European Union Aviation Safety Agency

SAFETY MATERIAL

RMT.0599

‘Evidence-based and competency-based training.’

SPT.012

‘Promote the new European provisions on pilot training’

EBT MANUAL

V2.3

According to:

ORO.FC.231. Evidence-based training

and

ORO.FC.232 EBT programme assessment and training topics.

together 4safety

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DISCLAIMER

The Agency has prepared this document to provide stakeholders with an easy-to-read publication. This document is part of the safety material documentation published by EASA. The document provides some of the best practices in the industry to implement EBT and **does not** form part of the EASA regulatory system (there is no need to comply with this document). This document is for information only. The Agency accepts no liability for damage of any kind resulting from the risks inherent in the use of this document.

BACKGROUND

EBT is a worldwide global initiative that was created and developed by many organisations that contributed equally to the development of the project. ICAO, IATA and OEM guidance is available for the support of implementation of EBT programmes worldwide. No single organisation or person can claim the original idea or ownership of EBT and its principles. Stakeholders are recommended to follow the advice and documentation provided by their regulator.

GENERAL

The objective of this manual is to support operators/ATO's in designing and conducting their EBT programme by complying with EASA regulation and facilitating the spirit of competency-based training.

This document is EASA Safety Promotion Material (SP), thus not part of the formal regulatory system. It is to be considered as support and guidance for the implementation of EBT mixed (ED decision 2015/027/R) and for EBT baseline (following the adoption of Commission Implementing Regulation (EU) 2020/2036 and (EU) 2020/2193 and the ED decision 2020).

Edition 1 of this manual contains the existing explanatory notes of RMT.0599 with some editorial modifications mainly for better readability and consistency. The content of the manual will be expanded in future editions to become a living document to address common questions and items of the EASA rulemaking structure necessary for clarification.

There are three sections in the manual:

Section I: It contains the need-to-know safety promotion material.

Section II: it contains the nice-to-know safety promotion material.

Section III: it contains the Epilogue concerning the legislation and acknowledgements.

Section IV: in a later version, there will be an EBT checklist for baseline (to be included in a later version).

SECTION I: EBT Implementation Material

1. ARO.OPS.226 point (e) — GUIDANCE FOR ALTERNATIVE MEANS OF COMPLIANCE RELATED TO EVIDENCE-BASED TRAINING

The competent authority shall contact EASA at the start of the evaluation of the AltMOC. EASA can provide useful information for the purpose of the evaluation.

- AltMOC related to AMC1 and AMC2 ORO.FC.231(b) Adapted competency model.
  1- The addition of a new competency is preferred (e.g. Professional competency) rather than a re-order of the EASA competencies because this still allows the comparison of the competency data with other operators and facilitates the job of the authority.
  2- It is recommended that OBs are not moved from one competency to another; instead it may be better that a new OB/s is introduced to complement the existing EASA OBs to a particular competency.
  3- Point 1 is preferred to point 2.

- AltMOC related to AMC2 ORO.FC.231(d)(1) Grading system.

Grading systems of 4-point scales, instead of 5 point scale as recommended in AMC1 ORO.FC.231(d)(1), may be accepted. It is recommended that the Operator merge EASA grade 4 and 5 into a single grade 4. This way grades 1 and 2, which are key in the EBT system, remain as recommended. Grade 3 also remains standard; grade 3 is also very important because it is one of the most common grades used across the airline. It is recommended that the Operator provides a comparison table as follows:

EASA grading scale (AMC1)	Operator grading scale (AMC2)
Grade 1	Grade 1
Grade 2	Grade 2
Grade 3	Grade 3
Grade 4	Grade 4
Grade 5	

2. ORO.FC.146(c) — EBT INSTRUCTOR COMPETENCY FRAMEWORK

EBT Instructors' Standardisation Programme Design

This safety promotion material describes a competency-based approach to the EBT instructors training using the five instructor and evaluator competencies (IECs).

A development programme for instructors and evaluators (IEs) should use a building block approach. The aim is to progress in a structured way, step-by-step, from the initial assignment through the complete spectrum of IE duties.

IEs need to be trained and assessed in all competencies to a solid foundational level of performance. However, specific assignments require special emphasis on specific competencies during training; the final competency standard for these competencies should be higher than foundational.

There are essentially two pathways to train and standardise IEs in the IECs. The first is for those IEs that are already qualified in accordance with Annex I (Part-FCL) and must be trained and standardised

to EBT standards according to ORO.FC.146. The second is for those (ab initio) IEs that are not yet qualified as such and must be trained and standardised to comply with both Annex I (Part-FCL) as well as ORO.FC.146.

Training of IEs qualified in accordance with Annex I (Part-FCL)

For those IEs already qualified in accordance with Annex I (Part-FCL), previous experience must be reorientated to CBTA instruction. The operator EBT standardisation should put special emphasis on the competencies 'Instruction', 'Interaction with the trainees' and 'Assessment and evaluation'. The IE training places special emphasis on those IECs because they are the ones that differ the most from the IE-standards in Annex I (Part-FCL).

Training objectives for EBT instructor standardisation will consequently refer to the descriptions of the relevant IECs and their OBs.

All IECs must be trained and assessed, but some IECs also require special emphasis (SE) for the initial EBT instructor training and standardisation. The table below shows a simplified matrix to train and assess ('TA') IEs. The competencies requiring special emphasis during training are additionally identified with 'SE'.

EBT instructor competencies for IEs qualified in accordance with Annex I (Part-FCL)				
IEC1	IEC2	IEC3	IEC4	IEC5
Pilot competencies	Management of the learning environment	Instruction	Interaction with the trainees	Assessment and evaluation
TA	TA	TA-SE	TA-SE	TA-SE

Note: TA: competencies trained and assessed
SE: competencies requiring special emphasis during training

Training ab initio IEs

As the prevalence and maturity of EBT programmes grow, more and more ab initio instructors will gain their first instruction experience within a CBTA environment. These candidates must comply with both Annex I (Part-FCL) requirements and ORO.FC.146 requirements. However, due to some overlap between these qualifications, it is possible to combine them into a single instructor training programme which qualifies candidates for both Annex I (Part-FCL) as well as ORO.FC.146. Such a combined training programme would be shorter than training the two qualifications independently. In any event, the combined course must qualify the instructor for both qualifications simultaneously at the end of the course, and it must feature a test following the training of Annex I (Part-FCL) Theoretical Knowledge. The table below provides Training Areas of Special Emphasis (TA-SE) of such a combined training:

EBT instructor competencies in a combined course (FCL + ORO.FC.146)				
IEC1	IEC2	IEC3	IEC4	IEC5
Pilot competencies	Management of the learning environment	Instruction	Interaction with the trainees	Assessment and evaluation
TA	TA-SE	TA-SE	TA-SE	TA-SE

It must be noted that it is also still possible to qualify such candidates sequentially. However, in this case, they must first be qualified in accordance with Annex I (Part-FCL), before being introduced into the EBT initial instructor training and standardisation course. This is essentially in accordance with the training of IEs qualified in accordance with Annex I.

In this regard (combination of the instructor course in accordance with Part-FCL and EBT instructor course in accordance with ORO.FC.231), the operators normally exercise a contracting activity under ORO.GEN.205 and request an ATO to deliver the combined training course (FCL instructor + Operator EBT instructor). As this model normally includes a combined 'assessment of competence', the examiner conducting this assessment should be an Operator EBT instructor and additionally fulfil the FCL requirements to conduct an assessment of competence.

Competency assessment

The recommended competency assessment model for instructor competencies is the VENN model already introduced for pilots. When the VENN model is not used, the table below is recommended for the development of an alternative grading system.

Final competency standard	Operators and ATOs define in their OMs the level of performance to be achieved by the instructor and evaluator.
Condition	**Ground training** (including CRM) and **flight training** in aircraft and in FSTDs: — licensing; — type rating; — conversion; — line training; and — recurrent training.

3. ORO.FC.231(a)(4) — CONCORDANCE

Concordance is an important subsystem in the EBT programme. Instructor competence in EBT is ensured by two pillars:

1- Instructor standardisation.

2- Instructor concordance assurance programme.

The following material provides more information about instructor concordance as follows:

Appropriate metrics

ORO.FC.231 point (a)(4) requires the operator to use appropriate methods and metrics to assess concordance, the following information expands on this requirement:

Concordance must be assessed independently per competency, and, if possible, segregated between different levels of competency assessment. This serves to identify whether concordance varies between competencies or between levels of assessment, providing guidance that is more accurate in order to improve concordance. Assessing concordance between instructors should make use of statistical methods, gauging both individual instructor metrics and group instructor metrics.

Different statistics may be appropriate for different types of measurement. Some options are: joint-probability of agreement, Cohen's kappa, Scott's pi and the related Fleiss' kappa, inter-rater correlation, concordance correlation coefficient, and intra-class correlation.

Individual assessments should assess to what extent an individual aligns with predefined standards for the reference material (e.g., correlation analysis) and to what extent the individual's ability to assess is improving or deteriorating over time (e.g., compared to previous concordance assessments). Group statistics may make use of group agreement (e.g., variance assessment) and group alignment (e.g. group averages compared to standards for the reference material). A high variance implies that a large number of instructors does not rate according to the standards set, and warrants investigation. Individual instructors who exhibit a large deviation from standards, consistent positive/negative bias or poor improvement/deterioration of their concordance with standards, must be considered for focused instructor training before being re-engaged in EBT assessments. However, the investigation may determine that although an individual instructor exhibits a large deviation, the reason is not that this instructor is not standardised. The reason could be that the instructor delivers a different programme (e.g., always delivering a harder-than-usual EBT programme in preparation of command upgrades) or that the instructor provides training to a specific group of pilots (e.g. those that require remedial training).

Finally, when subcontracted instructors are used, the standardisation provided to them should be particularly considered. This group of instructors may not achieve the initially required concordance. In order to maintain the data integrity for instructor concordance, the operator should maintain data traceability for each group of instructors (airline and subcontracted) as the root cause for the good or bad performance of each group may be different given that the background and environment of each group are different. It may be necessary to apply the same principles in other groups (e.g. mature vs. young instructors).

Identify areas of weak concordance

The instructor concordance is a tool for continuous improvement of the EBT programme.

AMC1 ORO.FC.231(a)(4) Point (a) 'The ICAP should be able to identify areas of weak concordance to drive improvement in the quality and validity of the grading system'. This point provides a requirement from a systemic view, e.g. the programme must identify that instructors in a certain fleet have problems to grade non-technical competencies or that one competency is always graded too low. This may occur with 'application of knowledge' or 'application of procedures' where instructors identify all the time 'KNO' or 'PRO' as the root cause for all pilots being deficient when they should not, leading thus to a low grading in 'knowledge' or 'PRO'.

As a very general comment, the findings in the instructor grading may be:

1- too low grading (the too strict – the butcher),

2- too high grading (the too lenient – Santa Claus),

3- too many gradings in the middle (3) (the lazy),

4- too many extreme gradings (1 and 5) and little number of gradings in the middle (the unbalanced – the crazy).

AMC1 ORO.FC.231(a)(4) Point (e) 'The operator should establish procedures to address those instructors who do not meet the standards required'. This point ensures that each individual instructor has the necessary concordance (e.g., my instructor Pepito Perez has problems to rate FPM and therefore this has to be addressed).

Continuous improvement of concordance

Metrics of instructor concordance must drive specific interventions in instructor training, the assessment framework used and/or the reference material developed. Instructor concordance must be submitted to a process of continuous improvement in order to safeguard against standards drift and concordance degradation. For this reason, these requirements do not specify statistical thresholds of minimum variance of concordance; however, improvement in concordance metrics should indicate whether the operator's concordance programme is effective. Over time, as concordance improves, so will the reliability of EBT data.

Concordance assurance and EBT instructor recurrent standardisation

Instructor concordance may be verified by controlling the content to be assessed (standardisation reference material), such as flight recordings, scripted videos and/or case studies. This material should be of comparable complexity, ambiguity and variation to situations that the operator encounters in their EBT programme.

Within each 3-year period, reference material should address every competency at a minimum of two levels per competency, such that concordance is assessed across the wide range of competency assessment that the instructor must be proficient in. Reference material may not be presented to the same instructor within 3 years in order to maintain a true assessment of an instructor's ability to assess accurately. Operators should strive to include a broad diversity of flight phases, situations and behaviours when developing reference material, and preferably integrate their own operations and standard operating procedures (SOPs).

Reference material should be assessed using the same assessment framework used for actual EBT training delivery, and preferably assess not only the competency observation, but also the ability to assess root causes and identify subsequent training needs. Reference material should be supplemented with 'correct' ratings (i.e. answer sheet), such that instructor assessment can be compared against agreed-upon standards. The answer sheet should be composed by a core group of EBT instructors; preferably rotating members, to prevent standards drift and/or lasting bias.

Instructor concordance may not be inferred from actual assessment data collected from EBT sessions when these sessions are not equivalent in terms of difficulty, competency distributions, etc., because this may not guarantee equal reference material between instructors.

Instructor concordance

The development of strong instructor concordance (inter-rater reliability) is critical for the validity of the EBT data collection. In a norm-referenced system, the operator must safeguard concordance between instructors. The operator normally sets minimum concordance standards; however, the

competent authority may recommend certain criteria, especially when the revalidation of licences is performed under EBT.

The distribution of grades across the instructor community for the modules conducted should be recorded. This recording may be accessible to the instructors, normally a posteriori. Some airlines underweight the grading performed by an instructor with poor concordance to have accurate competency data. Underweight may only be needed in rare cases during mixed EBT; however, it should not happen during full EBT.

However, this standard needs to be easy for the instructors and thus allow them to focus on the observation of the students and to provide training to them rather than cross-checking complicated criteria.

Instructor concordance scheme example:

(1) This is an acceptable example of a concordance scheme:

Grade	PRO	FPM	FPA	SAW	WLM	LTW	COM	PSD	KNO
1	Year 1	Year 2	Year 3	Year 1		Year 1	Year 2		Year 3
2		Year 1	Year 2		Year 3		Year 1	Year 2	
3	Year 3			Year 3		Year 2		Year 1	Year 2
4		Year 3		Year 2	Year 2	Year 3			Year 1
5	Year 2		Year 1		Year 1		Year 3	Year 3	

Note: It is possible to combine several competencies in a single assessment event.

(2) An unacceptable example of a concordance scheme:

Grade	PRO	FPM	FPA	SAW	WLM	LTW	COM	PSD	KNO
1	Year 1/ Year 2/ Year 3	Year 1	Year 1	Year 1	Year 1	Year 1	Year 1	Year 1	Year 3
2	Year 1/ Year 2/ Year 3	Year 2	Year 2	Year 2	Year 2	Year 2	Year 2	Year 2	Year 3
3	Year 1/ Year 2/ Year 3	Year 3	Year 3	Year 3	Year 3	Year 3	Year 3	Year 3	Year 3
4	Year 1/ Year 2/ Year 3	Year 1	Year 1	Year 1	Year 1	Year 1	Year 1	Year 1	Year 3
5	Year 1/ Year 2/ Year 3	Year 2	Year 2	Year 2	Year 2	Year 2	Year 2	Year 2	Year 3

The following table provides an overview of the usability of different data sources:

	Uniform reference material (e.g. videos)	EBT Assessment and training Data	EBT-I dual-observations (e.g. assessments of competence)
Useable for agreement?	**Yes:** all instructors can observe the same content.	**Yes,** if data normalisation is possible – otherwise **No,** as not all instructors have observed the same content.	**Partially:** although the examiner should be highly standardised, not all instructors have observed the same content.
Useable for alignment?	**Yes:** with assessment standard attached to the material.	**Yes,** if data normalisation is possible – otherwise **No,** as there are no assessment standards to compare to.	**Yes:** a crosscheck is possible.
Useable for other analysis?	**Yes:** outliers (both individuals and groups) may be identified.	**Partially:** outliers may be *suspected* by their rating behaviour.	**Yes:** this allows addressing other instructor competencies beyond ability to assess.
Notes	*Videos should ideally be of both a sim/flight event as well as the facilitated debriefing.*	*If training data is used to identify outliers, then outlier-generated data may be valued as unreliable data for concordance purposes. The gradings are still valid for licence revalidation and the grading system (e.g., tailored training).*	*It is difficult/time consuming to ensure exposing instructors to enough competency-grade combinations.*

4. ORO.FC.231 (a)(2)(iv) Validity of the EBT module.

The rule ORO.FC.231 (a) (2) (iv) says, "the validity period of an EBT module shall be 12 month(s)". In a giving moment the pilot shall have a valid module (at least one). This requirement is to be seeing in conjunction with ORO.FC.130[1].

On the other hand, in Part FCL, and in order to revalidate pilot licences under the Appendix 10, pilots must complete at least two modules within the validity period of their licences. It is not required to have two valid modules in order to revalidate. Example: a pilot has a licence expiry date of 31.12.2021 on the basis of module 1 performed in April 2020, module 2 in November 2020 and the administrative process of revalidation in November 2020 as the pilot is within 3 months revalidation period. The pilot may perform module 3 in April 2021 and module 4 on 30 of December 2021. From 01.12.2021 until

[1] ORO.FC.130 'Recurrent training and checking' [Regulation (EU) No 965/2012]
(a) Each flight crew member shall complete annual recurrent flight and ground training relevant to the type or variant of aircraft on which he/she operates, including training on the location and use of all emergency and safety equipment carried.
(b) Each flight crew member shall be periodically checked to demonstrate competence in carrying out normal, abnormal and emergency procedures.

30.12.2021, the pilot has a valid module (module 3), and therefore, he/she is in compliance with ORO.FC.231(a)(2)(iv) and ORO.FC.130 as required in Part ORO. Even if the November 2020 module is expired and therefore in December 2021, only one module is valid, Part-ORO only requires to have one module valid. However, to revalidate, it is required to complete two modules within the period of validity of the type rating (January to December 2021), which the pilot will do by completing module 3 in April and module 4 in December.

5. 'AMC1 ORO.FC.231(a) point (f) — CUSTOMISATION OF SYLLABI'

Work in progress. Completing the information in GM3 ORO.FC.231(a).

6. GUIDANCE FOR INSTRUCTORS ON THE COMPETENCY ASSESSMENT

There are two types of practical assessments, *formative and summative*.

The **formative assessments** are part of the learning process. Instructors provide feedback to the trainees on how they are progressing toward any interim or final competency standard. This type of assessment enables the trainees to progressively build on competencies already acquired and should aid learning by identifying gaps as learning opportunities.

Formative assessments serve to:

- motivate trainees;
- identify strengths and weakness; and
- promote learning.

For EBT, the EBT instructor performs mainly formative assessment.

Summative assessments are used to collect evidence of the competencies with respect to an interim or final competency standard(s). They are carried out at defined points during the training and/or at the end of training (for EBT, after the EVAL, MT, and SBT phases). During summative assessments, the decision is either "competent" or "not competent"/"training complete" or "training not complete." This decision can be more detailed when using a refined grading system with a scale of judgements (e.g. 1-5).

Grading must not be confused with the competency assessment itself. Grading purely relates the assessment results to a certain numerical scale; therefore, instructors should consider grading as a method to collect training data, not as a means to provide feedback to trainees.

Although the regulation may provide sufficient material (e.g. GM2 ORO.FC.231(d)(1)), the operator is required to provide the instructors with further guidance to standardise their assessment, grading and achieve concordance.

Formative and summative assessments in EBT.

In the context of Evidence-Based Training (EBT), formative assessment refers to providing feedback to the trainees on how they are performing with regard to the required competency standard. The feedback should highlight positive performance and aid learning by identifying gaps (missing OBs, reductions of safety margins…) as learning opportunities. This also allows the monitoring of a trainee's

learning curve by collecting evidence through observation and classification (ORCA[2]). However, when the trainee's performance is compared to a required standard as a final outcome it is a summative assessment.

In an EBT module, these two assessment approaches are used.

There is a distinction between assessments within a Mixed EBT implementation programme and a Baseline EBT training program.

a) In Mixed EBT, a summative assessment occurs after the EVAL & Manouvre validation (MV) phase and a formative assessment during all phases of the module.

b) In Baseline EBT, a formative assessment is done during the entire module, with a summative assessment at the end of the EVAL, and as defined by the operator, after the completion of the module. In other words, on completion of the evaluation phase, any areas that do not meet the minimum competency standard (summative assessment) will become the focus of subsequent training. If the required competency standard has not been achieved in all areas at the conclusion of this training, the pilot should be removed from line flying duty and should only resume line flying after additional training and assessment confirming that minimum competency standards have been achieved.

During Mixed EBT, the summative assessment of the pilot competencies after the EVAL & MV phase ultimately determines the overall session outcome (PASS/FAIL of the OPC/LPC). Generally, flight tolerances are still the regulatory benchmark[3]. The pilot competencies grades also serve as a formative assessment because they form the basis for the subsequent training during the SBT.

The SBT should be considered as a 'training' session in the strict sense, and therefore, the grading of the SBT phase is always formative, indicating the trainee's position on the learning curve for each pilot competency towards the highest competency standard, e.g., the 'Exemplary Performance' Grade 5. After all, in the absence of a higher learning objective, there cannot be a formative grading.

If an operator determines that a pilot does not meet the company criteria for unsupervised line flying after or during an EBT module, it is based on a summative assessment.

Operators who are transitioning to EBT need to recognise that there is no continuous summative assessment throughout an EBT module. The focus needs to shift away from constant evaluation. EBT involves observing, recording, and ultimately classifying (ORCA[2]) the trainee's performance over an extended period, presenting the ORCA process as a video rather than a snapshot. This approach allows for the collection of evidence to develop the trainee's learning curve throughout and across EBT modules. The distinction between the two types of assessment:

[2] See the process of ORCA in AMC3 ORO.FC.231(d)(1) 'Evidence-based training' RECOMMENDED CONDUCT OF THE GRADING — ORCA

[3] See Regulation (EU) 1178/2011 'Appendix 9 – Training, skill test and proficiency check for MPL, ATPL, type and class ratings, and proficiency check for the BIR and IR' point B. 'Specific requirements for the aeroplane category' FLIGHT TEST TOLERANCE

	Summative Assessment	Formative Assessment
Purpose	Gain evidence of the competencies and performance criteria to be demonstrated with respect to the required competency standard.	Motivate trainees, identify their strengths and weakness and promote learning. Monitor trainee's learning curve.
Applicability	Mixed EBT: after EVAL and MV phase (OPC/LPC). Baseline EBT: after EVAL, and as defined by the operator, after the completion of the module.	Mixed EBT and baseline EBT: EVAL, MV/MT and SBT phase
Result examples	Final outcome (e.g., PASS/FAIL, ready for unsupervised line flying)	Indication of trainee's position on the learning curve
Reference	Regulatory benchmark (Mixed EBT) or company minimum required standards (Baseline EBT).	Positive, demonstrated OBs and identified gaps (missing OBs) as learning opportunities. e.g. how to get a grade 5 (exemplary performance) as the highest competency standard through the demonstration of the OBs when required.

6.1. Standardising the fundamentals of assessment and grading

The operator should develop grading guidance for the instructors in accordance with AMC1 ORO.FC.231(d)(1) and AMC2 ORO.FC.231(d)(1).

Having said that, the instructor should be standardised to understand the overarching fundamentals of assessment and grading:

6.1.1 The diverging needs of output of assessment and grading for the various stakeholders.
6.1.2 The strong interconnection of the three elements: training event sequence, ORCA-process and grading methodology.

6.1.1. Diverging needs of the output of assessment and grading for the various stakeholders

The training data provided as output of assessment and grading in EBT serve three different stakeholders who have specific and diverging demands. See the following table:

Stakeholder	**Demand on the assessment and grading system**
Trainee	Knows his/her own strengths and weaknesses. Understand how to improve.
Operator	Monitor and ensure the development of the competencies of the individual pilot. ORO.FC.231(a)(2)(ii) Manage training system performance. ORO.FC.231(c) Obtain data for instructor standardisation and concordance ORO.FC.231 point (a)(4) Monitor and compare performance trends by pilot groups (e.g. fleet, rank)

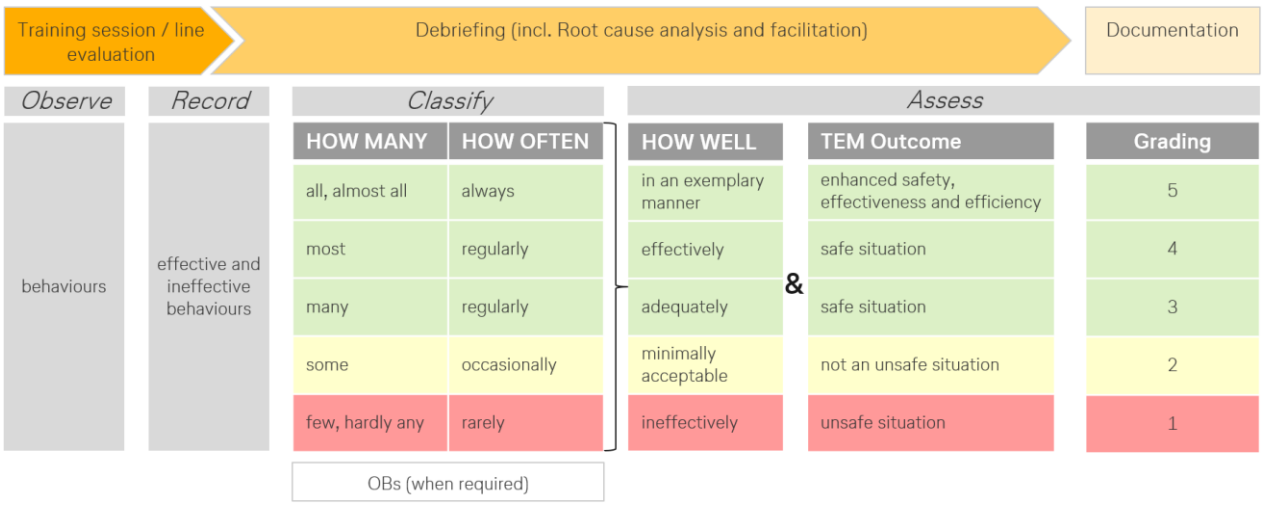
	Validate and refine the EBT programme
National Aviation Authority	Conduct EBT Oversight (non-EBT: Licence Issue, revalidation or renewal of licences)

The specific demands shown in the above table consequentially require the instructor to focus on various feedback messages and data when conducting the assessment and grading:

Stakeholder	**Feedback following an assessment (at the end of ORCA).**
Trainee	Facilitated guidance based on the demonstrated (or missing) OBs; potentially with commenting text (Level 2 and Level 3 grading metrics)
Operator	Numerical competency grades + identification of effective and ineffective performance (demonstrated and missing OBs) for the short and mid-term training needs of the individual Pilot (EVAL: Level 1 and Level 2 grading metrics) Numerical competency grades for statistical trend analysis (training system performance, instructor standardisation and concordance, trend-analysis of pilot group performance (e.g. per fleet, rank …) (Level 0 and Level 1 grading metrics)
National Aviation Authority	EBT Oversight - effectiveness of the operator's EBT programme using primary data related to Level 0 grading metrics.

6.1.2. Training event sequence, ORCA-process and grading methodology

The full understanding of the instructor of the interdependence of training sequence, ORCA and the grading methodology is vital for an effective, valid and reliable competency assessment and the resulting grading. The following diagram visualises how the ORCA process and the grading methodology are embedded in the EBT module (days 1 and 2):



Explanation of the diagram:

1) During the phases of the EBT module (and during the line evaluation), the instructor should initially only ***observe*** the performance of the trainees. Observe means to look at the behaviours while the pilots are performing the tasks and manage the threats, errors and possible undesired aircraft states in the given operational and environmental contexts.

2) Both, ineffective and (outstanding) effective performance should be recorded. The recording should not distract the instructor from monitoring the training progress and the trainees. Short hand-written remarks are usually sufficient and the most effective way to record. No detailed analysis of the behaviour should be done during the session. During the facilitated debriefing trainee's inputs may complement and refine the recorded notes for the identification of root causes.

3) The instructor should take time after the session and usually before the facilitated debrief without the trainees to organize their observations and recordings and relate them to OBs and competencies (classify).

4) Assessment includes the root cause analysis and should always involve the trainee's inputs in a facilitated debriefing. The instructor's notes and considerations will be used in combination with the trainee's reflections on their performance, including their TEM and related behaviour. Analysis of the TEM outcome, the identification of the demonstrated (or missing) OBs are the most effective elements of the feedback process for the trainee. TEM outcome and OBs are interrelated because the OBs serve as countermeasures (Competencies are a mitigation layer to avoid accidents[4]), and should not be assessed and debriefed in isolation. This should be the primary focus for instructors when assessing competency and providing feedback to the trainees.

5) "Root Cause Analysis: In context of EBT "root cause analysis" means the process by the instructor to relate an observed TEM outcome to the competency framework (missing or (exceptionally well) performed OBs)."

6) Grading, at the end of the ORCA process, relates the assessment result to the grading scale (1-5) and generates the training data. For assessments (e.g. at the end of a phase of an EBT module), the resulting grade must match at least the competency standard for each competency as defined by the operator. Grading serves only documentary and training quality assurance purposes which are of primary importance for the stakeholders "Operator" and "NAA". Grades should be of secondary importance for the trainee.

The operator should develop grading guidance for the instructors in accordance with AMC1 ORO.FC.231(d)(1) and AMC2 ORO.FC.231(d)(1).

6.2. EBT Assessment

For the assessment, the instructor should consider the overall performance over each EBT phase (EVAL, MT, SBT), not only at a particular training event. In-seat instruction should not be included in any assessment.

As much as possible, assessment and grading should be based on 'what has happened' (the outcome) and not 'what would have happened' (the potential outcome).

[4] Professor James Reason, theory of human factors - threat and error management model. See more in the book 'Managing Maintenance Error: A Practical Guide (co-written with Alan Hobbs)'.

If the Threat and error Management Model (TEM) outcome is an “unsafe situation”, it can be remediated by training of the relevant competency. If that is not achievable within the same module, the relevant competency should be graded as 1.

“Unsafe situation” means a situation, which has led to an unacceptable reduction in safety margin. (Definitions in GM15 Annex I and ICAO Doc 9995).

Correlation between “Undesired States”, “Unsafe situation” and “outcome”

According to ICAO Doc 9868 ‘PANS-TRG’ point 6.7.3, ‘undesired states can be managed effectively, restoring margins of safety, or can induce an additional error, leading to an incident, or accident.’

“Undesired aircraft states” are transitional states between a normal operational state (i.e., a stabilised approach) and an outcome. Outcomes, on the other hand, are end states - “safe situations” or “unsafe situations”.

6.3. Examples for assessment and grading:

The following four examples explain only the assessment focusing on the specific scenarios. When grading a complete phase or phases, an overall performance assessment should be applied following the same principles. Depending on the rest of the training session, the instructor could come to a different assessment outcome.

(A) Non-intentional non-compliance without consequences — trap error (an undetected error or mistake but corrected in a timely manner with a safe outcome)

Example: The crew makes a mistake on the altitude selection, they are busy with other tasks and do not recognise the mistake when it occurs, and therefore do not call ATC to confirm the altitude clearance. However, later and before the level bust, the pilots initiate a dialogue and realise their possible mistake, or one of the pilots, due to his awareness of the route altitudes, realises a possible mistake, which triggers a call to ATC to confirm the altitude and fix the error.

Assessing and debriefing the crew: the competencies PRO and SAW are identified as the root cause. The outcome is not an unsafe situation, as TEM was achieved by adequately applying the required OB’s. Consequently, trainees should be debriefed with a focus on all missing, and all demonstrated OB’s that led to this TEM outcome. Missing OBs: did not confirm with ATC when in doubt of an altitude clearance as required by the SOPs (OB PRO 1.3). Demonstrated OBs: the crew realised that the altitude selected did not make sense with the safe altitude for the route (OBs SAW 7.2, 7.3, 7.4).

In regard to summative grading, PRO may be graded 2, 3 or 4 depending on the rest of the simulator session. The competency PRO will probably not be graded with 5. This does not exclude that other competencies (e.g. SAW) could be graded with 5 based on the evidence of this particular scenario element. As explained above, there could be a number of reasons why PRO will probably not be graded with 5 following the narrative of this example, because the pilots did not confirm with ATC when in doubt of an altitude clearance as required by the SOPs...etc; however, the instructor may be graded with 5 in SAW amongst other reasons because they realised that the altitude selected did not make sense with the safe altitude for the route.

(B) Non-intentional non-compliance with consequences (an undetected error or mistake but corrected in a timely manner with a safe outcome, however, with a reduction in margins of safety[5] associated with an undesired aircraft state), but managed by the flight crew successfully.

Example: the mistake in the altitude selection in the first example was followed by a level bust resolved by a call of ATC or an ACAS flown to a good standard or a GPWS warning followed by an escape manoeuvre performed to a good standard.

Assessing and debriefing the crew: Was there a reduction in the safety margins? Yes, as in this example, the pilots reached an undesirable aircraft state. The outcome, however, was not an unsafe situation as the flight crew timely switched from error management to undesired aircraft state management. Therefore, the consequences were mitigated in a timely manner. The instructor should debrief the crew in regard to:

- the OBs that were not demonstrated when they were required and
- whether the OB's were demonstrated effectively.

- In regard to the summative assessment and grading of the competency PRO the instructor should also ask himself if the crew managed all the situations successfully in all of the events during the simulator session. Assuming that this was the case, the instructor knows that grading with 1 is not possible (the outcome was NOT unsafe), and therefore, the instructor is restricted to four possible gradings (2, 3, 4 or 5). Then the instructor will mentally move to the next step below.
- As the crew did not apply exemplary manner by always demonstrating almost all of the observable behaviours to a high standard when required, it cannot be 5. At this moment in the process, the instructor knows the grading can be neither 1 nor 5 and will move to the next step below.
- Entering into a dangerous undesired aircraft state means that some of the OBs were not demonstrated effectively; therefore, also depending on the rest of the session, grading 4 may not be possible as it requires 'most of' the OBs to be demonstrated effectively. Then, the instructor will mentally move on to the next step below.
- In this step, the instructor will ask himself how well the flight crew managed this situation and other situations in the simulator sessions. Once more, the grading should look at the global picture — that is why it is relevant to assess how well the flight crew resolved the situation of the example but also other situations in the simulator session.
- How well was the situation resolved? Did the crew timely switch from error management to undesired aircraft state management? Did the crew perform the best possible escape manoeuvre? and to a good standard? Depending on the rest of the simulator session, the instructor could grade 3 if the pilot/crew managed the other events in the simulator session in the best possible way and to a good standard. Otherwise, the grading will be 2.

[5] See ICAO Doc 9868 'PANS-TRG'Chapter 6.7 Undesired aircraft states, point 6.7.1 'Undesired aircraft state are characterized by divergences from parameters normally experienced during operations (e.g. aircraft position or speed deviations, misapplications of flight controls, or incorrect systems configurations) associated with a reduction in margins of safety' 'undesired aircraft states must be managed by flight crews'.

(C) Intentional non-compliance but recognised and corrected in a timely manner with a safe outcome.

Example: un-stabilised approach at the stabilisation gate (e.g.,limit 1000ft), followed by a delay of the pilot in the execution of the go-around and well below the stabilised gate.

Assessing and debriefing the crew: was there a reduction in the safety margins? Yes, as in this example, the pilots decided for a go-around at a very late stage. The outcome was, however, not an unsafe situation as the flight crew went around. The instructor should debrief the crew in regard to the OBs that were not demonstrated when required (e.g. PRO 1.2, 1.3, 1.6 and PSD 6.6) and the OB's demonstrated effectively (e.g. LTW 5.10).

– In regard to the summative assessment and grading for the competency PRO identified as root cause, depending on the rest of the simulator session, the probable grading will be 2 and the maximum grading may be 3. The grade 2 is the probable grading because the situation was not unsafe as the pilot executed a go-around, but the pilot did it well below the stabilised gate — meaning the reduction in the safety margins was significant. (i.e. the pilot should execute the go-around no later than the stabilisation gate). It should never be 4 or 5. It should not trigger a grade 1 as there was not an unacceptable reduction in safety margin.

Note: This guidance on grading is not to be used when there is a non-compliance because a higher degree of safety dictates otherwise. There may be other examples for which the operator may need to decide if a higher degree of safety dictates otherwise. For example, the captain decides to take 15 seconds to refresh quickly the go-around actions and warn the first officer to be ready below 500 feet. Another example is when the crew misses the touch-down zone for a bit on a long runway and decides to land instead of going around due to weather in the go-around area.

(D) Intentional non-compliance, not corrected and continued to the end state.

Example; unestablished approach and maintained until landing. In this example, the competency identified as the root cause should be graded 1 (not competent). It can be remediated by training of the relevant competency. If that is not achievable within the same module, the relevant competency should be graded as 1. Furthermore, no other competency of the pilot can be graded with 5.

Note: This guidance is not to be used when there is a non-compliance because a higher degree of safety dictates otherwise (e.g. unestablished approach maintained until landing due to uncontained fire or all engines flame out, etc.).

6.4. DIMENSIONS OF ASSESSMENT AND GRADING

Although AMC4 ORO.FC.231(d)(1) suggests that a mathematical formula (HOW MANY + HOW OFTEN = HOW WELL in context with the TEM outcome) may deliver a satisfying assessment and grading, the above examples (6.3) are a demonstration that the human behaviour may not be assessed mathematically. As demonstrated, the assessment is a combination of all demonstrated and missing OB's that were required and led to an observed TEM outcome. EBT instructors should, therefore,i observe behaviours and assess competencies in a comprehensive way rather than just simple mathematics.

