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APAC ALG TRANSPORTATION INFRASTRUCTURE & LOGISTICS

ČVUT ČESKÉ VYSOKÉ UČENÍ TECHNICKÉ V PRAZE

Generic Safety Case for the Implementation of IFR Operations

CZCAA IFR Study

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Change History

Version	Status	Date	Affected Pages	Author	Cause and Summary of the Change
00.01	Draft	2017-03-08	All	H. Scherzer	First draft
01.00	Draft	2017-03-28	All	H. Scherzer	Final draft
01.00	Released	2017-03-30	All	H. Scherzer	Released version

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N/A

1 Introduction

1.1 General

A study on the general principles for the redistribution of the Czech airspace in a way allowing IFR arrivals/departures to/from uncontrolled aerodromes and ensuring a sufficient safety level of air traffic was performed.

This document addresses the safety aspects of the study.

1.2 Limitation of This Generic Safety Case

This generic safety case validates the assumption that IFR operations implemented at uncontrolled aerodromes in the Czech Republic CAN BE acceptably safe if implemented appropriately and taking into account the [R02] Deliverable D2 - CONOPS Implementation of IFR Procedures in the Czech Republic as well as the safety requirements and assumptions/constraints as specified in this document.

A major limitation, among others, is that the Generic Safety Case is only applicable if the aerodrome is already AFIS certified.

It is required to perform a specific safety assessment for each uncontrolled aerodrome including the verification of evidence of correct implementation (aerodrome specific safety case) before the IFR operations can be considered acceptably safe.

1.3 Operational Background

The operational background is described in [R02] Deliverable D2 - CONOPS Implementation of IFR Procedures in the Czech Republic.

An operational FHA/PSSA was performed for the LKHK aerodrome and it is described in [R04] Safety Study on Implementation of IFR operation at LKHK airport. As far as generally applicable, the results of this operational safety assessment were taken into account for this Generic Safety Case.

1.4 Regulative Aspects

1.4.1 European Union Regulations

The International Regulatory Baseline is described in [R07] Regulative Baseline for the Implementation of IFR Operations at Uncontrolled Aerodromes in the Czech Republic.

1.4.2 Czech Republic Regulations

The Czech Republic Regulatory Baseline is described in [R07] Regulative Baseline for the Implementation of IFR Operations at Uncontrolled Aerodromes in the Czech Republic.

During the development of [R02] Deliverable D2 - CONOPS Implementation of IFR Procedures in the Czech Republic it was investigated whether any Czech Republic Regulation has to be taken into account. The result was that no local Regulation exists that has to be taken into account in addition to EU Regulations or is in contradiction with the EU Regulation.

1.5 Safety Assessment Process Overview

The safety assessment process for this Generic Safety Case consists of the following main steps and documents:

- Safety Assessment Planning: part of [R08] Generic Safety Assessment for the Implementation of IFR Operations;
- Safety Assessment: [R08] Generic Safety Assessment for the Implementation of IFR Operations;
- Safety Assessment Validation: [R08] Generic Safety Assessment for the Implementation of IFR Operations;
- Generic Safety Case (this document).

