



European Aviation Safety Agency – Rulemaking Directorate

Notice of Proposed Amendment 2014-17

Crew resource management (CRM) training

RMT.0411 (OPS.094) – 26.6.2014

EXECUTIVE SUMMARY

This Notice of Proposed Amendment (NPA) addresses a safety issue related to crew resource management (CRM) training. The safety recommendations linked to this issue were addressed during the development of this proposal.

The objective of this proposal is to establish and maintain a high uniform level of safety in air operations by reviewing, amending and expanding the Acceptable Means of Compliance (AMC) and the Guidance Material (GM) on CRM training.

This NPA proposes to incorporate new items in the present applicable framework on CRM training. Such items are provisions for CRM trainers and examiners, competency-based CRM training, surprise and startle effect, single flight crew CRM training, overview of operators by the competent authority, etc. In addition, this NPA proposes to restructure and rephrase the present AMC and GM to improve the clarity and readability of the text.

The proposed changes are considered to establish a more practicable and more effective framework for CRM training. These changes will give operators more reliable tools to mitigate further CRM-related risks and hazards and, therefore, are expected to increase safety during all phases of flight.

Applicability		Process map	
Affected regulations and decisions:	Decisions 2012/005/R (Part-CC), 2014/014/R (Part-ARO), 2014/017/R (Part-ORO), and 2012/019/R (Part-SPA)	Concept Paper:	No
Affected stakeholders:	Air operators, training organisations, personnel/licence and certificate holders, EASA Member States	Terms of Reference, Issue 2:	12.11.2012
Driver/origin:	Safety/stakeholder request	Rulemaking group:	Yes
Reference:	Safety Recommendations SPAN-2011-026, SPAN-2011-027, FRAN-2012-042, FRAN-2012-043, FRAN-2012-044, FRAN-2012-021, FRAN-2013-019	RIA type:	Light
		Technical consultation during NPA drafting:	No
		Duration of NPA consultation:	3 months
		Review group:	TBD
		Focused consultation:	TBD
		Publication date of the Opinion:	N/A
		Publication date of the Decision:	2016/Q2

Table of contents

1. Procedural information	3
1.1. The rule development procedure	3
1.2. The structure of this NPA and related documents	3
1.3. How to comment on this NPA.....	3
1.4. The next steps in the procedure.....	3
2. Explanatory Note	5
2.1. Overview of the issues to be addressed.....	7
2.2. Objectives	11
2.3. Summary of the Regulatory Impact Assessment (RIA)	11
2.4. Overview of the proposed amendments	12
3. Proposed amendments	20
3.1. Draft Acceptable Means of Compliance (AMC) and Guidance Material (GM) (Draft Decisions).....	20
3.1.1. Air operations — Decision 2014/014/R (Part-ARO)	20
3.1.2. Air operations — Decision 2014/017/R (Part-ORO)	21
3.1.3. Air operations — Decision 2012/019/R (Part-SPA)	60
3.1.4. Aircrew — Decision 2012/005/R (Part-CC).....	60
4. Regulatory Impact Assessment (RIA)	62
4.1. Issues to be addressed	62
4.1.1. Safety risk assessment	63
4.1.2. Who is affected?	63
4.1.3. How could the issue/problem evolve?	63
4.2. Objectives	63
4.3. Policy options	64
4.4. Analysis of impacts.....	64
4.4.1 Safety impact	64
4.4.2 Environmental impact.....	64
4.4.3 Social impact.....	64
4.4.4 Economic impact.....	64
4.4.5 General Aviation and proportionality issues	65
4.4.6 Impact on 'Better Regulation' and harmonisation	65
4.5 Comparison and conclusion	65
5. References.....	66
5.1. Affected regulations.....	66
5.2. Affected AMC and GM	66
5.3. Reference documents	66
6. Appendix — Evaluation of a European survey on CRM training	69
6.1. Background	69
6.2. Information on the respondents	69
6.3. Present status of CRM training	70
6.4. Future CRM training needs	72

1. Procedural information

1.1. The rule development procedure

The European Aviation Safety Agency (hereinafter referred to as the 'Agency') developed this Notice of Proposed Amendment (NPA) in line with Regulation (EC) No 216/2008¹ (hereinafter referred to as the 'Basic Regulation') and the Rulemaking Procedure².

This rulemaking task is included in the Agency's [4-year Rulemaking Programme](#) under RMT.0411 (OPS.094). The related Terms of Reference (ToR) were published on 12 November 2012³.

The text of this NPA has been developed by the Agency based on the input, among others, of the Rulemaking Group RMT.0411 (OPS.094). It is hereby submitted for consultation of all interested parties⁴.

The process map on the title page contains the major milestones of this rulemaking activity to date and provides an outlook of the timescale of the next steps.

1.2. The structure of this NPA and related documents

Chapter 1 of this NPA contains the procedural information related to this task. Chapter 2 (Explanatory Note) explains the core technical content. Chapter 3 contains the proposed text for the new requirements. Chapter 4 contains the Regulatory Impact Assessment showing which options were considered and what impacts were identified, thereby providing the detailed justification for this NPA. Chapter 5 contains the references and, finally, the appendix contains the evaluation of a European survey on CRM training.

1.3. How to comment on this NPA

Please submit your comments using the automated **Comment-Response Tool (CRT)** available at <http://hub.easa.europa.eu/crt/>⁵.

The deadline for submission of comments is **26 September 2014**.

1.4. The next steps in the procedure

Following the closing of the NPA public consultation period, the Agency will review all comments. The outcome of the NPA public consultation will be reflected in the respective Comment-Response Document (CRD). The Agency will publish the CRD with the Executive Director Decision containing Acceptable Means of Compliance (AMC) and Guidance Material (GM). The Agency plans to foresee a transition period of e.g. one year after publication of

¹ Regulation (EC) No 216/2008 of the European Parliament and 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 (OJ L 79, 19.3.2008, p. 1), as last amended by Commission Regulation (EU) No 6/2013 of 8 January 2013 (OJ L 4, 9.1.2013, p. 34).

² The Agency is bound to follow a structured rulemaking process as required by Article 52(1) of the Basic Regulation. Such process has been adopted by the Agency's Management Board and is referred to as the 'Rulemaking Procedure'. See Management Board Decision concerning the procedure to be applied by the Agency for the issuing of Opinions, Certification Specifications and Guidance Material (Rulemaking Procedure), EASA MB Decision No 01-2012 of 13 March 2012.

³ [http://easa.europa.eu/rulemaking/docs/tor/ops/ToR%20RMT.0411%20\(OPS.094\)%20Issue%202.pdf](http://easa.europa.eu/rulemaking/docs/tor/ops/ToR%20RMT.0411%20(OPS.094)%20Issue%202.pdf).

⁴ In accordance with Article 52 of the Basic Regulation and Articles 5(3) and 6 of the Rulemaking Procedure.

⁵ In case of technical problems, please contact the CRT webmaster (crt@easa.europa.eu).

the Decision until the provisions shall enter into force. This transition period gives operators the possibility to amend their CRM training programme accordingly.

2. Explanatory Note

Human factors continue to be one of the significant causes of incidents and accidents⁶. Human factors encompass crew resource management (CRM) which is described as the effective utilisation of all available resources (e.g. human resources, hardware, and information) to achieve safe and efficient operation. The objective of CRM is to enhance the communication and management skills of the crew members concerned. Emphasis is placed on the non-technical aspects of crew performance.

The following information illustrates the overall importance of CRM capabilities for maintaining safety in air operations:

- The UK CAA document 'Global Fatal Accident Review 2002 to 2011' identifies the top-four primary causal factors allocated for all fatal accidents as follows:
 1. Flight crew handling/skill — flight handling: 14 % of all fatal accidents;
 2. Flight crew perception and decision-making — omission of action or inappropriate action: 12 %;
 3. Flight crew situational awareness — lack of positional awareness in air: 10 %;
 4. Flight crew perception and decision-making — poor professional judgement or airmanship: 8 %⁷.

Rank Nos 2, 3 and 4 are related to CRM elements.

- In its analysis of the European helicopter accidents, the European Helicopter Safety Team (EHEST) identified the following three areas as the top factors, causal or contributory, for fatal accidents:
 1. Flight crew judgement and actions;
 2. Safety management/culture; and
 3. Flight crew situation awareness⁸.

All three top factors are related to CRM elements.

- ICAO⁹ describes the eight core competencies of flight crew as follows (in alphabetic order):
 1. Application of procedures;
 2. Communication;
 3. Flight path management — automation;
 4. Flight path management — manual control;
 5. Leadership and teamwork;
 6. Problem solving and decision making;
 7. Situation awareness; and

⁶ See, for instance, paragraph 7 of the U.S. Federal Aviation Administration (FAA) Advisory Circular No 120-51E: 'Investigations into causes of air carrier accidents have shown that human error is a contributing factor in 60 to 80 % of all air carrier incidents and accidents'.

⁷ See Table 8 in Chapter 3 of the UK CAA CAP 1036 'Global Fatal Accident Review 2002 to 2011'.

⁸ See Figure 10 in paragraph 4.3 of the 'EHEST analysis of 2000–2005 European helicopter accidents'.

⁹ See paragraph 3.2 and Appendix 1 of ICAO Doc 9995 'Manual of evidence-based training'.

8. Workload management.

The majority, five out of these eight core competencies (namely Nos 2, 5, 6, 7 and 8), are related to CRM.

This short preamble demonstrates the need to develop and enhance CRM capabilities and, subsequently, demonstrates the importance of appropriate CRM training. One major prerequisite for more practicable and more effective CRM training is a further improved European applicable framework. The latter is the subject of the present rulemaking task.

An explanation should be given on the use of the two terms 'Threat and error management (TEM)' and 'Crew resource management (CRM)'. The reason is that both terms and their 'relationship' are not always interpreted in a consistent manner by aviation experts.

TEM can be described as an overarching safety concept regarding aviation operations. The three basic components of the TEM framework are 'threats', 'errors' and 'undesired (aircraft) states'. The TEM framework proposes that threats and errors are part of everyday aviation operations that must be managed by flight crews, since both, threats and errors, have the potential to generate undesired aircraft states. Undesired aircraft state management largely represents the last opportunity to avoid an unsafe outcome.

CRM was described above as the effective utilisation of available resources, where emphasis is placed on the non-technical aspects of crew performance. In relation to TEM, CRM behaviours are an effective tool for managing threats and errors¹⁰. In this context, TEM can be understood as encompassing CRM with respect to crew performance or, in other words, CRM can be seen as being focussed on TEM.

Additionally, it is important to keep in mind that approaches to CRM have evolved since its inception in the late 1970s. Theoretical emphases have changed with its evolution that includes new models and academic underpinnings. One of the latest generations of CRM may be seen to include the concept of TEM as outlined above. Therefore, one may say that CRM in its current form is inclusive of this training approach. Consequently, CRM's functional goal is a flexible, systemic method for optimising human performance in general, and increasing safety in particular.

One other aspect may further explain the relationship between TEM and CRM: The study and consideration of human performance according to the CRM principles in air operations must not be an end in itself. Consequently, in search for a universal CRM rationale, it was concluded that the overarching justification for CRM is an effective (threat and) error management¹¹.

At the present stage, in the Air Operations Regulation¹² the term 'CRM' is used, while in the Aircrew Regulation¹³ in many cases the term 'TEM' is utilised. The explanation is that on the one hand in the Air Operations Regulation emphasis is put on the training of CRM

¹⁰ See R.L. Helmreich et al. 'Models of threat, error, and CRM in flight operations'.

¹¹ See R.L. Helmreich et al. about the 'Fifth generation of CRM' in 'The evolution of CRM training in commercial aviation'.

¹² Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1), as last amended by Commission Regulation (EU) No 379/2014 of 7 April 2014 (OJ L 123, 24.4.2014, p. 1).

¹³ 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 (OJ L 311, 25.11.2011, p. 1), as last amended by Commission Regulation (EU) No 245/2014 of 13 March 2014 (OJ L 74, 14.3.2014, p. 33).

behaviours as one important tool to manage threats and errors. On the other hand, the Aircrew Regulation mainly deals with pilot skills to identify and deal with threats and errors. In the future, however, the Agency might reconsider the terminology used in both Regulations.

2.1. Overview of the issues to be addressed

The situation today

The applicable framework for CRM training is laid down in Commission Regulation (EU) No 965/2012 on air operations and to some extent in Commission Regulation (EU) No 1178/2011 on aircrew. The Implementing Rules on CRM training are complemented by AMC and GM which, for air operations, have been transferred from the Joint Aviation Authorities (JAA) Temporary Guidance Leaflet (TGL) No 44 and JAR-OPS 3 AMC/IEM¹⁴. At present, the relevant AMC and GM are laid down in the Executive Director Decisions 2014/017/R (Air operations – Part-ORO) and 2012/005/R (Aircrew – Part-CC).

However, during the public consultation of the Agency's NPAs on air operations¹⁵, which finally led to Commission Regulation (EU) No 965/2012 and to the associated Executive Director Decisions, it emerged that the applicable framework concerning CRM training needs further improvement. This improvement has to take into consideration experience gained as well as recent developments since the JAA established TGL No. 44 and JAR-OPS 3. In addition, the Agency received two different rulemaking proposals from the European Human Factors Advisory Group (EHFAG) proposing to further specify AMC and GM related to CRM training. These two rulemaking proposals were as follows:

- CRM training: Proposal for alternatives to the applicable framework including proposals concerning training analysis and implementation; and
- CRM trainers and CRM trainer examiners: Proposal for CRM trainers and examiners to undergo specific training and accreditation.

Based on the comments of stakeholders and on the rulemaking proposals, the Agency decided to initiate the present rulemaking task (RMT.0411 (OPS.094)) to review and amend, where necessary, the AMC and GM on CRM training for flight crew, cabin crew and technical crew.

The Agency's Rulemaking Group

The role of the Agency's Rulemaking Group is advisory in nature. One major task is to assist the Agency in the drafting of the applicable framework. However, in the present case the role of the Rulemaking Group was expanded as follows¹⁶:

'For a time period of nine to twelve months the Group will investigate the subject of CRM training thoroughly by e.g. in-depth discussions, organising internal workshop(s) and inviting recognised experts.'

The main purpose of this measure was to collect experience gained over the past couple of years that should help improve the applicable framework. This purpose was achieved as follows:

¹⁴ IEM = interpretative explanatory material.

¹⁵ NPAs 2008-22 and 2009-02. These NPAs led to the Agency's Opinion 04/2011, which finally led to Commission Regulation (EU) No 965/2012.

¹⁶ See Section 5 of the Terms of Reference for RMT.0411 (OPS.094), Issue 2.

- The members of the Agency's Rulemaking Group provided 16 presentations in total, reporting on CRM items related directly to their daily work experience, but also covering issues such as:
 - history and development of CRM;
 - evaluation of CRM training;
 - cultural differences; and
 - startle factor.
- External, recognised experts were invited to the Agency's Rulemaking Group meetings to present and discuss a wide range of CRM issues related to the present rulemaking task. In total, 12 presentations were given, covering areas such as:
 - new generation of CRM;
 - human factors in air traffic management;
 - designing CRM training;
 - cultural differences concerning CRM; and
 - CRM and automation.
- A joint session was organised with the EHFAG 'Focus Group on Operations and Licensing' in order to have an in-depth discussion on the subject and on the rulemaking proposals made by the EHFAG.
- The Agency's Rulemaking Group established a survey on CRM training in order to analyse the present situation and the future needs concerning CRM training. The survey was widespread among European operators, crew and training organisations. The evaluation of the survey is provided in the appendix to this NPA.

The Agency's obligation to address safety recommendations

When linked to a rulemaking task, the Agency has the obligation to address safety recommendations in its deliberations during the rulemaking process. In the present case seven safety recommendations were identified to have a direct link to CRM training and, therefore, had to be addressed¹⁷. The safety recommendations addressed to the Agency, and the provisions taken by the Agency, are as follows:

1. **Safety Recommendation SPAN-2011-026:** It is recommended that the European Aviation Safety Agency (EASA) performs investigations or studies intended to know the status of application and the real effectiveness of the current EU requirements applicable to CRM. The results of these studies should permit to identify the weak points existing in this field and should contain proposals on how to strengthen them.

Provision taken: Following this safety recommendation, the Agency considered to initiate a research study to identify the weak points in the present CRM training and

¹⁷ These safety recommendations were established, among others, as a result of the investigation of:

- (a) the accident of a McDonnell Douglas DC-9-82 (EC-HFP) at Madrid-Barajas Airport on 20 August 2008 (Nos 1 and 2);
- (b) the accident of an Airbus A330-203 (F-GZCP) during the flight from Rio de Janeiro to Paris on 1 June 2009 (Nos 3 to 5);
- (c) the serious incident of an Airbus A340-313 (F-GLZU) in cruise flight over the north Atlantic Ocean on 22 July 2011 (No 6);
- (d) the French Bureau d'Enquêtes et d'Analyses (BEA), entitled 'Study on aeroplane state awareness during go-around (ASAGA)', see page 136 (No 7).

to provide proposals to strengthen them. However, the Agency concluded that enough experience and knowledge are already available. Therefore, the Agency decided to assign the Rulemaking Group the task to investigate the subject of CRM training thoroughly with the appropriate means (e.g. in-depth discussions and inviting recognised experts; for further details see above).

2. **Safety Recommendation SPAN-2011-027:** It is recommended that the European Aviation Safety Agency (EASA) standardise the CRM training that must be provided to the operations inspectors of national authorities, and define the criteria that must be met by said inspectors in order to exercise their duties as inspectors in the area of CRM.

Provision taken: Following this safety recommendation, the Agency proposes to introduce new AMC and GM in Part-ARO. These new AMC and GM will contain provisions concerning qualification measures and training for inspectors, as well as provisions concerning the oversight of operators by the competent authority (for details see paragraphs 2.4 and 3.1).

3. **Safety Recommendation FRAN-2012-042:** EASA to review the requirements for initial, recurrent and type rating training for pilots in order to develop and maintain a capacity to manage crew resources when faced with the surprise generated by unexpected situations.

Provision taken: Following this safety recommendation, the Agency proposes to introduce new AMC in Part-ORO. These AMC will cover CRM training elements concerning 'surprise and startle effect', and 'resilience development' (for details see paragraphs 2.4 and 3.1). In addition, for initial and type rating training the Agency envisages to further consider this safety recommendation in the context of rulemaking tasks RMT.0581 and RMT.0582, entitled 'Loss of control prevention and recovery training'.

4. **Safety Recommendation FRAN-2012-043:** EASA to ensure that operators reinforce CRM training to enable acquisition and maintenance of adequate behavioural automatic responses in unexpected and unusual situations with a highly charged emotional factor.

Provision taken: Following this safety recommendation, the Agency proposes to introduce new AMC in Part-ORO. These new AMC will cover CRM training elements concerning 'surprise and startle effect', and 'resilience development' (for details see paragraphs 2.4 and 3.1).

5. **Safety Recommendation FRAN-2012-044:** EASA to define criteria for selection and recurrent training among instructors that would allow a high and standardised level of instruction to be reached.

Provision taken: Following this safety recommendation, the Agency proposes to amend existing AMC and to introduce new AMC and GM in Part-ORO. These new AMC and GM will address CRM trainer qualification, training, assessment and recency (for details see paragraphs 2.4 and 3.1).

6. **Safety Recommendation FRAN-2012-021:** EASA to introduce the surprise effect in training scenarios in order to train pilots to react to these phenomena and work under stress.

Provision taken: Following this safety recommendation, the Agency proposes to introduce new AMC in Part-ORO. These new AMC will cover CRM training elements concerning crisis management in unexpected, unusual and stressful situations, addressing 'surprise and startle effect' (for details see paragraphs 2.4 and 3.1).

7. **Safety Recommendation FRAN-2013-019:** EASA to study the additional technical and regulatory means required to mitigate the shortcomings of CRM in high workload and/or unusual conditions.

Provision taken: In addition to the already existing training elements of 'stress and stress management' and 'workload management', the Agency introduced, to mitigate further the safety risk of unusual conditions, 'resilience development' as a new training element (for details see paragraphs 2.4 and 3.1).

Items which were incorporated

When envisaging the present rulemaking task, the Agency saw no need for amending the Implementing Rules on CRM training. Instead, the Agency proposes to amend the AMC and GM associated with the Implementing Rules. The major goal is to establish a more practicable and more effective framework in order to give operators reliable tools to mitigate risks and hazards.

During the analysis of the input received towards the establishment of this NPA¹⁸, the Agency noticed that some contributors requested an even more detailed and more descriptive compliance-based rulemaking scheme. Other contributors promoted a less complex rulemaking scheme with less specific topics and more flexibility ('open rules'). In addition, some other contributors requested to introduce a completely new approach (e.g. competency-based rulemaking and CRM as a risk management tool). Finally, some contributors emphasised that the present AMC and GM are the result of a long process and are still of considerable value. Therefore, the present AMC and GM should be maintained where appropriate.

