Effective January 2024

Evidence-Based Training Implementation Guide

Edition 2

International Federation of Air Line Pilots' Associations
IFALPA
The Global Voice of Pilots

IATA

DISCLAIMER

The content, data and information (the "Content") contained in this publication ("Publication"), is provided for information purposes only and is made available to you on an "AS IS" and "AS AVAILABLE" basis.

IATA has used reasonable efforts to ensure the Content of this Publication is accurate and reliable. We, however, do not warrant, validate, or express any opinions whatsoever as to the accuracy, genuineness, origin, tracing, suitability, availability or reliability of the sources, completeness, or timeliness of such Content. IATA makes no representations, warranties, or other assurances, express or implied, about the accuracy, sufficiency, relevance, and validity of the Content. IATA's observations are made on a best efforts and non-binding basis, and shall not be deemed to replace, interpret, or amend, in whole or in part, your own assessment and evaluation or independent expert advice. Nothing contained in this Publication constitutes a recommendation, endorsement, opinion, or preference by IATA.

IATA has no obligation or responsibility for updating information previously furnished or for assuring that the most up-to-date Content is furnished. IATA reserves the right to remove, add or change any Content at any time. Links to third-party websites or information directories are offered as a courtesy. IATA expresses no opinion on the content of the websites of third parties and does not accept any responsibility for third-party information. Opinions expressed in advertisements appearing in this publication are the advertiser's opinions and do not necessarily reflect those of IATA. The mention of specific companies or products in advertisements does not imply that they are endorsed or recommended by IATA in preference to others of a similar nature which are not mentioned or advertised.

This Publication is not intended to serve as the sole and exclusive basis for assessment and decision making and is only one of many means of information gathering at your disposal. You are informed to make your own determination and make your own inquiries as you may deem necessary and suitable. You shall independently and without solely relying on the information reported in this Publication, perform your own analysis and evaluation regarding the nature and level of information you may require, based upon such information, analyses, and expert advice as you may deem appropriate and sufficient, and make your own determination and decisions pertaining to the subject matter under consideration.

This Publication is the property of IATA and is protected under copyright. The Content of this Publication is either owned by or reproduced with consent or under license to IATA. This Publication and its Content are made available to you by permission by IATA, and may not be copied, published, shared, disassembled, reassembled, used in whole or in part, or quoted without the prior written consent of IATA. You shall not without the prior written permission of IATA: re-sell or otherwise commercialize, make mass, automated or systematic extractions from, or otherwise transfer to any other person or organization, any part of this Publication and its Content in whole or in part; store any part of this Publication, or any Content, in such a manner that enables such stored Content to be retrieved, manually, mechanically, electronically or systematically by any subscriber, user or third-party; or include it within, or merge it with, or permit such inclusion in or merge with, another archival or searchable system.

TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, IATA DISCLAIMS ANY REPRESENTATION OR WARRANTY (I) AS TO THE CONDITION, QUALITY, PERFORMANCE, SECURITY, NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THIS PUBLICATION AND CONTENT; OR (II) THAT THE ACCESS TO OR USE OF THIS PUBLICATION (INCLUDING ANY AUTOMATED FEEDS OR OTHER DELIVERY MODES) OR ANY CONTENT SUPPLIED OR CONTRIBUTED TO THIS PUBLICATION BY THIRD PARTIES, WILL BE UNINTERRUPTED, ACCURATE, THE MOST UP TO DATE, COMPLETE OR ERROR-FREE. IATA EXCLUDES ALL LIABILITY (TO THE EXTENT PERMITTED BY APPLICABLE LAW) FOR ANY COSTS, LOSSES, CLAIMS, DAMAGES, EXPENSES OR PROCEEDINGS OF WHATEVER NATURE INCURRED OR SUFFERED BY YOU OR ANY OTHER PARTY ARISING DIRECTLY OR INDIRECTLY IN CONNECTION WITH THE USE OF THIS PUBLICATION OR ANY CONTENT CONTAINED OR ACCESSED THEREFROM, OR DUE TO ANY UNAVAILABILITY OF THIS PUBLICATION IN WHOLE OR IN PART.

Montreal - Geneva
Cataloguing in Publication data can be obtained from Library and Archives Canada.
© International Air Transport Association. All rights reserved.

Table of Contents

Definitions

Adapted competency model—A group of competencies with their associated description and performance criteria adapted from an ICAO competency framework that an organization uses to develop competency-based training and assessment for a given role.

Air operator certificate (AOC)—A certificate authorizing an operator to carry out specified commercial air transport operations.

Approved training organization (ATO)—An organization approved by and operating under the supervision of a Contracting State in accordance with the requirements of Annex 1 to perform approved training.

Assessment—The determination by an instructor, assessor or evaluator as to whether a candidate meets a required competency standard under given conditions, by collecting evidence from observable behaviors. Assessment takes place during instruction and evaluation.

ATA Chapters—A common industry referencing standard for aircraft technical documentation.

Competency—A dimension of human performance that is used to reliably predict successful performance on the job. A competency is manifested and observed through behaviors that mobilize the relevant knowledge, skills and attitudes to carry out activities or tasks under specified conditions.

Competency-based training and assessment—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 standard—A level of performance that is defined as acceptable when assessing whether or not competency has been achieved.

Conditions—Anything that may qualify a specific environment in which performance will be demonstrated.

Critical flight maneuvers—Maneuvers that place significant demand on a proficient crew.

Critical system malfunctions—Aircraft system malfunctions that place significant demand on a proficient crew. These malfunctions should be determined in isolation from any environmental or operational context.

Evidence-based training (EBT)—Training and assessment that is characterized by developing and assessing the overall capability of a trainee across a range of competencies rather than by measuring the performance of individual events or maneuvers.

EBT instructor—A person, who has undergone a screening and selection process, successfully completed an approved course in delivering competency-based training and is subsequently authorized to conduct recurrent assessment and training within an approved EBT program.

Note: *ICAO Doc 9995 and the European EBT regulations regularly use the term "EBT Instructor", to highlight the fact that under any baseline EBT program, the instructor should have the privileges to conduct evaluations that includes the summative assessment of the pilot performance and the evaluation of the training system.*

For clarity and to be in line with the definitions of ICAO Doc 9868 (PANS-TRG), this guide consistently uses the term "EBT Instructor/Evaluator" (EBT IE) to refer to a person authorized to provide training and conduct evaluations during an EBT module.

EBT module—A session or combination of sessions in a qualified FSTD as part of the 3-year program of recurrent assessment and training.

EBT scenario element—Part of an EBT session designed to address a specific training topic.

EBT session—A single defined period of training in a qualified FSTD that normally forms part of an EBT module.

Error—An action or inaction by an operational person that leads to deviations from organizational or the operational person's intentions or expectations.

Error management—The process of detecting errors and responding to them with countermeasures that reduce or eliminate the consequences of errors and mitigate the probability of further errors or undesired states.

Evaluator—A person authorized to conduct the formal and final summative assessment of a trainee's performance.

Event—A combination of a task or a sub-task and the conditions under which the task or sub-task is to be performed.

Facilitation technique—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 to develop insight and their own solutions and resulting in better understanding, retention and commitment.

Flight crew member—A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Grading—A relation of the results of the competency assessment to a defined numerical scale by an instructor or evaluator (in order to facilitate a harmonized and consistent training data collection).

Human factors principles—Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Human performance—Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

ICAO competency framework—A competency framework, developed by ICAO, is a selected group of competencies for a given aviation discipline. Each competency has an associated description and observable behaviors.

Instructional systems design (ISD)—A formal process for designing training which includes analysis, design and production, and evaluation.

Inter-rater reliability—The consistency or stability of scores between different raters.

Line orientated flight scenario (LOFS)—LOFS refers to training and assessment involving a realistic, "real time", full mission simulation of scenarios that are representative of line operations.

Note: *Special emphasis should be given to scenarios involving a broad set of competencies that simulate the total line operational environment, for the purpose of training and assessing flight crew members.*

Maneuvers—A sequence of deliberate actions to achieve a desired flight path. Flight path control may be accomplished by a variety of means including manual aircraft control and the use of auto flight systems.

Monitoring—A cognitive process to compare an actual to an expected state.

Observable behavior (OB)—A single role-related behavior that can be observed and may or may not be measurable.

Operations manual—A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

Phase of flight—A defined period within a flight.

Performance criteria—Statements used to assess whether the required levels of performance have been achieved for a competency. A performance criterion consists of an observable behavior, condition(s) and a competency standard.

Pilot flying (PF)—The pilot whose primary task is to control and manage the flight path. The secondary tasks of the PF are to perform non–flight path related actions (radio communications, aircraft systems, other operational activities, etc.) and to monitor other crewmembers.

Pilot monitoring (PM)—The pilot whose primary task is to monitor the flight path and its management by the PF. The secondary tasks of the PM are to perform non–flight path related actions (radio communications, aircraft systems, other operational activities, etc.) and to monitor other crewmembers.

Rating—An authorization entered on or associated with a license and forming part thereof, stating special conditions, privileges or limitations pertaining to such license.

Scenario (event-set)—Relatively independent segment of training made up of several events.

Standardizers:—For the purpose of this guide, the standardizers are the instructors/evaluators in charge of the training and assessment of other instructors/evaluators.

Threat—Events or errors that occur beyond the influence of the flight crew, increase operational complexity and must be managed to maintain the margin of safety.

Threat management—The process of detecting threats and responding to them with countermeasures that reduce or eliminate the consequences of threats and mitigate the probability of errors or undesired states.

Trainee—For the purpose of this guide, "trainee" means a pilot or an instructor/evaluator receiving training or evaluation.

Trainer—For the purpose of this guide, "trainer" means an instructor/evaluator conducting training or evaluation.

Training objective—A clear statement that is comprised of three parts, i.e., the desired performance or what the trainee is expected to be able to do at the end of training (or at the end of particular stages of training), the performance standard that must be attained to confirm the trainee's level of competence and the conditions under which the trainee will demonstrate competence.

Unsafe situation—A situation which has led to an unacceptable reduction in safety margin.

Acronyms

A/C	Aircraft
ACAS	Airborne Collision Avoidance System
ADDIE	Analyze, design, develop, implement and evaluate
APP	Approach
AQP	Advanced Qualification Program
ATA	Air Transport Association
ATC	Air Traffic Control
ATO	Approved Training Organization
ATQP	Alternative Training and Qualification Program
CAA	Civil Aviation Authority
CBT	Computer-based training
CBTA	Competency-Based Training and Assessment
CLB	Climb
COM	Competency Communication
CPDLC	Controller–pilot data link communication
CRM	Crew Resource Management
CRZ	Cruise
DA	Decision altitude
DES	Descent
ETOPS	Extended-range Twin-engine Operations Performance Standards
EASA	European Aviation Safety Agency
EBT	Evidence-Based Training
EGPWS	Enhanced Ground Proximity Warning Systems
EVAL	Evaluation Phase
FAA	Federal Aviation Administration (United States of America)
FAF	Final Approach Fix
FCOM	Flight Crew Operating Manual
FFS	Full Flight Simulator
FL	Flight level
FDA	Flight data analysis
FMS	Flight Management System
FOQA	Flight Operations Quality Assurance
FPA	Competency Aeroplane Flight Path Management, automation
FPM	Competency Aeroplane Flight Path Management, manual control
FSTD	Flight Simulation Training Device
GA, G-A	Go-around
GND	Ground
GPS	Global Positioning System
ICAO	International Civil Aviation Organization
ICAP	Instructor Concordance Assurance Program
IE	Instructor/Evaluator
IFALPA	International Federation of Air Line Pilots' Associations
IOSA	IATA Operational Safety Audit
IRR	Inter-rater reliability
ISI	In-seat instruction
KNO	Competency Application of Knowledge
KSA	Knowledge, skills and attitudes
LDG	Landing
LIFUS	Line Flying under Supervision
LOFS	Line Orientated Flight Scenario
LOFT	Line Oriented Flight Training

LOSA	Line Operations Safety Audit
LTW	Competency Leadership and Teamwork
MEL	Minimum equipment list
MT	Maneuvers Training Phase
MV	Maneuvers Validation Phase
ND	Navigation Display
NPCT	Nominated Person Crew Training
OB	Observable Behavior
OEM	Original equipment manufacturer
ORCA	Observe, Record, Classify and Assess
PANS-TRG	Procedures for Air Navigation Services - Training, ICAO Doc 9868
PBN	Performance-based navigation
PF	Pilot Flying
PFD	Primary Flight Display
PM	Pilot Monitoring
PRO	Competency Application of Procedures and Compliance with Regulations
PSD	Competency Problem Solving and Decision Making
QNH	Mean sea level pressure (MSLP)
R/T	Radio Telephony
RVSM	Reduced Vertical Separation Minima
SAW	Competency Situation Awareness and Management of the Information
SMS	Safety management system
SBT	Scenario-Based Training (Phase)
SOP	Standard Operating Procedure
SPA	Special Approval
TEM	Threat and Error Management
TO	Take-off
UPRT	Upset prevention and recovery training
WLM	Competency Workload Management

Executive Letter

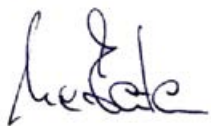
The Evidence-Based Training project was one of the major achievements of the IATA Training and Qualification Initiative (ITQI) launched in 2007. EBT was endorsed by ICAO in 2013, with the publication of Doc 9995, Manual of Evidence-based Training. To support operators with EBT implementation, a co-branded IATA/ICAO/IFALPA "Evidence-Based Training Implementation Guide" first Edition was also published in 2013.

Since then, many regulators and operators have implemented EBT and, more globally, the competency-based training and assessment (CBTA) approach of training has expanded. Hence, this guide has been authored synchronously with the first IATA CBTA Guide for Flight Crew Training in order to ensure consistency with the latest international provisions related to CBTA and the latest regulatory requirements related to EBT, while providing the best practices gained during EBT implementation during the last decade.

Moreover, EBT as any CBTA program generates a significant volume of training data that relates directly to human performance and that complements the safety data already collected in operations. Therefore, this guide also clarifies the role of the training data into the safety management system to enhance operational safety, with the goal to cope with the increased complexity of the aviation system, the introduction of advanced technologies, the design of new procedures and the enforcement of environmental constraints.

It is our belief that the shared efforts put into updating this guide will support the enhancement of the global implementation of EBT and will contribute to achieving our common goal of improving aviation safety worldwide.

Nick Careen
Senior Vice President
Operations, Safety and Security
IATA



Captain Uwe Harter
Executive Vice-President
Technical & Safety Standards
IFALPA

Acknowledgements

The revision of the EBT Implementation Guide, 1st Edition, and the integration of experience gained with EBT program implementation in this 2nd Edition, required a substantial amount of work and the support from various industry stakeholders, without which the publication would not have been possible.

Therefore, IATA wants to acknowledge the critical and valuable contribution of the following EBT Subgroup (EBT SG) members of the IATA Pilot Training and Licensing Task Force (PTL TF), and the representatives of the following international organizations, in the development of this guide.

Capt. Arnar Agnarsson
B767/757 Captain TRE
MSc Human Factors, SME CRM
Icelandair

Capt. Robert Gräf
Type Rating Instructor/Examiner (TRI/TRE)
Flight Operations Support & Training Standards
Airbus

Capt. Glen Finch
IFALPA Human Performance Committee
Line Training Captain
Jazz Aviation

Capt. Hiroshi Horikawa
777 Captain
Vice President Flight Training
Flight Operations
Japan Airlines
Vice Chairman of the PTLTF

Dr Patrizia Knabl-Schmitz
Human Factors Specialist
Emirates Flight Operations, Flight Training
Emirates

Capt. Fabien Laignel
Compliance and Regulatory Affairs
EBT Manager - Crew Training Safety Manager
Air France

Capt. Richard Lenz
Head of Conversion Training Standards
Chief Training CPT Airbus Long-range
Lufthansa

Capt. Olivier Mazzoleni
Flight Training International Regulatory Affairs
Airbus

Capt. Stephen Mercer
Standards Training Manager
Flight Operations, Training
Emirates

Capt. Thomas Robertson
Director Global Flight Training
Boeing Test & Evaluation
Boeing

Capt. Sanjay Sapra
Head of Crew Training
Etihad Airways

Frank Steiner
Head of EBT Standards Lufthansa Group
Lufthansa

Capt. David Swarbrick
Training Manager Boeing
Flight Operations
Emirates
Chairman of the PTLTF

Capt. (ret) Holger Hoffmann
Type Rating Instructor/Examiner (TRI/TRE)
Senior Consultant
IATA

Capt. (ret) Yann Renier
Head Training and Licensing
OSS-Flight and Technical Operations
IATA

Victoria Romero
Senior Manager Training and Licensing
OSS-Flight and Technical Operations
IATA

Disclaimer

Although every effort has been made to ensure accuracy, the International Air Transport Association (IATA) and the International Federation of Air Line Pilots' Associations (IFALPA), and other contributors to this publication shall not be held responsible for any loss or damage caused by errors, omissions, misprints or misinterpretation of the contents hereof. Furthermore, the International Air Transport Association, the International Federation of Air Line Pilots' Associations, and the contributors to this publication expressly disclaim any and all liability to any person or entity in respect of anything done or omitted, and the consequences of anything done or omitted, by any such person or entity in reliance on the contents of this publication.