Note: Regarding grades 3, 4 and 5, EASA slightly changed the approach proposed in Opinion No 08/2019, as the industry feedback was that most of the grades were between 3 and 4 and that grade 5 was rarely used. In order to improve the granularity of the grading, the wording has been updated to encourage the industry to have a more even distribution of the gradings.

7. Tips for the oversight - ORCA-process and grading methodology

It happens that, at the same time, operators have established guidance[6] for instructors to grade pilots; the actual practice of such policy is not ensured. That means the ORCA methodology is not always followed. Here are some examples that may jeopardise compliance with ORCA, and which should be corrected:

- Instructors are using the list of OBs as a checklist. Some instructors, especially in countries with strong, compliant cultures, the instructors may use the list of OBs as a checklist. This practice should be avoided, and instead, the OBs should be used as a link to the observed performance of the competency (see GM2 ORO.FC.231 (d)(1) point (a)(1)(ii)).
- The operator has no means to ensure instructors are following the ORCA process. Sometimes, instructors invert the ORCA process and perform reverse engineering to justify the grade they have in mind instead of following the ORCA process, which requires grading only at the end of the process. Although training (standardisation iaw AMC2 ORO.FC.146(c)) is one of the mitigation measures to avoid such issues, there are other mitigations that operators may implement to know about the implementation of ORCA and be aware of their strengths and weaknesses, for example:
    - by having a simulator observations programme where an observer (e.g. a EBT core group instructor, a trained observer, or third party EBT consultant, etc.) is introduced in a few sessions every year to raise ‘observations’ in a de-identified way and monitor the actual implementation of the EBT philosophy (like a LOSA programme for SIM).
    - by implementing a system where the whole ORCA flow is under one platform. Usually, the system offers the script of the simulator session and means for the instructor to take notes of their observations with an electronic pencil or predicted keyboard to facilitate instructors head ups. Once the simulator is finished, it means to help instructors to start the classification of their recorded observations into EBT observable behaviours; it is important that the system is designed in a way that avoids using the list of OBs as a checklist. It should also help the instructor to transfer each OB into the corresponding competency. Finally, an evaluation and grading page to complete the ORCA process. Such systems provide the whole ORCA flow and simulator information (i.e. simulator script) under the same platform, helping the instructor to follow the methodology in a standardised way and provides the operator with some insights on how the ORCA process is implemented (e.g. by providing de-identified information whether the instructor used the facilities provided by the system);

[6] See AMC1 ORO.FC.231(d)(1) point (c) & AMC2 ORO.FC.231(d)(1) point (c) ‘The operator should develop further guidance to the above points to help the instructors determine the grade of the pilots they assess.

- by means of a survey to the students (pilots) after the simulator session, asking them if, under their view, the instructor followed the ORCA methodology and grading policy. The data of such survey must be taken with care, as regular pilots do not have a full understanding of ORCA;
- by means of a survey of the instructors themselves. For data reliability, a strong non-jeopardy culture must be implemented in the operator.

- Instructors are recording all behaviours instead of recording only the behaviours that are non-standard, in other words, instructors should record the behaviours that are above the norm or those that are below the standard. To mitigate the practice of recording all behaviours, standardisation training, simulator observations, and electronic systems are suitable tools to ensure appropriate ORCA implementation.
- Incorrect classification of behaviours (e.g. instructor grading a competency and then justifying the OB – reverse engineering – instead of classifying OBs and then grading), which leads to a lack of opportunity to apply the VENN model (i.e. questions how many and how well may not be responded correctly).

Thus, the authority should ask how the operator is ensuring that the ORCA process and its guidance in grading are correctly implemented.

8. FACILITATION. An instructional method used in CBTA

What does 'facilitation' mean as an instructional method in CBTA?

'Facilitation method' refers to an active training method, which uses effective questioning, listening and a non-judgmental approach, and is particularly effective in developing skills and attitudes, assisting trainees in developing insight and their own solutions, resulting in better understanding, retention and commitment. (ref. (EU) No 965/2012 GM19 Annex I Definitions)

Why is the Facilitation instructional method so important in CBTA?

There are three main reasons why the facilitation method is instrumental in CBTA:

1. As an educational principle, any training that aims at an attitude or behavioural change will be less effective through telling and explaining than by enabling trainees to find out an adequate behaviour themselves.

   CBTA extended the traditional training of aviation personnel beyond a pure task-based focus towards developing a set of competencies and associated observable behaviours. While skills, as one element of the behaviours, can be effectively trained in isolation by traditional methods (show/tell/explain, etc.), complete behaviours are much better developed when the instructor triggers the trainee's capacity for self-analysis, which allows the trainee to find the answers by himself/herself.

2. Any training event should prepare and enable the trainees to self-assess their performance. This prepares them to develop their performance in day-to-day operations outside the learning environment. The aim of training by facilitation is to trigger an intuitive practice by the trainees so that they are able to assess and 'grade' themselves spontaneously, even without an instructor or examiner being present.

3. Facilitation during the debriefing of a training event may support the instructor in the root cause analysis of certain outcomes of crew activity or behaviour and address the correct

competencies. Such facilitation is particularly useful if the instructor considers a variety of possible triggers for observed crew behaviour.

How does the facilitation method relate to other instructional methods?

EASA Pilot Instructor/Evaluator competency "Instruction" (IEC3, 3.4) requires that instructors apply instructional methods as appropriate (e.g. explanation, demonstration, learning by discovery, facilitation, in-seat instruction).

The facilitation method is more effective than the method of showing and telling because the pilot's involvement and experiences are actually part of the learning process.

Further difference between facilitation and other recognized instructional methods is the amount of support a trainee can expect from the instructor. Three levels of instructor support (low, medium and high) have been defined and correlated to the recognized instructional methods as follows:

Level of instructor support	Low	Medium	High
Instructional method	- Discover without assistance - Facilitation	- Discover with assistance - Facilitation	- Explain (Tell) - Demonstrate (Show)

Facilitation may be relevant for low to medium levels of support, depending on the trainee's needs. The conditions related to the amount of support a trainee can expect from the instructor shall be defined for each training event.

What are the prerequisites for effective facilitation?

Traditional methods (Show, Tell, Demonstrate, etc.) target a **direct** execution by the trainee. Facilitation triggers an **indirect** execution (the trainee is encouraged to find his own solution and then execute it).

Therefore, the first crucial prerequisite for effective facilitation is the instructor's capability to model a desired output into questions and a dialogue to stimulate the trainee's understanding and own commitment. The better the instructional questioning and listening, the more effective the trainee's understanding, execution and retention.

Facilitation requires enough time to allow mental processing by the trainee. Therefore, facilitation should be the preferred method during briefing and debriefing of a training event. It should, however also be used during the training event itself when feasible. The instructor should, therefore, control the session progress in a way that allows facilitation whenever possible.

What are the techniques for an effective facilitation method?

Facilitation can be characterized as a dialogue between instructor and trainee(s) where the instructor establishes and leads a dialogue, whereas the trainee(s) talks most and develops insightful answers to reinforce or develop the underlying crew behaviour of a demonstrated performance.

The instructor should mostly use "open questions" as opposed to "closed questions"; this will help in establishing the dialogue. Example for a closed question:

Do you feel the communication in the flight deck was good?

This will likely trigger a *"yes/no"* answer, requiring another question from the instructor to be able to deepen in that matter. Transforming the same question to an open one:

"How would you evaluate the communication in the flight deck today?"

Such a question should prompt a response that will oblige the trainee to self-reflect and asses his communication level achieved.

Furthermore, after the trainee has qualified his communication competency as *"good"* or *"not so good",* a question asking for an example will further deepen into the conversation:

"So, what made your communication work well today?" or *"What seemed to be the problem at the time of communicating?"*

Such questions can even be directed to a specific student in order to gain a controlled response by the crew member that was actually communicating well.

The use of silence by the instructor and pauses after asking questions is a recognized communication skill that will prompt more and better responses from students during facilitation. One second may not be enough time for learners to develop a thoughtful response. Studies show that waiting about 3-4 seconds…

- Substantially improves the number and quality of responses.
- More voluntary comments from the group, increased interaction and number of questions.
- Increases the number of responses from slower or quieter individuals.
- Decreases the number of unanswered questions.

It is important; however, during moments of silence, the instructor looks relaxed, not anxious or impatient; he/she sits with a relaxed posture and smiles as silence otherwise can feel uncomfortable and be interpreted as hostile by the trainees. [7]

If at any time during the training event or during briefing or debriefing when facilitation is actively being applied and the responses by the trainees don't follow the expectations of the instructor, he/she always has the option to revert to a higher level of support to the point where telling and explaining can be reincorporated until students and instructor feel it is again feasible to reduce the level of assistance. In other words, there should always be a plan B if facilitation does not work at a certain stage, by doing this, the instructor will recover the sense of control.

A good measuring scale for the instructor to quickly asses the level of facilitation that has been achieved is to actively think who is doing most of the talking. If the instructor is talking more than the students, then the level of facilitation achieved is low, and the instructor should try to put the focus of the conversation again on the students.

How can we prepare the pilot for an effective facilitation during debriefing?

The instructor should advise the trainees **during the briefing stage** of a training event that it is expected that the pilot(s) will actively perform the facilitated debriefing, which in practice means that most of the talking should be done by the trainees.

A sample introduction, following the guidelines of "Facilitating LOS Debriefings: A Training Manual" (McDonnell, Jobe, & Dismukes, 1997), that the instructor may use as a tool to explain this technique to the trainees (who might be unfamiliar with the facilitation method), would be as follows:

[7] Lori K. McDonnell, Kimberly K. Jobe, R. Key Dismukes. NASA Technical Memorandum, TM-112192. Facilitating LOS Debriefings: A Training Manual. Document ID: 19970015346. NTRS - NASA Technical Reports Server. Publication Date: March 1, 1997. Copyright: Work of the US Gov. Public Use Permitted.

"How much you learn from the LOS (Line Oriented Simulations) depends on discussing it afterwards:

Analyzing the situations that confronted you; analyzing what you did to manage those situations, evaluating how well it worked out, and identifying anything you might want to do differently. It is very important that you make this analysis on your own. We all know how much more we learn when we work something out ourselves than when we listen to a lecture about it, especially if it concerns our own performance. So, if you are expecting a lecture from me, forget it!.
I realize that debriefing yourselves may be new to you, so I will act as a guide and help you get started. I encourage you, however, to take the initiative instead of waiting for me to raise issues. …please analyze what happened, what you did to manage the situation, and why you did it that way. What was the most difficult aspect and why? What CRM issues were involved, and what CRM techniques did you use? We are...."

Link between ORCA grading methodology and facilitation:

During the training event, the ORCA process runs in parallel to instruction. Facilitation is one method of instruction. As described in the ORCA process, the instructor should limit him/herself during the training session to **observe** and **record** behaviour. The OBs and the competency matrix **should not** be used at this stage of the training as there is no time for the instructor to conduct the session realistically and effectively while identifying all root causes for all OBs at the same time. Attention should be focused on the conduct of the training (or checking) at this stage by applying the EASA Pilot Instructor/Evaluator competencies following the applicable instructional methods.

Once the training session is complete, the **classification** stage begins. The instructor will then take sufficient time (see next section below) to reflect on their notes and identify which are the learning opportunities derived from that training based on the trainee's performance (effective or ineffective). Linking the performance of observed behaviours by trainees (previously observed and recorded during the session) to the standardized OB´s of the competency matrix is crucial at this classification stage. Facilitation at the classification-stage may support the instructor in the root cause analysis of certain outcomes of observed crew activity or behaviour and to address the correct competencies.

Once the classification of behaviour is complete and the instructor feels confident, he will then conduct the final stage of the ORCA process correctly, the **assess or evaluate phase** and document the grading.

Operators should therefore make sure this "mental model path" is used by instructors following the correct sequence.

1. First **observing** and **recording** evidence during the session,
2. Then analyzing and **classifying**, (reaching conclusions of performance & learning opportunities) based on the outcome (this may be complemented by facilitation in the debriefing stage).
3. Conducting the final assessment and documenting the grading based on all data and information.

It would be a mistake to perform this sequence the other way around; by first reaching grading conclusions (potentially biased by expectations and assumptions) and then looking for proof to justify the already previously-assumed grading (grade). Applying the Facilitation method during the session and the debriefing will help avoid such mistakes.

Debriefing rostering recommendations for the operators and time management:

The operator should provide proper debriefing time to allow the pilots and instructors to have a proper facilitated briefing. Debriefing is not just completing the paper work. Facilitated debriefing takes time.

Observed and recommended practice in some operators is to have the instructor reflect on the session (e.g. review and organise instructor notes, prepare the debriefing, prepare the classification (ORCA), identify key learning objectives,..etc) while the trainees go "for a coffee". The briefing time in the presence of the trainees can then be used more effectively for a facilitated debriefing. The operator should provide sufficient debriefing time to allow the pilots and instructors to have a proper facilitated debriefing. .. The minimum recommended allocated time for a facilitated debriefing is 1 hour. This time could be increased depending on the circumstances and type of session conducted.

Summary

	Traditional Training Method	Facilitation Method
How does the instructor communicate?	Telling, Showing, Demonstrating	Enabling the trainee to find the solution himself/herself.
What is the aim?	Transfer of knowledge, development of skills	Develop insight and self-analysis to find the solution or a behavioural change.
Who knows the subject?	Instructor	Instructor and Trainee
Who has the experience?	Instructor	Instructor and Trainee
What is the relationship?	Authoritarian	Equal
Who sets the agenda?	Instructor	Instructor and Trainee
Who talks the most?	Instructor	Trainee
What is the timescale?	Finite	Infinite
Where is the focus?	Instructor - task	Trainee – performance and behaviour.
What are the instructor's thoughts?	Judgmental	Non-Judgmental
How is the progress evaluated?	Graded observation	Guided self-assessment and formative assessment

Conclusion

The facilitation method is, therefore, the most essential instructional method for EBT training. Sound theoretical knowledge and standardisation of this method, followed by repetition and time, will improve its outcome and effectivity throughout the pilot community as instructors, trainees, and pilots achieve confidence in the technique.

Awareness of the effectivity of developing skills and attitudes, by assisting trainees in developing insight and their own solutions, will support the cultural change that the operator needs to achieve and enforce when implementing EBT.

9. INSTRUCTOR CONCORDANCE AND GRADING SYSTEM (ORO.FC.231(a)(4) and ORO.FC.231(d)(1)).

EASA identified that, during the early implementation of mixed EBT, the competencies 'application of procedures' (PRO) and/or 'application of knowledge' (KNO) normally have the lowest grading in the

airlines. The EBT manager should determine whether this information is genuine or not. For that purpose, Line Operations Safety Audit (LOSA), consultancy and other tools available in the industry could guide the EBT manager in determining the accuracy (veracity) of the grading results (PRO and/or KNO lowest grading). If the airline determines that its pilots have high standards in PRO and/or KNO, then there may be two possibilities to explain the lower grading in PRO and/or KNO:

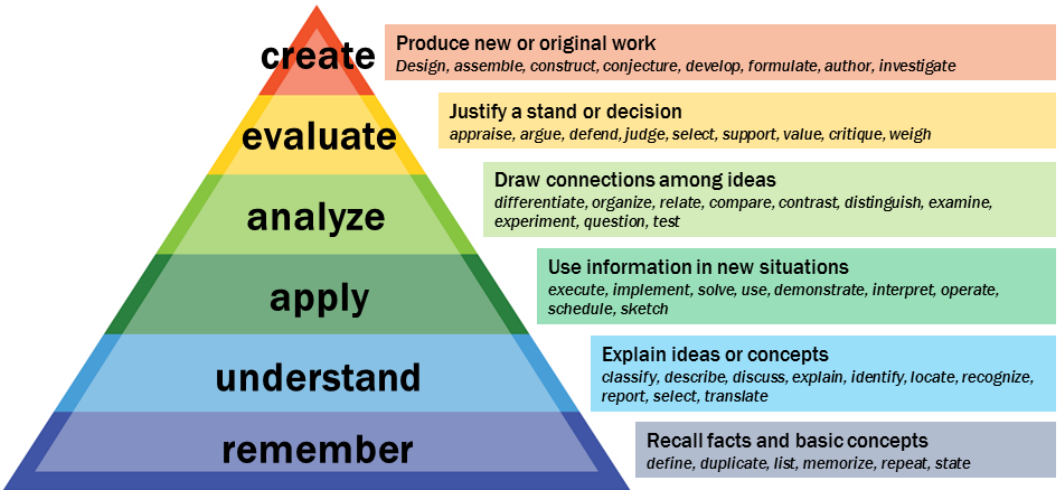
- The instructors have a wrong understanding of the OBs and grading provisions. Normally, this is not the case, as the instructors have recently received the EBT instructor course (this text pertains to new implementations of mixed EBT). The EBT manager should verify whether the instructors clearly understand the guidelines for grading provided by the airline.
- The instructors identify the 'training needs' wrongly. This mistake is common in some of the airlines starting mixed EBT. Why do the instructors tend to grade PRO or KNO lower than the rest of competencies?
    - Every competency is constructed with knowledge, skills and attitudes. Knowledge is, therefore an element of every competency; this confuses instructors, and if they are not careful, they will grade KNO or PRO lower than they should. Example: due to distractions, a captain forgets to switch the anti-ice system on several times. The instructor should normally identify the root cause as 'workload management' (WLM), or if the pilot was flying manually, it might be a problem of 'flight path management — manual control' (FPM) or both competencies (see 'distraction' in the Obs). However, when the instructor is new to EBT, they may give a lower grade to PRO instead. Why? becausee in the traditional system, the instructor should probably give a lower grade to PRO. This is usually not correct in EBT (that is why the facilitated debriefing is so important: to understand why the pilot forgot the anti-ice system). Note: If the pilot did not know the procedure, giving a lower grade to PRO is correct.
    - As explained in the comment to AMC1 ORO.FC.231(b) (competency framework), the competencies are linked. For instance, a pilot should first have FPA and/or FPM to build the competency of WLM. Then, the pilot can have 'thinking time' and construct 'problem-solving and decision-making' (PSD). Therefore, the instructor should always have in mind the argument of referring back to KNO or PRO as they usually are at the basis of the competency pyramid. The instructor should know where to stop the root cause analysis; otherwise, all problems would be attributed to KNO.

10. AMC1 ORO.FC.231(i) point (a)(3) — SELECTION OF THE METHOD AND TOOL — LEARNING OBJECTIVES AND TARGET GROUP RECEIVING PERFORMANCE-BASED CONTINUOUS GROUND TRAINING.

The selection of appropriate methods and tools for proper ground training delivery must be driven by answering two questions. WHO needs to be trained? WHAT needs to be trained (learning objectives)? Training topics that need further explanation or are optimally learned through discussions within a group, should be delivered by providing classroom training or web-based interactive sessions. When selecting the method and tool, operators should be driven by the desire to achieve the optimum outcome, which is the maximum possible knowledge increase. An example of a matrix for each question is provided below:

Learning objectives – What needs to be trained?

1. [Blooms taxonomy][8] Remember - Understand - Apply - Analyse - Evaluate – Create;



2. [pragmatic] Knowledge/first overview – deeper understanding – competencies/able to perform;
3. [pragmatic] Awareness/information – understanding/ knowledge – change of behaviour/performance.

TARGET GROUP – Who needs to be trained?

1. Learning preferences
2. Learning routines
3. Learning & media competencies
4. Level of expertise/experience
5. Job role and responsibility
6. Demographic/cultural characteristics
7. Access to media/resources.

11. DATA MANAGEMENT.

Use of level 1 and level 0 grading metrics.

Level 1 grading metrics (grade 1 to 5 each competency) is recommended for EVAL and SBT (Unless just culture and the necessary non-jeopardy environment during training phase (e.g. MT, SBT) may be compromised). In addition, the operator should allow the instructor to grade "not observed" when grading competencies.

> **Not observed VS Intentionally left in blank.**
>
> 'Not observed' is used by the instructor. During the analysis of the EBT data, 'not observed' provides, amongst others, good insights of the programme design or insights in the instructor standardisation or both.

[8] Input provided by Helen Heenan on the basis of: Krathwohl, D.R. (2002) "A Revision of Bloom's Taxonomy: An Overview" Theory Into Practice, 41(4), pp. 212–218. Available at: https://doi.org/10.1207/s15430421tip4104_2 . Picture from Vanderbilt University Center for Teaching.

'Competency left in blank' is intentionally used in programme design to prevent the instructor from grading certain competencies. It expresses that the programme intentionally offers NO opportunity to observe the competency left in blank. For example:

- When instructors grade competencies in the MT, which is a skill retention phase, and therefore it focuses on only some of the competencies.
- When instructors conduct a tailored training session focusing on only a competency/ies; it usually happens when the design of such tailored training does not follow LOFT scenarios (e.g. FPM).

Note: ´Competency left in blank´ is not used at programme design when the competency grading is a combination of the EVAL + MT/MV(only in EBT mixed), as the EVAL should provide opportunities to observe all competencies, which means the combination of EVAL + MT/MV grading should have no 'competency left in blank' by design.

Although the following practice is not recommended for the EVAL, when the operator performs an overall simulator grading (additional to level 1 of each competency), it should be a single level 0 grading metric (competent or not). As we already have a 5-point scale (level 1 grading metric) for the competencies, it should have a binary approach applied to the overall grade of the session. It would not be recommended to increase the granularity of this overall grade above that of a binary scale; as it will lead to significant complexity in deciding upon the grade for the instructors and incompatibilities between the level 1 grading made for each competency and the single grading of the overall simulator session resulting in contradictions in concordance. For example:

Binary overall grade system:

PRO	COM	FPA	FPM	LTW	PSD	SAW	WLM	KNO	**OVERALL GRADE**
1	2	2	3	3	3	3	3	3	**NOT COMPETENT**
2	3	2	3	2	3	3	3	3	**COMPETENT**
3	3	5	2	4	3	3	2	5	**COMPETENT**

5-point overall grade system (not recommended):

PRO	COM	FPA	FPM	LTW	PSD	SAW	WLM	KNO	**OVERALL GRADE**
1	2	2	3	3	3	3	3	3	**1**
2	3	2	3	2	3	3	3	3	**2 or 3?**
3	3	3	3	3	3	3	3	3	**3**
3	3	5	2	4	3	3	2	5	**2,3,4,5?**

Chapter to be further developed:

- Management.
- Quality. Include Concordance.
- Taxonomy – Line evaluation of competency.

12.ADMINISTRATIVE ACTION FOR THE REVALIDATION OF LICENCES (PART FCL) under EBT Baseline.

FCL.740.A includes that the completion of the EBT practical assessment shall be done in the 3 months immediately preceding the expiry date of the rating

(a) The completion of an EBT Practical assessment includes:
  (1) the assessment of pilot performance either in a simulated or an operational environment and
  (2) the administrative action, which includes the completion of the Appendix 10 form.

(b) Therefore, point (1) may be performed before the 3 months immediately preceding the expiry date of the rating as long as point (2) administrative action is completed within the 3 months.

Appendix 10 form includes the confirmation that the pilot has completed the operator's EBT programme, these requirements can be found in ORO.FC.231 and include, as a minimum, the completion of the EBT modules (minimum two EBT modules), a valid line evaluation of competence and the completion of the ground training.

SECTION II: other safety promotion material

Section II provides information on the basis of being nice to know.

1. CHAPTER 1 – Definitions for terms used in Annexes II to VIII of Regulation (EU) 965/2012 (PART- DEF)

Chapter 1 provides additional information on terms and definitions in Annex I including GM to Regulation (EU) No 965/2012.

Behaviour

This term has been transposed from ICAO Doc 9995.

It is important to highlight the wording in the definition section. GM19 Annex I (Definitions) reads 'capable of being measured'; this does not mean that the observer may be able to measure it, as the observer has obvious technical or human limitations that may prevent the measurement of the behaviour.

Conditions

This definition in GM19 Annex I (Definitions) has been introduced because it is frequently used in the context of competencies and observable behaviours. The definition has been transposed from the working paper to ICAO Doc 9868 'PANS-TRG', AN-WP/9237 Appendix A page A3 'preliminary review of proposed amendments to Annex 1 and the Doc 9868 'PANS-TRG' following its Amendment 5 with additional proposals developed by the 'competency-based training and assessment task force'.

Competency

The definition in Annex 1 has been transposed from ICAO Doc 9868 'PANS-TRG' TRG Amendment 5.

Competency-based training

The definition in Annex 1 has been transposed from ICAO Doc 9995 'Manual of evidence-based training' first edition:

ICAO extract from Doc 9995*: '**Competency-based training.** Training and assessment that are characterized by a performance orientation, emphasis on standards of performance and their measurement and the development of training to the specified performance standards.'*

Competency-based training and EBT — use of the wording 'assessment and training'

The wording 'assessment and training' instead of 'training and assessment' is used, because it reflects better the model used in EBT. EBT is used for airline pilots, who are current on type. Therefore, the phases of EBT focus first on assessment, to then develop the competencies in the subsequent phases of training.

The traditional use of the phrase 'training and assessment' is appropriate for initial type ratings and initial issues of licences where the pilots are not yet proficient, and they need to acquire a new type rating. In these cases, the sequence of 'training' first and then 'assessment' is appropriate.

Competency framework

The term 'identified competencies' has been used in the definition of Annex 1 to refer to the competencies the operator must choose to develop a competency framework (e.g. the nine

competencies of EASA that include the eight competencies of ICAO Doc 9995[9] plus 'Application of Knowledge'). These competencies are also called 'core competencies'.

The definition is based on the Doc 9995 definition of 'core competencies': **'**Core competencies. A group of related behaviours, based on job requirements, which describe how to effectively perform a job and what proficient performance looks like. They include the name of the competency, a description, and a list of behavioural indicators'.

'Unforeseen threats and errors' has been used to provide a link to resilience, as the concept of resilience is very important to aviation safety.

Competency

The definition in Annex 1 has been created based on:

— Amendment 175 to ICAO Annex 1 'Personal licensing'; and

— ICAO Doc 9995.

The ICAO Doc 9995 references used were:

— '7.8.5.1 To be competent in any job, a person requires a certain amount of knowledge, an adequate level of skills, and a particular set of attitudes'.

— '7.8.5.4 To be competent, a pilot requires capabilities across a range of knowledge, skills and attitudes (KSA)'.

Equivalency of malfunctions

The definition in Annex 1 has been created to clarify the rules of equivalency of malfunctions. It is a new definition, which is not included as definition in ICAO Doc 9995 AN/497 'Manual of Evidence-based training', third edition, 2021.

Evaluation phase

The evaluation phase is the first look assessment of competencies to identify individual training needs. On completion of the evaluation phase, any areas that do not meet the minimum competency standard will become the focus of the subsequent training. Further guidance to the definition in the IR is provided in the GM.

Evidence-based training

The definition has been transposed from ICAO Doc 9995.

Facilitation technique

Primary technique that should be used for competency-based training and assessment, including EBT.

In-seat instruction

Effective monitoring and error detection are increasingly important when operating highly reliable, automated aircraft. Multiple data sources illustrate substantial rates of undetected error. Error management is reported as a very significant countermeasure in current operations with one accident

[9] ICAO Doc 9995 AN/497 'Manual of Evidence-based Training', first edition, 2013.

study espousing that it is the most significant tool available to pilots for the prevention of accidents. Furthermore, multiple data sources show that there is a high level of intentional non-compliance and so any error management strategy must include greatly reducing its incidence. Error management skills are subject to decay. Error management currently does not form part of any strategy developed through the regulation of flight crew training; consequently, it is lacking in most training programmes. It is a key topic and needs to be incorporated into training strategies in order to raise flight crew situation awareness and further develop the professional capabilities of pilots.

When in training, flight crews are usually highly vigilant, and therefore the performance observed may not be representative of performance in normal routine operations. After extensive discussion, the worldwide international subject matter experts (SMEs) group that developed material for ICAO Doc 9995 concluded that an effective means to provide reliable exposure in FSTD training is to use a method called in-seat instruction (ISI). This is also an effective means to provide effective training in UPRT; data from loss of control – in flight (LOC-I) events regularly indicate a cognitive impairment of the pilot flying (PF), with the pilot monitoring (PM) often demonstrating a higher level of situation awareness (SAW). When the PF does not immediately respond to and act on monitoring calls, the PM takes control and recovers the aircraft. This approach is supported by both Airbus and Boeing in their guidance for recovery in FSTD training, and it has been integrated within the EBT programme.

Instructor concordance

The definition has been based on the ICAO Doc 9995 definition of inter-rater reliability.

Inter-rater reliability is a term not easily translated into all the languages of the European Union; therefore, a synonym for inter-rater reliability was used: ‘concordance’.

In statistics, inter-rater reliability, inter-rater agreement, or concordance, is the degree of agreement among raters.

Line-orientated flight scenario

The definition has been based on the ICAO Doc 9995 definition of line-oriented flight scenario.

Manoeuvres training phase

This is not a real-time training but allows crews the time to practise and improve performance in largely psychomotor skill-based exercises. Repositioning of the flight simulation in order to focus training on the intended manoeuvres will be a commonly used FSTD feature for this phase. The objective of this type of training should be communicated to the trainees to enssure acceptance.

Mixed EBT programme

The definition proposed has been inspired by ICAO Doc 9995 Chapter 4.2, paragraph 4.2.1, point (b).

‘(b) Mixed implementation. Implementation of a mixed EBT programme means that some portion of a recurrent assessment and training is dedicated to the application of EBT. This is a means of achieving a phased implementation where, for example, the CAA regulations or rules permit such a programme as part of the operator’s specific training and assessment, but preclude such a programme for the revalidation or renewal of pilot licences. This phased implementation recognizes the potential for such an EBT programme to be developed and implemented in advance of any future enabling regulatory changes, which may then permit total implementation.’

Monitoring

Monitoring is the fundament of threat and error management. Monitoring is embedded in the competency framework provided in ORO.FC.231, and its observable behaviours ~~indicators~~ are spread out in different competencies.

Observable behaviour

The definition has been transposed from the ICAO Doc 9841 definition. However, it has been slightly amended to express the idea that although the observable behaviour is 'capable of being measured' as per the definition of 'behaviour', the instructor may be unable to measure it. This limitation (being unable to measure a behaviour) occurs due to the obvious technical or human limitations of the instructor. In other words, it is very difficult to observe and measure 'all' and 'every single' behaviour that occur in an aircraft or in a simulator of aircraft for a long period of time (e.g. 8 hours of a module).

Performance criteria

The definition has been transposed from ICAO working papers for Doc 9868 'PANS-TRG'.

Practical assessment

Although ICAO Doc 9995 follows an approach where summative assessment is performed at the end of the evaluation as follows:

'3.6.2 The evaluation phase of each module will periodically be the focus of licence renewal or revalidation and may ultimately be the means by which Licensing Authorities continue to ensure that competence is maintained to hold a professional licence and type rating as applicable.',

ICAO Doc 9868 'PANS-TRG', Third Edition, published in November 2020 contains paragraph 4.4.1.2.2 which is moving the summative assessment, that otherwise would be made in the evaluation phase, to the end of the module. This ensures that no pilot is allowed to fly if found NOT competent.

Below is an extract of ICAO Doc 9868 'PANS-TRG'

'4.4.1.2 Assessment methods

4.4.1.2.1 The primary method for assessing performance is the conduct of practical assessments, which should serve to verify the integrated performance of competencies. It may be necessary to supplement practical assessments with other forms of evaluation. The supplemental evaluations may be included as a result of regulatory requirements and/or a decision that these methods are necessary to confirm that competence has been achieved.

4.4.1.2.2 Practical assessments take place in either a simulated or operational environment. There are two types of practical assessment: formative assessments and summative assessments. Formative and summative assessments are conducted based on 4.6.6 and 4.6.7.

4.4.1.2.2.1 Formative assessments

4.4.1.2.2.1.1 Formative assessments are a part of the learning process. Instructors provide feedback to the trainee on how they are progressing toward the interim or final competency standard. This type of assessment enables the trainee to progressively build on competencies already acquired and should aid learning by identifying gaps as learning opportunities. If trainees receive feedback or are assessed only at the end of the training, they will have no opportunity to use that information to improve their

performance. The frequency and number of formative assessments may vary depending on the duration of the training and the syllabus structure and its assessment plan (see 4.6).

4.4.1.2.2.1.2 Formative assessments should serve to:

a) motivate trainees;

b) identify strengths and weaknesses; and

c) promote learning.

4.4.1.2.2.2 Summative assessments

4.4.1.2.2.2.1 Summative assessments provide a method that enables the instructor/assessor to work with a trainee to collect evidence of the competencies and performance criteria to be demonstrated with respect to the interim or final competency standard(s). Summative assessments are carried out at defined points during the training and/or at the end of training. During summative assessments, the decision is either 'competent' or 'not competent' with respect to the interim or final competency standard(s). However, this can be further developed into a more refined grading system with a scale of judgements to improve feedback for the trainee and training personnel.

4.4.4.1.2.2.2 Summative assessments that are conducted during the course to evaluate the progress of the trainee are typically carried out by the instructing team. It may be advantageous if the instructors conducting these assessments were different from the instructors who routinely work with the trainee. Summative assessments conducted at the end of training and that lead to the issue of a licence and/or rating have both legal and safety implications. Therefore, the personnel carrying out these assessments should have the necessary competencies to assess objectively and meet the authority's requirements. Such personnel should be provided with the tools necessary to collect evidence in a systematic and reliable manner in order to ensure inter-rater reliability.

4.4.1.2.3 The list of methods below that supplement practical assessments is not intended to be restrictive. Any suitable supplemental method for assessing competence may be used. Other methods may include projects and group assignments.'

Scenario-based training phase

The definition of SBT has been based on the following ideas:

— Wherever possible, consideration should be given towards variations in the types of scenarios, times of occurrences and types of occurrences, so that the pilots do not become overly familiar with repetition of the same scenarios.

— Variations should be the focus of EBT programme design, but not left to the discretion of individual instructors in order to preserve programme integrity and fairness.

The definition has been based on ICAO Doc 9995 Chapter 3.8:

'c) Scenario-based training phase. This phase forms the largest phase in the EBT programme, and is designed to focus on the development of competencies, whilst training to mitigate the most critical risks identified for the aircraft generation. The phase will include the management of specific threats and errors in a real-time line orientated environment. The scenarios will include critical external and environmental threats, in addition to building effective crew interaction to identify and correct manage errors. A portion of the phase will also be directed towards the

management of critical system malfunctions. For this programme to be fully effective, it is important to recognise that these predetermined scenarios are simply a means to develop competency, and not an end or 'tick box' exercise in themselves'.

Train-to-proficiency

This text has been based on GM15 Annex I on UPRT and is referred to within the context of EBT.

2. CHAPTER 2 – Authority requirements for Air Operations (PART – ARO)

ARO.OPS.226 Approval and oversight of evidence-based training programmes

This IR contains the approval and oversight provisions to ensure a safe EBT programme. The provisions follow the concept already described in:

— point (a)(2) of ARO.GEN.200 regarding the training and qualification of the inspectors;

— the associated AMC2 ARO.GEN.200(a)(2) point (a) as regards the initial training programme for the instructors; and

— AMC4 ARO.GEN.200(a)(2)) concerning inspector qualification for CAT operations.

The requirements on training in ARO.OPS.226 are further developed in AMC1 ARO.OPS.226(a).

As regards the general structure of the rule, ARO.OPS.226 has been based on the new proposed rule ARO.OPS.225 as proposed in Opinion No 02/2020 on fuel schemes.

ARO.OPS.226 point (c)(1)

Due to the complexity of the EBT programme and the necessary maturity that the operator needs to demonstrate to ensure a good implementation of EBT, EASA decided to require the resolution of level 1 findings before approving EBT baseline. This is in line with the proposal of the RMG which agreed with the text 'resolution of significant findings'.

ARO.GEN.350 provides a definition of level 1 finding.

'ARO.GEN.350

(a) (…)

(b) A level 1 finding shall be issued by the competent authority when any significant non-compliance is detected with the applicable requirements of Regulation (EC) No 216/2008 and its Implementing Rules, with the organisation's procedures and manuals or with the terms of an approval, certificate, specialised operation authorisation or with the content of a declaration which lowers safety or seriously hazards flight safety. The level 1 findings shall include:

(1) failure to give the competent authority access to the facilities of the organisation in accordance with point ORO.GEN.140 of Annex III (Part-ORO) to this Regulation, or for balloons operators in accordance with points BOP.ADD.015 and BOP.ADD.035 of Annex II (Part-BOP) to Regulation (EU) 2018/395, during normal operating hours and after two written requests;

(2) obtaining or maintaining the validity of the organisation certificate or specialised operations authorisation by falsification of submitted documentary evidence;

(3) evidence of malpractice or fraudulent use of the organisation certificate or specialised operations authorisation; and

(4) the lack of an accountable manager.(…)'

ARO.OPS.226 point (c)(2)(ii) wording 'EBT programme suitability'

The wording refers to ORO.FC.231:

'The operator may substitute the requirements of ORO.FC.230 by establishing, implementing and maintaining a suitable EBT programme approved by the competent authority.'

AMC1 ORO.FC.231(a) provides a more detailed presentation of the suitability of an operator's EBT programme.

The terms 'suitability' and 'suitable', as well as terms similar to them, are used across the Air OPS Regulation (and the associated AMC and GM) more than 300 times. Furthermore, the term 'suitability' is used more than 50 times including the IR. For instance, in CAT.GEN.MPA.175 we read the phrases 'suitability of the flight crew in respect of the work environment' and 'psychological attributes and suitability of the flight crew'.

ARO.OPS.226 point (c)(2)(iii)

EBT programmes require extensive use of data and suitable records systems.

This is already required by the operator as per ORO.GEN.220 and ORO.MLR.115; therefore, it has been overseen in the past.