Taking into account these different opinions and concepts, the Agency tried to reach a compromise when establishing the proposed amended AMC and GM. Based on the input received, the Agency concluded that the following main measures are needed in order to improve the present applicable framework on CRM training:

- modernisation by incorporating new items to consider recent developments and experience gained; and
- restructuring and rephrasing to improve the clarity and readability of the text.

In detail, the Agency — based on the input received — proposes to incorporate the following new items in the AMC and GM on CRM training:

- qualification and training for inspectors of competent authorities;
- checklist for oversight of CRM training by inspectors of competent authorities;
- provisions concerning computer-based training;
- expansion of combined CRM training;
- CRM training and management system;

¹⁸ The input received includes the rulemaking proposals; input from the Agency's Rulemaking Group and from external, recognised experts; input from commentators; results of the survey; etc.

- competency-based CRM training¹⁹;
- monitoring and intervention;
- resilience development;
- surprise and startle effect;
- effective communication and coordination with personnel outside the aircraft;
- CRM training for single-pilot operations and for single cabin crew operations;
- qualification, training, assessment and recency of CRM trainer;
- qualification of CRM trainer examiner;
- training environment, flight crew CRM trainer vs flight crew instructor;
- design, delivery and evaluation of CRM training;
- non-technical skills assessment (NOTECHS) for flight crew.

Paragraph 2.4 provides further information on the proposed amendments to the AMC and GM, while Chapter 3 documents the proposed amendments.

As indicated above, during the public consultation of the Agency's NPAs, which finally led to Commission Regulation (EU) No 965/2012, the Agency received several comments related to the AMC and GM on CRM training. These comments were considered (again) in the course of the present rulemaking task. In summary, it can be stated that out of the 11 comments made:

- 5 comments were accepted (the proposals made were incorporated); and
- 6 comments were partly accepted (the proposals made were partly incorporated).

2.2. Objectives

The overall objectives of the EASA system are defined in Article 2 of the Basic Regulation. This rulemaking proposal will contribute to the achievement of the overall objectives by addressing the issues outlined in Chapter 2 of this NPA.

The specific objective of this proposal is to establish and maintain a high uniform level of safety in air operations by reviewing, amending and expanding AMC and GM on CRM training. This includes, as mentioned above:

- modernisation by incorporating new items; and
- restructuring and rephrasing to improve text readability.

2.3. Summary of the Regulatory Impact Assessment (RIA)

The complete Regulatory Impact Assessment (RIA) related to the present rulemaking task can be found in Chapter 4 of this NPA. The options identified in the RIA are as follows:

- Option 0: **Baseline option** (no change to the AMC and GM; risks remain as outlined in the issue analysis);
- Option 1: **Encourage operators** to develop alternative means of compliance; and

¹⁹ The competency-based CRM training, as proposed in this NPA (for details see below), is kept general and can be seen as a first step. The Agency plans to introduce the concept of competency-based training in a more general manner as a future rulemaking task. In this context, the provisions concerning competency-based CRM training may be expanded.

- Option 2: **Review and amend** AMC and GM on CRM training, as appropriate.

The most important impacts identified in the RIA for each option are the safety and the economic impacts. In the RIA it is concluded that Option 2 is the preferred one. The main reason is that this option is the only one which is expected to contribute to a higher reduction of the existing safety risks, when compared to Options 0 and 1, while also providing for a standardised application of the CRM training. Option 2 is the preferred one although the costs for operators are expected to be higher when compared to the other two options. In addition, costs are foreseen for the competent authorities. However, these costs for operators and competent authorities are reasonable, as it has been confirmed by the majority of the Agency's Rulemaking Group members. Commentators are invited to comment on this assessment in particular.

Option 0 would lead to no change concerning the safety risks, while Option 1 would only result in a minor reduction of the safety risks. Therefore, these options should not be considered further.

2.4. Overview of the proposed amendments

This paragraph provides a short substantiation concerning the proposed amendments to the AMC and GM and the contentious issues. In addition, information is given on how and where the proposed amendments have been incorporated. The substantiation and information given below is structured in the same order as the proposed amendments to the AMC and GM are documented in Chapter 3.

One major goal of restructuring and rephrasing the present AMC and GM is to introduce a similar structure for flight crew and for cabin crew provisions. This is further emphasised in the description of the proposed amendments below.

Air operations – Part-ARO

1. **Oversight by the competent authority:** One major concern expressed during the establishment of this NPA was that at present for the majority of Member States the oversight is not always effective. According to the input received, such an oversight is an important prerequisite for ensuring effective and high-quality CRM training. Further analysis, however, made it clear that the oversight, including the continued compliance of the operator's CRM training, is already adequately regulated in ARO.GEN.300 and the associated AMC and GM. Based on the input received, the Agency decided to propose as an additional measure a checklist for CRM training oversight by introducing GM3 ARO.GEN.300(a);(b);(c).

In order to fulfil the required monitoring tasks, the competent authority needs to have qualified and well-trained personnel. Consequently, the Agency proposes appropriate measures for qualification and training related to CRM by introducing AMC3 ARO.GEN.200(a)(2) related to the competent authority's management system.

Air operations – Part-ORO

2. **Flight crew – applicability:** The existing provisions are only applicable to commercial air transport (CAT) operations. With the proposed amendments, the applicability will be expanded to include all operations where Part-ORO applies to (see ORO.GEN.005 of Commission Regulation (EU) No 965/2012). The Agency decided, based on the input received, to distinguish between multi-pilot operations (see AMC1 ORO.FC.115) and single-pilot operations (see AMC2 ORO.FC.115).

3. **Flight crew — general items concerning CRM training:** The structure of the existing paragraph (a) of AMC1 ORO.FC.115, entitled 'General', only contains a few general items. In the present applicable framework other important items, which can also be considered as being 'general', are hidden further down in the AMC text. In addition, based on the input received, the Agency considered it necessary to introduce further new general items. Therefore, paragraph (a) of AMC1 ORO.FC.115 has been restructured and rewritten, and now contains new proposals for general items such as 'computer-based training', 'management system' and 'competency-based CRM training'. In addition, e.g. the provisions for combined training have been expanded.
4. **Flight crew - initial operator's training:** In order to improve the readability and the structure the Agency proposes to delete from the new paragraph (b) of AMC1 ORO.FC.115 the previous provisions on 'CRM trainer' (see existing paragraph (b) of AMC1 ORO.FC.115&215), and to transfer these provisions to AMC3 ORO.FC.115, entitled 'Flight crew CRM trainer and flight crew CRM trainer examiner'. In addition, based on the Rulemaking Group's proposal, the Agency introduced minimum training hours for initial operator's training.
5. **Flight crew — operator conversion course, recurrent CRM training and command course:** For these paragraphs (c), (d) and (e) of AMC1 ORO.FC.115 the Agency proposes, apart from editorial changes, the following amendments:
 - The order of the paragraphs has been changed to be in line with the order of the columns in Table 1 of AMC1 ORO.FC.115, and to be in line with the order of the cabin crew AMC.
 - Based on the input received, the Agency concluded that an assessment of CRM skills is appropriate. Therefore, the statement not to assess flight crew has been deleted. The definition of assessment of CRM skills ('Assessment of CRM skills is the process of observing, recording, interpreting and debriefing crews and crew member's performance ...') and further details on the process are laid down in paragraph (h) of AMC1 ORO.FC.115.
 - For the recurrent CRM training (paragraph (d) of AMC1 ORO.FC.115) the text has been restructured to enhance readability. In addition, provisions concerning the update of CRM training programme have been transferred from paragraph 3 of AMC1 ORO.FC.230, entitled 'Recurrent training syllabus' to AMC1 ORO.FC.115. The Agency is of the opinion that such provisions are more appropriate to be 'located' under the overall heading 'CRM training', since in most cases it will be CRM experts who have to update the training programme. Nevertheless, it is to be stressed that CRM training remains an integral part of recurrent training.
6. **Flight crew — training elements:** In order to improve the readability and the structure of the AMC, the Agency proposes to add a new paragraph (f) to AMC1 ORO.FC.115, entitled 'Training elements'. This paragraph includes explanations, if needed, for training elements which are mostly listed in Table 1 of AMC1 ORO.FC.115 below. In addition to the already existing training elements²⁰, the

²⁰ One of the existing training elements is 'automation and philosophy on the use of automation'. The proposed text considers action proposal No 4, entitled 'Improve the multi crew cooperation concept and training (instruction and

Agency proposes to incorporate new elements such as 'monitoring and intervention', 'resilience development' and 'surprise and startle effect' into this paragraph.

7. **Flight crew – CRM training syllabus:** The existing Table 1 showing the CRM training elements has been replaced by a new Table 1 in paragraph (g) of AMC1 ORO.FC.115. Format-wise, the table is now in line with the training syllabus for cabin crew (see AMC1 ORO.CC.115(e)). In addition, new elements have been added. Paragraph (g) of AMC1 ORO.FC.115 now also contains the amended description of the terms 'required' and 'in-depth' which are used in Table 1. In the existing AMC the appropriate terms were described in a separate paragraph, not directly related to Table 1.
8. **Flight crew – assessment of CRM skills:** Based on the input received, the Agency proposes some changes to paragraph (h) of AMC1 ORO.FC.115 to increase the clarity and readability. In this context, it is proposed that flight crew should be assessed during training in the operational environment, but not during training in the non-operational environment (e.g. during classroom training).

The present applicable framework contains a statement that the assessment '...methodology, should, where possible, be agreed with flight crew representatives'. The Agency's Rulemaking Group discussed in depth whether this statement should be kept or deleted. Some members emphasised that the involvement of flight crew representatives was a key requirement when CRM was introduced; and since this requirement has shown its benefit, it should remain. On the contrary, other members pointed out that this statement might have been appropriate in the early years of CRM training, but nowadays it is in substance of no use within a technical rule. This especially holds for a 'just culture' environment with an open form of communication and participation. Instead, State laws regulate agreements between company owners and employee representatives. The Agency, based on the input received, decided to propose deleting the statement concerning flight crew representatives' participation. Nevertheless, the Agency would like to ask the following question to commentators of this NPA:

Question: Should a statement such as the following be included in the provisions concerning assessment of CRM skills?

'In order to enhance the effectiveness of the programme, the assessment methodology should, where possible, be agreed with flight crew representatives'.

- a) Yes
- b) No

9. **Flight crew – single-pilot operations:** For CRM training of single-pilot operations, the differences towards multi-pilot CRM training are highlighted in AMC2 ORO.FC.115. This includes computer-based training, which is proposed to be accepted as a stand-alone training method for single-pilot operations.
10. **Flight crew/CRM trainer – other-than complex motor-powered aircraft:** The provisions in Part-ORO are applicable also to CAT operations and commercial specialised operations of other-than complex motor-powered aircraft (i.e. small

testing) practices to better address automation management', of the EASA Cockpit Automation Survey. Information on this survey is available at <http://easa.europa.eu/safety-and-research/safety-analysis-and-research.php>.

propeller-driven aeroplanes, sailplanes and balloons). To ensure that the provisions are proportionate to the risks of operations with this aircraft category, the Agency proposes the following measures to simplify matters:

- for single-pilot operations, the operator itself determines the number of minimum hours for the initial CRM training (see (b)(2)(ii) of AMC2 ORO.FC.115);
- an instructor does not have to fulfill additional training requirements to become a CRM (classroom) trainer (see (c)(5) of AMC3 ORO.FC.115).

The Agency invites commentators to specify where in their opinion further adjustments may be appropriate.

11. **Flight crew — CRM trainer vs CRM instructor:** In the present applicable framework for flight crew the term 'CRM trainer' is used. This is in contrast to the framework to be applied at present for cabin crew, where the Agency utilises the term 'CRM instructor'. For consistency reasons, the Agency proposes to use the term 'CRM trainer' for both flight crew and cabin crew.
12. **Flight crew — CRM trainer/examiner:** One major request received during the establishment of the NPA was to improve the requirements for CRM trainers and to introduce requirements for CRM trainer examiners. Following this request, the Agency proposes the following:
 - In order to improve the overall readability and structure, a separate AMC3 ORO.FC.115, entitled 'Flight crew CRM trainer and flight crew CRM trainer examiner', is introduced.
 - Existing provisions concerning the 'qualification of flight crew CRM trainer' are updated and transferred to AMC3 ORO.FC.115.
 - Provisions are introduced concerning training, assessment, recency and renewal of the status of the CRM trainer, as well as provisions concerning the CRM trainer examiner, based on the UK CAA Document No 29.
13. **Flight crew — description of CRM:** As in the existing applicable framework, GM1 ORO.FC.115 contains a description of the term 'CRM'. The Agency proposes minor editorial changes to the existing text.
14. **Flight crew — training environment, trainers and instructors:** During the discussions within the Agency's Rulemaking Group, it became clear that possible confusion may exist with regard to the different training environments and the role and responsibilities of CRM trainers and certified instructors. To avoid any misunderstanding, the Agency proposes GM2 ORO.FC.115 for clarification.
15. **Flight crew — design, delivery and evaluation of CRM training:** Based on the input received, the Agency decided to propose GM in the form of a checklist for design, delivery and evaluation of CRM elements (see GM3 ORO.FC.115)²¹. This checklist is intended to support operators.
16. **Flight crew — resilience development:** Based on the input from some members of the Rulemaking Group, the Agency decided to incorporate GM, giving explanation

²¹ The checklist is taken from E. Salas et al. 'A checklist for crew resource management training'.

on resilience engineering (see GM4 ORO.FC.115), in order to complement the AMC on this topic (see paragraph (f)(3) of AMC1 ORO.FC.115).

17. **Flight crew — NOTECHS:** Based on the input received, the Agency decided to propose the NOTECHS (NON-TECHNical Skill) framework as a possible instrument for assessing CRM skills. Although many publications exist describing the NOTECHS framework, the Agency came to the conclusion that a reference to one or more of these publications is not sufficient. Therefore, the Agency proposes to incorporate GM, based on the UK CAA Paper 2002/05²², to provide a brief description of the NOTECHS framework (see GM5 ORO.FC.115).
18. **Flight crew — CRM trainer assessment:** During the discussions towards the establishment of this NPA several external experts emphasised the need to further improve the assessment of CRM trainers. The Agency, therefore, decided to propose the incorporation of a checklist for the CRM trainer assessment (see GM6 ORO.FC.115). This checklist is based on a list used by the UK CAA.
19. **Flight crew — qualification standards for CRM trainers:** Another request made during the establishment of the NPA was to facilitate the possibility for a CRM trainer to work in all Member States. Taking this request into consideration, the Agency proposes to incorporate GM emphasising that the qualification criteria for CRM trainers, as described in the AMC, should be acceptable in all Member States (see GM7 ORO.FC.115).
20. **Flight crew — initial operator's CRM training:** In the proposed new structure the link to ORO.FC.215 (initial operator's CRM training for commercial air transport operations) will be removed²³. Therefore, based on the input received, the Agency proposes to include AMC1 ORO.FC.215 to make reference to AMC1 ORO.FC.115.
21. **Flight crew — operator conversion training and checking:** The Agency proposes to be more specific in AMC1 ORO.FC.220, concerning the applicable elements of CRM training, by making references to the relevant AMCs. This proposal ensures consistency with similar text in other AMCs for CRM training for both flight crew and cabin crew.
22. **Flight crew — recurrent training and checking:** The Agency proposes to streamline AMC1 ORO.FC.230 as follows:
 - To delete the list of the training elements, since it is a repetition of the elements listed in Table 1 of AMC1 ORO.FC.115.
 - To transfer the provisions concerning the update of CRM training programme and reasoning on the purpose of assessment to AMC1 ORO.FC.115. It is the Agency's opinion that these provisions and this reasoning are more appropriate to be 'located' under the overall heading 'CRM training'.
 - To add to the clause 'CRM assessment should not be used as a reason for a failure of the line check' the provision 'unless the observed behavior contributed to a significant reduction in safety margins'. This addition has been

²² See Appendix 8 of the UK CAA Paper 2002/05; see also, for example, Appendix 16, Annex E, of the UK CAA CAP 737 and R. Flin et al. 'Development of the NOTECHS system for assessing pilots' CRM skills'.

²³ In the present applicable framework, the provisions are contained in AMC1 ORO.FC.115&215 and are limited to commercial air transport (CAT), while in the proposed new framework AMC1 ORO.FC.115, AMC2 ORO.FC.115 and AMC3 ORO.FC.115 are to be applied.

made to be in line with the provisions concerning 'Assessment of CRM skills' in paragraph (h) of AMC1 ORO.FC.115.

- To introduce specific references to Table 1 of AMC1 ORO.FC.115 and to AMC2 ORO.FC.115 (for the reasoning, see above).
23. **Cabin crew — multi cabin crew vs single cabin crew:** As for flight crew, the Agency decided to distinguish between multi cabin crew operations (see AMC1 ORO.CC.115(e)) and single cabin crew operations (see AMC2 ORO.CC.115(e)). In this context, AMC2 ORO.CC.115(e) lists the differences with regard to multi cabin crew CRM training. This includes computer-based training, which is proposed to be accepted as a stand-alone training method for single cabin crew operations for aircraft with a seating configuration for 19 passengers or less²⁴.
 24. **Cabin crew — general items concerning CRM training:** As for flight crew, the Agency proposes to incorporate important items for cabin crew, which can be considered as being 'general', in one paragraph (see paragraph (a) of AMC1 ORO.CC.115(e), entitled 'general'). This includes new items such as 'safety management' and 'competency-based CRM training'.
 25. **Cabin crew — operator's CRM training, operator aircraft type conversion training, annual recurrent CRM training and senior cabin crew member course:** The Agency proposes to introduce paragraphs (b), (c), (d) and (e) in AMC1 ORO.CC.115(e), containing information on the different CRM trainings. This structure is proposed in order to be in line with the structure of equivalent paragraphs for flight crew in AMC1 ORO.FC.115. Following the proposal of the Rulemaking Group, the Agency decided to prescribe minimum training hours for the operator's (initial) CRM training only.
 26. **Cabin crew — training elements:** As for flight crew, the Agency proposes to add a new paragraph (f) to AMC1 ORO.CC.115(e), entitled 'training elements'. This paragraph includes explanations, if needed, for training elements which are listed in Table 1 of AMC1 ORO.CC.115(e).
 27. **Cabin crew — CRM training syllabus:** The existing Table 1 of paragraph (g) of AMC1 ORO.CC.115(e), showing the CRM training elements, has been updated to be in line with the appropriate table for flight crew (see in paragraph (g) of AMC1 ORO.FC.115). In addition, new elements have been added. As for flight crew, paragraph (g) of AMC1 ORO.CC.115(e) now also contains the amended description of the terms 'required' and 'in-depth' which are used in Table 1.
 28. **Cabin crew — no assessment of CRM skills:** After an in-depth discussion within the Rulemaking Group, the Agency decided not to propose an assessment of cabin crew, which is in contrast to flight crew. The main reason is that an assessment of cabin crew at the present stage would be considered as overregulation.
 29. **Cabin crew — existing paragraphs (b) and (c) of AMC1 ORO.CC.115(e):** In order to improve the overall readability and structure of the AMC/GM on CRM training, the Agency proposes to transfer the provisions of the existing paragraphs (b) and (c) as follows:

²⁴ It should be noted that according to paragraph (a) of ORO.CC.100 cabin crew is required for the operation of aircraft with a maximum operational passenger seating configuration of more than 19 when carrying one or more passenger(s). Therefore, for a seating configuration for 19 passengers or less, the operator, when employing cabin crew, does this on a voluntary basis.