1.6 Documentation Structure

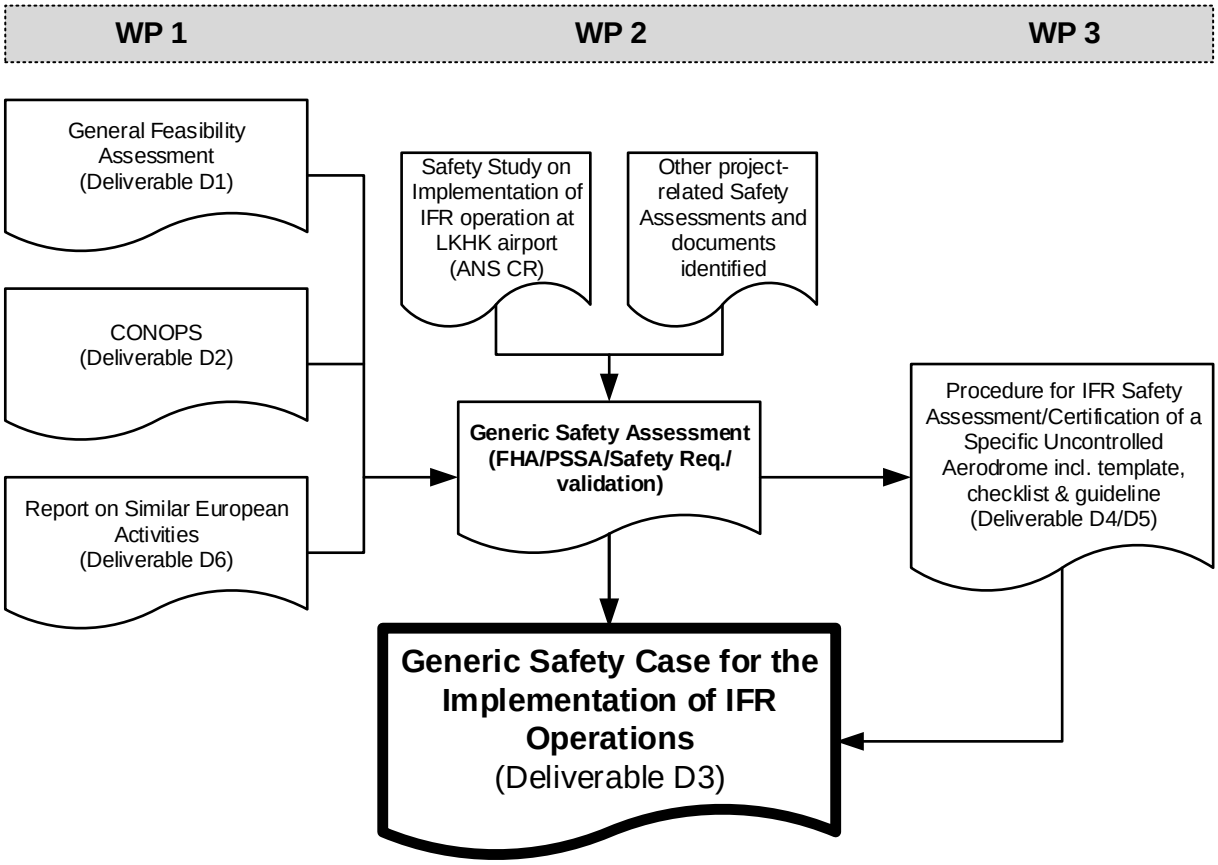

Figure 1-1 Documentation structure

2 CONOPS

The concept of operations incl. specific project-relevant IFR regulatory requirements are available in [R02] Deliverable D2 - CONOPS Implementation of IFR Procedures in the Czech Republic.