Opinions expressed in this publication do not necessarily reflect the opinion of the International Air Transport Association, nor the International Federation of Air Line Pilots' Associations. The mention of specific companies, products in this publication does not imply that they are endorsed or recommended by any of the above in preference to others of a similar nature which are not mentioned.

No part of this publication may be reproduced, recast, reformatted or transmitted in any form by any means, electronic or mechanical, including photocopying, recording or any information storage and retrieval system, without the prior written permission of the authors.

Publications

The material in this guide is based upon the following source documents:

Publication	Date
ICAO Annex 1	Fourteenth Edition, July 2022
ICAO Annex 6, Part I	Twelfth Edition, July 2022
ICAO Doc 9625, Manual of Criteria for the Qualification of Flight Simulation Training Devices, Volume 1 – Aeroplanes	Fourth Edition, 2015
ICAO Doc 9868, Procedures for Air Navigation Services – Training (PANS-TRG)	Third Edition, 2020 (Amendment 7)
ICAO Doc 9841 Manual on the Approval of Training Organizations	Third Edition, 2018
ICAO Doc 9859 Safety Management Manual (SMM)	Fourth Edition, 2018
ICAO Doc 9995, Manual of Evidence-based Training	First Edition, 2013 Second Edition, draft September 2023
ICAO Doc 10011 Manual on Aeroplane Upset Prevention and Recovery Training	First Edition, 2014
IATA CBTA Guide for Flight Crew Training	First Edition, 2023
IATA Guidance Material for Competency Assessment and Evaluation for Pilots, Instructors and Evaluators	Edition 1, 2021
IATA Guidance Material and Best Practices for Instructor and Evaluator Training	Edition 2, 2021
IATA Guidance Material for Improving Flight Crew Monitoring	Edition 1, 2016
IATA EBT Data Report	Edition 1, 2014 and Amendment 2021
IATA white paper “Competency-Based Training and Assessment (CBTA) Expansion within the Aviation System”	2021
EASA Aircrew regulation	Revision state October 2022
EASA Air Operations regulation	Revision state February 2023
EASA EBT Manual	Version 2.0, 2023

Section 1 - Introduction

1.1 Background

Evidence-Based Training (EBT) is a major safety initiative that arose from an industry-wide consensus that, in order to reduce the airline accident rate, a strategic review of recurrent and type-rating training for airline pilots was necessary. A review of available data sources, their scope, and relative reliability was undertaken. This was followed by comprehensive analyses of the data sources chosen, with the objective of determining the relevance of existing pilot training and to identify the most critical areas of training focus.

The aim of EBT is to train and assess the competencies required to operate safely and efficiently in a commercial air transport environment, while addressing the most relevant threats according to evidence collected in accidents, incidents, flight operations and training. The EBT program seeks to drive pilots to master competencies, to enhance their confidence and to develop resilience managing unforeseen situations in stark contrast to traditional recurrent training and checking programs that train and evaluate "set piece" events, often found to lack relevance to modern aircraft.

Since the publication of ICAO Doc 9995, Manual of Evidence-based Training in 2013, many States and regulators have adopted EBT into their regulations and have encouraged their operators to implement EBT. As an example, as of 2015 EASA permitted the introduction of EBT provisions for operator flight crew training via the publication of a guidance material addressing the implementation of a mixed EBT program, in advance to the baseline EBT European regulation applicability in 2020.

The experience gained by operators having implemented EBT during the last decade combined with the work performed by IATA to review the EBT data report and produce its first amendment in 2021, led the IATA Training and Licensing, Flight and Technical Department, to regroup EBT training experts from different parts of the world to propose a second edition of the "Evidence-Based Training Implementation Guide", which integrates the latest Competency-Based Training and Assessment (CBTA) best practices.

1.2 EBT paradigm shift

Recurrent training and assessment is a process of revalidation and affirmation that the pilot continues to demonstrate an adequate level of performance, in addition to presenting valuable opportunities for continuous improvement.

For many decades the industry has used the satisfactory completion of maneuvers as performance measurements, such as rejected take-off, engine failure between V1 and V2, etc. A pilot able to demonstrate the ability to fly these often-repetitive maneuvers within prescribed quantitative performance measurements indicating an acceptable level of deviation from ideal criteria was deemed to be "proficient".

The paradigm shift developed by CBTA, including EBT, is that pilot performance should be determined across a wider range of competencies, and not simply by the achievement of a pre-determined outcome in a specific task or maneuver.

Tasks and maneuvers remain important, as they are reflected in specific training topics which serve as vehicles to develop and maintain the pilot competencies in an EBT recurrent training program.

EBT emphasizes training versus checking and promotes learning from positive performance. Therefore, EBT recognizes the need that all pilots should be challenged with unrehearsed events that continually build resilience and confidence throughout a pilot's career. An essential component of the EBT ethos is that pilots enrolled in an EBT program are more confident in their ability to perform their role.

1.3 Objective of this guide

The objective of this guide is to consolidate EBT guidance material and industry best practices to support the effective implementation of EBT. The contents of this guide are intended primarily to provide guidance to the States and the industry on how to apply the provisions of ICAO Doc 9995, the Manual of

Evidence-based Training, and the relevant provisions of ICAO Doc 9868 (PANS-TRG). This guide also refers to published EBT regulations when they enhance effectiveness of the EBT implementation.

The contents of this guide provide awareness to and support EBT implementation by the following entities:

- Civil Aviation Authorities (CAAs) and Regulators
- Operators (AOCs)
- Approved Training Organizations (ATOs)
- Aircraft manufacturers (OEMs)
- Course developers
- Pilot representative bodies

It is expected that as EBT further matures there may be changes or improvements to the program. IATA, together with industry stakeholders, is committed to review this guide on a regular basis and to incorporate any significant changes that may occur considering "in-service" experience.

1.4 Guide structure

The guide is structured as follows:

- Section 1–provides a general introduction
- Section 2–addresses the fundamentals of an EBT program
- Section 3–contains an overview for the (staged) implementation of an EBT program
- Section 4–provides specific guidance on the implementation process for the operator
- Section 5–provides specific guidance for the conduct of EBT from an instructor/evaluator (IE) perspective
- Appendices–provide more details on the program's aspects and its implementation, in addition to other supporting reference material

1.5 ICAO provisions for EBT

EBT was developed as a means of compliance with ICAO 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 programs, and 9.4.4, Pilot proficiency checks.

Reference should also be made to ICAO Annex 1 to the Convention on International Civil Aviation, Personnel Licensing, paragraph 1.2.5, Validity of licenses. Further guidance material is provided in ICAO Doc 9868 (PANS-TRG), Chapter 3, which details the purpose and intent of EBT, and determines that States wishing to implement EBT shall do this in accordance with ICAO Doc 9995, the Manual of Evidence-based Training. This manual contains detailed guidance material for States and operators.

ICAO Doc 9868 (PANS-TRG), Chapter 7, contains the framework of qualification and competencies for instructors, including those conducting EBT. This is further amplified in the Manual of Evidence-based Training, Doc 9995.

Of particular interest are the appendices in ICAO Doc 9841, the Manual on the Approval of Training Organizations, which detail the unique differences inherent in competency-based training programs, such as EBT, and the need for specialized training for those Licensing Authorities that will regulate and oversee such activities.

It is important to realize that the EBT program specifically, and only, addresses training to be conducted in a qualified FSTD. Guidance on the qualification of FSTDs is contained in ICAO Doc 9625, the Manual of Criteria for the Qualification of Flight Simulation Training Devices, Volume 1 – Aeroplanes.

Section 2 - EBT Fundamentals

2.1 Introduction

This section elaborates on the essential principles, components, and associated definitions of the EBT program.

Since the publication of ICAO Doc 9868 (PANS-TRG) Amendment 7 in December 2020, the principles of CBTA are applicable to all licensing and operator training with the goal to provide a competent workforce for a safe and efficient air transport.

CBTA is defined by ICAO as "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".

EBT is defined by EASA as "assessment and training based on operational data that is characterized by the development and assessment of the overall capability of a pilot across a range of competencies, rather than by measuring the performance in individual events or maneuvers".

Hence, EBT is a CBTA program that uses specific training topics as vehicles to develop the pilot competencies. The training topics and their associated frequency were defined during the inception of EBT, through the analysis of both safety and training data from a worldwide perspective.

EBT is a CBTA program applicable as an alternative to traditional operator recurrent training and checking.

2.2 Program overview

The EBT program should consist of:

- EBT modules composed of FSTD sessions
- Ground training
- Line evaluation(s) of competence

Within EBT, recurrent training and assessment of the competencies is considered over a three-year period.

The EBT program includes a notional exemplar 48 FSTD hours for each pilot in a suitably qualified FSTD, distributed over six EBT modules across the 3-year period. Each EBT module consists of an evaluation phase and a training phase.

The training items that do not necessitate an FSTD as a training platform should be addressed during ground training.

Section 4 provides guidance on how to implement the EBT modules, the ground training and a line evaluation of competence which may supplement line checks conducted within traditional training programs.

2.3 Phases within a module

Each module should normally contain the following three phases (in certain circumstances the CAA may accept that the evaluation phase is conducted in a different sequence than the one presented in this guide; this is intended to enable coherence with certain existing AQP or ATQP programs).

(a) **Evaluation phase (EVAL)**. This phase consists of one or more line-oriented flight scenarios. The assessment should be realistic, and the scenario(s) should be representative of the operator's environment.

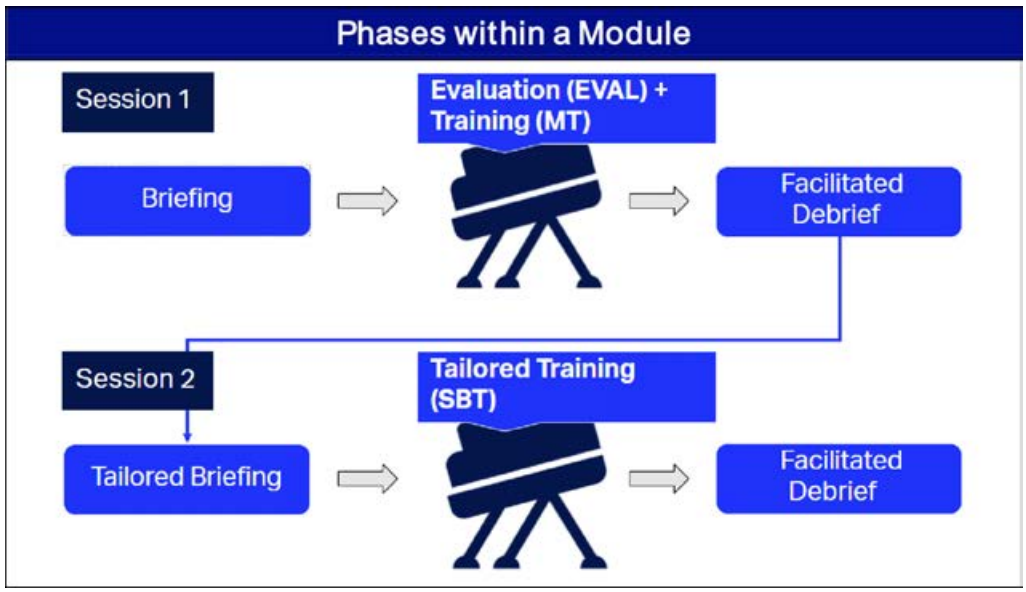
(b) **Maneuvers training phase (MT)**. This phase consists of maneuvers that place a significant demand on a proficient crew. Maneuvers in this context mean a sequence of deliberate actions to achieve a prescribed flight path or to perform a prescribed event to a prescribed outcome.

(c) **Scenario-based training phase (SBT)**. This phase forms the largest phase in the EBT program and is designed to focus on the development of competencies, whilst training to mitigate the most critical risks. The phase will include the management of specific threats in a line orientated environment. A portion of the phase will also be directed towards the management of critical system malfunctions.

Lists of maneuvers and the most critical risks are provided in Appendix G.IV, according to aircraft generation with indications of the recommended frequency in the EBT program. The scenarios shall include critical operational and environmental threats, in addition to building effective crew interaction to identify and manage errors. Scenario elements to be used for EBT module design and their related competencies are provided in Appendix G.V.

For the EBT program to be fully effective, it is important to recognize that the predetermined scenarios are simply a means to develop competency, and not an end or "tick box" exercise in themselves.

Industry best practice shows that the modules are usually scheduled as two consecutive FSTD sessions of 4 hours each. The following distribution of the EBT module phases is recommended: EVAL and MT constituting Session 1 and SBT constituting Session 2.



2.4 Program content

2.4.1 Assessment and training topics

The purpose of the EBT program is to use training topics defined to be most critical, as a means of assessing and developing competencies. It is important to note that, when adapting material in Appendix G to specific operator's needs, it is never the intention that all possible events or scenarios be programed within the EBT recurrent cycle. Operators should select the scenarios most useful to their needs while ensuring that the frequency of defined topics is maintained, to minimize competence decay over time.

Prioritization of the training topics is probably the most important result from the EBT data analysis (detailed information is provided in the EBT Data Report). Three levels of priority A, B and C are used to determine the frequency of pilot exposure to the defined training topics within a 3-year rolling recurrent training program.

The assessment and training guidance matrix is an extraction from the Data Report and its amendment (2021) which correlate specific training scenarios to competencies considered critical to the management of a specified threat or error.

The usage of the matrix during EBT program design is described in Section 4, Step 9: Assessment and training topics distribution, and Appendix G.II.

The following template provides the training topics and their associated frequency for the most common Jet aircraft generations 3 and 4.

Generations 3 & 4 Jet Training Topics	EBT/CBTA Overarching Principles (A frequency)					
	• Competencies non-technical (CRM) • Compliance • Monitoring and cross-checking			• Surprise • Workload, distraction, pressure • Aircraft system management		
A	Adverse weather	B	Adverse wind	C	ATC
	Automation management		Aircraft system malfunction		Engine failure
	Go-Around management		Approach, visibility close to minimum		Fire and smoke management
	Manual aircraft control		Landing		Managing loading, fuel, performance errors
	Error management, mis-managed aircraft state		Runway or taxiway condition		Navigation
	Unstable approach		Terrain		Pilot incapacitation
			UPRT		Traffic
			Windshear recovery		[1]Operations or type specific

2.4.2 Equivalency of aircraft system malfunctions

The philosophy of EBT is that the qualified FSTD should be used to the maximum extent possible for assessing and developing pilots' competence. Pilots should be exposed to a wide variety of situations that may be faced in line operations. Aircraft system malfunctions to be considered for the EVAL and SBT phases are those that place a significant demand on a proficient crew.

The EBT philosophy for the equivalency of aircraft system malfunctions is the following:

- Each pilot is trained and assessed in the management of aircraft system malfunctions
- Aircraft system malfunctions that place a significant demand on a proficient crew are organized by reference to the following characteristics:
  - Immediacy
  - Complexity
  - Degradation of aircraft control
  - Loss of instrumentation
  - Management of consequences
- Each pilot is exposed to at least one malfunction for each characteristic, at the frequency determined by the table of assessment and training topics
- Demonstrated proficiency in the management of one malfunction is considered equivalent to demonstrated proficiency in the management of other malfunctions with the same characteristics

All malfunctions not covered by these characteristics continue to require review and appropriate procedural knowledge but with different means. For instance, to repeat simple malfunctions and use the FSTD

1 Should be distributed across the EBT modules of the triannual plan.

environment as a "procedure training device" is to deny the full benefit of the FSTD as a learning tool. It is precisely for this reason that the malfunction clustering system has been developed, to reduce unnecessary requirements to "tick boxes" against each listed malfunction of the ATA chapters.

Procedures and guidelines on how to perform the equivalency of malfunctions process can be found in Section 4, Step 7: Equivalency of malfunctions.

