Directorate General for Civil Aviation

Civil aviation Technical centre

December 2017

Aerodromes in France faced with the requirement to use the English language

Volume 1

Study report

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Relevance of paragraph 14015 in France

Volume 1

Study report

Study conducted in accordance with paragraph 14015 of the annex to the SERA Part C regulation

Civil aviation technical centre

Department Information Systems and Air Navigation

December 2017

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Summary

This study explores safety aspects in the field of application of paragraph 14 015, namely 6 aerodromes, while taking into account the applicable provisions of European Union and French law on the use of languages.

The safety study did not find any added value from the requirement to use English as the only language for radiocommunications.

The study identified and reviewed 346 events that occurred over the last ten years and their analysis did not reveal any safety implications related to bilingualism.

To reduce the risk of runway incursion, the French aerodromes concerned by the "SERA Part C" regulation have obtained more safety gains with the ground surveillance and warning tools and more generally the application of the other measures of the EAPPRI plan.

As things stand, the low level of English language proficiency requirements for drivers of vehicles called on to enter the manoeuvring area would be a factor in reducing their understanding of pilot-controller communications, which would run counter to the desired objective.

The principle of improving aviation safety through the sharing of information via radio communications led to the drafting of paragraph 14 015 ; the validity of this principle has not been demonstrated and is called into question in the future, with selective pilot-controller dialogue becoming more widespread thanks to digital data links.

With the 14 015 AMC stating that such studies should seek the opinion of pilots, a questionnaire for pilots on their linguistic preference showed the preference of almost all French pilots for the use of French, while foreign pilots prefer English.

Canada, relying on a safety study and simulations, moved the province of Quebec from a monolingual English-language situation for air-ground communications to French-English bilingualism. More than 30 years after this change, no event caused by bilingualism has been reported.

In consequence, the study considers that there is justification for not making it compulsory in France to use English as the only language, in accordance with paragraph 14 015 of the annex to the "SERA Part C" regulation.

Contents

1. Introduction

1.1. France faced with paragraph 14 015 of the SERA Part C regulation

Implementing Regulation (EU) 2016/1185 of 20 July 2016 updates and completes the common rules of the air and operational provisions regarding services and procedures in air navigation (SERA Part C) in Europe. This regulation stipulates in paragraph 14 015 that the English language be used for communications between the ATS unit and the aircraft, at aerodromes with more than 50 000 international IFR movements per year.

This text authorises Member States, including France, in which English is not the only language used for communications between the ATS unit and aircraft at such aerodromes, to decide not to apply the requirement to use the English language. In that case, the Member States concerned shall, by 31 December 2017 at the latest, conduct a study on the possibility to require the use of the English language for communications between the ATS unit and aircraft at those aerodromes for reasons of safety, so as to avoid incursions of aircraft on an occupied runway or other safety risks, while taking into account the applicable provisions of Union and Member State law on the use of languages. They shall make that study public and communicate its conclusions to the European Aviation Safety Agency (EASA) and the Commission.

While recognising that this situation is not related to safety, it should be noted that French is one of the two working languages of the ICAO, the other language being English. French is spoken in numerous African countries, in particular the ASECNA member countries, in Quebec, in Switzerland and in Belgium. Finally, it should be noted that the only official languages of the International Civil Aviation Organization are French, English, Chinese, Spanish, Russian and Arabic.

1.2. Objective of the study

The Director General of Civil Aviation has entrusted the Civil Aviation Technical Centre (STAC) with the project management for France of the study mentioned in the previous paragraph.

The objectives of this study are three-fold.

It aims to verify the compliance and legal applicability of paragraph 14 015 with regard to international law, European treaties, procedures for drawing up European regulations and the Constitution and other elements of French law.

Second, it should verify the technical relevance of the elimination of bilingualism specified in paragraph 14 015 and its implementation documents, particularly with regard to aviation safety.

Finally, it should carry out independent studies specific to each of the French aerodromes concerned by the application of paragraph 14 015 of the SERA Part C regulation in accordance with the provisions of that same regulation, including AMC1, GM1 and GM2, which supplemented this article on 16 October 2016.

The study took an interest in the sector of the State aviation authorities whose crews carry out the sovereign missions of the State, in particular those on the safety of the population, after consulting these authorities.

1.3 Guide to the reader

To aid understanding, the study report is divided into three volumes.

The first volume contains the body of the study report and includes only the key points of questioning about the relevance of paragraph 14 015 in France and the findings. The second volume contains the six studies specific to the aerodromes concerned. The third volume contains annexes with the additional documents needed to understand the report.

In the first volume, chapter 1 introduces the framework and objective of the study. Chapter 2 deals with the methodology of the study, i.e. the assumptions made and the conduct of the study to meet the compliance requirements of paragraph 14 015 of the SERA Part C regulation. Chapters 3 and 4 cover the core common to the French aerodromes concerned on the technical and legal aspects relating to the impact of bilingualism on the prevention of runway incursions and other safety risks. Chapter 5 summarises the analyses and conclusions specific to each of the aerodromes concerned by the regulation. Chapter 6 provides a summary and opens up proposals for decisions/actions.

2. Methodology

2.1 Analysis of the problem

France is a signatory to the Chicago Convention on International Civil Aviation. As such, it takes into account the regulatory framework and recommendations adopted by the International Civil Aviation Organization. As a member of the European Union, France also applies European regulations in accordance with its Constitution. The study therefore assesses the regulatory requirements for the use of languages for relevant air operations in three frameworks : ICAO ; European treaties and regulations ; and the French Constitution on the use of the language of the republic.

Paragraph 14 015 of the Regulation is addressed to ATS units for the management of take-off and landing runways on the LOC position at the aerodromes concerned, so as to avoid runway incursions. The special structure of the services that are provided in these aerodromes in France makes it necessary to study the scope of the regulation beyond just aerodrome control. The aerodrome ATS unit may be required, within the same structure, to provide the approach control and flight information services. These different services may even be provided by the same controller at certain times of day, on the same radio communication frequency or group of frequencies.

It is also clear that the text of the paragraph refers only to communications between the ATS unit and the aircraft. On the other hand, the purpose of the regulation is clearly the search for improved safety through the eventual use of English as the only language for all communications on each frequency concerned, which includes those with vehicles circulating in the manoeuvring area.

These interpretations of the paragraph are present in Opinion[1] which preceded the regulation, and are confirmed by the guidance material (GM1), which explicitly encourages States to take a positive view of the extension of this requirement to aerodromes with less international traffic, to airspace around the aerodrome and to vehicles. The EAPPRI document analysed in this report demonstrates the same desire for a single language to be used by all ground vehicles. Finally IATA, which interacted with its members during the study, in particular during the publication of the AIC containing the pilot questionnaire, advocates the generalised use of the English language only, in all the airspace around the aerodromes concerned.

In this perspective, the study team analysed the strict application solely of paragraph 14 015 to aircraft on the LOC frequency, but also considered it useful to study the implications of the situation envisaged in the future, even if these implications were not proven in an initial implementation phase.

In consequence, the scope of application studied also takes into account the approach control at the aerodromes concerned and the FIS communications that are also managed, in some cases by the controller of the aerodrome concerned by the regulation, when grouping frequencies for example. The study also analyses the consequence of paragraph 14 015 on the population of private pilots performing flights in the airspace related to the aerodromes concerned.

[1] Extract from Rulemaking Process description (EASA website) : The agency prepares drafts of Opinions in order to assist the European Commission in its preparation of proposals for basic principles, applicability and essential requirements to the European Parliament and to the European Council.

2.1.1. Languages authorised in air-ground radiotelephony

2.1.1.1. ICAO

▸ It is Annex 10 of the Chicago Convention that sets the rule in Chapter 2.1.2 Language used :

The air-ground radiotelephony communications shall be conducted in the language normally used by the station on the ground or in the English language.

This ICAO norm is the regulatory basis for bilingualism in ATC communications.

2.1.1.2. European Union

Two EU implementing regulations lay down the rules for Member States regarding the language used in air-ground radiotelephony.

First, Regulation (EC) No. 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No. 1592/2002 and Directive 2004/36/EC.

▸ In its Annex Vb, article 4 it stipulates :

d) Language proficiency

i) An air traffic controller shall demonstrate proficiency to speak and understand English to the extent he/she is able to communicate effectively in voice-only (telephone/radiotelephone) and in face-to- face situations on concrete and work-related topics, including in emergency situations.

ii) Whenever necessary in a defined volume of airspace for ATS service provision purposes, an air traffic controller shall also have proficiency to speak and understand the national language(s) to the extent described above.

Then, Commission Implementing Regulation (EU) 2016/1185 of 16 July 2016, of which part 14 015 is the subject of the study, stipulates :

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) The English language shall be available, on request of any aircraft, at all stations on the ground serving designated aerodromes and routes used by international air services. Unless otherwise prescribed by the competent authority for specific cases, the English language shall be used for communications between the ATS unit and aircraft, at aerodromes with more than 50 000 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. In that case, those Member States shall, by 31 December 2017 at the latest, conduct a study on the possibility to require the use of the English language for communications between the ATS unit and aircraft at those aerodromes for reasons of safety, so as to avoid incursions of aircraft on an occupied runway or other safety risks, while taking into account the applicable provisions of Union and national law on the use of languages. They shall make that study public and communicate its conclusions to the Agency and the Commission.

c) The languages available at a given station on the ground shall form part of the Aeronautical Information Publications and other published aeronautical information concerning such facilities.

Sub-section (a) repeats the text of the ICAO norm, though inverting the order of the terms “English” and “language normally used”.

Sub-section (b) removes the possibility of using the language normally used by the station on the ground (French for France) at aerodromes with more than 50 000 international IFR movements per year. That is the subject of this study. The issue of this part of the regulation calls for an analysis of applicable law in the linguistic field, in particular the constitutional right to use a language other than that of the Republic.

The requirement in sub-section (c) was in force in French aeronautical documentation before the SERA regulations.

2.1.1.3. AIP France

▸ In AIP France, GEN 3.4.3.4 Languages used lays down the languages used in air traffic services :

Communications with ATS units can be held in French or English language unless the mention “French only” is specified on the relevant charts*, in which case communications shall be held in French language.

In France, therefore, air-ground communications are in French or in English. Contrary to this principle, paragraph 14 015 would make it impossible for the aerodromes concerned to use French for communications between the ATS unit and the aircraft and vehicles in the manoeuvring area.

2.1.2. Requirements on language use in ATS communications

▸ ICAO :

Following the adoption by ICAO of a regulatory framework (amendment 78 to Annex 10 in March 2003) on language skills for pilots and air traffic controllers, a manual (Doc 9835) was developed in preparation for the implementation of this regulation.

▸ In its introduction, Doc ICAO No. 9835 recalls what motivated this regulation :

Accident investigators usually uncover a chain of events lining up in an unfortunate order and finally causing an accident. In some instances, the use (or misuse) of language contributes directly or indirectly to an accident.

At other times, language is a link in the chain of events which exacerbates the problem. There are three ways that can be a contributing factor language in accidents and incidents :

a) incorrect use of standardized phraseologies ;

b) lack of plain language proficiency ;

c) the use of more than one language in the same airspace.

Without calling into question the ICAO norm for the use of languages in air-ground communications (Annex 10), the ICAO manual seems to consider that the joint use of another language with English poses a safety problem.

- This manual explains this question of bilingualism in air-ground communications as follows :

The use of two languages in the same airspace : This can have an impact on the situational awareness of flight crews who do not understand all the languages used for radiotelephony in that airspace and has been cited in several accident reports as a contributing factor.

- Finally, this analysis is supported in view of the following :

1.2.7 Concern over the role of language in aviation accidents and incidents has been expressed from several quarters. Data obtained from the ICAO Accident/Incident Data Reporting System (ADREP) database, United States National Transportation and Safety Board reports (ASRS), the United Kingdom Mandatory Occurrence Reporting System (MORS) and Confidential Human Factors Incident Reporting Programme (CHIRP) corroborate that the role of language in accidents and incidents is significant. A number of fatal and non-fatal accidents appear in the ICAO ADREP which cite "language barrier" as a factor. These data are further supported in two recent reports by Eurocontrol (Van Es, 2004 and Van Es, Wever and Verbeek, 2006).

The ICAO Air Navigation Bureau was questioned by the French ICAO representation on the studies and reports that would support the risk of two languages in one space.

The Bureau provided a March 2017 CAA report by you-say-tomato, a consulting firm, and references to a collision in Mexico between a Delta B727 and a Cessna 206.

The report analyses the problems of phraseology in MOR, the CAA incident database. It deals in a general way with the difficulty of using English in communications between the pilot and the controller. On the one hand, this is not the focus of our study and, above all, the main conclusion of the report is that the occurrences in the MOR database are not detailed enough in the field studied to draw conclusions about the linguistic impact on aviation safety. Also, while the report seems an interesting approach to linguistic problems in English, it does not however concern the problem of bilingualism and therefore has no connection with our study.

In the narrative extract of the 1993 event on the NTSB website, a collision in Mexico between a Delta B727 and a Cessna 206, causing minor injuries to the Cessna pilot, the information on this occurrence is specified to have originated from a foreign investigative authority. To our knowledge, Mexico has not produced a report on this event. There is, therefore, no reason to consider this occurrence to be an event where language was a causal or contributory factor.

In view of what has been provided, there is no objective evidence from the ICAO that can be taken into account in support of the perception of the risk from two languages in one space.

2.1.2.1. European Action Plan for the Prevention of Runway Incursions

This European plan for the prevention of runway incursions includes a certain number of recommendations organised by theme and is addressed to ANSPs, aerodrome operators and airlines.

The first plan dates from 2003 and the Eurocontrol SRC was tasked with ensuring its implementation.

The current version No. 2.0 dates from 2011 and has been formally signed by a number of European organisations[2].

[2] For France, it was signed by the directors of the DSAC and the DSNA.

- In the field of ATS communications, recommendation No. 3 should be considered :
  - ***Improve situational awareness, when practicable, by conducting all communications associated with runway operations using aviation english.***
  - ***Improve situational awareness, when practicable, by conducting all communications associated with runway operations on a common frequency.***
- These two recommendations are addressed to :
  - Airlines
  - Air Navigation Service Providers
  - Airport operators

The study analyses the bases for these recommendations.

2.1.2.2. The SRC

- Two structures have been created within EUROCONTROL, considered to be independent. Both are attached directly to the Provisional Council :
  - The Performance Review Commission (PRC) made up of 12 members acting independently,
  - The Safety Regulation Commission (SRC), made up of a representative from each of the 41 States. It reports directly to the Provisional Council.

The SRC is responsible for providing advice to guarantee, through cooperation between the States on safety regulation, high and consistent levels of air traffic management safety within the ECAC region.

The SRC gives its opinion on the development of harmonised requirements in safety regulations for the ATM system, which the Member States must apply.

The SRC informs the Permanent Commission, through the Provisional Council, of all matters relating to the regulation of ATM safety, including recommendations aiming to improve the safety of these services.

The EUROCONTROL SRC has been tasked with leading the implementation of the Action plan for the prevention of runway incursions under the oversight bodies of the Member States (the DSAC for the DGAC).

In its 2013 annual report, the SRC took a position on the issue of the exclusive use of English in ATC communications.

- ***Use of More than one Language at Airports in EUROCONTROL Member States :***
  - ***Since it was raised in 2011, the SRC and its Coordination Group (SRCCG) have been regularly discussing this subject.***
  - ***At its meeting in March 2013, the SRC was able to agree a position on the matter, with the following recommendation being accepted by the EUROCONTROL Provisional Council at its 39 th Session in May 2013.***

« States give positive consideration to the benefits of situational awareness to improve safety on airports and relevant surrounding airspace sectors at aerodromes and relevant surrounding airspace sectors with international traffic, more than 50,000 commercial IFR movements a year and a large majority of qualified pilots with acceptable level of English.

- *This consideration would in particular encompass :*
  - *Extending the use of English by qualified pilots on some safety critical frequencies on airports and relevant surrounding airspace sectors*
  - *Use of a single frequency for all the safety critical operations on a runway or a set of runways. »*

Where this consideration could lead to a change in current communication arrangements, States should decide to base their consideration on the outcome of local safety assessment

States should report to SRC the progress in their consideration.

The SRC position must therefore be supported by a safety study whenever the use of English becomes exclusive or preponderant. This study has not identified any such process prior to the regulation.

2.1.2.3. The 2006 EUROCONTROL study

The ICAO manual Doc 9835, referred to previously, mentions two EUROCONTROL reports from 2004 and 2006.

EUROCONTROL had noted that ATC communication problems were well documented for the USA and that their results would not necessarily apply to the ATC situation in Europe.

The Agency therefore decided to launch a study in this area. It outsourced it to the Dutch National Aerospace Laboratory (NLR-Netherlands). A first report was published in 2004 and a second in 2006 following a survey of ANSPs and airlines. This study covers all technical and operational aspects related to ATC communications.

- The study took place in two phases :
  - Phase 1 : Collection of incidents related to air-ground communications. This phase took place between 25 October 2004 and 31 March 2005, over about 5 months. A form was used, to be filled in on a dedicated NLR website.
  - Phase 2 : Collection of opinions from pilots and controllers participating in the study using a questionnaire.

The question of bilingualism in ATC communications is absent from the incidents collected (305 incidents).

However, the analysis of the pilots' responses to the questionnaire mentions the exclusive use of English as a proposed solution to resolve radio communication problems, by virtue of the concept of situational awareness.

However, the exclusive use of English is not explicitly included in the recommendations that conclude the study, except indirectly by recommending that an evaluation be carried out on a number of specific recommendations present in the opinions of the pilots and controllers.

2.1.2.4. Material accompanying paragraph 14 015 of the SERA Part C regulation

Paragraph 14 015 is accompanied by an AMC and 2 GMs. EASA has not provided a French translation of these texts.

- *AMC1 SERA. 14 015 Language to be used in air-ground communication :*

« The competent authority should only prescribe other conditions for the use of English language at aerodromes with more than 50 000 international IFR movements per year for specific cases, based on an individual assessment of the local arrangements. In any case, deviation from the requirement should be limited to exceptional cases and should be accompanied with a safety assessment. »

The meaning of this paragraph has been clarified by the DTA, which worked on drawing up the regulatory text. The first sentence deals with States where the exclusive use of English is effective because the level of traffic exceeds the defined threshold. The competent State authority then no longer has the capacity to issue authorisations to use the local language under standard conditions. Authorisation may only be issued on a case-by-case basis depending on the particular circumstances of the aerodrome. The use of a language other than English must be exceptional and in specific cases, each of which has been the subject of a prior safety study. For example, the case of returning to the local language in a distress situation for a crew having the nationality of the State of occurrence at a specific aerodrome must be analysed in this context.

« In States which decide not to apply the requirement to use the English language, the study referred to in SERA. 14 015 should include an independent and comprehensive assessment of the impact of not using English for air-ground radio communications. »

For the French State, the study is conducted by STAC, the Civil Aviation Technical centre, attached to the DTA, the Directorate of Air Transport of the DGAC.

Each of the aerodromes concerned has been the subject of an assessment mission by independent experts. The timing of these missions and the conclusions of the assessments are included in the report.

▸ ***Such an assessment should in particular take into account that :***

(a) Any available accident and incident investigation reports at least at EU level, where the use of language has been identified as a contributing factor. For this purpose, the central repository created in accordance with Commission Regulations (EC) Nos 1321/2007 and 996/2010 for such reports should also be consulted.

The research was limited to events in France, because it is not appropriate for the French authority to make a judgement on events abroad in which it is not involved. Having no access to the ECCAIRS database, this request was dealt with by analysing reports available from the French investigative authority, the BEA, which dealt with the issue.

To complete the picture for the BEA, which does not have the capacity to investigate all national events, the air navigation services of the aerodromes concerned were asked to provide the event notification forms (FNEs) for events involving crews using different languages.

In the same way, ASRs corresponding to such situations were requested from the airlines met (Air France, Hop !, and EasyJet).

Finally, the DSNA/DO supplied all “runway incursion” FNEs for the six aerodromes concerned by paragraph 14 015 for the past three years (2014, 2015 and 2016). All these events have been examined through the linguistic context of their occurrence.

On the other hand, no study justifying the interest of monolingualism, prior to drawing up the SERA Part C regulation has been identified.

▸ The only study on air-ground communications that it has been possible to find is that outsourced to the National Aerospace Laboratory (NAL) of the Netherlands by the Eurocontrol agency in 2004 then in 2006 :

- *Air-Ground Communication Safety Study : Causes and Recommendations.*

The analysis of the report of this EUROCONTROL study is presented in volume 3 of this study.

(b) The proportion of pilots frequenting that airport, with English language proficiency endorsement.

(c) The proportion of pilots frequenting that airport, lacking language proficiency endorsement in the alternative language to be used.

Points (b) and (c) can be interpreted as a request to assess the proportion of pilots who can communicate in a regulatory way in French or in English.

- An approach to this request was carried out using commercial traffic statistics for the six aerodromes in question, considering that :
  - Pilots from French companies communicate in French.
  - Pilots from all other companies communicate in English.

This approximation was completed with the VFR traffic at these aerodromes, for which almost all the pilots communicate in French.

(d) A consultation of flight crews operating at the airport in question, on their preferences and ability to use the languages in question.

This point was dealt with using an online questionnaire made available to users of the aerodromes concerned. The question posed by the AMC was understood as being the preference of pilots operating at the aerodromes concerned between the use of English and French and the declaration of their levels of language proficiency in the two languages.

(e) A consultation of the safety investigation authority.

A working meeting on the subject was organised with the BEA.

The BEA has not produced a specific study on the impact of bilingualism on safety.

- *GM1 SERA.14015 Language to be used in air-ground communication :*

« In addition to the requirement in SERA. 14 015, positive consideration should be given by competent authorities to the benefits of situational awareness which could improve safety on airports and relevant surrounding airspace sectors by extending the use of the English language on some safety critical frequencies at aerodromes and relevant surrounding airspace sectors also with less than 50 000 commercial IFR movements per year, but with international traffic, and a large majority of qualified pilots with acceptable level of English. »

As mentioned above, the study does address the consequence of the exclusive use of the English language for flight control in all surrounding areas associated with the aerodromes concerned. GM1 clarifies that States wishing to implement paragraph 14 015 may also consider this provision at aerodromes with a level of traffic below the defined threshold. The study is restricted to aerodromes where the international traffic is above the defined threshold.

- *This consideration should in particular encompass :*

(a) use of a single frequency for all the safety critical operations on a runway or a set of runways ;

The practice alluded to is verified at all the aerodromes concerned. The study has, nevertheless, analysed the impact of the use of vehicle frequencies.

(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.

The study also addresses this issue of the proficiency of vehicle drivers ; it has been systematically brought up during working meetings with the SNAs of each of the aerodromes concerned.