3 Overall Safety Argument

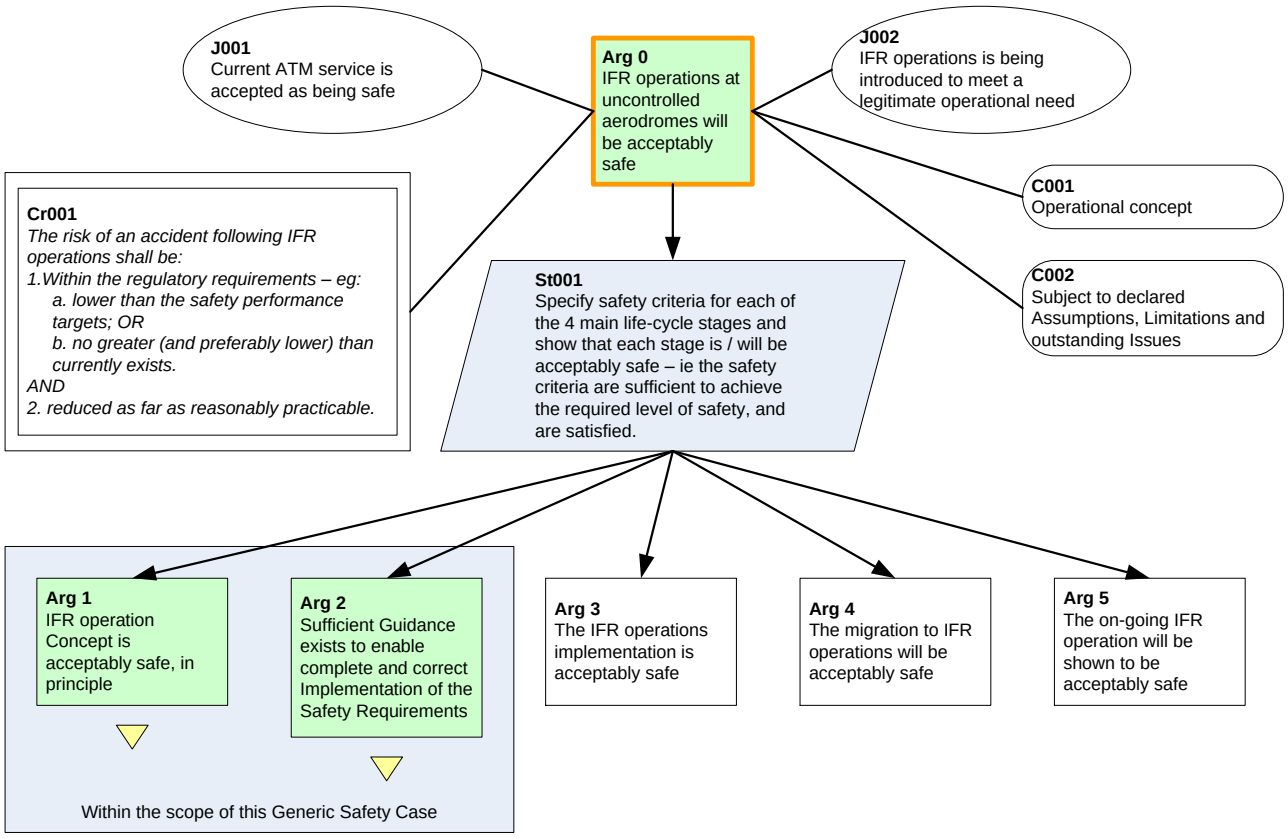

Figure 3-2 Overall Safety Argument for IFR Operation at Uncontrolled Aerodromes

Figure 3-2 Overall Safety Argument for IFR Operation at Uncontrolled Aerodromes provides a high level description of how the initial argument that the IFR operations at uncontrolled aerodromes can be acceptably safe is met. The initial safety argument is decomposed into lower level arguments and provides links to the evidence needed. The lower level arguments and evidence are described in chapter 4.

