5).

III.4 Criteria Overview

The following table summarises the developed criteria as introduced in the previous chapters:

Table 13: Weighted Criteria Overview

Dimension	D-Weight ⁵	Criteria	Description	C-Weight ⁶	Desired Direction ⁷	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

⁵ Dimension-Weight

⁶ Criteria-Weight

⁷ The Desired Direction describes an index for a criterion's proportions as a basis for the scoring system.

III.5 Scoring System

III.5.1 For a systematic evaluation and comparison of policy options, it is essential to implement a scoring mechanism that assigns a score to each policy option based on various criteria. This MCDA utilises a scoring range from -10 to +10, representing positive (+), negative (-), or neutral (0) impacts. Additionally, the implications for each secondary score across all criteria should be defined to ensure clear gradation and intermediate scores, resulting in a more accurate rating. Therefore, associating the scores with policy options will be enabled, thereby allowing for straightforward comparison. The subsequent Table 14 provides a summary of the scoring system, linking each criterion to its corresponding defined scores and remarks:

Table 14: 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	Moderately low acceptance	Lower acceptance	Slightly negative acceptance	No change/ Neutral	Slightly positive acceptance	Higher acceptance	Moderately high acceptance	High acceptance	Very high acceptance	Moderate acceptance expected, positive change possible, if acceptance is assumed higher.

III.6 Impact matrix

- III.6.1 In order to compare the considered policy options amongst each other and to identify the preferred option, an impact matrix has been created. In the impact matrix each policy option will be evaluated based on each criterion, as defined in III.2, and according to the established scoring system as per III.5. The evaluation of scores takes into account the regulatory implementation on EU-level and it's on the aviation system in general overall. Notably, the huge variety of all aerodromes subject to and within the scope of the Basic Regulation must be considered, as well as other aviation sectors like airlines and air traffic services. This means that the scoring represents an average. Thus, if the same evaluation would be applied on an organisation level, e.g. for a particular aerodrome, the result might be different.
- III.6.2 For clarity, the score evaluation including justifications for the scores is evaluated initially in a separate scoring matrix (Table 15). Then the impact matrix presents the scores directly in Table 16, without further explanation.
- III.6.3 In the impact matrix (Table 16), each policy option's score of a criterion is multiplied by criterion's weight with respect to Part III.3 and III.4, through which a weighted score for each criterion is attained. Finally, the weighted scores of each criterion are summed up to a total (weighted) score of each policy option.
- III.6.4 The policy option with the highest total score represents the preferred one. It should be noted that the total score of a policy option should be higher than 0 (i.e. a positive value), which signifies that the benefits are higher than the disadvantages such as risks or costs.
- III.6.5 Thus, following scoring matrix can be set up for considered policy options:

Table 15: Scoring matrix

Criteria	PO1 (a)	PO1 (b)	PO1 (c)	PO1 (d)	PO2 (a)	PO2 (b)	PO2 (c)	Remarks
Maximise safety benefits	+6	+2	+5	+4	+3	+2	+1	<ul style="list-style-type: none"> • PO1 (a): Fully implementing the Triple One concept results in a moderate enhancement of safety benefits (refer to Task 4 report). According to the statistical analysis (see section II.2.2 in the Task 4 report), there is no significant benefit for preventing runway incursions. However, a scenario-based analysis indicates a moderate potential safety benefit for certain occurrence types. • PO1 (c): Although the vehicle drivers' English language proficiency (ELP) is lower than that considered for PO1 (a), it is expected to be adequate to establish situational awareness (adequate language training and phraseology provided). Nevertheless, it is assumed that the overall quality of English language training is slightly lower than for PO1 (a). • PO1 (b) & (d): Due to the possibility of full or partial derogation, the anticipated overall safety benefits are lower compared to PO1 (a) and (c). It is assumed that aerodromes which would benefit from the Triple One concept but foresee high risks would opt for a derogation. • PO1 (b): Despite the requirement for all pilots to have ELP at level 4, a significant number of aerodromes are expected to seek a derogation, resulting in only a very low increase in overall safety benefits. • PO1 (d): Aerodromes where primarily national language is spoken would benefit due to the presence of a common language and the impossibility of a derogation from a common frequency. Consequently, the benefits are higher compared to PO1 (b). • PO2 (a) & (b): Since only vehicle drivers will be listening (with pilots not monitoring the communication between ATC and drivers), the enhancement of safety benefits is expected to be lower in general. In detail, the situational awareness of vehicle drivers plays a less critical role in mitigating runway incursions. However, more benefits are anticipated for PO2 (a) compared to PO2 (b), because pilots are required to be trained and communicate in English, which results in improved situational awareness among pilots. • PO2 (c): Negligible safety benefits are anticipated, as vehicle drivers might not comprehend the communication between ATC and pilots (no respective training required by regulation).