- 'CRM training programmes', including 'CRM training for senior cabin crew', has been transferred to paragraphs (a)(6) and (e) of AMC1 ORO.CC.115(e). However, based on proposals made by the Rulemaking Group, the Agency decided to delete the provisions concerning 'creating films of flight deck scenarios' (being too descriptive) and 'senior cabin crew to participate in line-oriented flight training (LOFT) exercises' (too difficult to organise).
 - 'CRM trainer qualifications' has been transferred to AMC3 ORO.CC.115(e).
30. **Cabin crew — CRM trainer vs CRM instructor:** As explained for flight crew, the Agency proposes for consistency reasons to use the term 'CRM trainer' instead of 'CRM instructor' for cabin crew²⁵.
31. **Cabin crew — CRM trainer:** As for flight crew CRM trainer, the Agency proposes the following:
- In order to improve the overall readability and structure, a separate AMC3 ORO.CC.115(e), entitled 'Cabin crew CRM trainer and cabin crew CRM trainer examiner', is introduced.
 - Existing provisions concerning 'qualification of CRM trainer' are transferred to paragraph (a) of AMC3 ORO.CC.115(e).
 - Provisions concerning the training, assessment, recency and renewal of the status of the CRM trainer, and provisions concerning the cabin crew CRM trainer examiner are introduced, based on the UK CAA Document No 29.
32. **Cabin crew — description of CRM:** As in the existing applicable framework, GM1 ORO.CC.115(e) contains a description of the term 'CRM'. The Agency proposes minor editorial changes to the existing text.
33. **Cabin crew — design, delivery and evaluation of CRM training:** As for flight crew, the Agency proposes GM in the form of a checklist for design, delivery and evaluation of CRM training (see GM2 ORO.CC.115(e))²⁶.
34. **Cabin crew — resilience development:** As for flight crew, and based on the input of some members of the Rulemaking Group, the Agency decided to incorporate GM, giving explanation on resilience engineering (see GM3 ORO.CC.115(e)), in order to complement the AMC on this topic (see paragraph (f)(1) of AMC1 ORO.CC.115(e)).
35. **Flight crew — CRM trainer assessment:** As for flight crew, the Agency proposes to incorporate a checklist for the CRM trainer assessment (see GM4 ORO.CC.115(e)). This checklist is based on a list used by the UK CAA.
36. **Cabin crew — qualification standards for CRM trainers:** As for flight crew, the Agency proposes to introduce GM emphasising that the qualification criteria for cabin crew CRM trainers, as described in the AMC, should be acceptable in all Member States (see GM5 ORO.CC.115(e)).
37. **Cabin crew — aircraft type-specific training and operator conversion training:** The Agency proposes to restructure and rephrase the text in

²⁵ In ORO.CC.115(e) of Part-ORO of Commission Regulation (EU) No 965/2012 the term 'CRM instructor' is used. It is not within the scope of the present rulemaking task to amend the Implementing Rules. Therefore, the Agency plans to change the term 'CRM instructor' to 'CRM trainer' in this Implementing Rule in the course of a future rulemaking task addressing the amendment of Part-ORO.

²⁶ The checklist is taken from E. Salas et al. 'A checklist for crew resource management training'.

AMC1 ORO.CC.125(d) to improve readability and to be in line with similar provisions on CRM training in other AMCs.

38. **Technical crew — CRM training:** For technical crew, at present, provisions concerning CRM training are only foreseen for initial training (see current paragraph (a)(8) of AMC1 ORO.TC.115). The Agency is of the opinion that CRM training elements should also be included in the operator conversion and recurrent training. Therefore, the Agency proposes new AMC (AMC1 ORO.TC.110(a)) stating that the technical crew training programme for initial, operator conversion and recurrent training should include relevant CRM training elements. Subsequently, it is proposed to delete the specific provisions concerning CRM training during initial training, as currently laid down in paragraph (a)(8) of AMC1 ORO.TC.115.

Air operations — Part-SPA

39. **HEMS medical passenger — briefing:** Based on the input received, the Agency proposes to add to the briefing of medical passengers prior to helicopter emergency medical service (HEMS) operations 'the operator's crew coordination concept including relevant elements of CRM' (see paragraph (h) of AMC1 SPA.HEMS.135(a)).

Aircrew — Part-CC

40. **Cabin crew — initial training course and examination:** The Agency proposes to include the amended description of 'in-depth' into the provisions for the initial cabin crew CRM training (at present: GM1 Appendix 1 to Part-CC(3)). This addition gives reason to change the 'level' of the provisions from GM to AMC (see the proposed AMC1 Appendix 1 to Part-CC(3)). This measure ensures consistency with the provisions for cabin crew for other than initial training and also with the provisions for flight crew, which both are at AMC 'level'. In addition, the Agency proposes several changes to AMC1 Appendix 1 to Part-CC(3) to be in line, content-wise, with Paragraph (g) of AMC1 ORO.CC.115(e) and with paragraph (g) of AMC1 ORO.FC.115.

3. Proposed amendments

The text of the amendment is arranged to show deleted text, new or amended text as shown below:

- (a) deleted text is marked with ~~strike through~~;
- (b) new or amended text is highlighted in grey;
- (c) an ellipsis (...) indicates that the remaining text is unchanged in front of or following the reflected amendment.

3.1. Draft Acceptable Means of Compliance (AMC) and Guidance Material (GM) (Draft Decisions)

3.1.1. Air operations – Decision 2014/014/R (Part-ARO)

...

SUBPART GEN – GENERAL REQUIREMENTS

...

AMC3 ARO.GEN.200(a)(2) Management system

QUALIFICATION AND TRAINING – CREW RESOURCE MANAGEMENT (CRM)

For the oversight of the operator's CRM training, the inspectors of the competent authority should be qualified and trained as follows:

(a) Qualification

To fulfil the qualification provisions, inspectors should:

- (1) have adequate knowledge of the relevant flight operations;
- (2) have adequate knowledge of human performance and limitations (HPL);
- (3) have completed initial CRM training;
- (4) have received additional training in the fields of group management, group dynamics and personal awareness; and
- (5) have experience in the assessment of the effectiveness of training programmes and management systems.

(b) Training

The training of inspectors should be both theoretical and practical, and should include:

- (1) in-depth knowledge of the CRM training elements as laid down in Part-ORO; and
- (2) specific skills for oversight of the operator's CRM training including the assessment of non-technical skills using proper techniques and methodologies.

...

GM3 ARO.GEN.300(a);(b);(c) Oversight

CHECKLIST FOR CRM TRAINING OVERSIGHT

The following list includes the major elements for the monitoring of the operator's CRM training:

- (a) development of CRM training considering the operator's management system;
- (b) content of the CRM training syllabus;
- (c) qualification of CRM trainer;
- (d) training facilities:
 - (1) classroom;
 - (2) FSTD;
 - (3) aircraft; and
 - (4) cabin training device;
- (e) training methods:
 - (1) classroom training (instructions, presentations and behavioural exercises);
 - (2) computer-based training;
 - (3) line-oriented flight training (LOFT); and
 - (4) check or test;
- (f) training analysis:
 - (1) pre-course reading and study;
 - (2) integration of the different training methods;
 - (3) competence and performance of the trainer or instructor;
 - (4) assessment of flight crew members; and
 - (5) effectiveness of training.

...

3.1.2. **Air operations – Decision 2014/017/R (Part-ORO)**

...

SUBPART FC – FLIGHT CREW SECTION I – COMMON REQUIREMENTS

...

AMC1 ORO.FC.115 Crew resource management (CRM) training

CRM TRAINING – MULTI-PILOT OPERATIONS

(a) General

(1) Training environment

CRM training should be conducted in the non-operational environment (classroom and computer-based) and in the operational environment (flight simulator training device (FSTD) and aircraft). Tools such as group discussions, team task analysis, team task simulation and feedback should be employed.

(2) Classroom training

Whenever possible, classroom training should be conducted in a group session away from the pressures of the usual working environment so that the

opportunity is provided for flight crew members to interact and communicate in an environment conducive to learning.

(3) Computer-based training

Computer-based training should not be conducted as a stand-alone training method, but may be conducted as a complementary training method.

(4) Flight simulator training devices (FSTDs)

Whenever it is practicable, parts of the CRM practical training should be conducted in FSTDs that reproduce a realistic operational environment and permit interaction. This includes, but is not limited to, line-oriented flight training (LOFT) scenarios.

(5) Integration into flight crew training

CRM principles should be integrated into relevant parts of flight crew training and operations including checklists, briefings, emergency and abnormal procedures.

(6) Combined CRM training for flight crew, cabin crew and technical crew

(i) Operators should provide combined training for flight crew, cabin crew and technical crew during recurrent CRM training.

(ii) The combined training should be a minimum of 8 hours over a period of 3 years. The minimum hours may be reduced when evidenced by the operator's management system, i.e. when the operational data collected and analysed demonstrate faultless cooperation and coordination among crew members.

(iii) The combined training should address at least:

(A) effective communication, coordination of tasks and functions of flight crew, cabin crew and technical crew; and

(B) mixed multinational and cross-cultural flight crew, cabin crew and technical crew, and their interaction, if applicable.

(iv) The combined training should be expanded to include medical passengers, if applicable to the operation.

(v) There should be an effective liaison between flight crew, cabin crew and technical crew training departments. Provision should be made for transfer of relevant knowledge and skills between flight crew, cabin crew and technical crew CRM trainers.

(7) Management system

CRM training should address hazards and risks identified by the operator's management system described in ORO.GEN.200.

(8) Competency-based CRM training

Whenever practicable, the compliance-based approach concerning CRM training may be substituted by a competency-based approach such as evidence-based training. In this context, CRM training should be characterised by a performance orientation, with emphasis on standards of performance and their measurement, and the development of training to the specified performance

standards. CRM training should be an essential element of the alternative training and qualification programme (ATQP) described in ORO.FC.A.245, when the operator applies ATQP.

(9) Contracted CRM training

In case of contracted CRM training, the operator should ensure that the content of the course meets the specific culture, the type of operations and the associated procedures of the operator. When crew members from several operators attend the same course, CRM core elements should be specific to the relevant flight operations and to the trainees concerned.

(b) Initial operator's CRM training

The course duration of the initial operator's CRM training should be a minimum of 24 hours, of which 16 hours should be classroom training. The initial training should cover all elements specified in Table 1 of paragraph (g).

(c) Operator conversion course — CRM training

When the flight crew member undertakes a conversion course with a change of aircraft type or change of operator, elements of CRM training should be integrated into all appropriate phases of the operator's conversion course, as specified in Table 1 of paragraph (g).

(d) Recurrent CRM training

(1) The operator should ensure that elements of CRM are integrated into all appropriate phases of recurrent training every year, as specified in Table 1 of paragraph (g).

(2) A modular training map should be established such that all applicable elements of CRM training are covered over a period not exceeding 3 years.

(3) Operators should update their CRM recurrent training programme over a period not exceeding 3 years. The revision of the programme should take into account information from the operator's management system including the results of the CRM assessment.

(e) Command course — CRM training

The operator should ensure that elements of CRM are integrated into the command course, as specified in Table 1 of paragraph (g).

(f) Training elements

The CRM training elements to be covered are specified in Table 1 of paragraph (g). The operator should ensure that the following aspects are addressed:

(1) Automation and philosophy on the use of automation

(i) The CRM training should include training in the use and knowledge of automation, and in the recognition of systems and human limitations associated with the use of automation. The operator should, therefore, ensure that the flight crew member receives training on:

(A) the application of the operations policy concerning the use of automation as stated in the operations manual; and

(B) system and human limitations associated with the use of automation, giving special attention to issues of mode awareness, automation surprises and over-reliance including false sense of security and complacency.

(ii) The objective of this training should be to provide appropriate knowledge, skills and attitudes for managing and operating automated systems. Special attention should be given to how automation increases the need for crews to have a common understanding of the way in which the system performs, and any features of automation that make this understanding difficult.

(iii) The training should include practical training with automation surprises of different origin (system and pilot induced) to be provided, whenever practicable, in FSTDs.

(2) Monitoring and intervention

Flight crew should be trained in CRM-related aspects of operation monitoring before, during and after flight, together with any associated priorities. This CRM training should include guidance to the pilot monitoring on when it would be appropriate to intervene, if felt necessary, and how this should be done in a timely manner. Reference should be made to operator procedures for structured intervention as specified in the operations manual.

(3) Resilience development

CRM training should address the main aspects of resilience development. The training should cover:

(i) Mental flexibility

Flight crew should be trained to:

(A) understand that mental flexibility is necessary to recognise critical changes;

(B) reflect on their judgement and adjust it to the unique situation;

(C) avoid fixed prejudices and over-reliance on standard solutions; and

(D) remain open to changing assumptions and perceptions.

(ii) Performance adaptation

Flight crew should be trained to:

(A) mitigate frozen behaviours, overreactions and inappropriate hesitation; and

(B) adjust actions in accordance with the current conditions.

(4) Surprise and startle effect

CRM training should address unexpected, unusual and stressful situations. The training should cover:

(i) surprises and startle effects; and

(ii) crisis management, including:

- (A) the development and maintenance of the capacity to manage crew resources;
- (B) the acquisition and maintenance of adequate automatic behavioural responses; and
- (C) recognising the loss and re-building situation awareness and control.

(5) Cultural differences

CRM training should cover cultural differences of multinational and cross-cultural crews. This includes recognising that:

- (i) different cultures may have different communication specifics, ways of understanding and approaches to the same situation or problem;
- (ii) difficulties may arise when crew members with different mother tongue communicate in a common language which is not their mother tongue; and
- (iii) cultural differences may lead to different methods for identifying the situation and solving the problem.

(6) Operator's safety culture and company culture

CRM training should cover the operator's safety culture, its company culture, the type of operations and the associated procedures of the operator. This should include areas of operations that may lead to particular difficulties or involve unusual hazards.

(7) Case studies

- (i) CRM training should cover aircraft type-specific case studies, based on the information available within the operator's management system, including:
 - (A) accident and serious incident reviews to analyse and identify any associated non-technical causal and contributory factors, and instances or examples of a lack of CRM; and
 - (B) analysis of occurrences that were well managed.
- (ii) If relevant aircraft type-specific or operator-specific case studies are not available, the operator should consider other case studies relevant to the scale and scope of its operations.

(g) CRM training syllabus

Table 1 below specifies which CRM training elements should be covered in each type of training. The levels of training in Table 1 can be described as follows:

- (1) 'Required' means training that should be instructional or interactive in style to meet the objectives specified in the CRM training programme or to refresh knowledge gained in a previous training.
- (2) 'In-depth' means training that should be interactive in style taking full advantage of group discussions, team task analysis, team task simulation, etc., for the acquisition or consolidation of knowledge, skills and attitudes. The CRM training elements should be tailored to the specific needs of the training phase being undertaken.

Table 1 – Flight crew CRM training

CRM training elements	Initial operator's CRM training	Operator conversion course when changing aircraft type	Operator conversion course when changing operator	Recurrent training	Command course
General principles					
Human factors in aviation; General instructions on CRM principles and objectives; Human performance and limitations; Threat and error management.	In-depth	Required	Required	Required	Required
Relevant to the individual flight crew member					
Personality awareness, human error and reliability, attitudes and behaviours, self-assessment and self-critique; Stress and stress management; Fatigue and vigilance; Assertiveness, situation awareness, information acquisition and processing.	In-depth	Not required	Not required	Required	In-depth
Relevant to the flight crew					
Automation and philosophy on the use of automation	Required	In-depth	In-depth	In-depth	In-depth
Specific type-related differences	Required	In-depth	Not required	Required	Required
Monitoring and intervention	Required	In-depth	In-depth	Required	Required
Relevant to the entire aircraft crew					
Shared situation awareness, shared information acquisition and processing; Workload management; Effective communication and coordination inside and outside the flight crew compartment; Leadership, cooperation, synergy, delegation, decision-making, actions; Resilience development; Surprise and startle effect; Cultural differences.	In-depth	Required	Required	Required	In-depth

CRM training elements	Initial operator's CRM training	Operator conversion course when changing aircraft type	Operator conversion course when changing operator	Recurrent training	Command course
Relevant to the operator and the organisation					
Operator's safety culture and company culture, standard operating procedures (SOPs), organisational factors, factors linked to the type of operations; Effective communication and coordination with other operational personnel and ground services.	In-depth	Not required	In-depth	Required	In-depth
Case studies	In-depth	In-depth	In-depth	In-depth	In-depth

(h) Assessment of CRM skills

- (1) Assessment of CRM skills is the process of observing, recording, interpreting and debriefing crews and crew member's performance using a validated or generally accepted methodology in the context of the overall performance.
- (2) A validated and generally accepted method of assessment should be used. The non-technical skills (NOTECHS) framework is such a method.
- (3) The flight crew member's CRM skills should be assessed in the operational environment, but not during CRM training in the non-operational environment. Nevertheless, during training in the non-operational environment, feedback from the flight crew CRM trainer or from trainees on individual and crew performance may be given during training to the crew members concerned.
- (4) The assessment of CRM skills should:
 - (i) include debriefing the crew and the individual crew member;
 - (ii) serve to identify additional training, where needed, for the crew or the individual crew member; and
 - (iii) be used to improve the CRM training system by evaluating summaries of all CRM assessments.
- (5) Prior to the introduction of CRM skills assessment, a detailed description of the CRM methodology including terminology used for the assessment should be published in the operations manual.
- (6) Methodology of CRM skills assessment

The assessment should be based on the following principles:

 - (i) only observable behaviours are assessed;
 - (ii) the assessment should positively reflect any CRM skills that result in enhanced safety; and

- (iii) assessments should include behaviour that contributes to a significant reduction in safety margins.
- (7) Operators should establish procedures, including additional training, to be applied in the event that flight crew members do not achieve or maintain the required CRM standards.

AMC2 ORO.FC.115 Crew resource management (CRM) training

CRM TRAINING — SINGLE-PILOT OPERATIONS

- (a) For single-pilot helicopter emergency medical service (HEMS) operations, AMC1 ORO.FC.115 should be applied.
- (b) For single-pilot operations other than those specified in paragraph (a), AMC1 ORO.FC.115 should be applied with the following differences:
 - (1) Relevant training

Training should cover the relevant CRM training, i.e. initial operator's training, the operator conversion course and recurrent training.
 - (2) Initial operator's CRM training

Notwithstanding paragraph (b) of AMC1 ORO.FC.115, the course duration of initial operator's CRM training should be:

 - (i) for complex motor-powered aircraft a minimum of 8 hours; and
 - (ii) for other-than complex motor-powered aircraft determined by the operator, based on the aircraft type and the complexity of the operation.
 - (3) Relevant training elements

CRM training should focus on the elements specified in Table 1 of paragraph (g) of AMC1 ORO.FC.115 which are relevant to single-pilot operations. Therefore, single-pilot CRM training should include, among others:

 - (i) situation awareness;
 - (ii) workload management;
 - (iii) decision-making;
 - (iv) resilience development;
 - (v) surprise and startle effect; and
 - (vi) effective communication and coordination with other operational personnel and ground services.
 - (4) Computer-based training

Notwithstanding paragraph (a)(3) of AMC1 ORO.FC.115, computer-based training may be conducted as a stand-alone training method.

AMC3 ORO.FC.115 Crew resource management (CRM) training

FLIGHT CREW CRM TRAINER AND FLIGHT CREW CRM TRAINER EXAMINER

- (a) Applicability

The provisions described herein:

- (1) should be fulfilled by flight crew CRM trainers and flight crew CRM trainer examiners responsible for classroom training; and
- (2) are not applicable to instructors, holding a certificate in accordance with Commission Regulation (EU) No 1178/2011, who conduct CRM training in the operational environment.

(b) Qualification of flight crew CRM trainer

- (1) A training and standardisation programme for flight crew CRM trainers should be established.
- (2) A flight crew CRM trainer, in order to be suitably qualified, should:
 - (i) have adequate knowledge of the relevant flight operations, preferably gained through current experience as flight crew member;
 - (ii) have adequate knowledge of human performance and limitations (HPL), whilst:
 - (A) having obtained a commercial pilot licence in accordance with Commission Regulation (EU) No 1178/2011, or
 - (B) having followed a theoretical HPL course covering the whole syllabus of the HPL examination;
 - (iii) have completed flight crew initial operator's CRM training;
 - (iv) have received training in group facilitation skills;
 - (v) have received additional training in the fields of group management, group dynamics and personal awareness; and
 - (vi) have demonstrated the knowledge, skills and credibility required to train the CRM training elements in the non-operational environment, as specified in Table 1 of AMC1 ORO.FC.115.
- (3) The following qualifications and experience are also acceptable for a flight crew CRM trainer in order to be suitably qualified:
 - (i) A flight crew member holding a recent qualification as a flight crew CRM trainer may continue to be a flight crew CRM trainer after the cessation of active flying duties if he/she maintains adequate knowledge of the relevant flight operations.
 - (ii) A former flight crew member having adequate knowledge of HPL may become a flight crew CRM trainer if he/she maintains adequate knowledge of the relevant flight operations and fulfils the provisions of paragraphs (2)(iii) to (2)(vi).
 - (iii) An experienced non-flight crew CRM trainer having adequate knowledge of HPL may become a flight crew CRM trainer if he/she fulfils the provisions of paragraphs (2)(i) and (2)(iii) to (2)(vi).

(c) Training of flight crew CRM trainer

- (1) Training of flight crew CRM trainers should be both theoretical and practical. Practical elements should include the development of specific trainer skills, particularly the integration of CRM into line operations.