4 Safety Arguments and Evidence

4.1 Argument 1: IFR Operation Concept Is Acceptably Safe, in Principle

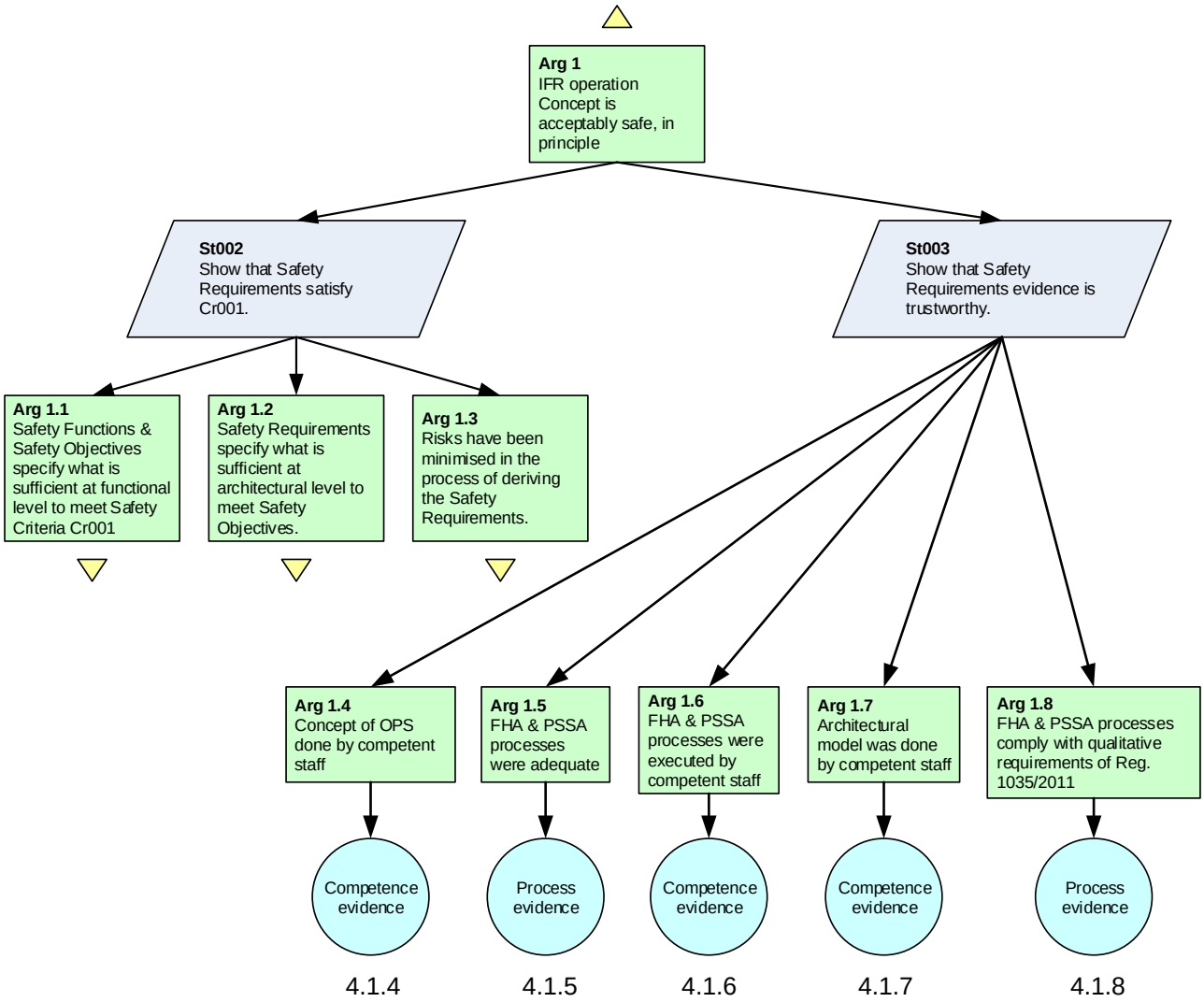

Figure 4-3 Argument 1: IFR operation Concept is acceptably safe, in principle

4.1.1 Argument 1.1: Safety Functions & Objectives Are Sufficient

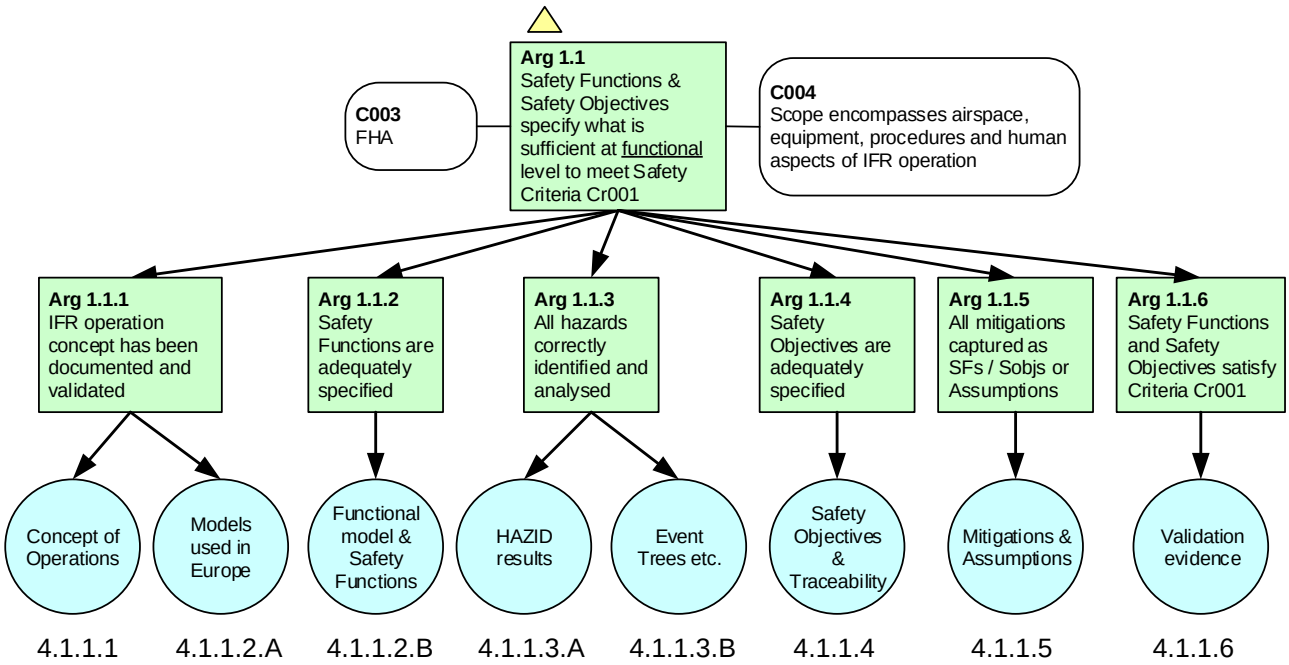

Figure 4-4 Argument 1.1: Safety functions & objectives are sufficient

4.1.1.1 Evidence for Argument 1.1.1: IFR Operation Concept

A. Concept of operations:

The concept of operation is described in [R02] Deliverable D2 - CONOPS Implementation of IFR Procedures in the Czech Republic.