Criteria								Remarks
	PO1 (a)	PO1 (b)	PO1 (c)	PO1 (d)	PO2 (a)	PO2 (b)	PO2 (c)	
Minimise risks	-8	-1	-5	-9	-2	-2	-6	<ul style="list-style-type: none"> • PO1 (d): Given the high probability of misunderstandings if vehicle drivers do not possess sufficient ELP, a significant increase in additional risks is anticipated. High risks result from misunderstandings and higher workload for drivers and pilots by mixing languages. • PO1 (a): A substantial increase in induced risks is projected with the full implementation of the Triple One concept (refer to Task 5 report), in particular related to the lack of safety relevant staff resources. However, since languages cannot be mixed, the risks are anticipated to be slightly lower compared to PO1 (d). • PO1 (c): Risks may rise moderately due to lower training and qualification requirements compared to PO1 (a). Nevertheless, aerodromes anticipating many additional operational risks cannot derogate. • PO1 (b): Aerodromes anticipating a high number of additional risks would opt for a derogation and avoid higher risks, wherefore the increase is likely to be very low. • PO2 (c): A moderate increase in risks is anticipated due to the higher probability of misunderstandings if vehicle drivers do not possess sufficient English language skills. • PO2 (a) & (b): As both POs involve vehicle drivers listening only while providing sufficient capabilities to comprehend English language, the probability of misunderstandings is considered low.
Minimise implementation and on-going costs	-10	-2	-7	-5	-4	-3	-1	<ul style="list-style-type: none"> • PO1 (a): The full implementation of the Triple One concept is anticipated to significantly increase costs. This is mainly due to the higher ELP requirements and the associated training expenses, which would apply to all aerodromes currently derogated in the baseline (refer to Task 5 report). • PO1 (c): While aerodromes that derogate from the ELP requirements will incur lower costs compared to PO1 (a), the additional expenses are still expected to be substantial due to the transition from the national language to English, assuming appropriate training and enforcement of English language standards. • PO1 (d): Costs are expected to increase moderately as ELP requirements are even lower than for PO1 (c). • PO1 (b): Since aerodromes with substantial efforts to overcome may derogate from any Triple One implementation requirement, the costs are anticipated to be very low. • PO2 (a) & (b): Both POs account for comprehensive English training for vehicle drivers and exclude radio certification fees, resulting in generally lower costs. However, since English language requirements also apply to pilots in PO2 (a), the costs are slightly higher for PO2 (a) compared to PO2 (b). • PO2 (c): The lowest additional costs are anticipated for PO2 (c) as no additional ELP requirements apply to any stakeholder.

Criteria								Remarks
	PO1 (a)	PO1 (b)	PO1 (c)	PO1 (d)	PO2 (a)	PO2 (b)	PO2 (c)	
Minimise negative revenue impact	-6	-2	-6	0	-6	0	0	<ul style="list-style-type: none"> PO1 (a) & (c) & PO2 (a): These POs mandate additional ELP for non-commercial VFR pilots. Consequently, a moderately high reduction in revenue is anticipated, as these pilots and flight schools may opt to use aerodromes outside the EASA scope to avoid ELP regulations. PO1 (b): Although ELP requirements also apply to non-commercial VFR pilots, aerodromes with a high ratio of general aviation may choose to derogate. Therefore, only a very low reduction in revenue is expected. PO1 (d) & PO2 (b) & (c): As these POs do not impose ELP requirements on non-commercial VFR pilots, no impact on revenue is anticipated.
Minimise impact on vehicle drivers	-10	-1	-6	-2	-4	-4	0	<ul style="list-style-type: none"> PO1 (a): The most significant social impact on vehicle drivers is anticipated under this PO due to the highest ELP requirements (ELP level 4). The limited ability to achieve ELP level 4, increased workload from additional auditory input and communication procedures is likely to result in a substantial reduction in the job's appeal, leading to high turnover rates. PO1 (c): A moderately high reduction in the job's appeal is expected, as vehicle drivers are still required to demonstrate adequate English language skills. However, since drivers are not mandated to achieve ELP level 4, the anticipated staff turnover rates are lower compared to PO1 (a). PO1 (b) & (d): Due to the option for a full or language-specific derogation, vehicle drivers will be only slightly affected. However, since a higher proportion of vehicle drivers may face increased workload from additional auditory input and communication procedures under PO1 (d), the job's appeal might be more impacted compared to PO1 (b). PO1 (b): Aerodromes anticipating a significant negative social impact on vehicle drivers may opt for a derogation, resulting in only a very low reduction in the job's appeal. PO2 (a) & (b): A low social impact is expected for these POs due to the lower English proficiency requirements for vehicle drivers, which only necessitate comprehensive skills. PO1 (d) & PO2 (c): As no English proficiency requirements apply, no or negligible social impact on vehicle drivers is anticipated.