However, for the initial approval, the competent authority should verify that the operator is compliant as EBT will increase the workload and usability of the record-keeping system; therefore, this may be a first indication of an operator's maturity to implement EBT.

The wording used 'the adequacy of the operator's record-keeping system, in particular with regard to flight crew training, checking and qualifications records' refers to ORO.MLR.115 points (c) and (d) and the related AMC1 ORO.MLR.115, GM1 ORO.MLR.115(c), and GM1 ORO.MLR.115(d).

ARO.OPS.226 point (c)(2)(iv)

This provision allows the competent authority to access pilot grading results. This already applies today and EBT will not change the current situation. The competent authority is allowed to access the pilot records (ORO.GEN.140 'Access') to verify 'the suitability of the operator's grading and assessment scheme'.

Furthermore, the access to records and grading data for the verification of the grading system is also recognised at ICAO level (see ICAO Doc 9379 'Manual of Procedures for Establishment and Management of a State's Personnel Licensing System' (Part I: General principles and organization Chapter 2 - The Licensing Authority, paragraph 2.8 Record-keeping)).

ARO.OPS.226 point (d)

The periodic oversight plan follows the following principles:

— A performance-based safety objective is provided in the IR.

— A more detailed criterion is then provided in the associated AMC1 ARO.OPS.226(d) 'Approval and oversight of EBT programmes OVERSIGHT PLAN — PERIODIC ASSESSMENT TO VERIFY THE COMPLIANCE OF THE EBT PROGRAMME'

— Then, GM addressing an important criterion that competent authority should oversee is developed — GM1 ARO.OPS.226(d) 'EFFECTIVENESS OF THE OPERATOR'S EBT PROGRAMME'.

The provision is linked to another IR (ARO.GEN.350) that provides a reference when continuing compliance is not ensured.

'ARO.GEN.350

(1) In the case of level 1 findings the competent authority shall take immediate and appropriate action to prohibit or limit activities, and if appropriate, it shall take action to revoke the certificate, specialised operations authorisation or specific approval or to limit or suspend it in whole or in part, depending upon the extent of the level 1 finding, until successful corrective action has been taken by the organisation.'

The intent of this rule also includes the need for the competent authority to have periodic observations of the training session; however, this requirement has not been included as AMC2 ARO.GEN.305(b) already provides for such a requirement:

'AMC2 ARO.GEN.305(b) Oversight programme

PROCEDURES FOR OVERSIGHT OF OPERATIONS

(…)

(b) Audits and inspections, on a scale and frequency appropriate to the operation, should cover at least:

(1) infrastructure,

(2) manuals,

(3) training,

(…)

(c) The following types of inspections should be envisaged, as part of the oversight programme:

(1) flight inspection,

(2) ground inspection (e.g. documents and records),

(3) training inspection (e.g. ground, aircraft/FSTD),

(…)'

Point (b) normally means a desktop audit (documentation), and point (c) normally means visit/inspection; therefore, observation of the training session.

ARO.OPS.226 point (d) wording 'EBT programme'

The term 'EBT programme' referred to in the rule is also contained in ORO.FC.231 point (a) 'EBT programme'. While the table of assessment and training topics is a generic programme for an aircraft generation, the 'EBT programme' is specific to a particular operator and it encompasses all the requirements contained in ORO.FC.231 from point (a) to point (i).

The 'EBT programme' is an approved programme for CAT aircraft. The reason for this approval is the existing provision ORO.FC.145 point (c); thus, 'EBT programme' encompasses an approved process by the competent authority.

ARO.OPS.226 point (d) EBT instructor standardisation

Generally speaking, a good standardisation of the EBT instructors is normally based on three main areas:

(a) Training

(b) Concordance assurance programme. The programme should be functional. In practical terms, this may include the identification from a data point of view of the four types of instructors that may require standardisation: the instructors that grade very high, the instructors that grade very low, the instructors that grade always the standard (e.g. 3), and the instructors whose grading is either very high or very low and with hardly any standard grades.

(c) Guidance of the operator on how to grade

ARO.OPS.226 point (e)

The intention behind the requirement in point (e) is to offer the support and expertise of EASA in regard to EBT to the competent authority when approving and implementing an alternative means of compliance (AltMoC) related to EBT. The intention is NOT to replace the authority in the evaluation and approval of an AltMoC.

Recurrent training of pilots is a critical safety element.

ICAO, IATA and EASA envisage the EBT requirements as a risk-based and data-driven regulation, having the roots of such regulation in the EBT DATA REPORT.

The EBT DATA REPORT is a +600-page document published by IATA in 2014. To fully understand the document, advanced knowledge in data management and statistics, as well as other skills may be required. Normally, a researcher or an accident investigation officer possesses such knowledge — not an OPS inspector. Therefore, the information contained in the EBT DATA REPORT is not always easy to find for a regular inspector.

As the majority of the provisions are linked to a reason, finding or conclusion in the EBT DATA REPORT, the review of the EBT DATA REPORT may be necessary in order to understand the implications of the proposed deviation (AltMoC).

EASA and IATA are currently involved in a revision of the EBT DATA REPORT that should be published in 2022. Furthermore, EASA foresees a continuous process of reviewing the operational risks, identifying findings, publishing an EBT DATA REPORT to then update the table of assessment and training topics (amongst others). This process puts additional pressure on the authorities because the

knowledge of the EBT DATA REPORT is dynamic and has to be updated. This challenge is especially relevant for those authorities that do NOT participate in the development of the EBT DATA REPORT, that is the majority of the authorities in Europe.

Knowledge of the EBT DATA REPORT may only be necessary to:

1- develop the regulatory material for EBT, or

2- help in understanding the impacts of a deviation (AltMoC).

From an efficient point of view, it may be more efficient to transfer the necessary knowledge of the EBT DATA REPORT on a case-by-case basis (AltMoC), from EASA to the authority. EASA already has the required knowledge because it was necessary to develop the EBT regulation. Requiring the authorities of Europe to acquire the same expertise would be neither efficient nor effective.

There may be an additional benefit in this provision, which is to ensure a level playing field in the implementation of EBT.

The only burden for the authority is to send a notification to EASA, which can be done with a simple email.

AMC1 ARO.OPS.226(a)

The intention of EASA is not to substitute the existing requirements in AMC4 ARO.GEN.200(a)(2) regarding the qualification of the inspector for the EBT programmes. On the contrary, the EBT training requirements are additional to those contained in AMC4 ARO.GEN.200(a)(2).

Only the EBT training course is required for inspectors and not the EBT assessment of competence (demonstration). This approach follows the concept already introduced in the regulation for the Fatigue Risk Management System course.

Since the EBT paradigm is mainly under the supervision of the operator, including the licensing issue, the inspector needs to have an accurate understanding of the principles, philosophy and application of EBT concepts, in order to understand the performance of the operator.

The demonstration of the acceptable level of knowledge of the inspector can be achieved through an on-the-job training.

AMC1 ARO.OPS.226(a) wording 'technical training'

The use of the term 'technical training' refers to AMC2 ARO.GEN.200(a)(2) point (a)(11).

'AMC2 ARO.GEN.200(a)(2) Management system
QUALIFICATION AND TRAINING — INSPECTORS

(a) Initial training programme:

The initial training programme for inspectors should include, as appropriate to their role, current knowledge, experience and skills in at least all of the following:

(…)

(11) technical training, including training on aircraft-specific subjects, appropriate to the role and tasks of the inspector, in particular for those areas requiring approvals.'

GM2 ARO.OPS.226(a) Approval and oversight of evidence-based training programmes

The GM provides further details on the learning objective 'acquire the ability to recognise the EBT programme suitability' contained in point (b)(2) of AMC1 ARO.OPS.226(a).

AMC1 ARO.OPS.226(c) Approval and oversight of evidence-based training programmes

This AMC has been introduced to guide the competent authority on the main characteristics of an EBT programme. It may be used by the competent authority to develop checklists for audits.

AMC1 ARO.OPS.226(d) Approval and oversight of evidence-based training programmes

The list has been derived by a read-through of ORO.FC.231 and all ARO.GEN, ARO.OPS requirements for approval and oversight.

Currently the list is supported by an EASA checklists for mixed EBT and EBT baseline implementation that competent authorities may request to EASA in word format, so it is easily adapted to their needs and procedures.

AMC1 ARO.OPS.226(d) points (b) and (c)

Points (b) and (c) should ensure that the competent authority has sufficiently qualified inspectors to oversee the EBT programme. EASA also provided the items that should be reviewed in the periodic oversight plan so that appropriate resources are planned.

AMC1 ARO.OPS.226d(d) point (c)(1)

This means that the operator should demonstrate to the competent authority that it has a method to collect, analyse and act upon the data from the EBT programme. It is expected that this would normally be discussed in regular meetings (the training standards meetings or similar format). Minutes of the meetings should be kept. In the training standards meetings, the operator would review the data and revise the programme as necessary. This is also provided for in ORO.GEN.200(a)(5) of the Air OPS Regulation.

AMC1 ARO.OPS.226(d) point (c)(3) wording 'relevance of the operator's EBT programme'

"Relevance" means that an EBT programme both includes the features contained in AMC1 ORO.FC.231(a) and continuously identifies the operator's operational risks to feed the operator's EBT programme.

There was a discussion in EASA and the RMG whether clarifying 'EBT effectiveness' and 'EBT relevance' was necessary. These are important elements of the EBT programme to verify performance output.

AMC1 ARO.OPS.226(d) point (c)(8)

The competent authority should verify compliance with the provision of record-keeping under ORO.GEN.220 and ORO.MLR.115. Data collection and record-keeping are a key part of the EBT system.

AMC1 ARO.OPS.226(d) point (c)(10) wording 'continuing standardisation of EBT instructors'

This provision includes training and concordance assurance of the instructor.

Verifying concordance should preferably be a data-driven process.

GM1 ARO.OPS.226(d) point (b)

This point has been introduced to guide the competent authority to verify the results of the competencies. Grading results may have variations, and those variations are acceptable. Variations occur for several reasons; for example, due to variations in the difficulty of the EBT programme. Therefore, the effectiveness of the EBT programme should be considered from a holistic view. For instance, a temporary decrease of pilot grading in core competencies does not necessarily mean a lack of effectiveness. Operators designing modules with numerous difficult events could end up in a decrease in the grading results of some competencies and vice versa.

3. CHAPTER 3 – Organisation requirements for Air Operations (PART -ORO)

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

This point has been amended to clarify that the training in the non-operational environment should include both classroom training and computer-based training, while the one in the operational environment includes both FSTD and aircraft when both are available. When the FSTD is not available, then it may only be aircraft.

ORO.FC.146 Personnel providing training, checking and assessment

ORO.FC.146(c)

EBT is a paradigm shift and instructors play a key role in the delivery of the programme. EASA found it necessary to add an EBT course on top of the qualification required in the Aircrew Regulation.

ICAO Doc 9995 requires this training as well:

‘6.3.2 Instructors should undergo suitable training in order to adapt to the needs of training within an EBT programme. Training should provide the framework for existing instructors to develop their competence to undertake EBT assessment and training’.

ORO.FC.146(c) wording ‘hold an Annex I (Part-FCL) instructor or examiner certificate’

The rule restricts the possibility of instructors that hold a certificate issued by a third country to become EBT instructors. By using the wording ‘hold an Annex I (Part-FCL) instructor or examiner certificate’, only instructors or examiners that hold a certificate issued in accordance with the EU regulatory framework can deliver EBT. The reasons for such a provision are the following:

— The EBT programme, being based on competencies, does not have the same prescriptive components as a task-based checking under Appendix 9 to Part-FCL. To ensure standardisation and integrity of the licence revalidation under EBT, EU-regulatory instructor qualification has been mandated.

— To ensure alignment between Part-ORO of the Air OPS Regulation and Part-FCL of the Aircrew Regulation, the requirement of FCL.900 point (c) must be reproduced in Part-ORO. Therefore, only holders of European instructors’ certificates (with a European pilot licence or with a pilot

licence issued by a third country but subject to FCL.900 (c)) are allowed to provide training to European licence holders.

— The instructor qualification requirements in Part-FCL and additional training requirements are provided in Part-ORO. Therefore, the EBT system relies on the prerequisite of instructor qualification and standardisation in Part-FCL. Foreign certificates may or may not provide the same level of qualification and standardisation as that provided in Part-FCL; therefore, EU instructor certificates have been required.

— The level of complexity of the oversight will increase due to the different standards for instructor certificates in the non-EU countries. Furthermore, the national authority performs the oversight of the EBT programme, while EASA performs the oversight of the third-country ATOs. Allowing third-country instructors will overcomplicate the oversight for the national authority.

— Furthermore, the situation where an instructor holding a pilot licence issued by a third country provides training, only occurs when the operator has subcontracted its training to an ATO under ORO.GEN.205. In this situation, the efforts of standardisation are already demanding. Considering that a small number of data derived from non-EU-ATO standardised sources is introduced in the EBT system can have big implications in the results of the programme.

— EASA was concerned that the delivery of the operator's EBT programme could be compromised; since Europe is the first region to deliver EBT baseline, Part-FCL certified instructors may better guarantee the consistency and philosophy of EBT. This is particularly important as at a later stage, initial type rating courses may be subject to EBT.

Note: Individual European certified trainers with a European pilot licence are allowed to provide EBT even if they are not operator or ATO staff members. This is allowed under ORO.GEN.205 on contracted activities.

ORO.FC.146(c) wording 'the operator's EBT instructor standardisation'

EASA was reluctant to allow the EBT instructor to revalidate the EBT instructor certificate under an ATO not belonging to an airline, and therefore the requirements for the assessment have been contained in the operators' requirements. Hence, the revalidation of the EBT instructor certificate requires an operator.

Following the concept already described in Subparts J and K of Part-FCL, the instructors should complete a course to become EBT instructors. This standardisation is composed of a training course and the assessment of competence, which follows the logic of Part-FCL. For example, FCL.930 'Training course', FCL.935 'Assessment of competence', and FCL.940.TRI TRI 'Revalidation and renewal' illustrate the situation for instructor courses and assessment:

AMC2 ORO.FC.146(c) point (a)

'conduct six EVAL or SBT phases of an EBT module (or a combination of both) every 36 months. One of the EVAL or SBT should take place in the period of 12 months immediately preceding the expiry date. The 36-month period should be counted from the end of the month the module was taken. If this has not been fulfilled, the EBT instructor should complete an EBT assessment of competence. When the

module is undertaken within the last 12 months of the validity period, the new period should be counted from the original expiry date;'

Reasons to introduce this provision:

The requirement proposed in point (a) is similar to the existing requirement that must be fulfilled by the examiners. As the EBT instructor is performing 'assessments', there was a consensus in the group to align both requirements due to the social implications.

According to FCL.1025, the examiner must conduct six proficiency checks every 3 years. As a module is equivalent to a proficiency check, the EBT instructor is required to follow the same approach.

Although legacy instructors are required to revalidate only one session in the preceding 12 months, the review group believes that this approach is incorrect due to the challenges associated with EBT. Additionally, EASA believes that more training of the instructors should improve safety.

Finally, the EBT instructor is required to perform a refresher training every year. Therefore, it is reasonable to complete six EBT phases (EVAL or SBT) every 3 years to ensure on-the-job training.

ORO.FC.146(c) wording 'EBT instructor – initial standardisation programme'

The wording in point (a) of AMC1 ORO.FC.146(c) 'EBT instructor initial standardisation programme' is using 'EBT' and also in each of the two parts of it: 'EBT instructor training' and 'EBT assessment of competence', to ensure they are both specific for EBT. The use of 'EBT assessment of competence' is to ensure that the EBT instructor is allowed to revalidate the instructor certificate when the EBT assessment of competence and the assessment of competence for the revalidation of the instructor are combined. EASA was reluctant to allow the EBT instructor to revalidate the EBT instructor certificate under an ATO not belonging to an airline, and therefore the requirements for the assessment have been contained in the operators' requirements. Hence, the revalidation of the EBT instructor certificate requires an operator.

Following the concept already described in Subparts J and K of Part-FCL, the instructors should complete a course to become EBT instructors. This standardisation is composed of a training course and the assessment of competence, which follows the logic of Part-FCL. For example, FCL.930 'Training course', FCL.935 'Assessment of competence', and FCL.940.TRI TRI 'Revalidation and renewal' illustrate the situation for instructor courses and assessment:

'FCL.940.TRI TRI — Revalidation and renewal

(a) *Revalidation*

(1) Aeroplanes. For revalidation of a TRI(A) certificate, the applicant shall, within the last 12 months preceding the expiry date of the certificate, fulfil one of the following 3 requirements:

(i) conduct one of the following parts of a complete type rating training course: simulator session of at least 3 hours or one air exercise of at least 1 hour comprising a minimum of 2 take-offs and landings;

(ii) receive instructor refresher training as a TRI at an ATO;

(iii) pass the assessment of competence in accordance with FCL.935.

[…]'

EASA believes that it must be an operator EBT instructor training. Therefore, the instructor course is operator-specific. However, credits are foreseen in point (d) of AMC1 ORO.FC.146(c) when an instructor has experience in EBT, allowing for a shorter training course.

ORO.FC.146(c)

The sentence 'Completion of the operator's EBT initial standardisation will qualify the instructor to perform EBT practical assessment' has been introduced because in the Aircrew Regulation the instructors do not have the privilege to perform EBT practical assessment. For example, the current FCL.905.TRI.TRI only provides the instructor with a privilege to 'instruct for'.

ORO.FC.146 (c) introduces the link to Part-FCL for the EBT proficiency check in accordance with Appendix 10 (EBT practical assessment). The wording 'EBT practical assessment' provides the link to Appendix 10 point 6 'The EBT practical assessment must be conducted in accordance with the operator's EBT programme'.

The use of 'completion' means also that the instructor successfully passed the instructor standardisation. In ORO.FC.231 (a)(3), this concept is already covered for the module; completion of an EBT module means to complete the programme (syllabi) and reach an acceptable level of performance. The same concept should be used for the instructor standardisation course: 1- the instructor has completed the syllabi for the EBT course, 2- an acceptable level of performance is reached (assessment of competence).

ORO.FC.146(c)(2) wording 'EBT practical assessment'

This wording is a transposition of the ICAO wording 'practical assessment' contained in ICAO Doc 9868 'PANS-TRG' paragraph 4.4.1.2.2.

Furthermore, practical assessment is defined in the new GM to definitions in Subpart ORO.FC.

AMC1 ORO.FC.146(c) point (b)

EBT INSTRUCTOR TRAINING

Point (b) provides the prerequisite for the pilot who delivers the EBT instructor training (ground course). The only prerequisite is that this pilot has completed the EBT instructor training. This pilot does not need to be a qualified instructor under Part-FCL of the Aircrew Regulation.

This requirement is less stringent than the one for the person who delivers the assessment of competence (see requirement AMC1 ORO.FC.146(c) point (g)). The person who delivers the assessment of competence needs to receive an EBT instructor training and be a qualified examiner in accordance with Part-FCL of the Aircrew Regulation.

AMC1 ORO.FC.146(c) point (c)

EBT INSTRUCTOR TRAINING

The syllabus for the EBT instructor training course has been taken from ICAO Doc 9995 and the IATA/ICAO/IFALPA Evidence-Based Training Implementation Guide.

The volume of training of the EBT instructor initial standardisation course is addressed in the new GM1 ORO.FC.146(c).

AMC1 ORO.FC.146(c) wording 'EBT assessment of competence'

The wording 'assessment of competence' has been used for consistency purposes between Part-ORO of the Air OPS Regulation and Part-FCL of the Aircrew Regulation and to allow a combined assessment of the revalidation of the EBT instructor in Part-ORO and the revalidation of instructor's certificate in accordance with FCL.935.

AMC1 ORO.FC.146 (c) point (e) wording 'complete an EBT assessment of competence' versus 'passed an EBT assessment of competence'

The verb 'passed' is usually used in Part-FCL — for example, in FCL.905.FI.FI, FCL.915 and FCL.940.SFI.SFI. On the contrary, in Part-ORO, 'complete' is the one usually used — for example, in ORO.FC.105, ORO.FC.120, and ORO.FC.130. As the rules on EBT are contained in Part-ORO, EASA has decided to use 'complete'.

The assessment of competence has been introduced as an AMC to be consistent with the CRM provision, for which also the assessment of competence is at AMC level. Furthermore, in order to ensure an equivalent level of safety in the case of an application of an AltMoC, ORO.GEN.200 ensures the competence of the personnel.

AMC1 ORO.FC.146(c) point (f) 'validity period of 3 years'

This provision has been transposed from the Aircrew Regulation as regards what applies in relation to instructors' and examiners' validity period.

Furthermore, this provision is also included Doc 9995 paragraph 6.3.5:

'All instructors should receive annual refresher training and be re-assessed in the competencies specified in 6.3.3 every three years.'

The 12-month transition period to complete the assessment of competence has been transposed from FCL.940.TRI TRI — 'Revalidation and renewal' of the Aircrew Regulation.

AMC1 ORO.FC.146(c) point (g)(1)

The requirement was originally transposed from the existing ICAO Doc 9995 and the Explanatory Note to ED Decision 2015/027/R on mixed EBT.

'A person nominated (refer to ICAO Doc 9995 AN/497 'Manual of Evidence-based training' first edition 2013 paragraph 6.3.4) by the operator for the conduct of competency assessments of EBT examiners and instructors should be a person who holds a certificate equivalent to that being assessed, provided that he or she has completed the training and assessment indicated in ICAO Doc 9995 paragraph 6.3'.

That's why point (g) of this AMC uses 'conducted by a person nominated by the operator.'

However, to be consistent with Part-FCL of the Aircrew Regulation and ORO.FC.146(c), a further clarification has been introduced as the ICAO provision does not provide details. Therefore, it requires an assessment of competence performed in the FSTD before receiving the EBT instructor qualification. To maintain legal consistency between the assessment of competence referred to in Part-FCL and the EBT assessment of competence proposed in this provision (OPS), EASA has decided that only personnel holding a certificate with privileges to perform assessment of competence is allowed to perform such an assessment of instructor competence ~~'test'~~. When revalidating an instructor or examiner licence in accordance with the Aircrew Regulation, the provision is already there. Therefore, this requirement

does not add an extra burden to the operators. The only exception to such statement (no extra burden to the operators) would be during the transition period from legacy training to EBT, where the instructor/examiner revalidation may not match with the assessment of competence of EBT required during the initial EBT course. After the transition phase, the operator will roster the instructor/examiner revalidation in combination with an EBT assessment of competence when required.

AMC1 ORO.FC.146I point (g)(1) wording 'is qualified in accordance with Annex I (Part-FCL) to Regulation (EU) No 1178/2011 to conduct an assessment of competence'

This provision has been introduced to ensure that an examiner will perform the EBT assessment of competence.

This provision is already required in the assessment of competence for the instructor in Subpart J of Part-FCL of the Aircrew Regulation.

The intention of EASA is to combine the assessment of competence for EBT and the assessment of competence to revalidate the instructor certificate, thus this provision should not add any further requirement or cost.

Only current examiners are permitted to conduct the EBT assessment of competence. Using NON-current examiners would allow more flexibility, for instance when EBT is introduced for the first time in the airline. This option deviates from the concept of instructor course in Part-FCL of the Aircrew Regulation.

EASA expects that most of the courses for EBT will be combined with Part-FCL instructor courses. Therefore, at the end, the assessment of competence is expected to be performed by a current qualified examiner anyway. Thus, the option of NON-current examiner has been discarded and in order to be consistent between Part-FCL and Part-ORO, EASA has decided that only current examiners will conduct the EBT assessment of competence.

ORO.FC.146(d)

The use of a suitably qualified commander, as in AMC1 ORO.FC.230 (3)(v), has been retained under EBT.

ORO.FC.146(c) AMC2 Personnel providing training, checking and assessment

The wording used has been based on the requirements pertaining to the revalidation for instructors and examiners in accordance with Subparts J and K of Part-FCL of the Aircrew Regulation.

Following the concept above, the revalidation for EBT instructor will be based on the completion of one full simulator session of EBT every 12 months; for that reason, the AMC requires an EVAL or SBT. EASA is aware that this would mean in reality the combination of evaluation plus manoeuvres training/validation (mixed EBT) and a scenario-based training. Additionally, an assessment of competence every 3 years is required.

Point (b) of AMC2 ORO.FC.146(c)) provides the requirement for EBT refresher training. This training may satisfy the requirement of FCL.940.TRI(a)(1)(ii) concerning instructor refresher training, if accepted by the competent authority.

This requirement has been proposed to ensure standardisation of the instructors.

Furthermore, the need for concordance assurance has been introduced considering ICAO Doc 9995 Attachment to Chapter 1 step 9.

9**	Instructor training and standardization.	4.1.1 and 6.3 of Part I	Instructor EBT programme standardisation, which should be a formalized approach to ensure a consistent and standardised approach to the EBT programme prior to implementation, including practical training reinforcing application of the assessment and grading system and maximising inter-rater reliability.

ORO.FC.146(c) Personnel providing training, checking and assessment

The transition to EBT involves a paradigm shift in the focus of training. To maximise the safety benefits of the programme, EBT instructors should be mentored to ensure that practice develops according to the expectations of the operator. EBT instructors delivering a standardisation course should be carefully selected and trained so that the standardisation activity provides the maximum benefit.

The syllabus described in AMC1 ORO.FC.146(c) provides enough granularity for a performance-based rule. Therefore, EASA decided not to include a prescriptive requirement regarding the number of hours needed to deliver the EBT instructor course; instead, the information is provided in point (e) of this GM.

However, EASA acknowledged the novelty of the EBT programme where the instructor training course is a fundamental element. Therefore, it was decided to provide GM that would include some references regarding the length of the EBT instructor course in order to promote a successful discussion between the operator and the competent authority where the focus is on the outcome of the course (provided at the level of the AMC) rather than on the prescription of 14/21/24 hours (provided at the level of GM).

GM1 ORO.FC.146(c) point (c)

The consultation of the NPA showed that the GM needed further amendment to clarify the additional personnel that can deliver the EBT instructor training. Other SMEs (e.g. aviation experts, psychologists, teachers, other industries experts, etc.) can provide valuable resources to enrich the instructor training.

GM1 ORO.FC.146(c) point (e)

Given the paradigm shift in the philosophy of assessment and training of competencies, a nominal value of course duration has been included as a standardisation element.

In order to agree on a figure, EASA reviewed the rules relating to qualification of instructors (e.g. FCL.930 TRI.TRI was consulted). The 14 hours were commensurate with those required for initial qualification of instructors.

Furthermore, the IATA Evidence-Based Training Implementation Guide recommends at least a 3-day course in Appendix B. However, this appendix provides a range of duration for the course between 3 and 5 days.

GM2 ORO.FC.146(c) Personnel providing training, checking and assessment

This GM for the annual EBT instructor standardisation has been developed to clarify the intent of the provision provided in the AMC. The GM provides certain criteria on how to perform the annual instructor standardisation; however, the criteria that may be provided by the competent authority are fundamental, as training is subject to approval under OM part D and revalidations and renewal of licences are performed within an EBT programme.

The authority should exercise its oversight powers to ensure that operators provide the right amount of training and concordance assurance to their instructors.

GM2 ORO.FC.146(c) point (b)

This point of the GM has been developed following the IATA Evidence-Based Training Implementation Guide[10] Chapter 4.1 'The EBT instructor'.

'The development of strong inter-rater reliability and consistency in the approach to EBT is of great importance and should not be underestimated either initially or as a focus for the continuous improvement of an EBT system. Establishing robust guidelines and thorough experience strengthens inter-rater reliability, provided that suitable mechanisms are put in place. Clear and concise instructions, accurate performance indicator descriptions and peer review all increase inter-rater reliability.'

GM3 ORO.FC.146(c) Personnel providing training, checking and assessment

This GM introduces the ICAO Pilot Instructor and Evaluator Competency Framework in EASA. It is based on the work of ICAO and IATA to promote the first competency-based approach for instructors and evaluators and applies to all types of training and checking, not only EBT.

EASA worked on this task with a specific task force that included representatives from the two biggest aircraft manufacturers, two of the most experienced airlines in EBT mixed and other two industry representatives and the Dutch national aerospace centre. The work has been based on the latest amendment of ICAO PNS TRG Doc 9868 third Edition 2020 which entered into force in November 2020.

The original idea to design an instructor evaluator competency set based on the same philosophy that served as the genesis for the pilot competency set: Mastering a defined set of pilot competencies should enable a pilot to perform the routine duties and manage unforeseen situations, which cannot be trained in advance.

Similarly, mastering a set of instructor and evaluator competencies (IECs) should enable an instructor and evaluator (IE) to perform instruction and evaluation duties and manage the full spectrum of assignments, from ground instruction to evaluations in dynamic flight situations.

The competency framework for instructors and evaluators has been developed based on the latest ICAO standards, EU and FAA regulations, and guidance material and best practices from the industry.

The defined set of IE competencies should be applied across all types of training, from licensing to operator recurrent training, and by both operators and ATOs.

[10] IATA Evidence-Based Training Implementation Guide, July 2013, 1st Edition.

Developing both pilot and instructor competencies through a globally harmonised system of competencies will contribute to improved quality of training, enhanced safety and will also increase training efficiency.

This GM defines the IE competencies, provides their descriptions and presents the associated observable behaviours.

The competency framework may be used for instructor selection, initial standardisation, recurrent standardisation and assessment of competence for EBT instructors.

Additional information can be found through the following link:

https://www.iata.org/contentassets/c0f61fc821dc4f62bb6441d7abedb076/guidance-material-and-best-practices-for-instructor-and-evaluator-training.pdf

GM3 ORO.FC.146(c) | Competency 'Management of learning environment'

EASA considered this competency relevant for the instructor course in FCL; however, for the EBT instructor course, it is less relevant because today — 2021 — most of the EBT instructors are already FCL instructors. This may change in the future as more and more instructors become EBT instructors at the same time they become FCL instructors.

GM3 ORO.FC.146(c) iOB 3.2

The term 'objectives' used in the description of iOB 3.2 refers to the relevance of learning objectives and how they apply in operations.

GM3 ORO.FC.146(c) iOB 3.3

To ensure consistency and accuracy of training delivery, operators and ATOs are required to maintain an approved training programme (AMC2 ORA.ATO.125 Training programme). An essential component of an approved programme is instructors' compliance with the approved syllabi contained in the operator and ATO approved training manuals. This OB measures the instructor's compliance with such approved programmes and syllabi.

GM3 ORO.FC.146(c) iOB 3.8

This iOB includes the idea to adjust the training to the trainee's needs. This idea is included in the example (e.g.) and it is an addition to the existing iOB of ICAO.

GM3 ORO.FC.146(c) iOB 4.1

This iOB differs from the one proposed through Opinion No 08/2019. The worked performed by EASA and the RMG in 2019 for the Opinion was based on the early drafts of ICAO. Thus, the ED Decision modified this iOB and others in order to ensure alignment with ICAO.

GM3 ORO.FC.146(c) iOB 4.3

This iOB differs from the one proposed through Opinion No 08/2019. The worked performed by EASA and the RMG in 2019 for the Opinion was based on early drafts of ICAO. Thus, the ED Decision modified this iOB and others in order to ensure alignment with ICAO. iOB 4.3, 'follows the approved training programme', as proposed through Opinion No 08/2019, has been transposed to iOB 3.3 following ICAO Doc 9868.

GM3 ORO.FC.146(c) iOB 4.4

To ensure legal clarity and as for part of the industry it was not clear, EASA has modified iOB 4.4 by introducing 'between the trainees' in the ICAO iOB 'encourage engagement and mutual support'. This was supported by the task force.

GM3 ORO.FC.146(c) iOB 4.5

Although iOB 4.5 'Coaches the trainees' is rather generic and some experts consider that it is already implicit in the whole of the other competencies, EASA and the task force agreed that alignment with ICAO was more important than an amendment of the iOB.

The understanding of EASA is that this iOB includes adult learning.

GM3 ORO.FC.146(c) Assessment and evaluation

Although EASA found neither enough references to assessment nor to evaluation in the iOBs proposed by ICAO, EASA decided to make no changes or very little changes to the iOBs proposed by ICAO in order to ensure worldwide alignment.

GM3 ORO.FC.146(c) iOB 5.7

The term 'summative' has not been transposed. Therefore, the EASA iOB slightly differs from the ICAO proposal.

ORO.FC.231 Evidence-based training

The EBT programme and philosophy are intended to be applied as the means of assessing and training key areas of flight crew performance in a recurrent training system. This is referred to in ICAO Annex 6, Operation of Aircraft, Part I, International commercial Air Transport — Aeroplanes, SARP 9.3, Flight crew member training programmes, and 9.4.4, Pilot proficiency checks. In addition, it is also referred to in ICAO Annex 1, Personnel Licensing, 1.2.5, Validity of licenses.

The EBT programme considers the differences between aeroplane generations by tailoring the recurrent training programme to the aeroplane generation. The paradigm shift proposed under the EBT programme is not simply to replace a set of critical events with a new set, but to use the events as a vehicle for assessing and developing crew performance across a range of competencies. In addition, EBT refocuses onto analysis of the root causes to correct inappropriate actions, rather than (e.g.) simply asking a flight crew member to repeat a manoeuvre with no real understanding as to why it was not successfully flown in the first instance. Finally, it is acknowledged that in today's high-fidelity simulator environment, very sophisticated training tools exist that are often not used effectively, as regulation focuses much more on checking. EBT seeks to redress the imbalance between training and checking. It recognises that an assessment of competence is necessary, but once completed, pilots learn more effectively when being trained by competent instructors to perform tasks and manage events measured according to a given set of observable behaviours (OBs), while not under test conditions.

The data analyses undertaken to support the EBT programme illustrate inadequacies in the perpetuation of historical airline flight training regimes and identify areas in which major change is necessary. They strongly support the implementation of such a change in both the regulation and development of recurrent airline pilot assessment and training. Finally, they identify the areas for improvement, providing the prioritisation of relevant training topics to guide in the construction of suitable EBT programmes.

ORO.FC.231 point (a)(1) wording 'a suitable EBT programme'

AMC1 ORO.FC.231(a) provides a more detailed presentation of the suitability of an operator's EBT programme.

The term 'suitable' is used in the Air OPS Regulation more than 200 times (IR, AMC and GM). In fact, there are many IRs using 'suitable' such us ARO.RAMP.120 '… instructional requirement suitable for the type of training provided', ORO.AOC.100 '… management are suitable and properly matched to the scale and scope of the operation', CAT.GEN.MPA.180 '(…) suitable aeronautical charts for the route of the proposed flight', CAT.OP.MPA.151 'suitable precautionary landing sites', CAT.POL.A.245 '(…) a suitable glide path reference system', etc.

The term 'EBT programme' referred to in the AMC is contained in ORO.FC.231 'Evidence-based training'. While the table of assessment and training topics is a generic programme in an aircraft generation, the 'EBT programme' is specific to a particular operator, and it encompasses all the requirements contained in ORO.FC.231 from point (a) to point (i).

The 'EBT programme' is an approved programme for CAT aircraft. The reason for this approval is the existing provision ORO.FC.145 point (c); thus 'EBT programme' encompasses a process approved by the competent authority.

ORO.FC.231 point (a)(1) wording 'demonstrate its capability to support the implementation'

The EBT training programme is intended to be implemented in phases, from legacy training or other alternate training programmes such as the Alternative Training and Qualification Programme (ATQP) via Mixed EBT to EBT baseline programme in accordance with ORO.FC.231.

Mixed EBT or mixed-ATQP are intended to provide enough experience for an operator to be ready to implement an EBT baseline programme in accordance with ORO.FC.231.

Also, this period should provide the competent authority with enough information on the resources needed to perform oversight of operators implementing an EBT programme in accordance with ORO.FC.231.

This assures a robust and standardised EBT implementation in accordance with ORO.FC.231 across the spectrum of airlines with different levels of experience in and resources for this kind of programmes.

ORO.FC.231 point (a)(1) wording 'equivalent level of safety'

The wording has been transposed from the IR on ATQP (ORO.FC.A.245). The wording 'equivalent level of safety' is also used in other provisions across the Air OPS Regulation (e.g. minimum cabin crew, alternative means of compliance, etc.).

ORO.FC.231 point (a)(2) wording '3 year programme'

'3-year programme' instead of '3-year *cycle*', as provided in ICAO Doc 9995. It has been used because:

(a) the European rules generally use 'programme' instead of 'cycle' (see Part-ORO); and

(b) of the definition of 'cycle' that expresses the notion of a 1-year period. Therefore, if '3-year cycle' is used, it may be confusing.

ORO.FC.231 point (a)(2)(iv) 'evaluation phase'

The evaluation phase should consist of a line-orientated flight scenario during which there are one or more occurrences for evaluating one or more key elements of the required competencies. The root cause/contributing factor should be identified rather than the symptoms of any deficiency.

This is not intended to be a comprehensive assessment of all areas of competency, nor a demonstration of all critical flight manoeuvres.

During the evaluation phase, for any competency observed below minimum:

- specific training needs should be determined; and
- the subsequent SBT includes remediation, and the flight crew member is not released to line flying until an acceptable level of performance is reached.

ORO.FC.231 point (a)(2)(iv) 'training phase'

The intent of the regulator is to complete the training phase after the evaluation phase, while the phases included in the training phase (MT and SBT) can be performed in any order.

Although ORO.FC.232 and the tables of associated AMCs suggests training topics to be addressed in specific phases (EVAL or SBT, or MT separately), some topics can be covered in both MT and SBT phases (e.g. "Emergency descent" in MT or "emergency descent" as part of Automation Management in SBT, or "go around" in MT or "go around" as part of "go around management" in SBT etc.).