B. Models used in Europe:

[R01] Deliverable D1 - General Feasibility Assessment;

[R02] Deliverable D2 - CONOPS Implementation of IFR Procedures in the Czech Republic; and

[R03] Deliverable D6 - Report on Similar European Activities.

4.1.1.2 Evidence for Argument 1.1.2: Functional Model & Safety Functions

[R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.1.3 Evidence for Argument 1.1.3: Hazards

A. HAZID results:

Hazards were identified and analysed in [R08] Generic Safety Assessment for the Implementation of IFR Operations.

B. Event Trees etc.

Event traceability is part of [R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.1.4 Evidence for Argument 1.1.4: Safety Objectives & Traceability

[R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.1.5 Evidence for Argument 1.1.5: Mitigations & Assumptions

[R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.1.6 Evidence for Argument 1.1.6: Validation

Safety Functions and Safety Objectives satisfy Criteria Cr001 – for evidence see [R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.2 Argument 1.2: Safety Requirements Meet the Safety Objectives

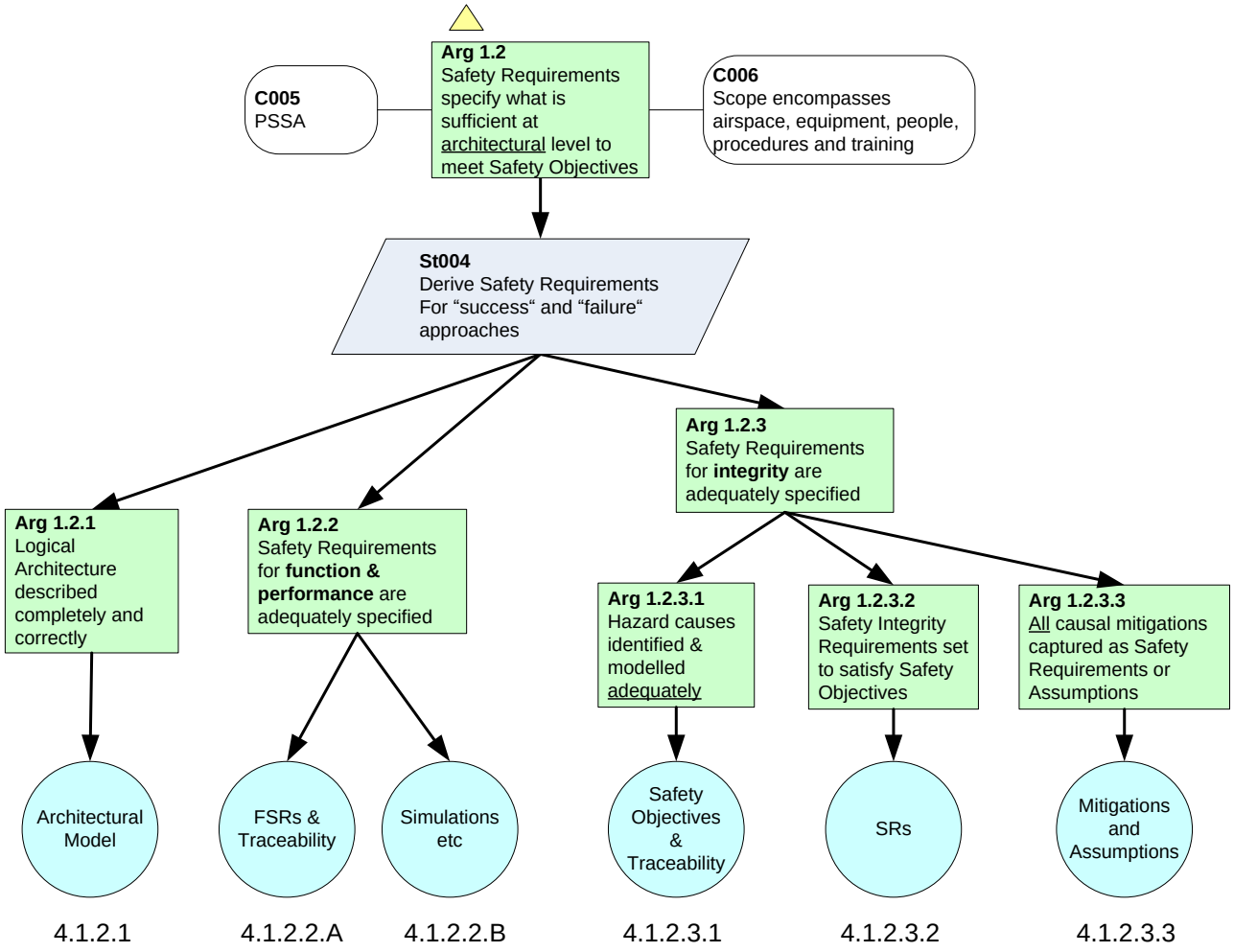

Figure 4-5 Argument 1.2: Safety requirements meet the safety objectives

4.1.2.1 Evidence for Argument 1.2.1: Architectural Model

[R02] Deliverable D2 - CONOPS Implementation of IFR Procedures in the Czech Republic.

4.1.2.2 Evidence for Argument 1.2.2: Safety Requirements for Function & Performance