Criteria								Remarks
	PO1 (a)	PO1 (b)	PO1 (c)	PO1 (d)	PO2 (a)	PO2 (b)	PO2 (c)	
Minimise impact on general aviation	-4	-4	-4	0	-4	0	0	<ul style="list-style-type: none"> PO1 (a) & (b) & (c) & PO2 (a): Requiring all pilots, including non-commercial VFR pilots, to demonstrate ELP at level 4 or higher is expected to cause only a slight decrease in general aviation activities, as many pilots already possess sufficient English skills for cross-border operations. However, to avoid significant efforts and costs associated with initial and ongoing language training, there may be a migration of general aviation operations to aerodromes outside the EASA scope. PO1 (d) & PO2 (b) & (c): No social impact is anticipated for stakeholders related to general aviation, as no additional language proficiency requirements will apply.
Harmonising new/additional rules with existing rules	-8	-4	-6	-1	-4	-2	0	<ul style="list-style-type: none"> PO1 (a): The full implementation of the Triple One concept necessitates the integration of new Implementing Rules applicable to all stakeholders, including aerodromes and general aviation. This will involve significant operational efforts, such as the standardisation of certification processes, enforcement by governmental organizations, amendments to existing regulations where necessary, and ensuring third-party compliance. PO1 (c): While similar integration measures as outlined in PO1 (a) are required, the optional derogation concerning language proficiency may enhance harmonisation with language proficiency requirements (i.e. ADR.OPS.B.029 [3]). Consequently, a moderate increase in efforts is anticipated. PO1 (b): The derogation option simplifies the enforcement of this PO, thereby reducing the required efforts. PO1 (d): Minimal efforts are anticipated since no new language proficiency regulations require harmonisation. However, integrating a common frequency into the EASA legal framework is necessary. PO2 (a): A low increase in rule-making efforts is expected due to the clarification of English comprehension skills, which may improve alignment with language proficiency requirements (i.e. ADR.OPS.B.029 [3]). PO2 (b): Since the language proficiency requirements for pilots will remain unchanged, only minimal rule-making efforts are anticipated. PO2 (c): As there are no language proficiency requirements to be incorporated into the legal framework, no additional rule-making efforts are expected.

Criteria								Remarks
	PO1 (a)	PO1 (b)	PO1 (c)	PO1 (d)	PO2 (a)	PO2 (b)	PO2 (c)	
Maximise stakeholder acceptance	-10	-2	-8	-6	-4	-2	0	<ul style="list-style-type: none"> • PO1 (a): Due to the high implementation costs, anticipated operational disadvantages and additional measures to compensate risks associated with stringent language proficiency requirements, very low acceptance is anticipated among all stakeholder groups, particularly aerodromes, general aviation groups such as non-commercial VFR pilots, third parties, and governmental organisations. • PO1 (c): Given the option for language-related derogation, stakeholders such as aerodromes and third-party contractors may show more acceptance compared to PO1 (a). However, other stakeholders are still likely to exhibit very low acceptance for this PO. • PO1 (d): In addition to the stakeholder groups that already show more acceptance for PO1 (c) (i.e. aerodrome operators and third-party contractors), non-commercial VFR pilots are expected to be more agreeable, as ELP requirements will not apply to them. • PO1 (b): Only a slightly negative acceptance is expected due to the option for a full derogation, which many aerodromes might opt for, despite facing numerous implementation risks and challenges. • PO2 (a). Although non-commercial VFR pilots must comply with this PO by providing ELP, which they may strongly oppose, aerodrome operators and third-party contractors are likely to be more accepting since vehicle drivers only need to demonstrate comprehensive skills. Nevertheless, overall acceptance is expected to be lower as there are still additional language requirements for vehicle drivers. • PO2 (b): As non-commercial VFR pilots are exempt from ELP requirements, the acceptance is anticipated to be higher compared to PO2 (a). • PO2 (c): A neutral position is expected, as no additional language proficiency requirements will apply.

III.6.6 Considering the evaluated scorings, following impact matrix can be set up:

Table 16: Impact matrix

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

III.6.7 To simplify this result, the impact matrix should be generalised at the dimension level:

Table 17: Impact matrix - Overview

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

III.6.8 The results of the impact matrix indicate only negative total scores, implying disadvantages predominated benefits. The analysis of the impact matrix indicates that PO1 (b) emerges as the policy option with the least disadvantages when considering the assigned weights of the evaluation criteria, given its weighted total score of -0.99. Consequently, only a negligible to minimal negative effect applies.

III.6.9 Apart from PO1 (b), POs that consider a “vehicle listening only” solution, i.e. PO2 (a), (b) and (c), exhibit minimal to low negative effects, making them generally preferable compared to those based on PO1. It should be noted that the other PO1 alternatives result in a range of negative changes, from moderately low (PO1 (c) and (d)) to moderately high (PO1 (a)) when compared to the baseline.

III.6.10 It should be noted that PO1 (a), representing the full implementation of the Triple One concept, is ranked the lowest overall, with a total score of -5.56.

III.7 Sensitivity Analysis

- III.7.1 Although the impact matrix has identified the least negative policy option, it's crucial to discuss these findings. Therefore, a scrutiny, or sensitivity analysis, will be conducted, focusing solely on altering the weights of the dimensions. Consequently, this analysis does not adjust the criteria weights for a direct and expressive comparison of the pre-determined weight options or alter scores, as it does not affect the scoring mechanism.
- III.7.2 In this sensitivity analysis, three alternative weighting options (WOs) are introduced to evaluate the robustness of the initial weight distribution within the impact matrix. The first alternative, Weight Option 1 (WO1), further prioritises the safety dimension over the economy by reallocating 10 % of the weight from the economy to safety. In contrast, Weight Option 2 (WO2) also emphasises safety (40 %) but distributes the remaining weights equally among all other dimensions, with each receiving 20 %, thereby prioritising stakeholder interests. Finally, Weight Option 3 (WO3) adopts an egalitarian approach, assigning an equal weight of 25 % to each dimension, ensuring a balanced consideration of all factors while reflecting a perspective that gives more importance to economic considerations compared to safety.
- III.7.3 Therefore, following weight deviations can be established in the following Table 18:

Table 18: Sensitivity Analysis - Weight Variation

Dimension	Criteria	Weight Option 1 (WO1)			Weight Option 2 (WO2)			Weight Option 3 (WO3)		
		D-Weight	C-Weight	Total weight	D-Weight	C-Weight	Total weight	D-Weight	C-Weight	Total weight
Safety	Maximise safety benefits	0.6	0.4	0.24	0.4	0.4	0,16	0.25	0.4	0.1
	Minimise risks		0.6	0.36		0.6	0,24		0.6	0.15
Economy	Minimise implementation and on-going costs	0.2	0.7	0.14	0.2	0.7	0,14	0.25	0.7	0.175
	Minimise negative revenue impact		0.3	0.06		0.3	0,06		0.3	0.075
Social Impact	Minimise impact on vehicle drivers	0.1	0.7	0.07	0.2	0.7	0,14	0.25	0.7	0.175
	Minimise impact on general aviation		0.3	0.03		0.3	0,06		0.3	0.075
Implementation	Harmonising new/additional rules with existing rules	0.1	0.5	0.05	0.2	0.5	0,1	0.25	0.5	0.125
	Maximise stakeholder acceptance		0.5	0.05		0.5	0,1		0.5	0.125

III.7.4 A new impact matrix can be created by integrating the predetermined weight options with the pre-assessed scores, as presented in the following:

Table 19: Sensitivity Analysis - Impact matrix

Criteria	Maximise safety benefits	Minimise risks	Minimise implementation and on-going costs	Minimise negative revenue impact	Minimise impact on vehicle drivers	Minimise impact on general aviation	Harmonising new/additional rules with existing rules	Maximise stakeholder acceptance	Total score	Average Rank
Weight Option 1 (WO1) – Total Weight	0,24	0,36	0,14	0,06	0,07	0,03	0,05	0,05		
Weight Option 2 (WO2) – Total Weight	0,16	0,24	0,14	0,06	0,14	0,06	0,1	0,1		
Weight Option 3 (WO3) – Total Weight	0,1	0,15	0,175	0,075	0,175	0,075	0,125	0,125		
PO1 (a) Common frequency and language - without derogation	+6	-8	-10	-6	-10	-4	-8	-10		
PO1 (a) (WO1 weighted)	1,44	-2,88	-1,4	-0,36	-0,7	-0,12	-0,4	-0,5	-4,92	7
PO1 (a) (WO2 weighted)	0,96	-1,92	-1,4	-0,36	-1,4	-0,24	-0,8	-1	-6,16	
PO1 (a) (WO3 weighted)	0,6	-1,2	-1,75	-0,45	-1,75	-0,3	-1	-1,25	-7,1	
PO1 (b) Common frequency and language - with full derogation option	+2	-1	-2	-2	-1	-4	-4	-2		
PO1 (b) (WO1 weighted)	0,48	-0,36	-0,28	-0,12	-0,07	-0,12	-0,2	-0,1	-0,77	1
PO1 (b) (WO2 weighted)	0,32	-0,24	-0,28	-0,12	-0,14	-0,24	-0,4	-0,2	-1,3	

Criteria	Maximise safety benefits	Minimise risks	Minimise implementation and on-going costs	Minimise negative revenue impact	Minimise impact on vehicle drivers	Minimise impact on general aviation	Harmonising new/additional rules with existing rules	Maximise stakeholder acceptance	Total score	Average Rank
PO1 (b) (WO3 weighted)	0,2	-0,15	-0,35	-0,15	-0,175	-0,3	-0,5	-0,25	-1,675	
PO1 (c) Common frequency and language - with derogation on EN language proficiency level only	+5	-5	-7	-6	-6	-4	-6	-8		
PO1 (c) (WO1 weighted)	1,2	-1,8	-0,98	-0,36	-0,42	-0,12	-0,3	-0,4	-3,18	6
PO1 (c) (WO2 weighted)	0,8	-1,2	-0,98	-0,36	-0,84	-0,24	-0,6	-0,8	-4,22	
PO1 (c) (WO3 weighted)	0,5	-0,75	-1,225	-0,45	-1,05	-0,3	-0,75	-1	-5,025	
PO1 (d) Common frequency - with derogation on EN language (NAT possible)	+4	-9	-5	0	-2	0	-1	-6		
PO1 (d) (WO1 weighted)	0,96	-3,24	-0,7	0	-0,14	0	-0,05	-0,3	-3,47	5
PO1 (d) (WO2 weighted)	0,64	-2,16	-0,7	0	-0,28	0	-0,1	-0,6	-3,2	
PO1 (d) (WO3 weighted)	0,4	-1,35	-0,875	0	-0,35	0	-0,125	-0,75	-3,05	
PO2 (a) Separate frequency with one language on TWR and vehicles listen only	+3	-2	-4	-6	-4	-4	-4	-4		
PO2 (a) (WO1 weighted)	0,72	-0,72	-0,56	-0,36	-0,28	-0,12	-0,2	-0,2	-1,72	4