As MT and SBT phases constitute the Training Phases, it is possible to assume that one exercise may cover the training requirements for both phases. Provided the most comprehensive excersiced in the MT or SBT is performed. Therefore, exercises may be validated from any training phase (e.g, SBT) to the other training phase (e.g. MT), AS LONG AS ALL TRAINING OBJECTIVES ARE MET.

As an example, for the Emergency Descent, MT enables the manoeuvre to be completed once in stabilised in descent.

	Emergency descent	C	Initiation of emergency descent from normal cruise altitude	CRZ	The manoeuvre is complete once the aircraft is stabilised in emergency descent configuration (and profile). However, if the EBT programme does not include the example scenario element 'emergency descent' in the training topic 'automation management', the emergency descent procedures should be completed and should not stop once the aircraft is stabilised in emergency descent configuration.

For SBT, in the Automation Management training topic, Emergency Descent should be performed until completion of the procedure (according to the operator policy).

Assessment and training topic		Frequency	Flight phase activation	Description (includes type of topic, being threat, error or focus)	Desired outcome (includes performance criteria OR training outcome)	Guidance material (GM) Example scenario elements
			TO APP	inappropriate autopilot usage.	Detect deviations from the desired aircraft state (flight path, speed, attitude, thrust, etc.) and take appropriate action. Anticipate mishandled auto flight system. Recognise mishandled auto flight system. Take appropriate action if necessary. Restore correct auto flight state. Identify and manage consequences.	Engine-out special terrain procedures
			CRZ			Forcing autopilot disconnect followed by re-engagement, recovery from low- or high-speed events in cruise
			CLB			Engine failure during or after initial climb using automation
			CRZ			Engine failure in cruise to onset of descent using automation
			CRZ			Emergency descent
			DES APP			Managing high-energy descent capturing descent path from above (correlation with unstable approach training)
			APP			No ATC clearance received prior to commencement of approach or final descent

As long as the whole procedure is completed, in accordance with the training topic Emergency Descent compliant with SBT and it may credit the Topic for MT.

The same principle may be applied for other MT topics meeting commonality with SBT scenario elements, or approach clustering.

ORO.FC.231 point (a)(2)(iv) 'the validity of an EBT module shall be 12 month(s)'

In any giving moment, the pilot must have a valid module (at least one – usually, the pilot has two valid modules). This requirement is to be seen in conjunction with ORO.FC.130.

On the other hand, in Part FCL, and in order to revalidate pilot licences underAppendix 10, pilots must complete at least two modules within the validity period of their licences. However, it is not required to have two valid modules in order to revalidate. Example: a pilot has a licence expiry date of 31.12.2021 on the basis of the module 1 performed in April 2020, module 2 performed in October 2020 and the administrative process of revalidation in November 2020 as the pilot is within 3 months revalidation period. The pilot may perform the module 3 in April 2021 and the module 4 on 30 of December 2021. From 01.12.2021 until 30.12.2021, the pilot has a valid module (module 2, and later module 3), and therefore, he/she is in compliance with ORO.FC.231(a)(2)(iv) and ORO.FC.130 as required in Part ORO. Even if the October 2020 module is expired; therefore in November and December 2021, only one module is valid (module 3), Part-ORO only requires to have one module valid. However, to revalidate, it is required to complete two modules within the period of validity of the type rating (January to December 2021), which the pilot will do by completing module 3 in April and module 4 in 30 December 2021.

ORO.FC.231 point (a)(2)(iv)(A)

The evaluation phase is a first look to assess competencies, determine training system effectiveness and identify individual training needs. On completion of the evaluation phase, any areas that do not meet the minimum competency standards will become the focus of the subsequent training.

ORO.FC.231 point (a)(2)(iv)(B)

'The training phase shall be conducted in a timely manner after the evaluation phase.'

The intent of this provision is to clarify the need to perform the training phase after the evaluation phase. In addition, the phrase 'in a timely manner' has been introduced to stress the need to define a period in which the training will be provided.

ORO.FC.231 point (a)(3)(i) wording 'type rating'

The use of the term 'type rating' clarifies the expiry date, as the validity of the type rating is up to the end of the month. Therefore, the intention of EASA is to ensure two modules a year (each module composed of two simulator sessions).

ORO.FC.231 point (a)(3)(i) wording 'by a period of not less than 3 months'

EASA consulted ICAO Annex 6 Part I Chapter 9 SARP 9.4.4 'Pilot proficiency checks' where two checks a year are required, performed at least 4 months apart:

> '9.4.4 Pilot proficiency checks
>
> 9.4.4.1 The operator shall ensure that piloting technique and the ability to execute emergency procedures is checked in such a way as to demonstrate the pilot's competence on each type or variant of a type of aeroplane. Where the operation may be conducted under instrument flight rules, the operator shall ensure that the pilot's competence to comply with such rules is demonstrated to either a check pilot of the operator or to a representative of the State of the Operator. Such checks shall be performed twice within any period of 1 year. Any two such checks which are similar and which occur within a period of 4 consecutive months shall not alone satisfy this requirement.'

EASA considers that these checks are not similar, as they are not repetitive training tasks or events, but evaluations in different scenarios. Therefore, a 3-month period is consistent with the European regulatory framework where the OPC in ATQP (ORO.FC.A.245) has a validity period of 6 months with the possibility to do it 3 months in advance.

Usually, the 3 months period in Europe means that if a pilot performed the module on the 1st of July then the pilot would be clear to perform the next module on the 1st of October (i.e. 31 + 31 + 30= 92 days).

Furthermore, according to ICAO Doc 9995, this document is a means of compliance with the Annex 6 SARP 9.4.4.

> 'This manual is intended to provide guidance to Civil Aviation Authorities, operators and approved training organizations in the recurrent assessment and training of pilots referred to in Annex 6 to the Convention on International Civil Aviation, Operation of Aircraft, Part I, International Commercial Air Transport — Aeroplanes, paragraphs 9.3, Flight crew member training programmes, and 9.4.4, Pilot proficiency checks.'

ORO.FC.231 point (a)(3)(i)(B) wording 'acceptable level of performance'

The wording 'acceptable level of performance' has to be defined following the requirements laid down in point (d).

> 'The operator shall use a grading system to assess the pilot competencies. The grading system shall ensure:

(i) a sufficient level of detail to enable accurate and useful measurements of individual performance;

(ii) a performance criterion and a scale for each competency, with a point on the scale which determines the minimum acceptable level to be achieved for the conduct of line operations. The operator shall develop procedures to address low performance of the pilot;'

The reason for not including the word 'minimum' is that the operator may require a level of performance higher than the minimum. The fact that the operator can impose higher requirements to its pilots is accepted today, through the OPC where the operator defines its own level of pilot performance.

Furthermore 'acceptable level' is used already in the Air OPS Regulation both in the IRs and the AMC & GM (e.g. SPA.SET-IMC.105 'an acceptable level of turbine engine reliability is achieved in service by the world fleet').

Note: EASA uses 'acceptable level of competence' when speaking about the EBT programme and 'acceptable level of performance' in the context of assessment of the ~~EBT~~ competencies.

ORO.FC.231 point (a)(4) 'instructor concordance'

It is imperative that instructor concordance is regulated as a core aspect of an EBT programme, and should be held to high standards, as it is one of the most critical drivers of data quality in an EBT programme. Concordance should be required to prevent drift in instructor quality over time, especially in the non-technical competencies.

ORO.FC.231 point (a)(5) wording 'line operations'

The use of the term 'line operations' allows for training flights. At the same time, it restricts line flying when minimum performance is not achieved. EBT is an FSTD programme; therefore, the recommendation is to provide such remedial training in the FSTD. However, the operator is allowed to conduct training flights, and the pilot should be permitted to be trained in flight, assuming the minimum performance for line operations was achieved, for example, when a pilot obtains a grade 2 in application of procedures (PRO). This is especially relevant in small aircraft models, and although most of those models are not yet permitted in EBT, EASA has plans to incorporate them in the future.

The term 'line operations' is used in the Air OPS Regulation, and although no definition is provided, its meaning is obvious.

ORO.FC.231 point (a)(5)

If low performance is observed and there is no immediate opportunity for remedial training (e.g. unforeseen circumstances, sessions separated by several days apart with flight duty in the middle, etc.), the pilot should be removed from line operations until an acceptable level of performance can be achieved.

ORO.FC.231(a) point (f)

General background about the wording 'customisation'

The regulation usually uses the terms 'customised' and 'customisation' in the context of the operator's EBT syllabi. The term expresses the necessity for the adaptation of the table of assessment and training topics that must be performed at operator level. Amongst others, the EBT programme is adapted to the operational risks of the airline, the different type ratings of the operator, the pilot work force, etc.

The term 'tailored' used in GM3 ORO.FC.231(a), point (a)(3), refers to the further 'customisation' of syllabi that is performed at the level of an individual pilot. In order to make a difference between the customisation at operator level (syllabi) and the customisation at individual pilot (individual syllabus), the regulation uses the word 'tailored', using mainly the wording 'tailored training'. Tailored training is required in ORO.FC.231(d) (see the related AMC) and further described in GM3 ORO.FC.231(a) 'Customisation of the EBT programme (syllabi)'.

'Contextualise': The verb 'contextualise' is used for the example scenario elements, where the operator should provide the 'context' (amongst others, weather of the example scenario element, area, route or aerodrome, procedures at the aerodrome (e.g. low-visibility procedures (LVPs)), etc.) of the example scenario elements provided in the table of assessment and training topics.**AMC1 ORO.FC.231(a) point (d)(1)**

The evaluation phase should be design in a way that allows the instructor to identify training needs, therefore allow both pilots to be expose to scenarios that would allow them the opportunity to display all competencies. In other words the combination of example scenario elements in the programme design should cover all the range of competencies in the competency map (at least once).

AMC1 ORO.FC.231(a) point (i)

The wording refers to AMC3 ORO.FC.231(d)(1) 'CONDUCT OF THE GRADING — ORCA', which is the preferred methodology.

AMC1 ORO.FC.231(a) point (j)

This point refers to the EBT instructor standardisation in AMC1 ORO.FC.146(c).

AMC1 ORO.FC.231(a) point (k)

Concordance depends on the number of rating levels used, concordance measures and complexity/ambiguity of scenarios and behaviours.

The acceptance level of concordance can be defined in coordination with experts and the NAA. It can be based on earlier results.

AMC1 ORO.FC.231(a) point (n)

Facilitation is an important element of EBT, thus EASA has introduced this as a provision in the regulatory framework.

AMC2 ORO.FC.231(a) Evidence-based training

Although ORO.FC.231 exempts operators that have implemented the EBT baseline programme from ORO.FC.230 (and consequently from its AMC), the UPRT provisions have been reintroduced through this AMC2 ORO.FC.231(a) due to their importance.

ICAO Doc 9995 has not transposed the latest UPRT requirements of Doc 10011 AN/506 'Manual on aeroplanes upset prevention and recovery training' first edition -2014.

EASA EBT rules today only address recurrent training and checking (ORO.FC.230); therefore, the requirements for the operator conversion course (ORO.FC.220) have not been amended. AMC1 ORO.FC.220&230 is linked to both IRs ORO.FC.220 and ORO.FC.230; therefore, AMC2 ORO.FC.231(a) just acknowledges the need to fulfil the UPRT provisions.

ORO.FC.231(a) EBT programme (UPRT)

UPSET PREVENTION AND RECOVERY TRAINING (UPRT) FOR COMPLEX MOTOR-POWERED AEROPLANES WITH A MAXIMUM OPERATIONAL PASSENGER SEATING CONFIGURATION (MOPSC) OF MORE THAN 19

The purpose of this table is to assist the operator in cross-mapping the requirements of UPRT in AMC1 ORO.FC.220&230 and explain how this objective is achieved in ORO.FC.231 EBT programmes. The example table is a compilation of the tables proposed by two different operators to their authorities.

AMC1 ORO.FC.220&230 Operator conversion training and checking & recurrent training and checking **UPSET PREVENTION AND RECOVERY TRAINING (UPRT) FOR COMPLEX MOTOR-POWERED AEROPLANES WITH A MAXIMUM OPERATIONAL PASSENGER SEATING CONFIGURATION (MOPSC) OF MORE THAN 19 SEATS**		
Current provision in AMC1 ORO.FC.220&230	**Means of compliance in ORO.FC.232 – AMC ORO.FC232**	**Rationale**
(a) Upset prevention training should:		
(1) consist of ground training and flight training in an FSTD or an aeroplane;	Ground training requirements are unchanged. FSTD requirements are included in the EBT programme	Applicability for EBT is determined by aircraft types and variants listed in ORO.FC.231 and only for those for which a suitably qualified FSTD is available
(2) include upset prevention elements from Table 1 for the conversion training course; and	Does not apply to recurrent training and checking	
(3) include upset prevention elements in Table 1 for the recurrent training programme at least every 12 calendar months, such that all the elements are covered over a period not exceeding 3 years.	Equivalent to the 'B' level within the EBT Programme, all items to be completed within the 3-year programme and some elements of UPRT to be included every year.	
(b) Upset recovery training should:		
(1) consist of ground training and flight training in an FFS qualified for the training task;	Included in the EBT programme as upset recovery. All exercises, but especially the ones in Table 2 **RECOVERY FROM DEVELOPED UPSETS**, should not take place during the evaluation phase and it is recommended that they should be done during the manoeuvres TRAINING.	
(2) be completed from each seat in which a pilot's duties require him or her to operate; and		
(3) include the recovery exercises in Table 2 for the recurrent training programme, such that all the exercises are covered over a period not exceeding 3 years.		

AMC1 ORO.FC.220&230 'Operator conversion training and checking & recurrent training and checking'	**Ground training**	**FSTD training**	**Rationale**	**ORO.FC.232 – AMC.ORO.FC.232 - Example – suggested relevant EBT 'training topic and description'**
Table 1: Elements and respective components of upset prevention training				
A.	**Aerodynamics**			

	AMC1 ORO.FC.220&230 'Operator conversion training and checking & recurrent training and checking'	Ground training	FSTD training	Rationale	ORO.FC.232 – AMC.ORO.FC.232 - Example – suggested relevant EBT 'training topic and description'
1.	General aerodynamic characteristics	•			
2.	Aeroplane certification and limitations	•			
3.	Aerodynamics (high and low altitudes)	•	•	Element A is basically fully covered by the mentioned EBT training topics and the exercises required by AMC1 ORO.FC.220&230 in the UPRT part. Aircraft handling at degraded control modes is covered by the malfunction category 'degraded aircraft control' and furthermore covered by component H.6. (Fly-by-wire protection degradations) and should be performed in manual and automatic flight. If aircraft and/or operator-related evidence (e.g. incidents, FDM data) indicates the need to further train a component, aircraft and/or operator-specific exercises should be added in the upset prevention training.	**Automation management** **Manual aircraft control** **Upset recovery** (recoveries at low and high altitude)
4.	Aeroplane performance (high and low altitudes)	•	•		
5.	Angle of attack (AOA) and stall awareness	•	•		
6.	Stick shaker or other stall-warning device activation (as applicable)	•	•		
7.	Stick pusher (as applicable)	•	•		
8.	Mach effects (if applicable to the aeroplane type)	•	•		
9.	Aeroplane stability	•	•		
10.	Control surface fundamentals	•	•		
11.	Use of trims	•	•		
12.	Icing and contamination effects	•	•		**Adverse weather**
13.	Propeller slipstream (as applicable)	•	•		**same as elements A 1-11**
B.	**Causes of and contributing factors to upsets**				
1.	Environmental	•		Deleted from FSTD training with Annex IV to ED Decision 2019/005/R	
2.	Pilot-induced	•			
3.	Mechanical (aeroplane systems)	•			
C.	**Safety review of accidents and incidents relating to aeroplane upsets**				
1.	Safety review of accidents and incidents relating to aeroplane upsets	•		Deleted from FSTD training with Annex IV to ED Decision 2019/005/R	
D.	**G-load awareness and management**				
1.	Positive/negative/increasing/decreasing g-loads	•	•		**Manual aircraft control**

AMC1 ORO.FC.220&230 'Operator conversion training and checking & recurrent training and checking'		Ground training	FSTD training	Rationale	ORO.FC.232 – AMC.ORO.FC.232 - Example – suggested relevant EBT 'training topic and description'
2.	Lateral g-awareness (sideslip)	•	•	Specific exercises related to this element are required in the upset prevention part and have to be performed as PF, as they are not fully covered by the EBT training topic 'Manual aircraft control'	**Upset prevention/recovery** (recoveries according to OEM recommendations at low and high altitudes — where there are indications of g-load, they can be included)
3.	g-load management	•	•		
E.	**Energy management**				
1.	Kinetic energy v potential energy v chemical energy (power)	•	•	Aircraft-specific UPT exercises during conversion course only, as energy management is trained during several EBT training topics	**Manual aircraft control** **Automation management**
F.	**Flight path management**				
1.	Relationship between pitch, power and performance	•	•	Components are fully covered by the mentioned EBT training topics. Components 5 and 6 are represented by identical EBT training topics. If aircraft and/or operator-related evidence (e.g. incidents, FDM data) indicates the need to further train an element, aircraft and/or operator-specific exercises should be added in the upset prevention training.	**Automation management** **Manual aircraft control**
2.	Performance and effects of differing power plants (if applicable)	•	•		**Automation management** **Manual aircraft control**
3.	Manual and automation inputs for guidance and control	•	•		**Automation management** **Manual aircraft control**
4.	Type-specific characteristics	•	•		**Automation management** **Manual aircraft control**
5.	Management of go-arounds from various stages during the approach	•	•		**Go-around management** **Automation management** **Manual aircraft control**
6.	Automation management	•	•		**Automation management** **Manual aircraft control**
7.	Proper use of rudder	•	•		**Failure of the critical engine between V1 & V2** **Engine-out approach & go-around** **Engine failure**

	AMC1 ORO.FC.220&230 'Operator conversion training and checking & recurrent training and checking'	Ground training	FSTD training	Rationale	ORO.FC.232 – AMC.ORO.FC.232 - Example – suggested relevant EBT 'training topic and description'
					Upset prevention/recovery This training can be combined with the Table 2 exercises.
G.	**Recognition**				
1.	Type-specific examples of physiological, visual and instrument clues during developing and developed upsets	•	•	See example scenario elements in the respective AMC for aircraft generation	**Upset prevention/recovery** This training can be combined with the Table 2 exercises.
2.	Pitch/power/roll/yaw	•	•		
3.	Effective scanning (effective monitoring)	•	•		
4.	Type-specific stall protection systems and cues	•	•		
5.	Criteria for identifying stalls and upsets	•	•		
H.	**System malfunction (including immediate handling and subsequent operational considerations, as applicable)**				
1.	Flight control defects	•	•	System malfunction with characteristic 'immediacy' and/or 'management of consequences'	**Automation management** **Manual aircraft control** **Knowledge**
2.	Engine failure (partial or full)	•	•	Identical EBT training topic	**Engine failure**
3.	Instrument failures	•	•	System malfunction combining characteristic 'loss of instrumentation' with 'immediacy' and/or 'management of consequences'	**Automation management** **Manual aircraft control**
4.	Loss of reliable airspeed	•	•	Same as component H.1.	**Automation management** **Manual aircraft control**
5.	Automation failures	•	•	Same as component H.1.	**Automation management** **Manual aircraft control**
6.	Fly-by-wire protection degradations	•	•	Same as component H.1.	**Automation management** **Manual aircraft control** **Knowledge**

	AMC1 ORO.FC.220&230 'Operator conversion training and checking & recurrent training and checking'	Ground training	FSTD training	Rationale	ORO.FC.232 – AMC.ORO.FC.232 - Example – suggested relevant EBT 'training topic and description'
7.	Stall protection system failures including icing alerting systems	•	•	Same as component H.1.	**Automation management** **Manual aircraft control** **Upset prevention/recovery** This training can be combined with the Table 2 exercises.
I.	**Manual handling skills (no autopilot, no autothrust/autothrottle and, where possible, without flight directors)**				
1.	Flight at different speeds, including slow flight, and altitudes within the full normal flight envelope	-	•	Except for components 3 and 5, components are fully covered by EBT training topics, if exercises are flown without autopilot, autothrust/autothrottle and, where possible, without flight directors.	**Automation management** **Manual aircraft control**
2.	Procedural instrument flying and manoeuvring including instrument departure and arrival	-	•		**Automation management** **Manual aircraft control**
3.	Visual approach	-	•		**Manual aircraft control**
4.	Go-arounds from various stages during the approach	-	•		**Go-around management** **Automation management** **Manual aircraft control** **Go-around, all engines operative** **Engine-out approach & go around**
5.	Steep turns	-	•		**Manual aircraft control**

Table 2: Exercises for upset recovery training					
A.	**Recovery from developed upsets**				
1.	Timely and appropriate intervention	•	•	Strongly recommended in Manoeuvres training / ISI phase. Flight crew must be trained as PF and PM.	**Upset prevention/recovery**
2.	Recovery from stall events in the following configurations: take-off configuration, clean configuration low altitude, clean configuration near maximum operating altitude, and landing configuration during the approach phase.	•	•		**Upset recovery** Due to the protections in flight envelope in the 4th generation aircrafts, the take-off upsets can be trained as final APP stall/ Go around
3.	Recovery from nose high at various bank angles	•	•		**Upset recovery**
4.	Recovery from nose low at various bank angles	•	•		**Upset recovery**
5.	Consolidated summary of aeroplane recovery techniques	•	•		**Upset recovery**

AMC8 ORO.FC.232 Evidence-based training

The purpose of this AMC is to allow operators to develop their own scenario elements and competency map to better reflect their operational environment, while maintaining the integrity of the EBT programme. Therefore, the training topics and frequency as per the table of assessment and training topics (AMC2 to AMC7) while the example scenario elements and their associated competency map may be adapted without using the AltMoC procedure (ORO.GEN.120).

This provision is a transposition of the ICAO Doc 9995 Paragraph 1.2.8.

Purpose

To give an indication of the most likely critical competencies required for effective management of the scenario or manoeuvre (considering the management of a threat or combination of threats).

Process

The nominated person for crew training or EBT manager designs one or more example scenario elements, including a description and an outcome. The competency map process is as follows:

The competency map process should be undertaken by SMEs who hold or have held a type rating on the aeroplane type. Steps of the competency map process:

1. Using the description of the scenario element, SME instructors determine the competencies most likely to be required for effective management of the scenario element. Generally, about three competencies may be selected.

2. SME instructors determine which competencies are most likely to be the root cause(s) of poor performance.

Note 1. This is done in teams of instructors, and it is for mapping purposes only. If there is a desire to be more accurate, ask two groups of instructors to review and suggest the competencies following this methodology. Each instructor should use a scale (for example, 1 to 5) for each competency for each scenario element. The following instructors should perform the same analysis independently, and then the results are compared and reconciled by a small group of SMEs.

Note 2. It is always easy to code (SAW) or knowledge (KNO) as underlying competency, but there are almost invariably other competencies, especially when there is ineffective management, so the intent should be to balance the mapping of SAW or KNO and map the other predominant competencies within the scenario.

Note 3: A similar process is described in ‘equivalency of malfunctions’ (see Delphi).

AMC8 ORO.FC.232 point (e)

The intent of this provision is to highlight that the competency map should not drive the instructor’s observations; instead, the instructor should observe the simulator session with a neutral observation, without focusing on the particular competencies mapped and make neutral assessment of all competencies. See also the guidelines for the ORCA process.

For the instructors, the competency map is intended to guide them on what they should expect to observe; however, this does not mean that they should ignore useful learning points for other competencies not mapped within that example scenario.

AMC3 ORO.FC.231(a) Evidence-based training

This content of this AMC has been transposed from AMC1 ORO.FC.230 point (d) with the necessary amendments. It includes the provision to allow CRM training by EBT instructors if they have completed the EBT instructors' standardisation.

This provision must be read in conjunction with ORO.FC.146; therefore, when EBT training is delivered, instructors must be provided with an EBT standardisation course. When other training is provided which is not part of EBT, then only point (b) applies (no combination with ORO.FC.146). A classic example would be 'aerodrome qualification' category C, where a regular instructor would provide such training unless the qualification is delivered in conjunction with the EBT programme.

AMC1 ORO.FC.230 point (d) reads as follows:

'(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 points (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) 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.'

GM1 ORO.FC.231(a)

RECURRENT CREW RESOURCE MANAGEMENT (CRM)
Demonstrating compliance with ORO.FC.115 by integrating CRM requirements into an EBT programme

AMC1 ORO.FC.231(a)(1) points (a) to (e)

EASA believes that the transition from legacy training to EBT requires experience in the use of data, the competency framework, the grading system and instructor concordance assurance.

Furthermore, a clear baseline for the training system performance must be established before any alleviation or competency-based licence revalidation can be achieved.

Finally, the competent authority must be able to transition and observe changes in the operator processes that support EBT. This requires time.

AMC1 ORO.FC.231(a)(1) point (f) and (g)

These provisions have been introduced to ensure equivalency between traditional training and EBT. There is documentation from the regulator, manufacturers and industry that may not be updated until a later stage due to the novelty of the EBT. This issue may be especially relevant when using the OSD, where credits are defined for a number of checks and training (e.g. credits are defined for line check but not yet for the line evaluation of competence). With this provision, the EBT operator is allowed to make use of such credits.

AMC1 ORO.FC.231(a)(1) point (f)

This provision has been introduced because other parts of the regulation refer to 'proficiency check'. For example, in SPA.LVO.120 the low-visibility training provisions have a frequency of 'every operator proficiency check'. Therefore, this provision is needed to indicate that a complete OPC is substituted by a complete EBT module, while an LPC is completed by at least two EBT modules as described in Appendix 10 to Part-FCL.

Furthermore, this provision has been introduced in order to provide clarity in FCL.740 point (a)(3).

> 'A pilot working for a commercial air transport operator approved in accordance with the applicable air operations requirements who has passed the operators proficiency check combined with the proficiency check for the revalidation of the class or type rating shall be exempted from complying with the requirement in (2)'.

The wording 'complete' is to ensure alignment with the current regulation — for example:

> 'ORO.FC.230 Recurrent training and checking
>
> (a) Each flight crew member shall complete recurrent training and checking relevant to the type or variant of aircraft on which they operate.
>
> (b) Operator proficiency check
>
> (1) Each flight crew member shall complete operator proficiency checks as part of the normal crew complement to demonstrate competence in carrying out normal, abnormal and emergency procedures.[…]'

AMC1 ORO.FC.231(a)(2) Evidence-based training

This AMC has been developed considering the existing GM5 ORO.FC.115 Crew resource management (CRM) training, RESILIENCE DEVELOPMENT.

'Resilience' is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events as defined by the US National Academies of science, engineering and medicine.

'Surprised': (adjective) caused to feel surprise, amazement or wonder, or showing an emotion due to an unexpected event.

'Unexpected': (adjective) not expected, anticipated or foreseen. Considered unlikely to happen, not to occur soon. Is used for events and behaviours that occur without warning.

'Unpredictable': unforeseeable; cannot say ahead of time. Is used for events and behaviours that are difficult or impossible to predict or foresee.

The operator can train its pilots for the unexpected so they show resilience when they need it ('Expect the unexpected'). In order to increase resilience, EBT needs to include the development of confidence and competence in recognising and recovering safely from undesired aircraft states. Resilience can be practised by starting small and growing into a more difficult situation.

AMC1 ORO.FC.231(a)(2) point (b)(2)

The experts consulted by EASA did not reach a consensus on where to include the training of the 'dilemma'; include it together with resilience or include it as a separate item related to decision-making.

The fact is that there are numerous studies and articles related to:

— resilience and decision-making; and

— resilience and ambiguity (dilemma).

Furthermore, ambiguity and decision-making are clearly related and there are many studies and research that also relate decision-making with resilience. While some experts believe that EASA should allocate ambiguity with 'decision-making', other experts believe it should be included in 'resilience'. EASA has taken the decision to include it in resilience.

GM2 ORO.FC.231(a)(2) This GM clarifies and complements the table of assessment and training topics regarding ISI.

EASA has agreed that some elements in the ICAO baseline programme classified as frequency A in ISI and regarding 'example scenarios' and 'competency map' are incorrect.

In addition, regarding the training topic 'monitoring, cross checking, error management, and mismanaged aircraft state', ICAO Doc 9995 titles the topic as in-seat instruction (ISI). EASA believes there is an inconsistency because ISI is a means to deliver a training topic and not a training topic (see definition of ISI). Therefore, ISI has been removed from the training topics. Furthermore, the IATA EBT Data Report does not identify that the means and the only means to deliver such topic (monitoring, cross-checking, error management, mismanaged aircraft state) should be ISI.

It also has to be noted that effective monitoring and error detection as well as error management, mismanaged aircraft state, compliance and cross-checking topics are also embedded in the observable behaviours. This way, they are present in all the EBT FTSD sessions, and any observance of deficiencies should be taken as a learning opportunity, identifying the root cause/contributing factor, and discussed during the subsequent 'facilitated debriefing'.

AMC1 ORO.FC.231(a)(3) Evidence-based training

The intent of the development of this AMC is to maintain the integrity of the EBT programme.

The EBT programme will be the means to revalidate pilots' licence: the revalidation will not be based on a single simulator event but instead on multiple simulator events. This requires clarity as to when the pilot joined the EBT programme. Normally, this will occur in the operator

conversion course where an EBT module (equivalent to an OPC) is planned. This provision also has relevance in the cases of long-term sickness or long leave of absence where the pilot discontinued the training programme.

AMC1 ORO.FC.231(a)(3) point (a) wording "commences"

This wording is interpreted as pilots enrolled on the EBT programme in the first minute of the EVAL in their first EBT module.

AMC1 ORO.FC.231(a)(3) point (c)

Due to the novelty of the EBT concept, EASA has found necessary to inform the pilots in the event they fail to demonstrate an acceptable level of competence. The provision has been transposed from Part-FCL with the necessary amendments to fit Part-ORO:

> '(FCL.740.A point c) Applicants who fail to achieve a pass in all sections of a proficiency check before the expiry date of a class or type rating shall not exercise the privileges of that rating until a pass in the proficiency check has been achieved.'

The provision has been moved to AMC because the same requirement has been transposed in FCL Appendix 10 into an IR.

> 'FCL.1030 Conduct of skill tests, proficiency checks and assessments of competence
>
> (..)
>
> (b) After completion of the skill test or proficiency check, the examiner shall:
>
> (1) inform the applicant of the result of the test. In the event of a partial pass or fail, the examiner shall inform the applicant that he/she may not exercise the privileges of the rating until a full pass has been obtained. The examiner shall detail any *further training requirement and explain the applicant's right of appeal; (…)'*

AMC1 ORO.FC.231(a)(3) point (c) wording 'acceptable level of competence'

The intent of EASA was to use acceptable level of competence when it relates to the overall EBT programme and use the wording 'acceptable level of performance' when it relates to the assessment of the competencies. In other words, to demonstrate an acceptable level of competence in the EBT programme, the pilot shall demonstrate an acceptable level of performance in the EBT competencies.

GM1 ORO.FC.231(a)(4) Evidence-based training

Safety promotion material — appropriate metrics

The following material has been developed to explain the intent of the wording used in the IR 'appropriate methods and metrics', and other concepts used in this regulatory proposal:

AMC1 ORO.FC.231(a)(5)

The purpose of this AMC is to outline some of the most common and general contingency procedures that an operator may encounter.

It is important to note that this AMC does not specifically address how to manage the three-month separation period when creating contingency procedures. The implementation rule (IR)

ORO.FC.231(a)(5) permits this option. Therefore, the requirement to maintain a three-month separation between modules may not apply when developing and implementing this AMC. As a result, operators may need to use the exemption provided in ORO.FC.231(a)(5).

AMC1 ORO.FC.231(a)(5) point (b)(1) wording 'unless the performance observed was below the minimum acceptable level'

EASA intent is to allow line operations as long as the observed performance of the pilot was acceptable, provided that the pilot is still in the validity period of the licence. However, if unsafe performance was observed prior to an interruption, the candidate should not continue line operations until remedial training has been provided.

There is a similar provision in Part-FCL where pilots shall not exercise the privileges of their licence if the LPC was failed even if their licence is still within the validity period.

Description of 'performance observed was below the minimum acceptable level' is provided in GM2 ORO.FC.231(d)(1) on RECOMMENDED GRADING SYSTEM METHODOLOGY — VENN MODEL.

GM1 ORO.FC.231(a)(5) Evidence-based training

The GM has been drafted following AMC1 ORO.FC.231(a)(5) and the existing AMC1 FCL.740(b)(1) 'Validity and renewal of class and type ratings'. AMC1 FCL.625(c) IR — 'Validity, revalidation and renewal' has been also considered.

ORO.FC.231(b)

Why is there a need to require a competency framework?

Mastering a defined number of competencies should allow a pilot to manage most of the situations in flight. The main benefit of a competency-based approach to training is its potential to encourage and enable individual aviation professionals to reach their highest level of operational capability while ensuring a basic level of competence as a minimum standard. This approach is supported by the study of MAN4GEN.

Legacy training and checking, and ATQP vs EBT

The major difference between ATQP and EBT lies in the approach taken to identify the KSA for the successful performance in the job. ATQP and traditional training (Appendix 9) focus on a task-based approach of the pilot role by identifying the job-related tasks (and subtasks), which are then used to identify a list of KSA required for successful pilot performance. On the other side, the EBT approach starts with the performance indicators of exemplary pilots to define an official list of observable behaviours (see list of OBs in the EBT competency framework) to then group them in competencies (see list of the EASA EBT competency framework. Through this process, the nine EBT competencies are related to effective or superior performance. Therefore, the question is not which KSA are required to perform the tasks of an airline pilot (ATQP approach), but which KSA do superior performers airline pilots possess and use independently from associated tasks (EBT approach).

Principles of a competency framework

— The purpose of competency-based assessment and training is to assess and train the capacity of an individual to perform at the standard expected in an organisational workplace.

— There is an explicit link between competencies and training, required performance on the job, and assessment.

— Competencies are formulated in a way that ensures they can be developed, observed and assessed consistently in a wide variety of work contexts for a given aviation profession or role.

— Each stakeholder in the process (including the trainee, instructor, training organisation, operator and regulator) has a common understanding of the competency requirements.

— Clear performance criteria are established for assessing competence.

— Evidence of competent performance is valid and reliable.

— Instructors' and assessors' judgements are calibrated to achieve a high degree of inter-rater reliability.

— The assessment of competencies is based on multiple observations across multiple contexts.

— A relevant competency framework is clearly defined for a particular role.

— To be considered competent, an individual demonstrates an integrated performance of all the required competencies to a specified standard.

Assumptions

All tasks performed by aviation professionals require the application of a relevant set of competencies.

— Aviation professionals apply the same set of competencies in a given role throughout their career but with different degrees of performance.

AMC1 ORO.FC.231(b) Evidence-based training

ICAO implemented a new competency model in November 2020 (see State letter 18-77 - Annex 1 and ICAO Doc 9868 'PANS-TRG' following its Amendment 5). The new competency model of ICAO is based on the original competency framework published in ICAO Doc 9995; however, it is not the same.

Background of the competency framework

The original competency framework has been developed by a large industry expert working group and has been based upon systems tested and validated in operational use.

The availability of a worldwide-harmonised framework of competencies is of great value. This competency framework can be applied to both baseline and enhanced EBT programmes. It may even be used for conventional training in parallel to the traditional standards (Training by CBTA principles).

Pilot core competencies were developed to support the EBT concept adopted by ICAO in 2013. An international industry working group was established in 2007. The Group began work in early

2008 and was mostly comprised of expert practitioners in pilot training from almost 50 organisations worldwide. The Group met every 2 months from early 2008 until the end of 2011.

The Group decided that the first and critical step in the development of EBT was to identify a complete framework of performance indicators, in the form of observable actions or behaviours, usable and relevant across the complete spectrum of pilot training for CAT operations. These competencies and performance indicators combine the technical and non-technical (CRM) knowledge, skills and attitudes that have been considered essential for pilots to operate aircraft safely, efficiently and effectively. The development of pilot core competencies was considered as the first important step towards the creation of the 'total systems approach to training'.

After extensive consultation and discussion, the framework of behaviours was developed, divided into eight core competencies, each with observable performance indicators. The competencies were published in ICAO Doc 9995. The core competencies are primarily an assessment tool, offering a different approach from the evaluation of outcomes and manoeuvres, the purpose being to understand and remediate root causes of performance difficulties, rather than addressing only the symptoms.

The purpose of these performance indicators is to underpin the creation of performance expectations at all stages of training in a pilot's career. To complete the picture, a fair and usable system of grading performance is also required, and instructors using it should be trained and assessed themselves as competent in its use.

The publication of ICAO Doc 9995 limits the applicability of EBT to recurrent training conducted in a qualified FSTD, but it has been always anticipated that the example framework of core competencies agreed should be applied to all aspects of initial and recurrent pilot training for CAT operations, including pilot selection and instructor pre-selection.