2.4.3 Equivalency of approaches

The development of an EBT program requires the determination of critical training events, the development of training scenarios and the definition of appropriate pilot performance criteria when managing these events and scenarios.

Selection of approaches for scenario-based training should be based on the underlying elements of flight crew performance to conduct them. Equivalent groups of approaches can be determined by reference to these elements. Demonstrated competence in the conduct of one approach type can be considered equivalent to demonstrated competence for the other approach types in the same group.

Procedures and guidelines on how to perform the Equivalency of Approaches process can be found in Section 4, Step 8: Equivalency of approaches.

2.5 Pilot and instructor/evaluator competency frameworks

One of the essential components of the EBT program is the implementation of a pilot competency framework.

IATA and several CAAs recommend using an adapted competency model, consisting of nine competencies, the eight ICAO aeroplane pilot competencies, plus the competency "Application of Knowledge". The competency "Application of Knowledge" refers to the ability of the pilot to recall and proactively update relevant knowledge and to apply acquired knowledge to the operational environment.

The following are the 9 IATA pilot competencies and their associated acronyms.

Acronyms	Pilot Competencies
KNO	Application of Knowledge
PRO	Application of Procedures and Compliance with Regulation
COM	Communication
FPA	Aeroplane Flight Path Management, automation
FPM	Aeroplane Flight Path Management, manual control
LTW	Leadership and Teamwork
PSD	Problem Solving and Decision Making
SAW	Situation Awareness and Management of Information
WLM	Workload Management

IATA also recommends implementing an instructor/evaluator (IE) competency framework for the initial and recurrent EBT IE standardization. In 2017, IATA developed such a framework, which includes the pilot competencies and four additional competencies for instructor/evaluator (IEC).

ICAO endorsed this IATA competency framework under the name of "ICAO pilot instructor and evaluator competency framework" which is described in ICAO Doc 9868 (PANS-TRG).

Pilot Instructor/Evaluator (IE) Competencies	
– Pilot Competencies – Management of the learning environment – Instruction	– Interaction with the trainees – Assessment and Evaluation

The IATA pilot and IE competency frameworks are available in Appendix B to this Section.

The competency frameworks are structured in such a way that each competency and associated description and Observable Behaviors (OB) are clearly identifiable and properly determined.

Since 2018, the OBs receive a number to facilitate CBTA data collection and analysis.

Example of the IATA pilot competency framework for the competency Communication:

COMMUNICATION		
Description	**Observable behaviors (OB)**	
Communicates through appropriate means in the operational environment, in both normal and non-normal situations.	OB 2.1	Determines that the recipient is ready and able to receive information
	OB 2.2	Selects appropriately what, when, how and with whom to communicate
	OB 2.3	Conveys messages clearly, accurately and concisely
	OB 2.4	Confirms that the recipient demonstrates understanding of important information
	OB 2.5	Listens actively and demonstrates understanding when receiving information
	OB 2.6	Asks relevant and effective questions
	OB 2.7	Uses appropriate escalation in communication to resolve identified deviations
	OB 2.8	Uses and interprets non-verbal communication in a manner appropriate to the organizational and social culture
	OB 2.9	Adheres to standard radiotelephone phraseology and procedures
	OB 2.10	Accurately reads, interprets, constructs, and responds to datalink messages in English

Operators and ATOs should implement the IATA and ICAO pilot and IE competency frameworks in order to facilitate the analysis and benchmarking of the training and safety data.

2.6 Adapted Competency Model

The Adapted Competency Model introduces the performance criteria to complement the competency framework. These performance criteria include the competency standards and the conditions under which the competencies are trained and assessed.

2.6.1 Structure of an adapted competency model

Performance criteria. **Statements used to assess whether the required levels of performance have been achieved for a competency. A performance criterion consists of an observable behavior, condition(s) and a competency standard.**

Competency	Description	Performance criteria		
		Observable behavior (OB)	Competency Assessment	
Competency 1	Description 1	OB 1	Competency standard (Final or interim)	Conditions: • Context complexity (operational and environmental) • Level of support of the instructor/ evaluator • Aircraft, FSTD, tool, system, or equipment
		OB 2		
		OB n		
Competency 2	Description 2	OB 1		
		OB 2		
		OB n		
Competency n	Description n	OB 1		
		OB 2		
		OB n		

Competency Standard. A level of performance that is defined as acceptable when assessing whether or not competency has been achieved

Conditions. Anything that may qualify a specific environment in which performance will be demonstrated.

Notes:

1. *Final and interim competency standards are defined by the organization.*
2. *There are different types of conditions to be considered:*
   - *Conditions related to context (nature and complexity of the operational and environmental context)*
   - *Conditions related to the amount of support or assistance a trainee can expect from the instructor*
   - *Conditions related to tools and systems/equipment airplane, FSTD*

2.6.2 Characterization of the conditions

IATA recommends that AOCs and ATOs characterize the conditions under which the competencies are trained and assessed during any CBTA program, including EBT, as follows:

Conditions related to tools and systems/equipment, airplane, FSTD

These conditions relate to the training platform that is used to train and assess the competencies. The training platform may be a classroom, a part task trainer, an FSTD, an airplane, etc.

Conditions related to the amount of support a trainee can expect from the instructor

These conditions should be correlated to recognized instructional methods as described in Section 5.6.

Three levels of instructor support (low, medium and high) have been defined and correlated to the recognized instructional methods as follows.

Note: *Facilitation may be relevant for low to medium levels of support, depending on the trainees' needs.*

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

Conditions related to context (nature and complexity of operational and environmental context)

The characterization of the context complexity is of upmost importance for an effective and efficient EBT implementation since:

- Most of the competencies necessitate the insertion of operational and/or environment threats to ensure regular demonstration of the associated OBs during the EBT module, and
- The EBT approach to the competency development is based on three phases within the modules where the complexity of the context is variable across the phases.

IATA addresses the context complexity characterization by the creation of a bi-dimensional matrix that combines different levels of complexity for both the operational and the environmental context.

To provide examples with three levels of complexity, in a training event containing the threat E01.01 Thunderstorm, the environmental context complexity would be:

- "Low" for an isolated cumulonimbus (CB-ISOL)
- "Medium" for an occasional cumulonimbus (CB-OCNL)
- "High" for frequent cumulonimbus (CB-FREQ)

To provide examples with three levels of complexity, in a training event containing the threat A01 Aircraft malfunction, the operational context complexity would be:

- "Low" for aircraft malfunction placing limited demand on the crew
- "Medium" for aircraft malfunction placing moderate demand on the crew
- "High" for aircraft malfunction placing significant demand on the crew

Note: *The criteria to determine the levels of demand (limited, moderate or significant) that a malfunction places on a crew can be found in ICAO Doc 9995, in the European Air Operation regulation and in the OEM documentation.*

The bi-dimensional matrix presents the zones (Zone XX) resulting from the combination of the operational and environmental context complexity. These zones are proportionate to the level of resources to be deployed by the pilot(s) to safely operate the aircraft while mitigating the risks associated to the operational and environmental threats present in the training event.

The matrix below presents an illustration of the zones resulting from 3 levels of operational and environmental context complexity.

Operational Context High	Zone III	Zone IV	Zone V
Operational Context Medium	Zone II	Zone III	Zone IV
Operational Context Low	Zone I	Zone II	Zone III
	Environmental Context Low	**Environmental Context** Medium	**Environmental Context** High

2.6.3 IATA general recommendation for adaptation

The criteria for adaptation are related to the following elements:

1. The competency itself, including its name
2. The description of the competency
3. The observable behaviors
4. The interim or final competency standard
5. The conditions of the demonstration of competency

The recommended IATA Adapted Competency Model for EBT is described in Section 4, Step 3: Development of an adapted competency model and grading system.

The notion of interim and final competency standards in the context of EBT is elaborated in Section 5, Grading.

IATA considers that elements 1 to 3 are optional for adaption and the ATO/AOC should modify only a few elements for high-level training strategies or for tactical reasons due to a specific type of operation.

An example of strategic adaptation is the inclusion of the competency "Application of Knowledge" in the IATA pilot competencies framework. It is worth noting that "Application of Knowledge" has been adopted by most operators and by regulators such as EASA.

An example of tactical adaptation could be the removal of Observable Behaviors, OB 2.10 "Accurately reads, interprets, constructs and responds to datalink messages in English" from the competency Communication for the ab initio training centers that do not have data link equipment for their operations.

IATA considers that elements 4 and 5 necessitate adaptation, depending on the purpose of the training. An example for different final competency standards can be illustrated during the selection of pilot instructors who need to achieve a higher final competency standard for specific competencies, compared to the regular pilots. For example, for the competency Workload Management the final competency standard should be "effective" (corresponding to grade 4) for pilot instructors, while the final competency standard should be "adequate" (corresponding to grade 3) for regular pilots.

The example for different conditions can be illustrated during a type rating course. The competency standard is identical throughout the course but during the early stages, trainees can expect active coaching and teaching from the instructor. As the trainee progresses towards the final competency standard and gains more confidence in performing independently, the instructor takes on a more passive role.

2.7 Relationship between CRM, TEM and Pilot/IE competency frameworks

In 2017, the IATA Pilot Training and Licensing experts conducted an analysis among several international organizations representing airlines and training organizations. The aim of the analysis was to assess the potential differences in the implementation of the TEM principles and to harmonize the role of the pilot and IE competency frameworks within the TEM model.

The IATA Pilot Training and Licensing experts agreed on the following conclusions:

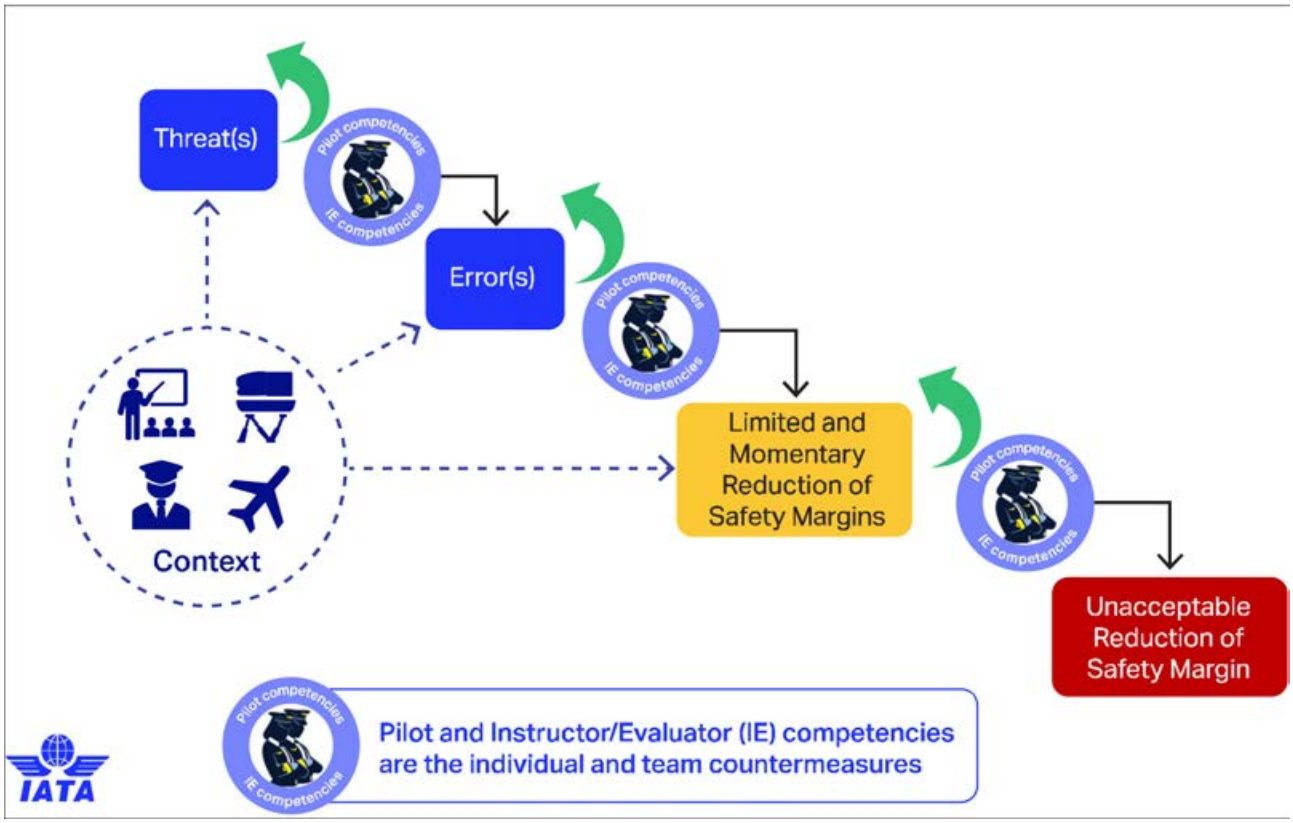
- TEM is the overarching concept in training and operations
- Pilot and IE competencies represent the set of individual and team countermeasures
- CRM skills are embedded in the pilot and IE competencies
- CRM training supports the development of the pilot and IE competencies as countermeasures in the TEM concept

The output of this work was adopted by ICAO through Amendment 5 to ICAO Doc 9868 (PANS-TRG), which states that: "*from a CBTA (including EBT) perspective, the competencies of the approved adapted competency model provide individual and team countermeasures to threats and errors and undesired aircraft states. CRM skills are embedded in the approved adapted competency model. Therefore, the CRM training supports the development of the competencies as countermeasures in the TEM concept.*"

and

"In competency-based training, including EBT, TEM is naturally and fully embedded in the training curriculum. The competencies of the approved adapted competency model provide individual and team countermeasures to threats and errors to avoid undesired aircraft states."

The following schematic is used as a pedagogical tool to illustrate the above concept.



Note:

- *"Limited and Momentary Reduction of Safety Margin" describes an outcome of TEM where the pilot or the IE demonstrated OBs that did not allow, on few occasions, a timely management of the threats or errors. This led to a limited and momentary reduction of the safety margin.*
- *"Unacceptable Reduction of Safety Margin" describes an outcome of TEM where the pilot or the IE demonstrated OBs that did not allow a timely management of the threats or errors. This led to an unacceptable reduction of the safety margin.*

Under EBT, Threat and Error Management is naturally and fully embedded in the training program. The Pilot and IE competencies provide individual and team countermeasures to threats and errors to avoid a reduction of safety margins during training and operations:

- The more OBs are timely demonstrated, the better the TEM should be. This should lead to the maintenance of the safety margins.
- Per opposition, the OBs that have not been demonstrated when they were required could result in the mismanagement of the threats and errors. This could lead to a reduction of the safety margins.

2.8 Competency assessment process and method

2.8.1 Definitions

Assessment. The determination by an IE as to whether a candidate meets a required competency standard under given conditions, by collecting evidence from observable behaviors.

The assessment takes place during instruction and evaluation and can be either formative or summative.

Formative Assessment. The formative assessments are a part of the learning process. IEs provide feedback to the trainees on how they are progressing toward the 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.

The formative assessment should serve to motivate trainees, identify strengths and weaknesses, and promote learning.

Summative Assessment. The summative assessments provide a method that enables the IE 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 the 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 judgment to improve feedback for the trainee and training personnel.

2.8.2 Process to assess performance

To assess the trainee's performance, the trainer should apply the following process (ORCA):

- **Observe** performance (behaviors) during the training or evaluation.
- **Record** details of effective and ineffective performance (behaviors) observed during the training or evaluation ('record' in this context refers to instructors/evaluators taking notes).
- **Classify** observations against the Observable Behaviors (OBs) and allocate the OBs to each competency.
- **Assess** the performance by determining the root cause(s) for low or high performance according to the competency framework. Low performance would normally indicate the area of performance to be remediated in subsequent training.

Note: *Depending on the training objective, the trainer guidance may indicate competencies which may be irrelevant to be assessed or recorded. In that case, the trainer will record "N/O" (NOT OBSERVABLE).*

2.8.3 Competency assessment method

IATA recommends applying the following methodology to ensure the maximum level of consistency and objectivity to assessments performed in a CBTA program.

To assess how well the trainee demonstrated the competency during training or evaluation, the trainer should assess the associated OBs of each competency against the following dimensions by determining:

- How many OBs the trainee demonstrated when they were required,
- How often the trainee demonstrated the OB(s) when they were required, and
- What was the outcome of the threat management and error management relating specifically to the competency being assessed?