Criteria	Maximise safety benefits	Minimise risks	Minimise implementation and on-going costs	Minimise negative revenue impact	Minimise impact on vehicle drivers	Minimise impact on general aviation	Harmonising new/additional rules with existing rules	Maximise stakeholder acceptance	Total score	Average Rank
PO2 (a) (WO2 weighted)	0,48	-0,48	-0,56	-0,36	-0,56	-0,24	-0,4	-0,4	-2,52	
PO2 (a) (WO3 weighted)	0,3	-0,3	-0,7	-0,45	-0,7	-0,3	-0,5	-0,5	-3,15	
PO2 (b) Separate frequencies with EN+NAT on TWR and vehicles listen only (understanding EN)	+2	-2	-3	0	-4	0	-2	-2		
PO2 (b) (WO1 weighted)	0,48	-0,72	-0,42	0	-0,28	0	-0,1	-0,1	-1,14	3
PO2 (b) (WO2 weighted)	0,32	-0,48	-0,42	0	-0,56	0	-0,2	-0,2	-1,54	
PO2 (b) (WO3 weighted)	0,2	-0,3	-0,525	0	-0,7	0	-0,25	-0,25	-1,825	
PO2 (c) Separate frequencies with EN+NAT on TWR and vehicles listen only (no further EN requirements)	+1	-6	-1	0	0	0	0	0		
PO2 (c) (WO1 weighted)	0,24	-2,16	-0,14	0	0	0	0	0	-2,06	2
PO2 (c) (WO2 weighted)	0,16	-1,44	-0,14	0	0	0	0	0	-1,42	
PO2 (c) (WO3 weighted)	0,1	-0,9	-0,175	0	0	0	0	0	-0,975	

- III.7.12 The sensitivity analysis conducted allows for a comparison of the new results, derived from the average total score (calculated by summing all total scores related to each PO and dividing by 3), with those from the initial impact matrix (see section III.6).
- III.7.13 The new total scores indicate that PO1 (b) provides the least negative impacts for WO1 (-0.77) and WO2 (-1.3), resulting in the highest average ranking. However, for WO3, PO2 (c) has the highest score among all POs (-0.975). This inconsistency in ranking results from a weighting that may not reflect a realistic scenario, as safety is not prioritised compared to other factors, making it the least viable and valid approach for weighting. Therefore, if realistic weight variations are considered, PO1 (b) stands out as the PO with the least disadvantages independently of weight variation.
- III.7.14 Additionally, while the average ranks of PO1 alternatives remained unchanged, the average ranks of PO2 (b) and (c) have swapped. This shift can be explained by the fact that both POs were initially ranked closely in the impact matrix, with only a 0.5-point difference. However, when considering only WO1 and WO2 for a direct comparison (since aviation safety improvements must always be prioritised), both POs are ranked higher for one WO. Consequently, the final ranking depends significantly on the weight distribution between the safety dimension and other factors. Therefore, if safety factors are heavily prioritised, PO2 (b) offers a better benefits-to-disadvantages ratio than PO2 (c).

III.8 Results

- III.8.1 In the previous chapters, a MCDA was conducted to extract the best policy to deal with the Triple One concept. This process involved establishing criteria, assigning them weights, and applying a scoring system. An impact matrix was then developed, which revealed the subsequent findings:
- All policy options, which differ from the baseline (the current status of legal framework), are expected to relate to a negative impact, if implemented.
 - PO1 (b) "Common frequency and language - with full derogation option" stands out as the policy option with the best scoring 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 and are therefore higher ranked than all other PO1 alternatives, except for PO1 (b).

- 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.

III.8.2

After the conduction of the MCDA, the results were challenged by a sensitivity analysis, in which three different weight options (deviations from the initial weighting) were applied for the evaluated scores. Consequently, the sensitivity analysis revealed the following findings:

- PO1 (b) “Common frequency and language - with full derogation option” has the least negative impacts for WO1 (-0.77) and WO2 (-1.3). Although PO1 (b) is ranked second for WO3, it is still ranked the highest in average.
- PO2 (c) has the highest score for WO3 (-0.975) as safety is not prioritised compared to other factors. However, if realistic weight variations are considered, PO1 (b) stands out as the PO with the least disadvantages independently from weight variation.
- The average ranks of PO2 (b) and (c) are switched as both POs were already ranked similarly in the initial impact matrix. Nevertheless, if safety factors are prioritised by far, PO2 (b) provides a better benefits-disadvantages-ratio than PO2 (c).

Part IV Conclusive recommendations

- IV.1 The MCDA showed that all policy options have a total score lower than 0. The conclusion implies that none of the policy options considered is preferable to the current situation (baseline). For the 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. The 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.
- IV.2 Options with full or partial derogation or exemptions do not contribute significantly to improving safety in relation to the additional risks and effort. PO1(b) with full implementation and full derogations is rated best and just below 0 but does not significantly improve the situation with regard to the overall objective and based on the defined criteria. There are only minor changes to the aerodrome provisions, limited to making a common frequency aspect mandatory and extending the existing exemption principle regarding language proficiency (ADR.OPS.B.029 (g) [3]) to the frequency aspect. In practice, this is already the case, as a safety assessment for a derogation from the English language proficiency requirement must already consider the use case of a common frequency. Conversely, for licence holders who are not yet required to have the appropriate endorsement, improving English proficiency among flight crew could help to close the gap. This presents an opportunity to harmonise language levels among flight crew and should be considered. At aerodrome level, it is recommended not to change regulations with further aspects of Triple One as it is not considered as a solution to significantly and globally improve safety around runway incursions with vehicles in relation to the additional risks as well as in a reasonable relation with required efforts and other negative impacts which have been analysed.
- IV.3 Despite the fact that the results from the MCDA do not support a universal recommendation for further regulation of a Triple One implementation, it can still serve as an effective mitigation measure to prevent or recover runway incursions in specific cases. In these instances, scores tailored to the specific circumstances and environment would be applied to the MCDA, resulting in a positive total score. This aerodrome-specific outcome would suggest that the safety benefits outweigh any risks or other disadvantages (such as costs). Consequently, a Triple One implementation would be recommended for this particular aerodrome, even if, in general, implementation at most aerodromes would likely result in more negative than positive changes.