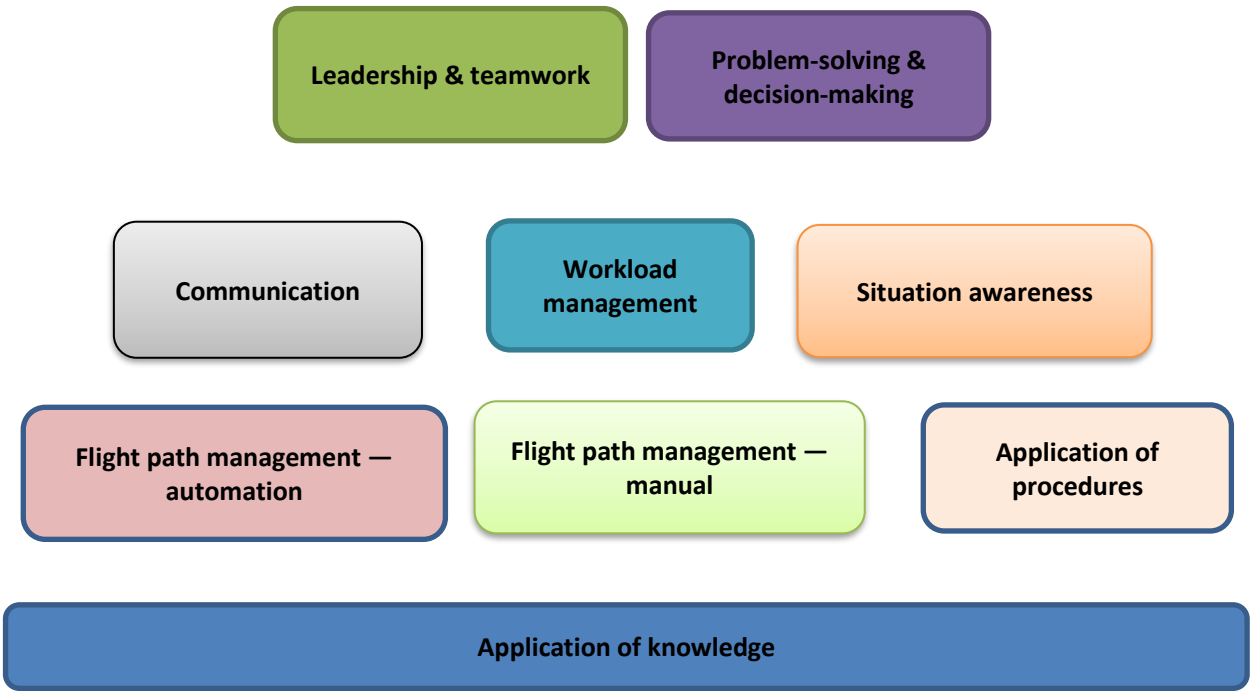
A number of 'behavioural marker' systems were considered, and the Group chose the most relevant and appropriate ones and developed them further to include technical competencies and associated performance indicators.

The behavioural marker system used was the one published by the UK CAA in CAP 737 in 2005, in service across a wide range of cultures since 2002. The system has been validated through operational use.

By far the most significant challenge for operators using these competency frameworks is the creation of an effective performance assessment and grading system, and subsequently the need for instructor training and the assurance of instructor concordance.

Finally, the competency framework of EBT provides a good process for the training needs analysis. The competencies in EBT provide a hierarchy and they are linked between them. There are some competencies that the pilot cannot reach without having first reached other ones. For example, in order for the pilot to have a strong competency in 'leadership and teamwork', it is necessary to be good at 'communications', and probably good at 'workload management'. At the same time, in order to be good at 'workload management', being good at 'flight path management — automation' or 'flight path management — manual control', depending on the scenario, is as well necessary.

An example of a possible root cause analysis is shown below.



This approach to competencies and the interaction/relationship between them is supported by the academic study MAN4GEN (Manual Operation for 4th Generation Airliners) – NLR-2015. An extract of the 'Final Report Summary' is provided below:

> '(…) Results show that high-performing crews in this scenario were highly rated in Communication, Leadership and Teamwork, Problem Solving and Decision Making, Situation Awareness, and Workload Management. These competencies need to be paired together since some of them are a consequence of good performance in the others. For example, Communication by itself is not indicative of good performance since this competency is only a medium to propagate good behaviour in the other competencies identified here. In fact, as noticed with poor-performing crews, communication needs to be effective and clear to guarantee that the recipients understand and acknowledge what is being said. If that is not the case, it can lead to a performance decrease in the other core competencies (e.g. loss of Situation Awareness).
>
> Reflecting on the results from this analysis, poor-performing crews showed difficulties in the competencies where high-performing crews were strong, especially during high-workload situations. These poor-performing crews completely skipped the planning flight phase which had a high impact during the execution flight phase, shown by the several below average and poor performance comments. Also, the heat-map shows that these crews already have difficulties in application of procedures (PRO) during low-workload situations (flight phases 1 and 2) and in manual flight throughout the scenario. High-performing crews, on the other hand, do not show negative comments for these competencies during these flight phases, yet positive comments were not present since conducting the required procedures here is not considered as above average

performance. Despite the predictive asymmetry preventing the prediction of positive performance, it can at least be premised that poor performance for the overall flight can be predicted from low workload situations. All in all the collection of observed competencies are able to draw a clear picture of the differences between high and poor performing crews.

This analysis has identified the competencies that are most helpful in managing unexpected and challenging events, in addition to those competencies whose absence is most likely to lead to poor performance and unsafe outcomes. The desirable competencies identified by the analysis of crew responses to this scenario are: Leadership & teamwork, communication and problem solving & decision making.'

AMC1 ORO.FC.231(b) Competency framework - recommended EBT competencies (EASA competency framework)

The EASA competency framework is based on the ICAO competency framework for aeroplane pilots contained in Part II, Section 1, Chapter 1 of Doc 9868 'PANS-TRG' (applicable since November 2020). EASA proposes the core competency model of ICAO with the addition of 'application of knowledge'.

AMC1 ORO.FC.231(b) — Application of knowledge

EASA has decided to introduce 'application of knowledge' as an additional competency to the ICAO core competency framework. The reason behind presenting knowledge as the first one and therefore numbering this competency with the 'zero' (0) is that all competencies are built on the basis of knowledge. The competency however has been named 'application of knowledge' to indicate that it is about what the instructor is observing — observable behaviours related to knowledge; therefore, the 'application of knowledge'.

KNO is a new competency not covered in ICAO Doc 9995. There is more information about this competency in some of the material provided by industry manufacturers. As an example of this, Airbus OTT 999.0012/17 provides the following reference:

'KNOWLEDGE

In order to ensure that the required competencies are acquired and to perform the training on undesired aircraft state, the flight crew should be aware of the following items:

- Causes and contributing factors of undesired aircraft state

- Examples of incidents related to undesired aircraft state.

In addition, the flight crew should review all of the following items:

- Control and display systems (EFIS & ECAM/EICAS):

The flight crew should know the indications provided by the display units, but also their evolution over time in order to anticipate the flying conditions.

- Flight controls systems, including flight control laws and protections:

The flight crew should know how to handle the aircraft. In addition, the flight crew should know how the protections work, their availability, and their limits.

- Automation (Autopilot (AP), Flight Directors (FD) and Auto thrust (A/THR)):

The flight crew should know how to use the automation, their availability and their limits. The flight crew should review the practices to engage the automatisms, as well as the takeover techniques and recommendations (e.g. Airbus golden rule n°4).

- Energy management of the aircraft, including thrust settings:

The flight crew should understand the acceleration and deceleration capabilities of the aircraft.

- Flight envelope limitations:

The flight crew should know the flight envelope of the aircraft, in order to keep the aircraft within the environmental and aerodynamic limits and to know when the aircraft is out of these limits.

- Aircraft capability related to flight control laws:

The flight crew should know the capability of the aircraft in response to the related active flight control laws (normal, alternate and direct law).

- Procedures and techniques related to undesired aircraft state:

The flight crew should know the procedure and techniques for nose high and nose low recovery, stall recovery and unreliable airspeed.'

The example above promotes the idea of a competency related to the application of knowledge.

AMC1 ORO.FC.231(b) — Application of procedures and compliance with regulations (PRO)

EASA has introduced a change in the abbreviation of 'application of procedures and compliance with the regulations' because of a comment received to the NPA. Additionally, the old abbreviation (APK) refers to application of procedures and knowledge. This is not appropriate for EASA due to the introduction of application of knowledge as a competency.

AMC2 ORO.FC.231(b) Evidence-based training

EBT and competency-based training are based on the concept that competencies are transferable. In the design of a competency-based assessment and training programme, a limited number of competencies are defined.

If an airline decides to add or remove a competency, there should be a clear and justifiable reason to do so.

Operators may develop suitable equivalent frameworks to meet their needs.

— A limited number of competencies involving knowledge, skills and attitudes should be defined.

— These defined competencies should cover more than a single situation and be consistently observable across a wide variety of contexts.

Short summary of how to develop an operator 'ADAPTED COMPETENCY MODEL'

A rapid analysis of the training needs and the local environment should answer the following questions:

— What is to be trained?

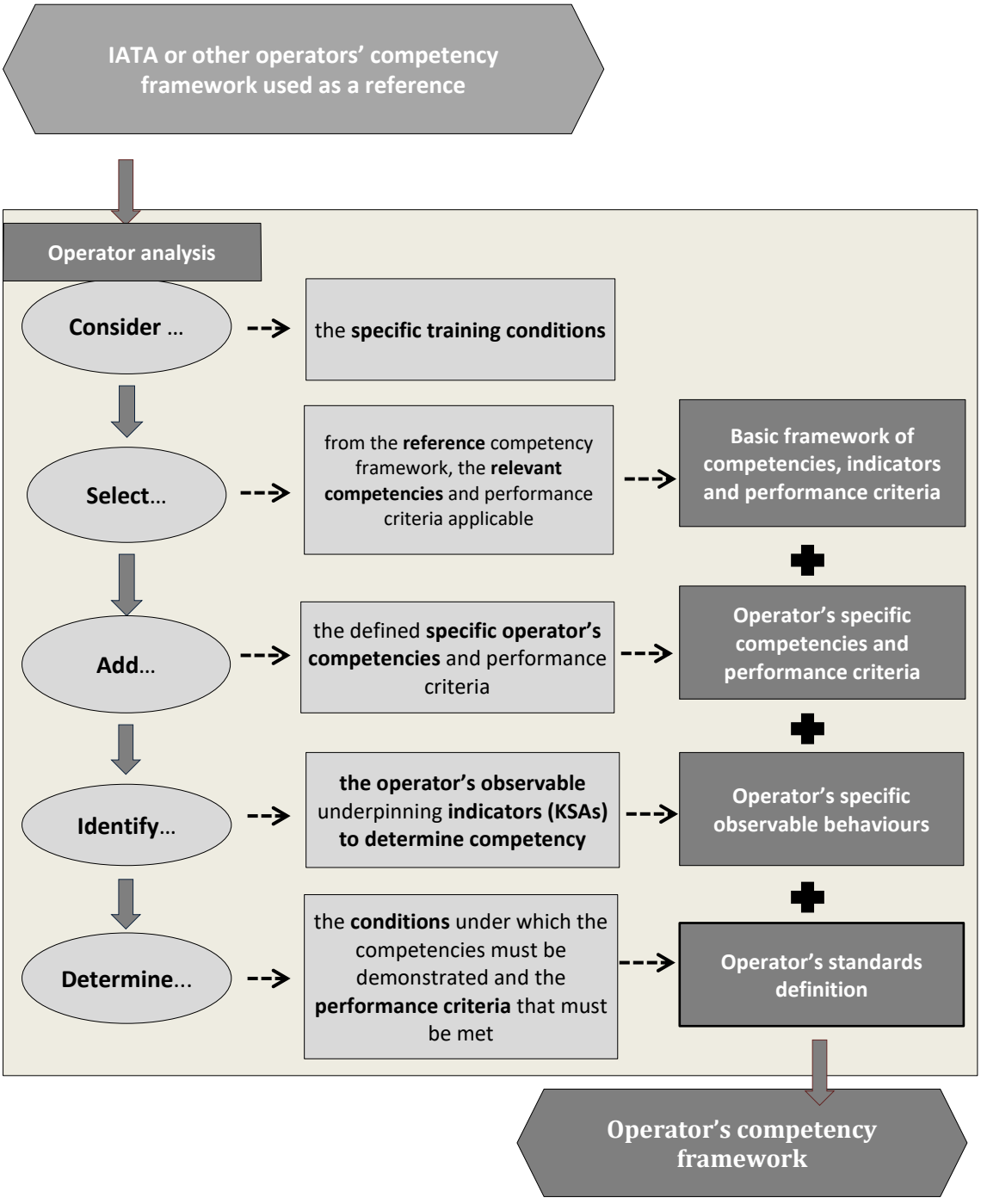
— What tasks does the trainee need to be able to perform by the end of the training?

— What regulatory, technical and operational knowledge is required?

— What skills are required?

— What attitudes are required?

— What are the specific conditions required for performance (i.e. level of complexity, specific requirements)?



AMC1 ORO.FC.231(b) point (a) table of Observable behaviours.

Disclaimer: The correct wording is always found in the Observable Behaviour itself. The examples are non-exhaustive and should be further developed by the user of the competency model.

As some required behaviours[11] are by nature 'covert behaviours', the observable behaviour[12] description often contain a key word that turns the 'covert behaviour' into an observable behaviour. This is to protect the model for consistency and objectivity. Key words are for information only. Focus words are used to denote the particularity of the behaviour and distinguish it from other similar behaviours.

Key and Focus words can be found in the Guideline column.

Observable Behaviours Guidance and Examples

	Observable Behaviour Description	Guideline	Examples
0 – Application of Knowledge (KNO)			
	Demonstrates knowledge and understanding of relevant information, operating instructions, aircraft systems and the operating environment ICAO Doc 9868: 2.1 Knowledge is specific information required to enable a learner to develop and apply the skills and attitudes to recall facts, identify concepts, apply rules or principles, solve problems, and think creatively in the context of work. 2.2 Knowledge is an outcome of the learning process, whether learning occurs in formal or informal settings. There are different types of knowledge: declarative (e.g. facts and raw data), procedural (e.g. categorized/ contextualized and application of conditional if-then rules), strategic (e.g. synthesis, inference to guide resource allocation for decision making, problem solving and behavioural action), and adaptive (e.g. generalization, innovation and invention).		
0.1	Demonstrates practical and applicable knowledge of limitations and systems and their interaction	Key: demonstrates Focus: limitations, systems and their interaction	• Maximum landing weight value • Understands the impact of a system's failure on NAT/RVSM requirements
0.2	Demonstrates required knowledge of published operating instructions	Key: demonstrates Focus: operating procedures	• Content of SOP • Memory/recall items • Knows ETOPS procedures

[11] 'Behaviour' refers to the way a person responds, either overtly or covertly, to a specific set of conditions, and which is capable of being measured. (see GM19 Annex I Definitions EVIDENCE-BASED TRAINING as amended by ED Decision 2021/002/R)

[12] 'Observable behaviour (OB)' refers to a single role-related behaviour that can be observed. The instructor may or may not be able to measure it. (see GM19 Annex I Definitions EVIDENCE-BASED TRAINING as amended by ED Decision 2021/002/R)

	Observable Behaviour Description	Guideline	Examples
0.3	Demonstrates knowledge of the physical environment, the air traffic environment including routings, weather, airports, and the operational infrastructure	Key: demonstrates Focus: operational environment	• GRF • Enroute terrain analysis
0.4	Demonstrates appropriate knowledge of applicable legislation	Key: demonstrates Focus: legislation	• NADP • FAA rules (OpsSpec) • Regulations (detailed rules, part of legislation)
0.5	Knows where to source required information	Key: source Focus: where	• De-icing procedures in supplementary
0.6	Demonstrates a positive interest in acquiring knowledge	Key: show Focus: attitude to learn	• Asking additional questions during a debriefing • Looking up information on the internet on the topic UPRT
0.7	Is able to apply knowledge effectively	Key: apply Focus: effectiveness of knowledge	• Dealing with all required topics such as LVO, SOP, MEL and transforming it into application.

	Observable Behaviour Description	Guideline	Examples

1 – Application of knowledge and compliance with procedures (PRO)

Identifies and applies appropriate procedures in accordance with published operating instructions and applicable.

The identifying and doing of procedures, layered with an attitude towards compliancy which demonstrates a level of professionalism.

1.1	Identifies where to find procedures and regulations	Key: identifies Focus: where	• RCAM references • Adverse weather operations • Cross-bleed procedure location • Source of operating instructions
1.2	Applies relevant operating instructions, procedures and techniques in a timely manner	Key: applies Focus: timely	• Execution of an efficient de-icing procedure
1.3	Follows SOPs unless a higher degree of safety dictates an appropriate deviation	Key: follows Focus: safety	• Flight into icing conditions and PM is currently in a long radio message and not ready

	Observable Behaviour Description	Guideline	Examples
			to be heard – PF switches on the ENG Anti Ice itself contrary to the SOPs
1.4	Operates aircraft systems and associated equipment correctly	Key: operates Focus: systems and equipment	• Correct use of the flap lever • Weather radar • Guarded switches/double confirmation switches • Sensible operation of the air conditioning system
1.5	Monitors aircraft systems status	Key: monitors Focus: systems status	• Scrolling through the System Pages • Monitoring of brake temperatures or quantities of operating fluids • RVSM awareness
1.6	Complies with applicable regulations	Key: complies Focus: regulations	• MEL applicability • Noise abatement • Observe speed limits • Adheres to local taxi speed restrictions
1.7	Applies relevant procedural knowledge	Key: applies Focus: procedural knowledge	• Knows the duration of abnormal procedures, e.g. duration of cabin prep • Logic of a slats/flaps jammed procedure • Intention of an overweight procedure

	Observable Behaviour Description	Guideline	Examples

2 – Communication (COM)

Communicates through appropriate means in the operational environment, in both normal and non-normal situations

Using the right way to talk and share information in different situations, even when things aren't going as usual.

2.1	Determines that the recipient is ready and able to receive information	Key: determines Focus: recipient ready	• Pay attention to whether the receiver is currently blocked by other activities (e.g. writes aeroplane log, fuel check, radio message)

	Observable Behaviour Description	Guideline	Examples
2.2	Selects appropriately what, when, how, and with whom to communicate	Key: selects Focus: appropriately	• In critical phases of the flight, only flight-relevant communication-(conversations about the new car are okay in cruise flight, but not in takeoff roll)
2.3	Conveys messages clearly, accurately, and concisely	Key: conveys Focus: lean communication	• Don't ramble, meander • Getting to the point • Clear pronunciation
2.4	Confirms that the recipient demonstrates understanding of important information	Key: confirms Focus: external understanding	• In case of doubt, ask again • Have essential information repeated (e.g. NITS)
2.5	Listens actively and demonstrates understanding when receiving information	Key: actively, demonstrates Focus: internal understanding	• Eye contact • Posture / Devotion • Listens Patiently • Signal understanding (nod of the head) • Stop other distracting actions, don't multitask (e.g. don't search/read the EFB while the other person is briefing)
2.6	Asks relevant and effective questions	Key: asks Focus: relevant, effective	• Asks situational/ topic-related questions • Uses appropriate questioning style (e.g. open, closed) • No leading or loaded questions
2.7	Uses appropriate escalation in communication to resolve identified deviations	Key: uses Focus: in case of deviations	• Increases volume, clarity, persistence • Chat, Communicate, Call-Out, Command • The higher the security risk, the higher the escalation level • In the event of deviation from the agreed course of action or the course of action specified in accordance with the SOP
2.8	Uses and interprets non-verbal communication in a manner appropriate to the	Key: uses and interprets Focus: non-verbal	• Friendliness, openness, affection • Eye contact, speech tone, facial expressions

	Observable Behaviour Description	Guideline	Examples
	organizational and social culture		• Sensitivity to cultural differences • Detects stress signals or fatigue in non-verbal communication
2.9	Adheres to standard radiotelephone phraseology and procedures	Key: adheres Focus: ATC	• Callsign is spoken clearly and completely • Numbers spoken according to radio telephony • "MAYDAY" at the correct time, no "declare emergency"
2.10	Accurately reads, interprets, constructs, and responds to datalink messages in English	Key: N/A Focus: datalink	• Correctly interprets ATC request "Set max. Uplink Delay" • Correct understanding of conditional messages, “climb by or at” “when can we expect”

	Observable Behaviour Description	Guideline	Examples
3 – FPA – Aeroplane flight path management — automation (FPA)			
Controls the flight path through automation.			
3.1	Uses appropriate flight management, guidance systems, and automation, as installed and applicable to the conditions	Key: uses automation Focus: appropriate automation	• Uses the FMS functionalities at OEI in the CRZ/OEI ceiling information • Reprograms the FMS correctly at change of destination • Switches from manual to automatic flight control to reduce workload, e.g. to be able to concentrate on working through an abnormal procedure • Uses FPV (e.g. “Bird”) in Raw Data Flight
3.2	Monitors and detects deviations from the intended flight path and takes appropriate action	Key: monitors, detects, takes action Focus: flight path deviation	• Vertical profile challenged due to a speed constraint

	Observable Behaviour Description	Guideline	Examples
3.3	Manages the flight path to achieve optimum operational performance	Key: manages flight path Focus: optimum	• Flexibility in the choice of AFS modes in order to achieve the most economical flight course possible • Most economic Cruise level / CI • Controls the flight path in order to approach a more economically advantageous RWY while maintaining the safety level (shortcut/ visual approach)
3.4	Maintains the intended flight path during flight using automation while managing other tasks and distractions	Key: maintains flight path Focus: distractions	• Adjustment of climb/descent rates before level-off despite distraction • Compliance with restrictions on SID/STAR despite active caution
3.5	Selects appropriate level and mode of automation in a timely manner considering the phase of flight and workload	Key: selects automation Focus: phase of flight and workload	• Solves short-term RWY change if necessary. no longer via FMS, but via Basic Modes • Smooth and accurate use of automation, without hesitation
3.6	Effectively monitors automation, including engagement and automatic mode transitions	Key: monitors automation Focus: engagement and transitions	• Performs FMA callouts and detects unwanted modes • Anticipates imminent undesirable AFS behavior and takes corrective action

	Observable Behaviour Description	Guideline	Examples
4 – Aeroplane flight path management — manual control (FPM)			
Controls the flight path through manual control Observing how good someone is at using specific motor skills (KSA). Also paying attention to cognitive skills while applying basic flying skills, and other times, more advanced ones.			
4.1	Controls the aircraft manually with accuracy and smoothness as	Key: controls Focus: accurate and smooth	• If possible, maximize Pax Comfort – low roll rates, overall.

	Observable Behaviour Description	Guideline	Examples
	appropriate to the situation		• No overcontrol, accurate flying
4.2	Monitors and detects deviations from the intended flight path and takes appropriate action	Key: monitors, detects, takes action Focus: flight path deviation	• Makes necessary corrections in a timely manner
4.3	Manually controls the aeroplane using the relationship between aeroplane attitude, speed and thrust, and navigation signals or visual information	Key: controls aeroplane Focus: relationships	• Level off manoeuvre • Coming out of a bank to wings level • Uses PAPI correctly • Visually aligns laterally with the RWY centerline
4.4	Manages the flight path to achieve optimum operational performance	Key: manages flight path Focus: optimum performance	• Continuous descent • Low drag/low noise
4.5	Maintains the intended flight path during manual flight whilst managing other tasks and distractions	Key: maintains flight path Focus: distractions	• Adjustment of climb/descent rates before level-off despite distraction • Compliance with restrictions on SID/STAR despite active caution
4.6	Uses appropriate flight management and guidance systems, as installed and applicable to the conditions	Key: uses Focus: appropriate guidance	• Turning off the FD if it doesn't show anything useful • Recognizing that a shift to a different level of guidance is needed • Workload-dependent adjustment of the FG level • Setup of the AFS during manual flight before AP or ATHR on
4.7	Effectively monitors flight guidance systems including engagement and automatic mode transitions	Key: monitors flight guidance Focus: engagement and transitions	• Performs FMA callouts and detects unwanted modes • Anticipates imminent undesirable FG behavior and intervenes to correct it • Monitoring of ATHR mode during TCAS RA

	Observable Behaviour Description	Guideline	Examples
5 - Leadership & teamwork (LTW)			
Influences others to contribute to a shared purpose. Collaborates to accomplish the goals of the team Applies for all crew members independent on their roles, experience and attitude.			
5.1	Encourages team participation and open communication	Key: encourages Focus: team	• Active invitation to get involved or express one's opinion (e.g. at the Cabin Briefing) • Cockpit briefing with the encouragement of openness and mutual support • Friendly, enthusiastic, motivating, and considerate of others
5.2	Demonstrates initiative and provides direction when required	Key: demonstrates Focus: initiative	• Suggests a common thread / Course of Action • Do not remain in passivity • Suggests what to do when team members need guidance to align their actions
5.3	Engages others in planning	Key: engages Focus: others in planning	• "What would you do now?", "How could we solve this?" • Share your "Mental Plan" with others • Shares activities fairly and appropriately
5.4	Considers inputs from others	Key: considers Focus: others	• Ideas and objections are heard and considered • Other opinions are actively queried and "screened" • Demonstrates Empathy • Receptive to other people's views
5.5	Gives and receives feedback constructively	Key: gives and receives Focus: feedback	• The recipient does not interrupt and does not lapse into justification • Factual, constructive and not on a personality level • Honesty
5.6	Addresses and resolves conflicts and disagreements in a constructive manner	Key: addresses and resolves Focus: conflicts	• It is recognized and verbalized that there is a conflict (an interaction that is perceived as emotionally stressful and/or factually unacceptable by at least one side)

	Observable Behaviour Description	Guideline	Examples
			• Safety-related discrepancies are settled immediately • Other disagreements can also be solved after the flight • Willing to compromise
5.7	Exercises decisive leadership when required	Key: exercises Focus: leadership	• Allows luggage to be loaded at short notice if the slot is not immediately endangered • Takes a stand when the situation requires it (e.g. speaks up, maintain their opinion) • Recognises when the situation leaves no time for grassroots democracy and resolutely switches to instruction/implementation mode • Confidently says and does what is important for safety
5.8	Accepts responsibility for decisions and actions	Key: accepts Focus: responsibility	• Answers why you have decided how and does not shift the responsibility to other/external circumstances • Admits mistakes
5.9	Carries out instructions when directed	Key: carries out Focus: instructions	• "Resolve this with the Ramp Agent...."
5.10	Applies effective intervention strategies to resolve identified deviations	Key: applies Focus: intervention on deviations	• FACE: Find out, Alert, Challenge, Emergency • “I have control…”
5.11	Manages cultural and language challenges, as applicable	Key: manages Focus: cultural and language	• Be open about language barriers • Demonstrates awareness of cultural preferences in terms of directness in language • Uses available resources for translation (including other team members) • Changes language if necessary • Show Respect • Tolerant

	Observable Behaviour Description	Guideline	Examples
6 - Problem-solving — decision-making (PSD)			
	Identifies precursors, mitigates problems, and makes decisions. Decision-making not only means to follow a “decision making model” (e.g., DODAR, FORDEC, etc) but also extending beyond or outside those “decision making models”.		
6.1	Identifies, assesses, and manages threats and errors in a timely manner	Key: identifies, assesses, and manages Focus: threats and errors, timely	• Anticipates / consciously searches for threats and addresses them (e.g. briefing) • Classifies an observation as a threat and defines strategies on how to deal with it • Deal with errors appropriately by actively addressing them (not covering them up) and correcting them
6.2	Seeks accurate and adequate information from appropriate sources	Key: seeks Focus: information	• Tapping into all the resources needed to get a clear picture of the situation (e.g. Expanded procedures, Cabin Crew, ATC, ATIS)
6.3	Identifies and verifies what and why things have gone wrong, if appropriate	Key: identifies Focus: root cause	• Reasons for an engine failure are analysed after the abnormal procedure has been completed • Icing conditions as a root cause for unreliable airspeed • Does not jump to conclusions
6.4	Perseveres in working through problems while prioritizing safety	Key: perseveres Focus: perseverance	• Remain focussed on achieving the highest safety margin at all times • Not giving up
6.5	Identifies and considers appropriate options	Key: identifies and considers Focus: options	• Diversion airports • Choice of runway and approach type • If committed to land, is performing a go-around still an option ?

	Observable Behaviour Description	Guideline	Examples
			• What is possible with the remaining fuel on board
6.6	Applies appropriate and timely decision-making techniques	Key: applies Focus: decision making techniques	• Natural decision making (experience, airmanship) • Rational decision making (time permitting) • Pattern recognition • Repeat (memory items, recall actions)
6.7	Monitors, reviews, and adapts decisions as required	Key: monitors, reviews and adapts Focus: review decision	• "Are there any new facts?" • "Is Plan B still valid?" • Review: "Did we miss something?"
6.8	Adapts when faced with situations where no guidance or procedure exists	Key: adapts Focus: no guidance	• Medical vs. Overweight Landing • Operational decision in case of extended volcanic ash situation • Able to improvise without reducing safety
6.9	Demonstrates resilience when encountering an unexpected event	Key: demonstrates Focus: unexpected	• Returning to a coordinated way of working after a state of panic or fear (Startle and Surprise) • ROC (Relax, Observe, Confirm) • Is able to maintain self-control after an explosive decompression

	Observable Behaviour Description	Guideline	Examples
7 - Situation awareness and management of information (SAW)			
	Perceives, comprehends and manages information and anticipates its effect on the operation. More than just knowing the aircraft's position, it's about cognitive processes like observing, monitoring, and assessing various aspects. These steps are applied across different areas such as observing the aircraft, its actions, surroundings, information, colleagues, future events, and oneself.		
7.1	Monitors and assesses the state of the airplane and its systems	Key: monitors and assesses Focus: aeroplane state and systems	• A malfunction without caution is detected and the consequences are correctly assessed • Monitoring of brake temperature after landing • Fuel state
7.2	Monitors and assesses the airplane's energy state and its anticipated flight path	Key: monitors and assesses Focus: aeroplane flight path	• Altitude vs distance vs speed • Estimate if a short vector can be accepted • “Too high, too low, too fast, too slow?” • Stays ahead of the aircraft
7.3	Monitors and assesses the general environment as it may affect the operation	Key: monitors and assesses Focus: aeroplane environment	• Aeroplane position on map • Observation and interpretation of weather conditions • Observation and interpretation of traffic • Obstacle awareness in relation to aeroplane position • Time awareness
7.4	Validates the accuracy of information and checks for gross errors	Key: validates Focus: information	• Application of rules of thumb (descent planning) • Plausibility check (loadsheet) • Flight time and mileage in FMS
7.5	Maintains awareness of the people involved in or affected by the operation and their capacity to perform as expected	Key: maintains Focus: others involved	• Detects signs of incapacitation, stress, overexertion, emotional distress in other people

	Observable Behaviour Description	Guideline	Examples
			• Inquires about cabin crew/passenger well-being after a go around or turbulence • Identifies passengers' need for information and makes announcements • Detects signs that someone is "in the tunnel"
7.6	Develops effective contingency plans based upon potential risks associated with threats and errors	Key: develops Focus: future risks	• Thinks about what could happen and looks for a solution (plan B, TEM in the future) • What would I do if this or that happens? What if ? • Programs Oxygen Escape Routes in FMS • Updated Scheduled Enroute/ETOPS Alternates • Mentions concrete alternative plans (e.g. diversion or new approach to G/A)
7.7	Responds to indications of reduced situation awareness	Key: responds Focus: self	• Detects signs of incapacitation, stress, overexertion, emotional distress in oneself (self-awareness) and responds to them • "I've just lost track"

	Observable Behaviour Description	Guideline	Examples
8 - Workload management (WLM)			
Maintains available workload capacity by prioritising and distributing tasks using appropriate resources Workload management is linked with complexity, but the challenge lies in consistently optimizing workload even in less complex situations. While individuals can manage their own workload, the real challenge is optimizing workload for the entire crew, requiring different approaches based on their capacity.			
8.1	Exercises self-control in all situations	Key: exercises Focus: all situations	• Stays calm and focused at all times (not related to an unexpected event)

	Observable Behaviour Description	Guideline	Examples
			• Is relaxed, careful and not impulsive • During high workload • During adverse weather • During challenging ground operations (slot, delay, …)
8.2	Plans, prioritizes, and schedules appropriate tasks effectively	Key: plans, prioritizes, and schedules Focus: multiple task handling	• Plan: gather all the required to-do's • Prioritize: decide which one to do first • Schedule: give an order of execution to the rest of the to-do's • "First level off, then make an ATC call, do the abnormal procedure, call the cabin"
8.3	Manages time efficiently when carrying out tasks	Key: manages Focus: time	• Can estimate how long individual work packages will take and make good use of available time • Can do multiple tasks in a limited time frame (call ATC, call cabin crew, give passenger speech).
8.4	Offers and gives assistance	Key: offers and gives Focus: lower others workload	• Verbalizes offer of help • Takes over tasks when the other person is or may become overloaded (e.g. "Do you want me to make the announcement for you?")
8.5	Delegates tasks	Key: delegates Focus: lower own workload	• Transfer to-do's to lower the own workload • Order "Direct to" actions in the FMS during intensive flight phases. • "Please make a reassuring passenger announcement"
8.6	Seeks and accepts assistance when appropriate	Key: seeks and accepts Focus: assistance	• Accepts help and support, and/or asks for it

	Observable Behaviour Description	Guideline	Examples
			• No one-man show while the other twiddles his thumbs • "Please monitor my speed during approach"
8.7	Monitors, reviews, and cross-checks actions conscientiously	Key: monitors, reviews, and cross-checks Focus: conscientious actions	• Ensures that actions and individual work steps are carried out conscientious and precisely • Verification if flaps are set correctly • Avoiding the shift to personal automatic mode while experiencing fatigue.
8.8	Verifies that tasks are completed to the expected outcome	Key: verifies Focus: task completion	• Ensures that the work is completed at the end as expected • Even after delegation – were things done? • Did we start the APU ? • Was the fueler informed ?
8.9	Manages and recovers from interruptions, distractions, variations, and failures effectively while performing tasks	Key: manages and recovers Focus: distractions	• Return to the previous activity after an interruption • Keeps the common thread • Situation-appropriate, active postponement of requests, fending off unnecessary interruptions

AMC2 ORO.FC.231(b) point (c)

The use of the term 'common language' refers to the common language used by the operator. An IR for such requirement is provided in the Air OPS Regulation Annex IV.

ORO.FC.231(c)

This requirement has been transposed from ICAO Doc 9995 paragraphs 3.6.6 and 3.6.7, with the necessary amendments, into the European regulatory system.

> '3.6.6 Quality management. The training system performance should be measured and evaluated in respect of the organizational objectives. Monitoring should include a feedback system to identify trends and ensure corrective action where necessary. The quality system of the operator or training organization, as defined in Doc 9841, the

Manual on the Approval of Training Organizations, should monitor alignment with the EBT assessment and training guidelines recommended in this manual.

3.6.7 Feedback system. For the purpose of collecting data from an EBT programme, and making adjustments and continuous improvement to the training system, an operator should implement a performance feedback system utilising defined metrics (see paragraph 5.3)'.

ORO.FC.231(c) point (1)(ii)

The requirement has been transposed from ICAO Doc 9995 paragraph 3.6.6 '… should monitor alignment with the EBT assessment and training guidelines recommended in this manual. …'. The interpretation of this paragraph was the following: As one of the main objectives of the EBT programme is to develop pilot competencies, the sentence in 3.6.6 was transformed to 'develops pilot competencies'.

ORO.FC.231(c) point (2)

'ORO.GEN.200 Management system

(a) The operator shall establish, implement and maintain a management system that includes:

(1) (…)

(4) maintaining personnel trained and competent to perform their tasks;'

AMC1 ORO.FC.231(c) Evidence-based training

This requirement has been transposed from ICAO Doc 9995 paragraphs 4.1.2 (d) and (e) with the necessary amendments to incorporate the ICAO proposal into the European regulatory framework.

'4.1.2 There are various mechanisms for the implementation of EBT, which should be conducted in close consultation with the CAA and which include:

a) the definition of an implementation and operations plan;

b) the adaptation of the programmes defined in Appendices 2 to 7 to Part II according to the generation of aircraft (fleet) and type of operation for the operator;

c) the EBT programme implementation (an initial limited trial phase should be considered by the CAA);

d) the review of training effectiveness upon receipt of sufficient training system data; and

e) the adjustment and continuous improvement of the training programme according to the training system feedback.'

AMC1 ORO.FC.231(c) point (a)

The definition has been transposed from ICAO Doc 9995 Chapter 3.6.

'3.6.7 Feedback system. For the purpose of collecting data from an EBT programme, and making adjustments and continuous improvements to the training system, an operator should implement a performance feedback system utilising defined metrics'

However, the ICAO text has been modified to accommodate the wording of the EU regulatory system.

AMC1 ORO.FC.231(c) point (a) wording 'continuous'

Using the term 'continuous' ensures that there is data collection throughout the year and not at a certain single point in time.

AMC2 ORO.FC.231(c) Evidence-based training

The volume of training data will increase through EBT, and some provision must be made for individual data protection. Generally speaking, data protection in excess of what the GDPR offers is undesirable in a safety-critical industry as the protection of the public is of higher interest than the protection of an individual pilot. On the other hand, the representative of the pilots in the EBT subgroup RMT.0599 requested more stringent data protection requirements due to the increased volume of training data and the risks that such data could be uncontrollably forwarded into the internet, social media, etc. Therefore, the regulatory package offers, on the one hand, the necessary data protection to pilots while maintaining the necessary transparency required in a safety-critical industry like aviation (i.e. recommending de-identified data instead of anonymised data, …etc.). For such purposes, proper oversight is a key element to ensure operators are correctly implementing the data access and security policy.

ORO.AOC.130 'Flight data monitoring – aeroplanes' already requires a system that provides such kind of protection (individual data protection) and at the same time provides useful information to operators and authorities. The details of such protection and scope are provided in AMC1 ORO.AOC.130 points (g) and (k). Therefore, the provision to require a data access and security policy in EBT should benefit from the experience developed in FDM and should not impose a big burden on the operator.