For aerodromes in the Paris region, a specific meeting was organised with the operator ADP.

where this consideration could lead to a change in current communication arrangements, it should be based on the outcome of a local safety assessment ;

This part concerns aerodromes that will apply paragraph 14 015 and for which the vehicle drivers are not proficient in the use of aviation English.

▸ ***GM2 SERA. 14 015 Language to be used in air-ground communication :***

« The competent authority should also consider extending the requirement for the use of English language to aerodromes with less than 50 000 international IFR movements per year based on local needs, such as seasonally high levels of international air traffic. »

This aspect of "anglophone seasonality" was considered irrelevant in the case of France. More specifically, no airport has been identified as falling under the GM2 "criteria".

2.1.2.5. Opinion on NPA SERA Part C section 14 015

Opinion No. 04/2014 makes reference to a safety study but, as we have indicated elsewhere herein, this study on the safety risks from the use of bilingualism for air-ground radio communications, or the safety improvements that could come from adopting monolingualism, does not really exist.

A safety impact assessment process has been carried out during the different phases of the development of the rule (see NPA 2014-0512). The application of this structured safety impact assessment process has shown that SERA Part C, will ensure a safer air traffic flow within the EU.

In the SERA 14 015 paragraph "Language to be used", there is a long definition of the term "designated aerodrome", which refers to aerodromes for international use and shown on a list established by the Member States. It also underlines that Eurocontrol has endorsed the recommendation of Member States (it is not clear which of them, or if this concerns all Member States) to take into consideration the extension of the use of English by qualified pilots on some critical frequencies (it is not specified which ones) for aerodromes with more than 50 000 annual commercial IFR movements. As mentioned above, our study has carefully analysed Eurocontrol's EAPPRI document and has not, through this analysis, been able find evidence that it has carried out an in-depth safety study.

In this provision, it is important to note that the term 'designated aerodromes'which appears in the phrase 'designated aerodromes and routes'appearing in (b), has a different meaning from that of 'designated'as, for example, in 'designated ANSP'in the SES context. The term as used in this paragraph refers to aerodromes and routes which are designated as being for international use in a list established by the Member States, which is accor- dingly published in the national AIPs. This explanation will be used to develop Guidance Material associated with SERA.14015. It also has to be noted that the EUROCONTROL Provisional Council in its 39 th meeting has endorsed the recommendation to Member States to consider the extension of the use of the English language by qualified pilots on some critical frequencies at aerodromes with international traffic of more than 50 000 commercial IFR movements per year.

The Opinion also specifies that the regulation should apply to ground personnel working on the operation and maintenance of the aerodrome infrastructures and in particular the manoeuvring areas.

▸ *2.5.2 Proposed amendments to apply the rule to aerodrome operators and personnel working on the operation and maintenance of the aerodrom infrastructure and in particular on the manoeuvering area.*

The rules of the air, as their name indicates, are the rules to be applied by users of the airspace, but also by the personnel on the ground so as to ensure the correct understanding between the personnel on the ground and the personnel on the air.

While the SERA IR Regulation concerns ground personnel engaged in aircraft operations, it does not concern specifically either the aerodrome operators or the personnel working on the operation and maintenance of the aerodrome infrastructure or on the manoeuvring area. That is the reason why paragraph 3 of Article 1 'Subject matter and scope'as well as the definition of the term 'safety-sensitive personnel' have been amended.

2.1.2.6. Comments on NPA SERA Part C section 14 015

It can be observed that the detailed text of the AMC and GMs adopted and published definitively in October 2016 is strictly identical to that in the NPA of 15 September 2015.

A detailed analysis of the comments and responses reveals (among other comments) that important comments on the use of the language have not been followed up, when they should have been better considered.

France, for example, expressed comments through the DGAC, noting that, although provisions aim to allow the use of the national language, this will not be possible in practice because all the phraseology is defined in English only and further enquiring if alternative means of compliance (ALT MOC) would be possible.

▸ *365 comment by : DGAC/DTA*

The Executive Director Decision issuing AMCs and GMs to SERA will be published on EASA's website only in English with no official translation provided elsewhere in other languages. Consequently, AMC1 SERA. 14 001 depicted in Appendix I will be provided only in English.

▸ *Furthermore, the requirements for the language to be used in air-ground communications are set in SERA. 14 015, allowing Member States to use their national language in some cases. Consequently, in those cases Member States will not be able to apply the phraseology defined by AMC1 SERA.14001 since it is provided only in English. This raises the following question*

Do Member States have to choose an alternative means of compliance (AltMOC) written in their national language to insure compliance with SERA. 14 001 when using their national language in air-ground communi cations ?

▸ The response from EASA dealt only with the form (The regulation does not provide for ALT MOC) and not the substance :

▹ *Response*

▹ *SERA does not contain any provisions about the possibility to use alternative means of compliance (AltMoC). The lack of a procedural mechanism specifically foreseen for notification of AltMoC means that deviations from an AMC do not necessarily have to be notified to the Agency. However, the Member States are reminded of the obligations contained in Articles 5, 8 and 9 of Regulation (EU) No 923/2012 in which the provisions regarding the differences to ICAO, transitional and additional measures and safety requirements are contained.*

We can also mention the intervention of the Europe Air Sport association which, while recognising the variety of languages in Europe, declared that monolingualism is not possible for general aviation because it would be a "loss of human rights" and suggested deleting all of paragraph 14 015 ;

- *346 comment by : René Meier, Europe Air Sports*

As you might imagine the "language to be used" provisions are of great concern, but this for sure is not surprising when we look at the map of Europe, where there are small countries counting up to 4 official languages, large countries with one official language only, and variations in-between.

These facts make it difficult to propose solutions acceptable to our members, understandably wishing to use their mother-tongue in their home-country, expecting English being available all over Europe as aviation standard to those crossing national borders which in many cases also are language borders.

- *Language to be used*
  - *The provision is not acceptable for GA. This would be seen as a loss of human rights in your own country.*
- *Proposal :*
  - *Delete the whole provision.*
- *Rationale :*
  - *This would prevent non-English speaking pilots from using some international airports.*

2.1.3. Linguistic proficiency of front-line stakeholders

2.1.3.1. Annex 1 of the Chicago Convention (ICAO) : Personnel licensing

In 1998, the Assembly of the ICAO, taking note of several accidents and incidents where the linguistic proficiency of pilots and air traffic controllers were causal or contributory factors (the Tenerife accident, for example, where no one spoke English to a sufficient standard allowing all the stakeholders to understand one another without ambiguity), adopted a resolution inviting the Air Navigation Commission to give priority consideration to the question of fluency in the English language.

- This resolution led to an amendment of Annex 1 of the Chicago Convention in 2003 (Amendment No. 164 of 5 March 2003). This amendment introduced a language proficiency rating scale in six levels :
  - 1 Pre-elementary
  - 2 Elementary
  - 3 Pre-operational
  - 4 Operational
  - 5 Extended
  - 6 Expert

Level 4 "Operational" is required as a minimum for pilots and controllers.

The European Union rating scale for pilots and controllers is given in Annex 2.

The amendment provided for a transitional implementation phase of 5 years, in this case until 5 March 2008.

2.1.3.2. Linguistic proficiency of pilots

By an order issued on 24 April 2007, the DGAC implemented level 4 proficiency in the English language for all professional pilots as of 5 March 2008. The DGAC aligned itself with the date set by the ICAO.

Currently, the European Union regulation in force which contains linguistic proficiency requirements for pilots (professional and private) is as follows :

COMMISSION REGULATION (EU) No 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council.

Part FCL.055 of this regulation stipulates that in order to exercise the privileges of their licence, pilots must demonstrate at least an operational level of language proficiency, both in the use of phraseology and in everyday language, either in English or in the language used in radio communications made during the flight.

This part specifies that all IFR pilots must have linguistic proficiency in English. Non-IFR pilots (PPLs in particular) must have linguistic proficiency in the language used in radiotelephony by the ground station. So, in this case, language proficiency in French is sufficient for VFR pilots in French airspace.

2.1.3.3. Linguistic proficiency of controllers (ICNA)

▸ The European Union adopted Directive 2006/23/EC on an ATC licence on 5 April 2006. This directive repeats the text of the ICAO recommendations on linguistic proficiency from amendment No. 164. Member States had to transpose this directive into national law no later than :

- 17 May 2008 for the licence in general
- 17 May 2010 for the special case of linguistic proficiency.

The DGAC put in place the requirement for linguistic proficiency in English at a minimum of level 4 for controllers as from 5 March 2008.

It should be noted that, several years before this deadline, the English level for competitive entry to ENAC for student controllers was level 3, with a minimum of level 4 on leaving.

COMMISSION REGULATION (EU) 2015/340 of 20 February 2015 laying down technical requirements and administrative procedures relating to air traffic controllers' licences and certificates was then published. It maintains the requirement for linguistic proficiency in English at a minimum of level 4 for controllers.

2.1.3.4. Linguistic proficiency of electronic engineers (IESSA)

There is no European regulation concerning the English language proficiency of this personnel.

The DSAC set the conditions for awarding the licence for maintenance personnel and personnel for technical monitoring of air navigation systems in the regulations through the ATSEP licence (Order of 11 September 2014).

The level of language proficiency used in this order is B1 in the Common European Framework of Reference for Languages (CEFRL).

2.1.3.5. Reasons for requiring a proficiency level in English

The ATSEP licence is applicable only to ATSEPs of the DSNA, the conditions for its award corresponding to their training and to the needs of the DSNA : use of technical instructions in English, contact with the customer service of certain non-Francophone equipment suppliers, coordination with foreign sites or services (e.g. tracking of foreign radar delivering data to CAUTRA).

2.1.3.6. Choice of the European CEFRL standard rather than that of the ICAO

The need in linguistic proficiency in English for IESSAs concerns technical, electronic or IT subjects.

The ICAO standard relates to the regulation of pilots and controllers for air-ground communications. The choice of the level of English, B1 in this case, does not concern the specific issue of certain IESSAs having to go to the manoeuvring area of an aerodrome for maintenance operations (ILS, for example). The question therefore remains open.

Although they have different objectives, it can be considered that CEFRL level B1 would correspond to between ICAO levels 3 and 4.

2.1.3.7. Situation for IESSA holders prior to 1 January 2017

This requirement for level B1 only concerns IESSAs who obtained their ENAC diploma after 1 January 2017.

There is no level upgrade action planned for IESSAs in activity before this date. They are holders of the ATSEP licence under “grandfather rights”, and are therefore deemed to have CEFRL level B1.

2.1.3.8. Linguistic proficiency of ground personnel

These are vehicle drivers liable to go into the manoeuvring area under certain circumstances :

- RFFS personnel,
- Wildlife control personnel,
- Personnel responsible for runway inspection,
- Personnel responsible for maintenance of the operator’s equipment,
- Personnel responsible for cleaning, de-icing and snow-ploughing runways.

There is no regulatory text, either national or European, concerning these personnel that includes requirements for English language proficiency.

The discussions that took place with Paris Aéroport (ex-ADP) in particular have highlighted the variety of levels in terms of English language proficiency found among all ground personnel required to circulate in the manoeuvring areas and especially on the runways.

2.1.3.9. Linguistic proficiency of pilots with State aviation authorities

- There are seven State aviation authorities in France deploying air resources :
  - lthe chief of staff of the army
  - the chief of staff of the navy
  - the chief of staff of the air force
  - head of the directorate general of armaments
  - the director general of the national gendarmerie
  - the director general for civil defence and crisis management
  - the director general for customs and excise

These Aviation authorities have missions of National Defence, inspection, protection and rescue for the civilian population and general public services.

The Aviation authority pilots, after their recruitment, receive training and, of course, maintain skills throughout their career within their own Aviation authority, but these various stages generally take place in a specific context.

Although some Authorities have partially aligned themselves with the licensing system (EASA Part FCL) and civilian qualifications (FCL 055, for example), this is not the general rule. Information on this subject was collected through various interviews. It is detailed in paragraph 4.2.6 of this volume.

2.1.4. Determination of the aerodromes concerned in France

2.1.4.1. Data from the DSNA/DO

- The following table shows 2015 traffic data :

Aerodrome	*International Traffic*	*Commercial Traffic*
Paris-Charles-de-Gaulle	*420 182*	*469 338*
Paris-Orly	*126 867*	*231 114*
Nice-Côte d'Azur	*89 171*	*157 769*
Bâle-Mulhouse	*64 983*	*73 298*
Lyon-Saint-Exupéry	*61 188*	*105 619*
Marseille-Provence	*50 026*	*90 648*

- The six aerodromes concerned SERA by paragraph 14 015 of the Part C regulation in France are therefore
  - Paris-Charles-de-Gaulle
  - Paris-Orly
  - Nice-Côte d'Azur
  - Bâle-Mulhouse
  - Lyon-Saint-Exupéry
  - Marseille-Provence

2.1.5. ATS units at the aerodromes concerned

The organisation of air navigation services at large French aerodromes differs from that at similar-sized aerodromes in Europe.

It is therefore necessary to specify the structure of an ATS unit at a large French aerodrome ; the six aerodromes concerned by the new regulation follow the model described below.

2.1.5.1. Airspaces

- The airspaces associated with the aerodrome are generally as follows :
  - A CTR, a TMA serving the aerodrome and a certain number of secondary aerodromes.
  - A flight information airspace larger or overlapping the TMA : called the FIS space by analogy with the service provided, this space often adjoins that of other aerodromes. For example the FISs for the Marseille-Provence and Nice-Côte d'Azur ATS units are adjoining.

The ceiling of the spaces managed by the unit is generally FL145.

2.1.5.2. Services provided

- The control services provided by the units present at the aerodrome are in general as follows :
  - Aerodrome control for the main aerodrome (the 6 aerodromes concerned by SERA 14015)
  - Approach control and flight information service depending on the class of airspace involved for IFR and VFR flights in transit and coming from / going to other aerodromes located within the boundaries of the TMA and FIS.

2.1.5.3. Special case of the Paris region

The airspace of the TMA of the Paris region is class A, so VFR flights are prohibited there. As a result, it has an increasingly wide perimeter per altitude stratum (7 strata) to enable VFR and light aviation activity at the peripheral aerodromes in the Paris region.

2.1.5.4. Consequences in terms of control positions

- Reading of the regulation leads to the conclusion that the following control positions are within the scope of part 14015 of the SERA regulation :
  - PREVOL : Start-up, departure clearance from the aerodrome
  - SOL : management of ground traffic at the aerodrome
  - LOC : Final approach and initial departure, take-off and landing at the aerodrome
  - APP : Approach and departure of traffic for all aerodromes in the TMA
  - SIV : when this airspace is class D for the management of IFR and VFR traffic

2.2. Methodological approach

French ATS units have historically practised French-English bilingualism. Today, all front-line stakeholders are working to achieve a constant level of safety in the face of ever-increasing traffic levels. The level of safety in France has never been considered problematic, neither by ICAO, by EASA, nor by the French surveillance authority the DSAC. The issue for the study is to investigate if there are, nonetheless, precursory elements that would indicate a safety problem in the coexistence of control instructions given in French and in English by the controller. We have seen in the previous chapter that a pilot, like a controller, must master English to a defined level in order to qualify. Similarly, the French controller and pilot master aviation phraseology in French at a sufficient level to be issued their licences. The level of linguistic proficiency for front-line stakeholders is therefore considered sufficient in the language they use.

In France, Anglophone pilots may not understand instructions given in French. The job of the controller is to provide control instructions to manage the traffic he has in the language of each of the pilots and to provide additional information if necessary. The Anglophone pilot, therefore, does not have the need to understand instructions given in French for the safe flow of traffic.

The expectations of paragraph 14 015 and its associated texts (AMC and GMs) are based on the assumption that the crew can gain situational awareness of the traffic around their aircraft by listening to radio communications and that this awareness should be maximised by ensuring that pilots understand all communications, thus imposing a single language in Europe : English.

The issue for the study is therefore to look for occurrences involving two crews speaking respectively in French and in English and in which the controller was not aware of a conflict situation and where it is proven that the use of two languages was the cause of the accident or incident. In addition, there has also been a search for occurrences where the two crews spoke the same language and where awareness of the situation by listening to the radio communications enabled a crew to detect the conflict situation. These occurrences have been sought out from the various organisations that contribute to the safety of the activity. These various issues are described below.

2.2.1. The issue studied through BEA incidents and accidents

AMC1, which clarifies part 14 015 of the SERA Part C regulation, requires a consultation with the State investigation authority. A meeting was therefore arranged with the BEA in this framework.

2.2.2. The issue studied through events reported by air operators

The study steering committee[5] chose to complete the factual safety elements presented in the report with the point of view of companies representative of the air operators at the aerodromes concerned by SERA Part C. It chose two French companies, Air France and Hop ! and one foreign company, EasyJet.

The DSAC supplied a contact at each of the companies who sent a list, established by the company, of people to meet ; each company freely came up with the list of people to meet.

Air operators have a safety management system that is an integral part of their AOC certification. This system requires the collection, analysis and transmission to the authorities of safety events in certain well-defined cases. In the scope of the study, each of the companies we met presented us with their SMS, making it possible to find any possible occurrences required for the study.

The companies met during the study supplied only one event related to bilingualism.

[5] *The conduct of the study is described in paragraph 2.3.2.*

2.2.3. The issue studied through events reported by the DSNA, provider of air navigation services

At the study launch meeting in the presence of members of the study steering committee and representatives of the air navigation service provider, the DSNA, it was decided to supplement the factual safety elements presented in the report with the view of the air navigation services at the aerodromes concerned by SERA Part C. The DSNA representatives indicated that the contacts for these studies would be the heads of operation of the SNAs and their respective heads of the Quality of Safety Service subdivisions.

The DSNA Integrated Management System (IMS) was sent by its Operations Directorate (DO) to the study authors.

The IMS comes within the scope of REGULATION (EC) No 549/2004 of the European Parliament and of the Council of 10 March 2004 laying down the framework for the creation of the single European sky, the European Parliament legislative resolution of 25 March 2009 on the proposal for a regulation of the European Parliament and of the Council amending Regulation (EC) No 216/2008 in the field of aerodromes, air traffic management and air navigation and with Commission implementing regulation (EU) No 390/2013 of 3 May 2013 laying down a performance scheme for air navigation services and network functions (règlement CE No 390/2013) and complies Commission implementing regulation (EU) No 1035/2011 of 17 October 2011 laying down common requirements for the provision of air navigation services with the requirements of the ISO 9001 "Quality Management Systems" standard.

This management system includes the safety, security, environmental and quality components related to the DSNA's activities.

This system requires the collection, analysis and transmission to the authorities of safety events in certain well-defined cases. In the scope of the study, the DSNA supplied us with its IMS manual and sent us all the relevant FNEs for our analysis.

The DSNA supplied 203 FNEs concerning runway incursion events.

2.2.4. The issue studied through events reported by airport operators

The situation of the airport operators concerned is similar to that of the air operators. They are certified under the European regulation which provides for a safety management system as an integral part of their certification.

For the emblematic case of the ADP Group, the director of the Directorate General of Operations (DGO) of the ADP Group allowed contact with the Directorate of airside areas at Paris-CDG (CDGR).

The Directorate of airside areas provided no event concerning movements of its vehicles in a situation of bilingualism.

2.2.5. The issue studied through events reported by State aviation authorities

An official letter from STAC to the DSAé of the Ministry of Defence allowed contact to be established with the State aviation authorities.

Direct contacts were also established with those designated within each of these Aviation Authorities.

The State aviation authorities provided no event in a situation of bilingualism.

2.2.6. The issue studied through the experience of Quebec

The study analysed the experience of the province of Quebec in Canada for the Montreal flight information region regarding the issue of the introduction of bilingualism. In fact, the Canadians introduced French in addition to English for ATC communications in the 1970s, to improve the aviation situation following extensive studies and simulations. They have not seen any deterioration in safety as a result of this.

2.2.7. The questionnaire requested by the AMC

An online questionnaire was established to meet the requirements of AMC1. It was developed with the Lime Survey tool and then processed by the IT Projects Assistance subdivision of STAC.

This questionnaire was brought to the attention of the users of the six aerodromes concerned by way of an aeronautical information circular, reference AIC France A 15/17, published in French and English on 1 June 2017 by the Aeronautical Information Service of the DSNA. This AIC is given in Annex 5 of volume 3 in both language versions.

For the purposes of a possible integrity check of the responses, the number and type of licence held by each pilot responding to the questionnaire was requested. This information was offered to the DSAC for control.

In this context, the file obtained from the questionnaire was the subject of a normal declaration to the CNIL under registration number 2 013 429. STAC undertook not to keep the licence identification data beyond the needs of the study and for a maximum of one year from the date of preparation of the complete file (30 June 2017).

- The users of the aerodromes concerned are classified as follows :
  - Professionals if they hold an ATPL or CPL licence
  - Private if they hold an LAPL, SPL, PPL, UL or VV licence
  - Occasional user of the aerodrome if the pilot has been there less than once a month on average (over the previous 12 months)
  - Regular user of the aerodrome if the pilot has been there once a month or more on average (over the previous 12 months)

A response to the questionnaire was considered complete when the user had answered the 18 questions, ticked the box promising to complete the questionnaire only once and sincerely, and saved the questionnaire. Only the complete responses have been used.

AMC1, which clarifies part 14 015 of the SERA Part C regulation, requires a consultation with the State investigative authority.

2.3. Conduct of the study

2.3.1. Stakeholders

The Director of STAC, Mr Olivier Jouans, appointed Mr Stéphane Ly as project manager. He is head of the Information Systems and Air Navigation Department of STAC, and he coordinated the study, supported by independent experts, Mr Yves Garrigues for airports and airlines and Mr André Xech for ATS.

A steering committee was made up of Mr Olivier Jouans, Director of STAC, Mr Jean-Louis Pirat, Scientific Advisor - International Affairs of STAC and designated representatives from DTA/MCU, Mr Gilles Mantoux, Head of Mission of the Single European Sky and the regulation of air navigation, and from the DSAC, Mr Frederic Medioni, Technical Director Airports and Air Navigation. DSNA specialists also participated in the meetings of this steering committee and provided information necessary for the conduct of the study.

2.3.2. Conduct of the study

The study was conducted by studying in parallel BEA reports, FNEs from the DSNA and ASRs from Air operators and various documents related to the issue. The lessons learned over time generated the demand for new information from the contacts within these entities.

- The main steps in conducting the study are listed below :
  - Establishment of the list of aerodromes concerned,
  - Interview with the SNAs of the aerodromes concerned,
  - Interview with the designated representatives of two major French airlines and a company whose AOC was issued by the United Kingdom, which is English-speaking by nature and whose operations are representative of the users of the aerodromes concerned,
  - Interview with an airport operator,
  - Interviews with representatives of other States in a situation of bilingualism similar to France,
  - Entretien avec le BEA,
  - Collection and analysis of accidents and incidents where bilingualism could have been a contributory cause or circumstance,
  - Collection and analysis of traffic data and safety reports from the SNAs at the aerodromes concerned,
  - Collection of Human Factor aspects brought into play by situational awareness,
  - Definition of a method to collect the opinion of pilots as required by the AMC of the regulation :
    - publication of an AIC and putting a questionnaire for pilots online.