- IV.4 Furthermore, runway incursions, including vehicle incursions, and the lack of situational awareness remain a relevant key risk and safety issue. Based on the observations and findings of this study, and in particular the extensive stakeholder engagement, further recommendations to EASA and other stakeholders have been derived and summarised in the following Part V.

Part V Further recommendations

V.1 Implementation of a Runway Incursion Prevention Programme

- V.1.1 Improving runway safety is a widely acknowledged intent of many operational participants in the aviation industry, including various requirements identified by regulators. Situational awareness is one important aspect of preventing runway incursions and hence this study into the idea of Triple One. The actors involved are flight crew, air traffic controllers and vehicle drivers. Air traffic controllers have a fundamental role to maintain situational awareness. Additional safety improvement arises if the flight crew and vehicle drivers have a better situational awareness in order to be able to react, to change their actions so as to prevent a collision.
- V.1.2 The detailed analysis of benefits and additional risks associated with the implementation of the Triple One concept showed that besides the local specific parameters also the landscape of existing and future alternative mitigation measures and safety net elements must be considered to prevent runway incursions and to reduce their severity.
- V.1.3 For instance, modern, and integrated A-SMGCS systems with sophisticated memory aid and alerting functions, notably in complex environments, might play an important role in reducing the risk of runway incursions and contribute to runway safety. The prerequisite for those systems is having a sufficient level of surveillance.
- V.1.4 One area worthy of progressing is a concept of "TCAS on the ground". The use of transponders in vehicles on the manoeuvring area indicated a significant influence on the rate of runway incursions (see Report "substantiation of the safety benefits", Task 4). Enhanced systems could provide alerts to flight crew and vehicle drivers, as appropriate, if a prediction algorithm saw a potential conflict developing and was able to generate a suitable alert in quick time. At many aerodromes moving maps with embedded indication of live aircraft and other vehicle positions are implemented and strongly support the maintenance of situational awareness of for drivers based on visual reproduction of the situation. These systems can form the basis for additional functionalities in form of additional safety nets and similar systems could be implemented in flight decks. Such solutions appear worthy of research.

- V.1.5 Situational awareness should be a focus for each airport to ensure the basic minimum is provided. This might include surveillance (ground movement radar or multilateration) and associated use of transponders in vehicles and a conflict alerting system for the tower controller like RIMCAS or any other alerting system which can range until an autonomous system like the so-called Autonomous Runway Incursion Warning System (ARIWS).⁸
- V.1.6 In the hierarchy of safety measures and associated actions more emphasis should be clearly placed on the prevention of incursions and only secondarily on the recovery. This should be reflected in rulemaking and any associated policies and programmes.
- V.1.7 In the overall goal of mature and efficient safety management, it must also be recognised that runway safety, and namely the protection against runway incursions, has to be thought of as a multilayered and organisation-wide approach which has to cover all areas of activities. During the stakeholder consultation it became apparent that aerodrome operators are aware of their specific hazard and risk landscape. Nevertheless, it is apparent that it is not in all cases appropriate to focus efforts on actions which are triggered by regulations instead of addressing and focussing on specific activities and mitigations addressing known issues. This may lead to neglect the interrelation between all system and thus the overall goal of achieving an optimal safety performance of the system.
- V.1.8 On the ANSP side, technical solutions are strongly interlinked with the capabilities and available products by the providers of the ATM systems. In general, there is a lack of knowledge of alternative possible solutions, which might be proven at other aerodromes.
- V.1.9 The importance of the Local Runway Safety Team must also be reflected in any Runway Incursion Improvement Programme, as this forum brings the key actors together. Details of the membership, role and purpose of this group is widely described in ICAO and other documentation⁹, which could be enhanced by a requirement of establishing an aerodrome specific Runway Incursion Prevention Plan (RIPP).
- V.1.10 Additionally, activities in the context of runway safety are often limited to the units of compliance and safety management, operations and eventually infrastructure and training. The interaction with the local ANSP is very variable across Europe and in many cases restricted to procedure coordination as part of bilateral agreements and the

⁸ ADR.OPS.B.030 [3] refers to requirements for transponder operations and considerations, however the implementation of surveillance systems as a pre-requisite for transponder operation (also on vehicles) is subject to local decisions.

⁹ Upcoming amendment of Regulation (EU) 139/2014 by Regulation (EU) 2024/1400 contains the LRST as part of safety programmes in ADR.OR.D.027 (b) [12]

obligatory engagement in the LRST which, however, misses often the proactive and predictive alignments¹⁰. Other areas, however, like those for long term planning (master planning) or technical departments like for the airfield electrical system are not directly involved or might not be fully aware of the background and relevant parameters.