AMC2 ORO.FC.231(c) point (a)

This point has been transposed from AMC1 ORO.AOC.130 point (b) and from ICAO Doc 9859 AN/474 Safety Management Manual (SMM):

> 'the sole purpose of protecting safety information from inappropriate use is to ensure its continued availability so that proper and timely preventive actions can be taken and aviation safety improved;'

AM2 ORO.FC.231(c) point (b)

This point has been transposed from AMC1 ORO.FC.130 point (k); however, some of the details have been transferred to GM2 ORO.FC.231(b).

AM2 ORO.FC.231(c) point (d)

This point has been transposed from AMC1 ORO.FC.130 point (k)(6).

This provision must be read in conjunction with ORO.GEN.140 of the Air OPS Regulation where the competent authority has access to all records:

> **'ORO.GEN.140 Access**
>
> (a) For the purpose of determining compliance with the relevant requirements of Regulation (EC) No 216/2008 and its Implementing Rules, the operator shall grant access at any time to any facility, aircraft, document, records, data, procedures or

any other material relevant to its activity subject to certification, SPO authorisation or declaration, whether it is contracted or not, to any person authorised by one of the following authorities: (…)'

AMC2 ORO.FC.231(c) point (e)

This point has been inspired by Regulation (EU) No 376/2014 Article 15 point 2(a).

AMC2 ORO.FC.231(c) point (f)

The principles in ICAO Annex 19 Appendix 3 Chapter 3 have been used to draft this provision.

GM1 ORO.FC.231(c) Evidence-based training

This requirement has been transposed from ICAO Doc 9995 paragraph 5.3.1 with the necessary amendments to incorporate the ICAO proposal into the European regulatory framework:

'5.3.1 Training metrics. The 'inner loop' within the training function is a valuable source of data. Taking full advantage of such data requires robust and well-calibrated training metrics. Typical metrics include:

a) differences in success rates between aircraft types and training topics;

b) distribution of errors for various training scenarios and aircraft types;

c) skill retention capability versus skill type;

d) the trainee's feedback, which provides a different perspective as to the quality and effectiveness of the training product; and

e) instructor tracking system: this system is important to measure the effectiveness of the instructor calibration process. However, it is essential to impress that the purpose of this system is not to spy on instructors or to pressure individuals to change their grading.'

GM1 ORO.FC.231(c) point (b*)*

This provision is a transposition from ICAO Doc 9995 paragraph 5.3.2:

'5.3.2 Training metrics are an invaluable component in supporting an EBT programme but they must be placed in the context of operational data, because only the latter can justify the importance of a specific skill within the real operation.'

Furthermore, operational data is already required in ORO.AOC.130 and ORO.GEN.200 of the Air OPS Regulation.

GM2 ORO.FC.231(c) Evidence-based training

This GM has been transposed from AMC1 ORO.AOC.130 'Flight data monitoring – aeroplanes' point (k):

(…) 'This procedure should, as a minimum, define:

(1) the aim of the FDM programme;

(2) a data access and security policy that should restrict access to information to specifically authorised persons identified by their position;

(3) the method to obtain de-identified crew feedback on those occasions that require specific flight follow-up for contextual information; where such crew contact is required the authorised person(s) need not necessarily be the programme manager or safety manager, but could be a third party (broker) mutually acceptable to unions or staff and management;

(4) the data retention policy and accountability, including the measures taken to ensure the security of the data;

(5) the conditions under which advisory briefing or remedial training should take place; this should always be carried out in a constructive and non-punitive manner;

(6) the conditions under which the confidentiality may be withdrawn for reasons of gross negligence or significant continuing safety concern;

(7) the participation of flight crew member representative(s) in the assessment of the data, the action and review process and the consideration of recommendations; and

(8) the policy for publishing the findings resulting from FDM.'

GM2 ORO.FC.231(c) – De-identified data vs anonymised data

De-identified data is recommended. Anonymised data is not recommended.

Anonymised data should be avoided in EBT, as in order to achieve the ultimate goal of the EBT system, which is a fully individual and personalised training programme for the pilot, the system needs to know the training history of the pilot. In addition, and in case of an accident or serious incident, the availability of data maybe higher. De-identification offers the possibility that NO human being would be able to ever have access to the identified data (or only the pilots themselves as the data belong to them), while at the same time, the system is able to offer a personalised training programme.

For information, please see below general definitions of anonymisation and de-identification.

'Anonymisation means the act of permanently and completely removing personal identifiers from data, such as converting personally identifiable information into aggregated data. Anonymised data is data that can no longer be associated with an individual in any manner.'

'De-identification: de-identification involves the removal of personally identifying information in order to protect personal privacy. In some definitions, de-identified data may not necessarily be anonymised data and in such cases, anonymised data is a particularised subset of de-identified data.'

Tips for the oversight - AMC2 ORO.FC.231(c) Evidence-based training and GM2 ORO.FC.231(c) Evidence-based training.

One aspect to take into account is that, at the same time, operators have established a correct data access and security policy in their manual and procedures; the actual practice of such policy is far from ensuring restricted access and data protection. Here are some examples that may jeopardise compliance (finding) with the data access and security policy and which should be corrected:

- Manual corrections of the grading performed by an EBT instructor without proper procedure in the data access and security policy, or without proper activity log in the IT system (e.g. audit trail, tracking log, etc), and/or without proper notification/agreement from the instructor. Note1: large organisations should have a procedure for such a scenario, as sometimes instructors may make mistakes in their grading and realise later such mistakes (e.g. grading the wrong name, mixing the evaluation session with the SBT session…etc.). Note: Activity log/audit trail/tracking log means a function of the IT system that records the changes that have been made to a database or file.
- Manually amendments of validity periods. For example, to accommodate capacity restrictions. The risk with manual amendments of validity periods is that the 3 months window where the new validity windows should be counted from the original expiry date (AMC1 ORO.FC.145(g) point (b)[13]) cannot be used because the original expiry date is not available anymore as it was manually amended; even if such new validity is more restricted.
- Manual transfer of EBT individual data from one system to another. Sometimes operators have the need to transfer data from one system to another (e.g. EBT recording system to a database), and instead of doing an automatic transfer that ensures data protection and restricted access, the operator uses a human to move data from one system to another (e.g. copying manually the results of a simulator session from one system to another)
- EBT regulation requires the establishment of some type of information security standards (e.g. ISO 2700x, NIST SP 800-53) to ensure that the security of the data includes information security standards; the new Part-IS also infers in the same idea. In addition, the systems should be prepared for cyber security attacks (pen-testing has been conducted). The authority should verify that the whole process of EBT data remains under a system or systems that are certified under such standards, including the links between those systems. Sometimes operators extract EBT data from a certified ISO or NIST system and transfer it to a non-certified system, which may not ensure the necessary data protection and secure access; or, as stated in the previous point, they move data from two certified systems manually, thus breaking the necessary data protection and access

ORO.FC.231(d)

Grading system

The paradigm shift from legacy training and checking programmes is a move away from checking the execution of predefined manoeuvres and tasks, based on the quality of execution. Remediation in these cases often leads to simple task repetition without an understanding of the underlying causes of ineffective performance.

[13] AMC1 ORO.FC.145(g) Provision of training, checking and assessment
VALIDITY PERIOD OF RECURRENT ASSESSMENT, TRAINING AND CHECKING
(…)
(b) When the recency, training or check is completed before the last 3 months of the validity period, the new validity period should be counted from the end of the month when the recency, training or check was completed and not from the original expiry date. (…)

To be consistent with the central philosophy of EBT, the assessment should be completed at key points during the module, and the performance should be evaluated against each of the defined competencies, using the most relevant OBs to the performance observed. The instructor should take an overview of everything observed during the phase, and using a methodology similar to that published, award grades in each competency only.

The grading system should be used for crew assessment, in addition to providing quantifiable data for the measurement of the training system performance. It can range from a simple 'acceptable/unacceptable' grading performance system to a gradual relative measurement system.

For the measurement of pilot performance, ICAO Doc 9995 does not provide a full measurement system. ICAO Doc 9995 provides a set of OBs; however, it does not provide a grading system. This was resolved in the rulemaking process in EASA that provided a grading system following the VENN methodology. This methodology allows a full measurement system for EBT. This system is more of a norm-referenced system than a criterion-referenced system.

Why EBT needs a norm-referenced system instead of a criterion-referenced system?

For many decades, the industry has used the completion of manoeuvres like rejected take-off, engine failure between V1 and V2, go-around from minima with the critical engine inoperative and a clearly defined flight tolerance (e.g. – 5 knots/+10 knots) as a performance measurement to demonstrate the performance of the pilot. In this context, a pilot being able to demonstrate the ability to fly these often-repetitive manoeuvres within prescribed quantitative performance measurements and indicating an acceptable level of deviation from ideal criteria is deemed to be 'competent'.

EBT is based on the premise that this concept is no longer appropriate as a simple indicator, due to the complexities of modern operations and automation systems, coupled with the significant attribution of serious incidents and accidents to human factors. The paradigm shift developed by EBT is that assessments, which are necessary during all forms of training and instruction, as well as evaluation and checking, should be determined according to the performance in the defined areas of competency, and not simply by the achievement of a predetermined outcome in a specific manoeuvre.

The EBT concept continues to require the completion of certain tasks, but competent flight crew members should be able to complete the tasks reasonably expected of them under achievable conditions. Tasks remain important, but only as long as they establish a predefined norm according to the curriculum, which in the case of recurrent EBT should be achieved. The key distinction is that EBT envisages a system of competence measurement, which looks at the total performance across a wide range of activities that include some traditional tasks.

Another reason why EBT needs a norm-referenced system is the way EBT evaluates pilots. In the context of the traditional training and checking, pilots are checked~~.~~. EBT moves away from assessment against the execution of predefined manoeuvres and tasks based on the quality of execution (ATQP and traditional training and checking), to a use of the events as a vehicle for developing and assessing crew performance across a range of competencies.

EBT also refocuses the instructor population onto analysis of the root causes to correct inappropriate actions, rather than simply asking a flight crew member to repeat a manoeuvre with no real understanding as to why it was not successfully flown in the first instance.

For those reasons, EASA introduced a competency-based grading system closer to a norm-referenced grading system, rather than a criterion-referenced system. In other words, although the EBT grading system provides a standardised methodology to pilot assessment, it is by definition a norm-referenced grading system (events do not have a set of conditions and the OBs linked to the events do not have a defined and unambiguous criterion).

While the criterion-referenced system unambiguously ascertains to what degree the objectives of the manoeuvres have been met, using such a system would mean that instructors would need to focus on the quality of execution of the manoeuvres rather than use the events as a vehicle to develop performance across a range of competencies.

Note: A norm-referenced grading system is a type of assessment which yields an estimate of the position of the tested individual in a defined population.

Note2: A criterion-referenced system is a type of assessment where the behavioural objectives and the systematic generation of test items are designed to unambiguously ascertain to what degree the objectives have been met.

EASA provides a set of rules to revalidate pilot licence under the EBT programme.

A norm-referenced system is subject to a defined population; it is thus subject to the population of pilots of a particular operator. EASA, some authorities, and the pilots' associations were concerned whether this would create a problem of level playing field for the licence revalidation.

Note that today licence revalidation provides a:

— criterion-referenced system for the technical skills; and

— norm-referenced system for the non-technical skills (e.g. CRM assessment).

To resolve the issue, EASA launched a focused consultation[14] in the 4th quarter of 2017 and the 1st quarter of 2018. The consultation concluded that a verification of the norm-referenced system was needed to re-assure the level playing field. (Further explanation is provided in the explanatory notes to ORO.FC.231(d) point (2), AMC1 ORO.FC.231(d)(2) and GM2 ORO.FC.231(d)(2)).

In summary:

— The EBT grading system is a norm-referenced grading system. Therefore, it varies from operator to operator and it depends on several factors, e.g. company standards, the design of the programme, culture of the organisations, culture of the instructors, etc.

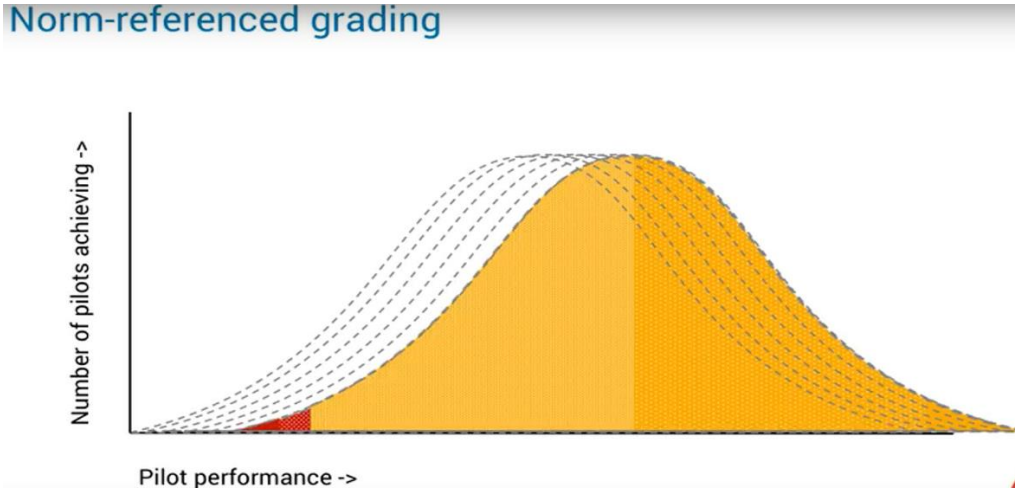
— Within an operator, a norm-referenced grading system varies in the course of time. This happens because the EBT programme varies, the culture of the organisation varies, the

[14] EASA performed a focused consultation in the 4th quarter of 2017 and the 1st quarter of 2018 with several stakeholders outside the EBT subgroup RMT.0599. This consultation included the main group of RMT.0599 and other actors of the aviation industry such as the national aerospace centre of Holland (NLR), nominated persons for crew training, inspectors and consultants.

culture of the instructors varies, the population of pilots changes, etc. Therefore, a norm-referenced grading system may provide different grading results for the same pilot performance in the course of time (for example, as pilot population performance improves, better performance is needed to obtain the same grading result).

— The situation above occurs while the concordance between instructors may be high. Because all instructors vary their grading in the same direction, the population of pilots moves to the right or to the left in the graph below, and thus the grading results of the performance of a particular competency are shifting to the right or to the left of the graph.

Conclusion: Measuring competencies (especially the non-technical ones) using a norm-referenced grading may be more appropriate; however, we also need to verify the grading system against a criterion-referenced system in order to ensure legal assurance and level playing field in the revalidation of pilot licences.



Summary

The current system provides a criterion-referenced grading for the LPC of the Aircrew Regulation , which measures performance against a fixed set of predetermined criteria or learning standards established through the mandatory manoeuvres and criteria set in Appendix 9.

It is necessary for the European aviation system to apply a criterion-referenced grading system for the rating and revalidation issue.

In addition, it is necessary for the feedback on the effectiveness of the training programme.

Therefore, the following tables provide an example for the grading system (VENN 1 to 5):

— The line between 1 and 2 should have the lowest variation possible between operators by a verification against a criterion-referenced system, while above grade 2, a norm-referenced system may be followed. This means that it may vary in the course of time and therefore the same performance may not obtain the same grading results.

year 1	1	2	3	4	5	Norm-referenced system
	Not proficient	proficient				Criterion-referenced system

year 2	1	2	3	4	5	Norm-referenced system
	Not proficient	proficient				Criterion-referenced system

Observe how the grading system in year 2 provides a grading of 5 to a lower pilot performance than year 1 and year 3.

year 3	1	2	3	4	5	Norm-referenced system
	Not proficient	proficient				Criterion-referenced system

ORO.FC.231(d) wording 'a grading system to assess'

The provision has been transposed from ICAO Doc 9995 paragraph 3.6.3:

> '3.6.3 Assessment and grading system. A full description of the competencies is provided in Appendix 1 to Part II. It is essential to note that an operator intending to use this framework should in addition develop a clear assessment and grading system for expected crew performance. Competencies are a fundamental component of the grading system. It is not the intention of this document to fully describe a grading system, but a grading system should be used for crew assessment, in addition to providing quantifiable data for the measurement of the training system performance. It can range from a simple 'acceptable/unacceptable' grading performance system to a graduated relative measurement system.'

ORO.FC.231(d) point (1)(iii)

Data integrity is the maintenance of, and the assurance of the accuracy and consistency of, data over its entire life-cycle and is a critical aspect of the design, implementation and usage of any system which stores, processes, or retrieves data.

Any unintended changes to data as the result of a storage, retrieval or processing operation, including malicious intent, unexpected hardware failure, and human error, is failure of data integrity.

ORO.FC.231(d) point (2)

Why do we need a verification of the grading system?

The EBT grading system provides a norm-referenced system, although it contains some characteristics of a criterion-referenced system (see above the general description for *ORO.FC.231(d)*) .

Glasser (1963) formalised the concept of criterion-referenced testing (CRT). The development of a CRT entails, firstly, a statement of behavioural objectives and then a systematic generation of test items designed to unambiguously ascertain to what degree these objectives have been met. Standards of performance are set using minimal levels of competence before the test is applied.

The elements of the development of a CRT (e.g. to unambiguously ascertain) are difficult to achieve in the EBT system for certain OBs and grading, especially with regard to non-technical skills, associated OBs and their grading. For example, a grade 3 ('The pilot communicated adequately, by regularly demonstrating many of the observable behaviours when required,

which resulted in a safe operation') in communication will require that all OBs are clearly and unambiguously defined. As an example, the OB 'Uses eye contact, body movement and gestures that are consistent with and support verbal messages' would require further criteria in the context of a particular scenario to reach the 'unambiguously ascertain to what degree the objective has been met' explained by Glasser (1963). These criteria could be at least 20 seconds of eye contact along with a body movement of three gestures (e.g. indicating with the arm the side of the aircraft affected) that support the verbal message of the explanation of an engine problem to the cabin crew.

Today, the revalidation of licences is based on a criterion-referenced system for the conduct of the training, tests and checks of Appendix 9 with regard to technical competencies (see FLIGHT TEST TOLERANCE, Appendix 9 to Part-FCL of the Aircrew Regulation). For the non-technical competencies, a norm-referenced system may be provided (see ORO.FC.115 &215 of the Air OPS Regulation).

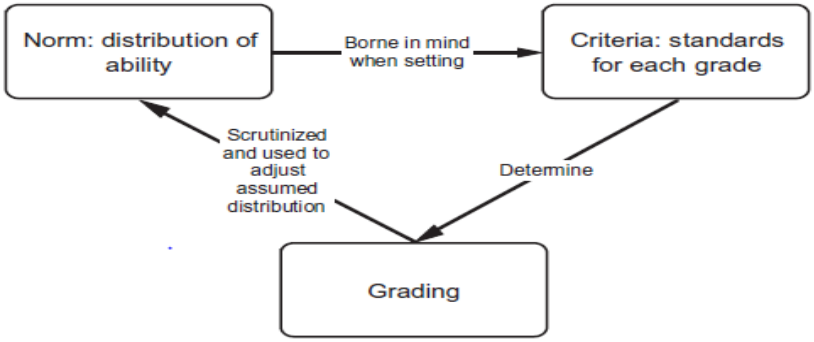
This use of a criterion-referenced system for revalidation of pilot licences ~~to~~ ensures a level playing field (one of the aims of the Basic Regulation — see Article 1). EBT proposes a norm-referenced system. In order to combine both methods, a feedback process is proposed. This process is recommended in different scientific works. EASA refers to the book 'Criterion-referenced and norm-referenced assessments: compatibility and complementarity' author: Beatrice Lok, Carmel McNaught & Kenneth Young.

An extract of this book is provided to support the need for the verification of the grading system in EBT. The book proposed a yearly verification of the grading system; however, instead EASA proposed a one-time feedback every 3 years.

Feedback process:

> There is no need to choose between norm referencing and criterion referencing. They are both present.
>
> — Not only are they both present, but with the caveat about minor adjustments from year to year, they are consistent. Thus, it is possible both to define rubrics (criterion referencing) and to prescribe grade-distribution guidelines (norm referencing), provided the latter contains a degree of flexibility.
>
> — The presence of norm referencing and criterion referencing in a loop enables the generation of both useful feedback to learners and useful summative information to external stakeholders.
>
> — The use of criteria allows meaningful reference to higher-order learning outcomes. While these are inevitably ambiguous and even unknown to external stakeholders, the simultaneous use of norm referencing *allows the* interpretation of these criteria to be supported by norm comparisons, and to guard against grade inflation.
>
> — Since these steps are all in a loop, there is no need to argue which one comes first.
>
> — The entire approach is coherent with modern quality-assurance and fitness-for purpose concepts.'

Assessment & Evaluation in Higher Education



Feedback loop.

AMC1 ORO.FC.231(d)(1)

Grading system

The rulemaking process of EBT raised discussions regarding the regulatory level it should have — IR, AMC or GM (e.g. GM2 ORO.FC.231(d)).

Airline associations represented in the EBT subgroup RMT.0599 believed that the operators should have the choice to use their own grading system without any involvement of the competent authority. Other stakeholders believed there should be a prescriptive approach in order to ensure that all pilots are assessed in the same way. Some of the arguments for such prescriptive approach are:

— As EASA will allow the revalidation of licences based on the EBT system and therefore based on the rate obtained within the grading system, all pilots in Europe should be graded in the same way given that pilots with a valid type rating can join any airline in the European market. Therefore, level playing field should be considered. This argument is relevant for points 1 and 2 in the scale proposed in the ~~is~~ ED Decision.

— A standardised grading system of airlines will allow a standardised approach to grading and therefore to forms and paperwork. This may simplify bureaucracy in the competent authorities across Europe. In addition, the potential benefits this standardised approach to the grading system would bring to the oversight functions of the competent authorities were discussed.

— Data exchange: EASA consulted some data experts whether a standardised approach to the grading system could bring benefits to all stakeholders[15]. The conclusion is that in order to facilitate the data exchange (which is of paramount importance nowadays), it is quite important to have a common grading system. Data preparation, normalisation and standardisation can take up to 90 % of the resources, while the actual data analysis may take only 10 %. A standardised approach to grading system, competency framework and OBs could reduce the data preparation and normalisation close to 100 %. It could additionally increase data exchange between stakeholders (de-identification is ensured

[15] The whole spectrum of stakeholders: airlines, competent authorities, accident and incident investigation authorities, safety analysts, etc. (there are plans to extend EBT to helicopters and business jets).

in accordance with the data protection regulations). Furthermore, platforms like the European Data4safety or the FAA Aviation safety information analysis and sharing (ASIAS) will largely benefit from a standardised approach. Note: The initiatives described above are planned on a voluntary basis and in full compliance with the GDPR.

Taking into account the above, EASA has decided to locate this provision at an intermediate regulatory level: AMC. This regulatory level allows an increased flexibility compared to IRs, whereby national authorities could approve deviations in accordance with AltMoC (ORO.GEN.120 of the Air OPS Regulation). Furthermore, an alternative grading system in AMC2 ORO.FC.231(d)(1) provides further flexibility to the operators.

Data exchange will be done in accordance with the data protection regulations (European and national).

On the other hand, some operators believe that in order to fulfil the 1 to 5 grading requirement, they will need to change their IT tools. This may be expensive. According to the RIA, the price of this system is around EUR 150 000 (one-off expense) and the same amount is needed every year (maintenance). For that reason, to avoid this one-off expense, the possibility for an alternative grading system was provided to allow those operators that have already invested in a system to continue to do so.

The grading provided in the AMC follows the criteria presented in the IATA Evidence-Based Training Implementation Guide, Chapter 6.4:

1. Fairness and accuracy

The grading system should allow the evaluation to be objective, fair, and relevant. It should be reliable, accurate, consistent and resistant to abuse, halo effects, instructor-evaluator laziness, ‘box ticking’ and bias, both positive and negative. Finally, it should ensure that pilots who are unable to fulfil competency performance expectations are not released to line service.

2. Clarity

The grading system should allow assessments to be transparent, clear, complete, unambiguous, and not subject to interpretation or confusion. It must also address the occasions where pilots do not have the opportunity to demonstrate a particular competency.

3. Usability

The grading system should be simple, easy to use, understandable, practical, manageable, accessible, uncomplicated, and resistant to unintentional errors. It should not dominate any debrief and should be compatible with facilitation. Finally, it should be compatible with any media to be used, electronic or otherwise.

4. Ease of compliance

The grading system should comply with both operator and CAA requirements. It should meet high-level regulations, allow auditing, and be traceable, explainable and long lasting. It should also ensure that any assessment is less liable to legal action.

5. Continuous improvement

The grading system should provide evidence to enable improvements in both the training system and trainee performance, for the purpose of enhancing safety. It should be meaningful, deliver useful data, identify trends, aid analysis and address existing, future or potential problems in order to improve the training system. It should enable trainees to provide feedback on their assessment in order to help improve grading consistency and the grading system. It should also enable the continuous development of the trainee's performance.

6. Motivating

The grading system should be motivating, trustworthy, respectful, and easy to 'sell'', so that both trainers and trainees enjoy the experience without creating fear. It should also recognize exemplary performance and promote commitment by both trainers and trainees to the assessment process.

7. Technical data management

The grading system should provide a manageable quantity of good data, be media compatible, easy to record and produce electronic data, compatible with analysis and presentation tools. It should also maintain data protection and assure controlled access.

8. Adaptability

The grading system should be adaptable, flexible and able to tailor to all facets of the operation, aircraft types and training objectives.

9. Implementation risk

The grading system should provide robust defences against the risks of ineffective implementation. The system should be comprehensible for trainers, enable efficient trainer standardisation, strong inter-rater reliability, and facilitate the identification of trainer divergence. It should be familiar to all users, cost efficient and resistant to drift and mutation.'

Further guidance to expand some of the characteristics is as follows:

— Fairness and accuracy: identifies evaluator divergence, facilitates instructor concordance, is not repressive, is not open to abuse, avoids positive/negative bias

— Usability: is acceptable to evaluators, avoids unintentional mistakes, is familiar and is not complicated

— Safety improvement: is compatible with facilitation, works towards excellence, is useful, identifies trends, is acceptable to operator, not costly, does not allow incompetent pass, improves system, continuous development

— Adaptability: customisable, cross-cultural.

AMC1 ORO.FC.231(d)(1) point (b)(2)

The wording 'competent for the conduct of line operations' means that the pilot is competent at an industry level, in order to ensure a level playing field. It is therefore NOT intended to be at

an airline level. This does not mean that the airline may require more than a grade 2 to allow the pilot to operate in their aircraft.

AMC1 ORO.FC.231(d)(1) point (b) Grade 5

The preferred scale of grading is 1 to 5 in order to ensure a good granularity on the pilot performance and allow the instructor to grade the norm. Although EASA allows alternative grading systems in AMC2 ORO.FC.231(d)(1) and therefore allows 1 to 4 grading, the initial intention was to measure competence performance (grade) in the same way, meaning 1 and 2 should mean the same in both grading systems as this is a key element for level playing field. EASA has decided to merge grades 4 and 5 in the alternative grading system and have only one grade: grade 4. Additionally, the equivalency of grades was extended to grade 3, and therefore grades 1 to 3 mean the same in both grading systems, while grade 4 in the alternative grading scale includes 4 and 5 in the standard EASA grading scale.

AMC1 ORO.FC.231(d)(1) point (c)

This provision is intended to ensure that the operator develops guidance for its instructors.

AMC2 ORO.FC.231(d)(1)

Grading system – alternative system

During the discussions in the context of the adoption of the EBT regulation (*COMMISSION IMPLEMENTING REGULATION (EU) 2020/2036 of 9 December 2020),* point (a) of this AMC was amended to ensure that the AltMoC procedure is used.

This AMC has been fundamentally developed for the case where a grading from 1 to 4 is used. In this case, grades 1 and 2 should be the same as for the EASA grading scale 1 to 5. Ideally, in the alternative grading system grade 4 represents the merge of grades 4 and 5 in the EASA grading system.

AMC3 ORO.FC.231(d)(1)

Recommended conduct of the grading - ORCA

This AMC has been inspired by the IATA Evidence-Based Training Implementation Guide, Chapter 6.6.

> ‘6.6 TECHNIQUES TO BE APPLIED IN GRADING
>
> Assessment is a continuous process throughout all training phases. It is the process of observing, recording, analyzing and determining crew performance against defined expectations in the context of overall performance. It includes the concept of self-critique and feedback, which can be given during training, or in summary thereafter.’
>
> Furthermore, this technique (observe, record, classify and assess/evaluate) is widely used in the competency-based interview in the domain of human resources. An example can be found in the book ‘assessment methods in recruitment, selection and performance’ by Robert Edenborough (2005). In this context and according to the author, the process is necessary in a competency-based assessment as ‘It identifies a stepwise process that prevents a too-rapid arrival at conclusions, which is the case if such a structure is not followed.’

AMC3 ORO.FC.231(d)(1) point (b) and AMC4 ORO.FC.231(d)(1) point (b)

There is a need to ensure a level playing field. Therefore, EASA has decided to have a standard approach to grading. This is supported in the original idea of EBT as evidenced in the IATA Implementation Guide Appendix D where the crew is graded on both days.

The fact that the EBT instructor grades the performance of the pilot in the EVAL and SBT does not mean that this grading is accessible to everybody:

— From a 'training system performance' point of view, this information is needed to demographically assess the level of performance of the pilot community before the module.

— From a 'nominated person flight OPS' point of view, the information needed is whether the pilot is competent or not competent to conduct line operations. This applies to both days; otherwise, the pilot shall not fly.

The decision to recommend grading at level 1 at the end of the EVAL, and SBT has been supported by the IATA Implementation Guide Chapter 6.5 Figure 6.2 – 'the 8 grading systems evaluated with scores' where it described that grading 'each competency on the session' and grading 'each competency on the session and on the scenario/manoeuvres training with the deviation below the norm' was the system that received the highest scores.

However, the EASA regulatory framework also allows for the purpose of creating a non-jeopardy environment and facilitating a better training experience in some cultures, the use of grading at level 0 in the training phase (SBT and/or MT). See AMC4 ORO.FC.231 (d)(1) point (b)(3)

When a grade level 0 (training completed/not completed) is used in the SBT, the EBT manager should review the conditions triggering tailored training and additional training of AMC4 ORO.FC.231(d)(1) point (d).

It is recommended that level 1 grading is still introduced in the database and de-identified later, in order to be able to extract statistical data insight.

AMC4 ORO.FC.231(d)(1)

Recommended grading system methodology – Venn Model

Assessment and grading form an integral part of the learning process. As part of the development of EBT as a new approach to competency-based training, a pilot performance assessment and grading system is required to address the fundamental shift from previous systems which are 'event-based' and require the assessment of the quality of the outcome of a manoeuvre or the management of the event or threat. In certain previous systems, behavioural markers or competencies were used as assessment tools or reason codes for the outcome of the manoeuvre or of the management of the event or threat. The paradigm shift in EBT is to focus the attention to the underlying areas of flight crew member performance to determine training needs or focus. EBT is a system designed to determine areas of focus for all flight crew members and not just those whose performance is observed below a minimum acceptable level. The system is intended to fulfil the needs of operators and has been created according to a structured design process.

Rationale

The assessment and grading system should meet the needs of the following stakeholders:

— Civil aviation authority (CAA) — performance of assessments for the revalidation and renewal of flight crew licences and/or ratings

— Operator — measurement of individual, crew, fleet and operator pilot performance and identification of development needs for both individuals and the system.

— Flight crew member — provision of information about performance measured during training, for the purpose of continuous development and improvement.

The system has been created considering the importance of a number of design criteria. After wide consultation, criteria were considered as follows:

Fairness and accuracy, clarity, usability, ease of compliance, continuous improvement, motivation, data management, adaptability, implementation risk

Following the criteria definition, the development process was segregated in the following steps, with agreed criteria being applied at each step to determine the optimum solution:

— System definition (what to grade: the whole event, parts of the event, individual actions or a combination with different granularity): to be consistent with the aims of EBT, it should be the competencies at predetermined points during the module.

— Grading scales (considering sensitivity and the need to identify unacceptable, minimum acceptable, norm and performance above the average): a 5-point scale is commonly used with grade 1 indicating unacceptable performance, the average being grade 3; grade 2 indicates the minimum acceptable performance, and 4 and 5 indicate performance above average. There are many arguments for and against the number of points on a scale and this should be finally determined by the operator and approved by the competent authority under the operations manual Part D.

— Word pictures: to assure the fulfilment of the criteria, in particular, fairness, accuracy and clarity, grades are described by standardised word pictures. They describe the VENN dimensions in a standardised way, and this facilitates inter-rater reliability. The VENN model described in this GM is based on the following measurements at predetermined points during an EBT module:

  A = HOW WELL (e.g. The pilot communicated ineffectively…)

  B = HOW OFTEN (e.g. …by rarely demonstrating…)

  C = HOW MANY (e.g. … any of the performance indicators when required…)

  D = OUTCOME (e.g. … which resulted in an unsafe situation).

In order to ensure consistency, a grading system should also be employed for the line evaluation of competence, with information provided for remediation where performance is determined to be below the minimum acceptable level, which in the example system is 1 on a 5-point scale.

Following a revision of the provisions related to grading, EASA proposed to move the word picture from GM2 ORO.FC.231(d)(1) to safety material as follows:

WORD PICTURE competency grading.

Application of knowledge (KNO)	
Description:	Demonstrates knowledge and understanding of relevant information, operating instructions, aircraft systems and the operating environment.

GRADE:	Word picture KNO
1	The pilot showed inadequate knowledge, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation.
2	The pilot showed knowledge at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation.
3	The pilot showed adequate knowledge, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation.
4	The pilot showed adequate knowledge, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation.
5	The pilot showed exemplary knowledge, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency.

Application of procedures and compliance with regulations (PRO)	
Description:	Identifies and applies appropriate procedures in accordance with published operating instructions and applicable regulations.

GRADE:	Word picture PRO
1	The pilot applied procedures ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation
2	The pilot applied procedures at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation.
3	The pilot applied procedures adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation.
4	The pilot applied procedures effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation.
5	The pilot applied procedures in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency.

Communication (COM)	
Description:	Communicates through appropriate means in the operational environment, in both normal and non-normal situations.

GRADE:	Word picture COM
1	The pilot communicated ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation.
2	The pilot communicated at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation.
3	The pilot communicated adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation.
4	The pilot communicated effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation.
5	The pilot communicated in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency.

Aeroplane flight path management — automation (FPA)	
Description:	Controls the flight path through automation.

GRADE:	Word picture FPA
1	The pilot managed the automation ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation.
2	The pilot managed the automation at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation.
3	The pilot managed the automation adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation.
4	The pilot managed the automation effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation.
5	The pilot managed the automation in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency.

Aeroplane flight path management — manual control (FPM)	
Description:	Controls the flight path through manual control.

GRADE:	Word picture FPM
1	The pilot controlled the aircraft ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation.
2	The pilot controlled the aircraft at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation.
3	The pilot controlled the aircraft adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation.
4	The pilot controlled the aircraft effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation.
5	The pilot controlled the aircraft in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency.

Leadership & teamwork (LTW)	
Description:	Influences others to contribute to a shared purpose. Collaborates to accomplish the goals of the team.

GRADE:	Word picture LTW
1	The pilot led or worked as a team member ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation.
2	The pilot led and worked as a team member at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation.
3	The pilot led and worked as a team member adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation.
4	The pilot led and worked as a team member effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation.
5	The pilot led and worked as a team member in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency.

Problem-solving — decision-making (PSD)	
Description:	Identifies precursors, mitigates problems, and makes decisions.

GRADE:	Word picture PSD
1	The pilot solved problems or made decisions ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation.
2	The pilot solved problems and made decisions at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation.
3	The pilot solved problems and made decisions adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation
4	The pilot solved problems and made decisions effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation.
5	The pilot solved problems and made decisions in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency.

Situation awareness and management of information (SAW)	
Description:	Perceives, comprehends and manages information and anticipates its effect on the operation.

GRADE:	Word picture SAW
1	The pilot's situation awareness was inadequate, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation
2	The pilot's situation awareness was at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation
3	The pilot's situation awareness was adequate, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation
4	The pilot's situation awareness was good, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation
5	The pilot's situation awareness was exemplary, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency

Workload management (WLM)	
Description:	Maintains available workload capacity by prioritising and distributing tasks using appropriate resources .

GRADE:	Word picture WLM
1	The pilot managed the workload ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation.
2	The pilot managed the workload at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation.
3	The pilot managed the workload adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation.
4	The pilot managed the workload effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation.
5	The pilot managed the workload in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency.

AMC4 ORO.FC.231(d)(1) point (d)

The provisions of EBT regarding grading are more detailed than those provided for legacy training in ORO.FC.230 where there is no definition of what training may be required after LPC failure or OPC failure. Remediation may include FSTD training, line flying under supervision (LIFUS), or something else depending on the circumstances (e.g. virtual reality training).

GM1 ORO.FC.231(d)(1)

A simple practice during the classification of the observations recorded during the simulator session against the OBs is to classify the OBs as positive or negative (e.g. Level 0) and when it is not clear, undetermined. This practice may facilitate the assessment and evaluation step to determine the grade.

AMC1 ORO.FC.231(d)(2)

VERIFICATION OF THE ACCURACY OF THE GRADING SYSTEM

The concept behind this provision and the associated AMC and GM has been transposed from the ‘Alternative training and qualification programme’ (ATQP). However, to adapt the concept to EBT, the requirement suffered a complete shift.

Background

In ATQP, it is required to have a criterion-referenced system to be able to measure the effectiveness of the training programme. This criterion-referenced system is set by the operator in ATQP.