The detailed calendar of all the meetings is shown in Annex 1 of volume 3.

2.3.3. Compliance with the requirements of the SERA Part C regulation

The compliance of the study with the requirements of the SERA Part C regulation is guaranteed on the one hand by the methodological approach that verifies the AMC1, GM1 and GM2 complements to the requirements of paragraph 14 015 described in paragraph 2.1.2.4. At the same time, whenever it was necessary, the understanding of the texts by the independent experts was compared with the point of view of the DTA which is responsible for the establishment of the regulations in France and its coordination with the European Commission and EASA, as well as the DSAC, which is responsible for monitoring the application of the regulations in France by service providers and operators.

2.4. Reference documents

The documents used as reference for the study are listed below :

- Annex 1 to the Convention on International Civil Aviation (Amendment N° 164 on 5 March 2003)
- Annex 10 to the Convention on International Civil Aviation (Amendment N° 78 on March 2003)
- ICAO Manual Doc 4444
- ICAO Manual Doc 9476
- ICAO Manual Doc 9 835
- Commission Regulation (EC) N° 551/2004
- Commission Regulation (EC) N° 549/2004
- Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008
- Commission Regulation (EC) N° 29/2009 (Data Link Services)
- Commission Regulation (EC) N° 1070/2009
- Commission Regulation (EC) N° 1035/2011 of 17 October 2011
- Commission Regulation (EC) N° 1178/2011 of 3 November 2011
- Commission Regulation (EC) N° 963/2012
- Commission Regulation (EC) N° 390/2013
- Commission Regulation (EC) of 20 February 2015
- Commission Implementing Regulation (EU) 2016/1185 of 20 July 2016
- Directive N° 2006/23/CE de l'Union Européenne.
- Loi n° 94-665 du 4 août 1994
- Opinion N° 04/2014
- ENDSLEY, MR (1995) Toward a theory of situation awaraness in dynamic systems Human Factors
- « Air-Ground Communication Safety Study Causes and Recommendations » EUROCONTROL 2006
- European Action Plan for the Prevention of Runway Incursions Edition 2.0 Eurocontrol 2011
- Safety Regulation Commission 2013 Annual Report
- « The Language of the skies » Sanford F.Borins Collection, The Institute of Public Administration of Canada
- « Le français dans les airs » Sanford F.Borins, L'institut d'aministration publique du Canada

3. Legal analysis

The study dealt in the preceding parts with the coherence of paragraph 14 015 of the SERA Part C regulation with the texts of the ICAO and the European Commission and the taking into account of comments following the consultation of the States during the preparation of this regulation.

The following part deals with the coherence of paragraph 14 015 of the SERA Part C regulation with the French Constitution. It is based on interviews with the DGAC's legal department.

3.1. EU law and that of the Member States

3.1.1. European law

The Treaty on European Union provides :

- **Articles 3 : (The Union) It shall respect its rich cultural and linguistic diversity, and shall ensure that Europe's cultural heritage is safeguarded and enhanced.**
- **Article 4 § 2 : The Union shall respect the equality of Member States before the Treaties as well as their national identities, inherent in their fundamental structures, political and constitutional, (...). The Court of Justice of the European Union says that the protection of the official national languages is part of the national identities of its Member States as duly respected by the Union.**

The Treaty on the Functioning of the European Union provides :

- **Article 18 : Within the scope of application of the Treaties, and without prejudice to any special provisions contained therein, any discrimination on grounds of nationality shall be prohibited.**

Charter of Fundamental Rights of the European Union

- **Article 21 : Any discrimination based on any ground such as (...) language, shall be prohibited.**
- **Article 22 : The Union shall respect cultural, religious and linguistic diversity.**

Like any European regulation, Regulation (EU) 923/2012 as amended by the Implementing Regulation (EU) 2016-2012 (SERA - Part C) is part of the hierarchy of European standards, at the top of which is, on the one hand, the Treaty on European Union (TEU) and the Treaty on the Functioning of the EU (TFEU), and on the other hand the Charter of Fundamental Rights annexed to the Treaties and of identical legal value[3].

From this point of view, the reference in SERA 14 015 to "taking into account the applicable provisions of Union law" is superfluous, not to mention the fact that, according to a general principle of interpretation of the Court of Justice of the European Union, an act of the Union must be interpreted as far as possible in accordance with all primary law and, in particular, with the provisions of the Charter[4]. The reference cited is nevertheless a reminder to technical decision-makers, less concerned by legal provisions, of the boundaries they must not go beyond.

[3] See article 6 § 1 TUE.

[4] CJUE Mc Donagh, C 12/11, point 44.

To articles 3 of the TEU (respect for linguistic diversity) and 18 of the TFEU (non-discrimination on grounds of nationality) but also 21 (non-discrimination based on language in particular) and 22 (cultural, religious and linguistic diversity) of the Charter of Fundamental Rights already cited, should be added article 4 § 2 of the TEU which states that "the Union shall respect the equality of Member States before the Treaties as well as their national identities, inherent in their fundamental structures, political and constitutional, [...]". The Court of Justice of the European Union has ruled that the protection of the national official language is part of the national identity of its Member States[8] as respected by the Union.

The articles of the Charter do, however, lay down principles whose concrete translation must be ensured by secondary legislation or CJEU case law. Article 22 (linguistic diversity) of the Charter thus served as a basis for the Court to recognise the legitimacy of the objective of protecting the official national language (in this case Lithuanian)[9]. Similarly, article 21 of the Charter (non-discrimination based on language) enabled the Court to censor the lack of full publication of European open competition notices in all official languages of the EU[10].

These articles of the Treaties and the Charter of Fundamental Rights are therefore part of the "applicable provisions of EU law" to be taken into account, to use the terminology of SERA 14 015.

3.1.2. French law

The French Constitution :

Article 2 defines the national language : "The language of the Republic shall be French."

It is important to underline that this article is found in title 1 of the Constitution "On Sovereignty", including it among the founding elements of the Republic. It gives assimilation of the language to the Republic and establishes French as the official and exclusive language. The use of a common language is also considered as preserving equality, another founding element of the Republic.

- **Law 94-665 of 4 August 1994 relating to usage of the French language ("Toubon Law") :**
- **Article 1 : "Language of the Republic under the Constitution, the French language is a fundamental element of the personality and heritage of France.**
- **It is the language of teaching, work, trade and public services.**
- **It is the privileged link of the States making up the Francophone community."**

[8] CJEU C-391-09, Runevic-Vardyn, point 86.

[9] CJEU, C-391/09 Vardyn.

[10] CJEU, C-566/10, Italian Republic v. European Commission, Lithuania and Greece.

3.1.3. European law and French law

The law of 4 August 1994 known as the "Toubon Law", which specifies how this article 2 is to be applied, recalls in article 1 that "the French language is a fundamental element of the personality and heritage of France". From this point of view, the French language can be considered as part of the constitutional identity of France, or of the "national identity" within the understanding of part 4 § 2 of the TEU.

Based on case law from the Constitutional Council[11], this article of the Constitution has become a real regulatory requirement for public authorities.

Since it is an element of the national identity of a Member State within the understanding of European law, it is however interesting to note that the CJEU seeks to reconcile the safeguarding of that identity with Union law, in particular in the case of a national provision with constitutional value. The Court has thus made it clear that the safeguarding of that identity constitutes a legitimate aim respected by the Union's legal system, in accordance with article 4 § 2 of the TEU[12].

3.2. Applicability of paragraph 14 015 in law

As regards both constitutional case law and the Toubon Law (article 1), the use of French is mandatory for the public persons[13] to whom French air traffic services (ATS) are responsible. This article therefore prevents, as it stands, the right to recognise the exclusive use of a language other than French in relations between users (pilots) and air traffic controllers.

Applied to the case of ATC communications between pilots and controllers, the case law mentioned above means that a national constitutional principle such as the use of the French language by public persons in their relations with users is protected, not only in internal law but also in Union law, since the national language also contributes to the preservation of the principle of equality, as mentioned above.

In conclusion, it can be argued that EU regulatory provisions establishing restrictions on the use of the French language by French air traffic services in radio communications (and in consequence by all French pilots) are not applicable in law.

If, as in this case, it concerns article 14 015 of the SERA Part C regulation, which is the subject of this study, we must not forget the implementing regulation thereof. It is Regulation (EC) No. 216/2008 of the European Parliament and of the Council in its Annex Vb, article 4, which limits the use of French to a defined volume of airspace as mentioned in paragraph 2.1.1.2.

3.2.1. European Union and ICAO regulations

As the European Union is not party to the Chicago Convention and its Annexes, the Chicago Convention is not integrated into the European legal system and has no higher value than Regulation (EU) No. 923/2012[14]. Therefore, the European Union is theoretically not bound by the provisions of the Convention, either in substance or in form.

In substance, however, this principle must be qualified, because all the Member States of the Union are parties to the Chicago Convention and its Annexes.

[11] Constitutional Court decisions Nos. 94-345 and 2006-541

[12] CJEU, C-51/08, European Commission v. Luxembourg, point 1243

[13] Or private persons tasked with a public service mission

[14] Contrary to the Montreal Convention of 28 May 1999 for the unification of certain rules relating to international air transport.

Member States are therefore bound by both their international and European commitments, which could, in theory, be contradictory. The European Union therefore takes this fact into account[15], not to mention that it incorporates most ICAO norms in EU law. There is further proof, in the framework Regulation (EC) No. 549/2004, that Regulation (EU) No. 963/2012 as amended states through Regulation (EC) No. 551/2004 that its application "shall be without prejudice to the rights and duties of Member States under the Chicago Convention" (article 1 § 3).

3.2.2. Modification in the hierarchy of languages

▸ Given the previous analysis of compliance with the European Union's regulations with regard to

"the rights and duties of Member States under the Chicago Convention", we are entitled to question the compliance of paragraph (a) of SERA 14 015 with respect to paragraph 5.2.1.2.1 of Annex 10 of the Chicago Convention :

- In fact, this paragraph (a) of SERA 14 015 stipulates : air-ground radiotelephony communications shall be conducted in English or in the language normally used by the station on the ground.
- As for norm 5.2.1.2 of Annex 10 of the ICAO, it stipulates : "air-ground radiotelephony communications shall be conducted in the language normally used by the station on the ground or in English."

Does not this inversion of terms constitute a hierarchy in the use of languages, French becoming an option vis-à-vis English ?

In a strictly grammatical sense, the coordinating conjunction "or" uniting the two groups of words establishes a link between them relating to choice ("either", "either…or"). The conjunction does not therefore establish a legal hierarchy in favour of the first group of words. Norm 5.2.1.2 of ICAO Annex 10, based only on the statement in (a) of SERA 14 015, is therefore strictly equivalent to it. The reversal of the order cannot therefore be considered as non-compliance with an ICAO norm.

But in that case, why change the ICAO text to which the European regulation is supposed to comply ?

The answer is to be found in Annex Vb article 4 of Regulation (EC) No. 216/2008 of the European Parliament and of the Council mentioned in 5.1.1.2., which creates a restriction in principle to the scope of use of the French language (a defined volume of airspace) in relation to the English language.

Unless otherwise interpreted, through the requirements for controllers' linguistic proficiency, Regulation No. 216/2008 implicitly lays down the general principle that the English language must be used in ATC communications, while maintaining a limited use, which remains to be defined, of a national language.

Yet in principle, the ICAO norm concerns the entire national airspace.

▸ Therefore, through Annex Vb of Regulation (EC) No. 216/2008 of the Parliament and of the Council and sub-section (a) of SERA paragraph 14 015 of Implementing Regulation (EU) No. 216/1185 we are entitled to consider that a hierarchy is indeed established between the use of English and French :

- English, in principle, should be used throughout French airspace,
- French can be used in certain defined airspaces.

[15] See also the Memorandum of Cooperation between the European Union and ICAO providing a strengthened framework for cooperation approved by decision of 8 May 2012.

In practice, the airspace where French will still be usable is defined through the requirement for the exclusive use of English for ATC communications at aerodromes with more than 50 000 international IFR movements per year, and in their associated airspace.

The question therefore arises of the compliance of Annex Vb of the basic Regulation EC 216/2008 and (a) of SERA 14 015 with norm 5.2.1.2 of ICAO Annex 10.

3.2.3. Access restrictions to the aerodromes and airspace concerned for private French pilots

French holders of LAPL, SPL, PPL, VV or UL licences operating in visual flight have demonstrated language proficiency in the French used in radiotelephone communications made during flight. It would be contrary to Implementing Regulation (EU) 1178/2011 to forbid them access to the aerodromes and airspace concerned.

Restrictions of access to certain aerodromes and airspace to private pilots who are not holders or who cannot be holders of the English language proficiency required by article FCL055, may be considered as not in compliance with the principle set out in article 5 § 4 of the Treaty on European Union. It may also be asked whether the principle of subsidiarity, as set out in article 5 § 3 of the TEU, is infringed. This concept, the legal nature of which is not clearly established and more the result of a political assessment, aims to protect the capacity for decision-making and action of the Member States while legitimising intervention by the Union if it is able to act more effectively.

In addition, requiring pilots flying in visual flight to obtain English language proficiency would be contrary to Implementing Regulation (EU) 1178/2011 in the same way, in so far as FCL055 (a) provides that the language proficiency validated on their licences is “either in English or in the language used in radiotelephone communications made during the flight”.

4. Analysis of the technical relevance

4.1. Situational awareness

4.1.1. Definition of situational awareness

▸ In its Manual of Evidence-based Training – Appendix 1 CORE COMPETENCIES AND BEHAVIOURAL INDICATORS, the ICAO gives the following understanding of situational awareness as regards crew member competency description:

«Perceives and comprehends all of the relevant information available and anticipates what could happen that may affect the operation.»

This definition was further developed through the work of Mrs Mica Endlsey, who was Chief Scientist of the US Air Force, and who is a reference in this field. In particular, she specifies that situational awareness calls on "the perception of elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future".

The psychologists met during the STAC study, who are also teachers at the ENAC academy, indicate that for pilots, the subject of "situational awareness", a concept that has only started to be taught quite recently, is one of the non-technical skills within crew resources that also include the ability to cooperate, the leadership with managerial skills and the decision-making ability.

Situational awareness can be divided into: awareness of systems, awareness of the environment and awareness of time. To take form, it must call on different senses, mainly sight and hearing.

4.1.2. The mental development process in situational awareness

▸ For both pilots and controllers, the mental development process in building situational awareness involves the following four steps:

- extraction of the necessary elements from the environment
- integration of this information with internal knowledge of the system to create a mental representation of the current situation
- use of this representation to direct further exploration in a cycle of continuous perception
- anticipation of future events.

4.1.3. Application of the concept to the ATC system

While a crew is "in sole command" for the conduct of a flight, as far as the safety of the flight is concerned it is, on the other hand, the responsibility of the air traffic control service to ensure safety and regulatory separation from known surrounding traffic.

For a controller: situational awareness therefore means having knowledge of the current positions of aircraft, their flight plans and forecasting future states so as to detect possible conflicts. It requires acquiring and maintaining a visualisation of the situation of traffic under control and anticipating potential changes. This includes communication with the aircraft (by voice or data-link/CPDLC) and with other controllers, the exploitation of the visual representation of the traffic being managed including all the essential flight data (indicator, FL, ground speed, ascent/descent) as well as flight plan PLN data in the form of paper "strips" or flight lists on a terminal connected to the Flight Plan Processing System.

The automated system includes a mechanism for ultimate detection of a conflict between two flights: the STCA, commonly called the safety net.

For a pilot: situational awareness means having a mental representation of the relationships between the aircraft's position, flight conditions, configuration and energy, as well as other factors that may affect safety such as ground proximity, obstacles, reserved airspaces and weather situation. The acquisition of situational awareness for pilots uses a variety of senses that cannot be reduced to hearing alone: this certainly includes communication with the controller, listening to communications between the controller and other aircraft, but also external vision, navigation, the environment on board and automated assistance, for which the last-resort safety nets (TCAS II, GPWS, RWSL), are not only warning tools but tend, rightly or wrongly, especially in the case of TCAS II, to become real information sensors, sometimes used continuously. Possible consequences of loss of situational awareness by the pilot may include CFIT, loss of control of aircraft, runway incursion, airspace violation, loss of separation, wake turbulence, severe icing or finally unplanned exposure to winds.

This observation applies in the same way during the various ground phases, before and after flight.

In conclusion: it is obvious that pilots can only acquire limited and partial information on the traffic around them; they cannot give it an exhaustive representation. From this point of view there is an asymmetry between the usable data and the representation of the traffic between the controller and the pilot.

4.1.4. SERA Part C and situational awareness for the pilot

The logic of part 14 015 of the SERA Part C regulation leads to a rather restrictive perception of the concept of situational awareness, such as the identification and understanding of a traffic situation by a pilot through the channel of listening to radio communications.

- However, situational awareness of the surrounding ATC situation is only part of flight management by the flight crew among other supervisory tasks and is not necessarily and at all times its major concern:
  - first of all because it is the controller's role to have an exhaustive knowledge of the traffic and fundamentally piloting in instrument flight conditions rests on this principle,
  - secondly, because pilots need to establish situational awareness in several areas, such as how tasks are actually handled within the crew in relation to the CRM[16] expected by the airline, the configuration of the aircraft, navigation, the meteorological environment, the airline's air operations, the situation of the cabin crew, the safety and comfort of the passengers and finally the air control environment,
  - and finally because the attention of flight crews to the surrounding traffic is more or less important according to the current action plan in the flight deck and according to the parameters for which supervision is critical at any given time.

It may be agreed that the vicinity of a runway is a place where the detection of another conflicting flight is favoured, provided that the meteorological conditions are sufficient, by the proximity of the aircraft and the geometry of the taxiways; and that if, by chance, a crew perceives a communication involving another aircraft that might be in conflict with the conduct of its flight, it will have no trouble locating such traffic, for example if it is allowed to enter the same runway. In this, situational awareness on the runway is theoretically operative, but on the one hand it has never been demonstrated and on the other hand the study notes that it is first visual contact, before auditory perception, that enables identification of the intruder. Perhaps, precisely because pilots cannot in practice take other communications into account, whatever their language

Anglophone pilots, when they have to line up or land on a runway, may sometimes feel some discomfort when they hear French instructions, since they do not have the ability to know if these instructions affect them or not. From this discomfort, there may arise the desire to want to understand all these instructions and consequently to impose the language they understand on other users, namely Francophone pilots and drivers of vehicles in the manoeuvring area.

[16] *Crew Resource Management.*

Yet, it should be noted that Francophone pilots understand French as well as English[17] and that vehicle drivers almost exclusively understand only French instructions. Moreover, it is experienced by all pilots that the very existence of two languages allows them to immediately identify instructions that do not concern them, by the fact that they are not in the language they use with the controller. This filter thus produces a reduction in the listening workload on the frequency for the crews. The result of the transition to a single language can therefore be seen as the transfer of the discomfort for Anglophone pilots to discomfort for Francophone pilots and vehicle drivers. The latter, near and on the runways, will no longer understand any radio exchange between the controller and the pilots, and communications between the controller and the drivers will remain in French, unless English is imposed on drivers at a level that they do not necessarily have the ability to achieve[18]. The level of security is, in turn, guaranteed in both cases by the vigilance of the controllers, aided by specific monitoring and warning tools.

CPDLC[19] is a system of sending clearances only to the intended aircraft, outside the VHF voice communications channel between the pilot and the controller. It is in operational service in Europe in 14 flight information regions in the upper airspace that covers the centre of Western Europe where the traffic is densest. French upper airspace should soon complete this scheme. According to EUROCONTROL sources, a large proportion of current commercial aircraft have CPDLC capabilities. Mandated by Regulation (EU) No. 29/2009 (Data Link Services) this technology is being developed and should become operational in the coming years: after initial problems, a correction phase has been launched with the SESAR Joint Undertaking, which should lead to definitive implementation in the course of 2018. This requirement covers communications between ATS providers and flights over FL285. Faced with an increasingly busy flight and communications environment, it is clear that because of the congestion of certain control frequencies, the choice not to share all the clearances in a way that can be captured by other crews makes sense, so as to give priority to safety instructions between the pilot and the controller.

- In the same logic, it is consistent to consider that the fact that not all pilots hear or understand all the messages exchanged with the controller is not generally more detrimental to flight safety, whether it is over FL285 or in lower airspace, or at an aerodrome or in the controlled airspace surrounding it:
  - because no precise information of the air traffic control environment is currently presented on board, so that the perception of traffic from radio communications remains random and incomplete,
  - because listening attentively to radio communications that do not concern the crew is not possible continuously throughout the duration of the flight,
  - finally, because with random and incomplete data, a crew can build an erroneous mental image of the situation that can lead to inappropriate action plans.

These different points lead to the conclusion that contrary to the logic of SERA 14 015, the concept of situational awareness seen as the identification and understanding of a traffic situation by a pilot by the sole channel of listening to radio communications is questionable and could lead to unsuitable organisation of ATC.

4.1.5. Situational awareness improvement tools available to controllers (ASMGCS)

Faced with the development of traffic since the 1990s and the increase in the number of aircraft and vehicles circulating at aerodromes, ensuring the safety of runways has become a major issue for aerodromes around the world.

To respond comprehensively, the civil aviation authorities have undertaken to develop control systems to improve situational awareness and assist in aircraft management.

[17] To the extent of the quality of the communications and the quality and accent of the English spoken by the different pilots.

[18] Through lack of basic training or inability to follow suitable training.

[19] Controller – Pilot Data Link Communications.

Airport systems, known as SMGCS, for monitoring, control and guidance of ground movements, particularly those based on surface radar, have been deployed in Europe and in France, including at some of the six aerodromes covered by part 14 015 of the SERA Part C regulation.

ICAO Doc 9476-AN/927 Manual of Surface Movement Guidance and Control Systems gives the precise definition and use of such systems.

A SMGCS system consists of the provision of guidance to, and control or regulation of, all aircraft, ground vehicles and personnel on the movement area of an aerodrome. Guidance relates to facilities, information and advice necessary to enable the pilots of aircraft or the drivers of ground vehicles to find their way on the aerodrome and to keep the aircraft or vehicles on the surfaces or within the areas intended for their use.[20].

The limitation of SMGCS systems in dealing with high traffic densities, especially in low visibility conditions, has led to the need for a more highly developed system called A-SMGCS.

ICAO Doc 9830-AN/452 Advanced Surface Movement Guidance and Control Systems Manual specifies the high-level specifications and services expected from these systems whose functions may vary according to the specificities of the different aerodromes.