A. FSRs & Traceability:

Safety requirements for function & performance were defined in [R08] Generic Safety Assessment for the Implementation of IFR Operations.

B. Event Simulations: N/A.

4.1.2.3 Evidence for Argument 1.2.3: Safety Requirements for Integrity

4.1.2.3.1 Evidence for Argument 1.2.3.1: Safety Objectives & Traceability

[R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.2.3.2 Evidence for Argument 1.2.3.2: Safety Requirements

Safety integrity requirements were defined [R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.2.3.3 Evidence for Argument 1.2.3.3: Mitigations & Assumptions

[R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.3 Argument 1.3: Satisfaction of Qualitative Safety Criteria

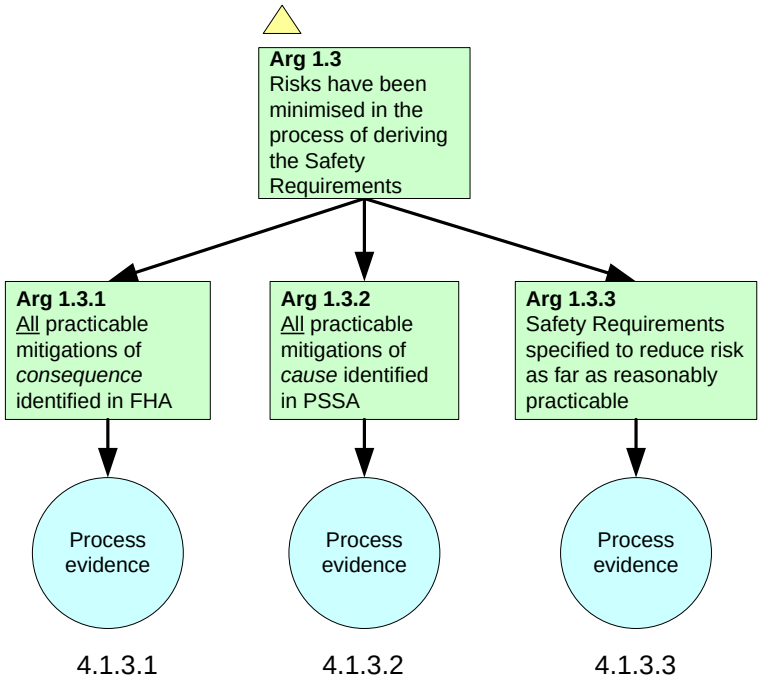

Figure 4-6 Argument 1.3: Satisfaction of qualitative safety criteria

4.1.3.1 Evidence for Argument 1.3.1: Practicable Mitigations of Consequences

[R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.3.2 Evidence for Argument 1.3.2: Practicable Mitigations of Cause

[R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.3.3 Evidence for Argument 1.3.3: Safety Requirements Specified

[R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.4 Evidence for Argument 1.4: Concept of OPS Competence Evidence

Concept of OPS done by competent staff – for evidence see:

[R02] Deliverable D2 - CONOPS Implementation of IFR Procedures in the Czech Republic.