-
- (2) The course duration of the basic training of flight crew CRM trainers should be a minimum of:
- (i) 24 hours for trainees holding an instructor certificate for complex motor-powered aircraft, as specified in Commission Regulation (EU) No 1178/2011, which includes 25-hour training in teaching and learning; or
 - (ii) 40 hours for trainees who do not hold an instructor certificate as specified in paragraph (i).
- (3) The basic training of flight crew CRM trainers should include the training elements for flight crew, as specified in Table 1 of AMC1 ORO.FC.115. In addition, the basic training should include the following:
- (i) introduction to CRM training;
 - (ii) operator's management system;
 - (iii) characteristics:
 - (A) of the different types of CRM trainings (initial, recurrent, etc.);
 - (B) of combined training; and
 - (C) related to the type of aircraft or operation; and
 - (iv) assessment, including NOTECHS.
- (4) The refresher training of flight crew CRM trainers should:
- (i) be a minimum of 8 hours; and
 - (ii) include new methodologies, procedures and lessons learned.
- (5) Instructors for other-than complex motor-powered aircraft should be qualified as a flight crew CRM trainer for this aircraft category with no additional training, as specified in (2) to (4) when:
- (i) holding a certificate in accordance with Commission Regulation (EU) No 1178/2011; and
 - (ii) fulfilling the provisions of paragraph (b)(2) or (b)(3).
- (6) The training of flight crew CRM trainers should be conducted by flight crew CRM trainers with a minimum of 3 years' experience or by flight crew CRM trainer examiners. Assistance may be provided by experts in order to address specific areas.
- (d) Assessment of flight crew CRM trainer
- (1) The operator should ensure that the process for the assessment is included in the operations manual describing methods for observing, recording, interpreting and debriefing the flight crew CRM trainer. All personnel involved in the assessment must be credible and competent in their role.
 - (2) A flight crew CRM trainer should be assessed by a flight crew CRM trainer examiner, nominated by the operator, when conducting the first CRM training course. This first assessment should be valid for a period of 3 years.
- (e) Recency and renewal of qualification as flight crew CRM trainer

- (1) For recency of the 3-year validity period, the flight crew CRM trainer should:
 - (i) conduct at least 2 CRM training events in any 12-month period;
 - (ii) be assessed within the last 12 months of the 3-year validity period by a flight crew CRM trainer examiner; and
 - (iii) receive a flight crew CRM trainer refresher training within the 3-year validity period.
 - (2) The next 3-year validity period should start at the end of the previous period.
 - (3) For renewal, i.e. when a flight crew CRM trainer does not fulfil the provisions of paragraph (1), he/she should, before resuming as flight crew CRM trainer:
 - (i) comply with the qualification provisions of paragraphs (b) and (d); and
 - (ii) receive a flight crew CRM trainer refresher training.
- (f) Flight crew CRM trainer examiner
- (1) For assessing flight crew CRM trainers, the operator should nominate qualified flight crew CRM trainers to act as flight crew CRM trainer examiners. This personnel should demonstrate recent and relevant knowledge and background, and a minimum of 3 years' experience as a flight crew CRM trainer.
 - (2) An operator which does not have the resources to conduct the assessment as described should employ a contractor. The standard of these external flight crew CRM trainer examiners should be confirmed on a 3 year basis by the operator.
 - (3) Continued suitability in the role of a flight crew CRM trainer examiner should be subject to the following provisions:
 - (i) The examiner should demonstrate continued compliance with the provisions for a flight crew CRM trainer and should demonstrate capability in that role.
 - (ii) The examiner should have conducted at least 2 flight crew CRM trainer assessments in any 12-month period.
 - (iii) The examiner should be observed by the operator every 3 years when conducting an assessment of a flight crew CRM trainer.
 - (4) For renewal, i.e. when the examiner has not maintained activity in the role, as described in paragraph (3), he/she should comply with the provisions of paragraph (d), before resuming activities as examiner.

GM1 ORO.FC.115 Crew resource management (CRM) training

GENERAL

- (a) CRM is the effective utilisation of all available resources (e.g. crew members, aircraft systems, supporting facilities and persons) to achieve safe and efficient operation.
- (b) The objective of CRM is to enhance the communication and management skills of the flight crew member concerned. The emphasis is placed on the non-technical knowledge, skills and attitudes of flight crew performance.

GM2 ORO.FC.115 Crew resource management (CRM) training

TRAINING ENVIRONMENT, TRAINERS AND INSTRUCTORS

(a) Flight crew CRM training can be separated as follows:

(1) training in the non-operational environment:

- (i) classroom; and
- (ii) computer-based;

(2) training in the operational environment:

- (i) flight simulator training device (FSTD); and
- (ii) aircraft.

(b) In general, CRM training is provided as follows:

(1) classroom training by a flight crew CRM trainer;

(2) training in the operational environment by an instructor holding a certificate in accordance with Commission Regulation (EU) No 1178/2011;

(3) computer-based training as a self-study training method. If needed, directions concerning CRM-related issues are provided by a flight crew CRM trainer or by an instructor holding a certificate in accordance with Commission Regulation (EU) No 1178/2011.

GM3 ORO.FC.115 Crew resource management (CRM) training

DESIGN, DELIVERY AND EVALUATION OF CRM TRAINING

The checklist in Table 1 provides guidance on the design, delivery and evaluation of CRM training, and on their incorporation into the operator's safety culture. Elements of the operator's management systems and the competency-based approach are incorporated in the checklist.

Table 1 – Checklist for design, implementation, evaluation and transfer of CRM training

Step No	Description	Element
1	Needs analysis	Determine the necessary CRM competencies
		Develop CRM training goals
		Ensure the organisation is ready for CRM training
2	Design	Develop CRM training objectives
		Determine what to measure and how to measure it
3	Development	Describe the CRM learning environment
		Develop full scale prototype of training
		Validate and modify CRM training
4	Implementation	Prepare trainees and environment
		Set a climate for learning (e.g., practice and feedback)
		Implement the CRM training programme
5	Evaluation	Determine training effectiveness
		Evaluate CRM training at multiple levels
		Revise the CRM training programme to improve effectiveness
6	Incorporation	Establish an environment where CRM training is positively recognised
		Reinforce CRM behaviours in daily work
		Provide recurrent CRM training

GM4 ORO.FC.115 Crew resource management (CRM) training**RESILIENCE DEVELOPMENT**

- (a) The main aspects of resilience development can be described as the ability to:
- (1) learn ('knowing what has happened');
 - (2) monitor ('knowing what to look for');
 - (3) anticipate ('finding out and knowing what to expect'); and
 - (4) respond ('knowing what to do and being capable of doing it').
- (b) Operational safety is a continuous process of evaluation of and adjustment to existing and future conditions. In this context, and following the description in paragraph (a), resilience development involves an on-going and adaptable process including situation assessment, self-review, decision and action. Training in resilience development enables crew members to draw the right conclusions from both positive and negative experiences. Based on those experiences, crew members are better prepared to maintain or create safety margins by adapting to dynamic complex situations.
- (c) The training topics listed in paragraph (f)(3) of AMC1 ORO.FC.115 are intended to develop the appropriate knowledge and skills in order to achieve resilient crew performance. The topics are to be understood as follows:

(1) Mental flexibility

- (i) The phrase 'understand that mental flexibility is necessary to recognise critical changes' means that crew members are prepared to respond to situations where there is no set procedure.
- (ii) The phrase 'reflect on their judgement and adjust it to the unique situation' means that crew members learn to review their judgement based on the unique characteristics of the given circumstances.
- (iii) The phrase 'avoid fixed prejudices and over-reliance on standard solutions' means that crew members learn to update solutions and standard response sets, which have been formed on prior knowledge.
- (iv) The phrase 'remain open to changing assumptions and perceptions' means that crew members constantly monitor the situation, and are prepared to adjust their understanding of the evolving conditions.

(2) Performance adaptation

- (i) The phrase 'mitigate frozen behaviours, overreactions and inappropriate hesitation' means that crew members correct improper actions with a balanced response.
- (ii) The phrase 'adjust actions in accordance with the current conditions' means that crew members' responses are in accordance to the actual situation.

GM5 ORO.FC.115 Crew resource management (CRM) training

NON-TECHNICAL SKILLS ASSESSMENT

- (a) NOTECHS (non-technical skills) is a validated method for assessing flight crew CRM skills. The NOTECHS framework consists of four main categories:
 - (1) Cooperation: Cooperation is the ability to work effectively in a crew.
 - (2) Leadership and managerial skills: Effective leadership and managerial skills help to achieve joint task completion within a motivated, fully-functioning team through coordination and persuasiveness.
 - (3) Situation awareness: Situation awareness relates to one's ability to accurately perceive what is in the flight crew compartment and outside the aircraft. It is also one's ability to comprehend the meaning of different elements in the environment and the projection of their status in the near future.
 - (4) Decision-making: Decision-making is the process of reaching a judgement or choosing an option.
- (b) Each of the four categories is subdivided into elements and behavioural markers. The elements are specified in Table 1 with examples of behavioural markers (effective behaviour). The behavioural markers are assessed by a rating scale to be established by the operator.

Table 1 – Categories, elements and behavioural markers of NOTECHS

Category	Element	Behavioural marker (examples)
Cooperation	Team building and maintaining	Establishes atmosphere for open communication and participation
	Considering others	Takes condition of other crew members into account
	Supporting others	Helps other crew members in demanding situations
	Conflict solving	Concentrates on what is right rather than who is right
Leadership and managerial skills	Use of authority and assertiveness	Takes initiative to ensure crew involvement and task completion
	Maintaining standards	Intervenes if task completion deviates from standards
	Planning and coordination	Clearly states intentions and goals
	Workload management	Allocates adequate time to complete tasks
Situation awareness	Awareness of aircraft systems	Monitors and reports changes in systems' states
	Awareness of external environment	Collects information about environment (position, weather and traffic)
	Anticipation	Identifies possible future problems
Decision-making	Problem definition and diagnosis	Reviews causal factors with other crew members
	Option generation	States alternative courses of action
		Asks other crew members for options
	Risk assessment and option selection	Considers and shares estimated risk of alternative courses of action
Outcome review	Checks outcome against plan	

GM6 ORO.FC.115 Crew resource management (CRM) training**FLIGHT CREW CRM TRAINER ASSESSMENT**

The checklist in Table 1 provides guidance on the assessment of a flight crew CRM trainer. If a flight crew CRM trainer is competent in his/her role, the response to the questions in Table 1 should be 'yes'. The flight crew CRM trainer examiner, when answering the questions in Table 1, should provide justifications and should give examples related to the responses given.

Table 1 – Flight crew CRM trainer assessment checklist

Questions to assess a flight crew CRM trainer	Response yes/no
Did the CRM trainer demonstrate the knowledge required for the role?	
Did the CRM trainer support CRM concepts?	
Did the CRM trainer encourage trainees to participate, share their experiences and self-analyse?	
Did the CRM trainer identify and respond to the trainees' needs relative to expertise/experience?	
Did the CRM trainer integrate practical CRM within technical training and line operations?	
Did the CRM trainer incorporate company CRM standards when appropriate?	
Did the CRM trainer identify and discuss the non-technical reasons involved in accidents, incidents and events included in case studies?	
Did the CRM trainer regularly check for understanding and resolve ambiguity?	
Did the CRM trainer demonstrate effective instruction and facilitation skills?	

GM7 ORO.FC.115 Crew resource management (CRM) training

QUALIFICATION STANDARDS FOR FLIGHT CREW CRM TRAINERS

The qualification criteria for flight crew CRM trainers described in AMC3 ORO.FC.115 set harmonised provisions. The criteria facilitate the possibility for a flight crew CRM trainer to work in all Member States.

...

SECTION II – ADDITIONAL REQUIREMENTS FOR COMMERCIAL AIR TRANSPORT OPERATIONS

...

~~AMC1 ORO.FC.115&215 Crew resource management (CRM) training~~~~CRM TRAINING – CAT OPERATIONS~~~~(a) General~~

- ~~(1) CRM training should reflect the culture of the operator as well as type of operation and be conducted by means of both classroom training and practical exercises including group discussions and accident and serious incident reviews to analyse communication problems and instances or examples of a lack of information or crew management.~~
- ~~(2) Whenever it is practicable to do so, consideration should be given to conducting relevant parts of CRM training in FSTDs that reproduce, in an acceptable way, a realistic operational environment and permit interaction. This includes, but is~~

~~not limited to, appropriate line-oriented flight training (LOFT) scenarios conducted in FSTDs.~~

- ~~(3) It is recommended that, whenever possible, initial CRM training be conducted in a group session away from the pressures of the usual working environment so that the opportunity is provided for flight crew members to interact and communicate in an environment conducive to learning.~~

~~(b) Initial CRM training~~

- ~~(1) Initial CRM training programmes are designed to provide knowledge of, and familiarity with, human factors relevant to flight operations. The course duration should be a minimum of 1 day for single-pilot operations and 2 days for all other types of operations. It should cover all the elements indicated in (f).~~

- ~~(2) The CRM trainer should:~~

- ~~(i) possess group facilitation skills;~~
- ~~(ii) have and maintain adequate knowledge of the operation and the aircraft type, preferably through current CAT experience as a flight crew member;~~
- ~~(iii) have successfully passed the human performance and limitations (HPL) examination whilst recently obtaining the airline transport pilot licence (ATPL) in accordance with Regulation (EU) No 1178/20127; or followed a theoretical HPL course covering the whole syllabus of the HPL examination;~~
- ~~(iv) have completed initial CRM training;~~
- ~~(v) have received additional education in the fields of group management, group dynamics and personal awareness; and~~
- ~~(vi) be supervised by suitably qualified CRM training personnel when conducting his/her first initial CRM training session.~~

- ~~(3) The operator should ensure that initial CRM training addresses the nature of the operations of the operator concerned, as well as the associated procedures and the culture of the operator. This will include areas of operations that produce particular difficulties or involve adverse climatic conditions and any unusual hazards.~~

- ~~(4) If the operator does not have sufficient means to establish initial CRM training, use may be made of a course provided by another operator, or a third party or training organisation. In this event the operator should ensure that the content of the course meets his/her operational requirements. When crew members from several companies follow the same course, CRM core elements should be specific to the nature of operations of the companies and the trainees concerned.~~

- ~~(5) The flight crew member's CRM skills should not be assessed during initial CRM training.~~

~~(c) Operator conversion course CRM training~~

²⁷ OJ L 311, 25.11.2011, p. 1.

-
- ~~(1) If the flight crew member undergoes a conversion course with a change of aircraft type, elements of CRM should be integrated into all appropriate phases of the operator's conversion course, in accordance with (f).~~
- ~~(2) If the flight crew member undergoes a conversion course with a change of operator, elements of CRM should be integrated into all appropriate phases of the operator's conversion course, in accordance with (f).~~
- ~~(3) The flight crew member should not be assessed when completing elements of CRM training that are included in the operator conversion course.~~
- ~~(d) Command course – CRM training~~
- ~~(1) The operator should ensure that elements of CRM are integrated into the command course in accordance with (f).~~
- ~~(2) The flight crew member should not be assessed when completing elements of CRM training that are included in the command course, although feedback should be given.~~
- ~~(e) Recurrent CRM training~~
- ~~(1) The operator should ensure that:~~
- ~~(i) elements of CRM are integrated into all appropriate phases of recurrent training every year, in accordance with (f), and that modular CRM training covers the same areas over a maximum period of 3 years; and~~
- ~~(ii) relevant modular CRM training is conducted by CRM trainers qualified according to (b)(2).~~
- ~~(2) The flight crew member should not be assessed when completing elements of CRM training that are included in the recurrent training.~~
- ~~(f) Implementation of CRM~~
- ~~(1) Table 1 indicates which elements of CRM should be included in each type of training.~~

Table 1: Elements of CRM to be included in training

Core Elements	Initial CRM Training	Operator conversion course when changing type	Operator conversion course when changing operator	Command course	Recurrent training
Human error and reliability, error chain, error prevention and detection	In-depth	In-depth	Overview	Overview	Overview
Operator safety culture, standard operating procedures (SOPs), organisational factors		Not required	In-depth	In-depth	
Stress, stress management, fatigue & vigilance					
Information acquisition and processing situation awareness, workload management			Not required	In-depth	
Decision making		Overview			
Communication and coordination inside and outside the flight crew compartment					
Leadership and team behaviour synergy					
Automation, philosophy of the use of automation (if relevant to the type)	As required	In-depth	In-depth	As required	As required
Specific type-related differences			Not required		
Case studies	In-depth	In-depth	In-depth	In-depth	In-depth

~~(g) Coordination between flight crew and cabin/technical crew training~~

~~(1) Operators should, as far as practicable, provide combined training for flight crew and cabin/technical crew, including briefing and debriefing.~~

~~(2) There should be an effective liaison between flight crew and cabin/technical crew training departments. Provision should be made for transfer of relevant knowledge and skills between flight and cabin/technical crew instructors.~~

~~(h) Assessment of CRM skills~~

~~(1) Assessment of CRM skills is the process of observing, recording, interpreting and debriefing crews and crew member's performance and knowledge using an acceptable methodology in the context of overall performance. It includes the concept of self-critique, and feedback which can be given continuously during training or in summary following a check. In order to enhance the effectiveness of the programme, this methodology should, where possible, be agreed with flight crew representatives.~~

~~(2) NOTECHS (non-technical skills evaluation) or other acceptable methods of assessment should be used. The selection criteria and training requirements of the assessors and their relevant qualifications, knowledge and skills should be established.~~

~~(3) Assessment of CRM skills should:~~

~~(i) provide feedback to the crew and the individual and serve to identify retraining where needed; and~~

~~(ii) be used to improve the CRM training system.~~

~~(4) Prior to the introduction of CRM skills assessment, a detailed description of the CRM methodology, including terminology used, should be published in the operations manual.~~

~~(5) Methodology of CRM skills assessment~~

~~(i) The operator should establish the CRM training programme, including an agreed terminology. This should be evaluated with regard to methods, length of training, depth of subjects and effectiveness.~~

~~(ii) A training and standardisation programme for training personnel should then be established.~~

~~(iii) The assessment should be based on the following principles:~~

~~(A) only observable, repetitive behaviours are assessed;~~

~~(B) the assessment should positively reflect any CRM skills that result in enhanced safety;~~

~~(C) assessments should include behaviour that contributes to a technical failure, such technical failure being errors leading to an event that requires debriefing by the person conducting the line check; and~~

~~(D) the crew and, where needed, the individual are verbally debriefed.~~

~~(6) De-identified summaries of all CRM assessments by the operator should be used to provide feedback and such feedback should be used to update and improve the operator's CRM training.~~

~~(7) Operators should establish procedures, including retraining, to be applied in the event that personnel do not achieve or maintain the required standards.~~

- ~~(8) If the operator proficiency check is combined with the type rating revalidation/renewal check, the assessment of CRM skills should satisfy the multi-crew cooperation requirements of the type rating revalidation/renewal. This assessment should not affect the validity of the type rating.~~
- ~~(i) Levels of training~~
- ~~(1) Overview. When overview training is required, it should normally be instructional in style. Such training should refresh knowledge gained in earlier training.~~
- ~~(2) In-depth. When in-depth training is required, it should normally be interactive in style and should include, as appropriate, case studies, group discussions, role play and consolidation of knowledge and skills. Core elements should be tailored to the specific needs of the training phase being undertaken.~~
- ~~(j) Use of automation~~
- ~~(1) The operator conversion course should include training in the use and knowledge of automation and in the recognition of systems and human limitations associated with the use of automation. The operator should therefore ensure that the flight crew member receives training on:~~
- ~~(i) the application of the operations policy concerning the use of automation as stated in the operations manual; and~~
- ~~(ii) system and human limitations associated with the use of automation.~~
- ~~(2) The objective of this training should be to provide appropriate knowledge, skills and behavioural patterns for managing and operating automated systems. Special attention should be given to how automation increases the need for crews to have a common understanding of the way in which the system performs, and any features of automation that make this understanding difficult.~~

~~AMC1.1 ORO.FC.115&.215 Crew resource management (CRM) training~~

~~CRM TRAINER~~

~~The Acceptable Means of Compliance are as set out in AMC1 ORO.FC.115&.215, except for (b)(2) of that AMC, for which the following qualifications and experience are also acceptable for a CRM trainer:~~

- ~~(a) a flight crew member holding a recent qualification as a CRM trainer may continue to be a CRM trainer even after the cessation of active flying duties;~~
- ~~(b) an experienced non-flight crew CRM trainer having a knowledge of HPL; and~~
- ~~(c) a former flight crew member having knowledge of HPL may become a CRM trainer if he/she maintains adequate knowledge of the operation and aircraft type and meets the provisions of AMC1 ORO.FC.115&.215, (b)(2)(i), (iv), (v) and (vi).~~

~~GM1 ORO.FC.115&.215 Crew resource management (CRM) training~~

~~GENERAL~~

- ~~(a) Crew resource management (CRM) is the effective utilisation of all available resources (e.g. crew members, aircraft systems, supporting facilities and persons) to achieve safe and efficient operation.~~
- ~~(b) The objective of CRM is to enhance the communication and management skills of the flight crew member concerned. The emphasis is placed on the non-technical aspects of flight crew performance.~~

AMC1 ORO.FC.215 Initial operator's crew resource management (CRM) training

TRAINING ELEMENTS AND TRAINER QUALIFICATION

Initial operator's CRM training should:

- (a) cover the training elements as specified in Table 1 of AMC1 ORO.FC.115.
- (b) be conducted by a flight crew CRM trainer who is qualified as specified in AMC3 ORO.FC.115.