Regarding the definition of ASMGCS, it should be noted that the visions of EUROCONTROL and ICAO do not overlap, which can lead to difficulty in classifying some systems such as RWSL for example. In a very general way, it can be said that ICAO defines system implementations according to the ability to deal with situations defined by the combination of visibility conditions in the field, the level of traffic to be processed and the complexity of the aerodrome lay-out, whereas EUROCONTROL defines system implementations according to the level of the functions to assist the controller.

- EUROCONTROL defines the following levels for A-SMGCS:

Level 1: The system assists the controller in locating and identifying all aircraft in the movement area[21], locating all vehicles in the manoeuvring area and identifying support vehicles at the aerodrome.

Level 2: In addition to level 1 functions, the system assists the controller in detecting certain runway incursions and in guiding vehicles.

Level 3: In addition to level 2 functions, the system allows sharing of the controller's situational awareness with pilots and vehicle drivers by providing them with the position of mobile traffic in the areas concerned. The system provides assistance to the controller in defining guidance instructions for users.

- More in-depth definitions of A-SMGCS systems can be found in the following documents:
  - Le document EUROCONTROL Definition of A-SMGCS Implementation Levels
  - Document EUROCAE[22] Minimum Aviation System Performance Specification for Advanced Surface Movement Guidance and Control Systems

It is not within the scope of this study to detail all these tools but rather to point out their existence and their contribution to safety for the situational awareness of the controller.

[20] ICAO Document 9476.

[21] The movement area consists of the manoeuvring area (runways and taxiways) and the apron area (parking, maintenance and apron taxiways).

[22] EUROCAE is an international non-profit organisation that brings together players in the field of civil aviation to establish rules for the standardisation of systems used for civil aviation in Europe and worldwide.

4.1.6. Situational awareness improvement tools available to crews from on-board warning systems

We have been able to explain the particular character of situational awareness for a pilot and for the human loop of the two pilots forming the crew. As previously described, the meeting with the psychologists from ENAC's Department of Languages, Humanities and Social Sciences has reinforced the observation that air-ground communication is not the only factor allowing the crew to develop situational awareness.

Initially designed as warnings, other sources of information also feed situational awareness. These technologies are recent; they are the result of feedback from past situations. The most notable are TCAS and GPWS.

Another warning tool has been implemented at Paris-Charles-de-Gaulle for the first time in Europe, called Runway Status Light (RWSL). This equipment significantly improves the situational awareness for both the aircraft crews and drivers of vehicles in the manoeuvring area, as to the occupation of a runway by an aircraft.

4.1.7. The RWSL at CDG

RWSL is an intelligent visual warning system designed to effectively prevent runway incursions and provides, through light signals, indications and alarms based on the risk of using the runway, directly to aircraft crews and vehicle drivers

- Fed by sensors embedded in the surface of the manoeuvring area concerned and also using information from radar sensors, the RWSL is composed of two types of red lights prohibiting further movement initiated by mobile traffic (aircraft or vehicle):
  - RELs (RunWay Entrance Lights) on access roads and runway crossings
  - THLs (Take Off Hold Lights) on the first 450 m of the runway from each departure position.

RWSL is installed on the two take-off runways 09R/27L and 08R/26L on the associated taxiway intersections of Paris Charles de Gaulle airport. The airport operator, ADP, is assessing the possibility of installation at Orly.

It is important to note the help that such a system can provide as a last resort on the ground, in a similar way to TCAS in flight, for both aircraft crews and vehicle drivers. It should be noted, however, that RWSL is a developing system, for which feedback has been positive but is still in the early stages.

4.2. Safety and runway incursions

4.2.1. Traffic data for the air navigation services managing the concerned aerodromes

The data in this paragraph has been supplied by the Operations Directorate of the DSNA.

- Definitions:
  - IFR platform: Arrival – Departure IFR movements at the aerodrome,
  - IFR unit: IFR movements controlled by the air traffic unit (main aerodrome, satellite aerodromes and transits in the TMA),
  - VFR platform: Arrival – Departure VFR movements at the aerodrome,
  - VFR unit: VFR movements controlled by the air traffic unit (main aerodrome, satellite aerodromes and transits in the CTR, the TMA and the FIS airspace).

		2014	2015	2016
Paris Charles-de-Gaulle	IFR platform	470 797	476 669	479 543
	IFR unit	559 802	573 188	568 196
Paris-Orly	IFR platform	231 107	234 462	237 830
	IFR unit	257 312	256 859	260 602
	VFR platform	3 163	2 867	2 780
	VFR unit	3 163	2 867	2 780
Nice-Côte d'Azur	IFR platform	136 879	136 099	139 789
	IFR unit	159 565	160 189	164 114
	VFR platform	32 796	33 535	36 915
	VFR unit	78 914	80 412	84 755
Lyon-Saint-Exupéry	IFR platform	108 228	108 620	ND
	IFR unit	134 669	136 109	140 155
	VFR platform	184	249	231
	VFR unit	46 060	49 876	48 507
Bâle-Mulhouse	IFR platform	76 816	77 867	78 190
	IFR unit	95 027	95 399	94 788
	VFR platform	10 300	11 430	11 373
	VFR unit	55 264	62 904	61 432
Marseille-Provence	IFR platform	97 653	95 890	105 516
	IFR unit	120 683	120 627	133 543
	VFR platform	24 769	27 094	28 539
	VFR unit	89 108	77 769	82 937

▸ Remarks concerning VFR traffic:

Paris-Charles-de-Gaulle: the CDG control unit manages extremely marginal VFR traffic (helicopters) because of the A classification of the PARIS TMA; it has not been included in the table above.

Paris-Orly: the Orly control unit is in the same regulatory situation as CDG. However, it manages more "platform and unit" VFR traffic, consisting of specific authorised helicopter movements (Civil Defence, Gendarmerie).

Nice-Côte d'Azur: VFR platform traffic is essentially made up of commercial helicopter activity, in particular with Monaco.

Bâle-Mulhouse: VFR platform traffic is essentially made up of the Swiss flying club activity.

Marseille-Provence: VFR platform traffic is essentially made up of helicopter traffic for the AIRBUS plant and traffic for the Civil Defence base (currently relocated at the Nîmes-Garons aerodrome).

Lyon-Saint-Exupéry: VFR platform traffic is marginal, the VFR activity being located at the satellite aerodromes in the TMA.

4.2.2. Safety reports for the concerned aerodromes

4.2.2.1. Data provided by DSNA/DO

The DSNA Operations Directorate has forwarded the FNEs and associated ASRs (where available) for runway incursion events collected from the six aerodromes concerned over the past three years.

	2014			2015			2016		
	Total	Aircraft	Vehicles	Total	Aircraft	Vehicles	Total	Aircraft	Vehicles
LFPG	53	47	6	44	44	0	26	24	2
LFPO	6	5	1	5	4	1	9	9	0
LFMN	7	5	2	4	4	0	3	2	1
LFLL	6	4	2	5	5	0	4	4	0
LFSB	4	4	0	6	3	3	3	2	1
LFML	4	4	0	9	8	1	5	5	0
TOTAL	80	69	11	73	68	5	50	46	4

Analysis of events from 2014 to 2016 (FNEs forwarded by DSNA/DO)

- Analysis method for FNEs from 2014 to 2016 :

First of all, it should be noted that the analysis of incidents relates only to the possible role of the language or languages used in radio communications.

The purpose of examining past incidents is to look for cases where a risk has been mitigated or prevented by the "situational awareness" of a crew acquired solely through communications.

The nature of other causal or contributing factors in the occurrence of the incidents listed as well as their severity are not included in the study.

- The following are excluded from the study :
  - Runway incursions with no consequence in terms of safety due to the absence of another conflicting aircraft or vehicle. These situations are unrelated to the issue of the language used in communications.
  - Cases where a crew became aware of a risk visually and not by radio communications. For example, lined up and cleared for take-off, a crew sees an aircraft entering the runway.

All these types of incursion by aircraft are accounted for under "other cases not concerning bilingualism".

Cases concerning incursions by vehicles without contact or authorisation from the controller are accounted for in the same way under "other cases not concerning bilingualism".

- Distinction is made between the languages used:
  - The events are classified according to the languages used by the crews concerned:
    - Communications in French only (French monolingualism)
    - Communications in English only (English monolingualism)
    - Communications in French and English (Bilingualism)
- Identification of cases of situational awareness:

In column ASA, the table includes cases where one of the crews involved acquired situational awareness through radio communications.

Why identify the origin (controller or pilot) of incidents?

When an instruction issued by a controller initiates a situation that is obviously going to evolve into an incident, one of the flight crews may possibly become aware of it through radio communications. These cases are accounted for in the PSA (Possible situational awareness) column.

When a crew initiates a situation that can evolve into an incident, often due to a misunderstanding about clearance, a missed clearance or even a lack of clearance, this error is rarely associated with bilingual radio communication as the pilot and the controller speak a common languages. In such cases, "situational awareness" is scarcely possible through radio communication, even if it is all in English. These are therefore cases where another crew is unlikely to become aware of what is going on through communications. These cases are accounted for in the ISA (Impossible situational awareness) column.

Is situational awareness impossible because of bilingualism?

When an incident involves two aircraft, with one crew communicating in French and the other in English, the concept of situational awareness through radio communications is theoretically still possible, since one of the two crews, the Francophone crew, is able to understand all communications.

- In fact, one can make the following observation:
  - Controller: bilingual (French ICAO level 6, English ICAO level 4 as a minimum)
  - Francophone pilot: bilingual (French ICAO level 6, English ICAO level 4 as a minimum)
  - Anglophone pilot: monolingual (English ICAO level 4 as a minimum)
- In conclusion, for this study, to validate the relevance of the application of SERA regulation 14 015, the only relevant case is as follows:
  - A crew has situational awareness (of a risk) by understanding the radio communications exchanged between ATC and other traffic on the platform, allowing it to mitigate or eliminate the presumed risk.

It should be noted, however, that this reasoning has its limits in class D airspaces in the presence of non-Anglophone VFR flights.

a) Results on aircraft incursions (FNEs forwarded by DSNA/DO)

The following table has been established by applying the methodology developed above.

- ASA column: Actual situational awareness;
- PSA column: Possible situational awareness;
- ISA column: Impossible situational awareness.

Number of aircraft incursions 2014 - 2016 : 203									
Potential role of languages : 183									
Bilingualism			*French monolingualism*			*English monolingualism*			*Other cases where bilingualism is not concerned*
65			*29*			*41*			
ASA	*PSA*	*ISA*	*ASA*	*PSA*	*ISA*	*ASA*	*PSA*	*ISA*	
0	*35*	*30*	*1*	*11*	*18*	*1*	*17*	*24*	*48*

- Remark:
  - the two cases of actual situational awareness (ASA) are of course also counted in cases where situational awareness was possible (PSA).
- Occurrences of monolingual French situational awareness:
  - Incident on 6 September 2014[23] at Paris-Charles-de-Gaulle aerodrome
  - AFR1061 was cleared to cross runway 27L by K3 when it started to enter DGV Z3.
  - Following that, AFR4002 was authorised for take-off on runway 27L. It acknowledged this instruction at the same time as AFR1061 entered the CAT III area at holding point K3 before runway 27L.
  - AFR1061, which had heard the AFR4002 take-off clearance, reported on the frequency that it was cleared to cross runway 27L but that it had not done so.
- Occurrences of monolingual English situational awareness:
  - Incident on 13 February 2016 at Lyon-Saint-Exupéry airport

While JAF79K was cleared for take-off on runway 18R, EZY45AX which had just landed on runway 18L was cleared by mistake by the LOC controller to cross runway 18R. JAF79K reacted on the frequency and the LOC controller stopped the runway crossing.

- In conclusion, we can make the following assessment for the six aerodromes over the past 3 years:
  - Out of 70 events in a situation of monolingualism, there are only two cases in which "situational awareness" through listening to radio communications played a role in the safety loop for the event.
  - Out of the 65 cases in a situation of bilingualism, there is no case where Francophone crews served as a safety loop, even though they had the ability to understand both languages.
  - Finally, overall, in 102 cases, situational awareness was not possible through radio communications.

[23] *The situation did not seem to require a local safety commission or the opening of a safety investigation.*

b) Overall vehicle results for the six aerodromes (FNEs forwarded by DSNA/DO)

- Other cases:
  - these are incursions of vehicles without contact with the LOC controller or which took place without conflicting traffic.

Number of incursions	*20*	-
Other cases where bilingualism is not concerned	*14*	-
Bilingualism	*3*	*Bâle-Mulhouse*
French monolingualism	*3*	*Marseille, Lyon and Paris-CDG*
English monolingualism	*0*	-
Pilot or driver situational awareness	*2*	*By the driver in both cases*

In the two incidents where the driver understood the conflict situation, the crews communicated in French.

Incident on 6 September 2014 at Lyon-Saint-Exupéry airport

A FLYCO driver on 36R heard clearance to land for an Air Algérie flight. He asked for confirmation from LOC of the need to leave the runway.

Incident on 3 October 2015 at Marseille-Provence airport

A WPC vehicle was cleared to enter runway 31L to collect a dead bird. However, the vehicle driver understood that he was cleared to enter 31R.

When he heard a landing clearance for an aircraft on 31R, he informed the LOC of its position and quickly vacated 31R.

- **Analysis:**

In a situation of English monolingualism, in both cases identified, the driver of the vehicle would not have had "situational awareness".

4.2.2.2. Events identified by QSS sub-divisions

During the meetings with control units at the aerodromes concerned, the QSS sub-divisions were requested to supply details of incidents they could identify as having a possible link with the issue of bilingualism.

	Number of events	*Remarks*
LFPG	*7*	*5 in 2012, 1 in 2015 and 1 in 2016*
LFPO	*1*	*1 in 2016*
LFMN	*0*	-
LFLL	*2*	*1 in 2014 and 1 in 2016*
LFSB	*0*	-
LFML	*0*	-
TOTAL	*10*	-

Events which took place in 2014, 2015 and 2016 are mentioned in the table.

All these events are analysed in the study (volume 2) specific to each aerodrome.

4.2.2.3. Safety reports for the concerned air operators

During the meetings with air operators, they were asked to look for events (ASRs) which they could identify as being relevant to the issue of bilingualism. The results are given in the following table:

Air operator	*2014*	*2015*	*2016*
Air France	*0*	*0*	*0*
HOP!	*0*	*0*	*0*
EasyJet	*0*	*1*	*0*

We can only note the very low number of ASRs forwarded by the air operators.

Analysis of runway incursions forwarded by the air operators

EasyJet reported a serious incident at Paris-Charles-de-Gaulle airport in which bilingualism in air-ground communications was an issue. It took place on 12 February 2015.

Runway 27L has an alignment feeder Q6 at the threshold of runway 27L.

Runway 27L has an alignment feeder Q4 located at the displaced threshold of 27L.

The Q4 feeder is therefore downstream of the Q6 feeder in the direction of 27L take-offs.

- The chronology of events is as follows:
  - Flight AF1784, an Airbus 319, was cleared to line up from Q4, runway 27L
  - Flight AF684 ZA, an Airbus 320, was cleared to line up from Q6, runway 27L with the instruction to hold
  - Flight AF1784 was cleared for take-off
  - Flight EZY94MN holding at Q4 was cleared to line up behind the departure of an AF flight, an Airbus 320, from the runway threshold. It began taxiing towards the runway
  - Flight AF684 ZA was cleared for take-off
  - AF684 ZA reported that an aircraft was lining up in front and interrupted its take-off.
- The crew of flight EZY94MN was correctly informed in English of the traffic situation but several elements gave rise to a misunderstanding of the situation:
  - It had to line up behind an AF Airbus 320 that was taking off from the runway threshold.
  - It saw an AF 319 (in fact it was AF1784) taking off in front of it from a runway threshold. But it was a displaced threshold and not a runway threshold.

The issue of language is irrelevant. In fact, on the one hand, it was the Air France crew that identified the situation visually. On the other hand, it was the phraseology that was not adapted to the particular infrastructure of runway 27L; this gave rise to the confusion for the EZY94MN crew, causing the incident.

The issue of bilingualism was not accepted as a causal factor by the DSNA National Safety Commission.

4.2.3. BEA investigation reports 2008 – 2016[24]

In 2000, the BEA identified bilingualism as a contributing factor in a collision at Paris-Charles-de-Gaulle airport (25 May 2000); it issued a recommendation in its report asking the DGAC to **"study the expediency and methods of implementation for the systematic use of the English language for air traffic control at Paris Charles de Gaulle aerodrome, as well as the extension of this measure to other aerodromes with significant international traffic".**

The first step of the study on SERA C regulation part 14015 therefore concerned the accident and serious incident investigation reports published on its website by the BEA subsequent to this accident.

Indeed, it seemed logical to think that they could be a source of information on bilingualism as a causal or contributory factor in a given event.

In order to have a robust reference on the level of linguistic proficiency expected of controllers and pilots, 2008 was chosen as the start of the period studied: this was the year of implementation of the ICAO regulations on the level of assessment of linguistic proficiency of pilots and air traffic controllers.

- The approach chosen was as follows:
  - Question 1: Did the BEA identify the problem of bilingualism as a causal or contributing factor in accidents or serious incidents?
- If not, does the reading of the reports make it possible to answer the following questions:
  - Question 2: Did a crew acquire information through radio communications with other flights, allowing it to use the information and adapt flight behaviour accordingly?
  - Question 3: Could the use of two languages have been an obstacle to the acquisition of information that might have been of use?

Methodology

- Nature of the flights:

The study is limited to cases where at least one flight in question was an IFR public transport flight.

- Criteria:
  - The cases selected are accidents and incidents studied by the BEA, where the reports have been made public, and in which the following factors can be found:
  - One or two aircraft and/or vehicles were involved as well as the air traffic control service.
  - These events took place at an airport or in the Approach phase to an airport.
  - Communication took place in English or in French.
  - Situation awareness played a role, by radio or otherwise (visual)
  - In the end, in relation to SERA regulation 14015, for each event selected, the role of ATC communications in situational awareness was examined whether they were bilingual or not.

[24] Given the time required to complete an investigation report, no report related to this study was made public after 2015.

Results

In total, 129 investigation reports were examined.

12 reports were selected as being of interest for the issue of "situational awareness and bilingualism".

Answer to question 1

- Only one incident was identified by the BEA where the use of English and French would have been a causal factor in the course of the event. It involved an aircraft on approach, therefore formally outside the scope of paragraph 14 015 of SERA Part C. It was the following:
  - Incident on 17 June 2010 at Bâle-Mulhouse aerodrome: Diversion, go-around on short final with low fuel level
- The BEA report contains the following analysis:

Because they were English-speakers the crew of the aircraft on approach did not understand the exchange of communications in French between the controller and the crew of the aircraft on the runway. They only became aware belatedly that the runway was occupied. If they had been aware of the situation, they probaly would have carried out a missed approach earlier.

An in-depth review of this investigation report, the investigation report of the Bâle-Mulhouse control unit's Local Safety Commission, and above all the ASR of the Anglophone captain seem to invalidate this analysis. This event is studied in volume 2 of the study under paragraph 4.3.6.

Answers to questions 2 and 3

- They are given in the following table:

Year	*Reports examined*	*Reports selected*	*Events at SERA 14 015 aerodromes*	*Situational awareness by ATC comms*	*Language barrier*
2008	*16*	*0*	*0*	*0*	*0*
2009	*13*	*2*	*2*	*0*	*0*
2010	*38*	*6*	*4*	*0*	*0*
2011	*26*	*2*	*0*	*0*	*0*
2012	*19*	*0*	*0*	*0*	*0*
2013	*11*	*2*	*1*	*0*	*0*
2014	*4*	*0*	*0*	*0*	*0*
2015	*2*	*0*	*0*	*0*	*0*
2016	*0*	*0*	*0*	*0*	*0*
TOTAL	*129*	*12*	*7*	*0*	*0*

- It can be noted that in two cases, a crew became aware of the situation visually:
  - The Bâle-Mulhouse incident on 17 June 2010 identified by the BEA and mentioned above.
  - An incident at Nice aerodrome on 29 March 2010: night-time runway incursion by an aircraft not detected by control; interruption of takeoff of another aircraft. The crew of the latter aircraft saw an aircraft enter the runway from an intermediate feeder. The incursion was not detectable by radio communications, this aircraft having lost its way towards the runway threshold.

Finally, an accident was identified as highlighting the issue of bilingualism in a flight deck with crew members of different nationalities, not native English speakers (runway excursion on landing at Lyon, 29 March 2013).

The presentation of the seven BEA investigation reports on "Radio communication and situational awareness" is provided in Annex 3 of Volume 3 of the study.

4.2.4. Results of the questionnaire for crews

The questionnaire was available online from 01 to 30 June 2017, as indicated in AIC A15/17.

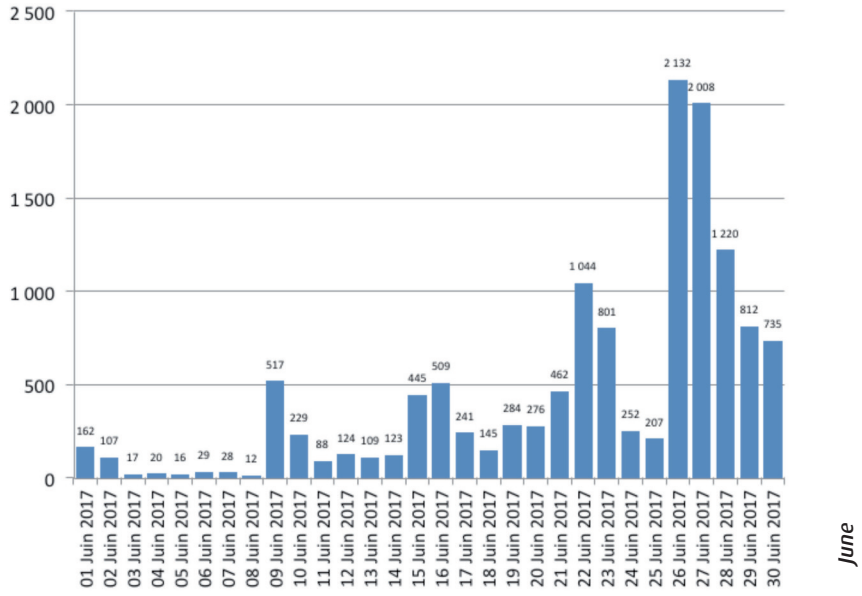
It received 23 860 replies of which 13 154 were complete

The overall summary of the complete replies for the six aerodromes is presented in this paragraph.

- Remark:
  - the number given in the following pie charts relates to the given category.

The replies are given per aerodrome in volume 2.

Daily number of replies during the period in which the questionnaire was available online.