A criterion-referenced system is set up by the regulator in the LPC. Appendix 9 defines a set of manoeuvres (mandatory manoeuvres) and a set of task-targets (see Appendix 9 'Conduct of the proficiency check — Flight tolerances') which form a criterion-referenced system.

ATQP also benefits from this criterion-referenced system of Appendix 9 because every year the ATQP pilots are required to complete an LPC (also see point (a)(6) of AMC1 ORO.FC.A.245 below).

The method for the assessment in ATQP is follows:

1. A task and subtask analysis of each event;
2. Each event has one or more specific training targets/objectives, which require the performance of a specific manoeuvre;
3. For each event, the proficiency that is required to be achieved should be established;
4. The conditions pertaining to each event should also be established;
5. Each event should include a range of circumstances under which the crews' performance is to be measured and evaluated;
6. The behaviour marker must be specified; and
7. The operator should measure and monitor the progression, and target must be achieved.

AMC1 ORO.FC.231(d)(2) point (b)

The EASA EBT checklist for mixed EBT implementation already provides the criteria to complete Appendix 9 (e.g. element 3.6 may credit item 3.4) and this point follows the same approach.

3.4.0 to 3.4.14 (M)	Normal and abnormal operations of systems. Minimum of 3 for the crew.
3.6.1 to 3.6.9 (M)	Abnormal and emergency procedures. Minimum of 3 for the crew.

GM1 ORO.FC.231(d)(2)

The 'desired outcome' in some of the elements in the table in GM1 ORO.FC.231(d)(2) have been transposed from the Appendix 9 guidance from AustroControl https://www.austrocontrol.at/jart/prj3/ac/data/dokumente/HB_LSA_PEL_002_2018-03-29_1203646.pdf.

ORO.FC.231 point (e) SUITABLE TRAINING DEVICES AND VOLUME OF HOURS TO COMPLETE THE OPERATOR'S EBT PROGRAMME.

These two elements are important pieces in ensuring a safe implementation of an EBT programme.

ORO.FC.231 point (e)(1) FSTD qualification level

The requirement follows a performance based philosophy that should allow:

(a) to match the detailed provisions, further explained in the AMC1 ORO.FC.231(e) point (c) with regard to the FSTD qualification required to deliver the EBT programme,

with

(b) the requirements to certify the FSTD which are currently (year 2023) contained in CS-FSTD — see https://www.easa.europa.eu/regulations.

Therefore, the IR provides the safety objective and remains technology agnostic to allow a proper evaluation of the regulatory framework.

ORO.FC.231 point (e)(2)(iii) Volume of hours to complete the operator's EBT programme

Recommendation[16]: the introduction of an EBT programme alone should not be used as a rationale to drive a reduction in the duration of the operator's existing recurrent FSTD training and checking programme.

AMC1 ORO.FC.231(e) VOLUME AND FSTD QUALIFICATION LEVEL

AMC1 ORO.FC.231(e) point (a)

The provision has been transposed from ICAO Doc 9995 (Part II paragraph 1.1.1).

> 'Appendices 2 to 7 form the basis for the construction of EBT recurrent assessment and training programmes. In order to address all assessment and training topics at the defined frequency, a training programme of 48 FSTD hours over a three-year period for each flight crew member has been assumed. This EBT recurrent assessment and training should be conducted in an FSTD qualified for the purpose.'

Part I paragraph 3.6.1

> 'The EBT recurrent assessment and training of the competencies (contained in Appendix 1 to Part II) are considered over a three-year recurrent assessment and training period. For the purposes of the construction of model training programmes as listed in Appendices 2 to 7 to Part II, the programme has been developed to include a notional exemplar 48 hours for each crew member over a three-year period in a suitably qualified flight simulation training device (FSTD). The training programme is divided into modules. The three phases of a module (evaluation, manoeuvres training and scenario-based training) are described in Chapter 7 of Part I.'

AMC1 ORO.FC.231(e) point (c)

EASA is currently updating the requirements for FSTDs through RMT.0196 'Update of flight simulation training device requirements'. More information about this RMT is available under https://www.easa.europa.eu/document-library/rulemaking-subjects/update-flight-simulation-training-devices-requirements.

Currently, Appendix 9 to Part-FCL of the Aircrew Regulation requires the FSTDs used to revalidate a type rating in the context of CAT to meet the standards required for 'training to proficiency'. There was a consensus in the RMG to provide a similar requirement for the EBT programmes. The actual drafting of the text for this provision was agreed with EASA FSTD experts and members of RMG RMT.0196. RMG RMT.0599 did not have experts in this subject and therefore the text was simply accepted with no further discussion.

[16] This recommendation was already included in the explanatory note to the ED Decision 2015/027/R chapter 2.4 point 'Implementation of EBT programme'

The reasoning behind the text proposed is related to the EASA certificate awarded to each FSTD. Each certificate (see EASA Form 145 in Appendix IV to Annex VI (Part-ARA) to the Aircrew Regulation) contains a table in paragraph 'L' named 'Guidance information for training, testing and checking considerations'. The line 'Proficiency check YES/NO' covers this item.

Below are some of the considerations of the RMG for the actual and future development of FSTDs to maximise effectiveness when used as part of an EBT programme:

(a) Environmental effects:

(1) Weather

(2) Real-time full environment simulation without limitations and demand on the instructor to code effects, layers of clouds, etc. repetitively during a session

(3) Enhancement of the availability of cumulonimbus and storms with a strong correlation to motion cues

(4) Availability of multiple storms and cumulonimbus to create a more realistic and challenging weather profile

(5) Greater variation in precipitation effects

(6) Better-modelled ground effects; especially, variations in friction caused by water, snow and ice

(7) ATC

(8) To maximise realism and the benefits of EBT, the air traffic control (ATC) environment needs simulation with context-specific ATC interactions. Creating a normal, dynamic and distracting ATC environment is challenging for an instructor to achieve and is a diversion from the instructor's primary task of observing flight crew members.

(b) Aircraft effects

(c) Greater accuracy in modelled engine malfunctions based on engine OEM data with motion and sound effects that are more realistic

Currently, EASA is working on a process to allow aviation blended learning environment (ABLE) to support FSTD training. This will optimise the use of available FSTD time.

When this process is in place as an approved AMC, the requirement for FSTD training may be replaced by requirements for training in any combination of devices supporting the specific tasks.

AMC1 ORO.FC.231(f) point (b) Step 1

AMC1 ORO.FC.231(f) point (b) Steps 1

EQUIVALENCY OF MALFUNCTIONS - PROCESS

'Look at (review) all aircraft system malfunctions provided by the OEM.' This wording has been used instead of a more prescriptive wording such as flight crew operating manual, because each manufacturer has a different title for the document which contains the malfunctions relative to the aircraft (e.g. Airbus label this FCOM, Boeing FCOM and AFM — other manufacturers use AFM). The quick reference handbook (QRH) is normally not an exhaustive list of malfunctions.

AMC1 ORO.FC.231(f) point (b) Steps 1 and 2

Steps 1 and 2 provide a similar concept to today's AMC1 ORO.FC.230(a)(4)(i)(A), where the list of major system malfunctions is selected (as per industry best practices) from the list of malfunctions of the real aircraft (not from the list of malfunctions provided by the FSTD). Then the operator selects the ones that are considered 'major' and covers them in a 3-year training period. The EBT malfunction clustering follows a similar approach where from the list of malfunctions of the real aircraft, the operator selects the ones that put a significant demand on a proficient crew.

GM1 ORO.FC.231(f) has been developed to illustrate the concept of significant demand on a proficient crew.

Once the malfunction is determined as putting a significant demand on a proficient crew, this means that it will have one or more of the five characteristics included in GM2 ORO.FC.231(f).

AMC1 ORO.FC.231(f) point (c)

This point has been introduced in the AMC as per ICAO Doc 9995 paragraph 3.8.2 which provides the following text:

> '3.8.2 Practical training in the management of aircraft system malfunctions. Aircraft system malfunctions to be considered for the evaluation and scenario-based training phases are those that place a significant demand on a proficient crew. All malfunctions not covered by this characteristic continue to require review and appropriate procedural knowledge training with different means than considered in the recurrent EBT training conducted in an FSTD.'

and from Table I-3-1. 'Malfunction characteristics and crew performance'

> 'Note — This refers to the case of recurrent training and assessment conducted in an FSTD qualified by the CAA at the appropriate level for recurrent training and assessment. Other malfunctions not covered by the characteristics detailed in 3.8.2 and 3.8.3 continue to require review and appropriate procedural knowledge training conducted in a less qualified but suitable environment (classroom, flight procedures training device, etc.), as an additional component of EBT. This is intended simply as a means of offloading the need to perform such training in a highly qualified FSTD, which has much greater potential benefit in other areas'.

AMC1 ORO.FC.231(f) point (c) — wording 'malfunctions included in the equivalency of malfunctions'

This wording is related to the definition of 'malfunction clustering' introduced in Annex I to the Air OPS Regulation.

AMC1 ORO.FC.231(f) point (c) — wording 'equivalency of malfunctions'

Equivalency of malfunctions contains all the malfunctions that put a significant demand on a proficient crew, regardless if they are included or not in the FSTD programme.

Point (c) has been transposed from ICAO Doc 9995, Paragraph 3.8.2, and table I-3-1 Note:

'All malfunctions not covered by this characteristic continue to require review and appropriate procedural knowledge training with different means than considered in the recurrent EBT training conducted in an FSTD'

The intention is to require the pilot to be trained in each of the malfunctions that put a significant demand on a proficient crew. EASA avoids on purpose examples such as multiple-choice test or online PowerPoint presentations. Instead, EASA proposes advanced computer-based training and ABLE to foster new training means.

AMC1 ORO.FC.231(f) point (c) — wording 'EBT FSTD programme'

This refers to the 3-year EBT FSTD programme.

AMC1 ORO.FC.231(f)(3)

CREW EXPOSURE TO AT LEAST ONE MALFUNCTION FOR EACH CHARACTERISTIC

EASA considered this provision an important safety objective; for this reason, originally this provision was at IR level. However, in order to provide flexibility to operators when malfunction clustering has a limited number of emergencies pertaining to degradation of aircraft control and loss of instrumentation (which varies from aircraft type to aircraft type), EASA moved this provision to AMC level. The limitation explained before creates a burden and limits the construction of line-orientated scenarios (EVAL and SBT). This feedback derives from operators that have already implemented mixed EBT. Having this provision at AMC level allows for the use of AltMoC in accordance with ORO.GEN.120.

GM1 ORO.FC.231(f)

Equivalency of malfunctions – significant demand on a proficient crew

The concept of 'significant demand on a proficiency crew' has been introduced by ICAO Doc 9995 since 2013 but ICAO has never explicitly explained the concept.

GM1 ORO.FC.231(f) addresses this issue by providing human performance-based criteria to determine when the management of the aircraft system malfunction is placing significant demand on a proficient crew.

The definition of the criteria permits the identification of the pilot competencies that are specifically challenged during the management of the procedure and the characteristic of the aircraft system malfunction procedure.

The identification of the pilot competencies ('challenged competencies') facilitates the design of the training syllabus related to the equivalency of malfunctions and supports a consistent assessment of the crew member proficiency by the instructor/evaluator.

GM4 ORO.FC.231(f)

EQUIVALENCY OF MALFUNCTIONS PROCESS — DELPHI

The Delphi method is a structured communication technique or method, originally developed as a systematic, interactive forecasting method that relies on a panel of experts. The experts answer questionnaires in two or more rounds. After each round, a facilitator or change agent provides a de-identified summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgements. Thus, experts are encouraged to revise their earlier answers in light of the replies of other members of their panel. It is believed that during

this process, the range of the answers will decrease and the group will converge towards the 'correct' answer. Finally, the process is stopped after a predefined stop criterion (e.g. number of rounds, achievement of consensus, stability of results) and the mean or median scores of the final rounds determine the results.

As a reference, the figure of 50 % of the instructor community was provided for the following reasons:

— The malfunction clustering should be adapted to the level of training and culture of the company. Therefore, the number of instructors should be sufficient.

— The EBT should involve the instructors and examiners as much as possible and this community should participate as much as possible in the development of the programme. A high level of participation may indicate that instructors and examiners are committed to implementing EBT.

— Minimisation of errors: a large community of SMEs (50 % of instructors and examiners) are more likely to provide unbiased results; personal views and biased opinions may be discarded by the average results.

SPT.012 — Safety material for EBT — Equivalency of malfunctions

Equivalency of malfunctions process – DELPHI – criteria on elaboration of malfunction clustering

The analysis of the grouping of abnormal and emergency procedures should only be carried out by a TRI EBT/SFI EBT or TRE EBT/SFE EBT in possession of the type rating of the aeroplane to be analysed.

Abnormal and emergency procedures should be considered in isolation from any environmental or operational context. However, the operator should establish a minimum standardisation guide for those instructors/examiners who are going to carry out the study, in which some guidance is provided to analyse the procedures depending on the flight phase or conditions present, because significant differences will appear at the time of evaluation. For instance, an abnormal procedure AIR PACK 1+2 FAULT does not have the same consequences below FL100 as at the maximum aircraft flight level.

Standardisation guidance

— The subject matter experts (SMEs) that develop the malfunction clustering should consider that the abnormal/emergency condition will remain when steps to fix the malfunction are included in the malfunction procedure (e.g. the failed engine will not restart, or the fuel pump remains failed after the reset, or the electric generator is not fixed after the reset, etc.). To this end, the operator should reproduce the malfunction in the FSTD programme in the same way (no restart of the engine, or successful reset of the fuel pump or electric generator) in order to meet the characteristics assumptions. The operator may include successful resets or restart in addition to the malfunctions considered for the characteristics. When a reset puts a significant demand on a proficient crew, then both options should be included in the malfunction clustering and therefore

the same malfunction should be evaluated for both cases: for successful reset/restart and for unsuccessful reset/restart.

— Whenever the possibility of icing is specified in the abnormal/emergency procedure, then it is assumed that this meteorological condition is present (e.g. in case of 'pitot heating', it is assumed that the conditions of icing are present). This case should follow the same principle as in the previous paragraph, where the EBT FSTD programme should include the icing condition when triggering the pitot heating.

— Other possibilities require proper analysis.

Grading

— The grading varies from 1 to 5. 1 corresponds to the lowest level of malfunction characteristic. 5 corresponds to the highest.

— When using the abbreviated procedure and using a scale different from the recommended one (1 to 5), the same principles covered in this safety promotion material may be applied.

— The abnormal/emergency procedures to be graded are for the standard malfunctions for the type of aircraft (e.g. the malfunctions of the FCOM in A320) approved for the EBT programme.

— The other malfunctions of the different versions of the aircraft models in the operator's fleet (e.g. A321 / 319 / 320B4S, etc.) will be subject to a later revision and will be included in the 3-year period within the EBT topic 'Operation- or Type-specific'.'

Minimum criteria

A minimum of guidance is established when assigning a value to each of the characteristics of abnormal/emergency/non-normal procedures for the standardisation purpose of the analysis. OEM specific wordings (e.g. red/amber ASAP, direct law) have to be adopted for other OEMs.

Immediacy

'Immediacy': System malfunctions that require immediate and urgent crew intervention or decision to manage the malfunction based on the worst scenario. (e.g. malfunctions with memory items).

When using a scale of 1 to 5, the following references may apply:

— If the caution or warning displays only crew awareness: minimum rating 1.

— If it contains an amber 'land as soon as possible' (ASAP) warning: minimum rating 2.

— If it contains a red 'land as soon as possible' (ASAP) notice: minimum rating 3.

— If it is a procedure of memory steps: minimum rating 5.

Complexity

'Complexity': System malfunctions that require recovery procedures with multiple options to analyse and/or multiple decision paths to apply'. System malfunctions with complexity have normally all of the following:

- Require an increase of the flight crew cognitive resources for management of the procedures,
- Increase the flight crew workload, and
- Affect the normal aircraft handling characteristics.

When using a scale of 1 to 5, the following references may apply:

— If the caution or warning displays only crew awareness: minimum rating 1.

— If the caution or warning includes steps: minimum rating 2.

— If the caution or warning contains or must be followed by a computer reset: minimum rating 2 (depending on the complexity of the reset).

Degradation of control

'Degradation of aircraft control': System malfunctions that result in significant degradation of flight control in combination with abnormal handling characteristics. System malfunctions with degradation of control result in the modification of the normal aircraft handling characteristics or pitch attitude during approach and landing.

Any condition that implies an extra difficulty to fly the aeroplane will be taken into account for the characteristic of degradation of control (which may not be limited to the flight control system), e.g. loss of flight protections laws, loss of power plant, etc.

When using a scale of 1 to 5, the following references may apply:

— One engine inoperative flying (engine failure in multi-engine aircraft): minimum rating 3 (except for some aircraft types with automatic yaw compensation in engine failures).

— Alternative law flight (direct law with landing gear down): minimum rating 3 or4 (depending of the aircraft type flying characteristics).

Loss of instrumentation

'Loss of instrumentation': System malfunctions that require monitoring and management of the flight path using degraded or alternative displays. Normally these system malfunctions result in a temporary or permanent loss of any parameter related to the flight path which is displayed on a Primary Flight Display, Head-Up Display or Navigation Display. Therefore, the management of the flight path is assumed to be performed by the use of degraded or alternative displays, either temporarily or permanently

The characteristic to be assessed is not solely due to loss of the PFD, HUD or ND. Abnormal/emergency procedures that imply flying with loss of relevant information for primary aircraft systems should also be assessed. This principle increases the number of malfunctions available for this characteristic to allow a better design of EBT FSTD sessions.

When using a scale of 1 to 5, the following references may apply:

— Loss of display units: minimum rating 2.

— Significant loss of primary information related to systems (speeds, flap or slat position, fuel figures, etc.): minimum rating 2.

— Loss of information related to abnormal and emergency procedures (FWC 1 + 2 FAULT, SDAC 1 + 2 FAULT, etc.): minimum rating 3.

— Loss of information due to single failure (1 ADR Fault, 1 IR Fault, discrepancy messages, etc.): minimum rating 2.

— Loss of information due to double failures (1+2 ADR Fault, 1+2 IR Fault, disagree messages, etc.): minimum rating 3/4.

— Total loss of information (ADR 1+2+3 Fault, IR 1+2+3 fault, unreliable speed indication, etc.): minimum rating 5.

Management of consequences

'Management of consequences': System malfunctions that affect significantly the flight crew standard task sharing and/or the workload management and/or the decision-making process during an extensive period.

When using a scale of 1 to 5 the following references may apply:

— Consequences for the category of approach and landing or the required CAT II/III equipment: minimum rating 2.

— Consequences for the minimum navigation requirements: minimum rating 2.

— APP PROCEDURE in the STS: minimum rating 3.

— One engine inoperative landing: minimum rating 3.

The operator, once the equivalency of malfunctions process has been completed, may reflect maximum and minimum difficulty values for each malfunction characteristic in its training manual . Depending on the difficulty value, the malfunction will be included in the different phases of the EBT module (e.g. maximum EVAL value 20, while SBT accepts a maximum of 25).

ORO.FC.231(g) and related AMC and GM

APPROACHES THAT PLACE AN ADDITIONAL DEMAND ON A PROFICIENT CREW

The RMG developed a definition of the concept as follows: ''equivalency of approaches' refers to approaches relevant to operations determined by a defined method, leading to a reduced frequency of approaches with an increased focus on the operational relevance rather than just on the conduct of an approach which is not realistic in the operational context'.

— Introduction

ICAO Doc 9995 recommends approach clustering ('equivalency of approach types') as a way to avoid repetitive training on approaches that require the same actions by the pilot ('underlying elements of flight crew performance to conduct them'). It also recommends avoiding those approaches that are typically flown during line operations ('Frequency of training may be reduced for types of approaches that are conducted regularly in line operations.'). However, ICAO Doc 9995 does not explain how to carry out an 'equivalency of approach types' process.

Additionally, the recurrent training requirements specified in Part-SPA do not reflect the reality of normal operations. For instance, the use of the HUD in generation 3 and 4 aircraft types is usually mandated by the operator for all phases of flight, and therefore the requirement to carry out the approaches for recurrent training specified in Part-SPA

does not reflect the EBT concept of incorporating approaches that are not conducted regularly in line operations.

— Approach types

The industry has moved from essentially three different approach genres (non-precision, precision and low-visibility operations (LVOs)) to a multitude of different approaches utilising satellite- and ground-based enhancements. This allowed curved approaches and approaches with varying gradients. While an aircraft's acquisition of the flight path has changed significantly, the 'underlying performance' for crews to perform the approaches has changed only a little, as the OEMs have made the pilot interface with the autopilot and the displays very similar to conventional approaches (i.e. ILS). The main change from a pilot's viewpoint is the introduction of HUD and emergency vision assurance system (EVAS).

Essentially, ICAO Annex 6 has delineated the approach types as two-dimensional (2D) and three-dimensional (3D) approaches, and Type A and B in accordance with the 'achieved' minima. Most generation 3 and 4 aircraft types have the same autopilot/pilot interface and displays for all 3D approach methods, irrespective of whether or not the approach is Type A or Type B. Variations do exist for the conduct of 2D methods depending on OEM.

ICAO Doc 9995 groups aircraft into generations, with the biggest groups being the generation 4 and 3 jets. The delineation between the two generations is based upon whether or not the aircraft has fly-by-wire and flight envelope protections. While this delineation is entirely relevant and useful to derive recurrent training programmes, it does not necessarily reflect the avionics capability or the pilot's interface with the autopilot. For example, the B 747-8 is assigned to generation 3 as it has conventional flight controls. Therefore, by clustering approaches in accordance with the aircraft generation would unnecessarily penalise some aircraft types.

— HUD and EVAS

Generation 4 and generation 3 aircraft types fitted with a HUD utilise it for all approaches, irrespective of whether or not they are Type A or Type B utilising 3D or 2D methods. This is the standard mode of operation.

Similarly, the use of EVAS, although not currently fitted to generation 3 and 4 aircraft types, is again the standard mode of operation and utilised for all approaches. For recurrent training, flying additional approaches to revalidate the use of the HUD is simply replicating normal line operations with a little benefit. The operator can assure pilot proficiency in the use of HUD and EVAS by the 'line evaluation of competence', when it will be used in the real operational context.

— Go-around training

Go-around training is not considered in this section because the go-around training frequency is defined by the table of assessment and training topics and is in excess of that required by Part-SPA.

— Approach clustering

In the absence of guidance in ICAO Doc 9995, the principles used for malfunction clustering have been adopted to create a similar concept for approach clustering. Two principles in particular have been considered:

— approaches that place an additional demand on a proficient crew; and

— approaches should be selected according to certain characteristics.

For the first principle, the emphasis has been changed from 'significant demand' to 'additional demand'. This is because the approach will normally be flown at the end of a scenario within the EVAL or SBT. That scenario will have included malfunctions and other training topics that have already added 'significant demand' on the crew. The approach chosen should therefore contain good training value and realism, without compromising the learning by adding workload on top of workload. For example, a scenario involving a significant malfunction has better value and realism if concluded with an autoland rather than a circling approach.

For the second principle, the concept of approach characteristics has been adopted. ICAO Doc 9995 lists eight 'parameters' that can be used in a clustering process; however, many seem to be types of approaches rather than characteristics. Instead, it was determined that approach characteristics can be divided into three groups, which are listed in the AMC with examples given in the GM.

— Types and frequency of approach training

As stated earlier, the EBT generation delineation of aircraft types is not useful when comparing avionics and pilot interface/display information. Many generation 3 and 4 aircraft types have a single button push for all approaches, with little or no changes in the displayed information. It would seem therefore appropriate to analyse the aircraft in these generations to review the appropriate types to develop an 'approach generation/group'.

A focus of EBT is to remove extraneous training for which there is little safety benefit or evidence of need, and in particular those approaches that are regularly performed in line operations. Additionally, an operator will seek a simple system that allows for the variation in the definition of training topics throughout the semester to cater for the trainees' needs. Mandating repetitive approaches would not be beneficial to the operator or the trainee alike.

Using the frequencies defined in ICAO Doc 9995, and applying the emphasis intended by EBT, the following has been derived.

Type	Flight method	Phase	Frequency
A	3D	EVAL & SBT	B
B	3D	EVAL & SBT	B
A	2D	MT	B

The operator's policy generally defines which flight method should be used on line operations to conduct this kind of approaches.

These recommendations should be followed by crews during EVAL.

During SBT or MT, it should be considered interesting to adapt the conduct of the selected approaches in order to develop specific competencies.

There is no intention to define here that a pilot has to be pilot flying (PF) for each approach; this is because it is part of the line-orientated scenarios. Any approach that is required to be flown specifically in the PF role should be classified as 'skills retention'; therefore, it should be trained in the MT.

The above mentioned approaches should be flown simulating normal operations. An enhanced vision system (EVS) or enhanced flight vision system (EFVS) or head-up display (HUD) should be utilised, if required in normal operations.

The allocation of the types of approaches into either the EVAL and SBT or the MT is determined by the purpose of the exercise. 3D approaches are the most commonly flown in normal operations and would therefore be the most relevant and realistic to be included in training scenarios. They will additionally be chosen to place an additional demand on a proficient crew.

In contrast, a 2D approach is typically flown less frequently, and normally only, if a 3D approach is unavailable due to aircraft or airport downgrade. For some modern aircraft types (e.g. A380, Boeing 787), multiple, unrealistic failures have to occur before a 2D approach is required. Additionally, the flight crew procedures to fly a 2D approach typically demand more automation management skill than a 3D approach. The MT is precisely what this is for: to enable the pilot to retain the skill to fly low-probability but higher-risk manoeuvres. The principle behind this type of training is skills retention.

The B frequency has been considered appropriate for two reasons. First, to align with the malfunction clustering B frequency, and second, to fit in the requirements of EVAL and SBT. In a typical EBT programme, there will be 8 to 10 approaches in these phases per year. As noted earlier, it would be inappropriate to add approaches with additional workload to scenarios that already place a significant demand on a proficient crew. Therefore, mandating at least two 3D approaches of different flight methods with additional demand per year has been considered the correct number.

AMC2 ORO.FC.231(g) Evidence-based training

Equivalency of approaches relevant to operations – specific approval

The rationale behind this AMC is that the operator has conducted a review of the approaches. It has taken into account which of them place a significant demand on a proficient crew and the characteristics of each of them. Therefore, more is done in terms of approaches within an operational context than is done today. EBT offers a frequency of B for specific approvals. Currently, ATQP also offers a frequency B for specific approvals.

ORO.FC.231(h) wording 'competence'

Line evaluation of competence

The heading of the rule is 'line evaluation of competence'. The word 'competence' has been selected instead of 'competency', because EASA wanted to reflect that an assessment of the competencies must be made and the pilot has to reach a certain level of performance: 'competence'.

ORO.FC.231(h)(1)

The safety objective is stated in the IR. The sentence 'undertake a line evaluation in an aircraft to demonstrate the safe, effective and efficient conduct' has been transposed from ICAO Doc 9995, FOREWORD and in Part I, paragraph 1.6:

> 'The aim of this programme is to develop and evaluate the identified competencies required to operate safely, effectively and efficiently in a commercial air transport environment'

'Normal line operations' has been used because ORO.FC.230 point (c)(1) uses the same wording:

> '(1) Each flight crew member shall complete a line check on the aircraft to demonstrate competence in carrying out normal line operations described in the operations manual.'

The provision on the line evaluation of competence is intended to have the same scope as the line check currently has. Obviously, this implies successful demonstration of competence in the management of any abnormal or emergency situations that may occur during the flight. Therefore, the use of 'normal line operations' does not refer to the malfunctions; it refers to a normal flight (not test flight, not maintenance flight, etc.).

ORO.FC.231(h)(1) wording 'in an aircraft'

The wording 'in an aircraft' is used in this IR to remove any ambiguity as to where the line evaluation may be undertaken. EASA noted that in GM1 ORO.FC.230 point (c) there is a mention of 'line check and proficiency training and checking' in an FSTD. This was no transferred into GM1 ORO.FC.231.

ORO.FC.231(h)(3)(i)

The intent of this rule is to continue to permit those operators who had been conducting ATQPs for more than 24 months and can, therefore, continue to apply for a 24-month line evaluation (check under ATQP) periodicity when they transition to an EBT programme. This does not apply under the mixed EBT implementation phase, ORO.FC.230 and ORO.FC.245 remain applicable.

Under this IR, it is left to the discretion of the competent authority whether it will grant a 24-month validity period for line checks to those operators who had not previously conducted an ATQP. However, the competent authority shall ensure that the operator is fully conversant with a competency-based evaluation system prior to applying this rule.

The reason behind allowing extensions of validity periods in the line evaluation of competence (line check) is the following:

- Legacy training requires one line check per year.
- ATQP provides an alleviation of one line check every 2 years because it requires a line-orientated evaluation (LOE) per year. That means that two LOEs substitute one line check.

— EBT provides more opportunities than the ATQP for LOE, because both in EVAL and in SBT line-orientated flights are required twice per year (EBT requires two modules a year).

ORO.FC.231(h)(3)(i)

The 3-year extension of the 'line evaluation of competence' is subject to a line-orientated safety audit programme. The wording that described the intent of such a programme has been transposed from ICAO Doc 9803 Line operations safety audit (LOSA) 'It is an organisational tool used to identify threats to aviation safety, minimize the risks such threats may generate and implement measures to manage human error in operational contexts'.

AMC1 ORO.FC.231(h) Evidence-based training

The AMC has been developed following the principles contained in AMC1 ORO.FC.230 point (b)(3) on line check. For some of the points, there is almost a direct transposition with only minor amendments. For others, the amendments are extensive.

AMC1 ORO.FC.231(h) point (a)

The requirement is extracted from AMC1 ORO.FC.230 (b)(3)(i) with the proper modifications:

> '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.'

AMC1 ORO.FC.231(h) point (d)

This provision has been transposed from the current AMC1 ORO.FC.230 point (b)(3)(v)

> 'Line checks should be conducted by a commander nominated by the operator. The operator should inform the competent authority about the persons nominated. (...)'

Before starting the EBT course and when the training department is selecting a commander to be nominated as a line evaluator, the training department should consider the following:

- Whether he/she has excellent knowledge of the operating procedures, the use of checklists used by the operator and its documentation.
- Their level of technical competence.
- Their previous experience as instructors or examiners, either as ground instructors or in-flight, in the aviation domain or outside.
- Experience in a feedback process for the monitoring of line operations (i.e. LOSA).
- Human factors. Do they have the necessary soft skills?

AMC1 ORO.FC.231(h) point (f) wording 'validity period'

The wording for 'validity period' is similar to that used in ORO.FC.245(d).

The revalidation window has been maintained in 3 months after extensive discussions within EASA about the appropriateness of 6 months in line evaluations of competence with validity periods of 2 or 3 years that would also be in line with other periods of validity that exist in Part-FCL (e.g. revalidation of a rating). However, as the forthcoming EASA Opinion on all-weather operations (RMT.0379) and the update of ORO.FC (RMT.0599) is going to propose a general

concept regarding the revalidation window, EASA for the time being decided to maintain a coherent approach in Part-ORO, where most of the revalidation windows are 3 months.

AMC1 ORO.FC.231(h)(3) Evidence-based training

The 2-3-year extension of the line evaluation of competence provides a vehicle for operators that have ATQP to continue with the credits they have under an ATQP. The safety case is that an ATQP operator needs 2 years of ATQP before being approved for an extension of the validity of the line check. This requirement is mirrored here, as the operator will need more than 3 years of mixed EBT implementation to extend the validity of the line evaluation of competence.

To encourage an operator to use line operations safety data programmes because they provide further safety enhancements, the 3-year extension is offered if the safety data programme is integrated within the EBT programme.

The requirement on the safety data programme has been transposed from FAA AC120-90 paragraph 5, dated 27th April 2006.

AMC1 ORO.FC.231(h)(3) point (a)

One of the purposes of a line check is to verify the ability of a pilot to undertake normal line operations in the real aircraft. The validity of the line evaluation of competence is extended with the condition that the pilot's ability to undertake normal line operations is maintained. For that purpose, EASA decided that an EBT instructor with current line operations experience is required once a year in the EBT programme to compensate for the fact that the line evaluation of competence (line check) will have an extended validity. That means that the operator should have a sufficient number of EBT instructors who have themselves enrolled in the EBT programme and a line evaluation of competence as specified in the OM to provide the EBT modules. The extension of the line evaluation of competence is based on the substitution of one line check every 2 years by the evaluation phase in the EBT modules. As the evaluation phase is a line-orientated flight scenario that attempts to mirror the operational risks and should be contextualised to the airline operations, then the evaluation phase could be considered as a good vehicle to substitute one of the line checks every 2 years.

The term 'operations' in this context refers to normal, abnormal and emergency operations of aircraft.

Therefore, the intention of the provision is to have an EBT instructor who is enrolled in the operator's EBT programme and has a valid line evaluation of competence; however, as the line evaluation of competence requires the instructor to be enrolled, the final text does not contain the word 'enrolled'.

GM1 ORO.FC.231(h)

Line evaluation of competence

This text was inspired by the content of AMC1 ORO.FC.230 and GM1 ORO.FC.230 in 2019 with some small amendments. Some of them are explained below.

GM1 ORO.FC.231(h) point (a)

'Line operations' is used instead of 'normal line operations' because 'normal line operations' will imply that if the crew faces a failure in the aircraft, they may not be able to complete the line check.

The phrase 'including preflight and post-flight activities as specified in the operations manual' has been introduced (this wording is not present in AMC or GM to ORO.FC.230) to clarify the scope of the line evaluation of competence.

ORO.FC.231(i)(1)

Ground training

The provision has been drafted as follows:

(a) Transposition of the existing ORO.FC.230 of the Air OPS Regulation:

'(…)

(d) Emergency and safety equipment training and checking

Each flight crew member shall complete training and checking on the location and use of all emergency and safety equipment carried. The validity period of an emergency and safety equipment check shall be 12 calendar months.

(…)

(f) Each flight crew member shall undergo ground training and flight training in an FSTD or an aircraft, or a combination of FSTD and aircraft training, at least every 12 calendar months. (…)';

(b) Combination of the two points;

(c) Removal of the word 'check' because in EBT the concept of checking is removed. Also, in the industry, training and checking are combined; therefore, the text has been amended to reflect the industry's practice; and

(d) Finalisation of the provision by adjusting the text to the EBT regulation.

ORO.FC.231(i)(2)

The provision has been transposed from ORO.FC.A.245 of the Air OPS Regulation and reworded as appropriate. The alleviation is consistent with the existing alleviation provided for the ATQP.

AMC1 ORO.FC.231(i)

Points (a) and (b) have been transposed from AMC1 ORO.FC.230. However, point (a) has been substantially modified.

Point (c) has been based on the principles established in ORO.FC.A.245 and AMC1 ORO.FC.A.245 'Alternative training and qualification programme'.

AMC1 ORO.FC.231(i) wording 'ground training'

The wording used in AMC1 ORO.FC.230 is 'ground and refresher training'; however, this wording has been modified in order to align with the title of the AMC and therefore avoid duplication and misunderstanding.

AMC1 ORO.FC.231(i) point (a)

The idea behind the performance-based continuous ground training is to extend the principles of EBT into the area of ground training. Ground training in this context has two objectives:

(1) Ensure adequate knowledge regarding aircraft systems and operational procedures and requirements.

(2) Ensure adequate awareness regarding accidents and incidents following a risk model (e.g. TEM).

Knowledge is essential regarding systems, procedures and requirements in order to understand, interpret and properly apply the operator's procedures related to aircraft systems.

However, theoretical knowledge of incidents and accidents does not prevent reoccurrence in the future. It is foremost the analysis of the incidents and accidents using an agreed risk model, in order to identify the underlying root causes, which the pilot needs to be aware of, in order to effectively apply countermeasures in the future.

A ground training element should be conducted every 12 calendar months, which should be embedded in a 3-year programme, hereby adapting the EBT period.

AMC1 ORO.FC.231(i) point (a)(1)(i)(B)

The provision has been transposed from AMC1 ORO.FC.230 point (a)(1)(i)(B), according to which the ground training should include:

> '(B) operational procedures and requirements, including ground de-icing/anti-icing and pilot incapacitation;'

However, the reference to 'de-icing/anti-icing and pilot incapacitation' has been deleted because it is already provided in the table of assessment and training topics as a training topic.

AMC1 ORO.FC.231(i) point (b)(3)(vi)

The provision has been transposed from AMC1 ORO.FC.230 point (a)(2)(iii)(F). However, the provisions for helicopters have been deleted as currently EBT, in accordance with ICAO Doc 9995, is only provided for some types of aeroplanes.

EASA is currently working on the development of an EBT data report for helicopters in order to first allow mixed EBT implementation and in the future an EBT programme for helicopters.

AMC1 ORO.FC.231(i) point (b)(7)

As explained above, AMC1 ORO.FC.231(i) points (a) and (b) have been transposed from AMC1 ORO.FC.230; however, the training elements and the checking elements are scattered across point (a) and point (b) of AMC1 ORO.FC.230. As in ORO.FC.231 both elements are combined in a single point, point (b)(7) has been introduced; however, the wording has been modified as in EBT the word 'checking' is not used.

AMC1 ORO.FC.231(i) point (c)

The requirement has been transposed from the existing ATQP provision (see ORO.FC.A.245 of the Air OPS Regulation). The reason behind using the ATQP provisions is that emergency and safety equipment is outside the scope of EBT competencies; therefore, the ATQP provision is fit

for purpose for the extension of validity. The maximum validity of 24 months has been also transposed from ATQP.

AMC1 ORO.FC.231(i) point (c)(1)

This point has been transposed from ORO.FC.245.A point (b) and adapted for the purposes of the AMC regarding ground training. This requirement provides the safety objective if an extension is requested, which is to achieve and maintain the level of proficiency set out in point (b).