AMC1 ORO.FC.220 Operator conversion training and checking

OPERATOR CONVERSION TRAINING SYLLABUS

- (a) General
- (1) The operator conversion training should include, in the following order:
 - (i) ground training and checking, including aircraft systems, and normal, abnormal and emergency procedures;
 - (ii) emergency and safety equipment training and checking, (completed before any flight training in an aircraft commences);
 - (iii) flight training and checking (aircraft and/or FSTD); and
 - (iv) line flying under supervision and line check.
 - (2) When the flight crew member has not previously completed an operator's conversion course, he/she should undergo general first-aid training and, if applicable, ditching procedures training using the equipment in water.
 - (3) Where the emergency drills require action by the non-handling pilot, the check should additionally cover knowledge of these drills.
 - (4) The operator's conversion may be combined with a new type/class rating training as required by Regulation (EU) No 1178/2011.
 - (5) The operator should ensure that:
 - (i) applicable elements of CRM training, as specified in Table 1 of AMC1 ORO.FC.115, are integrated into all appropriate phases of the conversion training; and
 - (ii) the personnel integrating elements of CRM into conversion training are suitably qualified, as specified in AMC3 ORO.FC.115.
- (b) ...

...

AMC1 ORO.FC.230 Recurrent training and checking
RECURRENT TRAINING SYLLABUS

(a) Recurrent training

Recurrent training should comprise the following:

(1) Ground training

...

(2) Emergency and safety equipment training

...

(3) CRM

~~(i) Elements of CRM training, as specified in Table 1 of AMC1 ORO.FC.115, should be integrated into all appropriate phases of recurrent training.~~

~~(ii) A specific modular CRM training programme should be established such that all major topics of CRM training are covered over a period not exceeding 3 years, as follows:~~

~~(A) human error and reliability, error chain, error prevention and detection;~~

~~(B) operator safety culture, standard operating procedures (SOPs), organisational factors;~~

~~(C) stress, stress management, fatigue and vigilance;~~

~~(D) information acquisition and processing, situation awareness, workload management;~~

~~(E) decision making;~~

~~(F) communication and coordination inside and outside the flight crew compartment;~~

~~(G) leadership and team behaviour, synergy;~~

~~(H) automation and philosophy of the use of automation (if relevant to the type);~~

~~(I) specific type related differences;~~

~~(J) case studies;~~

~~(K) additional areas which warrant extra attention, as identified by the safety management system.~~

~~(iii) Operators should establish procedures to update their CRM recurrent training programme. Revision of the programme should be conducted over a period not exceeding 3 years. The revision of the programme should take into account the de-identified results of the CRM assessments of crews, and information identified by the safety management system.~~

(4) Aircraft/FSTD training

...

(b) Recurrent checking

Recurrent checking should comprise the following:

(1) Operator proficiency checks

...

(2) Emergency and safety equipment checks.

...

(3) Line checks

- (i) Line checks should establish the ability to perform satisfactorily a complete line operation including pre-flight and post-flight procedures and use of the equipment provided, as specified in the operations manual. The route chosen should be such as to give adequate representation of the scope of a pilot's normal operations. When weather conditions preclude a manual landing, an automatic landing is acceptable. The commander, or any pilot who may be required to relieve the commander, should also demonstrate his/her ability to 'manage' the operation and take appropriate command decisions.
- (ii) The flight crew should be assessed on their CRM skills in accordance with the methodology described in AMC1 ORO.FC.115 and as specified in the operations manual. ~~The purpose of such assessment is to:~~
 - ~~(A) provide feedback to the crew collectively and individually and serve to identify retraining; and~~
 - ~~(B) be used to improve the CRM training system.~~
- (iii) CRM assessment ~~alone~~ should not be used as a reason for a failure of the line check, unless the observed behaviour contributed to a significant reduction in safety margins.
- (iv) When pilots are assigned duties as pilot flying and pilot monitoring they should be checked in both functions.
- (v) Line checks should be conducted by a commander nominated by the operator. The operator should inform the competent authority about the persons nominated. The person conducting the line check should occupy an observer's seat where installed. His/her CRM assessments should solely be based on observations made during the initial briefing, cabin briefing, flight crew compartment briefing and those phases where he/she occupies the observer's seat.

(c) Flight crew incapacitation training, except single-pilot operations

...

(d) Personnel providing training and checking

Training and checking should be provided by the following personnel:

- (1) ground and refresher training by suitably qualified personnel;
- (2) flight training by a flight instructor (FI), type rating instructor (TRI) or class rating instructor (CRI) or, in the case of the FSTD content, a synthetic flight instructor (SFI), providing that the FI, TRI, CRI or SFI satisfies the operator's

- experience and knowledge requirements sufficient to instruct on the items specified in paragraphs (a)(1)(i)(A) and (B);
- (3) emergency and safety equipment training by suitably qualified personnel;
 - (4) CRM:
 - (i) integration of CRM elements into all the phases of the recurrent training by all the personnel conducting recurrent training. The operator should ensure that all personnel conducting recurrent training are suitably qualified to integrate elements of CRM into this training;
 - (ii) ~~modular classroom~~ CRM training by at least one CRM trainer, ~~qualified as specified in AMC3 ORO.FC.115~~, who may be assisted by experts in order to address specific areas.
 - (5) recurrent checking by the following personnel:
 - (i) operator proficiency check by a type rating examiner (TRE), class rating examiner (CRE) or, if the check is conducted in a FSTD, a TRE, CRE or a synthetic flight examiner (SFE), trained in CRM concepts and the assessment of CRM skills.
 - (ii) emergency and safety equipment checking by suitably qualified personnel.
- (e) ...
- ...

SUBPART CC – CABIN CREW

SECTION 1 – GENERAL REQUIREMENTS

...

AMC1 ORO.CC.115(e) Conduct of training courses and associated checking

~~CREW RESOURCE MANAGEMENT – CRM INSTRUCTORS AND TRAINING PROGRAMMES~~
 CREW RESOURCE MANAGEMENT (CRM) TRAINING – MULTI CABIN CREW OPERATIONS

(a) General

(1) Training environment

CRM training should be conducted in the non-operational environment (classroom and computer-based) and in the operational environment (cabin training device and aircraft). Tools such as group discussions, team task analysis, team task simulation and feedback should be employed.

(2) Classroom training

Whenever possible, classroom training should be conducted in a group session away from the pressures of the usual working environment so that the opportunity is provided for cabin crew members to interact and communicate in an environment conducive to learning.

(3) Computer-based training

Computer-based training should not be conducted as a stand-alone training method, but may be conducted as a complementary training method.

(4) Cabin training devices and aircraft

Relevant parts of practical CRM training should be conducted in representative cabin training devices that reproduce a realistic operational environment, or in the aircraft. During practical training, interaction should be encouraged.

(5) Integration into cabin crew training

CRM principles should be integrated into relevant parts of cabin crew training and operations, including checklists, briefings and emergency procedures.

(6) Combined CRM training for flight crew and cabin crew

(i) Operators should provide combined training for flight crew and cabin crew during the annual recurrent training.

(ii) The combined training should be a minimum of 8 hours over a period of 3 years. The minimum hours may be reduced when evidenced by the operator's management system, i.e. when the operational data collected and analysed demonstrate faultless cooperation and coordination among crew members.

(iii) The combined training should address at least:

(A) effective communication, coordination of tasks and functions of flight crew and cabin crew; and

(B) mixed multinational and cross-cultural flight crew and cabin crew, and their interaction, if applicable.

(iv) There should be an effective liaison between flight crew and cabin crew training departments. Provision should be made for transfer of relevant knowledge and skills between flight crew and cabin crew CRM trainers.

(7) Management system

CRM training should address hazards and risks identified by the operator's management system described in ORO.GEN.200.

(8) Competency-based CRM training

Whenever practicable, the compliance-based approach concerning CRM training may be substituted by a competency-based approach. In this context, CRM training should be characterised by a performance orientation, with emphasis on standards of performance and their measurement, and the development of training to the specified performance standards.

(9) Contracted CRM training

In case of contracted CRM training, the operator should ensure that the content of the course meets the specific culture, the type of operations and the associated procedures of the operator. When crew members from several operators attend the same course, CRM core elements should be specific to the relevant flight operations and to the trainees concerned.

(b) Operator's CRM training

- (1) The operator's CRM training should cover all elements listed in Table 1 of paragraph (g). Several training elements are specified as 'not required' for the operator's CRM training, since they are covered under the introductory CRM course for cabin crew as required in Annex V (Part-CC) of Commission Regulation (EU) No 1178/2011.
 - (2) The course duration of the operator's CRM training should be a minimum of 8 hours.
- (c) Operator aircraft type conversion CRM training
- If the cabin crew member undertakes the operator's conversion training on an aircraft type, the applicable CRM training elements should be covered as specified in Table 1 of paragraph (g).
- (d) Annual recurrent CRM training
- (1) Annual recurrent CRM training should be provided in such a way that all CRM training elements specified for the annual recurrent training in Table 1 of paragraph (g) are covered over a period not exceeding 3 years.
 - (2) Operators should update their recurrent CRM training programme over a period not exceeding 3 years. The revision of the programme should take into account information from the operator's management system.
- (e) Senior cabin crew member course
- (1) CRM training for senior cabin crew members should be the application of knowledge gained in previous CRM training and operational experience relevant to the specific duties and responsibilities of a senior cabin crew member. The operator should ensure that for the senior cabin crew member course the CRM training elements are integrated into the training, as specified in Table 1 of paragraph (g).
 - (2) The senior cabin crew member should demonstrate the ability to manage the operation, and take appropriate leadership and management decisions.
- (f) Training elements
- The CRM training elements to be covered are specified in Table 1 of paragraph (g). The operator should ensure that the following aspects are addressed:
- (1) Resilience development

CRM training should address the main aspects of resilience development. The training should cover:

 - (i) Mental flexibility

Cabin crew should be trained to:

 - (A) understand that mental flexibility is necessary to recognise critical changes;
 - (B) reflect on their judgement and adjust it to the unique situation;
 - (C) avoid fixed prejudices and over-reliance on standard solutions; and
 - (D) remain open to changing assumptions and perceptions.
 - (ii) Performance adaptation

Cabin crew should be trained to:

(A) mitigate frozen behaviours, overreactions and inappropriate hesitation; and

(B) adjust actions in accordance with the current conditions.

(2) Surprise and startle effect

CRM training should address unexpected, unusual and stressful situations including interruptions and distractions. Therefore, CRM training should be designed to prepare cabin crew to master sudden events and associated uncontrolled reactions.

(3) Cultural differences

CRM training should cover cultural differences of multinational and cross-cultural crews. This includes recognising that:

(i) different cultures may have different communication specifics, ways of understanding and approaches to the same situation or problem;

(ii) difficulties may arise when crew members with different mother tongue communicate in a common language which is not their mother tongue; and

(iii) cultural differences may lead to different methods for identifying the situation and solving the problem.

(4) Operator's safety culture and company culture

CRM training should cover the operator's safety culture, its company culture, the type of operations and the associated procedures of the operator. This should include areas of operations that may lead to particular difficulties or involve unusual hazards.

(5) Case studies

(i) CRM training should cover aircraft type-specific case studies, based on the information available within the operator's management system, including:

(A) accident and serious incident reviews to analyse and identify any associated non-technical causal and contributory factors, and instances or examples of a lack of CRM; and

(B) analysis of occurrences that were well managed.

(ii) If relevant aircraft type-specific or operator-specific case studies are not available, the operator should consider other case studies relevant to the scale and scope of its operations.

~~(a) Implementation of CRM training~~

~~Table 1 below indicates which CRM training elements should be covered in each type of training.~~

(g) CRM training syllabus

Table 1 below specifies which CRM training elements should be covered in each type of training. The levels of training in Table 1 can be described as follows:

- (1) 'Required' means training that should be instructional or interactive in style to meet the objectives specified in the CRM training programme or to refresh knowledge gained in a previous training.
- (2) 'In-depth' means training that should be interactive in style taking full advantage of group discussions, team task analysis, team task simulation, etc., for the acquisition or consolidation of knowledge, skills and attitudes. The CRM training elements should be tailored to the specific needs of the training phase being undertaken.

Table 1 – Cabin crew CRM training

CRM TRAINING ELEMENTS to be covered	Operator's CRM training	Operator Aircraft type conversion training	Annual Recurrent training	Senior Cabin crew member (SCCM) course
General Principles				
Human factors in aviation; General instructions on CRM principles and objectives; Human performance and limitations; Threat and error management.	Not required (as covered under initial training required by Part-CC)	Not required Required	Not required Required	Overview Required
Relevant to the individual cabin crew member				
Personality awareness, human error and reliability, attitudes and behaviours, self-assessment and self-critique; Stress and stress management; Fatigue and vigilance; Assertiveness, situation awareness, information acquisition and processing.	Not required (as covered under initial training required by Part-CC)	Not required Required	Overview Required (3 year cycle)	Not required Required

Relevant to the entire aircraft crew				
<p>Error prevention and detection</p> <p>Shared situation awareness, shared information acquisition and processing;</p> <p>Workload management;</p> <p>Effective communication and coordination between all crew members including the flight crew as well as inexperienced cabin crew members;</p> <p>Cultural differences</p> <p>Leadership, cooperation, synergy, delegation, decision-making, delegation actions;</p> <p>Individual and team responsibilities, decision making, and actions</p> <p>Resilience development;</p> <p>Surprise and startle effect;</p> <p>Cultural differences;</p> <p>Identification and management of the passenger human factors: crowd control, passenger stress, conflict management, medical factors.</p>	In-depth	Required (when Relevant to the type(s))	Overview Required (3 year cycle)	Reinforcement (relevant to the SCC duties) In-depth
<p>Specifics related to aircraft types (narrow/wide bodied, single/multi-deck), flight crew and cabin crew composition and number of passengers</p>	Not required Required	In-depth	Overview Required (3 year cycle)	Reinforcement (relevant to the SCC duties) In-depth
Relevant to the operator and the organisation				
<p>Company Operator's safety culture and company culture, standard operating procedures (SOPs), organisational factors, factors linked to the type of operations;</p> <p>Effective communication and coordination with other operational personnel and ground services;</p> <p>Participation in cabin safety incident and accident reporting.</p>	In-depth	Required (when Relevant to the type(s))	Overview Required (3 year cycle)	Reinforcement (relevant to the SCC duties) In-depth
<p>Case studies</p>	Required In-depth	Required (when Relevant to the type(s))	Required In-depth	Reinforcement (relevant to the SCC duties) In-depth

~~(b) CRM training programmes for commercial air transport operations~~

- ~~(1) There should be an effective liaison between flight crew and cabin crew training departments. Provision should be made to allow, whenever practicable, flight and cabin crew instructors to observe and comment on each other's training. Consideration should be given to creating films of flight deck scenarios for playback to all cabin crew during recurrent training, and to providing the~~

- ~~opportunity for cabin crew, particularly senior cabin crew, to participate in flight crew line-oriented flying training (LOFT) exercises.~~
- ~~(2) The programme of each CRM training course, its content and the level to be achieved should comply with the relevant elements specified in table 1 below as applicable to the appropriate training course to be completed.~~
- ~~(3) CRM training for senior cabin crew~~
- ~~(i) CRM training for senior cabin crew members should be the application of knowledge gained in previous CRM training and operational experience relevant to the specific duties and responsibilities of a senior cabin crew member.~~
- ~~(ii) The senior cabin crew member should demonstrate the ability to manage the operation and take appropriate leadership/management decisions.~~
- ~~(c) CRM instructor qualifications for commercial air transport operations~~
- ~~(1) All personnel conducting training should be appropriately qualified to integrate elements of CRM into all appropriate training programmes.~~
- ~~(2) A training and standardisation programme for CRM instructors should be established.~~
- ~~(3) The cabin crew CRM instructor should:~~
- ~~(i) have suitable experience of commercial air transport operations as a cabin crew member;~~
- ~~(ii) have received instruction on human factors performance limitations (HPL);~~
- ~~(iii) have completed an introductory CRM course as required by Part CC and all cabin crew CRM training required by Part ORO;~~
- ~~(iv) have received instruction in training skills in order to conduct CRM courses; and~~
- ~~(v) be supervised by an appropriately qualified CRM instructor when conducting their first CRM training course.~~
- ~~(4) An experienced non-cabin crew CRM instructor may continue to be a cabin crew CRM instructor, provided that the provisions specified in (3)(ii) to (3)(v) are satisfied and that the instructor demonstrates a satisfactory knowledge of the nature of the operation, the relevant specific aircraft types and the cabin crew working environment.~~
- ~~(5) Instructors integrating elements of CRM into aircraft type training, recurrent training, or senior cabin crew training should have acquired relevant knowledge of human factors and have completed appropriate CRM training.~~

AMC2 ORO.CC.115(e) Conduct of training courses and associated checking**CREW RESOURCE MANAGEMENT (CRM) TRAINING — SINGLE CABIN CREW OPERATIONS**

For single cabin crew operations, AMC1 ORO.CC.115(e) should be applied with the following differences:

(a) Operator's CRM training

Notwithstanding paragraph (b) of AMC1 ORO.CC.115(e), the course duration of the operator's CRM training should be a minimum of 4 hours for aircraft with a maximum operational passenger seating configuration of 19 or less.

(b) Relevant training elements

CRM training should focus on the elements specified in Table 1 of paragraph (g) of AMC1 ORO.CC.115(e) which are relevant to single cabin crew operations. Therefore, single cabin crew CRM training should include, among others:

- (1) situation awareness;
- (2) workload management;
- (3) decision-making;
- (4) resilience development;
- (5) surprise and startle effect; and
- (6) effective communication and coordination with
 - (i) the flight crew; and
 - (ii) other operational personnel and ground services.

(c) Computer-based training

Notwithstanding paragraph (a)(3) of AMC1 ORO.CC.115(e), computer-based training may be conducted as a stand-alone training method for aircraft with a maximum operational passenger seating configuration of 19 or less.

AMC3 ORO.CC.115(e) Conduct of training courses and associated checking
CABIN CREW CRM TRAINER AND CABIN CREW CRM TRAINER EXAMINER

(a) Qualification of cabin crew CRM trainer

- (1) A training and standardisation programme for cabin crew CRM trainers should be established.
- (2) The cabin crew CRM trainer, in order to be suitably qualified, should:
 - (i) have appropriate experience of the relevant flight operations as a cabin crew member;
 - (ii) have received instructions on human performance and limitations (HPL);
 - (iii) have completed an introductory CRM course, as required in Annex V (Part-CC) of Commission Regulation (EU) No 1178/2011, and an operator's CRM training, as specified in AMC1 ORO.CC.115(e);
 - (iv) have received training in group facilitation skills;
 - (v) have received additional training in the fields of group management, group dynamics and personal awareness; and
 - (vi) have demonstrated the knowledge, skills and credibility required to train the CRM training elements in the non-operational environment, as specified in Table 1 of AMC1 ORO.CC.115(e).

- (3) An experienced non-cabin crew CRM trainer may become a cabin crew CRM trainer, provided that he/she fulfils the provisions specified in paragraphs (2)(ii) to (2)(vi) and demonstrates a satisfactory knowledge of the relevant flight operations and the cabin crew working environment.
 - (4) Trainers or instructors who are integrating CRM elements into the aircraft type training, recurrent training, or senior cabin crew member training should have acquired relevant knowledge of human performance and limitations, and have completed appropriate CRM training.
- (b) Training of cabin crew CRM trainer
- (1) Training of cabin crew CRM trainers should be both theoretical and practical. Practical elements should include the development of specific trainer skills, particularly the integration of CRM into day-to-day operations.
 - (2) The course duration of the basic training of cabin crew CRM trainers should be a minimum of:
 - (i) 24 hours when the operator can justify that the trainee already has received sufficient and suitable instruction in training skills in order to conduct CRM training courses; or
 - (ii) 40 hours for trainees not fulfilling (i).
 - (3) The basic training of cabin crew CRM trainers should include the training elements for cabin crew, as specified in Table 1 of AMC1 ORO.CC.115(e). In addition, the basic training should include the following:
 - (i) introduction to CRM training;
 - (ii) operator's management system; and
 - (iii) characteristics:
 - (A) of the different types of CRM trainings (initial, recurrent, etc.);
 - (B) of combined training; and
 - (C) related to the type of aircraft or operation.
 - (4) The refresher training of cabin crew CRM trainers should:
 - (i) be a minimum of 8 hours; and
 - (ii) include new methodologies, procedures and lessons learned.
 - (5) The training of cabin crew CRM trainers should be conducted by cabin crew CRM trainers with a minimum of 3 years' experience or by cabin crew CRM trainer examiners. Assistance may be provided by experts in order to address specific areas.
- (c) Assessment of cabin crew CRM trainer
- (1) Assessment is the process of observing, recording, interpreting and debriefing the cabin crew CRM trainer. The operator should describe the assessment process in the operations manual. All personnel involved in the assessment must be credible and competent in the role.