Replies to the questionnaire per airline

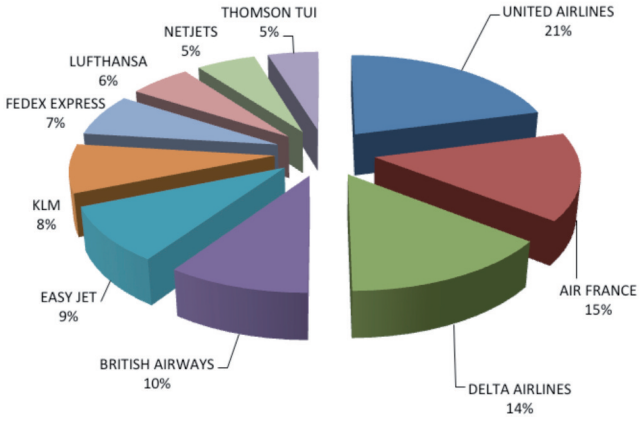


Table of the top 10 airlines ranked in order of number of replies:

Rank	*Airline*	*Number per airline*
01	*UNITED AIRLINES*	*1 141*
02	*AIR FRANCE*	*797*
03	*DELTA AIRLINES*	*788*
04	*BRITISH AIRWAYS*	*524*
05	*EASY JET*	*506*
06	*KLM*	*442*
07	*FEDEX EXPRESS*	*389*
08	*LUFTHANSA*	*312*
09	*NETJETS*	*301*
10	*THOMSON TUI*	*257*

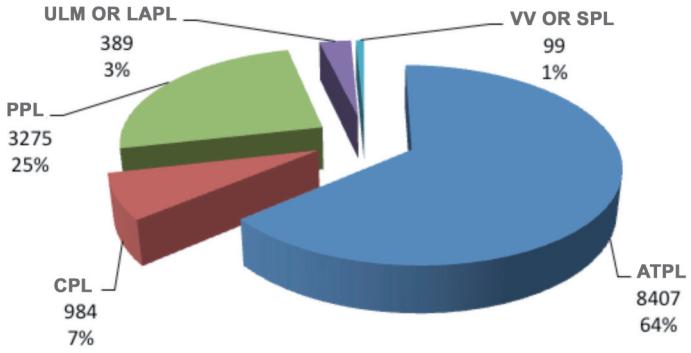
Breakdown of replies per type of licence held

Type of licence - All Aerodromes:

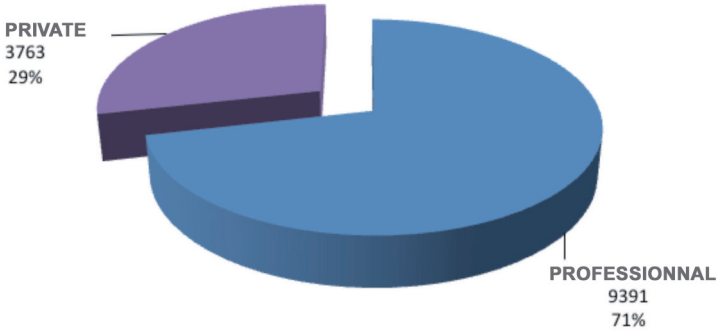
	ATPL	*CPL*	*PPL*	*ULM OR LAPL*	*VV OR SPL*
Participation per type of licence (ATPL/CPL/PPL/ULM OR LAPL/VV OR SPL)	*8 407*	*984*	*3 275*	*389*	*99*
	13 154				

	PROFESSIONAL	*PRIVATE*
Participation per type of licence (PROFESSIONAL/PRIVATE)	*9 391*	*3 763*
	13 154	

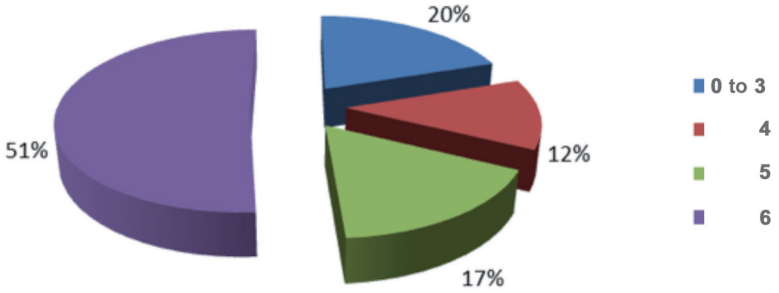
Participation per type of licence (ATPL/CPL/PPL/ULM OR LAPL/VV OR SPL)



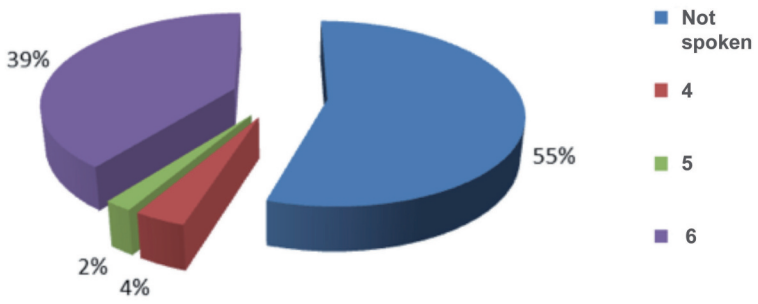
Participation per type of licence (Professional/Private)



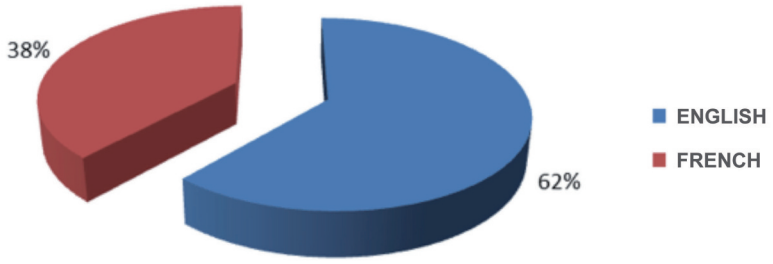
Breakdown of replies by level of linguistic proficiency in English



Breakdown of replies by level of linguistic proficiency in French



Breakdown of replies by linguistic preference



- Remark :
  - 90 % of private pilots answered that they had no preference for English at the six aerodromes and airspaces concerned and 7 % that they had no preference for French at the six aerodromes and airspaces concerned.

4.2.4.1. Conclusions

It is clear that the replies to the questionnaire are not completely representative of the proportions of users of the aerodromes.

It can be seen, for example, that as from 15 June 2017 there was a strong increase in replies from Anglophone airlines, American in particular. This trend coincided with the sending of an email from IATA to some airlines. In fact, it can be noted, for example, that United Airlines, which supplied the most replies to the questionnaire with 1141 complete replies (21 % of the total replies to the questionnaire), is not present in France at this level of traffic[25].

- The main conclusions that can be drawn are the following:
  - A consultation of pilot users at the six aerodromes concerned on their linguistic preferences and proficiency was requested by the European Commission. This consultation has been carried out. The objective of this consultation is not specified in the SERA Part C regulation,
  - The number of replies for one month of consultation, 23 860 replies of which 13 154 were complete, shows the interest that users have in the linguistic question,
  - The English language proficiency stated by the pilots who responded to the questionnaire shows that 20 % of users do not have ICAO level 4, but 68 % of them are at level 5 or higher.
  - The French language proficiency stated by the pilots who responded to the questionnaire shows that 45 % of users have at least ICAO level 4 in the national language.
  - The quantity of replies from pilots with a language preference for French, 5046 (39 % of complete replies) shows the attachment of a large number of users of the aerodromes and airspaces concerned to the use of French in radiotelephone communications, even though they do not represent a majority in the replies.
  - The quantity of replies from private pilots, 3763 (29 % of complete replies) shows the interest that this population of users has in the linguistic question and the majority thereof expressed their choice of the French language, which can be seen as highly sensitive for free circulation in the French skies.

4.2.5. The point of view of air operators

4.2.5.1. Air France

The six French aerodromes concerned by the application of SERA C regulation part 14 015 are regularly frequented by Air France crews.

Meetings were held with the Director of Technical Development, Innovation and Transformation, a Deputy Director, an A330/340 Captain, the Deputy Director of Safety and Training, and the person in charge of ATC-related projects.

It appeared from the various discussions with these managers, during a working meeting and subsequent exchanges by mail, that from the airline's point of view there was no concrete demonstration that bilingualism results in a deterioration in the level of operational safety. No ASR of this type was forwarded in response to our event collection request.

Regarding the operation of the SMS, flight analysis within the airline did not establish a specific category of incidents related to bilingualism.

[25] In 2016 United Airlines, which was present in France only at Paris-Charles-de-Gaulle, represented 0.82 % of the platform's commercial traffic (ranked 23rd among the airlines present). Source: DTA.

Pilot Reports (PIREPs) show that, sometimes, pilots can remove an ambiguity by listening to and following exchanges in both languages. However, the airline recognises that such attentive listening requires effort and mobilises a lot of mental resources especially in phases near the runway, and that it is therefore not possible to listen to all exchanges in this way.

The airline's representatives said they agree with the observation that pilots do not have all the elements to establish precise situational awareness of the traffic around their own aircraft in flight and that the controller has information about this environment that the crew does not have; the move to direct air-ground digital communications will only accentuate this reality.

They stated that pilots are in their "comfort zone" when speaking French in communications with French controllers; the exchanges are more fluent and more precise. They find, however, that when pilots go to countries like China or Russia, they are confronted with many exchanges with control that they do not understand, but this does not create an unacceptable difficulty.

The representatives added that recommendations resulting from LOSA audits would be their main motivation for considering monolingualism as provided by the new SERA Part C regulation. These audits are carried out by trained and experienced pilots working for other airlines that adhere to this concept supported by the ICAO. During a flight, the auditors observe its progress and the procedures applied by the flight crew. The auditors, who are often American and mostly not French-speaking, express their feeling that Paris-Charles-de-Gaulle is a "threat" because of bilingualism; it is observed that this finding is purely declarative and no factual evidence has been provided to support this view.

It should be noted that the airline has made a structural effort to have crews speak English in most work phases. The representatives stated that in situations of extreme urgency, the return to the mother tongue can be instinctive and difficult to control and avoid.

The airline stated that moving to a single language, English, at major aerodromes, especially Paris-Charles-de-Gaulle, would probably, although this has never been proven, be a good opportunity to improve operational safety because it could possibly improve the understanding of certain situations by non-French-speaking crews; however, it considers that it would be a tactical error to proceed by an authoritarian obligation to impose English as in paragraph 14 015 of the SERA Part C Regulation, and that this could even be counterproductive. The immediate imposing thereof would be the best way to create conflict and ultimately fail.

4.2.5.2. HOP!

Resulting from the merger of three previous subsidiaries of the Air France group (Hop Britair, Hop Régional and Hop Airlinair), in April 2016 Hop, based at Paris Orly, moved on to a more definitive phase of integration of its organisation and working methods.

The fleet at the time we met the airline consisted of 88 aircraft including 25 Ejets (E170 and E190), 16 EMB145s, 21 ATRs and 26 CRJs (700 and 1000).

Its network is made up of around forty destinations in France including about 50 % between Orly and CDG, some being seasonal, 7 in Italy and 1 in each of the following European countries: Belgium, the Czech Republic, Germany, Luxembourg, the Netherlands, Norway, Sweden and Switzerland. French aerodromes are therefore the most frequented.

The six French aerodromes concerned by the application of the SERA Part C regulation paragraph 14 015 are regularly frequented by Hop! crews.

Meetings were organised with the Director of Air Operations, who is also an Embraer Ejets captain and examiner, and the SMS and compliance manager, who is also a Bombardier CRJ captain.

As with Air France, the meeting concluded that there had been no concrete demonstration within the company, in particular through specific ASRs or even incidents, that bilingualism reduces the level of operational safety. No ASR of this type was forwarded following the meeting in response to our request.

The airline representatives nevertheless stated that moving to a single language, i.e. English, at the major European aerodromes would undoubtedly be a positive change for them and that it would also be useful, for training reasons, at the smaller aerodromes in its network. They added that the general management is not against such a move, but that it expects opposition from the staff, thus creating difficulties for the airline.

The airline also bases its stance on monolingualism on the opinions of representatives of foreign airlines met at conferences. Safety arguments are not the primary reasons put forward, but rather a concern to align with the methods of the competing airline EasyJet, for the most part.

The airline's representatives agree with the observation that pilots do not have all the elements required to establish precise situational awareness of the traffic around them and that the controller has information about this environment that the crew does not.

In case of emergency or distress, the airline manual stipulates that the first message accompanying the "PAN, PAN, PAN" or "MAYDAY, MAYDAY, MAYDAY" shall be in English.

However, as with Air France, the airline representatives added that in an emergency, an instinctive return to the mother tongue (French for most of the airline's crews) is a natural practice.

4.2.5.3. EasyJet

EasyJet was chosen as the representative foreign airline for the six aerodromes concerned by paragraph 14 015 of the SERA Part C regulation.

Because of its British nationality and the multinational origins of its crews, EasyJet imposes the exclusive use of English for all its operations.

General information on EasyJet operations in France.

The airline has an AOC issued by the United Kingdom and is under the supervision of the UK CAA. In France, it employs about 1100 staff. In 2016 it carried 17 million passengers from aerodromes in mainland France.

- It operates 30 aircraft, all A320s, from 5 bases:
  - 8 aircraft from Paris-Charles-de-Gaulle,
  - 7 aircraft from Lyon-Saint-Exupéry
  - 6 aircraft from Paris-Orly
  - 6 aircraft from Nice-Côte d'Azur
  - 3 aircraft from Toulouse Blagnac

Its operating model is therefore different from that of the low-cost airline Ryanair, which has no aircraft based in France.

Its main base (Hangar 89) is at London Luton aerodrome.

- Note:
  - as a result of Brexit, EasyJet has created an easyJet Europe subsidiary with an AOC issued by the authority of a European State.

A meeting was organised with the Chief Pilot and Air Operations Manager for France. He is also an A320 captain and TRI.

He explained that EasyJet asserts a developed safety culture: all airline staff contribute to it, and first and foremost the crews. The concept of "operational readiness" is the foundation of the airline's operations: it is above all about being ready and remaining ready, that is to say being able to cope with any eventuality.

The SMS is filed with the UK CAA; the manager we met gave a detailed description of it, which is briefly described below.

In application of the "Manual of occurrence reporting", the authority is informed by the airline of defined events. The authority also receives reports from the various reviews carried out by the airline and it goes without saying that the "reporting system" is subject to recurring oversight audits.

Events are reported either through ASRs or through the FDM, the term used by the airline for flight analysis.

- There are four review levels:
  - Operational Base level, led by a "Base Safety Officer" who is responsible for analysing the event and deciding whether to pass it to the next level, depending on the severity resulting from the classification (called the ERC)
  - National level, led by a "Safety Policy Captain" (located at CDG for France)
  - Network level
  - company board level

The airline has put in place a "Safety Action Group", which summarises all the data and provides feedback and ensures operational readiness.

For its part, Quality Assurance is responsible for measuring the system, both for ASRs and the FDM.

- The ERC analysis matrix is a double-entry table:
  - Q1: if the event had escalated, what would have been the most credible outcome?
  - Q2: What was the effectiveness of the remaining safety barriers?
- The result is a number between 1 and 2500, calculated automatically:
  - values below 500 are events with minor consequences,
  - values above 500 are events with major or catastrophic consequences.

For some events over 100, it may be necessary to consult the FDM for more information to analyse the flight during which the ASR was generated. The airline's FDM is a unit, with its director reporting directly to the board.

The FDM software is specific to the airline; depending on their frequency and severity, events are classified from 1 (the least serious) to 3. The Flight Crew Liaison Officer draws the necessary lessons, possibly after a debriefing with the two pilots concerned.

In fact, the airline sees very few events coming out of the FDM.

Risk reduction

The airline has put risk reduction tools in place in its safety management system.

- In-house actions include:
  - oral communication with the crews by the Base Captain,
  - information included in the flight record, which must be commented on during departure and arrival crew briefings.
  - an NTC for any urgent actions,
  - the monthly Newsletter or the Flight Safety Bulletin, published quarterly,
  - a change to the Operating Manual for longer-term actions.

External actions essentially concern dialogue with the ATC services.

The airline representative stated that in France, meetings are requested with the local SNA. The language issue is considered a "political" matter and as such, it is not generally addressed in dialogue with the SNAs.

Events linked to bilingualism

The airline representative searched in the system described above for events considered to be related to bilingualism.

Only one event was calculated with an ERC above 500. It was mentioned in chapter 3.3.4.5 and is the subject of a detailed analysis in this report in chapter 4.1 relating to Paris-Charles-de-Gaulle airport.

- The other events were:
  - 4 events at ERC 50,
  - 3 events at ERC 20,
  - 13 events at an ERC below 10 of which 7 ERC = 1.
- For these events, flight safety was not compromised. They concerned:
  - runway incursions,
  - low visibility procedures (LVP),
  - knowledge of the weather,
  - runway condition.

For these matters, the airline representative indicated the need for better information sharing in order to remove any ambiguity. He added that monolingualism in radio communications could probably contribute to this, but in a more certain way and, including in a situation of bilingualism, a clear message from the controller about the reasons for the limitation, the weather, the runway condition, etc. will give clear, concise and efficient information on the situation to crews who do not necessarily understand French.

The use of English within EasyJet

The airline's pilots are of various nationalities; ICAO level 5 in English is required on hiring, then level 6 must be obtained after one year. The airline representative explained that this is achieved very easily thanks to the constant use of English.

The EasyJet representative added that the question of accents is not an issue internally. If there is a misunderstanding, for a clearance for example, it is repeated back to the controller to remove any ambiguity, the airline's culture being that no doubt is allowed. Some difficulties have been noted in certain countries with controllers' accents, but they have not given rise to ASRs. Even in emergencies, the airline has never encountered a situation of reversion to mother tongue.

The same goes for cabin crew. They must speak three languages: their mother tongue and two other languages. One of the three languages must be English.

The introduction of Data Link

Considering that although France itself is a bit behind on this subject, the EasyJet representative indicated that the development of Data Link is inevitable and key. It will have the advantage of reducing the workload for clearances. The airline representative added, however, that some information concerning other nearby aircraft will no longer be available and that in areas with high traffic density, situational awareness may be lost.

Application of paragraph 14 015 of the SERA Part C regulation.

The EasyJet representative stated that his company naturally has a preference for the exclusive use of English.

Speaking personally, and not on behalf of the airline, he thinks it regrettable that this European regulation was not brought in after a real safety study, and that as a result we find ourselves "posturing" and involved in political debate.

4.2.6. The point of view of State aviation authorities

The DSAE has horizontal skills and coordination missions for all Aviation Authorities (e.g. regulatory changes, airworthiness monitoring...).

As mentioned in 2.1.3.9, not all Aviation authority pilots have civilian licences, and FCL055 language proficiency in particular.

Even within an Aviation authority, the Air Force for example, distinctions are made according to the nature of the activity practised. Transport squadron pilots, who are required to fly around the world on medium- and wide-body aircraft, hold the ATPL license and must be proficient in English. In addition, action is taken to maintain these skills with a view to future professional re-training as civilian pilots. But in general, English language proficiency is not the rule in the various branches of the Ministry of Defence. Similar situations are found in other Aviation authorities.

The case of Civil Defence is particularly important and must be taken into consideration.

- This entity makes use of liaison aircraft, helicopters for relief to civilian populations and water-bombing aircraft and helicopters:
  - Only crews on overseas ferrying missions are proficient in English.
  - Other crews, notably those involved in relief missions in France, including in the greater TMAs of the six French aerodromes concerned by paragraph 14 015 of SERA Part C, carry out all air-ground communications in French. Indeed, no level is imposed at the time of recruitment and, even if some young pilots have a higher level of English, the English language proficiency of pilots is not determined.

The State cannot refrain from ensuring the safety of populations under the airspace managed by the six aerodromes concerned under the pretext of a reference level of English which is not held by the crews, who are particularly experienced in performing very difficult missions, even though the controllers speak French; except by allowing a deterioration in the service of protection and relief to the civilian populations.

The same issue applies to the Gendarmerie Nationale and to Customs.

DIRCAM DSAé states that from the point of view of human factors, the mother tongue remains preferable in a crisis situation. It adds that in such situations, pilots tends to revert to their mother tongue. This is why the message will always be more fluent, clear and precise in French than in English. In addition, regardless of the final decision on the application of paragraph 14 015 of the SERA Part C regulation, crews performing PPS missions will retain the use of French phraseology with the military interception controller and also with the intercepted pilot if the latter is Francophone.

DIRCAM DSAé therefore recommends maintaining the French language within the six national areas.

4.2.7. The point of view of the Directorate of airside areas at Paris-CDG airport

AdP group strategy

The managers met stated that they have a good knowledge of paragraph 14015 of the SERA Part C regulation.

In this regard, the company has put itself in the position of assuming that the regulation could be applied in the future. As a result, since 2014 it has embarked on an English language training programme for staff called on to circulate in the Areas.

ADP wished to make this an ambitious programme by targeting all personnel holding P (Runway and taxiway) or M (Taxiway) licences, namely around 250 people. The populations are diverse: area command post personnel, RFFS personnel, wildlife control personnel. The training also applies to personnel circulating in "high energy" zones (access to the runways) and those circulating only in "medium energy" zones (taxiways)[26].

The challenge for the company is to try to bring the personnel up to a level of aviation English that will allow them to improve their understanding of what is going on in their immediate environment.

The initial evaluation showed that the starting levels are varied and different among these staff. Some personnel have very little knowledge of English, and this is often the case in the field of wildlife control, where personnel are passionate about nature and wildlife. People in other jobs may have some higher level of knowledge including in aviation English, which is more the case with area command post personnel, because these populations often include former pilots or ground staff.

Finally, as the programme proved a bit too ambitious, the company has revised its initial objectives. It has redirected the training programme: instead of addressing all P and M licence holders indiscriminately, priority has been given to P licence holders. For example, with firefighters (about 126 personnel out of 250 in total), only the crew commanders are now targeted, though other firefighters can also be trained, which could later open the way to promotion to crew commander.

Concerning the level, ADP has chosen to aim for level 4 from ICAO Annex 10. It would like to be able to conduct its assessments according to level 4, but it notes that the evaluation forms are designed for pilots and not for ground staff, who are unfamiliar with the operations that are the subject of the communications in the placement test. ADP has found itself facing real difficulties with this training.

For the recruitment of new staff, the level of English is taken into account only for area command post personnel and not firefighters or wildlife control personnel.

Treatment of runway incursions

With its two pairs of runways, Paris-Charles-de-Gaulle aerodrome also has numerous taxiways and extensive manoeuvring areas. The complexity of this network and orientation difficulties in large spaces without topographic landmarks, especially at night, may be conducive to runway incursions by vehicles (which are nevertheless quite rare).

The SNA RP/CDG-LB systematically associates ADP with its study of runway incursion FNEs, for those involving vehicle traffic or for which the infrastructure may be an issue.