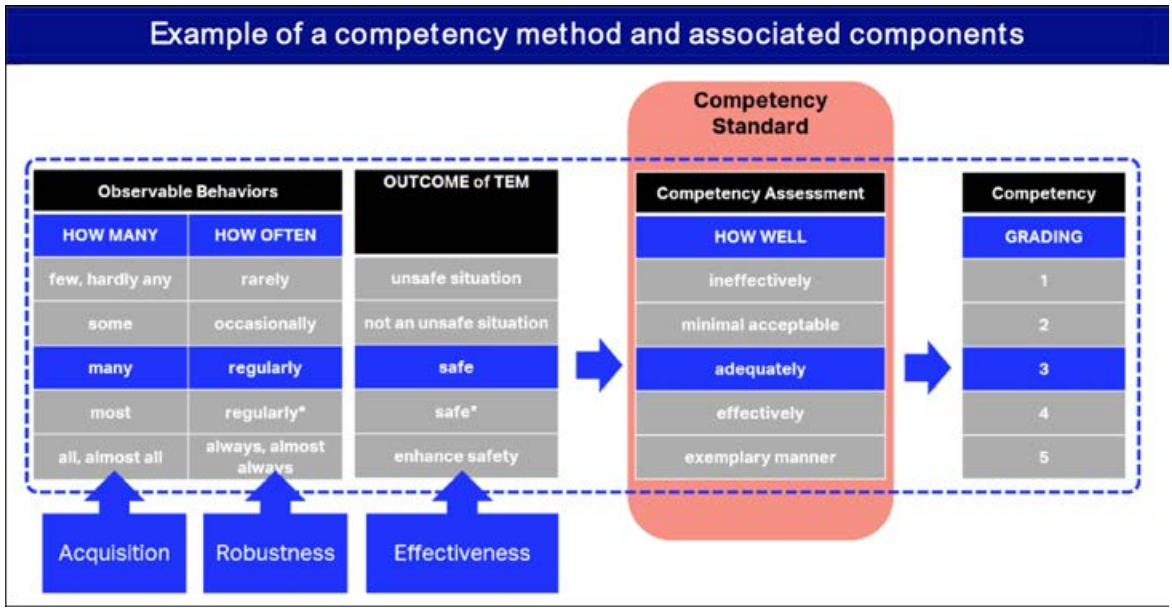
The competency assessment (**HOW WELL**) is the combination of the number of OBs demonstrated and their frequency of demonstration and the consequential outcome of the TEM relating specifically to the competency being assessed.

The "**HOW MANY**" dimension provides evidence related to the acquisition of the competency.

The "**HOW OFTEN**" dimension provides evidence related to the robustness of the competency.

The "**Outcome of TEM"** dimension provides evidence related to the effectiveness of the competency as individual and team countermeasures against threats and errors.

The following template provides an illustration of the competency assessment method.



regularly*: When they were required, the trainee has regularly* (very often) demonstrated most of the OBs during training or evaluation. This led to an improvement of the safety margin.

safe* : Illustrates a more pro-active safety level. (Please see 5.5.3, Word Pictures of "OUTCOME OF TEM" dimension.)

The IATA "Competency Assessment and Evaluation for Pilots, Instructors and Evaluators" is intended to provide guidance to Civil Aviation Authorities (CAA), Operators (AOC) and Approved Training Organizations (ATO) for the competency assessment and evaluation of pilots and IEs in the context of the global expansion of CBTA programs.

Excerpts from this guide and EBT-specific guidance are contained in Section 4 and Section 5.

2.9 Concept of resilience

The EBT program seeks to drive pilots to master competencies, to enhance their confidence and to develop resilience managing unforeseen situations. Consequently, this paragraph elaborates on the concept of resilience and on the how an EBT program should ensure its development.

Resilience is defined by the EU regulation as "the ability of a flight crew member to recognize, absorb and adapt to disruptions."

Note: *Science and academics provide additional definitions of the concept. For example, resilience is also defined as "the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events" (US National Academies of science, engineering and medicine). Scientific research in psychology often describes resilience as the ability to bounce back from adversity as well as to grow from challenges.*

From a practical perspective, pilots demonstrate resilience when they are able to maintain or to restore the safety margins following one or more unexpected events, which may result in a deterioration of performance.

Managing operational disruptions is a core business for pilots. Many of these disruptions may be anticipated and consequently managed effectively. However, in some cases operational disruptions may not be anticipated and thus occur unexpectedly, while triggering *surprise*, or inducing a *startle* response.

Note: *Definitions from ICAO Doc 10011:*

- **Surprise***. The emotion-based recognition of a difference in what was expected and what is actual.*
- **Startle***. The initial short-term, involuntary physiological and cognitive reactions to an unexpected event that commence the normal human stress response.*

Startle and surprise are terms that are often used interchangeably, although they have different origins.

- In prevalent aviation literature, surprise is regarded as a cognitive-emotional response to an unexpected event, resulting from a mismatch between expectation and perception. Surprise is triggered either through the occurrence of an unexpected event, or the unexpected absence of an expected event.
- In contrast, startle is a physiological reflex which occurs after sudden exposure to an intense external stimulus (auditory, visual, tactile). Immediate consequences of the startle response include physical, cognitive, emotional, and behavioral impairments, whereby their magnitude and duration depend on the severity of the stimulus and the perceived seriousness of the threat. In life-threating situations, these reactions can be substantial and long lasting, making it difficult for pilots to recover from the critical event.

Startle and surprise can be perceived simultaneously. However, it is also possible to be surprised without being startled, and to be startled without being surprised. In the latter case, despite the onset of the startling stimulus being known or anticipated, the startle reflex will nevertheless occur, and its psychophysiological consequences have to be managed.

A clear understanding of the concepts of startle and surprise, and to train the recovery from both is essential for resilience development in managing critical events.

- A robust application of TEM can reduce surprise through the anticipation and effective subsequent management of events. In addition, Situation Awareness is a critical competency to avoid surprises.
- The training of startle may comprise the exposure to startling events in the simulator but should also include education of pilots about the nature of the startle reflex, the consequences they need to expect, and the development of resilience strategies to overcome a deterioration of performance. Extensive evidence from literature suggests that a pilot's immediate actions following a startle are often wrong or inadequate to recover from the situation. Since startle may severely impair cognitive functioning, easy and basic rules are often taught, such as "sit on your hands", or "take a deep breath before starting any action". In any case, it is essential to establish a brief but deliberate cognitive gap between the startling event and taking the first action to regain control. Mnemonics such as "push, roll, power, stabilize" in UPRT may support recovery from startle.

- After overcoming the initial effects of surprise and/or startle, pilots should apply the required competencies to maintain or restore the safety margin, including the competency PRO. To manage disruptions not covered by any normal or abnormal procedures or checklists, pilots need to adapt by applying appropriate OBs (e.g., OB 6.8 Adapts when faced with situation where no guidance or procedure exists, or OB 5.2 Demonstrates initiative and provides direction when required), and OB 8.6 Seeks and accepts assistance, when appropriate).

The objective of resilience development is to:

- Strengthen the competency situation awareness, to minimize surprise
- Understand the concepts of surprise and startle, as well as their differences
- Understand and train resilience strategies to recover from surprise and startle
- React in a controlled and structured manner to an unexpected event
- Maintain or restore the safety margin by applying appropriate competencies

Resilience development should be integrated in EBT module design and the conduct of its training phase, as indicated in Sections 4 and 5. Emphasis on resilience development should also be given in Human Factors and CRM training. Awareness and training on protective resilience factors such as mental agility, self-regulation, emotional control, and self-efficacy, etc., can further support resilience on the flight deck.

2.10 EBT IE standardization

The EBT IEs should hold or have held a license and be authorized to carry out instruction on the basis of their expertise, and/or qualifications, and/or ratings, and should also meet additional EBT related qualification requirements.

CBTA, including EBT programs, are highly dependent upon the IEs' abilities and commitment to develop and assess the trainees' competence and confidence. Therefore, it is important that only those individuals who have the potential to support the trainees' professional and personal development are considered for IE positions. Hence prospective IEs should be selected, trained and qualified in accordance with the provisions in Section 4 of this guide to ensure safe operations and training effectiveness.

Therefore, the IE applicant should:

- Undergo a selection process designed to ensure that the individual's motivation and disposition are suitable for the IE role.
- Receive initial theoretical and practical training to develop the required IE competencies (as described in Appendix B.II). The IE training should also focus on:
  - Determining root causes for deviations below the standards of performance; and
  - Identifying situations that could result in unacceptable reductions in safety margins.
- Successfully complete an initial formal IE competency assessment during the conduct of practical EBT FSTD training. During the assessment, the applicant should demonstrate the IE competencies according to the level of performance defined in the adapted competency model, as approved by the appropriate authority. The competency assessment should be conducted during a practical training session supervised by a person nominated by the AOC or the ATO.

All the EBT IEs should receive refresher training and complete a formal recurrent IE competency assessment during the conduct of practical EBT FSTD training, at an interval not greater than three years. The competency assessment should be conducted during a practical training session supervised by a person nominated by the operator or the ATO.

For more details regarding EBT IE standardization refer to Section 4, Step 5: EBT IE initial standardization, and Step 15: EBT IE recurrent standardization and ICAP.

2.11 Data collection and analysis

2.11.1 Importance of data within the EBT program

Data collection and analysis are essential components to inform, develop, monitor, and enhance training programs. An EBT program requires the determination of critical training events, the development of training scenarios, and the definition of appropriate flight crew OBs when managing these events and scenarios. It is necessary to collect real world data from accidents, incidents, flight operations and training to feed and validate course development. Data collection should provide for a detailed analysis of existing threats and identify potential weaknesses regarding the airline's operational safety.

The following data sources are relevant:

Inner Loop Data, which refers to data available within the operator. It comprises two main components:

1. *Training data*
   - Pilot performance data, with an analysis of recent trends across all the operator's fleets, to identify and quantify differences and specific areas of threat or interest; this requires the development of a training measurement system
   - IE data, within the framework of a robust Instructor Concordance Assurance Program (ICAP)
   - Subjective feedback data, to complement objective data and derive insights into the quality and effectiveness of the EBT program from a trainee and IE perspective
2. *Operational data*
   - Flight data with an analysis of recent trends across the operator's own or similar fleets, to identify and quantify differences and specific areas of threat or interest
   - Operator's SMS data, including safety reports with an analysis of the operator's safety data from all sources with specific identification of those risks that can be mitigated by pilot training
   - Operator's specific operational challenges that relate to route network, aerodromes used, weather, etc.

Outer Loop Data, which refers to data from multiple external sources outside of the operator. World fleet data can provide an analysis of safety data from operations with similar aircraft types and operations. Outer loop data also includes OEM data. The Data Report for Evidence-Based Training allows to create a training framework that could mitigate the operational risks raised in the report.

The development of the operator's training program starts with the generic training program by generation of aircraft, provided by the regulator. With this program, the operator distributes the assessment and training topics over a period of 3 years and adds other requirements such as specific approvals (e.g., LVO), further operational or training requirements (e.g., either seat qualification).

Evidence gained from previous training and the operator's SMS has to be integrated at this point, as well. It is advantageous to develop, train and assess competencies utilizing scenarios that are relevant to operations. In some cases, the data may highlight certain competencies considered critical to the management of a specified threat or error in the operation, which may lead to a focus on specific areas as part of the training program.

2.11.2 Collection and analysis of training data

Training metrics introduction

Training metrics, sustaining the monitoring and enhancement of the EBT program performance, constitute the core of the EBT training data that should be collected and analyzed by the CAAs, operators and training organizations. Taking full advantage of such data requires robust and well-calibrated metrics.

Metrics derived from EBT training data can be classified into the following categories:

- Pilot performance
- Instructor/Evaluator performance
- Trainee feedback

Pilot performance metrics refer to data derived directly from the EBT grading system. The following grading metrics were introduced within the European regulatory framework in the context of baseline EBT implementation and recommended that they be captured.

Example of grading metrics mandated by the Evidence-Based Training European regulation
Level 0 (competent metrics): The information whether the pilot(s) is (are) competent or not.
Level 1 (competency metrics): Level of performance reflected by numeric grade of the competencies (e.g., 1 to 5).
Level 2 (observable behavior metrics): The instructors record OBs predetermined or required by the organization (Regulatory or Policy requirements).
Level 3 (TEM metrics): The instructor records Threats, Errors or Reduction of Safety Margin predetermined or required by the organization.

These metrics should then be compared to independent variables such as different aircraft types, pilot roles, pilot qualifications, experience level, or training topics.

Vital evidence can be gained from assessing OBs not just on a quantitative but also on a qualitative level. These insights can provide a fundamental source for deriving training needs and feeding the respective EBT program design.

Instructor performance metrics are important to measure the effectiveness of the instructor calibration process. However, it is essential that the purpose of this system is not to spy on instructors or to pressure individuals to change their grading. Instructor performance metrics are further discussed in Section 4 as part of the Instructor Concordance Assurance Program (ICAP).

Trainee feedback should be captured to provide a different perspective on the quality and effectiveness of the training program and induce subsequent program developments. It is recommended to capture this feedback through an electronic feedback survey, which should be reviewed regularly through an established feedback review process. Operators should be attentive to response rates and actively encourage feedback from trainees and instructors.

Data review processes and procedures should be established within the training department to ensure the quality and proper conduct of the data review and analysis. Descriptive statistics should be used to summarize and describe the metrics captured. Inferential statistics should be used when comparing results between different groups or trying to reach conclusions which extend beyond the immediate sample observed.

It needs to be recognized that data analytics requires a specific skill set and expertise. Appropriate business analytics capabilities should be established within training departments to ensure that data is analyzed correctly, and interpretations of the results are valid. If such expertise is not available, consideration should be given to outsourcing data analytics and reporting to either a dedicated analytics department within the business or seeking external consultation.

Although training metrics are an invaluable component in supporting an EBT training program, they must be placed in the context of operational data, because only the latter can justify the importance of a specific competency within the real operation.

Diverging needs of assessment and grading data 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 strength and weakness. Understands how to improve.
Operator	Monitors and ensures the development of the competencies of the individual pilot. Manages training system performance. Obtains data for instructor standardization and concordance. Monitors and compares performance trend by pilot groups (e.g., fleet, rank) Validates and refines the EBT program.
CAA	Conducts EBT oversight (revalidation or renewal of licenses).

The specific demands shown in the above table consequentially require that the IEs 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 (Level 1 and Level 2 grading metrics).Numerical competency grades for statistical trend analysis (training system performance, instructor standardization and concordance, trend-analysis of pilot group performance (e.g., per fleet, rank ...) (Level 0 and Level 1 grading metrics).
CAA	EBT oversight - effectiveness of the operator's EBT program using primarily data related to Level 0 grading metrics.

The collection and analysis of these EBT training metrics within the global SMS should first enhance a **proactive hazard identification**, and second **support a more predictive approach to hazard identification** by providing visibility on the individual and the team countermeasures (the competencies) to efficiently manage the threats encountered and errors committed in both training and operational contexts.

2.11.3 Collection and analysis of operational data

The purpose of data collection and analysis is to inform the training program by deriving insights into performance deficiencies. This should then drive adjustments to the program and allow to determine whether it has been effective or not. The following section will deal with the safety reporting programs forming the most classic source of safety information.

Flight data analysis (FDA)

Flight data analysis is a powerful data collection tool that allows quick access to the results. A limitation is that FDA can only detect pre-defined events based on predetermined technical cues.

FDA information is useful for examining what has occurred in the operation, but not why an event occurred or how the situation was managed after the event did occur. However, FDA can be very powerful in highlighting important operational trends, for example:

- The rate of unstable approaches and corresponding rate of resultant go-arounds versus landings
- The frequency of some threats and events, e.g., ACAS alerts, rejected take-offs
- Operation and route specificities, including those of destinations, and other operational factors
- Issues that relate directly to training, e.g., hard landings or rotation technique

FDA is most effective as a trending tool to measure improvement or degradation in operational performance in terms of the risk events defined in the specific FDA program. From the trends, adjustments can be made in the training program to mitigate the risk shown by the FDA analysis. As the trend continues, the effectiveness of the adjustments can be measured and validated in a quality loop process.

Flight deck observation

Flight deck observation is intended to monitor normal operations by trained observers, in programs such as Line Oriented Safety Audit (LOSA) and other similar methods. The philosophy is a non-intrusive observation of the flight crew activity. The focus is on threats and errors and on the effectiveness of competencies in their management. Results are not correlated to the individual pilots but are interpreted at the level of the whole operation. LOSA is performed on a time-limited (snapshot) basis, but other variations of normal operations monitoring can occur on a more continuous basis.