4.1.5 Evidence for Argument 1.5: FHA & PSSA Process Evidence

FHA & PSSA processes were adequate – for evidence see:

[R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.6 Evidence for Argument 1.6: FHA & PSSA Competence Evidence

FHA & PSSA processes were executed by competent staff – for evidence see:

[R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.1.7 Evidence for Argument 1.7: Architectural Model Competence Evidence

Architectural model was done by competent staff – for evidence see:

[R02] Deliverable D2 - CONOPS Implementation of IFR Procedures in the Czech Republic.

4.1.8 Evidence for Argument 1.8: FHA & PSSA Processes and [R09] Commission Implementing Regulation (EU) No 1035/2011 Compliance Evidence

FHA & PSSA processes comply with qualitative requirements of [R09] Commission Implementing Regulation (EU) No 1035/2011 – for evidence see:

[R08] Generic Safety Assessment for the Implementation of IFR Operations.

4.2 Argument 2: Sufficient Guidance Exists to Enable Complete and Correct Implementation of the Safety Requirements

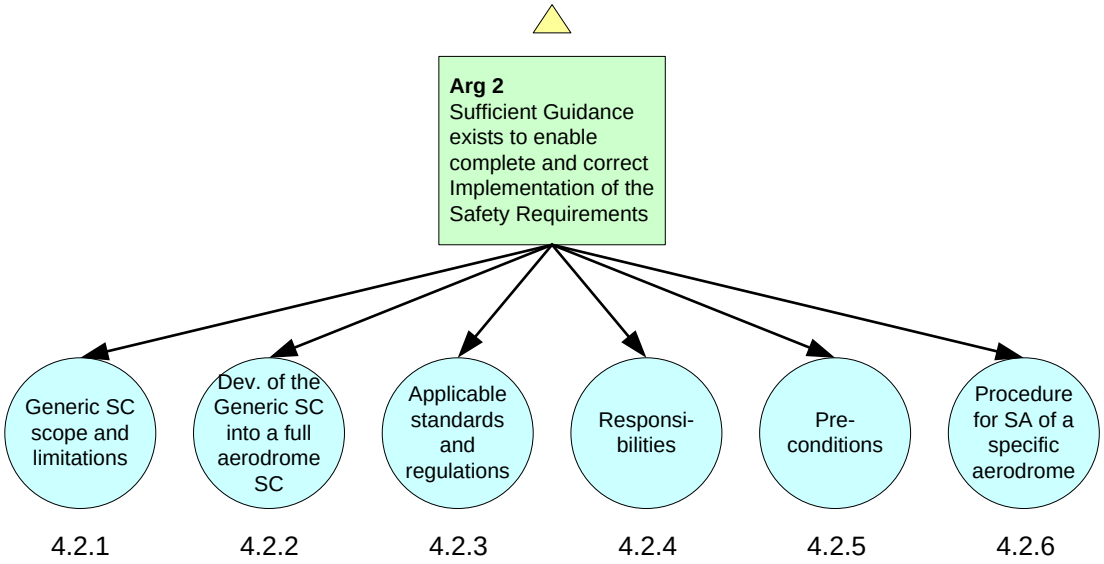

Figure 4-7 Argument 2: Sufficient Guidance exists to enable complete and correct Implementation of the Safety Requirements

4.2.1 Evidence for Argument 2: Generic SC Scope and Limitations

This document.

4.2.2 Evidence for Argument 2: Development of the Generic SC into a Full Aerodrome SC

[R10] Deliverable D4/D5 - Procedure for IFR Safety Assessment/Certification of a Specific Uncontrolled Aerodrome in the Czech Republic/Step 3: Safety Assessment Validation and Further Steps.

4.2.3 Evidence for Argument 2: Applicable Standards and Regulations

[R07] Regulative Baseline for the Implementation of IFR Operations at Uncontrolled Aerodromes in the Czech Republic.

4.2.4 Evidence for Argument 2: Responsibilities

[R10] Deliverable D4/D5 - Procedure for IFR Safety Assessment/Certification of a Specific Uncontrolled Aerodrome in the Czech Republic.

4.2.5 Evidence for Argument 2: Preconditions

[R10] Deliverable D4/D5 - Procedure for IFR Safety Assessment/Certification of a Specific Uncontrolled Aerodrome in the Czech Republic.