[26] *This distinction between zones does not appear in the regulation.*

The FNEs may concern use of manoeuvring areas by M licence holders other than ADP's own personnel, for example airline ground handling personnel (towing, pushing back), DGAC maintenance or Météo France personnel. Security rounds and patrols are carried out by ADP personnel.

Depending on the severity that emerges from the analysis, a local safety review is organised in order to share feedback and to set up procedures to prevent reoccurrence of the event (Corrective action plan).

Risk reduction

- Sophisticated tools have been put in place by ADP to reduce risks for both aircraft and vehicles:
  - The RWSL system for the two inner runways: the considerable cost, more than 10 million euros, is unique in Europe to date and deserves to be mentioned as an example of investments intended to improve the level of airport safety. However, it still lacks a visual warning that could alert a crew in flight before landing that the runway is still occupied.
  - The SYLETRACK system (location by Mode S beacons) is used primarily for vehicles required to enter the "high energy" zones. This on-board system is not taken into account as a risk management tool in the safety management system (SMS) because its availability is not complete across the fleet and also its use, with frequent zooming in and out on the image, is not optimal because it takes up too much of the user's attention to the detriment of other perceptions.
- Remark:
  - The "RIMCAS" system is not incorporated into SYLETRACK.
  - ADP is working on making a Geo-fencing function available in all vehicles, using geolocation software to monitor the position and movement of vehicles and to take action if the vehicles get too close to the runways, for example. Work is in progress to develop the alarms generated by the tool.

Experimentation with monolingualism

The experiment carried out in 2000 was suspended. For ADP, no useful feedback can be drawn from it.

The 2014 experiment, discussed elsewhere, was an Air France initiative that could not be brought to a successful conclusion.

ADP vehicles were excluded from the scope of both experiments.

Safety event concerning runway incursion

ADP did not supply any FNE having a link with bilingualism.

Impact for ADP of implementing SERA paragraph 14 015

As previously described, ADP launched a general English language training programme in anticipation of the regulation. But it appears that this work will be long, with a period of about seven years considered necessary to achieve a convincing result.

In addition to the SERA regulation, it is feared that a future revision of the IR ADR regulation will lead to a requirement for the exclusive use of the English language for operators of certified aerodromes.

The managers recognise that paragraph 14 015 of SERA Part C may possibly create employment discrimination against French citizens compared with nationals of other European countries where English is better mastered.

ADP has embarked on considerable investment to develop tools, unique in Europe, for preventing runway incursions, such as RSWL. These investments are likely to have more immediate qualitative results than the move to monolingualism.

Use of "operator" frequencies different to the VHF control frequencies

Some airport operators, notably ADP at CDG and Orly, use radio frequencies established outside the VHF band to communicate directly with service vehicles circulating on aprons or manoeuvring areas; these are the two frequencies 71,175 MHz and 400 MHz. It seemed to us essential to mention this subject in our study in order to show clearly that this subject has no connection with the issue of paragraph 14 015 of the SERA regulation.

The 71,175 MHz frequency is used on vehicles circulating in various areas of the aerodrome. It allows for coordination and exchange of information between vehicles but also with the command post. This frequency is therefore a working tool under normal operating conditions and the control tower is not equipped with it; there is therefore no possible interaction between this frequency and air traffic.

The 400 MHz frequency is only used with aerodrome firefighting vehicles (RFFS) to allow exchanges between them or with the command post (areas command post) during actual emergency operations. The SOL and LOC control positions are not equipped with this frequency, only the tower chief has acces to it, mainly to follow the progress of emergency operations.

Again in this case it can be seen that no interaction is possible between these frequencies and air traffic and it can therefore be concluded that the use of these frequencies has no connection with the issue of paragraph 14 015 of the SERA Part C regulation.

It should be noted that these two frequencies are used for communications only in French and their very existence is justified to facilitate targeted communications so as not to overload the VHF band. In the hypothesis (not selected) of moving to monolingualism for air-ground radio communications, naturally the use of these frequencies would continue in French because they are intended to improve the flow of communications with vehicles.

4.2.8. The point of view of the BEA

In accordance with the regulation, the BEA was requested to forward safety events with a link to the use of two languages in air-ground communications.

- In reply to this request, the BEA identified the use of bilingualism as being of interest in two events:
  - Collision between F-GHED (Air Liberté) and G-SSWN (Streamline Aviation) on 25 May 2000 at Paris-Charles-de-Gaulle aerodrome.
  - Incident on 17 June 2010 at Bâle-Mulhouse aerodrome: Diversion, go-around on short final with low fuel level.

These two events are the subject of an analysis on the linguistic question, in addition to the information present in the BEA investigation reports.

- The BEA also forwarded eight events for which the question of bilingualism had not been taken into account and which it offered for appraisal by the study authors:
  - 7 incidents at Paris-Charles-de-Gaulle aerodrome
  - 1 incident at Lyon-Saint-Exupéry aerodrome

All these events took place in a bilingual context: one crew communicating in French and the other in English. They were analysed using the same methodology as the incidents forwarded by the DSNA/DO and the QSS sub-divisions of the control units.

The analysis of the impact of bilingualism was therefore conducted as part of the study and is non-binding for the BEA.

Number of incidents forwarded by the BEA		
8		
ASA	*PSA*	*ISA*
0	*4*	*4*

- ASA column: Actual situational awareness
- PSA column: Possible situational awareness
- ISA column: Impossible situational awareness

The analysis of these eight incidents is provided in Annex 3 of volume 3 of the study.

A meeting was organised with the head of the BEA investigations department and the BEA safety analyst in charge of the use of investigation data.

The BEA representatives stated that their organisation does not carry out risk management analysis. They specified that this is the responsibility of the those involved in the activity. The BEA only conducts safety studies based on proven and investigated malfunctions.

They explained that the events referenced by the BEA in the scope of this request did not have bilingualism as their root cause, though that was the only way to present things.

In these events, bilingualism is further identified by the BEA as the weakening or removal of possible protection through a lack of situational awareness.

The BEA agrees, however, that it cannot say that this defence (i.e. a situation of English monolingualism) would have allowed these accident sequences to be stopped earlier.

In addition, the BEA is aware that the move to English monolingualism could introduce new risks. It was in this spirit that the recommendation was formulated in the report on the collision between F-GHED and G-SSWN, on 25 May 2000 at Paris-Charles-de-Gaulle, namely that the benefits and risks of such a transition should be studied.

4.2.9. Impact of monolingualism in exceptional situations

The BEA was also questioned about the cases it handled where a crew made up of members with different mother tongues was faced with situations in which the smooth operation of the flight was suddenly compromised.

The following two events illustrate this issue.

4.2.9.1. Serious incident that occurred on 12 January 2011 at Paris-Orly aerodrome (94) affecting the McDonnell Douglas MD-83 aircraft registered XT-ABF operated by Air Burkina.

▸ The BEA supplied the following synopsis:

Insufficient fuel during a ferry flight, turn-back, descent below the decision altitude in instrument flight conditions.

The crew was performing a ferry flight from Paris-Orly to Olbia (Sardinia, Italy). This flight was performed with the landing gear down, following a hydraulic failure during the previous flight. During preparation for the flight, the crew did not have the documentation to calculate the fuel required for a flight with landing gear down, and carried insufficient fuel. After about 23 minutes of flight, the crew observed that fuel consumption was higher than expected and it was decided to return to land at Paris-Orly.

During the ILS approach, the crew performed a go-around because of a malfunction in the VOR/ILS system on the captain's side and a descent causing a risk of collision with the terrain. It then performed a VOR/DME approach. The cloud ceiling was 300 feet above ground level, or 600 feet/QNH, while the meteorological minimum for the VOR/DME approach is 900 feet. The crew judged that the small amount of fuel remaining obliged them to land at the end of this approach. At the MDA, it continued to descend until visual ground contact. On exiting the cloud at around 300 feet, the runway was observed on the left. After large-scale lateral manoeuvres, the aircraft landed half-way down the runway. The aircraft came to a stop a few meters short of the runway end.

The BEA states:

The incident resulted in particular from inadequate flight preparation and poor CRM[27] which did not allow for correct identification of the state of the means of navigation available on board and the different deviations from flight trajectory.

[27] *Crew resource management.*

The Captain was a 54-year-old man, from Burkina Faso. The First Officer was a 47-year-old Italian man.

The Air Burkina operating manual states in the "flight procedures" section that French should be used but that nevertheless, when performing certain technical tasks on board and to deal with particular situations, English may be used. The Italian First Officer on this flight did not master the French language. Exchanges were initially in English.

After the first ILS approach to runway 26, where the crew missed the Localizer interception, and after the decision made by the captain to perform an action that was not in accordance with operational procedures, exchanges between the captain and first officer became disorganised and sparse.

- The BEA states:
  - **These partial interventions and reversion to the mother tongue are indicative of a phenomenon of unease that was gradually taking hold of the captain.**
- The BEA specifies:
  - **During the second approach, the nature of the captain's interventions became hesitant and they were mostly in French, a language the first officer did not understand.**
- The BEA adds:
  - **The recording of the conversations indicates a gradual shift of authority from the captain to the first officer. Work as a crew deteriorated significantly.**

It should be noted that the BEA did not retain the language barrier as a contributory cause or circumstance of the incident. On the other hand, it noted that in the case of a crew having different mother tongues and using English as a common language, the reversion to his mother tongue by the captain at the time was related to a phenomenon of unease when the conduct of the flight seemed to him to have deteriorated.

4.2.9.2. Incident that occurred on 24 May 2011 affecting Falcon 7X HB-JFN

The BEA report describes this incident which occurred during descent to Subang airport in Kuala Lumpur (Malaysia) after a 12h flight without passengers from Nuremberg.

The incident consisted of an untimely and uncontrollable runaway of the pitch trim (THS). The very long investigation showed that the runaway was provoked by the failure of an electronic component in the pitch command chain computer. More specifically, it was a soldering defect leading to a change of impedance.

The immediate effect of the THS runaway was an excessive increase in the longitudinal pitch of the aircraft and a reduction in speed down to 130 knots.

The crew had no way of changing the position of the THS in normal law. The captain, who was the PNF, took over command to try to regain control of the aircraft, but was not able to improve the situation.

The first officer, who was the PF, understood the situation, took back the controls, and applied actions acquired in his military career during training for "level toss" bombing manoeuvres in fighter jets. This made it possible to recover the situation by transforming the strong nose-up attitude by turning into a very steep inclination, close to 80°. Luckily there were no passengers on board !

The first officer explained that he banked the aircraft as a reflex but that he had never received any specific upset recovery training during his career as an airline pilot. This explains why the captain, who did not have the same military experience, had a less good grasp of the situation. Subsequently, manual recovery became possible and the aircraft was able to land in Kuala Lumpur in a declared emergency.

The BEA report mentions explicitly that "the French-speaking first officer indicated that due to the stressful situation generated by the uncommanded climb, he had real difficulty in explaining in English what was happening to the English-speaking captain".

This incident shows that in a high-stress emergency, it is easier and more instinctive to explain yourself in your mother tongue than in another language acquired later in life. This is an instinctive reflex, just like the piloting reflex that saved the Falcon 7X.

The psychologists we met during the study explained that because the mental resources of a human being are finite, it is normal that in a situation where a lot of intellectual energy is required, the use of the mother tongue is inevitable because this solution requires the least resources.

Other similar situations have been noted in other BEA reports ; we have limited ourselves to the analysis of the two cases above which are perfectly explicit.

4.2.9.3. Findings on the impact of imposed monolingualism in exceptional situations

The analysis of these two serious incidents, which do not concern communications with control but which nevertheless have an interesting instructional character, shows that the practice of imposed monolingualism for actors who are not perfectly bilingual, in emergency or highly deteriorated situations, is problematic because pilots (as well as controllers) under stress will instinctively revert to their mother tongue, which of course may not be English, to communicate with their environment. In the case of Francophone pilots in France, the current practice is more advantageous from a safety viewpoint.

This reversion from imposed monolingualism to the mother tongue may make it more difficult to share the action plan and thus aggravate an unusual situation.

4.3. Meetings with other States practising bilingualism

4.3.1. Canada

This chapter was written following a mission to Canada in the summer of 2016 by a DGAC executive, which included meetings with various stakeholders having left their mark on the history of the implementation of bilingualism in air traffic control in this nation, which is a major stakeholder in civil aviation.

The work "The Language of the Skies" by Sandford F Borins as well as the final report of the Commission of Inquiry and Radio Canada recordings were also consulted and used for this study.

4.3.1.1. The control context in Canada

Bilingualism in air traffic control is a subject that caused violent opposition between Anglophone and Francophone Canadians in the mid-1970s.

Until this time, since the end of the Second World War, control was exclusively in English and it was strictly forbidden for Francophone pilots and controllers to use French, even for VFR flights. The aviation community was generally considered to be quite conservative and there was no intention of making a change among the mostly Anglophone professionals.

The conflict grew as Francophone pilots and controllers from Quebec formed a pressure group, the "Association des gens de l'air", to strive to introduce French, in addition to English, into aviation in the province of Quebec. This was to answer the simple and obvious need to communicate in their mother tongue, French, when pilots and controllers were French-speaking; Francophone populations represent approximately 60 % of the population concerned in Quebec and 40 % in Montreal, and roughly the same proportions are found among air traffic controllers. This is not the case among pilots, where the proportion of Anglophones was higher in the major airlines (Air Canada, Canadian Airlines) and the manufacturers (De Havilland, Bombardier), even if there were, conversely, many Francophone pilots in light aviation and general aviation.

At that time, altercations even took place on several occasions, either between controllers or between controllers and pilots, and the famous phrase broadcast on the radio frequency, « **Speak White, Please**[28] », made a strong impression.

The crisis deepened in June 1976 when Francophone airline pilots went on strike to lend their support to the controllers.

At first, the Canadian public was largely divided on the subject.

The strike ended with an agreement between the Ministry of Transport and the unions, CALPA for the pilots and CATCA for the controllers. This agreement was considered a humiliation by Francophone Canadians. But in a political context that went beyond the field of aviation, English-speaking pilots quickly lost the support of public opinion across the country, in favour of Francophone pilots and controllers. The Prime Minister himself, Mr Trudeau, supported this change in a speech: « **If Francophone Canadians do not intend to learn English, we do not intend to force them to do so, and if they want to fly their aircraft over their province while speaking French, they can speak French** ».

[28] This phrase comes from Canada's colonial past, when a slave was told that he did not have the right to speak his native language and was to adopt that of his masters.

▸ Beyond this political change, in order for air traffic control to become bilingual in Quebec, two conditions had to be met:

- the English-speaking Canadian public had to accept it,
- the aviation community had to agree to it.

The federal government then put the case into the hands of a Royal Commission of Inquiry, an independent body.

Naturally, the details of the events in this case are of no interest here, so we will limit ourselves to analysing the working methods and the conclusions of the Commission of Inquiry, which have a certain scientific interest.

These studies conducted in Canada in the late 1970s are important and support our own safety study.

4.3.1.2. The working method of the Royal Commission of Inquiry

The mandate given to the Royal Commission of Inquiry by the federal government was to be impartial and transparent. It was headed by two independent judges.

Its work was considerable. In plenary sessions alone, for example, there were no fewer than 68 working days. Based in Ottawa, the judges hired bilingual Francophone lawyers from Montreal and bilingual Anglophone lawyers from Toronto.

▸ The methodology implemented by the commission was the result of a carefully prepared action strategy. The hearings initially focused on the implementation of bilingualism in air traffic control for VFR flights at the Saint Hubert airport alone; afterwards, the analysis was quickly extended to IFR flights from all other aerodromes in Quebec:

- Initially the commission, which recognised that it was a novice in the field of air traffic control, was anxious to inform itself. To gain a better understanding of the air traffic control system and in a spirit of neutrality, the judges did not visit Canadian facilities but instead visited the New York and Washington airports; later visits were also organised to Paris Charles de Gaulle for some of the commissioners.
- The cases of Geneva and Mexico, both of which are bilingual control centers, were also examined.

After the first informative visits, hearings were organised with the various interested parties. Obviously this included representatives of the CALPA and CATCA unions. The people met were targeted in order to obtain conflicting opinions.

In order to objectively measure the impact of bilingualism on safety, the commission made the decision to have a large-scale simulation carried out. We will briefly discuss how it worked in the next section.

Finally, the commission carried out an accident study analysing the circumstances of air accidents that had occurred all over the world over the previous twenty years and for which one of the root causes could possibly have been linked to the use of bilingualism.

The production of an interim report submitted to interested parties made it possible to collect their proposals and objections before the presentation of the final report to the Prime Minister.

4.3.1.3. The simulations

The simulation exercises (known by the English acronym BICSS, Bilingual IFR Communications Simulation Studies) took place in several successive stages. The first series of simulations took place in 1976 and 1977, before the publication of the interim report.

Each simulation, carried out in a radar environment at the new simulation center of the Ministry of Transport in Hull, included 4 control positions, each with a radar screen; they were grouped into 3-day periods: a first day of information and training, a second day for exercises in one language and the third day for the same exercises but in both languages. The controllers involved were from the Montreal control center and members designated by CATCA. The pilots were mostly commercial pilots and the control system was connected to flight simulators located in Ottawa and Montreal.

The exercises were designed to compare the performance of individuals in monolingual and bilingual air traffic control systems.

The exercises began with en route traffic control by simulating sectors in East Montreal and James Bay. Then they applied themselves to tackle the complexity of the Montreal terminal area. The exercises included increasing volumes of traffic to be controlled; for some, the traffic of more than 60 movements per hour was higher than that experienced during the 1976 Olympic Games, which represented an absolute traffic peak at the time.

A scientific method was developed to test radio monitoring: the pilots were given a real map and after listening to a radio frequency for a certain time, they had to indicate the location of the other aircraft on the map. Then the maps were replaced by tape recorders to take note of the flights they believed to compromise safety and also to note any transmission errors.

The simulations included a mix of IFR and VFR flights.

Finally exercises took place with exceptionally adverse weather conditions and also very busy holding patterns.

4.3.1.4. The conclusions of the Royal Commission of Inquiry

With the precautions implemented, the environment and the tools deployed, the results of the simulations cannot be contested.

Based on data from phases 1 and 2, analysis of controller errors identified a total of 1387 transmission errors when both languages were used, which represents 5.49 %, and must be compared to the 5.03 % (1287) errors when using only one language, which is not a significant difference. Moreover, most of the additional errors committed in bilingual situations were initial contact errors, i.e. the use of the wrong language by the controller for the initial contact; this type of error is easily corrected with suitable tools.

The BICSS team also examined the potentially important issue, from the safety point of view, of loss of separation: a total of 85 losses of separation occurred during the exercises with a very similar proportion in bilingual and monolingual situations. On this subject, the Commission concluded that “we have not found language to have been the cause of loss of separation and there is no evidence that it influenced any particular operating irregularity”.

Finally the Commission examined the case of radio monitoring by pilots: among all the data compiled from 1974 to 1978, in 72 cases the pilots had either detected errors thanks to radio monitoring, or failed to detect them while they had sufficient information to do so; as a result, the Commission's conclusion was that radio monitoring is not a sufficient argument for maintaining monolingualism. "While radio monitoring is a good thing in itself, the technological innovations being developed (such as automated air-ground data exchange!) will gradually limit in certain areas the amount of information from which pilots can detect errors."

We may note, on this last point, a convergence between this vision of the Royal Commission in the 1970s and the situation that we analyse in our own study in paragraph 4.1.4.

The Commission further noted that pilot radio monitoring is more efficient in an en-route environment than in the terminal area because en-route airspace is less busy and pilots listen to each radio frequency for a longer period of time.

The study had an unexpected advantage: some issues unrelated to language were brought to light, including the fact that the controllers did not pay enough attention to pilots readback and did not adequately pick up on readback errors. It was further recommended that controllers provide more information to aircraft, in particular those in holding patterns.

The Royal Commission performed a considerable amount of work that can be measured by the voluminous, thorough, high-quality documents that it produced. These documents still exist today and can be consulted by the public.

After three years of detailed studies and in-depth experiments, the Commission came to the conclusion that bilingualism in air traffic control could be implemented without any risk in terms of safety.

The results of the simulations demonstrated not only the absence of risk but even more: an improvement in the technical understanding of the traffic by some French-speaking pilots, which resulted in improved safety. In addition, the accident study in the interim report allowed the commission to formally conclude that "there is nothing inherently dangerous" in bilingual air traffic control.

The federal government accepted the Commission's conclusion in August 1979 and implemented its recommendations in 1980; from that time, **and it is still the case today**, air traffic control in Quebec has taken place in both French and in English, for VFR flights and for IFR flights, both domestic and international.

4.3.1.5. The current situation in Canada

Today, the Montreal center is divided into six zones corresponding to specific traffic: the Montreal and Quebec/Ottawa terminal zone, the corridor along the St Lawrence River, the rest of Quebec and Nunavut in lower airspace, and upper airspace mainly corresponding to continental and transcontinental flights and overflights including polar flights, divided into two sub-units called North and South.

The defining feature of the control sectors in this zone is the geographical area requiring surveillance (mode-S, ADS-B) and numerous and varied communications, including those in remote polar regions. Particular vigilance must be observed with frequency transfers, to avoid contact losses at range limits. Control instructions are broadcast on all grouped frequencies and the calls/responses from pilots are relayed through repeaters on all other frequencies, greatly reducing the likelihood of having two pilots calling at the same time.

Pilot-controller communications take place in English, French or by CPDLC link, with 90 % of the fleet equipped, at the pilot's initiative.

Control is carried out mainly with the traffic display screen and the associated dialogue tools. An ancillary system also provides flight plan information but is used more for planning purposes when traffic requires it, or for backup flight information in case of deterioration of the primary control system.

The case of Montreal Pierre Elliot Trudeau airport (formerly Montreal Dorval): Montreal P E Trudeau airport has two specialised parallel runways (06L-24R mainly landings and 06R-24L take-offs) and an oblique 10-28 runway used by lower tonnage, turbo-prop and B737 aircraft and in case of strong west winds. Traffic is around 230-240 000 movements a year and constantly rising.

The main runway incursion problems result from landings on the northern runway (06L-24R) crossing the runway (10-28) to reach the terminal or from crossings of the same runway to reach the de-icing station located to its north (unfortunately, runway incursion statistics are not immediately available).

In addition to observance of control procedures and consistent use of phraseology, the prevention of incursions is based on verifying that the pilot or the driver knows the intentions of other mobile traffic (aircraft or vehicle).

The managers interviewed stated that the coexistence of two communication languages between pilots and controllers does not pose a safety problem because the controllers give the flight information when necessary. They added that the hypothesis of safety improvement through frequency monitoring by pilots (party-line) is totally erroneous because of the distribution of information on various frequencies, the use of data links and the impossibility for the pilot to build up an image of the positions and trajectories of the flights without a specific device. They explained that, on the contrary, pilot monitoring of control communications which are not for them is a source of distraction and confusion, call signs in particular.