- (2) A cabin crew CRM trainer should be assessed by a cabin crew CRM trainer examiner, nominated by the operator, when conducting the first CRM training course. This first assessment should be valid for a period of 3 years.
- (d) Recency and renewal of qualification as cabin crew CRM trainer
- (1) For recency of the 3-year validity period, the cabin crew CRM trainer should:
- (i) conduct at least 2 CRM training events in any 12-month period;
 - (ii) be assessed within the last 12 months of the 3-year validity period by a cabin crew CRM trainer examiner; and
 - (iii) receive a cabin crew CRM trainer refresher training within the 3-year validity period.
- (2) The next 3-year validity period should start at the end of the previous period.
- (3) For renewal, i.e. when a cabin crew CRM trainer does not fulfil the provisions of paragraph (1), he/she should, before resuming as cabin crew CRM trainer:
- (i) comply with the qualification provisions of paragraphs (a) and (c); and
 - (ii) receive a cabin crew CRM trainer refresher training.
- (e) Cabin crew CRM trainer examiner
- (1) For assessing cabin crew CRM trainers, the operator should nominate qualified cabin crew CRM trainers to act as cabin crew CRM trainer examiners. This personnel should demonstrate recent and relevant knowledge and background, and a minimum of 3 years' experience as cabin crew CRM trainer.
- (2) An operator which does not have the resources to conduct the assessment as described should employ a contractor. The standard of these external cabin crew CRM trainer examiners should be confirmed on a 3 year basis by the operator.
- (3) Continued suitability in the role of a cabin crew CRM trainer examiner should be subject to the following provisions:
- (i) The examiner should demonstrate continued compliance with the provisions for a cabin crew CRM trainer and should demonstrate capability in that role.
 - (ii) The examiner should have conducted at least 2 cabin crew CRM trainer assessments in any 12-month period.
 - (iii) The examiner should be observed by the operator every 3 years when conducting an assessment of a cabin crew CRM trainer.
- (4) For renewal, i.e. when the examiner has not maintained activity in the role as described in paragraph (3), he/she should comply with the provisions of paragraph (c), before resuming activities as examiner.

GM1 ORO.CC.115(e) Conduct of training courses and associated checking

~~CREW RESOURCE MANAGEMENT (CRM)~~ — GENERAL

~~(a) CRM General~~

- ~~(1)(a) CRM should be~~ the effective utilisation of all available resources (e.g. crew members, aircraft systems, and supporting facilities) to achieve safe and efficient operation.
- ~~(2)(b) The objective of CRM should be~~ to enhance the communication and management skills of the crew member, as well as the importance of effective coordination and two-way communication between all crew members.
- ~~(3) Operator's CRM training should reflect the culture of the operator, the scale and scope of the operation together with associated operating procedures and areas of operation that produce particular difficulties.~~
- ~~(4) Accordingly, where required during CRM training, if relevant aircraft type-specific case studies are not available, then other case studies relevant to the scale and scope of the operation should be considered.~~
- ~~(b) General principles for CRM training for cabin crew~~
- ~~(1) Cabin crew CRM training should focus on issues related to cabin crew duties and, therefore, should be different from flight crew CRM training. However, the coordination of the tasks and functions of flight crew and cabin crew should be addressed.~~
- ~~(2) Whenever practicable, combined training should be provided to flight crew and cabin crew, particularly senior cabin crew members. This should include feedback.~~
- ~~(3) Where appropriate, CRM principles should be integrated into relevant parts of cabin crew training.~~
- ~~(4) CRM training should include group discussions and the review of accidents and incidents (case studies).~~
- ~~(5) Whenever it is practicable to do so, relevant parts of CRM training should form part of the training conducted in cabin training devices or in the aircraft.~~
- ~~(6) CRM training courses should be conducted in a structured and realistic manner.~~
- ~~(7) There should be no assessment of CRM skills. Feedback from instructors or members of the group on individual performance should be given during training to the individuals concerned.~~

GM2 ORO.CC.115(e) Crew resource management (CRM) training

DESIGN, DELIVERY AND EVALUATION OF CRM TRAINING

The checklist in Table 1 provides guidance on the design, delivery and evaluation of CRM training, and on their incorporation into the operator's safety culture. Elements of the operator's management systems and the competency-based approach are incorporated in the checklist.

Table 1 – Checklist for design, implementation, evaluation and transfer of CRM training

Step No	Description	Element
1	Needs analysis	Determine the necessary CRM competencies
		Develop CRM training goals
		Ensure the organisation is ready for CRM training
2	Design	Develop CRM training objectives
		Determine what to measure and how to measure it
3	Development	Describe the CRM learning environment
		Develop full-scale prototype of training
		Validate and modify CRM training
4	Implementation	Prepare trainees and environment
		Set a climate for learning (e.g., practice and feedback)
		Implement the CRM training programme
5	Evaluation	Determine training effectiveness
		Evaluate CRM training at multiple levels
		Revise the CRM training programme to improve effectiveness
6	Incorporation	Establish an environment where CRM training is positively recognised
		Reinforce CRM behaviours in daily work
		Provide recurrent CRM training

GM3 ORO.CC.115(e) Crew resource management (CRM) training

RESILIENCE DEVELOPMENT

- (a) The main aspects of resilience development can be described as the ability to:
- (1) learn ('knowing what has happened');
 - (2) monitor ('knowing what to look for');
 - (3) anticipate ('finding out and knowing what to expect'); and
 - (4) respond ('knowing what to do and being capable of doing it').
- (b) Operational safety is a continuous process of evaluation of and adjustment to existing and future conditions. In this context, and following the description in paragraph (a), resilience development involves an on-going and adaptable process including situation assessment, self-review, decision and action. Training on resilience development enables crew members to draw the right conclusions from both positive and negative experiences. Based on those experiences, crew members are better prepared to maintain or create safety margins by adapting to dynamic complex situations.

(c) The training topics listed in paragraph (f)(1) of AMC1 ORO.CC.115(e) are intended to develop the appropriate knowledge and skills to achieve resilient crew performance. The topics are to be understood as follows:

(1) Mental flexibility

- (i) The phrase 'understand that mental flexibility is necessary to recognise critical changes' means that crew members are prepared to respond to situations where there is no set procedure.
- (ii) The phrase 'reflect on their judgement and adjust it to the unique situation' means that crew members learn to review their judgement based on the unique characteristics of the given circumstances.
- (iii) The phrase 'avoid fixed prejudices and over-reliance on standard solutions' means that crew members learn to update solutions and standard response sets, which have been formed on prior knowledge.
- (iv) The phrase 'remain open to changing assumptions and perceptions' means that crew members constantly monitor the situation, and are prepared to adjust their understanding of the evolving conditions.

(2) Performance adaptation

- (i) The phrase 'mitigate frozen behaviours, overreactions and inappropriate hesitation' means that crew members correct improper actions with a balanced response.
- (ii) The phrase 'adjust actions in accordance with the current conditions' means that crew members' responses are in accordance to the actual situation.

GM4 ORO.CC.115(e) Conduct of training courses and associated checking
CABIN CREW CRM TRAINER ASSESSMENT

The checklist in Table 1 provides guidance on the assessment of a cabin crew CRM trainer. If a cabin crew CRM trainer is competent in his/her role, the response to the questions in Table 1 should be 'yes'. The cabin crew CRM trainer examiner, when answering the questions in Table 1, should provide reasons and should give examples related to the responses given.

Table 1 – Cabin crew CRM trainer assessment checklist

Questions to assess a cabin crew CRM trainer	Response yes/no
Did the CRM trainer demonstrate the knowledge required for the role?	
Did the CRM trainer support CRM concepts?	
Did the CRM trainer encourage trainees to participate, share their experiences and self-analyse?	
Did the CRM trainer identify and respond to the trainees' needs relative to expertise/experience?	
Did the CRM trainer integrate practical CRM within technical training?	
Did the CRM trainer incorporate company CRM standards when appropriate?	
Did the CRM trainer identify and discuss the non-technical reasons involved in accidents, incidents and events included in case studies?	
Did the CRM trainer regularly check for understanding and resolve ambiguity?	
Did the CRM trainer demonstrate effective instruction and facilitation skills?	

GM5 ORO.CC.115(e) Crew resource management (CRM) training QUALIFICATION STANDARDS FOR CABIN CREW CRM TRAINERS

The qualification criteria for cabin crew CRM trainers described in AMC3 ORO.CC.115(e) set harmonised provisions. The criteria facilitate the possibility for a cabin crew CRM trainer to work in all Member States.

AMC1 ORO.CC.125(d) Aircraft type-specific training and operator conversion training

TRAINING PROGRAMME — OPERATOR CONVERSION TRAINING

The following training elements should be covered as relevant to the aircraft type and the related operator's specifics:

...

(h) ~~Crew resource management~~ CRM

- ~~(1) Each cabin crew member should complete the operator's CRM training covering the applicable training elements to the level specified in the relevant column of Table 1 of AMC1 ORO.CC.115(e).~~
- ~~(2) When a cabin crew member undertakes the operator's conversion training on an aircraft type, the applicable training elements specified in Table 1 of AMC1 ORO.CC.115(e) should be covered to the level specified in column 'Operator's aircraft type conversion training'.~~
- (1) The operator should ensure that all applicable CRM training elements, as specified in Table 1 of AMC1 ORO.CC.115(e), are covered to the level required in the column 'Operator aircraft type conversion training'.

- ~~(3)~~(2) The operator's CRM training and the CRM training covered during the operator aircraft type conversion training should be conducted by at least one cabin crew CRM trainer.

...

AMC1 ORO.CC.140 Recurrent training

TRAINING PROGRAMMES

(a) Elements of the annual recurrent training programme

- (1) Training on the location and handling of safety and emergency equipment should include all relevant oxygen systems, and any equipment such as defibrillators if carried on board.
- (2) Training on emergency procedures should cover pilot incapacitation procedures and crowd control techniques.
- (3) CRM training should satisfy the following:
 - (i) the applicable training elements specified in Table 1 of AMC1 ORO.CC.115(e) should be covered within a 3-year cycle to the level required by Column 'Annual Recurrent Training';
 - (ii) the definition and implementation of the CRM training programme should be managed by a cabin crew CRM instructor/trainer; and
 - (iii) when CRM training is provided by stand-alone modules, it should be conducted by at least one cabin crew CRM instructor/trainer.

(b) ...

...

SUBPART TC – TECHNICAL CREW MEMBER IN HEMS, HHO OR NVIS OPERATIONS

...

AMC1 ORO.TC.110(a) Training and checking

CRM TRAINING

The technical crew training programme for initial, operator conversion and recurrent training should include relevant CRM training elements as specified in AMC1 ORO.FC.115.

AMC1 ORO.TC.115 Initial training

ELEMENTS

- (a) The elements of initial training mentioned in ORO.TC.115 should include in particular:

...

- ~~(8) Relevant CRM elements of AMC1 and AMC1.1 ORO.FC.115&.215.~~

3.1.3. **Air operations – Decision 2012/019/R (Part-SPA)****AMC1 SPA.HEMS.135(a) HEMS medical passenger and other personnel briefing**
HEMS MEDICAL PASSENGER BRIEFING

The briefing should ensure that the medical passenger understands his/her role in the operation, which includes:

- (a) familiarisation with the helicopter type(s) operated;
- (b) entry and exit under normal and emergency conditions both for self and patients;
- (c) use of the relevant on-board specialist medical equipment;
- (d) the need for the commander's approval prior to use of specialised equipment;
- (e) method of supervision of other medical staff;
- (f) the use of helicopter inter-communication systems; and
- (g) location and use of on board fire extinguishers; and
- (h) the operator's crew coordination concept including relevant elements of crew resource management.

3.1.4. **Aircrew – Decision 2012/005/R (Part-CC)****SUBPART TRA – TRAINING REQUIREMENTS FOR CABIN CREW ATTESTATION – APPLICANTS AND HOLDERS****GM1AMC1 Appendix 1 to Part-CC(3) Initial training course and examination**
CREW RESOURCE MANAGEMENT TRAINING TABLE

The CRM training table recapitulates all elements relevant to CRM training for cabin crew, indicating specifying the following:

- (a) ~~those~~The elements of the introductory course on CRM ~~to be covered during~~required for the cabin crew initial training course and the level to be attained, and, where 'in-depth' means a training that should be interactive in style taking full advantage of group discussions, team task analysis, team task simulation, etc., for the acquisition of knowledge, skills and attitudes.
- (b) ~~for information those~~The elements identified as 'not required' for the cabin crew initial training, ~~which should be~~ listed for information as they are covered during other training in accordance with the applicable requirements provisions of Annex III (Part-ORO) of Commission Regulation (EU) No 965/2012.

CRM TRAINING TABLE	Introductory course on CRM
Training elements	
General Principles	
Human factors in aviation; General instructions on CRM principles and objectives; Human performance and limitations; Threat and error management.	In depth
Relevant to the individual cabin crew member	
Personality awareness, human error and reliability, attitudes and behaviours, self-assessment and self-critique; Stress and stress management; Fatigue and vigilance; Assertiveness, situation awareness, information acquisition and processing.	In depth
Relevant to the entire aircraft crew	
<p> Error prevention and detection; Shared situation awareness, shared information acquisition & processing; Workload management; Effective communication and coordination between all crew members including the flight crew as well as inexperienced cabin crew members, cultural differences; Leadership, cooperation, synergy, delegation, decision-making, delegation actions; Individual and team responsibilities, decision-making, and actions; Resilience development; Surprise and startle effect; Cultural differences; Identification and management of passenger human factors: crowd control, passenger stress, conflict management, medical factors. </p> <p>Specifics related to aircraft types (narrow/wide bodieds, single/multi-deck), flight crew and cabin crew composition and number of passengers</p>	Not required (covered under CRM training required by Part-ORO)
Relevant to the operator and the organisation (principles)	
<p> CompanyOperator's safety culture and company culture, standard operating procedures (SOPs), organisational factors, factors linked to the type of operations; Effective communication and coordination with other operational personnel and ground services; Participation in cabin safety incident and accident reporting. </p> <p>Case studies</p>	Not required (covered under CRM training required by Part-ORO)

4. Regulatory Impact Assessment (RIA)

4.1. Issues to be addressed

CRM is the effective utilisation of all available resources (e.g. crew members, aircraft systems, supporting facilities and persons) to achieve safe and efficient operation. The objective of CRM is to enhance communication, human factors and management skills of the crew members concerned. Emphasis is placed on the non-technical aspects of crew performance.

One major prerequisite to further develop and enhance CRM capabilities is to establish training requirements. At present, the applicable framework for CRM training is laid down in Commission Regulation (EU) No 965/2012 on air operations and in Commission Regulation (EU) No 1178/2011 on aircrew. The Implementing Rules on CRM training are complemented by AMC and GM which, for air operations, have been transferred from the Joint Aviation Authorities (JAA) Temporary Guidance Leaflet (TGL) No 44 and JAR-OPS 3 AMC/IEM. These AMC and GM are laid down in the related Executive Director Decisions.

However, during the public consultation of the Agency's Notice of Proposed Amendment (NPA)²⁸, which finally led to Commission Regulation (EU) No 965/2012 and to the associated Executive Director Decisions, it emerged that the applicable framework concerning CRM training needs further improvement. These improvements have to take into consideration experience gained as well as recent developments. In addition, the Agency received rulemaking proposals from the European Human Factors Advisory Group (EHFAG) suggesting to specify further AMC and GM related to CRM training.

Based on the comments of stakeholders and on the rulemaking proposals, the Agency identified the following safety issues, among others, which may have to be addressed:

- The envisaged applicable framework at the present stage may lead to little practical and partly non-effective training concerning 'non-technical skills' and the associated training. One reason is that it might not be clear in all cases what the term 'suitably qualified' means, which is used in the applicable framework. This implies a possible risk that no measurable improvement in the accident rate caused by known hazards and no substantial prevention of future hazards associated with these factors may be achieved.
- As the assessment of CRM may be considered inherently subjective in nature, the risk of misinterpretation of the assessment process might undermine the confidence in CRM training. This may in turn create negative reactions towards the usefulness of CRM skills development in order to increase safety, and may diminish the training value.
- Repetitive training for the major CRM topics may not, to a certain extent, yet meet the primary objective of CRM training, which is to give operators effective tools to mitigate risks and hazards.
- The reality of multicultural aircrew teams has to be considered even more. One has to recognise that each culture has different communication specifics, ways of understanding and approaching the same opportunity or problem. Therefore, attention should be given to multicultural cabin crew teams, to the interaction of multicultural cabin crews with multicultural flight crews, etc.

²⁸ NPAs 2008-22 and 2009-02.

4.1.1. **Safety risk assessment**

Human factors continue to be the major cause of accidents and incidents. CRM — as the effective utilisation of all available resources to achieve safe and efficient operation with emphasis on non-technical aspects of crew performance — is an important factor in this context. In order to strengthen CRM performance, the flight crew, but also cabin crew and technical crew, must be trained properly in this area. It is expected that the implementation of improved CRM training will have a positive impact on safety by giving operators more effective tools to mitigate risks and hazards.

Based on the information provided in accident review and analysis reports²⁹, one can state that the probability of occurrences related to CRM is 'improbable'. This implies that an incident or accident is very unlikely to occur to each aircraft during its total life, but that an accident may occur a few times when considering the total operational life of all aircraft within a category. Improving CRM training by reviewing and amending AMC and GM is supposed to reduce further the probability of occurrences. However, improving CRM training is only one element that could reduce the likelihood of accidents and incidents.

If an accident occurs during an operation due to the lack of appropriate CRM, the severity of occurrence can be considered 'catastrophic'. This implies multiple deaths and destruction of equipment.

4.1.2. **Who is affected?**

It is expected that mainly air operators will be affected if the applicable framework concerning CRM training would be revised and expanded, as appropriate. This would imply that flight crew, cabin crew and technical crew would also be affected. In addition, competent authorities and training organisations would be affected.

At this stage the current situation and regulatory conditions neither raise public concern nor stir controversy among the general public or stakeholders.

4.1.3. **How could the issue/problem evolve?**

If the applicable framework is not changed, the situation cannot improve. Human factors will continue to be the major cause of accidents and incidents. Due to a further increase of air operations, which require, among others, dedicated CRM skills and attitudes, the situation may even deteriorate, at least in absolute terms.

4.2. **Objectives**

The overall objectives of the EASA system are defined in Article 2 of the Basic Regulation. This rulemaking proposal will contribute to the achievement of the overall objectives by addressing the issues outlined in Chapter 2 of this NPA.

The specific objective of this proposal is to establish and maintain a high uniform level of safety in air operations with the following measures in order to improve the present applicable framework on CRM training:

- modernisation by incorporating new items to consider recent developments and experience gained; and
- restructuring and rephrasing to improve the clarity and readability of the text.

²⁹ UK CAA 'Global fatal accident review 2002 to 2011', IATA 'Data report for evidence-based training', and 'EHST analysis of 2000–2005 European helicopter accidents'.

4.3. Policy options

In order to achieve the above objective, the options below were identified. Thereby, the baseline option (Option 0) is considered as the reference scenario.

Table 1: Selected policy options

Option No	Short title	Description
0	No change	Baseline option (no change to the AMC and GM; risks remain as outlined in the issue analysis).
1	Encourage operators	Since the details of CRM training are laid down in AMC, encourage operators to develop alternative means of compliance.
2	Amend AMC and GM	Review and amend AMC and GM on CRM training, as appropriate.

4.4. Analysis of impacts

In this paragraph, the major impacts of the options identified are discussed. For each option the safety, environmental, economic and social impacts are considered, as well as proportionality and harmonisation issues.

4.4.1 Safety impact

Option 0 is defined as the 'baseline option' with no changes envisaged. This option means that no restructuring of the AMC and GM, no additional measures and no 'modernisation' will take place. Operators may only introduce improvements on their own initiative. The safety risks would remain the same, as described in paragraph 4.1.1, or might even increase, as indicated in paragraph 4.1.3.

Option 1, to encourage air operators developing alternative means of compliance, is expected to result in a minor reduction of the safety risks. This could be a lengthy process and individual operators may not have the capability to develop such alternatives themselves. However, exchange with other operators and competent authorities might be beneficial as it puts any CRM training enhancements on a broader basis.

Reviewing and amending the AMC and GM on CRM training (Option 2) is expected to lead to a higher reduction of the safety risks, when compared to Options 0 and 1.

4.4.2 Environmental impact

No environmental impacts are expected for any of the options.