The benefit of flight deck observation is in its capability to capture data through anonymous and structured recording of normal operations. The processes and competencies used by pilots to manage threats, errors and undesired aircraft states may be accurately captured. All threats and errors seen by the

observer are captured in addition to the competencies used to manage them. Also, and very importantly, all contextual factors (e.g., weather, time pressure, etc.) are recorded, and the "Whys" and "Hows" missed by FDA, are also observed. The principal disadvantage is a relatively high human resource requirement.

For the purpose of training enhancement and review of effectiveness, flight deck observation may produce a valuable source of information. Of course, a significant number of observations needs to be made to derive any meaningful results.

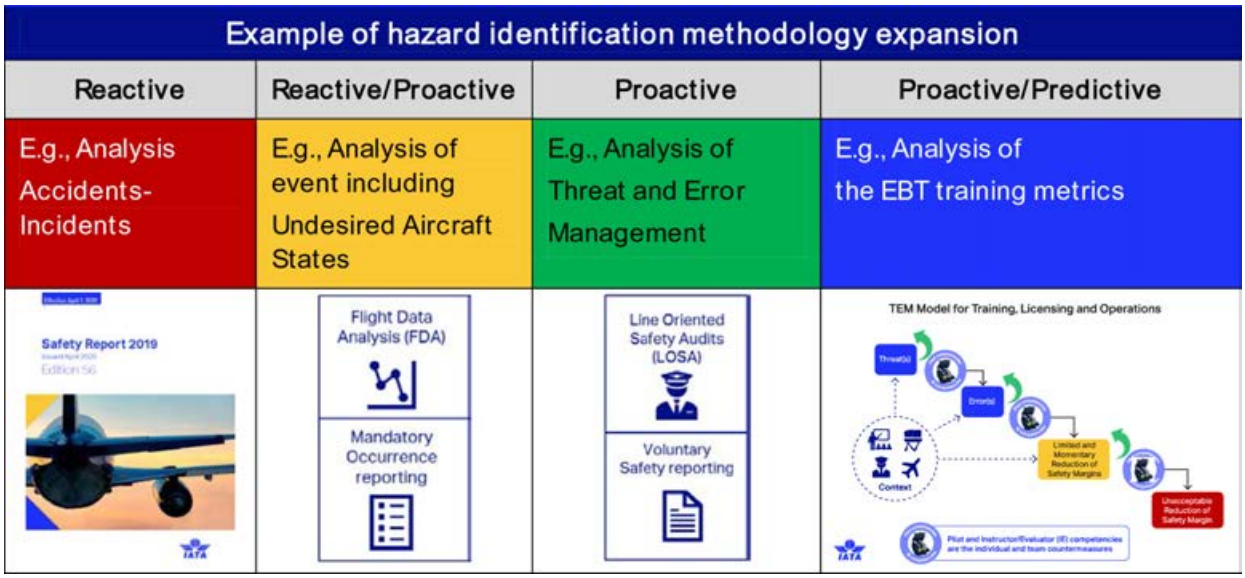
Participation in data sharing groups

There are opportunities to share relevant operational and training data between operators. The relevance of data from other operators depends on the similarity of aircraft types, destinations, training programs and other factors. While some of such data may be valuable, care must be taken not to drive the training program too extensively based on such external data. Furthermore, aircraft manufacturers share information on fleet-wide trends and individual events of concern. Such information may be very useful to the operators of the aircraft type/family in question.

As an over-arching report, the EBT Data Report (1st Edition, and its amendment 2021) might primarily be used to consider outer loop data for the EBT program and secondly establish a common, worldwide EBT framework.

2.11.4 Summary

Data collection and analysis generally needs to cover various types of data, both from within the training activity and from the flight operations and SMS. Data analysis can be as simple as analyzing the operator's mission and making sure that operator-specific threats are accounted for in the training program. Alternatively, the analysis may be carried out using sophisticated flight data analysis software.



Procedures and guidelines on how to analyze safety and training data can be found in Section 4, Step 13: Measurement of training system performance.

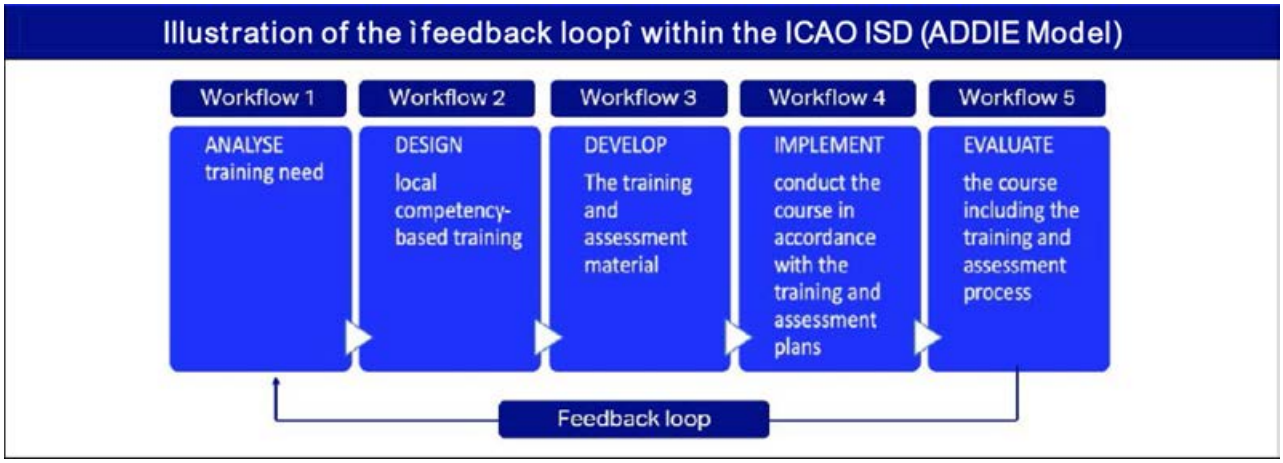
2.12 Feedback loop

EBT implicitly provides dynamic, effective, and efficient programs because it respects the instructional system design (ISD) principles. In particular, the ADDIE (Analyze, Design, Develop, Implement and Evaluate) model ensures that the training program is adapted to the organization and trainees' needs while making best usage of training media and devices.

The EBT program targets to deliver competent trainees (Workflow 4) that have demonstrated the achievement of the organization's competency standard.

The achievement of the organization's competency standard should permit to reliably predict that the trainees conduct safe and efficient operations after the course delivery. Consequently, the consistent demonstration by a cohort of trainees of an adequate level of performance across all the competencies of the adapted competency model should be the basic criteria to evaluate the effectiveness of the course.

Specifically, Workflow 5 generates a "feedback loop" that sustains a continuous enhancement of the course.



In particular, the Workflow 5 process mandates the analysis of the courses results, which includes the trainees' performance data based on training metrics. Therefore, at the end of each EBT module, feedback on training performance is gathered to determine the effectiveness in supporting the progression of learning towards competence in the operational environment.

Furthermore, EBT programs use operational and safety data to adapt the training program. For details, refer to Section 4, Step 14: Continuous improvement of the training program.

Section 3 - Implementation Overview

This section provides an overview of a possible pathway to implement an EBT program. The proposed pathway is a step-by-step approach for an AOC/ATO to transition from traditional recurrent training and checking to EBT. This pathway is recommended because EBT represents an important shift in terms of training philosophy, also because EBT involves a significant amount of resources for its successful implementation. Therefore, the following paragraphs describe the steps that should permit the AOC/ATO to progressively introduce EBT within the organization, ensuring a planned allocation of resources and facilitating the adoption by the workforce (pilots, instructors, courses developers, etc.).

Note: *The Steps ensuring the progressive implementation of EBT are presented in a template at the end of this section and Section 4 provides the details on each implementation step.*

3.1 Baseline EBT requirements

This paragraph illustrates the magnitude of the transition from traditional recurrent training and checking to EBT, by presenting the requirements for the baseline EBT implementation and the actions to be conducted by the organization for the program to be approved by the Authority.

The minimum requirements considered necessary prior to any implementation of EBT are as follows:

(a) Implementation of an adapted competency model

(b) Development of the EBT program, by distributing the training and assessment topics over a period of 36 months

(c) Training and assessment of the EBT IEs, including initial and recurrent standardization and inter-rater reliability assurance

(d) Providing information to pilots regarding EBT principles, methodology and the level of performance expected to be demonstrated across the pilot competencies

(e) Ensuring the availability of a measurement of training system performance

Before implementing EBT, the AOC/ATO should ensure that it meets the requirements specified by the CAA for the implementation of EBT.

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

- The definition of an implementation and operations plan
- Review of the training effectiveness before and after the EBT implementation
- The adaptation and approval of the EBT program, in compliance with Appendix G, according to the generation of aircraft (fleet) and type of operation for the operator
- The EBT program implementation
- The adjustment and continuous improvement of the training program according to the training system feedback

Note: *Appendices D and E to the Manual on the Approval of Training Organizations (Doc 9841) also provide guidance to ATOs and CAAs on managing risk while planning for and implementing a proof-of-concept trial.*

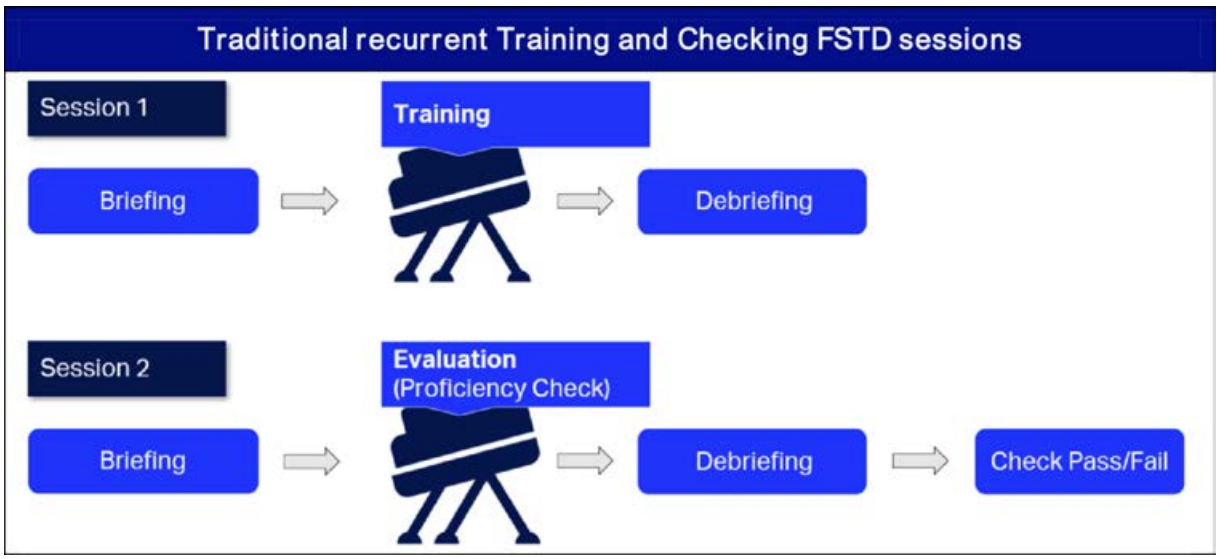
3.2 Staged implementation

Stage 0 – Traditional recurrent training and checking programs

In traditional recurrent training and checking FSTD programs, operators conduct mainly task-based training and assessment. As most of the regulations (based on Annex 1 and Annex 6 provisions) mandate the completion of two operator proficiency checks per year and a license proficiency check per year, the

yearly operator recurrent training and checking patterns are often composed of two FSTD sessions every six months. These training and checking FSTD sessions are often scheduled as consecutive days, with the first session being a training session mainly dedicated to preparing the second session, which is dedicated to the evaluation (License and/or Operator Proficiency check).

The following schematic presents traditional recurrent training and checking FSTD sessions that are conducted approximately every six months.



Stage 1 - Introducing EBT principles within traditional recurrent training and checking

The introduction of the EBT principles means that the operator starts to implement some elements of EBT within its current traditional recurrent training and checking program. This means a reversion of the sequence of the FSTD training and checking sessions.

The introduction of the EBT principles is ensured by the following:

- FSTD Session 1 as proficiency check, and FSTD Session 2 dedicated to training, to develop the pilot's performance, based on individual strengths and weaknesses identified during Session 1
- The implementation of an adapted competency model to enable a more effective outcome even when using existing program elements
- The expansion of the facilitation technic utilization by the instructor to increase the involvement of the pilots in their learning process

The introduction of the EBT principles does not require any regulatory amendment nor specific approval as the operator continues to comply with the traditional training and checking requirements. However, the operator starts to implement competency-based pilot assessment in addition to the regulatory requirements for license/operator proficiency checks.

For the introduction of the EBT principles, the operator should conduct the following steps of the implementation process detailed in Section 4:

- Step 3: Development of an adapted competency model
- Step 5: Standardize the IEs regarding the adapted competency model content, the competency-based assessment process and the methodology, and the facilitation as preferred instructional method
- Step 4: Inform the pilots about the adapted competency model and associated performance criteria

During the introduction of the EBT principles, the operator may also consider the following to facilitate the steps towards baseline EBT implementation:

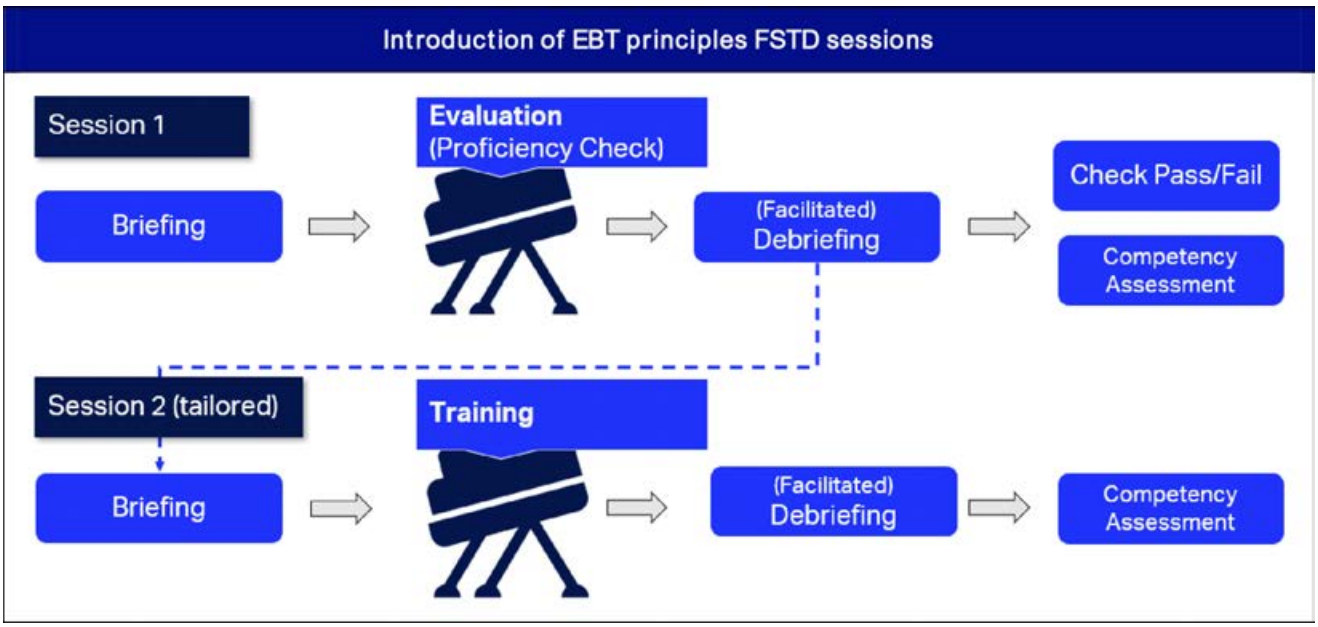
- Step 0: Step 0: Information session(s) of the stakeholders
- Step 1: Safety Risk Assessment regarding the introduction of the adapted competency model
- Step 2: Step 12: Review of training effectiveness

The conduct of the traditional training program should integrate the following EBT program elements (see Chapter 5 for more details):

- Competency-based assessment
- Briefing and debriefing using the facilitation technique

In accordance with EBT principles, after the FSTD Evaluation Session 1 (dedicated to proficiency check), the operator should implement a procedure to tailor the content of the FSTD Session 2 dedicated to training. The content of the FSTD Session 2 should be based on the performance demonstrated during Session 1. This procedure should support the IE in further developing the pilot competencies.