4.3.1.6. Conclusion

The Canadian example shows that, in a monolingual situation in air-ground radio communications and based on scientifically constructed experiments, bilingualism has been adopted without any risk to flight safety. The simulation exercises were very objective, including stakeholders with experience from their everyday work and often opposed (in principle) to the official adoption of bilingualism. The example of Canada is therefore based on a real safety study, which is not the case with paragraph 14 015 of the SERA Part C regulation.

4.3.2. Switzerland

As part of the study, we made the choice to examine the situation at Geneva airport, which practices French-English bilingualism for air-ground communications, and for this purpose we held on-site meetings with:

- representatives of the ATM service provider, SKYGUIDE,
- the airport operator, Genève Aéroport,
- the Swiss civil aviation agency, FOCA.

4.3.2.1. Geneva aerodrome

Geneva aerodrome is located on the border with France. It is situated in a very enclosed location.

It is subject to many constraints: constantly increasing traffic, physical possibilities of extension that are almost non-existent, the proximity of the city of Geneva, a mountainous environment, and the existence of a border road passing under the runway and penetrating the heart of the terminal.

The aerodrome has connections with 134 international destinations provided by the airline Swiss and by 57 foreign airlines. EasyJet has a dominant position with 41.8 % of flights, followed by Swiss with 15.2 % of flights; Air France, Lufthansa and British Airways each represent around 4 %. Airlines from the Persian Gulf (Emirates, Saudia) are growing continuously.

Geneva aerodrome has the particularity of heavy commercial traffic co-existing with a developed business aviation activity (second position in Europe behind Le Bourget) and light aviation.

The aerodrome has a main paved runway 05/23 a secondary grass/earth runway 05L/23R. The commercial infrastructure and the TWR are located south of the runway while the north zone includes industrial maintenance facilities and light and business aviation.

Air traffic control in Switzerland is provided by the private company Skyguide, the successor to Swisscontrol.

In Geneva, Skyguide provides local control at the aerodrome (ground and LOC). It also manages Geneva approach control and a portion of airspace delegated by France, including the approach to Annecy and Chambéry aerodromes and arrivals and departures from aerodromes without IFR procedures, such as Annemasse and Bellegarde. In the north-west, this delegated airspace covers a large part of the French Jura towards Dijon. Vertically, the delegated airspace goes up to FL 145.

The aerodrome has an effective SMGCS system with stop bars and visualisation of movements.

In addition, the Geneva en-route Regional Control Center operated by Skyguide is also based at the aerodrome.

4.3.2.2. Bilingualism of controllers in Geneva

Skyguide recruits its controllers in Switzerland and in any other country; in the case of personnel stationed in Geneva, learning of phraseology in French is also required and recruitment takes place in France. The level of English is tested systematically during the recruitment of future staff; the exams are completed on computer.

ICAO level 4 in English is required to do the job; if the recruit is borderline in relation to this level, the company offers courses and it is up to the personnel to decide whether or not to follow them on a voluntary basis.

Controllers are trained at the civil aviation school in Zurich. As the instructors are of various nationalities, the lessons are given in English, though specific additional material for Geneva is taught in French.

ASM personnel are also trained at the school in Zurich and have level 6 in French.

At Geneva aerodrome, all communications between ATS units and aircraft are either in French or in English.

In the delegated airspace, services are provided in French and in English.

- Using two dedicated frequencies, the airport operator provides the following ground services:
  - communication with all vehicles circulating in the manoeuvring area,
  - pre-flight, push-back and taxiing with the aircraft.

When taxiing on arrival and departure, transfer is done with the air traffic control ground frequency so as to optimise the use of the available areas.

All commercial crews including Swiss communicate in English, except Air France and Hop which communicate in French.

Communication is in English for business aviation, while for most light aviation and helicopter movements communication is in French.

Drivers of vehicles entering the manoeuvring area (firefighters, bird control...) are often of French nationality; they communicate in French with the ASM service.

Difficulties may appear at the aerodrome during taxiing, especially during the Geneva Motor Show when there are more general aviation flights. In these cases, "Follow Me" vehicles are used, systematically tuned to the Ground frequency. This practice is likely to avoid the creation of conflict situations when taxiing but it should be added that these difficulties do not originate from the bilingualism practised, but rather from insufficient knowledge of the aerodrome by the specific pilot population during the Show.

Concerning the language used in aeronautic radio communications, other than French at Geneva, German may be used at other aerodromes (Zurich, Bern, Lugano...).

The representatives met agreed that bilingualism for ATC necessarily follows from the delegation of airspace; it also meets a need for light aviation and helicopter traffic and finally vehicles circulating in the areas.

The level of English of commercial pilots does not generally pose a problem. However, for some nationalities the use of English causes real difficulties and reduces the fluency of communications and hence the quality of service.

Conversely, certain expressions in French employed by Canadian pilots can cause surprise, due to differences in vocabulary,

but they do not cause serious understanding difficulties. The same applies to Swiss controllers using numbers like “septante” for “70”, which for a French pilot is “soixante-dix”.

The FOCA representative reported an incident in Sion between a German pilot speaking English in IFR during the approach phase on ILS and a pilot taking off speaking French.

This event is out of scope of the study, however we have examined the report sent to us by FOCA; it turns out that the bilingualism actually practised had nothing whatsoever to do with the root causes of the event.

4.3.2.3. Conclusion

For the Geneva aerodrome, there is no known situation, at least in the past twenty-five years, in which the practice of bilingualism could have created a risk. The representatives met were certain of this.

This aerodrome therefore presents a typical situation of bilingualism in air-ground radio communications and the managers met think that if France notifies the European Commission of its decision not to apply paragraph 14015 of the SERA Part C regulation, this will logically also apply for air traffic control in the delegated airspace.

4.4. Safety through monolingualism: an unfounded assumption in the case of France

4.4.1. Unfounded requirements

4.4.1.1. ICAO

- As stated earlier, the manual on the implementation of ICAO language proficiency requirements (Doc 9835) calls bilingualism into question:

The use of two languages in the same airspace: This can have an impact on the situational awareness of flight crews who do not understand all the languages used for radiotelephony in that airspace and has been cited in several accident reports as a contributing factor

Through the French representative on the Air Navigation Commission, the ICAO was questioned about the "numerous accidents" in which bilingualism was a contributing factor, in order to obtain the reports.

Inquiries at the ICAO headquarters in Montreal did not allow to identify these investigation reports of "numerous" accidents, except the one that occurred on 25 May 2000 at Paris-Charles-de-Gaulle airport, already mentioned several times in this report.

4.4.1.2. EAPPRI

- In one of its provisions, this plan recommends the exclusive use of English with the following statement:

Use of Aviation English is proven to be a significant factor in the establishment and maintenance of situational awareness for all participants associated with runway operations.

- With regard to the prevention of runway incursions, the question to be answered is:
  - What safety gain is brought by monolingualism and the situational awareness it would allow?

The bibliography of the EAPPRI document does not include any study that answers this question.

The literature searches conducted as part of this study did not identify any reports on this specific case of situational awareness.

An experiment carried out in France in 2004 on the impact of the human factor during a T-CAS event, while certainly in a different case, highlighted that following a poor mental representation, situational awareness can be erroneous and lead to inadequate reactions.

Finally, it would have been instructive to study to what extent this concept of situational awareness among pilots could have played a role in the prevention of runway incursions at aerodromes where ATC communications are only in English (Great Britain, USA).

4.4.1.3. Annual reports of the SRC

Reading the annual reports of the SRC post-EAPPRI (hence from 2005) did not allow an assessment to be made of the evaluation by this EUROCONTROL Commission of the application of the various measures contained in this plan and the results obtained in terms of runway incursions.

In particular those relating to the exclusive use of English in ATC communications.

Indeed, the annual reports of the SRC are far too synthetic and general to provide visibility into the application of the 99 proposals contained in the EAPPRI plan.

This may be understandable, as the plan is addressed to 41 States and to the major aerodromes. The first plan targeted the first 100 ECAC airports.

In addition, from the first report to the last, the SRC notes problems with incident reporting and classification by severity (this is covered in one of the 11 EAPPRI recommendations, associated with the creation of Local Runway Safety Teams: "Data collection and lesson sharing").

- However, in its 2013 report, the SRC reported internal discussions since its creation on the issue of bilingualism in ATC communications. It proposes a recommendation to be submitted to the (Provisional) Council of EUROCONTROL, which would adopt it at its 39 th session in May 2013 :
  - *Use of More Than one Language at Airports in Eurocontrol Member States:*
    - *Since it was raised in 2011, the SRC and its Coordination Group (SRCCG) have been regularly discussing this subject.*
    - *At its meeting in March 2013, the SRC was able to agree a position on the matter, with the following recommendation being accepted by the EUROCONTROL Provisional Council at its 39 th Session in May 2013.*

- *States give positive consideration to the benefits of situational awareness to improve safety on airports and relevant surrounding airspace sectors at aerodromes and relevant surrounding airspace sectors with international traffic, more than 50,000 commercial IFR movements a year and a large majority of qualified pilots with acceptable level of English. This consideration would in particular encompass:*
  - *Extending the use of English by qualified pilots on some safety critical frequencies on airports and relevant surrounding airspace sectors.*
  - *Use of a single frequency for all the safety critical operations on a runway or a set of runways.*
  - *Where this consideration could lead to a change in current communication arrangements, States should decide to base their consideration on the outcome of local safety assessment.*
  - *States should report to SRC the progress in their consideration.*

It was not possible to find out about any studies that might have informed discussions within the SRC to let it decide on the adoption of this recommendation, the premise of the SERA regulation paragraph 14 015.

4.4.1.4. The 2006 EUROCONTROL study « Air-Ground Communication Safety Study Causes and Recommendations »

This study is cited in ICAO Doc 9835 as the most recent carried out on the "language barrier" as a factor contributing to accidents or incidents.

An exhaustive analysis of this European study is attached in Annex 6 to volume 3 of the study.

- It was carried out in two parts as described in 2.1.1.4:
  - The first part analyses 535 radiocommunications incidents. The statistical results from this study show that the issue of bilingualism is far from being the main cause of communication or safety incidents. They also show the relative nature of the concept of situational awareness, which is used as the grounds for seeking English monolingualism.
  - The second part analyses the replies of 308 pilots and 36 controllers to a questionnaire. The result calls bilingualism into question, whatever the cause of the radiocommunications incident.

Given this contradiction and with surprising explanations[29], the authors of the report conclude that the opinion of pilots should be taken into account rather than their own objective study based on the ASRs of said pilots.

The exhaustive analysis of this study provided in the annex shows that there are many other grounds for questioning the relevance of this study.

- However, it should be noted that a certain number of replies to the questionnaire express an expectation that is summarised in the Eurocontrol study as follows:
  - *A number of recommendations from the survey respondents require a safety study before a rational decision can be made on whether or not to implement a recommendation. Such a safety assessment needs to examine the feasibility of the recommendation in terms of safety and operational consequences and benefits, costs, timeline for implementation and possible side effects. This requires participation from the different actors involved in communication, i.e. operators, ANSPs, regulators and researchers.*

This is nothing more than the application of safety management principles before the implementation of any changes (procedures, working methods, equipment, etc.).

- Indeed, this now leaves us in a very paradoxical situation:
  - The preliminary safety impact assessment, which is a basic requirement, was not carried out before the adoption of SERA regulation 14 015 whereas it should have been a prerequisite.
  - The situation is now the inverse thereof, where a study must be carried out so as not to apply the regulation.

[29] When specifically questioned about these issues, they report them more often than when not questioned. In other words, the addition of a specific "bilingualism" section on the ASR forms would reveal the problem of bilingualism.

4.4.2. No event showing the link between monolingualism and safety

4.4.2.1. The accident on 25 May 2000 at Charles-de-Gaulle

The analysis of this accident on the question of the use of French by the French crew of the MD83, Air Liberté, and of English by the English crew of the Short 330, G-SSWN, is presented in volume 2 of the study in the annex to chapter 1.

- It is appropriate here to return to some essential points of this analysis:
  - The captain of the G-SSWN testified that he heard a message in French, which he did not understand (it was the take-off authorisation for the Air-Liberté flight), then the instruction in English concerning him.
- This remark was retained by the BEA as a contributing factor to the accident:
  - The use of two languages for radio communications, (which) removed the possibility for the Shorts crew to realise that the MD 83 was going to take off.

The BEA wording might suggest that if the Shorts pilot had understood Air Liberté's take-off clearance, he might not have aligned himself.

- This conjecture can be debated:
  - First, the testimony of the captain says nothing of the sort.
  - Then, his alignment instruction mentioned simply that he was number 2 for take-off. It was not therefore the take-off of No. 1 that was a concern for him but rather the position of this No. 1, behind which he should logically line up. The absence of any clarification to remove all doubts of the controller was also noted as a cause of the accident by the BEA.
  - The captain had tried to visually locate the No. 1 for take-off, without success and without persevering. His alignment at a High Speed Exit did not provide him with this visual acquisition. The pilot nevertheless started the alignment procedure.
  - The take-off clearance for Air Liberté did not mention from which position it should take off since it was aligned at the end of the runway: "Liberté eighty-eight zero seven cleared for take-off twenty-seven two hundred and thirty degrees ten to fifteen knots." In English, this alignment clearance would not have allowed the Shorts captain to locate the aircraft taking off in relation to his own position.
  - As for the MD83 crew, it clearly understood the communications in English. But the alignment clearance given to the Shorts by the controller was insufficient to alert them: "Stream Line two hundred line up runway 27 and wait, number two." In fact, the controller did not specify from which intermediate feeder the Shorts 330, No. 2, was authorised to align.

In conclusion, it is clear that the languages used in the communications, whether they had been in English, in French or both at the same time, did not play a contributing role in the accident.

It was the incomplete ATC clearances given to the two crews that deprived them of any awareness of a conflict situation that the controller was unintentionally creating.

This accident has therefore been improperly used as an illustration of the negative impact of bilingualism on situational awareness.

This point is all the more important since it led the BEA to a safety recommendation inviting the DGAC to conduct a study on the desirability and conditions of systematic use of the English language for aerodrome control at Paris-Charles-de-Gaulle.

This recommendation is often mistakenly confused with a recommendation requesting the exclusive use of English in ATC communications.

In fact, the BEA, as with all its recommendations, left the organisation concerned, which has the best point of view for this, the possibility of analysing the advantages and disadvantages of implementing the suggested initiative.

In December 2009, the steering committee of the State Security Plan closed the recommendation by noting the very divided views of its members on the potential for improving safety and the difficulty of assessing this possible improvement. Subsequently, it was noted in 2014 that an experimental project on the exclusive use of English at Paris-Charles-de-Gaulle aerodrome had to be cancelled in the face of the difficulties involved in its implementation (see volume II of the study in Chapter 1.1.3.7).

Finally, the response today to this type of event is without doubt the installation of the RWSL system.

4.4.2.2. Analysis of runway incursion incidents in France

- The following incidents were examined during the study:
  - The accident that occurred at Paris-Charles-de-Gaulle aerodrome on 25 May 2000
  - 129 reports of accidents or serious incidents published by the BEA from 2008 to 2015
  - 8 runway incursion events forwarded by the BEA
  - 203 runway incursion incidents from 2014 to 2016 forwarded by DSNA/DO
  - 5 runway incursion incidents (outside the period 2014 – 2016) forwarded by the QSS sub-divisions of the 6 air navigation services concerned
  - 1 runway incursion incident forwarded by an airline (EasyJet)

The analysis of a total of 346 events does not allow us to draw the conclusion that there is anything to be gained through English monolingualism in ATC communications.

4.5. A change that would expose France to new issues

4.5.1. The workload on French-speaking pilots and controllers will only increase

It has not been possible to demonstrate, on the basis of the analysis of safety events or accident investigation reports, that monolingualism will lead to increased safety. Nevertheless, it can be agreed that there are phases of flight where crews may be more available to listen to the surrounding traffic and that this can sometimes happen in the vicinity of the runway. But we can see through the many events studied that crucial messages, even delivered in English, are not picked up. However, meetings with both airlines and psychologists have shown that French pilots sometimes use the language filter to identify messages that are addressed to them. The attentional load will increase in proportion to the volume of traffic that changes from French to English. And one may ask what crucial messages will not be picked up if "all English" communications further increase the volume of information that they have to deal with?

4.5.2. Ground personnel will lose understanding of their ATC environment in the manoeuvring area

The missions to the 6 airports as well as to Paris-Aéroports (formerly ADP) have shown that there would be great difficulty in training vehicle-driving ground staff to ICAO level 4 in English: as they stand, the tests rely on knowledge of pilot-specific air operations that these personnel do not have.

A large majority of these personnel were recruited to positions that do not require English (RFFS, WCP, etc.). So while they are remarkable professionals in their fields, this new skill, required mid career, will pose a real social problem, as much for the personnel themselves as for the airport operators.

If we now examine the hypothesis of the application of SERA 14015 only to pilots and controllers, it could be considered that the regulation does not fulfil the objective of a high and uniform level of aviation safety as laid down in the basic Regulation (EC) 216/2008. Similarly, it could be argued that it "[also] does not provide a consistent approach to regulating civil aviation safety", as recalled by recital (4) of the Implementing Regulation (EU) 2016/1185.

Finally, this would involve moving from a situation where this personnel can understand part of the ATC communications (those in French) to a situation where they will understand none at all. This would mean, a priori, a lower level of safety at the airports concerned.

4.5.3. Airspace and safety reduction for VFR pilots

The visits to the six aerodromes concerned by paragraph 14015 of the annex to the SERA Part C regulation and the events collected have shown that the co-existence of Francophone VFR and Anglophone IFR has not revealed any safety event.

- The requirement for monolingualism, if it were imposed in the airspaces managed by the units at the aerodromes concerned, would have the following drawbacks:
  - Restriction of access for non-commercial VFR and IFR flights in CTR TMA and FIS airspaces and at the aerodromes, the pilots concerned having no obligation to hold FCL055 English language proficiency.
  - Risk of more penetrations without radio contact by VFR flights unable to communicate in English in Class E airspaces, which runs counter to the current safety objective of strongly recommending that these VFR pilots contact the FIS frequencies.

This issue also applies to State aircraft carrying out specific missions, notably population protection missions (Civil Defence, aerial forest-firefighting).

5. Summary of the conclusions for each of the French aerodromes

5.1. Conclusion on the possibility of imposing English on Paris-Charles-de-Gaulle aerodrome

5.1.1. Overview of the safety events examined

- The following have been analysed :
  - 123 runway incursions over the past 3 years.
  - 7 incidents reported by the QSS sub-division of the unit from 2005 to 2016
  - 1 accident in 2000 having been the subject of a BEA investigation report
  - 7 incidents reported by the BEA from 2004 to 2016
- This shows that :
  - No case has been identified for which bilingualism was a cause or contributory factor of the event.
  - A single case where situational awareness avoided a risk of incursion. It involved two Francophone crews.
  - For a total of 138 events studied, situational awareness was potentially possible through radio communications in 51 cases, i.e. 37 %, though in almost all the cases envisaged, it did not happen. This puts into perspective the role of the concept of situational awareness that would allow a crew to reduce a risk.

5.1.2. Consequence of imposing English on Paris-Charles-de-Gaulle aerodrome

- The application of SERA 14 015 by the DE GAULLE control unit poses the following problems :
  - Once the conditions of paragraph 14 015 of the SERA Part C regulation are applied to pilots and controllers, there is likely to be a drop in safety : vehicle drivers will no longer understand half of the air-ground communications.
  - If it were decided to extend the requirement of obtaining ICAO level 4 to vehicle drivers in the manoeuvring area, this would necessitate training and maintenance of proficiency in English for ground personnel liable to access the manoeuvring area (Aéroport de Paris personnel and IESSAs).

5.1.3. Decision on the requirement to impose the English language on Paris-Charles-de-Gaulle aerodrome

- The study shows that :
  - no element has been found to indicate that bilingualism in air-ground communications at Paris-Charles-de-Gaulle aerodrome endangers safety,
  - no element has been found to indicate that imposing English would avoid aircraft incursions on an occupied runway or other safety risks.

Consequently, it seems justified to decide not to impose the exclusive use of the English language in communications between the ATS unit and aircraft at Paris-Charles-de-Gaulle aerodrome, in accordance with paragraph 14 015 of the annex to the SERA Part C regulation.

5.2. Conclusion on the possibility of imposing English on Paris-Orly aerodrome

5.2.1. Overview of the safety events examined

- The analyses of the 20 runway incursions (aircraft + vehicles) over the past 3 years at the Paris-Orly platform for an average annual traffic of 234 000 movements, and of the FNE reported by the QSS of SNARP/Orly, implicating situations of bilingualism show that :
  - No case has been identified for which bilingualism was a cause or contributory factor of the event.
  - In 14 cases out of 20, situational awareness was not objectively possible through radio communications. This puts into perspective the role of the concept of "situational awareness" that would allow a crew to reduce a risk.

5.2.2. Consequence of imposing English on Paris-Orly aerodrome

- The application of SERA 14 015 by the ORLY control unit poses the following problems :
  - Once the conditions of paragraph 14 015 of the SERA Part C regulation are applied to pilots and controllers, there is likely to be a drop in safety : vehicle drivers will no longer understand two-thirds of the air-ground communications.
  - If it were decided to extend the requirement of obtaining ICAO level 4 to vehicle drivers in the manoeuvring area, this would necessitate training and maintenance of proficiency in English for ground personnel liable to access the manoeuvring area (the operator's personnel and IESSAs).

5.2.3. Decision on the requirement to impose the English language on Paris-Orly aerodrome

- The study shows that :
  - no element has been found to indicate that bilingualism in air-ground communications at Paris-Orly aerodrome endangers safety,
  - no element has been found to indicate that imposing English would avoid aircraft incursions on an occupied runway or other safety risks.

Consequently, it seems justified to decide not to impose the exclusive use of the English language for communications between the ATS unit and aircraft at Paris-Orly aerodrome, in accordance with paragraph 14 015 of the annex to the SERA Part C regulation.

5.3. Conclusion on the possibility of imposing English on Nice-Côte d'Azur aerodrome

5.3.1. Overview of the safety events examined

- The analysis of the 14 runway incursions over the past 3 years at the Nice platform for an average annual traffic of 190 000 IFR + VFR flights, shows that :
  - No case has been identified for which bilingualism was a cause or contributory factor of the event.
  - In 9 cases out of 11, situational awareness was not objectively possible through radio communications. This puts into perspective the role of the concept of situational awareness that would allow a crew to reduce a risk.

The QSS sub-division of the SNA-SE has not identified any event coming within the scope of the study before 2014.

The BEA studied a runway incursion incident in 2010, in which situational awareness was impossible through radio communications.