4.2.6 Evidence for Argument 2: Procedure for Safety Assessment of Specific Aerodrome

[R10] Deliverable D4/D5 - Procedure for IFR Safety Assessment/Certification of a Specific Uncontrolled Aerodrome in the Czech Republic.

4.3 Argument 3: The IFR Operations Implementation Is Acceptably Safe

This argument cannot be developed within the scope of a Generic Safety Case and has to be completed during the development of the Safety Case for a specific IFR operation for a specific aerodrome.

4.4 Argument 4: The Migration to IFR Operations Will Be Acceptably Safe

This argument cannot be developed within the scope of a Generic Safety Case and has to be completed during the development of the Safety Case for a specific IFR operation for a specific aerodrome.

4.5 Argument 5: The On-going IFR Operation Will Be Shown to Be Acceptably Safe

This argument cannot be developed within the scope of a Generic Safety Case and has to be completed during the development of the Safety Case for a specific IFR operation for a specific aerodrome.

5 Assumptions

No additional assumptions other than those already covered by referenced documents have been identified.

6 Issues

No outstanding safety issues identified.

7 Limitations

Please see 1.2.

8 Conclusion

Through qualitative arguments as provided by this document it is demonstrated that the IFR operations implemented at uncontrolled aerodromes in the Czech Republic can be operated acceptably safely within the constraints defined in accordance with 3 Overall Safety Argument.

9 Recommendations

No additional recommendations other than those already covered by referenced documents have been identified.

10 Abbreviations and Definitions

AFIS	Aerodrome Flight Information Service
APAC	Austrian Product Assurance Company
Arg	Argument
ATM	Air Traffic Management
C xyz	Context xyz

CONOPS	Concept of Operations
Cr xyz	Criterion xyz
CZCAA	Civil Aviation Authority of the Czech Republic
FHA	Functional Hazard Assessment
HAZID	Hazard Identification
IFR	Instrument Flight Rules
J xyz	Justification xyz
LKHK	Hradec Králové Aerodrome
N/A	Not Applicable
OPS	Operations
PSSA	Preliminary System Safety Assessment
SA	Safety Assessment
SC	Safety Case
SF	Safety Function
SObj	Safety Objective
SR	Safety Requirement
St xyz	Strategy xyz

11 References

Ref.	Document name / identifier / author / date
[R01]	Deliverable D1 - General Feasibility Assessment / CZCAA IFR study 00019 01.00 Released / Alsina, Nuria/ALG / 2017-03-30
[R02]	Deliverable D2 - CONOPS Implementation of IFR Procedures in the Czech Republic / CZCAA IFR study 00020 01.00 Released / Alsina, Nuria/ALG / 2017-03-30
[R03]	Deliverable D6 - Report on Similar European Activities / CZCAA IFR study 00036 02.00 Released / Kraus, Jakub/CTU / 2017-03-30
[R04]	Safety Study on Implementation of IFR operation at LKHK airport / CZCAA IFR study 00014 01.05 Draft / ANS CR / 2016-04-21
[R05]	Kick-off meeting minutes (MoM), Prague 2017-01-16 / CZCAA IFR study 00004 01.00 Draft / Mlynarik, Michal/APAC / 2017-01-19
[R06]	Air Navigation System Safety Assessment Methodology / SAF.ET1.ST03.1000-MAN-01, Edition 2.1, Released / EUROCONTROL / 2006-10-03
[R07]	Regulative Baseline for the Implementation of IFR Operations at Uncontrolled Aerodromes in the Czech Republic / CZCAA IFR study 00043 01.00 Released / Scherzer, Hans/APAC / 2017-03-30
[R08]	Generic Safety Assessment for the Implementation of IFR Operations (containing FHA and PSSA) / CZCAA IFR study 00047 01.00 Released / Scherzer, Hans/APAC / 2017-03-30
[R09]	Commission Implementing Regulation (EU) No 1035/2011 of 17 October 2011 laying down common requirements for the provision of air navigation services and amending Regulations (EC) No 482/2008 and (EU) No 691/2010 / - / European Commission / 2011-10-17
[R10]	Deliverable D4/D5 - Procedure for IFR Safety Assessment/Certification of a Specific Uncontrolled Aerodrome in the Czech Republic / CZCAA IFR study 00052 01.00 Released / Scherzer, Hans/APAC / 2017-03-30