The following schematic illustrates the introduction of EBT principles within traditional recurrent training and checking FSTD sessions, which are conducted approximately every six months.



The change of sequence between the sessions dedicated to training and evaluation should be communicated carefully to the pilot community to ensure they understand that the intent is to move away from "training for the check" to "evaluation for competency development". Experience has demonstrated that this change provides a good opportunity to build trust among the pilots' community.

Stage 2 - Mixed EBT implementation

Mixed implementation of an EBT program means that EBT program elements are progressively applied, to the maximum extent permissible, under existing rules. The introduction of the EBT principles, as described in the previous paragraph, may be a preamble (or a part) of the mixed EBT implementation. EBT mixed implementation is a way to transition from traditional training and checking to the baseline EBT program.

Mixed implementation also recognizes the potential for an EBT program to be developed and implemented in advance of any future enabling regulatory changes, which may then permit full implementation.

The revalidation or renewal of pilot licenses is performed in accordance with the traditional licensing and operator checking regulations.

To start the mixed EBT implementation, the operator should conduct the following steps of the implementation process detailed in Section 4:

- Step 0: Information session(s) of the stakeholders
- Step 1: Implementation plan and safety risk assessment
- Step 2: Pre-EBT training effectiveness review
- Step 3: Development of an adapted competency model and grading system
- Step 4: Communication plan
- Step 5: EBT IE initial standardization
- Step 6: EBT IE's competency assessment
- Step 9: Assessment and training topics distribution over a 3-year period
- Step 10: Module design
- Step 11:Implementation of the EBT program

During mixed EBT implementation, the operator should progressively implement the following remaining steps necessary to reach baseline EBT:

- Step 7: Definition of aircraft system malfunctions equivalency
- Step 8: Definition of approaches equivalency
- Step 12:Review of training effectiveness
- Step 13:Measurement of training system performance
- Step 14:Continuous improvement of the training program
- Step 15:Implementation of the recurrent IE standardization

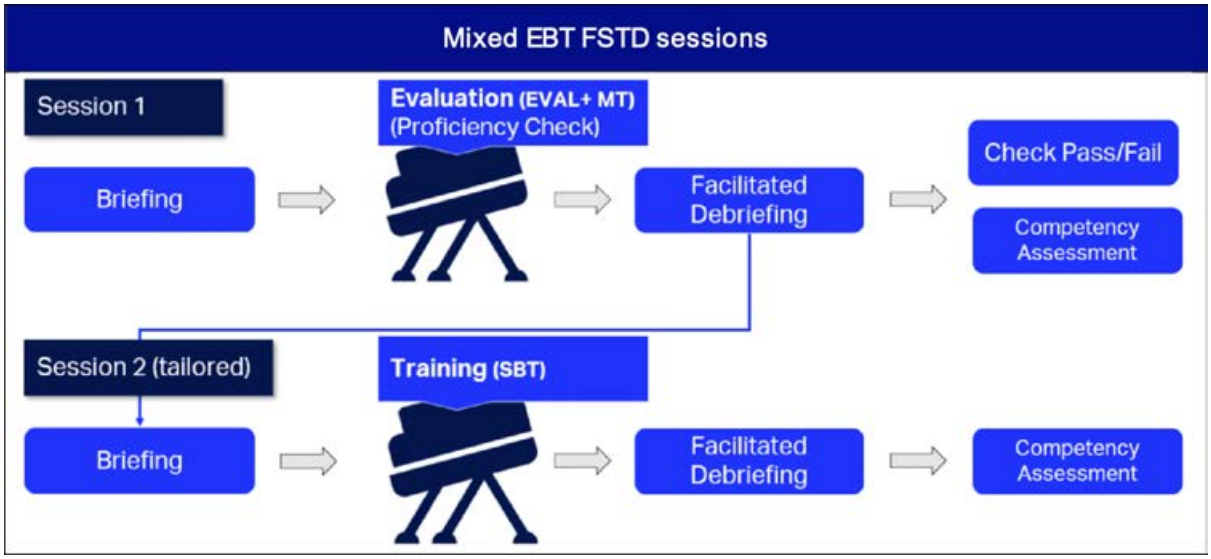
Under mixed EBT, one of the challenges is to set up EBT modules with the three phases (EVAL, MT, SBT) including their associated assessment and training topics, and to combine them with the significant number of mandatory items to be performed during traditional license and operator proficiency checks.

This challenge may be overcome by considering that a certain amount of the assessment and training topics during the MT are identical with some proficiency check items. In this case, the phase may be considered as MV, which maintains the same purpose, that is, to train and assess the handling skills necessary to fly critical flight maneuvers so that they are maintained to a defined level of proficiency. These assessment and training topics should place a significant demand on a proficient pilot. Handling skills within this definition refer to the competencies FPA, FPM and PRO.

This method allows a smooth transition from traditional proficiency checks to the baseline EBT program, as the definition and training topics of the MV and MT are almost identical.

Note: *European EBT regulations require that operators implement mixed EBT for three years before moving to baseline EBT. EASA also provides a detailed checklist for mixed EBT implementation on its EBT-related website.*

The following schematic illustrates the mixed EBT implementation of FSTD sessions that are conducted approximately every six months.



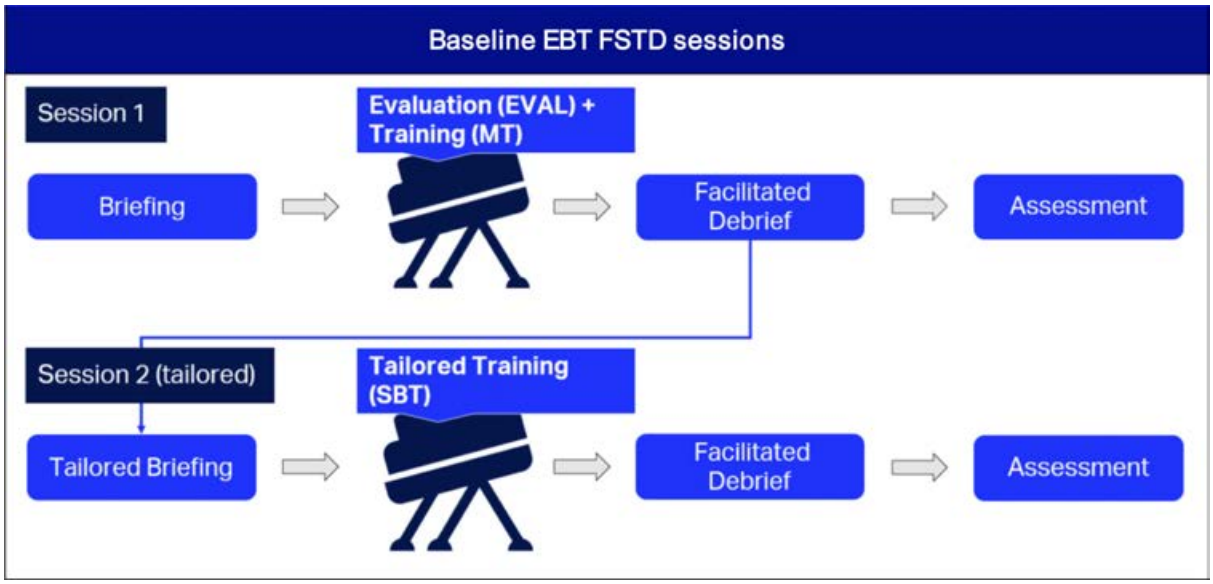
Stage 3 - Baseline EBT

Implementation of a baseline EBT program means that the recurrent training and assessment is fully dedicated to the application of EBT, and the revalidation or renewal of the pilot's licenses is accomplished in accordance with EBT regulations described by the CAA. The EBT module should be the means by which Licensing Authorities continue to ensure that competence is maintained to hold a professional license and type rating as applicable.

The baseline EBT program is a generation-specific, ready-made program. It does not require detailed analysis or program design by the operator or the ATO. It only needs the necessary adaptation to aircraft type and operation, and the development of an adapted competency model, and a grading system. The operator should address and comply with all the requirements indicated/listed in Chapter 3.1.

In baseline EBT, the training phase starts already after the evaluation phase. MT and SBT may be delivered in any order; however, IATA recommends the sequence EVAL – MT – SBT to allow the instructor a deeper insight into the manual and automatic flying skills before adapting the training for the SBT phase.

The following schematic illustrates the scheduling option chosen by most operators for Baseline EBT implementation of FSTD sessions, which are conducted approximately every six months.



The following template shows the progressive implementation of the EBT elements to achieve the baseline EBT status.

Step	Scope	Introducing EBT principles	Start Mixed EBT	Start Baseline EBT
0	Information session(s)		X	X
1	Implementation plan and safety risk assessment		X	X
2	Pre-EBT review of training effectiveness		X	X
3	Development of an adapted competency model and associated grading system	X	X	X
4	Communication plan	X	X	X
5	EBT Instructor/Evaluator initial standardization	X	X	X
6	EBT Instructor/Evaluator competency assessment		X	X
7	Equivalency of Malfunctions			X
8	Equivalency of Approaches			X
9	Distribution of assessment and training topics over a 3-year period		X	X
10	Module design		X	X
11	Implementation of the EBT program		X	X
12	Review of training effectiveness			X
13	Measurement of training system performance			X
14	Continuous improvement of training program			X
15	EBT IE recurrent standardization			X

3.3 Enhanced EBT

An enhanced EBT program is an EBT program where the assessment and training topics matrix contained in Appendix G.IV is adapted. Adaptation may be necessary to:

- Mitigate a specific operational risk identified by the Authority, operator or OEM
- Maintain the suitability of the EBT program

Any adaptation must be approved by the CAA, and duly sustained by a safety case.

The baseline EBT program is based on a robust methodology and reliable worldwide data acquisition and analysis. An enhanced EBT program requires the same level of operator data robustness as described in the EBT Data Report and its amendment(s). Due to the lack of reliable data for enhanced EBT, presently no guidance for enhanced EBT programs can be given to operators and CAAs. However, this does not preclude operators from collaborating with their CAA to enhance EBT.

When enhancing an EBT program, it is very important to focus on the most critical operational risks, provided that training can demonstrably mitigate these. There should be a close correlation between training and operations.

An identical adapted competency model is recommended for both baseline and enhanced EBT programs.

Section 4 - Implementation Process

The content of this section provides practical guidance for an organization to transition from traditional recurrent training and checking to EBT.

The transition to EBT has a significant impact on the training policy and procedures, the program design, the qualification of the personnel and potentially the training tools. Therefore, EBT concepts and principles should be understood by the operational staff of the organization (training managers, safety officers, etc.), and the high-level management of the organization (e.g., Accountable Manager) should commit to provide significant resources for the transition to EBT.

The transition to EBT represents opportunities in terms of safety benefit and training efficiency but also internal challenges (expertise, resources, communication…), and challenges for external stakeholders (oversight resources, service providers availability…), which should be addressed by a specific EBT project team nominated by the Accountable Manager (or the nominated post holder flight crew training) of the organization.

The following template provides the essential steps to be followed during the transition process towards EBT. Some steps are sequential, and some can run in parallel enabling the most efficient implementation of EBT. Each step is further detailed in this section.

Step	Scope	Parties involved
0	Information session(s)	AOC/ATO, pilot representatives, CAA
1	Implementation plan and safety risk assessment	AOC/ATO, CAA
2	Pre-EBT review of training effectiveness	AOC/ATO
3	Development of an adapted competency model and associated grading system	AOC/ATO, pilot representatives, CAA as appropriate
4	Communication plan	AOC/ATO, pilot representatives
5	EBT IE initial standardization	AOC/ATO
6	EBT IE competency assessment	AOC/ATO, CAA
7	Equivalency of Malfunctions	AOC/ATO, OEM, CAA as appropriate
8	Equivalency of Approaches	AOC/ATO
9	Distribution of assessment and training topics over a 3-year period	AOC/ATO Course developers
10	Module design	AOC/ATO Course developers
11	Implementation of the EBT program	AOC/ATO, CAA
12	Review of training effectiveness	AOC/ATO, CAA as appropriate
13	Measurement of training system performance	AOC/ATO, CAA
14	Continuous improvement of training program	AOC/ATO, CAA
15	EBT IE recurrent standardization	AOC/ATO, CAA

Note: *If an organization transitioning to EBT elects to be supported by a service provider for any of the following steps, it should consider recognized and accredited entities that demonstrate the compliance of their methodology to international standards.*

Step 0: Information session(s) of the stakeholders

Description: The EBT project team provides awareness about the transition to EBT.

Before starting any implementation measures, the operator/ATO shall ensure that all relevant stakeholders are informed about the intent to introduce EBT in pilot recurrent training and assessment.

The objective of the information session(s) is to ensure proper awareness of internal and external stakeholders about the operator plans for the transition from legacy recurrent training and checking to EBT. Information session(s) are necessary because successful implementation of EBT depends on an effective partnership between:

- Operator-internal stakeholders such as safety, operations and compliance managers, and pilot representatives in addition to the staff involved in the development and delivery of training and of the pilot population
- Operator-external stakeholders such as the Competent Authority in charge of the operator oversight

The information session(s) content should permit to share the operator's vision, including the challenges and the benefits of EBT implementation, with internal and external stakeholders.

It is also recommended that the EBT project team sets up regular information sessions with the internal and external stakeholders to inform them on the project's status. The duration and the frequency of these sessions should be adapted to the audience. They should be consistently aligned with the communication plan and the EBT IE standardization elaborated under Steps 4 and 5.

Step 1: Implementation plan and safety risk assessment

Description: The EBT project team formalizes the EBT transition plans and addresses the management of change.

Implementation plan

Once a decision has been taken by the AOC or ATO to implement EBT, a consultative document should be created in cooperation with the CAA, defining the objectives, timelines and any limitations based upon existing rules and risk management processes. This can be agreed according to the options described within the guide, for staged or total implementation, fleet-wide or operation-wide, or as a program that runs in parallel to components of existing training. Agreement about the program principles should be reached before detailed planning commences.

Before implementing the Baseline EBT program, a minimum experience with the application of the CBTA principles should be assured. This experience may include Mixed EBT. A staged implementation, as described in Section 3, should be considered.

Note: *European Baseline EBT regulations require a minimum experience of:*

- *3 years of a mixed EBT program*
- *2 years of an instructor concordance assurance program*
- *1 year of a valid equivalency of malfunctions*
- *1 year of integration of training data in the customization of the EBT program and SMS data for the contextualization of the example scenario elements*

The EBT project team should provide the implementation plan, including milestones and timeframes, to the CAA in charge of the approval. The implementation plan should be the result of an organizational gap analysis to move from traditional recurrent training to EBT in the following main areas:

- Awareness of management
- Qualification of personnel
- Documentation including training policy and procedures
- Training tools, equipment, and material necessary to deliver the training and collect the training data

Safety Risk Assessment

The gap analysis should be complemented by a safety risk assessment (SRA) conducted in accordance with the operator management system process. The SRA entails that the organization develops and maintains a process that ensures analysis, assessment and control of the safety risks associated with identified hazards.

Examples of considerations that would form part of a risk profiling exercise are:

- Selection and training of management and staff
- Training program development, application for approval, validation, and continued review
- Development and maintenance of training courseware
- Administrative staff duties in support of the training program, the instructors/evaluators and pilots
- Delivery of training
- Record-keeping
- Grading and assessment processes
- Licensing authority feedback
- Customer feedback, where applicable

As result of the SRA, the implementation plan may include the option to return to traditional recurrent training and checking if the implementation of EBT is cancelled.

Note: *The risk assessment is a living document and may be amended throughout the project.*

Generic SRA template

No.	Event	Hazard	Consequence *(worst case scenario)*	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
Item													

The following example uses the recommendations of ICAO Doc 9859 (Safety Management Manual) to perform the risk assessment and specifically to rate the risk.

Note: *Appendix A provides further SRA examples.*

Example of a safety risk matrix

Safety Risk		*Severity*				
Probability		*Catastrophic A*	*Hazardous B*	*Major C*	*Minor D*	*Negligible E*
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely improbable	1	1A	1B	1C	1D	1E

Practical illustration of how to perform an SRA

This illustration is based on the following assumptions:

- The organization is an operator that has already implemented a competency framework which is used by the IE to support the pilot performance assessment in addition to the regulation requirements based on pass/fail criteria.
- The operator plans to implement CBTA for its recurrent training under the umbrella of EBT.
- The operator has standardized the IEs to perform pilot competency assessment using the operator competency framework. The operator has not established any inter-rater reliability assurance program.