In ATQP, ORO.FC.A.245 point (b) is then reflected in AMC1 ORO.FC.A.245 point (a)(1)(i) 'documentation'.

However, the proposal for ground training under the EBT programme does not impose these requirements. This does not mean that the competent authority is not entitled to ask for it; however, as the scope of the ground training is limited and the safety objectives of the EBT are demonstrated elsewhere, the proposed regulation tries to avoid unnecessary burden.

AMC1 ORO.FC.231(i) point (c)(2)(iii)

The provision has been transposed from AMC1 ORO.FC.A.245.point (a)(1) 'documentation'; however, the following adjustments have been made:

Point (a)(1)(i) of AMC1 ORO.FC.A.245 has not been included;

Point (a)(1)(ii) of AMC1 ORO.FC.A.245 has been transposed with no change;

Point (a)(1)(iii) of AMC1 ORO.FC.A.245 has been transposed with slight modifications;

Point (a)(1)(iv) of AMC1 ORO.FC.A.245 — only the concept has been transposed, and provision has been made to express the safety objective.

Extract of AMC1 ORO.FC.A.245

'(1) Documentation that details the scope and requirements of the programme, including the following:

(i) The programme should demonstrate that the operator is able to improve the training and qualification standards of flight crew to a level that exceeds the standards prescribed in ORO.FC and Subpart E of Annex V (SPA.LVO).

(ii) The operator's training needs and established operational and training objectives.

(iii) A description of the process for designing and gaining approval for the operator's flight crew qualification programmes. This should include quantified operational and training objectives identified by the operator's internal monitoring programmes. External sources may also be used.

(iv) A description of how the programme will:

(A) enhance safety;

(B) improve training and qualification standards of flight crew;

(C) establish attainable training objectives;

(D) integrate CRM in all aspects of training;

(E) develop a support and feedback process to form a self-correcting training system;

(F) institute a system of progressive evaluations of all training to enable consistent and uniform monitoring of the training undertaken by flight crew;

(G) enable the operator to be able to respond to new aeroplane technologies and changes in the operational environment;

(H) foster the use of innovative training methods and technology for flight crew instruction and the evaluation of training systems; and

(I) make efficient use of training resources, specifically to match the use of training media to the training needs.'

ORO.FC.232 EBT programme assessment and training topics

ORO.FC.232(b)(1)

The provision follows the principles of ICAO Doc 9995. In fact, the definition of EBT in ICAO Doc 9995 highlights this principle.

> 'Evidence-based training (EBT). Training and assessment based on operational data that is characterized by developing and assessing the overall capability of a trainee across a range of core competencies rather than by measuring the performance in individual events or manoeuvres.'

The table defines also the frequency of training those topics. The programme is described at AMC level. This means that an AltMoC can be also used to demonstrate compliance with the IR (in accordance with ORO.GEN.120 of the Air OPS Regulation). However, in order to seek for an approval, the operator should demonstrate that this change of the programme is subject to a proper study of the operational risks. Such a large study was conducted by a collaborative group (industry and the regulator) in writing the IATA EBT DATA REPORT. If operators would like to modify the 'table of assessment and training topics', a similar work should be carried out.

AMC1 ORO.FC.232 point (b) 'Frequency'

The explanation provided for frequency has not been transposed from ICAO Doc 9995, because the document provides two different definitions in paragraphs 1.2.3 and 1.4.2 of Part II.

This ED Decision provides a new definition for frequency using the new term 'cycle'. This term is defined in Annex I (Definitions) to the Air OPS Regulation. The proposal reflects the intent of the provision of ICAO in regard to frequency. This principle is based on the yearly requirement for training topics with frequency B.

GM1 ORO.FC.232 Evidence-based training

Table of assessment and training topics

The table is a transposition of Table II-1-1 of ICAO Doc 9995. However, the table in the GM does not contain the column that matches each flight phase with the corresponding phase in the training criticality survey. For the sake of transparency, the information is provided below:

Threats/Errors	*All flight phases*	*Potential threats/errors in any or all phases of flight*
Pre-flight and taxi	Phase 1	Pre-flight and taxi: flight preparation to completion of line-up
Take-off	Phase 2	From the application of take-off thrust until the completion of flap and slat retraction
Climb	Phase 3	From the completion of flap and slat retraction until top of climb
Cruise	Phase 4	From top of climb until top of descent
Descent	Phase 5	From top of descent until the earlier of first slat/flap extension or crossing the initial approach fix
Approach	Phase 6	From the earlier of first slat/flap extension or crossing the initial approach fix until 15 m (50 ft) AAL, including go-around
Landing	Phase 7	From 15 m (50 ft) AAL until reaching taxi speed
Taxi and post-flight	Phase 8	From reaching taxi speed until engine shutdown

AMC2 to AMC6 ORO.FC.232 EBT programme assessment and training topics

Summary of amendments to Appendices 2 to 6 to Doc 9995:

— The competency KNO and its competency map have been introduced (34 marks of KNO in the competency map for GEN4).

— The wording ‘Guidance material’ has been introduced in the ‘example scenario element column’ to indicate that this column is guidance material.

— The ‘rejected take-off’ manoeuvre in generations 4 and 3 Jet has been moved from frequency A in Doc 9995 to frequency B. The ATQP operators in the RMG demonstrated that their pilots are equally proficient in demonstrating this manoeuvre. The amendment was agreed in June 2019. For the rest of the generation EASA maintained the frequency in Doc 9995; however, this manoeuvre is allowed in LVO conditions, to allow a possible combination with the low-visibility rejected take-off in AMC1 SPA.LVO.120. Note: the requirement in AMC1 SPA.LVO.120 will be amended through RMT.0379, and therefore this decision may be further evaluated.

— The engine failure on take-off followed the same approach described above for ‘rejected take-off’; however, EASA did not find such general consensus for the ‘failure of critical engine between V1&V2’ for generation 3; therefore, for generation 3, only one of the two engine failures has been moved from frequency A in Doc 9995 to frequency B. For generation 4, both engine failures have been moved from frequency A to frequency B.

— A new manoeuvre, ‘failure of the critical engine above V2 (any segment of the TO)’ has been introduced at a frequency B. This manoeuvre complements the existing manoeuvre of ‘failure of one engine on take-off —- failure of one engine from V1 and before reaching V2’; only one of them is required. The reason is to allow the pilot to cope with this failure outside the segment of V1 and V2. Data provided by operators shows that engine failures are more probable in another segment than V1 and V2. Therefore, it allows the operators to complement their programme with a manoeuvre that should cover better their operational risks. The amendment was agreed in June 2019.

— The three go-arounds in the manoeuvres training phase have been merged because it was confusing for the operators to know what the frequency was for each go-around manoeuvre. Frequencies have been also merged. That means that the operator may choose only one of the three go-arounds at a frequency A.

— "Either seat qualification" in accordance with ORO.FC.235 has been introduced with a frequency B in line with ATQP ORO.FC.A.245.

— Training topic 'adverse weather' — example scenario element 'adverse-weather scenario,' e.g. thunderstorm activity, precipitation, icing: the flight phase activation has been amended from take-off (TO) to all phases of flight (ALL).

— Training topic 'automation management' — for three example scenario elements, the flight phase activation has been changed from ALL to CLB, CRZ, DES, APP, as those example scenario elements cannot be triggered on ground (e.g. recoveries from TAWS, ACAS warnings, recovery and subsequent engagement of automation).

— Training topic 'automation management' — the wording of the example scenario element 'Gear malfunction during an approach planned with autoland (including autobrake)' has been slightly modified compared to Doc 9995 and EASA Opinion No 08/2019. Normally, a successful outcome in this situation may require the pilot to fly manually. The experts in EASA discussed to maintain FPA in the competency map only for generation 4 as normally this generation accepts full automation or nearly full automation in an autoland. The same discussion took place for generation 3 Jet. EASA decided to add a note in this example scenario to advise the operators about the possibility of having or not having this competency in the map.

— In the training topic 'manual aircraft control' EASA made changes to the phases of some example scenario elements following the amendments of 'automation management' (e.g. ACAS RA to descend or ATC […]).

— Training topic 'competencies — non-technical (CRM)' — example scenario element 'ACAS warning immediately following a go-around, with a descent manoeuvre required' — the activation phase has been changed from CRZ to APP.

— Training topic 'manual aircraft control' — a new example scenario element and its competency map have been introduced (Approach planned with autoland, followed by a failure below 1 000 feet […]).

— Training topic 'monitoring, cross checking, error management, and mismanagement aircraft state' — the term 'in-seat instruction' has been deleted. Feedback from operators implementing mixed EBT has highlighted that ISI is not the only means of training this operational risk; therefore, an increased flexibility in regard to the means to deliver this training topic has been introduced. Furthermore, the 'Data Report for Evidence-Based Training'[17] does not make any reference to in-seat instruction.

— Training topic 'aircraft system malfunctions, including operations under MEL' — a new example scenario element and its competency map have been introduced (fuel leak (management of consequences)).

— Training topic 'terrain' — the example scenario element of demonstration of TAWS has

[17] IATA Data Report for Evidence-Based Training August 2014 1st Edition.

been amended to allow operators to train this exercise with ISI in order to avoid negative training for pilots.

— 'Stress' has been added to the original training topic 'workload, distraction, pressure' as according to the experts consulted, it is covered in this training topic. In addition, there is alignment with the provision of CRM.

— A new training topic (operations of special airport approval) has been introduced with a frequency of 'C' in order to ensure time for airports with special approval (e.g. Funchal, Innsbruck, etc.)

— The training topic 'upset recovery training' has been extensively amended. ICAO Doc 9995 was published before the ICAO Doc 10011 'UPRT manual', and therefore Doc 9995 does not provide the latest training exercises for UPRT. The new text requires compliance with AMC1&2 ORO.FC.220&230. The new text allows training this topic in the MT and SBT of the modules providing thus more flexibility. EASA excluded this training topic (recovery) from the evaluation phase. The reason agreed by the experts consulted by EASA was that in the evaluation phase, every skilled pilot will avoid in the upset prevention stage the need to go into a 'recovery from upset'; therefore, in order to avoid negative training, the recovery part should be avoided in the evaluation phase.

— Furthermore, the experts consulted by EASA found that some of the recovery example scenario elements described in Doc 9995 to be example scenario elements related to prevention; therefore, EASA has transferred them to the training topic of upset prevention — frequency B. One such case is the example scenario element 'Demonstration of the defined normal flight envelope and any associated changes in flight instruments, flight director systems, and protection systems. This should take the form of an instructor-led exercise to show the crew the points beyond which an upset condition could exist' that is located in Doc 9995 in the training topic 'upset recovery'; however, in AMC1 ORO.FC.220&230 Table 1 and Doc 10011 'UPRT manual', this example scenario element is located in the prevention part; therefore, the conclusion of EASA and its experts was to move it to upset prevention.

— Table 2 of AMC1 ORO.FC.220&230 – Recovery elements and components have been transposed into the training topic of recovery in ORO.FC.232. The competency map was agreed following the Delphi methodology.

— Some more example scenario elements have been introduced by the experts of the RMG with a special emphasis on scenarios of LTW and WLM.

— EASA has introduced additional example scenario elements related to ACAS/TCAS the reasons for such addition are explained in a separate paragraph.

Additional example scenario elements related to ACAS/TCAS in AMC2 ORO.FC.232

The EBT programme provides compliance with CAT.OP.MPA.295 'Use of airborne collision avoidance system (ACAS)', *'The operator shall establish operational procedures and training programmes when ACAS is installed (…)*' by the EBT training topic 'traffic' (i.e. Frequency C for GEN4 Jet). However, EASA has expanded the example scenario elements further and introduced a number of example scenario elements related to ACAS in the tables of assessment and training topics (i.e. AMC2, AMC3, AMC4 and AMC6 ORO.FC.232) which provides additional elements for compliance with CAT.OP.MPA.295.

Additional information for the example scenario element 'ACAS warning (resolution advisory to level off) during climb or descent; for example, close to the cleared level when the capture mode has already been activated': Data shows that about 30 % of level-off RAs have weak or no responses; EASA has introduced new examples scenario elements to give an opportunity to cover this weakness in pilot performance. Level-off RAs typically happen close to the cleared level when the capture mode has already been activated.

Clarification for the scenario element 'ACAS warning (resolution advisory) immediately following a go-around, with a descent manoeuvre required. (The RA should be a command for descent when above 1 100 ft AGL)'. EASA introduced a clarification that below 1 100 ft AGL descent, RAs are inhibited by TCAS, so the scenario should take this into account. This is the only ACAS warning which warrants a pilot reaction. Response to other warnings (Traffic Advisory or TA and Proximate Traffic or PA) are not permitted (ref. ICAO PANS-OPS chapter 3, 3.2.a).

New example scenario element 'ACAS warning (resolution advisory) requires the pilot to climb or ATC calls for immediate climb (preferably during descent which requires a significant change in aircraft attitude).' Also, improved wording to ensure consistency with 'ACAS warning (resolution advisory) requires the pilot to descend, or ATC calls for immediate descent (preferably during climb which requires a significant change in aircraft attitude).' Data shows that the weakest pilot responses to climb and descent RAs (~50 %) are when attitude change is required, i.e. from climb to descent or the other way around.

Additional information for the example scenario element 'While in descent, ACAS warning (traffic advisory) of an aircraft below. The crew should not initiate an avoidance manoeuvre based on TA (except decreasing the rate of descent unless otherwise instructed by ATC, etc.). This example scenario can be done during climb with conflicting traffic above.' Visual acquisition: RAs shall be followed even if the conflicting traffic is in sight (ICAO PANS-OPS Chapter 3, 3.2.c.1) as the visually acquired traffic might not be that causing an RA or, in coordinated encounters, a non-response may undermine the collision avoidance advice offered by TCAS.

It should be noted that visual acquisition requires an assessment of the sighting and determining which manoeuvre might be appropriate (which bears the risk of misjudgement). RAs are just to be followed and would work regardless of the visual conditions.

However, ICAO provisions do not prevent pilots-in-command from exercising their best judgement (including visual manoeuvres) to avoid a collision.

ACAS TA: Per ICAO PANS-OPS Chapter 3, 3.2.a), no manoeuvres are permitted in response to TAs. TAs are intended to alert pilots to the possibility of an RA and to enhance crew's situational awareness.

AMC1 ORO.FC.232(b)(1) EBT programme assessment and training topics

EBT data report

EASA has developed this AMC on the basis of the IATA Data Report for EBT. The intent of this AMC is to provide clarity and the necessary methodology to develop a data report.

AMC1 ORO.FC.232(b)(3) EBT programme assessment and training topics

Aircraft types by generations

EASA has developed this AMC based on the following principles:

(1) Automation and human interaction with this automation

(2) Accident rate: data report for EBT as a reference for each generation

(3) Technology-driven, the fatal rate is qualifying

This provision has been transposed from ICAO Doc 9995 Appendix 1 with two differences:

(1) There is a definition of each generation.

(2) Embraer 120 has been moved from GEN3 Turboprop to GEN2 Turboprop, because:

— the equipment in Embraer 120 is really similar to that of ATR 42-500 (or ATR 200/300). ATR 42-500 and below are classified GEN2 Turboprop. Even though the RMG acknowledged that E120 has GPWS, they considered that this reason alone was not enough to classify Embraer 120 as GEN3 Turboprop;

— the new definitions of aircraft generation include a year for each generation. Therefore, Embraer 120 should be included in GEN2 Turboprop as it was certified in October 1985.

— EASA reviewed the number of Embraer 120 flying in Europe. Their number is low, and therefore, the possible impact of this change is low.

ORO.FC.240 Operation on more than one type or variant

AMC1.ORO.FC.240 Operation on more than one type or variant

EASA concluded that ORO.FC.240 is applicable to EBT and does not require modification. However, some minor modifications were needed in AMC1 ORO.FC.240.

‘ORO.FC.140 Operation on more than one type or variant

(a) Flight crew members operating more than one type or variant of aircraft shall: comply with the requirements prescribed in this Subpart for each type or variant, unless credits related to the training, checking, and recent experience requirements are defined in the mandatory part of the operational suitability data established in accordance with Regulation (EU) No 748/2012 for the relevant types or variants.

(b) Appropriate procedures and/or operational restrictions shall be specified in the operations manual for any operation on more than one type or variant.’

This document considers two aspects:

1. How many modules are necessary for each aircraft type when operating in more than one type or variant? The rationale was as follows:
   - one module is equivalent to a proficiency check
   - the OSD may allow one proficiency check in each alternate aircraft type during the validity period of the type rating (e.g. one OPC/LPC in A320 and 6 months later an OPC/LPC in A330).
   - EASA concluded that provided OSD allows such thing, one module in alternate aircraft type within the validity period of the type rating should satisfy the requirements and provisions included in the Air OPS and Air Crew regulation.

Example: one module in A320 (2 simulator sessions EVAL/MT + SBT) followed by another module in A330, followed by another module in the A320 the following year and A330 later.

2. Whether the EBT module should be performed in different simulator aircraft types (e.g. EVAL in A320 and SBT in A330) or the whole module should be performed in the same simulator aircraft type. The conclusion is that the whole module should be performed in the same aircraft type.

Finally, EASA concluded that in case of different generations of aircraft, the operator has to fulfil both generations' EBT programme requirements as per AMC 2, 3, 4, 5 and 6 ORO.FC.231(a).

AMC1 ORO.FC.240 point (a)(4)(vii)

EASA, following the principles contained in ORO.FC.240, agreed to not allow extension of the validity of the line evaluation of competence further than that allowed in ORO.FC.240.

ORO.FC.240 and AMC1 ORO.FC.240 allow consecutive line checks; therefore, a check is required every year; however, this is made alternatively in each type, so a check is performed for each single type every 2 years. This can be seen as an extension of the validity period of the line evaluation of competence. Therefore, the provision proposed for the line evaluation of competence limits the extension of 3 years only to single fleet operations and therefore ensures for operations of more than one type or variant one line evaluation of competence every 2 years, which ensures at least one line evaluation of competence every 3 years.

AMC1 ORO.FC.240 point (a)(4)(vii)(B)

EASA, following the principles contained in ORO.FC.240, agreed to not allow extension of the validity of the line evaluation of competence further than that allowed in ORO.FC.240.

ORO.FC.240 and AMC1 ORO.FC.240 allow consecutive line checks; therefore, a check is required every year; however, this is made alternatively in each type, so a check is performed for each single type every 2 years. This can be seen as an extension of the validity period of the line evaluation of competence. Therefore, point (f) limits the extension of 3 years only to single fleet operations and therefore ensures for operations of more than one type or variant one line evaluation of competence every 2 years, which ensures at least one line evaluation of competence every 3 year.

'CAT.GEN.MPA.120 Common language

The operator shall ensure that all crew members can communicate with each other in a common language.'

4. CHAPTER 4 – Licence revalidation concept within an EBT programme

Background of licence revalidation

— The current revalidation process has four components:

(a) the applicant;

(b) the examiner;

(c) the technical assessment carried out in the simulator or the aircraft; and

(d) the administrative procedure that includes the completion of Appendix 9, and the rest of administrative procedures in Part-FCL FCL.1030 points (b), (c) and (d) that include the licence endorsements.

This process is carried out by the same person (examiner) who performs the technical assessment and the administrative procedure at the same 'location' (simulator or aircraft) and at the same time (the date and time of the proficiency check).

Note: Although most of the LPCs are carried out by a single examiner, the possibility of having several examiners for the same check already exists.

— The EBT philosophy should provide a different approach, where training is maximised and therefore checks disappear (assessment is introduced) and the pilot is trained in a NON-jeopardy environment. Furthermore, the continuous training evidence of the pilot (data) should provide a better assessment of the competence of the pilot. Therefore:

(a) the EBT technical assessment has several events (simulator sessions) instead of one;

(b) there are several assessors of pilot performance (EBT instructors) instead of just one (examiner); however, the EBT manager, who is an examiner designated to provide a final assessment of the data collected, and the administrative procedure should be maintained. As there are several people involved in the technical assessment, the administrative procedure involves the EBT manager who bears the responsibility of the licence revalidation and a designated person who will endorse the licence.

Concept of licence revalidation in the context of an operator's EBT programme

The revalidation process proposed has the following components:

(a) the applicant;

(b) the people involved in the revalidation of the pilot licence:

(1) the EBT manager who is an examiner responsible for the operator's EBT programme — ensuring that the manoeuvres assessed are of a good training value and that the applicant completed those manoeuvres. The EBT manager will be mostly responsible for the completion of Appendix 10. This person has the overall picture of the pilot training data for the period of validity (as shown by the evidence provided by the EBT programme);

(2) the designated person who has the signature delegation from the EBT manager to endorse the licence and complete Appendix 10; and

(3) the EBT instructors who conducted each of the technical assessments that provide data to the EBT grading system and the training system performance;

(c) the several technical assessments carried out in the simulators which provide the necessary evidence to ensure the pilot has an acceptable level of performance; and

(d) the administrative procedure which includes the completion of Appendix 10 and the rest of administrative procedures provided in FCL.1030.

GM1 FCL.1030(b)(3)(ii) Conduct of skill tests, proficiency checks and assessments of competence

This GM has been developed to clarify the responsibility of the TRE as regards 'the required manoeuvres and exercises'. See point (b)(3)(ii) of FCL.1030 of the Aircrew Regulation below:

'FCL.1030

(…)

(ii) confirmation that all the required manoeuvres and exercises have been completed, as well as information on the verbal theoretical knowledge examination, when applicable. If an item has been failed, the examiner shall record the reasons for this assessment;'

AMC1 to Appendix 10 — Revalidation and renewal of type ratings, and revalidation and renewal of IRs when combined with the revalidation or renewal of type ratings – EBT practical assessment

The EBT system integrates into a single concept the provisions for revalidation of licence in Part-FCL and those for recurrent training and checking in Part-ORO. Most of the requirements for the oversight are in Part-ARO and then refer back to Part-FCL. See below.

AMC1 ARO.OPS.226(d) Approval and oversight of evidence-based training programmes
Oversight plan – periodic assessment to verify compliance of the EBT programme

(c) Audits and inspections, on a scale and frequency appropriate to the operation, should cover at least:

(…)

(9) administration of programme enrolment and compliance with the requirements of Annex I (Part-FCL) for licence revalidation and renewal;

Instructors are already allowed to sign licences under FCL.945 in certain conditions:

'FCL.945 Obligations for instructors

Upon completion of the training flight for the revalidation of an SEP or TMG class rating in accordance with FCL.740.A (b)(1) and only in the event of fulfilment of all the other revalidation criteria required by FCL.740.A (b)(1) the instructor shall endorse the applicant's licence with the new expiry date of the rating or certificate, if specifically authorised for that purpose by the competent authority responsible for the applicant's licence.'

AMC1 to Appendix 10 point (b) 'The instructor(s) that conducted the training to the applicant has (have) been standardised.'

This provision refers to AMC1 ORO.FC.146(c) and AMC2 ORO.FC.146(c).

The oversight of this provision falls under the jurisdiction of the competent authority issuing the EBT approval; however, the licensing authority may at its own discretion inspect the training records of the instructors that pertain to revalidation of licences.

AMC1 ORO.FC.146(c) Personnel providing training, checking and assessment

EBT instructor – initial standardisation programme

(a) Before delivering the operator's EBT programme, the instructor should complete an EBT instructor initial standardisation programme composed of:

(1) EBT instructor training; and

(2) EBT assessment of competence.

[…]

AMC2 ORO.FC.146(c) Personnel providing training, checking and assessment

EBT instructor – recurrent standardisation programme

The EBT instructor should:

(a) conduct six EVAL or SBT phases of an EBT module (or a combination of both) every 36 months. One of the EVAL or SBT should take place in the period of 12 months immediately preceding the expiry date. The 36-month period should be counted from the end of the month the module was taken. If this has not been fulfilled, the EBT instructor should complete an EBT assessment of competence. When the module is undertaken within the last 12 months of the validity period, the new period should be counted from the original expiry date;

(b) receive annual recurrent standardisation. The recurrent standardisation should include:

(1) refresher EBT training; and

(2) concordance training; and

(c) complete an assessment of competence every 3 years. When the assessment of competence is conducted within the 12 months preceding the expiry date, the next assessment of competence should be completed within 36 calendar months of the original expiry date of the previous assessment of competence.

AMC1 to Appendix 10 point (c)

EASA has performed several rounds of consultation regarding the implementation of the delegation of signatures. One element brought up to the attention of EASA was the need to ensure a lean process to perform the signature of licences. Although EASA has initiated the project to implement the electronic signature of licences, this project may take years to conclude. In the meantime, the simulator training centre may be a good location where after the completion of the training module the pilot and a personnel of the training department (instructor) may complete the signature of the licence.

AMC1 to Appendix 10 point (c)(2)

For the sake of clarity and due to some comments in the CRD regarding the process of signature delegation, EASA has decided to provide clarity and level playing field by requiring the instructor to be the person to whom the examiner (EBT manager) may delegate his or her signature.

AMC1 to Appendix 10 point (c)(3)

This provision has been added for clarity. This provision is a logical argument when reading Appendix 10 point 1(a) in combination with point 4(c)(2) and the following requirements in ORO.FC.231:

1- Point (a)(3)(B) — The EBT module is completed when: '(B) an acceptable level of performance in all observed competencies has been demonstrated'.

2- Point (a)(5): 'The procedures shall ensure that a pilot does not continue line operations if the performance observed was below the minimum acceptable level.'

3- Point (d)(1)(ii) Grading system: '(…) a point on the scale which determines the minimum acceptable level to be achieved for the conduct of line operations.'

GM1 to Appendix 10 Proficiency check for type ratings, and proficiency check for IRs when combined with type rating — EBT practical assessment

GM1 to Appendix 10 point (b)

The GM clarifies what the examiner can do during the transition to full EBT in the case the pilot has not completed two EBT modules under full EBT. As during mixed EBT the pilot is completing an EBT module, this can be used as a means to revalidate the licence under full EBT. The GM has been introduced as a consequence of the public consultation of the NPA.

GM2 to Appendix 10 Proficiency check for type ratings, and proficiency check for IRs when combined with type rating — EBT practical assessment

The GM transposed a definition from Part-ORO into Part-FCL and explains how EBT provides a demonstration of skills equivalent to the traditional proficiency check.

The definition of proficiency check is already provided in FCL.010; therefore, it is not included in this GM.

"'Proficiency check' means the demonstration of skill to revalidate or renew ratings, and including such oral examination as may be required."

In legacy training, such demonstration is performed in a single event (following Appendix 9). Although an EBT practical assessment is equivalent to a proficiency check and demonstrates the necessary skills to revalidate or renew ratings, EBT goes one step further and this demonstration is performed at least twice a year in each of the EBT modules, to complete the revalidation process. The demonstration of equivalency between Appendix 9 and the EBT module is performed at least once every 3 years as required under the several provisions (IR + AMC + GM) on 'verification of the accuracy of the grading system'.

To conclude this explanatory note, the definition of 'competency' (where the term 'skills' is included) in Annex I to the Air OPS Regulation is provided below.

'competency' means a dimension of human performance that is used to reliably predict successful performance on the job. A competency is manifested and observed through behaviours that mobilise the relevant knowledge, skills and attitudes to carry out activities or tasks under specified conditions;

Rationale behind the equivalence between OPC, LPC and the EBT programme

The EBT programme is aligned with the existing approach to OPC contained in ORO.FC.130, ORO.FC.230 and AMC1 ORO.FC.230 point (b):

OPS	FCL	Authorities comments	EASA AMC2 ORO.FC.230 (a)	Doc 9995	Remarks
	1.4 (M)	Use of checklist prior to starting engines, starting procedures, radio and navigation (…).	Covered by LOE and SBT under compliance frequency A	Covered by LOE and SBT under compliance frequency A	Part-FCL Appendix 9 item 1.4 may be assessed as crew actions during a single preflight cockpit preparation. The expected added value of EBT is that it assesses and develops the competency application of procedures in many events instead of only in an isolated task application.
	1.6 (M)	Before take-off checks	Covered by LOE and SBT under compliance frequency A	Covered by LOE and SBT under compliance frequency A	Part-FCL Appendix 9 item 1.6 may be assessed as crew actions during a single event during the before take-off procedures. The expected added value of EBT is that it assesses and develops the competency application of procedures in many events instead of only in an isolated task application.
B	2.5.2 (M)	Take-off with engine failure between V_1 and V_2 (take-off safety speed)	Covered by the manoeuvres training phase Failure of the critical engine between V1 & V2 frequency B	Covered by the manoeuvres training phase Failure of the critical engine between V1 & V2 two different frequencies are requested	The failure should be inserted between V1 and V2 to create the need for asymmetric handling. It is possible to include additional failures in order to comply with 3.6.1, which should be added after item 2.5.2. During the manoeuvres phase, this item should commence from the

				frequency A for initial control of the aircraft frequency B until clean configuration.	initiation of the failure until: (a) establishment of the final configuration; or (b) completion of the abnormal checklist.
A	2.6 (M)	Rejected take-off at a reasonable speed before reaching V1.	Covered by the manoeuvres training phase rejected take off frequency A	Covered by the manoeuvres training phase rejected take off frequency A	The rejected take-off is considered a crew item and may be combined with the rejected take-off for operators (LVOs) In the manoeuvres phase, this item should commence from the initiation of the failure until: (a) full stop and completion of the abnormal checklist initial actions; or (b) full stop and completion of abnormal checklist where items 3.6.1, 3.6.7 or 3.6.8 are combined.
	3.4.0 to 3.4.14 (M)	Normal and abnormal operations of systems. Minimum of 3 for the crew	LOE and SBT aircraft malfunctions example scenario: 'at least one malfunction for each characteristic should be included in every 12-month period'	idem	An exercise may validate several Part-FCL items In order to facilitate the provision of simple and realistic scenarios in accordance with Doc 9995 Chapters 3.8 and 7.4, the evaluation phase is not intended to be a comprehensive assessment of all Part-FCL Appendix 9. Pre-existing technical deviations and associated operational instructions should not be taken into

					account as 3.4.0 to 3.4.14 items.
	3.6.1 to 3.6.9 (M)	Abnormal and emergency procedures. Minimum of 3 for the crew	Proposal to add fire and smoke management The evacuation is not prescribed in in Part-FCL		
	3.8.1* (M)	Adherence to departure and arrival routes and ATC instructions	No reference in table of assessment and training topics		The crew would be assessed when required to follow a clearance, or comply with a SID or STAR.
C	3.8.3.4 * (M)	Manually, with one engine simulated inoperative; engine failure has to be simulated during final approach before passing 1 000 ft above aerodrome level until touch down or through the complete missed approach procedure.	Manoeuvres training phase engine out approach & go around frequency A		

D	3.8.4 * (M)	2D operations down to MDH/A.	Manoeuvres training phase TYPE A 2D approach	No reference in Doc 9995 but equivalency of approaches applies (refer to 3.8.4)	This item should be completed under conditions described in the relevant operations manual. RNAV/GNSS approaches validate OPS – (D) item and Part-FCL 3.9.4 item. During the manoeuvres phase, this item should commence when intercepting the final approach and end when reaching the prescribed DA/H.
E	4.4* (M)	Manual go-around with the critical engine simulated inoperative after an instrument approach on reaching DH MDH or MAPt.	Manoeuvres training phase engine out approach & go around frequency B	Manoeuvres training phase engine out approach & go around frequency A	During the manoeuvres phase, this item may commence approaching DA and end once the aircraft is established in a clean or defined normal manoeuvring configuration.
F	5.5 (M)	Landing with the critical engine simulated inoperative.	Manoeuvres training phase Engine out landing frequency B	Manoeuvres training phase Engine out landing frequency A	In the manoeuvres phase, this item may start passing the final approach fix (FAF) and end when the aircraft reaches normal taxi speed.

AMC1 ARA.GEN.315(a) Procedure for issue, revalidation, renewal or change of licences, ratings or certificates — persons

The new point (d) clarifies that in order for the competent authority to verify the compliance of the applicant with the requirements for revalidation or renewal under the EBT programme, in addition to the requirements in points (a), (b) and (c) of the AMC, it should also refer to AMC1 to Appendix 10.

AMC2 ARA.FCL.205 Monitoring of examiners

The purpose of this AMC is to clarify how a competent authority may conduct oversight of examiners where those examiners revalidate licences as part of an operator's EBT programme. This is because the delivery of an EBT module is performed by instructors on behalf of the EBT manager who maintains ultimate responsibility for the programme and who is an examiner.

Member States provide a briefing within the Examiners Differences Document https://www.easa.europa.eu/sites/default/files/dfu/Examiner%20Differences%20Document_version_2021Q1.pdf for use by examiners with a Part-FCL examiner certificate conducting a proficiency check of a licence holder whose licence was issued by a competent authority other than their own.

As an EBT practical assessment is equivalent to a proficiency check (see Appendix 10), then the procedures for the proficiency check for the purpose of the Examiner Differences Document should be followed.

GM1 to AMC2 ARA.FCL.205 Monitoring of examiners

The vehicle to allow the licensing competent authority to inspect the training also had to be provided to be in line with existing oversight responsibilities. The principle described in this GM 'When the authority conducts an inspection of the FCL requirements (e.g. training delivery), it is advisable that the inspector of the competent authority follows the requirements laid down in AMC1 ARO.OPS.226(a)' has been transposed and adapted from the existing AMC1 ARA.FCL.205, to ensure that any oversight is preferably performed by appropriately trained and qualified inspectors.

4.1 Administrative action for the revalidation of licences (PART FCL) under EBT Baseline.

FCL.740.A includes that the completion of the EBT practical assessment shall be done 3 months immediately preceding the expiry date of the rating

(c) The completion of an EBT Practical assessment includes:
  (3) the assessment of pilot performance either in a simulated or an operational environment and
  (4) the administrative action which include the completion of the Appendix 10 form.

(d) Therefore, point (1) may be perform before the 3 months immediately preceding the expiry date of the rating as long as point (2) administrative action is completed within the 3 months.

Appendix 10 Form includes the confirmation that the pilot has completed the operator's EBT programme, these requirements can be found in ORO.FC.231 and include as a minimum the

completion of the EBT modules (minimum two EBT modules), a valid line evaluation of competence and the completion of the ground training.

4.2 Compliance for the ATPL skill test in an EBT module.

Rule reference: FCL.520.A ATPL(A) – Skill test

ATPL skills test in an EBT module

The skill test in accordance with Appendix 9 may be combined with an EBT module. It may follow the same process already described in mixed EBT for the LPC (e.g. EVAL + manoeuvres validation phase for the pilot performing the ATPL skill test). The same rational can be applied to the regular skill test. The competent authority may provide additional and further guidance.

The following applies:

- TRE or SFE is needed (no TRI or SFI) for the conduct of the Module as it includes a skill test (either regular or ATPL skill test).
- An appendix 9 and 10 should be completed.
- The test may be performed during the EVAL and the Manoeuvres validation phase. Thus, the Manoeuvres Training is replaced by the Manoeuvres validation.
- It is recommended that the Operator develops guidance for the conduct of such test for the EBT instructor/examiner. This is usually done through the EBT instructor manual.

SECTION III: Epilogue

1. LEGISLATION AND REFERENCES

Primary legislation and references:

European Regulations:

- Regulation (EU) 2020/2036 of 9 December 2020 amending Regulation (EU) 965/2012.
  - https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020R2036&qid=1607691853186
- Regulation (EU) 2020/2193 of 16 December 2020 amending Regulation (EU) 1178/2011.
  - https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020R2193

ED Decisions:

- ED Decision 2021/002/R 'Update of the AMC & GM to Subpart FC of Part-ORO (evidence -based training (EBT))
  - https://www.easa.europa.eu/document-library/agency-decisions/ed-decision-2021002r

Explanatory notes and Safety promotion material (The safety material is included in the Explanatory note)

- Explanatory note to the ED Decision 2021/002/R and Regulation (EU) 2020/2036 and Regulation (EU) 2020/2193.
  - https://www.easa.europa.eu/sites/default/files/dfu/explanatory_note_to_ed_decision_2021-002-r.pdf

Secondary legislation and references:

- ED Decision 2015/027/R Implementation of evidence-based training (EBT) within the European regulatory framework https://www.easa.europa.eu/document-library/agency-decisions/ed-decision-2015027r. It includes:
  - Annex I to ED decision 2015/027/R: **GM1 ORO.FC.230 (a); (b); (f). Recurrent training and checking** to Part-ORO – Issue 2, Amendment 4; and
  - Explanatory Note to the ED Decision 2015/027/R.
- ICAO Doc 9995 AN/497 Manual of Evidence-based Training First Edition – 2013.

For info:

- EASA Opinion No 08/2019 (A) Subpart FC 'Flight Crew' of Annex III (part-ORO) to Regulation (EU) 965/2012 – Update of ORO.FC: Evidence-based training (EBT).
  - https://www.easa.europa.eu/document-library/opinions/opinion-082019-b
- EASA Notice of proposed of Amendment 2018-07(B) and 2018-07(A).
- ToR RMT.0696 Implementation of Evidence-Based Training within the European regulatory framework
  - https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-rmt0696.
- ToR (+ Concept Paper) RMT.0599 Evidence-based and competency-based training
  - https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-concept-paper-rmt0599
- IATA Evidence-Based Training Implementation Guide July 2013 & IATA Data Report for Evidence-Based Training August 2014 1st edition.
- ICAO PANS Training DOC 9868.

- Other related documents

CRD 2018-07 (A) & (B) 'Update of ORO.FC — evidence-based training subtask'

MORE INFORMATION

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https://www.easa.europa.eu/community/system/files/2023-05/SPT%20Group%20Composition%20%E2%80%94%20SPT.0012%20V1%20issue%201%202023.pdf