- V.1.11 The crucial question for each aerodrome is, what is the most effective measure or approach to decrease the risk level regarding runway incursions. Beside the measurement of the safety performance (based on data), appropriate guidance on an identification process is missing in current policies. It has furthermore been observed that often, a structured approach focussing on the decision process missing. There is also a lack of awareness of existing alternatives, technical, procedural or organisational, and their effectiveness. In this point, more guidance should be made available.
- V.1.12 It is recognised that current regulations require so-called safety programmes (ADR.OR.D.027 [3]) to promote safety, including runway safety. The scope and details are mainly at AMC level. This will be expanded and further detailed in the forthcoming amendments [12]. The activities and components of the safety programmes are described in a rather general way and do not contain e.g. specific guidance on which organisational areas are to be covered (e.g. operations, infrastructure, safety, maintenance, ADR planning) or provide guidance on possible solutions and relevant decision criteria.
- V.1.13 It is therefore recommended to expand the focus to the overall objective of reducing the risk of runway incursions considering a variety of technical, infrastructural and procedural aspects on a local level, whereas the Triple One concept must be considered as one possible solution. Recognising that the intervention of situations which could lead to a runway collision must be multi-layered, it is deemed appropriate to evaluate the effectiveness and efficiency of all possible solutions instead of putting the focus on a single isolated solution.
- V.1.14 It is recommended to demand each aerodrome to establish of a specific Runway Incursion Prevention Programme (RIPP) per regulation. This might include the following elements:
1. Require the systematic review of runway incursion risk and the identification of appropriate measures for improvement, and
 2. Provide more guidance on this process to identify the most appropriate and efficient measures.

¹⁰ Upcoming amendment of Regulation (EU) 139/2014 by Regulation (EU) 2024/1400 contains requirements for proactive and predictive activities for the LRST in ADR.OR.027 (d) [12]

Both must be complemented with appropriate guidance, which might include the Triple One concept and its variations together with all other technical, infrastructural and operational measures and alternatives and safety layers.

It is worth to mention that a so-called “Runway Incursion Prevention Programme” is already mentioned in certain parts of the EASA Aerodrome Regulations [12], namely within two sections about infrastructure design:

- GM1 ADR-DSN.D.240 Taxiways general (b) [12]: This GM includes guidance that the design of new infrastructure or the change of existing infrastructure must consider the risk of runway incursions. “This guidance may be considered as part of a runway incursion prevention programme and to help ensure that runway incursion aspects are addressed in any new design proposal.”
- GM1 ADR-DSN.T.900 [12] Emergency access and service roads (4)

Characteristically, AMC1 ADR.AR.C.010 [3] Oversight programme (b) (17) requires oversight authorities to consider a “runway excursion and incursion prevention programmes of the aerodrome operator” as part of their oversight programme of aerodrome operators and of organisations responsible for the provision of AMS. An inconsistency exists as there is no dedicated implementing rule or any other reference establishing the context of such as programme, defining objectives, elements, responsibilities etc.

V.1.3 Furthermore, several paragraphs in the aerodrome certification specifications refer to certain infrastructural requirements as “runway incursion prevention measures” [12], like:

- GM1 ADR-DSN.L.570 Enhanced taxiway centre line marking
- GM1 ADR-DSN.M.710 Taxiway centre line lights
- GM1 ADR-DSN.M.730 Stop bars
- (GM1) CS ADR-DSN.M.745 Runway guard lights
- GM1 ADR-DSN.M.771 No-entry bar.

V.1.4 However, at no point in existing and in upcoming regulation, there is a clear reference to such a Runway Incursion Programme nor there are further detailed specifications that puts such a programme into a context of an overarching approach. It is acknowledged that upcoming regulation on Safety Programmes foster that aerodrome operators and relevant stakeholders put a better focus on common efforts to improve runway safety. It is, however, recommended to clearly declare such a programme as ‘Runway Incursion Prevention Programme’. This would be appropriate as runway incursions are commonly declared as one of the major risks in aviation. Considering the

multi-layered factors and parameters having an impact on the risk of runway incursion, a programme level, instead of the focus on individual measures or on general Safety Programmes is deemed as appropriate and would be in-line with other, already established programmes regarding major risks, such as foreign object debris control programme (ADR.OPS.B.016), wildlife risk management programme (ADR.OPS.B.020), maintenance programme (ADR.OPS.C.005) or Training and proficiency check programme (ADR.OPS.D.080 and 085). [3]

V.1.5 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 in understanding benefits of different solutions
- Provide guidance on how to identify most efficient and reliable and future-proof solutions and how the results can be demonstrated in the course of compliance verification.

V.2 Miscellaneous

V.2.1 **Addressing mixed languages:** Enhancing situational awareness to reduce runway incursions necessitates both adequate language proficiency, particularly in communication skills, and the operational use of a common language. Although English is the default language of international aviation, local languages are often used concurrently for air-ground communication. This mix of languages on tower frequency increases the risk of runway incursions (see SI-2029 in Table 2). This risk arises because English language proficiency requirements do not apply to all stakeholders, especially private or non-commercial pilots who do not hold an instrument flight rating as per FCL.055 (d) [7]. Additionally, the use of English on tower frequency is not generally mandated at aerodromes with fewer than 50,000 international IFR movements per year, as required by SERA.14015 [9], and is often subject to national or local exemptions. Therefore, it is recommended that a wider review of language used by all stakeholders should be considered, notably to address the common use of national language in commercial aviation as well as the private and non-commercial pilot groups.