A) SRA regarding the competency framework

Step 1 is to perform the gap analysis based on the operator's current status regarding the competency framework.

Gap analysis			
Component	**ICAO provisions**	**Current Status**	**Compliance**
Implementation of pilot competency framework	ICAO Doc 9868, • Part I, Chapter 2 paragraph 2.4 • Part II, section 1, Chapter 1 and Appendix 2 to Chapter 1 ICAO Doc 9995	The competency framework used by the operator is partially aligned with the ICAO one	Partial

Step 2 is to perform the Safety Risk Assessment based on the gap analysis.

Risk assessment PRIOR mitigations					
Hazard	**Consequence**	**Existing controls**	**Probability**	**Severity**	**Risk**
The training data is not relevant to ensure appropriate inner loop data	Tailored and remedial training inadequately implemented due to mismatch between the ICAO competency framework (training topics/competency mapping) and operator competency framework	NIL	4-Occasional	D-Minor	4D Moderate risk

Step 3 is to define mitigation measures to reduce the risk level to acceptable.

Risk assessment WITH mitigations					
Mitigation	**Ownership**	**New Control**	**Probability**	**Severity**	**Residual Risk**
Implementation of the ICAO competency framework	Training Manager	Consistency of the Training data collection and the ICAO training topic mapping	1- Extremely improbable	D-Minor	1D Low risk

B) SRA regarding the instructor standardization

Step 1 is to perform the Gap Assessment based on the Operator current status regarding the instructor standardization.

Gap analysis			
Component	**ICAO provisions**	**Current Status**	**Compliance**
Instructor selection, initial training, recurrent training and inter-rater reliability (IRR) requirements	ICAO Doc 9868, • Part I, Chapter 3 • Part II, section 1, Chapter 7 ICAO Doc 9995	The instructors have received initial training to perform pilot's competency assessment using operator competency framework	Partial

Step 2 is to perform the Safety Risk Assessment based on the gap assessment.

Risk assessment PRIOR mitigations					
Hazard	**Consequence**	**Existing controls**	**Probability**	**Severity**	**Risk**
Inappropriate initial and recurrent training, lack of inter-rater reliability assurance program	Non-competent pilot conducting line operations	Traditional Operator proficiency checks	4-Occasional	B- Hazardous	4B High risk

Step 3 is to define mitigation measures to reduce the risk level to acceptable.

Risk assessment WITH mitigations					
Mitigation	**Ownership**	**New Control**	**Probability**	**Severity**	**Residual Risk**
Progressive implementation of training data collection and analysis including instructor performance data	Training Manager	Initial and recurrent IE standardization and IRR assurance program based on evidence	1-Extremely improbable	B-Hazardous	1B Low risk

Step 2: Pre-EBT training effectiveness review

Description: The EBT project team commits the Nominated Person Crew Training/Head of Training to report on the training effectiveness of the organization before EBT implementation.

The Nominated Person Crew Training/Head of Training, supported by the training managers, analyses the existing training data to report the current training effectiveness of the organization.

The review of the current training effectiveness is necessary for both internal and external stakeholders and specifically the Competent Authority.

Providing visibility on the training effectiveness permits the AOCs/ATOs to:

- Raise awareness of the internal stakeholders on the overall performance of the training organization and, where applicable, identify the strengths and weaknesses of the current training system
- Provide the accurate status about the organization's current training system performance to the Competent Authority and consequently set the bottom-line in terms of training system performance to be enhanced during the EBT implementation

The main challenge for the training effectiveness review under traditional recurrent training and checking programs relates to the quality of the training metrics. From a regulatory perspective the requirements,

applicable to both AOCs and ATOs, mandate to collect and keep records for a limited period, such as the pilots' training, checking and qualification (e.g., AOC - 3 years).

Generally, these records provide a macroscopic view with limited insights into the pilot's performance, as the traditional training metrics are based on Pass/Fail criteria for each task and maneuver realization.

To assess the training effectiveness under traditional recurrent training and checking program, the following indicators should be considered:

- Failure rates during proficiency checks
- Rate of successful training objective achievement
- Volume of remedial training, etc.

These indicators have been considered sufficient to set the bottom-line before the implementation of an EBT program.

Organizations having implemented Advanced Qualification Program (AQP), or Alternative Training and Qualification Program (ATQP) should get a better visibility on their training effectiveness, as the training metrics contain behavioral markers that provide more human performance insights, also because AQP/ATQP contains quality assurance components sustaining the monitoring of the program's effectiveness.

Step 3: Development of an adapted competency model and grading system

Description: The EBT project team defines the content of the adapted competency model in collaboration with training, operation and safety managers.

Adapted Competency Model for EBT

IATA recommends that the AOC/ATO use the IATA competency frameworks for aeroplane pilots and for pilot instructor/evaluator described in Appendices B.I and B.II for the training and assessment of the pilot receiving EBT and the IE delivering EBT.

IATA recommends that the AOC/ATO characterize the conditions under which the competencies are trained and assessed depending on the phases of the EBT module.

Conditions related to tools and systems/equipment, airplane, FSTD

During an EBT module, the training platform is an ICAO FSTD level 7 (Full Flight Simulator).

Conditions related to the amount of support or assistance a trainee can expect from the IE

Instructor support should vary between the evaluation and the training phases of the module:

- During the EVAL phase, the IE should not normally give any instruction to the pilots or interrupt
- During the MT phase, the IE should provide support, where needed, to ensure that the pilot demonstrates the motor skills necessary for the successful realization of the maneuvers
- During the SBT phase, the IE should apply all the instructional methods to ensure that the pilot efficiently develops the competencies

The template below proposes the instructional methods to be applied by the IE during an EBT module depending on the phase.

EBT Module Phase	Evaluation Phase (EVAL)	Training Phases (MT/SBT)
Level of support from the EBT IE	N/A	Low to High
Instructional Method	The IE provides guidance for the conduct of the flight profile of the EVAL	All instructional methods depending on the pilot's needs

Conditions related to context (nature and complexity of operational and environmental context)

According to the training objectives of the evaluation phase and the scenario-based training phase, IATA recommends applying the following:

- The context under which the competency is demonstrated during the EVAL phase of an EBT Module should be defined and limited to zone III, and
- The context under which the competency is demonstrated during SBT of an EBT Module should be extended but limited to zone IV

Operational Context High	Zone III	Zone IV	Zone V
Operational Context Medium	Zone II	Zone III	Zone IV
Operational Context Low	Zone I	Zone II	Zone III
	Environmental Context Low	**Environmental Context** Medium	**Environmental Context** High

Note: *The grey zones are not used because either not challenging enough (zone I and II) or too demanding (Zone V).*

Example of conditions applied to all IATA pilot competencies for an EBT EVAL phase

The pilot should demonstrate an integrated performance of all the competencies under the following conditions:

Conditions related to the context:

Context consistent with the operator's network and sustaining a realistic application of both normal and abnormal procedures under the following combination of complexity of operational and environmental context:

- High operational context complexity (e.g., malfunction placing significant demand on the flight crew) and low environmental complexity (e.g., VMC conditions with maximum cross wind 15 Knots), or
- Medium operational context complexity (e.g., Cabin event: O2 mask deployed) in a medium environmental complexity (frequent CB during the phase of flight), or
- Low operational context complexity (e.g., MEL item with no impact on performance nor procedures); and high environmental complexity (severe icing conditions, runway contamination having significant impact on performance)

Conditions related to tools and systems/equipment:

FSTD ICAO level 7

Conditions related to the amount of support from the IE:

Without assistance from the Instructor/Evaluator

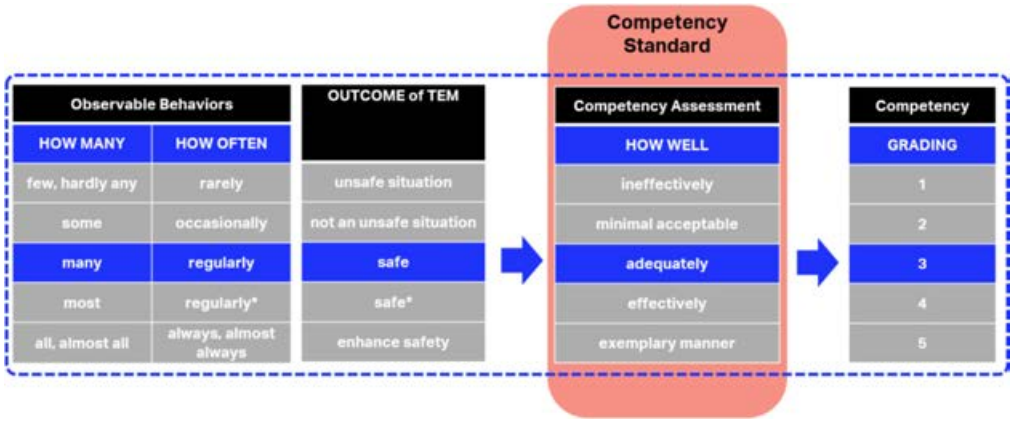
Competency assessment and grading

Prior to the introduction of EBT in the operator's training program, a detailed description of the training and assessment methodology (including standard terminology to be used) acceptable to the CAA should be published in the Operations Manual. This methodology should include procedures to be applied if pilots do not achieve the required level of performance over the EBT modules (refer to Step 11 for more details).

IATA's recommended competency assessment methods are described in Section 2 and Section 5.

IATA recommends that the AOC/ATO require an "adequate" level of performance (corresponding to a grade 3) to be demonstrated by the pilot for each pilot competency at the end of the EBT module.

This recommendation aims at maintaining a reasonable margin against the minimal acceptable level of performance to cover the case of a potential pilot competency decay between EBT modules and/or the estimated probable instructor error of alignment with the operator standard during the pilot competency assessment.



Step 4: Communication plan

Description: The EBT project team produces and implements a communication plan including specific information to the IEs and the pilots.

As with any change management process, timely and accurate communication with the internal and external stakeholders affected by the change is critical.

The general communication content should elaborate on the What is CBTA, the Why, the How and the When of the transition to EBT. This communication should be adapted to the audience (the Who) that is affected by the EBT implementation.

Consequently, the communication plan should cover the following items with different levels of granularity:

- EBT principles and objectives
- Relationship between Threat and Error Management, competencies, and crew resource management
- Description of the EBT modules and associated phases
- Expected value in terms of safety and efficiency of EBT versus the organization's current training programs
- Description of the Adapted Competency Model and associated grading system
- Performance assessment process and methodology
- EBT data collection and protection

Concerning the specific information towards the IEs, the general communication items listed above, should be communicated in advance of the IE initial standardization to enhance its effectiveness and efficiency.

Concerning the specific information towards the pilots, the general communication items listed above, should be communicated in advance. Pilots generally accept that training processes evolve over time, however, a lack of information or uncertainty as to what to expect can lead to a lack of acceptance. It is essential that pilots who will be trained and assessed according to CBTA principles understand all the processes involved and are given time to adjust to the new performance requirements. The CBTA project team should coordinate the communication with pilot representatives to enhance the understanding and acceptance of this fundamental change in the training system.

Refer to Appendix C for an example of a communication plan template.

Step 5: EBT IE initial standardization

Description: The Standardizers* deliver the IE initial standardization. The EBT project team monitors this activity.

***Note:** For the purpose of this guide, the standardizers are the IEs in charge of the training and assessment of other IEs.

IEs play a critical role in the delivery of EBT. They are essentially a link between the organization and the trainees in the delivery of the training program. As such, it is critical that suitably qualified IEs are selected and trained to deliver EBT.

As EBT programs expand, many already qualified IEs under the traditional training system should transition to EBT program delivery. These IEs should complete initial and recurrent standardization to ensure safe operations and effective application of the EBT methodology.

The IATA Guidance Material and Best Practices for IE Training contains practical details for the design of the IEs initial and recurrent standardizations.

Selection

The selection process should consider the following:

- The level of performance as a pilot
- The potential to support the trainee's learning development
- The potential to become a role model
- The potential to successfully complete the IE training

Standardization

The competency-based training and assessment for IEs should consist of an integrated program of theoretical and practical instruction.

The training objectives of the theoretical and practical training should be to develop the IE competencies (as described in Appendix B) and to acquire knowledge of EBT principles, with special emphasis on the following:

- Threat and Error Management
- Learning from positive performance
- Building resilience
- Data driven training
- Principles of adult learning and how they relate to CBTA

The IE standardization should place special emphasis on the instructor competencies "Instruction" and "Assessment and Evaluation". It should include training covering the importance of using Observable Behaviors (OBs) for effective training and assessment, the ability of the IE to analyze the root-cause for high and low trainee performance and the application of facilitation during the conduct of the EBT modules.

IATA experts have applied the Instructional System Design methodology to design the IE initial standardization with the assumption that the candidates are already qualified IEs under the traditional training system. According to the training need analysis, it has been identified that the training objectives of the EBT IE initial standardization program, for IEs transitioning from traditional training to CBTA, are sustained by the OBs related to the competencies "Instruction" and "Assessment and Evaluation".

"Special Emphasis" for Traditional IE moving to CBTA (including EBT)				
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	TA-SE
Note: **TA:** Means competencies **trained and assessed** **SE:** Means competencies requiring **special emphasis** during training				

The table below proposes, as a guidance for the course developers, the OBs in bold that permit to sustain and adjust the training objectives for the EBT IE initial standardization.

Placing emphasis on the competency assessment procedures and methods should also ensure inter-rater reliability.

Competency	Description	Instructor Observable Behaviors (IOB)
IEC3: Instruction	Conducts training to develop the trainee's competencies	OB 3.1 References approved sources (operations and technical sources, training manuals and regulations)
		OB 3.2 States clearly the objectives and clarifies roles for the training
		OB 3.3 Follows the approved training program
		OB 3.4 Applies instructional methods as appropriate, (e.g., explanation, demonstration, learning by discovery, facilitation, in-seat instruction)
		OB 3.5 Sustains operational relevance and realism
		OB 3.6 Adapts the amount of instructor inputs to ensure that the training objectives are met
		OB 3.7 Adapts to situations that might disrupt a planned sequence of events
		OB 3.8 Continuously assesses trainee's competencies
		OB 3.9 Encourages the trainee to self-assess
		OB 3.10 Allows trainee to self-correct in a timely manner
		OB 3.11 Applies trainee-centered feedback techniques (e.g.: facilitation, ...)
		OB 3.12 Provides positive reinforcement
IEC5: Assessment and Evaluation	Assesses the competencies of the trainee-Contributes to continuous training system improvement	OB 5.1 Complies with Operator/ATOs and authority requirements
		OB 5.2 Ensures that the trainee understands the assessment process
		OB 5.3 Applies the competency standards and conditions
		OB 5.4 Assesses trainee's competencies
		OB 5.5 Performs grading
		OB 5.6 Provides recommendations based on the outcome of the assessment
		OB 5.7 Makes decisions based on the outcome of the summative assessment
		OB 5.8 Provides clear feedback to the trainees
		OB 5.9 Reports strengths and weaknesses of the training system (training environment, curriculum, assessment/evaluation) including feedback from trainees
		OB 5.10 Suggests improvements for the training system
		OB 5.11 Produces reports using provided appropriate forms and media

Course delivery

Detailed EBT IE initial standardization course requirements are described in Appendix D.I. Sample footprints are shown in Appendix D.II.

AOCs/ATOs should ensure that all IEs conducting EBT are qualified in accordance with all applicable state regulations. This includes IEs who are external to the operator, e.g., subcontracted IEs.

For ATOs/AOCs delivering an EBT program with subcontracted IEs, the subcontracted IEs should complete the initial standardization, and achieve the same performance standard and inter-rater reliability as the in-house IEs. Recurrent standardization and regular feedback loops between the operator and training the organization are required to maintain the proper application of specific contents and training methods of the operator.

Step 6: EBT IE's competency assessment

Description: The Standardizer conducts the IE's competency assessment before delivering EBT.

Prior to delivering mixed or baseline EBT, the IE should undergo an assessment of competence, conducted during a practical CBTA session by a person nominated by the AOC/ATO and acceptable to the CAA.

Note: *European EBT regulations require a specific EBT competency assessment prior to baseline implementation. For mixed EBT, the competency assessment should be performed according to the applicable regulations, prior to EBT implementation.*

The IE should demonstrate the competency standard approved by the CAA, for all the competencies of the adapted competency model.