5.3.2. Consequence of imposing English on Nice-Côte d'Azur aerodrome

- The application of SERA 14 015 by the NICE control unit poses the following problems :
  - Once the conditions of paragraph 14 015 of the SERA Part C regulation are applied to pilots and controllers, there is likely to be a drop in safety : vehicle drivers will no longer understand one quarter of the air-ground communications.
  - If it were decided to extend the requirement of obtaining ICAO level 4 to vehicle drivers in the manoeuvring area, this would necessitate training and maintenance of proficiency in English for ground personnel liable to access the manoeuvring area (the operator's personnel and IESSAs).
- The extension of the application of paragraph 14 015 of the SERA regulation to approaches and FIS would lead French VFR pilots not holding FCL055 to have to avoid penetrating :
  - the Nice FIS and be deprived of the flight information service. This situation would be a regression in terms of safety.
  - the TMA.
  - impossibility for French VFR pilots to reach Corsica according to the published routes that cross airspaces (TMA, CTR) where radio contact is mandatory and where English would be the only language of ATC communication.
  - impact on Civil Defence flights involving public service and personal assistance missions.

5.3.3. Decision on the requirement to impose the English language on Nice-Côte d'Azur aerodrome

- The study shows that :
  - no element has been found to indicate that bilingualism in air-ground communications at Nice-Côte d'Azur aerodrome endangers safety,
  - no element has been found to indicate that imposing English would avoid aircraft incursions on an occupied runway or other safety risks.

Consequently, it seems justified to decide not to impose the exclusive use of the English language for communications between the ATS unit and aircraft at Nice-Côte d'Azur aerodrome, in accordance with paragraph 14 015 of the annex to the SERA Part C regulation.

5.4. Conclusion on the possibility of imposing English on Bâle-Mulhouse aerodrome

5.4.1. Overview of the safety events examined

- The analyses of the 13 runway incursions over the past three years at the Bâle-Mulhouse platform for an average annual IFR traffic of 77 000 flights, and that of the single BEA report on an incident that took place in 2010, show that :
  - No case has been identified for which bilingualism was a cause or contributory factor of the event.
  - In 8 cases out of 9, situational awareness was not objectively possible through radio communications. This puts into perspective the role of the concept of "situational awareness" that would allow a crew to reduce a risk.

5.4.2. Consequence of imposing English on Bâle-Mulhouse aerodrome

- The application of SERA 14 015 by the BALE control unit poses the following problems :
  - Once the conditions of paragraph 14 015 of the SERA Part C regulation are applied to pilots and controllers, there is likely to be a drop in safety :
  - vehicle drivers will no longer understand part of the air-ground communications.
  - If it were decided to extend the requirement of obtaining ICAO level 4 to vehicle drivers in the manoeuvring area, this would necessitate training and maintenance of proficiency in English for ground personnel liable to access the manoeuvring area (the operator's personnel and IESSAs).
- The extension of the application of paragraph 14 015 of the SERA regulation to approaches and FIS would lead French VFR pilots not holding FCL055 to have to avoid penetrating :
  - the Bâle FIS and be deprived of the flight information service. This situation would be a regression in terms of safety.
  - the TMA.

5.4.3. Decision on the requirement to impose the English language on Bâle-Mulhouse aerodrome

- The study shows that :
  - no element has been found to indicate that bilingualism in air-ground communications at Bâle-Mulhouse aerodrome endangers safety
  - no element has been found to indicate that imposing English would avoid aircraft incursions on an occupied runway or other safety risks.

Consequently, it seems justified to decide not to impose the exclusive use of the English language for communications between the ATS unit and aircraft at Bâle-Mulhouse aerodrome, in accordance with paragraph 14 015 of the annex to the SERA Part C regulation.

5.5. Conclusion on the possibility of imposing English on Lyon-Saint-Exupéry aerodrome

5.5.1. Overview of the safety events examined

- The analyses of the 17 runway incursions over the past 3 years at the Lyon-Saint-Exupéry platform for an average annual traffic of 108 000 IFR + VFR flights, show that :
  - A single case was identified in which monolingualism in English allowed avoidance of a runway incursion. This does not seem sufficient to challenge bilingualism in ATC communications.
  - The crews were at the origin of the runway incursions in most cases (10 out of 17). This puts into perspective the role of the concept of "situational awareness" that would allow a crew to reduce a risk.

5.5.2. Consequence of imposing English on Lyon-Saint-Exupéry aerodrome

- The application of SERA 14 015 by the SAINT-EX control unit poses the following problems :
  - Once the conditions of paragraph 14 015 of the SERA Part C regulation are applied to pilots and controllers, there is likely to be a drop in safety : vehicle drivers will no longer understand half of the air-ground communications.
  - If it were decided to extend the requirement of obtaining ICAO level 4 to vehicle drivers in the manoeuvring area, this would necessitate training and maintenance of proficiency in English for ground personnel liable to access the manoeuvring area (the operator's personnel and IESSAs).
- The extension of the application of paragraph 14 015 of the SERA regulation to approaches and FIS would lead French VFR pilots not holding FCL055 to have to avoid penetrating :
  - the Lyon FIS and be deprived of the flight information service. This situation would be a regression in terms of safety.
  - the TMA.

5.5.3. Decision on the requirement to impose the English language on Lyon-Saint-Exupéry aerodrome

- The study shows that :
  - no element has been found to indicate that bilingualism in air-ground communications at Lyon-Saint-Exupéry aerodrome endangers safety,
  - no element has been found to indicate that imposing English would avoid aircraft incursions on an occupied runway or other safety risks,

Consequently, it seems justified to decide not to impose the exclusive use of the English language for communications between the ATS unit and aircraft at Lyon-Saint-Exupéry aerodrome, in accordance with paragraph 14 015 of the annex to the SERA Part C regulation.

5.6. Conclusion on the possibility of imposing English on Marseille-Provence aerodrome

5.6.1. Overview of the safety events examined

17 runway incursion have been analysed over the past three years at the Marseille-Provence aerodrome for an annual traffic of more than 126 000 IFR + VFR flights.

- This shows that :
  - No case has been identified for which bilingualism was a cause or contributory factor of the event.
  - In 16 cases out of 17, situational awareness was not objectively possible through radio communications. This puts into perspective the role of the concept of "situational awareness" that would allow a crew to reduce a risk.

5.6.2. Consequence of imposing English on Marseille-Provence aerodrome

- The application of SERA 14 015 by the PROVENCE control unit poses the following problems :
  - Once the conditions of paragraph 14 015 of the SERA Part C regulation are applied to pilots and controllers, there is likely to be a drop in safety : vehicle drivers will no longer understand half of the air-ground communications.
  - If it were decided to extend the requirement of obtaining ICAO level 4 to vehicle drivers in the manoeuvring area, this would :
    - necessitate training and maintenance of proficiency in English for ground personnel liable to access the manoeuvring area (the operator's personnel and IESSAs),
    - create difficulties in obtaining navy firefighting personnel from the Ministry of Defence, to be in charge of the RFFS at the Marseille-Provence aerodrome, having level 4 ICAO language proficiency ; this type of staff in particular showing a high geographical mobility.
- The extension of the application of paragraph 14 015 of the SERA regulation to approaches and FIS would lead French VFR pilots not holding FCL055 to have to avoid penetrating :
  - the PROVENCE FIS and be deprived of the flight information service. This situation would be a regression in terms of safety.
  - the TMA.
  - closure of this airspace to Civil Defence flights on missions to assist people in danger (forest firefighting, for example). The same problem would likely apply to the CEV, operating from Istres Le Tubé.

5.6.3. Decision on the requirement to impose the English language on Marseille-Provence aerodrome

- The study shows that :
  - no element has been found to indicate that bilingualism in air-ground communications at Marseille-Provence aerodrome endangers safety,
  - no element has been found to indicate that imposing English would avoid aircraft incursions on an occupied runway or other safety risks.

Consequently, it seems justified to decide not to impose the exclusive use of the English language for communications between the ATS unit and aircraft at Marseille-Provence aerodrome, in accordance with paragraph 14 015 of the annex to the SERA Part C regulation.

6. Conclusion

6.1. Summary of the study results

6.1.1. Conclusions from the questionnaire for crews

It is clear that the selection of pilots having replied to the questionnaire is not completely representative of the proportions of users of the aerodromes.

It can be seen, for example, that from 15 June 2017 onwards, there has been a strong increase in replies from pilots of Anglophone airlines, American in particular. This trend coincided with the sending of an email from IATA to some airlines. In fact, it can be noted, for example, that United Airlines, which supplied the most replies to the questionnaire with 1141 complete replies (21 % of the total replies to the questionnaire), is not present in France at this level of traffic.

- The following main conclusions can be drawn :
  - a consultation of pilot users at the six aerodromes concerned on their linguistic preferences and proficiency was requested by the European Commission. This consultation has been carried out. The objective of this consultation is not specified in the SERA Part C regulation,
  - The number of replies to the consultation over a period of one month, i.e. 23 860 replies of which 13 154 were complete, shows the interest that users have in the linguistic issue,
  - The English language proficiency declared by the pilots who responded to the questionnaire shows that 20 % of users do not have ICAO level 4, but that 68 % of them are at level 5 or higher.
  - The French language proficiency declared by the pilots who responded to the questionnaire shows that 45 % of users have at least ICAO level 4 in French.
  - The quantity of replies from pilots with a language preference for French, i.e. 5046 (39 % of complete replies) shows the attachment of a large number of users of the aerodromes and airspaces concerned to the use of French in radiotelephone communications, even though they do not represent a majority in the replies.
  - The quantity of replies from private pilots, 3763 (29 % of complete replies) shows the interest that this group of users has in the linguistic issue and most expressed their preference of the French language, which can be seen as an indicator of a high sensitivity to free circulation in the French skies.

6.1.2. Findings of the study

- The application of paragraph 14 015 of the SERA Part C regulation is not applicable in respect of the Constitution of the French Republic and the "Toubon Law" (law No. 94-665 of 4 August 1994 relating to use of the French language). This finding is reinforced by the law of the European Union, in particular through article 4 § 2 of the Treaty on European Union : the Union shall respect the equality of Member States before the Treaties as well as their national identities, inherent in their fundamental structures, political and constitutional.
- Annex Vb article 4 of the basic Regulation EC 216/2008 which restricts the use of the French language to a defined volume of airspace is not applicable in respect of the Constitution of the French Republic and the Toubon Law for the same reasons, unless this volume is French airspace in its entirety.
- The ICAO Air Navigation Bureau has not provided any accident report that mentions failure to understand a language in radiotelephony as having an impact on situational awareness, during the use of two languages in the same airspace, except that which occurred on 25 May 2000 at Paris-Charles-de-Gaulle aerodrome.

› No BEA accident or incident report mentions bilingualism as being a causal factor.

› In the accident that occurred on 25 May 2000 at Paris-Charles-de-Gaulle to the aircraft registered F-GHED and G- SSWN, it was the incomplete ATC clearances given to the two crews that deprived them of awareness of a conflict situation that the controller was unintentionally creating. As an additional measure, the BEA formulated a safety recommendation inviting the DGAC to conduct a study on the benefits and conditions of systematic use of the English language for aerodrome control at Paris-Charles-de-Gaulle. This recommendation is often confused with a recommendation requesting the exclusive use of English in ATC communications. This accident has therefore been improperly used as an illustration of the negative impact of bilingualism on situational awareness. In addition, the BEA is aware that the move to English monolingualism could introduce new risks.

› This study researched, over a significant period, runway incursion events that could be related to the use of the two languages authorised in France on the ATS frequencies and thus collected and analysed 346 events from the French navigation service provider, two French airlines, one airline with its AOC issued by the United Kingdom, Aéroport de Paris and the BEA. In only two cases, one of the two crews involved became aware of the potential conflict situation before the controller through the communications : one in a situation of French monolingualism, the other in a situation of English monolingualism. In neither case did the situation appear serious enough for a safety investigation to be opened.

› The study noted the commonly accepted finding among specialists in human factors that a pilot's situational awareness of the surrounding traffic can hardly rest on radio communications alone.

› Several documents have advocated systematic use of the English language subject to a prior study on the desirability and conditions of its implementation before making it obligatory. No specific study or preliminary impact assessment on the advantages of monolingualism was found in Europe.

› Canada, relying on a real safety study and simulations, moved the province of Quebec from a monolingual English-language situation for air-ground communications to French-English bilingualism. More than 30 years after this change, no event caused by bilingualism has been reported.

› The implementation of the regulation in France would close access to a large portion of airspace to VFR flights communicating exclusively in French, the communication prerogatives of which are derived from EC Regulation No. 216/2008 and Annex 10 of the Chicago Convention to which France is a signatory.

› A great majority of ground staff or vehicle drivers at the aerodromes concerned, have difficulties in obtaining ICAO level 4 English language proficiency

6.1.3. Conclusion of the study

In France, air-ground radio communications are in French or in English.

The French Constitution as well as the Toubon Law are in contradiction to the requirement for the exclusive use of the English language in air-ground radio communications. Furthermore, according to the law of the European Union, in particular through article 4 § 2 of the Treaty on European Union : the Union shall respect the equality of Member States before the Treaties as well as their national identities, inherent in their fundamental structures, political and constitutional.

This study has nevertheless examined the possibility of imposing the use of the English language for communications between the ATS unit and the aircraft, at aerodromes with more than 50 000 international IFR movements per year, for safety reasons, so as to avoid aircraft incursions on occupied runways or other risks to safety.

The study highlights that the principle behind the drafting of paragraph 14 015 is that the sharing of information via the exclusive use of English in radio communications improves safety. However, most of the previous reflections on the systematic use of the English language include the recommendation to carry out a prior study on the desirability and conditions of its implementation before making it obligatory.

It turns out that no specific study or preliminary impact assessment on the advantages of monolingualism has been found in Europe. The example of Canada shows, on the contrary, that by relying on a real safety study and simulations, this country moved the province of Quebec from a monolingual English-language situation for air-ground communications to French-English bilingualism. More than 30 years after this change, no event caused by bilingualism has been reported.

Furthermore, the implementation of this paragraph of the regulation would close access to a large portion of airspace for a large number of VFR flights communicating exclusively in French, the communication prerogatives of which are derived from Annex 10 of the Chicago Convention to which France is a signatory.

The study noted the commonly accepted finding among specialists in human factors that pilots' situational awareness is very far from resting on radio communications alone. The tools available to pilots such as TCAS, GPWS, RWSL play a safeguard role. Above all, these are alarms, clearly showing that situational awareness within the flight crew of the aircraft is achieved through multiple sensors and not only communications. For the air traffic situation, only the controller, himself assisted by certain tools of last resort, has a full understanding of the dynamic evolution of the situation.

The study further highlights that the search for situational awareness through radio communications is an issue that is called into question now that selective pilot-controller dialogue is becoming more widespread thanks to digital data links. The aerodromes concerned by SERA Part C will obviously achieve more safety gains by equipping themselves with advanced control assistance tools than by practising English monolingualism in communications.

The study was inspired by the principles of safety management systems, by approaching various safety partners in the field in order to collect more than 340 events that were analysed as feedback from the viewpoint of language use. In only two cases, one of the two crews involved became aware of the potential conflict situation through the communications : one in a situation of French monolingualism, the other in a situation of English monolingualism. In neither case did the situation appear serious enough for a safety investigation to be opened. In all other cases where this awareness was possible, it was not effective either in a monolingual or bilingual situation.

In the event that the regulation is applied in France, the study was extended to take account of ground vehicle drivers in the manoeuvring area. The difficulty or even impossibility for these ground staff to communicate in English was noted. The solution of using several frequencies, including one between the controller and the pilots and a different one, possibly outside the aeronautic VHF band, between the controller and ground vehicle drivers during certain phases of their work, does not solve the issues of operational safety.

While the conclusions can be extended to the impact on those stakeholders who might ultimately be affected by the exclusive use of English, the study has shown in particular, in the strict field of application of paragraph 14 015, the absence of any safety gain as a result of the exclusive use of English in radio communications between air traffic control and aircraft for the prevention of runway incursions in France, in particular at each of the six French aerodromes concerned.

The questionnaires for pilots on their language preference, despite the easily observed bias in the statistics on the populations who replied, at least showed the attachment of almost all French pilots to the use of the French language. The study did not address the human, financial and social costs of these provisions. This was not within its remit.

In consequence, it seems justified, in view of this study, to decide not to make it compulsory to use English as the only language, in accordance with paragraph 14 015 of the annex to the "SERA Part C" regulation.

6.2. Proposals for decisions/actions

6.2.1. Note sent by the French authorities to the European Commission

Subject : Application du paragraphe 14015 de l'annexe au règlement (CE) n° 216/2008 du Parlement européen et du Conseil du 20 février 2008 concernant des règles communes dans le domaine de l'aviation civile et instituant une Agence européenne de la sécurité aérienne, et abrogeant la directive 91/670/CEE du Conseil, le règlement (CE) n° 1592/2002 et la directive 2004/36/CE

In the framework of the implementation of Commission Implementing Regulation (EU) No. 2016/1185 of 20 July 2016 amending Implementing Regulation (EU) No. 923/2012 as regards the update and completion of the common rules of the air and operational provisions regarding services and procedures in air navigation (SERA Part C) and repealing Regulation (EC) No 730/2006, a study was outsourced to the Civil Aviation Technical Centre (STAC) on the applicability of paragraph 14 015 of the Annex to Regulation 923/2012 as amended - known as "SERA Part C".

The summary of this study is appended hereto.

The study shows the absence of any gain in safety from the exclusive use of English in radio communications between air control and the aircraft for the prevention of runway incursions in France, and in particular at each of the six French aerodromes concerned.

Consequently, through this note, the French authorities notify the European Commission, as well as the European Aviation Safety Agency, that they have decided not to make the exclusive use of the English language compulsory at the aerodromes concerned, nor at other aerodromes, as stipulated in paragraph 14 015 of the Annex to the "SERA Part C" Regulation.

In accordance with SERA paragraph 14 015, the complete study will be forwarded to the Commission and the European Aviation Safety Agency before 31 December 2017 and made public.

The French authorities remain available to supply any additional information that the European Commission or the European Aviation Safety Agency may require.

6.2.2. Additional actions

- Other than the communication to the European Commission and EASA of the study report and the decision by France not to apply paragraph 14 015, the DGAC could consider the following actions :
  - in cooperation with other Francophone civil aviation authorities, ensure that a unique phraseology in French, similar to the English phraseology published by EASA, is defined and published at European level. This phraseology could be derived from the ICAO phraseology, with the agreement and support of its French-speaking administrations (Belgium, Switzerland, Canada, Francophone African countries...).
  - give major priority to the verification of all international or European regulations, guides and in particular EAPPRI from EUROCONTROL to ensure that they contain no provision advocating the exclusive or preferential use of the English language. When this is the case, ensure that the text is modified by giving a reminder of the need for a safety study prior to the adoption of such provisions and the ICAO rule which stipulates the use of the ground station language, published in the AIP, or English. In this respect, as soon as the opportunity arises, encourage changes in the European regulations so that the wording is re-established in the order "the language of the ground station or the English language".
  - Study the ways in which EASA could systematically check the advisability of translating proposed provisions into the ICAO languages used in Europe, in order to avoid misinterpretation.

Glossary

ACAS	Airborne Collision Avoidance System
ADP	Aéroports de Paris
ADREP	Accident Report
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
ALAT	French Army Light Aviation
ALT MOC	Alternative Means of Compliance
AMC	Acceptable Means of Compliance
AOC	Air operator's certificate
ASM	Airspace Management
ASMGCS	Advanced Surface Movement Guidance and Control Systems
ASR	Air Safety Report
ASRS	Aviation Safety Reporting System
ATC	Air Traffic Control
ATFCM	Air traffic flow and capacity management
ATM	Air Traffic Management
ATPL	Airline Transport Pilot Licence
ATSEP	Air traffic safety electronics personnel
BEA	French Civil Aviation Safety Investigation and Analysis Bureau
CAA	Civil Aviation Authority
CALPA	Canadian Air Line Pilots Association
CAPA	Corrective Actions and Preventive Actions
CATCA	Canadian Air Traffic Controllers Association
CAUTRA	French Automated air traffic control system
CDG	Paris-Charles de Gaulle airport
CEFRL	Common European Framework of Reference for Languages
CEV	French flight test center
CFIT	Controlled flight into terrain
CHIRP	Confidential Human Factors Incident Reporting Programme
CJEU	Court of Justice of the European Union
CLS	French local safety commission
CNS	Communications, navigation and surveillance
CODIR	Management committee

COPIL	Steering committee
CPDLC	Controller-pilot data link communications
CRM	Crew Resource Management
DGAC	French Directorate General for Civil Aviation
DIRCAM	French Military air traffic directorate
DSAC	French Directorate for civil aviation safety
DSAE	French State directorate for aeronautical safety
DSCGC	French General directorate for civil defence and crisis management
DSNA	French Directorate of air navigation services
DTA	French Directorate of air transport
DTA MCU	French Directorate of air transport Mission for the single sky and regulation of air navigation
EAPPRI	European Action Plan for the Prevention of Runway Incursions
EASA	European Aviation Safety Agency
ECAC	European Civil Aviation Conference
ECCAIRS	European Co-ordination Centre for Accident and Incident Reporting Systems
ENAC	French National school for civil aviation
ERC	Events Risks Calculation
EU	European Union
EUROCAE	European Organisation for Civil Aviation Equipment
FATO	Final Approach and Take-off area
FCL	Flight Crew Licence
FDM	Flight Data Monitoring
FMS	Flight management system
FNE	French Event notification form
GM	Guidance Material
GPS	Global Positioning System
GPWS	Ground proximity warning system
ICAO	International Civil Aviation Organization
ICNA	Air navigation control engineer
IESSA	Air safety systems electronic engineer
IFR	Instrument Flight Rules
IGN	French National geographical institute
ILS	Instrument Landing System

IMS	Integrated Management System
LOSA	Line Operations Safety Audit
MANEX	Operations manual
MORS	Mandatory Occurrence Reporting System
MSQS	French Mission for safety, quality and security management
NAL	National Aerospace Laboratories
NLR	Netherlands Aerospace Centre
NPA	Notice of Proposed Amendment
NTC	Notice to crews
PNC	Cabin crew
PPL	Private pilot licence
PPS	French Permanent air security posture
PRC	Performance Review Commission
REX	Feedback from experience
RFFS	Rescue and Fire Fighting Service
RWSL	Runway status lights
SERA	Standardised European Rules of the Air
SESAR	Single European Sky ATM Research
SMS	Safety Management System
SMGCS	Surface Movement Guidance and Control Systems
SNA	French Air navigation service
SRC	Safety Regulation Commission
STAC	French Civil aviation Technical centre
STAN	French National archive processing system
STCA	Short Term Conflict Alert
TCAS	Traffic alert and collision avoidance system
TFEU	Treaty on the Functioning of the EU
TMA	Terminal control area
TEU	Treaty on European Union
TRI	Type Rating Instructor
UK	United Kingdom
ULM	French LAPL
VFR	Visual Flight Rules
VV	French SPL
WCP	Wildlife Control Personnel

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