4.4.3 Social impact

No social impacts are expected for any of the options.

4.4.4 Economic impact

No economic impact is expected for Option 0.

Option 1 could mean that operators examine, and if appropriate, revise their CRM training provisions. This implies some costs. Providing training related to eventually revised

procedures would lead to reasonable additional costs. In addition, some costs are envisaged for the competent authorities, when approving alternative means of compliance.

Option 2 is expected to lead to higher costs for operators when compared with Options 0 and 1. The reason is that revising the AMC and GM will most probably lead to modifications of the CRM training as such. As a follow-up, all operators will have to amend their training syllabus, have to train their CRM trainers, and have to include additional training elements. In addition, measurable costs are foreseen for the competent authorities. However, these costs for operators and competent authorities are still considered reasonable, as confirmed by the majority of the Agency's Rulemaking Group members.

4.4.5 General Aviation and proportionality issues

No proportionality issues concerning small and medium operators and/or General Aviation are expected for any of the options.

4.4.6 Impact on 'Better Regulation' and harmonisation

No impacts on 'Better Regulation' and harmonisation are expected for any of the options.

4.5 Comparison and conclusion

As outlined in paragraph 4.4 of this RIA, safety and economic impacts are to be expected when considering the different options. Therefore, only these possible impacts will be further considered in this conclusive paragraph.

The baseline option (Option 0) implies that the safety risks remain the same as outlined in paragraph 4.4.1. Although it also means that no additional costs are induced, the Agency is of the opinion that this option should not be considered further.

Option 1 proposes to address the issue without amending the applicable framework. Instead, operators are to be encouraged to develop alternative means of compliance. As outlined above, it is expected that Option 1 would only result in a minor reduction of the safety risks accompanied by reasonable additional costs.

Finally, Option 2, which is reviewing and amending the AMC and GM on CRM training, has to be considered. When comparing this option to the others, as outlined above, Option 2 would lead to higher additional costs for operators than Option 1, and would also result in measurable costs for competent authorities. However, these costs are still considered reasonable, as confirmed by the majority of the Agency's Rulemaking Group members. On the other hand, Option 2 is the most effective option in terms of risk reduction. Therefore, when considering the different evaluating factors, **Option 2 is the preferred one.**

5. References

5.1. Affected regulations

N/A

5.2. Affected AMC and GM

Decision 2012/005/R of the Executive Director of the Agency of 19 April 2012 on Guidance Material to 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 — 'Guidance Material to Part-CC'. Available at <http://easa.europa.eu/agency-measures/agency-decisions.php>.

Decision 2014/014/R of the Executive Director of the Agency of 24 April 2014 on adopting Acceptable Means of Compliance and Guidance Material to Part-ARO of Commission Regulation (EU) No 965/2012 and repealing Decision 2012/016/R of the Executive Director of the Agency of 24 October 2012 — 'Acceptable Means of Compliance and Guidance Material to Part-ARO - Issue 2'. Available at <http://easa.europa.eu/agency-measures/agency-decisions.php>.

Decision 2014/017/R of the Executive Director of the Agency of 24 April 2014 on adopting Acceptable Means of Compliance and Guidance Material to Part-ORO of Commission Regulation (EU) No 965/2012 and repealing Decision 2012/017/R of the Executive Director of the Agency of 24 October 2012 — 'Acceptable Means of Compliance and Guidance Material to Part-ORO - Issue 2'. Available at <http://easa.europa.eu/agency-measures/agency-decisions.php>.

Decision 2012/019/R of the Executive Director of the Agency of 24 October 2012 on Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council — 'Acceptable Means of Compliance and Guidance Material to Part-SPA', as last amended by Decision 2013/020/R of the Executive Director of the Agency of 23 August 2013. Available at <http://easa.europa.eu/agency-measures/agency-decisions.php>.

5.3. Reference documents

Bureau d'Enquêtes et d'Analyses (BEA): 'Study on aeroplane state awareness during go-around (ASAGA)', August 2013. Available at <http://www.bea.aero/etudes/asaga/asaga.php>.

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 (OJ L 311, 25.11.2011, p. 1), as last amended by Commission Regulation (EU) No 245/2014 of 13 March 2014 (OJ L 74, 14.3.2014, p. 33).

Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296,

25.10.2012, p. 1), as last amended by Commission Regulation (EU) No 379/2014 of 7 April 2014 (OJ L 123, 24.4.2014, p. 1).

European Aviation Safety Agency Notice of Proposed Amendment (NPA) 2008-22 'Authority and Organisation Requirements'. Available at <http://easa.europa.eu/rulemaking/r-archives.php>.

European Aviation Safety Agency Notice of Proposed Amendment (NPA) 2009-02 'Implementing Rules for air operations for Community operators'. Available at <http://easa.europa.eu/rulemaking/r-archives.php>.

European Aviation Safety Agency Opinion 04/2011 'Air Operations'. Available at <http://easa.europa.eu/agency-measures/opinions.php>.

European Aviation Safety Agency Terms of Reference (ToR) RMT.0411 (OPS.094) 'Crew resource management (CRM) training'. Available at <http://easa.europa.eu/rulemaking/terms-of-reference-and-group-composition.php>.

European Helicopter Safety Team (EHST): 'EHST analysis of the 2000–2005 European helicopter accidents', *Final Report 2010*. Available at <http://easa.europa.eu/essi/ehst/category/publication-type/reports-and-analysis>.

Flin, R., Martin, L., Goeters, K.-M., Hoermann, H.-J., Amalberti, R., Valot, C. and Nijhuis, H.: 'Development of the NOTECHS (non-technical skills) system for assessing pilots' CRM skills', *Human factors and aerospace safety* 3(2), 2003, pp. 95-117.

Helmreich, R.L., Klinect, J.R. and Wilhelm, J.A.: 'Models of threat, error, and CRM in flight operations', *Proceedings of the tenth international symposium on aviation psychology*, Ohio State University, Columbus, Ohio, USA, 1999, pp. 677-682.

Helmreich, R.L., Merritt, A.C. and Wilhelm, J.A.: 'The evolution of crew resource management training in commercial aviation', *International Journal of Aviation Psychology* 9(1), 1999, pp. 19-32.

International Air Transport Association (IATA): 'Data report for evidence-based training', First Edition, July 2013. Available from IATA (<http://www.iata.org>).

International Civil Aviation Organization (ICAO): 'Manual of evidence-based training', *ICAO Document 9995, AN/497*, First Edition, 2013. Available at <http://www.icao.int/SAM/Documents/2014-AQP/EBT%20ICAO%20Manual%20Doc%209995.en.pdf>.

Joint Aviation Authorities (JAA): Administrative & Guidance Material, Section Four, Operations, Part Three (JAR-OPS), Temporary Guidance Leaflet (TGL) No 44, JAR-OPS 1, Amendment 13, Section 2 updated to incorporate Section 2 text proposals from suspended JAA NPAs, 01.06.2008.

Joint Aviation Authorities (JAA): JAR-OPS 3, 'Commercial air transport (helicopters)', Amendment 5, 01.07.2007.

Salas, E., Wilson, K.A., Burke, C.S., Wightman, D.C. and Howse, W.R.: 'A checklist for crew resource management training', *Ergonomics in design*, Spring 2006, pp. 6-15.

United Kingdom Civil Aviation Authority: 'Methods used to evaluate the effectiveness of flight crew CRM training in the UK aviation industry', *CAA Paper 2002/05*, 23 June 2003. Available at www.caa.co.uk.

United Kingdom Civil Aviation Authority: 'Crew resource management (CRM) training — guidance for flight crew, CRM instructors (CRMIS) and CRM instructor-examiners (CRMIES)', *CAP 737*, 29 November 2009. Available at www.caa.co.uk.

United Kingdom Civil Aviation Authority: 'Global fatal accident review 2002 to 2011', *CAP 1036*, June 2013. Available at www.caa.co.uk.

United Kingdom Civil Aviation Authority: 'The crew resource management instructor (CRMI) and crew resource management instructor examiner (CRMIE) accreditation framework', *Standards Document No 29, Version 4*, 27 October 2009. Available at www.caa.co.uk.

U.S. Department of Transportation, Federal Aviation Administration (FAA): 'CRM training', *Advisory Circular AC No 120-51E:22*, January 2004. Available at http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/22879.

6. Appendix — Evaluation of a European survey on CRM training

6.1. Background

This appendix contains the evaluation of a European survey on CRM training. The questions of this survey were established by the Agency's Rulemaking Group on CRM training during its first meeting in October 2012. The aim was to gain a better overview of the status of CRM training in Europe. The survey contained three parts:

- Part 1: Information on the respondents (four questions);
- Part 2: Present status of CRM training (eight questions);
- Part 3: Future CRM training needs (two questions).

The survey was distributed by the members of the Agency's Rulemaking Group and by the Agency. The period for providing responses was from 19 October to 31 December 2012, and respondent anonymity was guaranteed.

In total, the Agency received responses from 81 organisations or persons, which could be used for the evaluation. 81 responses are not that many, however, it can be stated that the responses represent to a certain extent the status of CRM training in Europe. Nevertheless, the Agency has been careful not to over-interpret the results; it especially avoided drawing explicit conclusions or discussing immediate consequences in depth within this appendix. Instead, the results of the evaluation served as input, together with other input as described in the Explanatory Note of this NPA, for amending the applicable framework on CRM training. Consequently, any detailed discussion concerning the needs for the proposed amendments is presented in the Explanatory Note and not in this appendix.

6.2. Information on the respondents

In the survey, four questions were asked in order to collect information on the respondents. **Figure A1**³⁰ provides information about the organisation where the respondent is employed. The largest group of employers is aeroplane operators (33.3 %), and the second largest group is helicopter operators (23.5 %). No aeroplane manufacturer and only one helicopter manufacturer (1.2 %) responded to the survey. The responses from 'others' (12.3 %) included training and governmental organisations. In total, about 4/5 of all respondents provided information on behalf of their organisation (80.2 %), while about 1/5 responded as private persons (19.8 %).

Figure A2 shows the distribution per country with the United Kingdom on top (25.9 %), followed by Spain (14.8 %) and Italy (9.9 %). In general, one can state that the respondents are spread quite broadly over Europe and are not concentrated to only one region. This is important to note, since CRM items are also related to cultural differences existing within the European region.

The next question asked was on the role of the respondent within the organisation. **Figure A3** shows that the 1/3 of the respondents is flight crew only (33.3 %), followed by 'management and flight crew' (28.4 %). In total, roughly 2/3 of the respondents has at least a 'basis' as flight crew (69.1 %), while cabin crew (2.5 %) and technical crew (3.7 %) are represented at a low level.

³⁰ The figures are presented at the end of this appendix.

In addition, the question was asked whether the respondent has an active role in delivering or developing CRM training. 80.2 % of the respondents answered 'yes', while 19.8 % responded with 'no'.

6.3. Present status of CRM training

In order to gain an overview of the present status of CRM training, eight questions were asked. The first question was about the kind of CRM training provided³¹. **Figure A4** shows that the majority of training is provided in classroom (61.7 %), followed by simulator (13.3 %) and computer-based/e-learning (11.7 %). Other training environments (7.8 %) include interactive group training, training during line checks, and in-flight training. It should be noted that it is not clear from the question asked and from the responses received in how many cases classroom training includes practical exercises.

The next question was on how the CRM training is provided or delivered (see **Figure A5**). The majority responded that the training is delivered only by the organisation itself (56.8 % for 'internal'). About 1/4 of the respondents answered that the training is contracted to external bodies (23.5 %), but only 2.5 % responded that the training is provided by another airline. For 12.3 % of the respondents, the training is provided as a combination of internal and external training.

Figure A6 provides information on the professional background of CRM trainers^{32,33}. The figure shows that the majority of the CRM trainers has a background as flight crew members (54.6 %), while about 1/4 are or have been cabin crew members (27.0 %). Professionals such as technical crew, psychologists and medical personnel rank at a much lower level (2.1, 5.0 and 3.5 %).

The next question asked was whether joint (combined) CRM training is provided. 84.0 % of the respondents answered 'yes' to this question. **Figure A7** shows that many different 'combinations' of crew members and other persons were named as being included in the joint training. As expected, top rated is the flight crew/cabin crew joint training (25.9 %). At first sight, the number of the flight crew/HEMS crew joint training is surprisingly high (16.0 %). This high number, however, can be explained by the high number of helicopter operators who responded to the survey (compare to **Figure A1**). Many of them are obviously HEMS operators.

Concerning joint training, one additional interesting result is that in more than 20 % ground personnel is involved. Finally, it should be noted that 4.9 % of the respondents understand the training of the flight crew (training within the flight deck) as joint training.

Figure A8 shows how much time is spent conducting initial CRM training. The figure makes it clear that the time spent differs enormously (e.g. for flight crew, from the minimum of 0.25 days to the maximum of 5 days). The average time for initial CRM training for flight crew is about 1.8 days, for cabin crew about 1.4 days, and for technical crew about 1.5 days.

The results concerning the time spent conducting recurrent CRM training are shown in **Figure A9**. As for the initial training, the time spent differs in a quite broad range (for all

³¹ For answering this question the respondents could provide more than one answer.

³² Some organisations use the term 'CRM trainer', while others utilise the term 'CRM instructor', meaning the same, namely a person suitably qualified to provide CRM training. In this appendix, the term 'CRM trainer' is used in most cases.

³³ Again, it was possible to provide more than one answer.

crew members from the minimum of 0.25 days to the maximum of 3 days). The average training time for recurrent training is about 1.0 days for flight crew and about 0.9 days for cabin and technical crew.

The next question asked was on CRM assessment: Are CRM skills/performance assessed or evaluated? During the evaluation, it became clear that one has to distinguish between the three following cases in order to avoid a misinterpretation of the results:

- Case 1: Crew and CRM trainer in organisation;
- Case 2: Only crew in organisation;
- Case 3: Only CRM trainer in organisation.

Figure A10 shows the results for all three cases. As a first result it becomes clear that because of the small number of responses, Case 2 (7 responses) and Case 3 (2 responses) should not be interpreted further.

For Case 1, the Agency received a sufficient number of responses, namely 71, allowing further evaluation. Figure A10 shows that for the majority (59.2 %), both 'crew' and 'CRM trainers' are assessed, while the numbers for 'crew only' and for 'CRM trainer only assessed' are lower (19.7 and 15.5 %). 'No assessment at all' is the case for 5.6 % of all cases.

The respondents also provided information on how CRM skills are assessed (see **Table A1**). The table makes it clear that the methods of assessment differ between crew members and CRM trainers.

Table A1 – How are CRM skills/performance assessed or evaluated?

Crew member assessment by:	CRM trainer assessment by:
Line and simulator checks, NOTECHS framework, assessment system, classroom tests, safety oversight, etc.	Quality audit, accreditation scheme, supervision, feedback system, evaluation survey, etc.

The final question on the present status of CRM training was about additional training which is provided, but which is not included in the current training syllabus of the European regulatory framework. **Figure A11** shows that surprisingly about half of the respondents (49.4 %) reported that additional CRM training is provided. This result is an indication that the applicable framework needs to be amended. Concerning the content of the additional training, the respondents named, among others, the following items:

- Aeromedical CRM;
- Aspects related to threat and error management, and to SMS;
- Safety analysis and flight crew reports;
- Interaction with ground OPS and air traffic management;

- Role specific (e.g. leadership course);
- UK CAA Standards Document 29.

6.4. Future CRM training needs

Concerning the future needs of CRM training, the following two questions were asked:

- What do you think could be improved in CRM training?
- What are the future needs concerning the regulatory framework?

The evaluation of the two specific questions showed that there was a wide overlap in the responses. Therefore, the Agency decided that it would be appropriate to 'merge' the two questions into a more general one: 'What needs to be considered concerning future CRM training?' In total, 162 responses were considered for the evaluation. The Agency grouped the most important responses under 14 headings³⁴ (see **Table A2**). The table shows that the largest numbers of responses concerning future needs were provided on the following items:

- Practical training (No 2: 28 responses);
- Future rules (Nos 12 and 13: 21 responses); and
- CRM trainers (Nos 10 and 11: 18 responses).

The Agency discussed the future needs expressed and the proposals made with the Agency's Rulemaking Group and considered the responses provided during the drafting process of the proposed AMC and GM.

Table A2 — Responses to the question 'What needs to be considered concerning future CRM training?'

No	Issue	Response
1	Training — general	(Joint) training for all personnel involved (6) ³⁵ Integrated in overall training (1) Refreshers during the year (2) More helicopter-oriented training (4) More focus on workload management (1)
2	Practical training	More practice, less theory (9) More operator mission-oriented (10) More case/evidence-based (6) More interactive (3)
3	Joint training	(Mandatory) joint FC and CC training (5) Inter-pilot and pilot/other crew relationship (1) Joint aeromedical training (1)
4	Flight crew	Leadership training for pilot-in-command (1) Different perception cultures (1) Single flight crew training (1)

³⁴ It should be noted that this grouping means a 'simplification' of the responses provided. Many of the responses contained detailed statements and, therefore, could not be reprinted in this appendix.

³⁵ The numbers in brackets indicate the numbers of responses.

No	Issue	Response
5	Consider different cultures and generations (2)	—
6	E-learning	Not to be allowed (1) Only in small organisations with single-pilot operation (1)
7	Sharing information	Easy access to in-depth information (4) International exchange of information (2) A centralised advisory body which gives advice (1)
8	SMS	SMS as the vehicle to address HF issues (1) Integration of safety management principles (1) Direct link between SMS and CRM (1)
9	Evaluation/assessment	Ongoing evaluation/assessment (1) Evaluation during ground courses (1) CRM as part of assessment for FC and CC (2)
10	CRM trainer — qualification	Qualification and formal process (2) Clarify requirements (2) High standards (2) Clear definition of 'suitably qualified' (2) Active experience in flying (1) Emphasis on NOTECHS, HF, teaching experience, etc. (1)
11	CRM trainer — training	Training courses (1) Clear rules for recurrent training (3) Simplify training procedures (1) Availability of adequate training (1) Specific CRM issues training (2)
12	Future rules — general	Clear, concise, practical and standardised system (3) Clear and precise rules on time span for courses (3) Continue with UK system (4) More stringent rules (1) Simplify rules (1) To integrate CRM and flight deck automation (1)
13	Future rules — flexibility	More flexibility concerning the syllabus (3) 'Open rules' (1) Flexible and less rigid rules (2) Less rules and shifting responsibilities to operator (3)
14	No specific issues (9)	—