- V.2.2 **Improve reporting and safety data base (ECCAIRS and organisations SMS):**
While the safety potential analysis was conducted as part of the Task 4 report, it was noted that the quality of many reports was too poor to extract useful information about runway incursions which allows detailed analysis. This issue may stem from inadequately prepared, trained, or qualified reporting staff due to insufficient guidance or instruction. Additionally, the safety potential analysis highlighted a significant discrepancy in the reporting rates of runway safety events, as detailed in the Task 4 report, section II.2.2. The apparent differences in runway incursion rates do not seem credible and suggest inconsistencies in methods, definitions, or reporting culture across Europe. Consequently, it is highly recommended to provide additional training and guidance material to establish a standardised reporting culture.
- V.2.3 **Improve understanding and provide guidance regarding available measures:**
Despite from the Triple One concept, other runway incursion mitigation measures exist, which should be considered to prevent runway incursion in general. To improve understanding of such mitigation measures, which may have an even bigger impact than implementing the Triple One concept, more awareness should be gained for available measures and barriers (technical and operational) beyond radio communication. Therefore, the provision of additional guidance material regarding available measures is recommended. In addition, awareness could be achieved by the conduction of safety campaigns in cooperation with the industry (e.g. by spreading newsletters, hosting events or trainings).
- V.2.4 **Safety essential vehicle movements:** During consultations with various aerodrome operators, it become obvious that a disproportionately high number of stakeholders and individuals hold licenses to access the runway, despite not needing this access for their work for safety purposes. Even though ADR.OPS.B.026 [3] Authorisation of vehicles states that “The aerodrome operator shall limit the number of vehicles authorised to operate on the movement area and other operational areas to the minimum number required for the safe and efficient operation of the aerodrome.”, it was observed that the interpretation whether certain vehicle operations must take place within the safety area of an operational runway differs widely. While at some aerodromes the runway access is kept at an absolutely minimum, there is a huge number of activities taking place at a regular basis whose value for safe operations can be questioned. For instance, it is clear that vehicles of rescue and firefighting services must be licenced for the access on the runway, however it must be carefully evaluated to which extent regular movements on an active runway contribute to safety. At some aerodromes, the inspection of movement areas is spread over several units like aerodrome safety, aerodrome operations, rescue and firefighting, wildlife management, airfield electrical or pavement maintenance, whereas each division does individual inspections. Hence,

to reduce the risk of runway incursions, more guidance and provision informational material should be provided, offering guidance on which stakeholder groups are required to access the runways for safety reasons and that there is a formalised process to define this groups based on local specifications. Additionally, national CAAs should put an emphasis on reviewing and verifying the number of licenses issued and to whom they are granted.

V.2.5 **Definition of runway status:** It is recommended that EASA provides clear guidelines on how the runway status are defined. Terms currently in use include active/inactive, operational/non-operational, in use, suspended, available/unavailable, open or closed and combinations thereof. For example, some aerodromes use time criteria (e.g. 5 minutes) for situations, when safety critical activities have to be performed on an open runway and on a tactical level, which take longer than a regular inspection embedded in the traffic flow, and the runway is not useable for take-offs or landings during that time. It is recommended that guidance is provided which involves aerodrome operators, flight crew and ANSP input to define clear requirements and definitions how these situations shall be handled on an operational basis. In creating such guidelines, EASA should include consideration of the commencement of an approach to such a runway.

List of Abbreviations

A-SMGCS	Advanced - Surface Movement Guidance and Control System
ADR	Aerodrome
AMC	Acceptable Means of Compliance
AMS	Aircraft Maintenance Service
ANS	Air Navigation Services
ANSP	Air Navigation Service Provider
ARWIS	Autonomous Runway Incursion Warning System
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATM	Air Traffic Management
ATS	Air Traffic Services
BL	Baseline
CAA	Civil Aviation Authority
CS	Certification Specification
EAPPRI	European Action Plan for the Prevention of Runway Incursions
EASA	European Aviation Union Safety Agency
ECCAIRS	European Co-ordination Centre for Accident and Incident Reporting Systems
ELP	English Language Proficiency
EPAS	European Plan for Aviation Safety
EU	European Union
EU-OPS	European Union Requirement – Operations
FCL	Flight Crew Licensing
GAPPRI	Global Action Plan for the Prevention of Runway Incursions
GEMs	Guidance and Explanatory Materials
GH	Ground Handling
GM	Guidance Material
IAS	Indicated Air Speed
ICAO	International Civil Aviation Organization

IFR	Instrument Flight Rules
IR	Implementation Rule
KRA	Key Risk Area
LRST	Local Runway Safety Team
MCDA	Multi-Criteria Decision Analysis
NOTAM	Notice to Airmen
NPA	Notice of Proposed Amendment
PO	Policy Option
RIMCAS	Runway Incursion Monitoring and Conflict Alert System
RIPP	Runway Incursion Prevention Programme
SERA	Standardised European Rules of the Air
SI	Safety Issue
SMS	Safety Management System
TCAS	Traffic Alert and Collision Avoidance System
TWR	Tower
VFR	Visual Flight Rules
WO	Weight option

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