Figures A1 to A11

Figure A1 — Kind of organisation where the respondent is employed

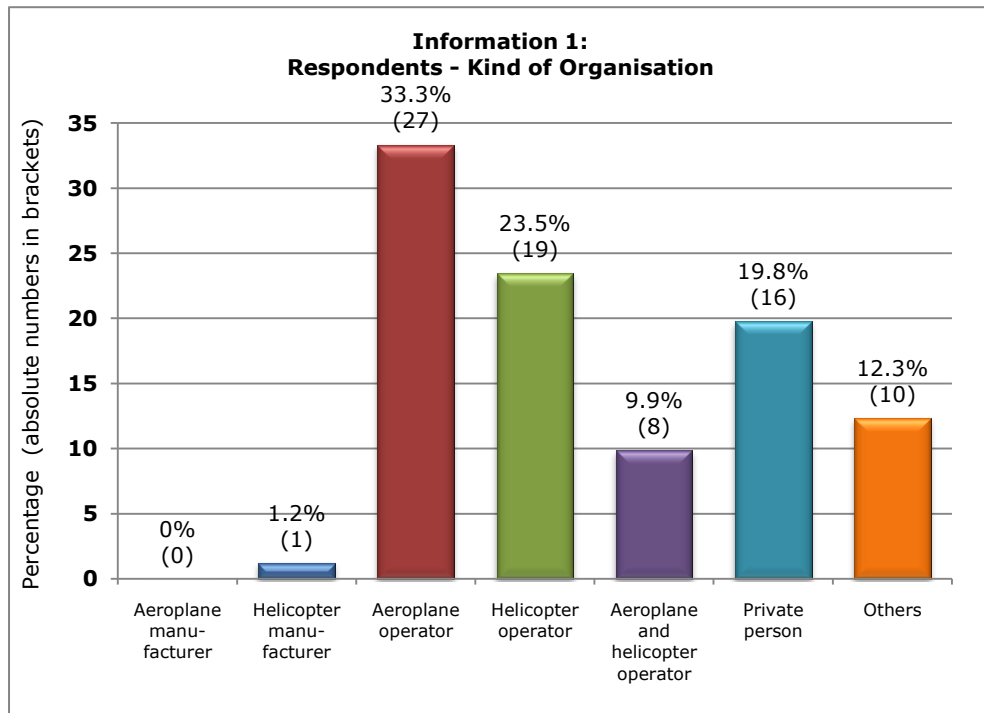


Figure A2 — Country where the respondent/organisation is located

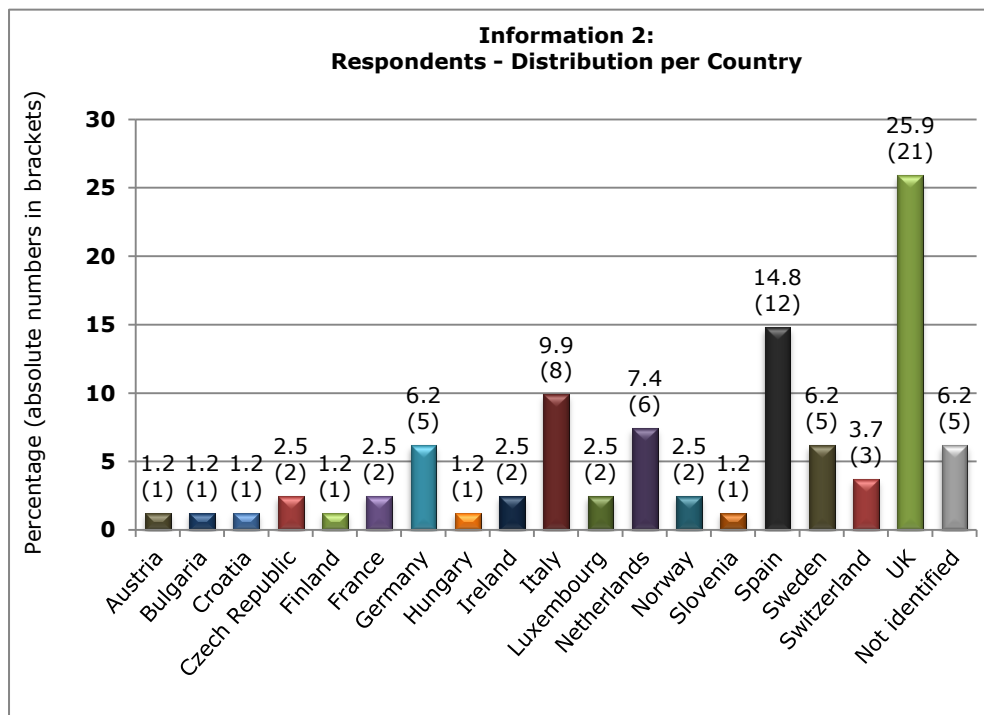


Figure A3 — Role/responsibility of the respondent in the organisation

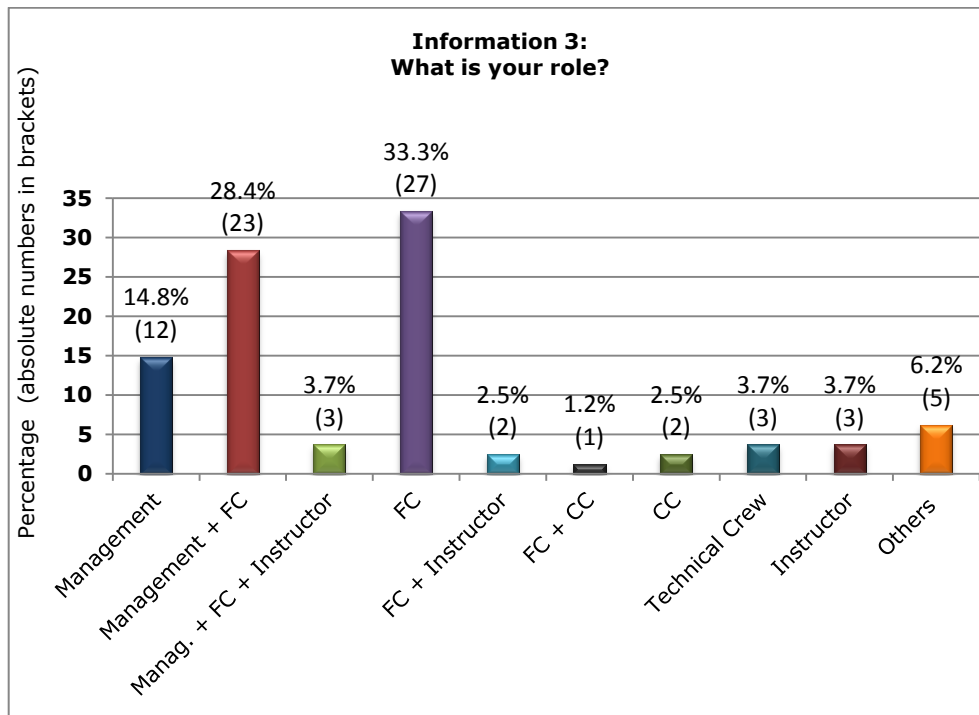


Figure A4 — Kind of training provided

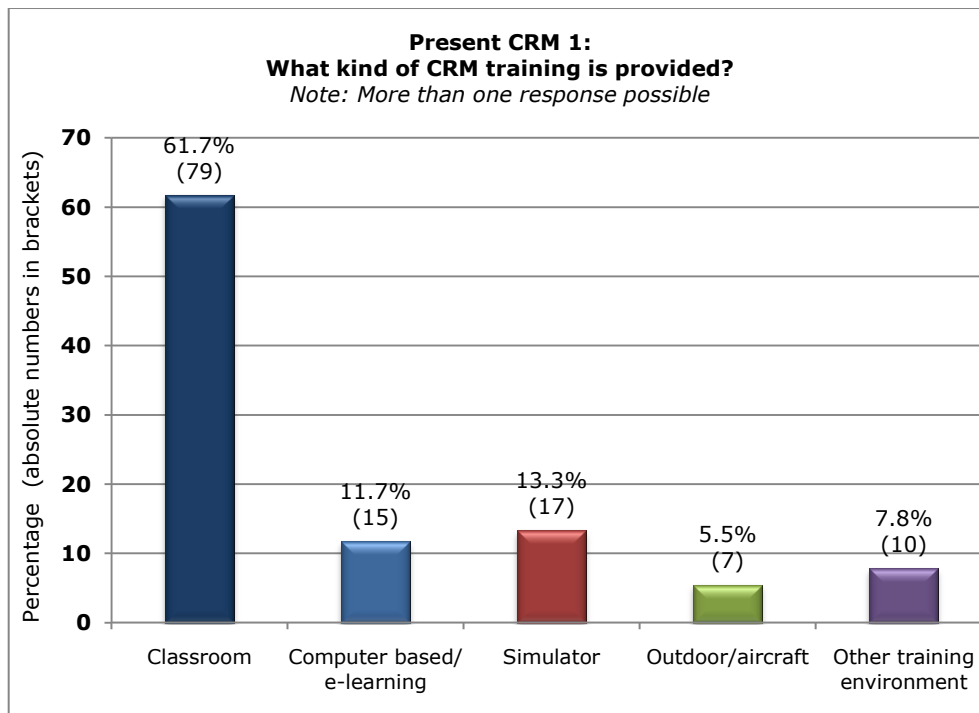


Figure A5 — How CRM training is provided or delivered

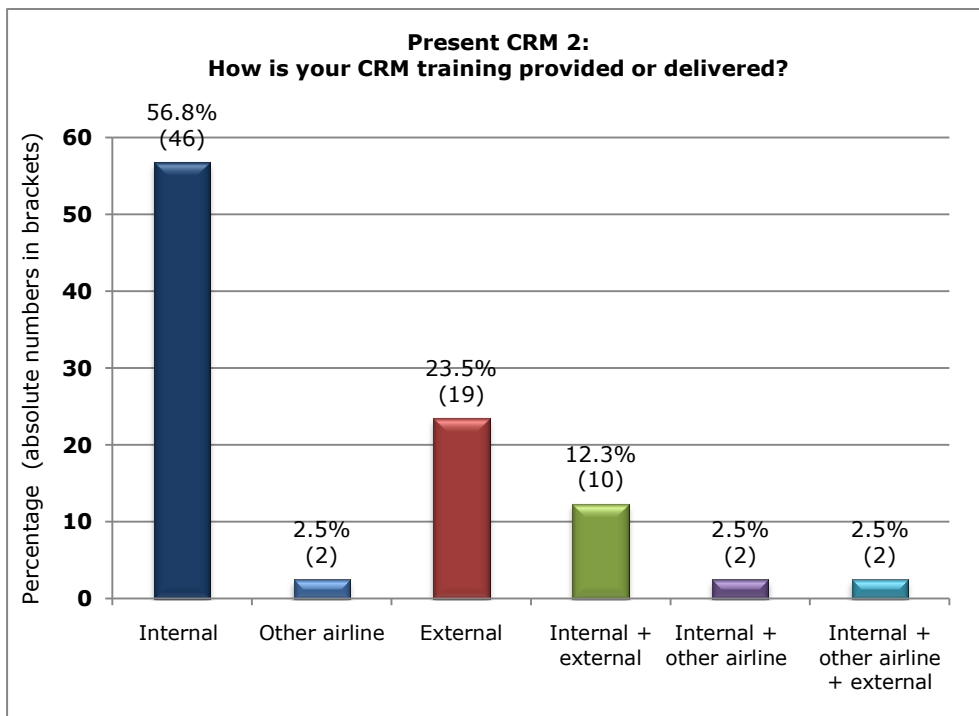


Figure A6 — Professional background of CRM trainers

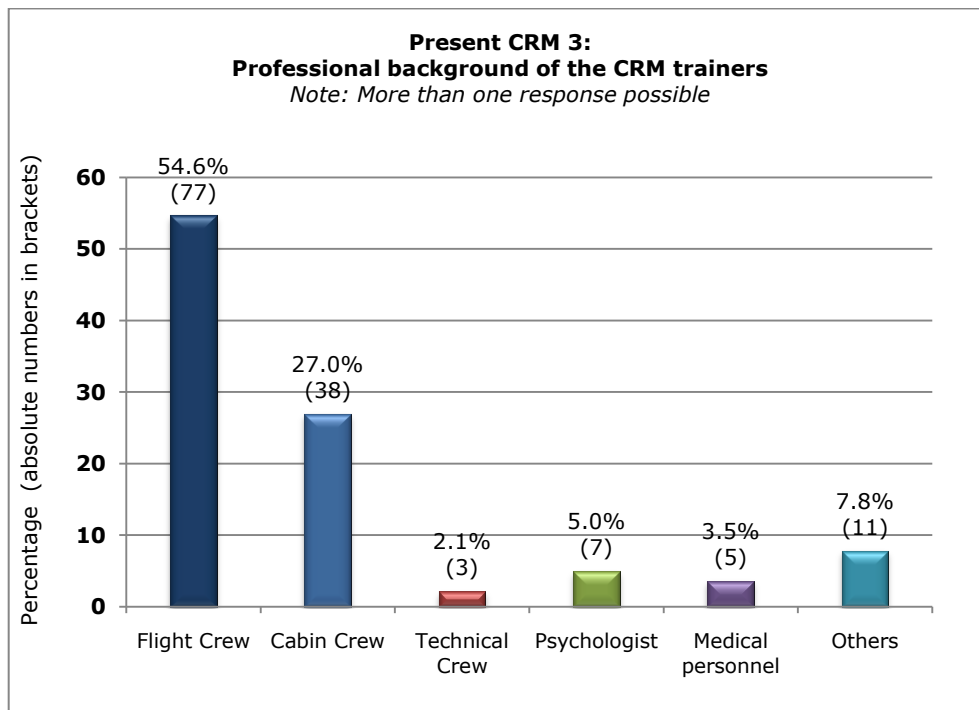


Figure A7 – Joint (combined) CRM training

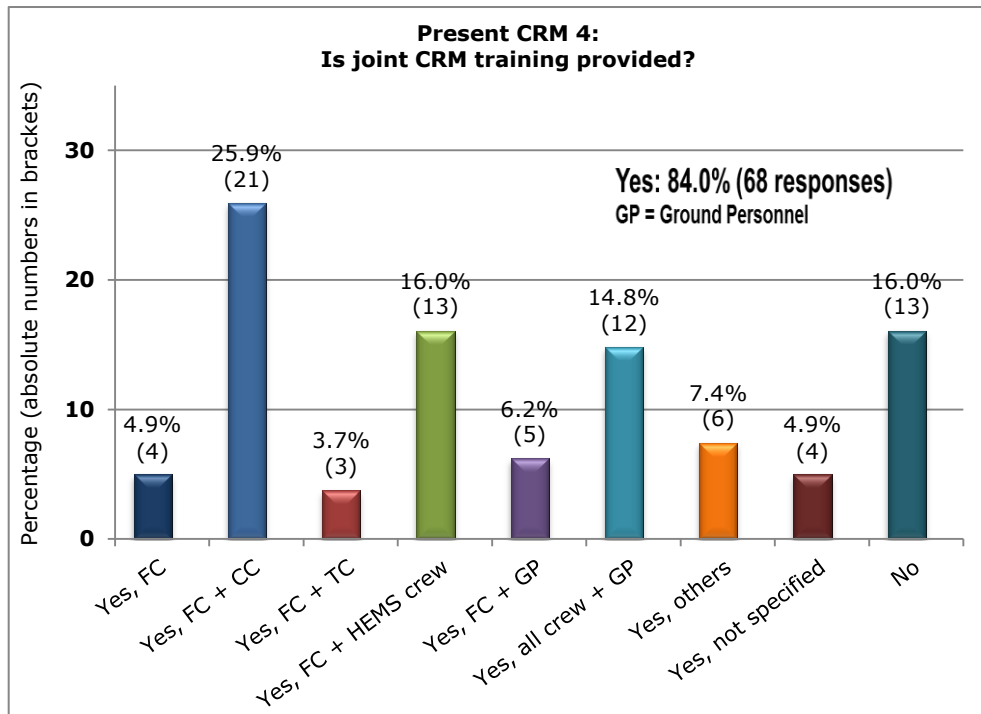


Figure A8 – Time spent on initial CRM training

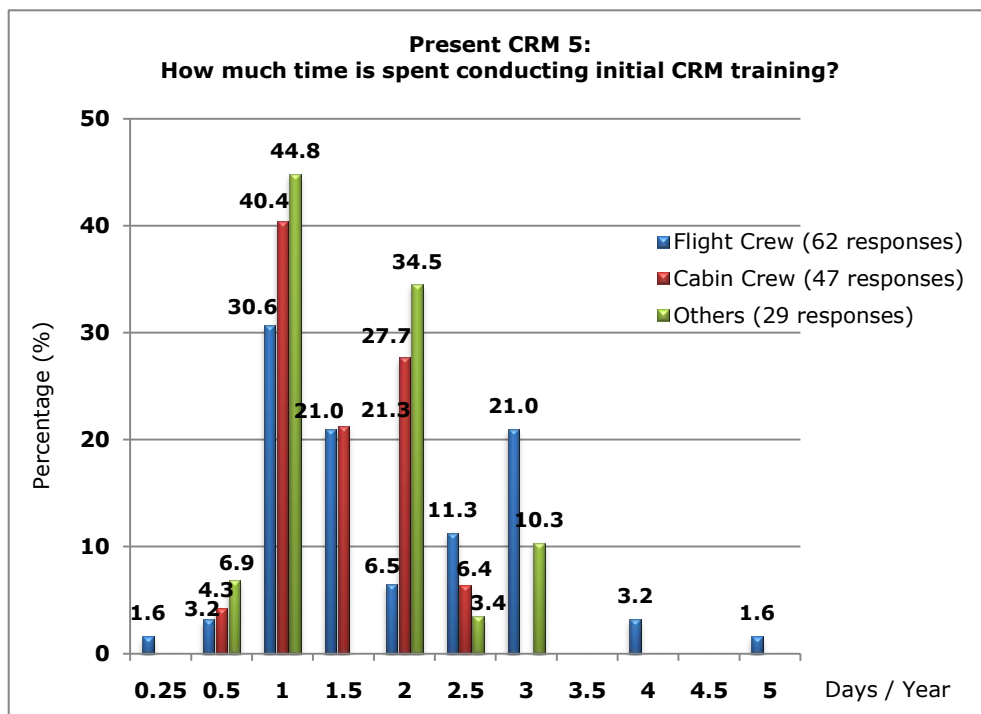


Figure A9 – Time spent on recurrent CRM training

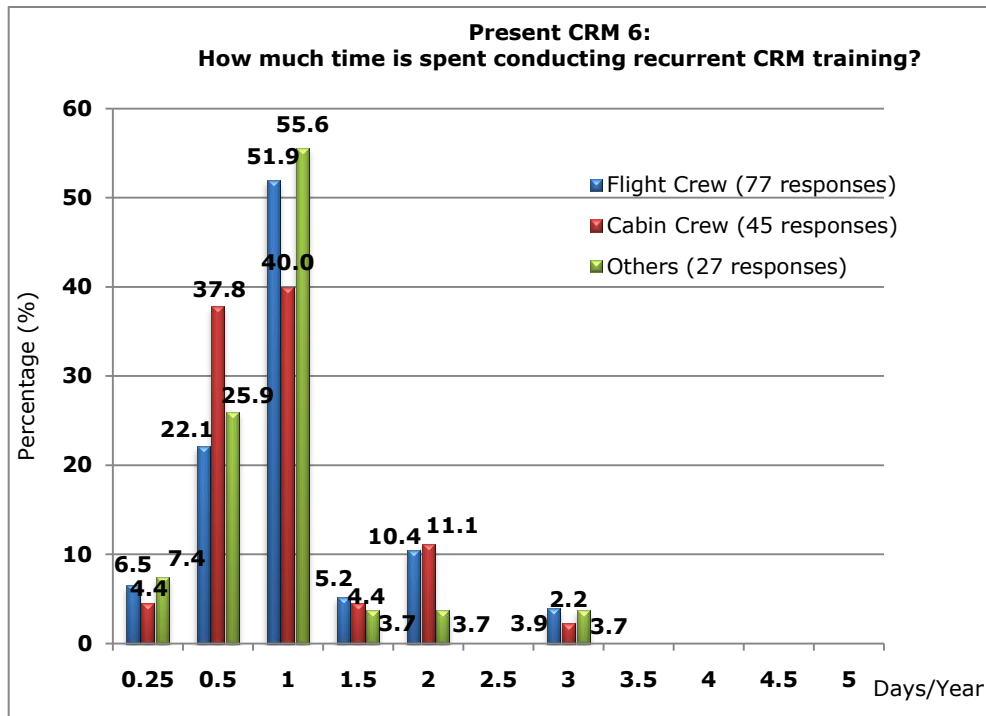


Figure A10 – Assessment of CRM skills

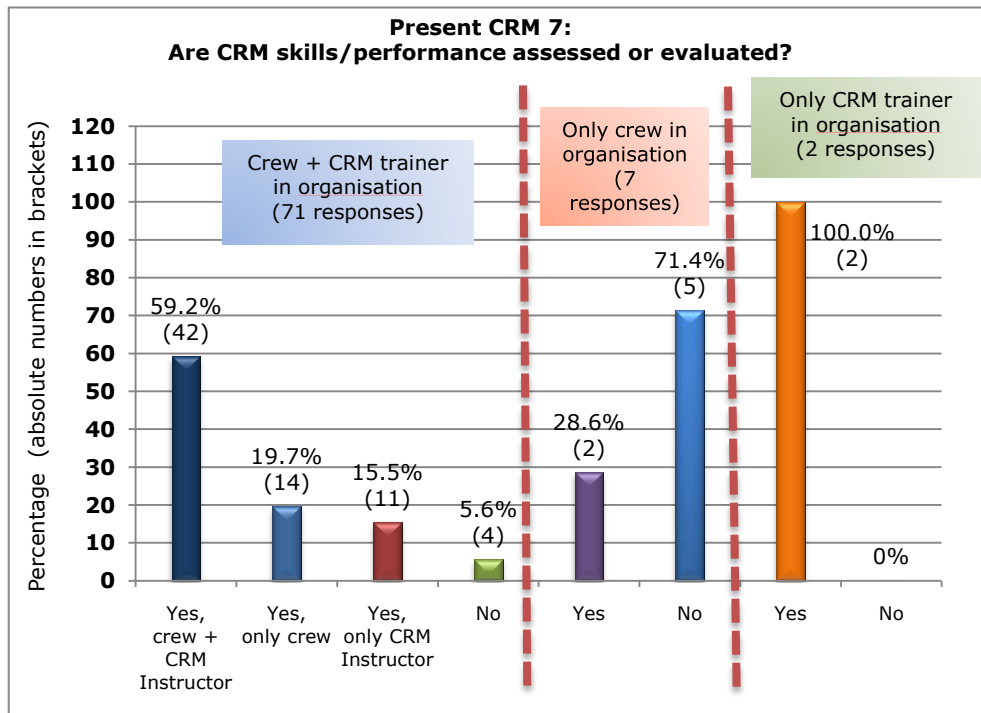


Figure A11 — Additional CRM training outside the present European regulatory framework