For the "entry into service" of EBT, it is recognized that the first Standardizer(s) nominated by the operator may not have had the opportunity to complete their assessments. Under these conditions, the Standardizer(s) nominated by the operator should receive the EBT IE initial standardization (Step 5) and have experience in the role of a Standardizer undertaking instructor competency assessments under traditional training regulations.

The performance assessment process and methodology, as described in Section 2 and Section 5, are fully applicable to the IE's competency assessment.

In the context of the IE's competency assessment, the OUTCOME of TEM dimension is applicable for IE performance assessment.

In the context of training and licensing, the OUTCOME of TEM dimension integrates the specific threats, errors and potential reductions of safety margins that could happen or result from the conduct of training or evaluation activities.

In the context of training and licensing, potential threats could be:

- Event requiring an evacuation of the facilities or of the device
- Facilities, training device or equipment not appropriate for the training objective (Actual Malfunctions, MEL, Device certification, ...)
- Training interruption or disruption (FFS down, ATC constraint, phone call, ...)
- Any disruption that generates time pressure (late arrival of the trainee, trainee does not show up, training time reduced, ...)
- Last minute change of training rostering (session content, trainees, ...)
- Inappropriate official documentation (FCOM not up to date, training programs deficiencies, ...)
- ...

In the context of training and licensing, potential errors could be:

The IE:

- Does not prepare sufficiently the training session (not familiar enough with the training facilities access, with the training device functionalities, with the IT procedures, ...)

- Has hobby horses
- Does not manage time appropriately
- Does not manage priorities appropriately (e.g., during flight instruction focuses on instruction instead of safety of the flight, ...)
- Omits safety briefings elements or training tool limitations
- Intervenes inappropriately (too early or too late)
- Refers to personal customized documentation
- Uses inappropriate teaching method (does not facilitate, ...)
- Generates unrealistic or inappropriate conditions for the training
- Demonstrates negative attitude towards the trainees (is careless, harsh, has bias, is lacking empathy, ...)
- Does not allocate enough time for trainee feedback
- Is not familiar with training policy and procedures
- Omits to provide necessary advice to improve performance
- Cuts corners with the training program
- Does not apply organizational performance standards
- ...

In the context of training and licensing, potential reduction of safety margins could be:

- Limited and momentary reduction of the safety margin:
  - Temporarily involuntary reduction of safety margin during training (e.g., mismanagement of a stall exercise) recognized and timely recovered by the instructor
  - Temporarily negative transfer of training, recognized and timely recovered by the instructor
  - Temporarily negative training, recognized and timely recovered by the instructor
  - ...
- Unacceptable reduction of safety margins:
  - Involuntary reduction of safety margins during training (e.g., mismanagement of a stall exercise) not recognized or recovered too late by the instructor
  - Negative transfer of training not recognized or not recovered by the instructor
  - Negative training not recognized or not recovered by the instructor
  - Incident or accident during training
  - ...

Note: *When the training and assessment are conducted during flight operations (for example IE as a trainee delivering instruction in an aircraft as an FI), the IE as trainer observes, as well, the IE as trainee managing the threats, the errors, and the potential reductions of safety margins in the operational context.*

Step 7: Equivalency of malfunctions

Description: The EBT project team commits a group of Subject Matter Experts (SMEs) to define equivalency between malfunctions according to EBT principles.

For the practical training in the management of aircraft system malfunctions, EBT moves away from grouping malfunctions according to ATA chapters, to organizing them according to the crew performance required to manage the malfunction.

The aircraft system malfunctions that place a significant demand on a proficient crew are organized by reference to the following characteristics:

- Immediacy
- Complexity

- Degradation of aircraft control
- Loss of instrumentation
- Management of the consequences

The following table shows the malfunction characteristics and the required crew performance to manage the malfunctions.

Characteristic	Description of required crew performance	Examples
Immediacy	System malfunctions requiring immediate and urgent crew intervention or decision.	Memory items: fire, smoke, loss of pressurization at high altitude, failures during take-off, brake failure during landing
Complexity	System malfunctions requiring complex procedures, i.e., that require recovery procedures with multiple options to analyze and/or multiple decision paths to apply.	Multiple hydraulic system failures, smoke and fumes procedures
Degradation of aircraft control	System malfunctions resulting in significant degradation of flight controls in combination with abnormal handling characteristics, such as modification of the normal pitch attitude during approach and landing or reconfiguration of the flight control laws or modes.	Jammed flight controls, certain degradation of fly by wire (FBW) control, flaps/slats inoperative
Loss of instrumentation	System malfunctions that require monitoring and management of the flight path using degraded or alternative displays such as temporary or permanent loss of any flight-path-related parameter displayed on the primary flight display (PFD), head-up display (HUD) or navigation display (ND), including loss of any setting capability of one of these indications. It includes primary instrumentation to monitor and manage primary aircraft systems.	Unreliable primary flight path information, unreliable airspeed, flaps indication, loss of fuel indications, etc.
Management of consequences	System malfunctions that require extensive management of their consequences, i.e., that significantly affect the flight crew standard task sharing and/or the workload management and/or the decision-making process during an extensive period after managing the malfunction itself.	Fuel leak or fuel not usable, altitude/speed limitations, malfunctions with “deferred” items in later flight phases.

Process

The equivalency of malfunctions process should be undertaken by SMEs who hold or have held a type rating on the aircraft type and who are standardized on the equivalency of malfunction process.

The process steps during the EBT program design can be summarized as follows:

Review aircraft system malfunctions

Normally the Abnormal Procedure Section in the OM-B/FCOM will provide sufficient information. All abnormal/emergency procedures related to non-technical conditions (e.g., overweight landing, bomb on board) may be discarded. For most OEMs these procedures are listed in the MISC section of the OM-B/FCOM. The remaining procedures will be provided to the group of SMEs selected for the process.

The list of malfunctions provided by the FSTD may provide malfunctions not listed in the OEM Abnormal Procedures. Nevertheless, the operator may decide to add these malfunctions. This will allow for the training of system malfunctions where no clear procedure guideline exists (e.g., an un-annunciated IR drift is provided in the FSTD, but not in the OEM documentation).

Determine significant demand and characteristics

The SME should determine:

- The malfunctions that place a significant demand on a proficient crew, in isolation from an environmental or operational context
- The applicable characteristic or characteristics for the malfunctions that place a significant demand on a proficient crew

Note: Based on ICAO and the European EBT regulations, as well as best practices developed by operators and OEMs, the following guidance should be applied:

- *Isolation from an environmental or operational context.* When assessing significant demand on a proficient crew, SMEs may consider that there are no significant environmental and operational threats. For example, the aircraft is close to a suitable aerodrome with environmental conditions permitting all published approaches to be made, no ATC restrictions, with no pre-existing malfunctions and sufficient fuel for several hours.
  E.g., European EBT regulations require that whenever the possibility of icing is specified in the abnormal/emergency procedure, it shall be assumed that this meteorological condition is present (e.g., in case of pitot heating failures).
- *Persistence of malfunction*. 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.). 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: successful reset/restart and unsuccessful reset/restart.
  The operator should reproduce the malfunction in the FSTD program 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.
- *Worst case consideration*. If the worst result of a system malfunction is addressed in a different (second) procedure, this worst case shall be assessed in that second procedure and not in the originating malfunction (e.g.: if the unreliable airspeed procedure is referenced in the blocked pitot procedure, unreliable airspeed shall NOT be considered for the pitot blockage).

Incorporate malfunctions

Develop the EBT FSTD program to incorporate malfunctions at the frequency specified in the table of assessment and training topics (Appendix G.IV).

Practical training in the management of aircraft system malfunctions

Each pilot shall receive assessment and training in the management of aircraft system malfunctions. The aircraft system malfunctions to be considered for the EVAL and SBT phases are those that place a significant demand on a proficient crew. At least one malfunction with each characteristic should be included every year. Combining characteristics should not reduce the number of malfunctions below four, for each crewmember, every year according to the EBT module cycle.

Procedural training in the management of aircraft system malfunctions

Some malfunctions meeting the significant demand criteria may not be included in the EBT FSTD program. These malfunctions require procedural knowledge training to ensure that the pilot demonstrates adequate knowledge of the relevant procedures, systems and their interaction. Training may be conducted in a less qualified immersive but suitable alternative environment (classroom, flight procedures training device, advanced computer-based training, etc.).

Note: *The operator should establish procedures to determine what malfunctions should be included in the FSTD in accordance with the equivalency of malfunctions criteria. This may include a different malfunction difficulty between the EVAL and the SBT.*

Methodologies

The SMEs should apply one of the two following methods to ensure consistent determination of the malfunction characteristics and of an appropriate significant level of demand of the malfunctions.

Characteristics-oriented method

1. The SMEs review aircraft system malfunctions provided in the official documentation of the OEM.
2. A group of minimum three SMEs rates individually each of the five characteristics in each malfunction listed in point 1:
   - The rate will be 0 when the characteristic is irrelevant for the malfunction.
   - The rate will be 1 to 5 when the characteristic is relevant for the malfunction. Rate 1 applies when the characteristic is hardly relevant for the malfunction and rate 5 when the characteristic is highly relevant.
3. An average rate of the group of SMEs is calculated for each characteristic of each malfunction.
4. The average calculated in point 3 is communicated to the group of SMEs. The group of SMEs agrees on a final rate for each characteristic of each malfunction.
5. The SMEs select the rate of the characteristics (e.g., rate 2 or 3) at which or above which the characteristic is considered to be relevant in the malfunction, i.e. placing a significant demand on a proficient crew.
6. The SMEs may use the rates of the characteristics to determine the level of demand placed on a proficient crew to manage the malfunction.
7. The SMEs may refer to an aircraft OEM malfunction analysis to support all the steps of the session.

OEM-based method

1. The OEM provides equivalency of malfunction documentation, based on aircraft system malfunctions provided in the official OEM documentation, with lists of:
   - The malfunction characteristics, and
   - The malfunctions placing a significant demand on a proficient crew
2. A group of minimum three SMEs performs an analysis of the OEM equivalency of malfunction documentation.

The group of SMEs agrees on an operator list of the malfunctions that combine a significant demand on a proficient crew and the characteristic.

Step 8: Equivalency of approaches

Description: The EBT project team commits a group of Subject Matter Experts (SMEs) to define equivalency between approaches according to EBT principles.

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. Equivalency of approaches relevant to operations shall ensure training of approaches that place an additional demand on a proficient crew.

Selection of approaches for scenario-based training should be based on the underlying elements of flight crew performance to conduct them. Equivalent groups of approaches can be determined by reference to these elements. Demonstrated competence in the conduct of one approach type can be considered equivalent to demonstrated competence for the other approach types in the same group.

Process

The equivalency of approaches process should be undertaken by SMEs who hold or have held a type rating on the relevant aircraft generation and are standardized on the equivalency of approaches process.

The required process steps during the EBT Program Design can be summarized as follows:

Note: *All steps should be performed for each aircraft type to allow type-specific training.*

Review operational network

To identify approaches that place an additional demand on a proficient crew, the SMEs should review the operator's operational network.

Note: *This should be implemented as a continuous process to assure an adaptation of the EBT program to type-specific destination changes.*

Determine additional demand and characteristics

The SMEs should select approaches with one or more of the following characteristics:

Characteristic	Description	Examples
Unusual approach and/or aerodrome design	Non-standard approach aids and/or approach patterns	Offset final approach track Steep approach Unusual DH/DA
	Unusual aerodrome characteristics or performance limitations or any other relevant attributes, including obstructions, physical layout, lighting, etc.	Non-standard lighting Non-standard marking Optical illusions due to slope, unusual rwy width
Low frequency of exposure	Infrequently operated aerodrome	Destination alternate aerodrome En-route alternate aerodrome
	Infrequently conducted approaches at commonly operated aerodromes	Circling approach, NDB approach, CAT II operations, SA CAT I approach
Non-standard approach guidance	Non-standard internal guidance or aircraft equipment	Head-up display (HUD) disconnected Flight directors off
	Non-standard external guidance or ground equipment	

Incorporate approaches

Each pilot shall receive assessment and training in the management of approaches that place an additional demand on a proficient crew. The approaches selected via the equivalency of approaches process should be embedded in the training topic of "Operation and type specific" at the frequency required by the local CAA. Approach training may be performed in all phases of an EBT module.

Any approach that is required to be flown in the PF role specifically should be classified as "skills retention" and may be trained in the MT.

Note: *Aerodrome qualification requirements according to ICAO Annex 6 may be met by this training topic.*

The operator's policy generally defines which flight method should be used during line operations to conduct 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.

Preamble to Step 9 and Step 10 – EBT program design general

The purpose of the EBT program is to use events defined to be most critical, as a means of assessing and developing competencies. The Baseline EBT program should be constructed to contain all topics for the aircraft generation listed according to following provisions:

Appendix G forms the basis for the construction of the EBT recurrent assessment and training program.

- G.III CBTA/EBT program overarching principles: describes topics applicable to all airplane generations
- G.IV Generation-specific assessment and training matrix: lists topics for each specific generation of airplanes
- G.V Scenario elements and competency map: supports the module-specific scenario design, based on given training topics and competencies to be assessed and/or trained

In order to address all assessment and training topics at the defined frequency, a training program of 48 FSTD hours over a three-year cycle for each pilot has been assumed. This EBT recurrent assessment and training should be conducted in an FSTD qualified for the purpose.

When adapting material in Appendix G to specific operator's needs, it is important to note that it is never the intention that all possible events or scenarios be programed within the EBT recurrent cycle. Operators should select the scenarios that are most useful to their needs, while ensuring that the frequency of defined topics is maintained, to minimize competence decay over time.

The EBT program customization should be based on evidence sustaining the following three different layers:

1. The first layer of customization is based on the evidence collected in operations (e.g., safety management system, operator occurrences, state safety plan, international operational information, occurrences, manufacturer data, etc.) and concerns specifically the adaptation of the example scenario elements attached to the training topics. Therefore, the EBT program is similar across the generations for the entire pilot population, but the volume and the relevance of the scenario elements is enhanced. This should permit to effectively contextualize the training topics and to better expose the pilots to surprise and unexpected events.
2. The second layer of customization is based on the evidence collected in operations (see first layer above) and on the evidence collected in the training context (training metrics collected and analyzed by pilot population, per fleet, per aircraft type, per network, etc.). Therefore, the EBT module should be adapted to the pilot population defined by the operator. This should permit to develop the pilot competencies according to the needs identified within a specific pilot population on a particular fleet (e.g., long haul vs short haul), and/or depending on the role (e.g., Captains vs First Officers). This may include different example scenario elements for each population.
3. The third layer of customization is based on the evidence collected in the training context (evidence collected during the EVAL or historical training metrics of the pilot). Therefore, the training phases (MT and SBT) of the module should be adapted to the individual pilot needs. This is the goal of EBT; to develop the individual pilot competencies depending on the needs identified during the EVAL or from previous modules. The tailorization to the individual's needs is elaborated in Step 10.

Step 9: Assessment and training topics distribution

Description: The EBT project team commits the course developers to distribute the assessment and training topics.

The EBT course developers should select scenarios and priorities according to the principles described in the previous paragraph "EBT program design general" (Preamble to Step 9 and Step 10), combined with any additional requirements, while respecting the assessment and training topic frequency.

The additional requirements may include, but are not limited to:

- Legal requirements not covered by EBT regulations (e.g., requirements for Low Visibility and other Special Approval Operations)
- Requirements based on the Equivalency of Malfunctions process for the aircraft type
- Airport-specific requirements not covered by the Equivalency of Approaches process (e.g., requirement to regularly practice approaches at this specific airport)
- IOSA Standards and Recommended Practices mandated by the IOSA Standards Manual (ISM)
- Operational Suitability Data (OSD) mandated by aircraft manufacturers
- Training Areas of Specific Emphasis (TASE) and other training recommendations of aircraft manufacturers (e.g., documented within the Airbus FCTS)
- Operator-specific requirements derived from the SMS processes (e.g., temporary or permanent Safety Review Board decisions)

Guidance to manage the modules for pilots qualified to operate in either seat

The following recommendations apply to module design for pilots designated to perform their duties from either pilot seat, such as:

- Type Rating Instructors/Examiners (TRI/TRE)
- Line check/evaluation airmen
- Pilots who are authorized to conduct take-offs and landings from either control seat
- Cruise relief pilots

State regulations as well as IOSA standards require a seat-specific (right or left seat, as applicable) recurrent program for pilots who perform duties from either pilot station.

Under traditional training programs, the additional training and checking items required to operate in either pilot seat include a selection of the following events:

- An engine failure during take-off
- A one-engine-inoperative approach and go-around
- A one-engine-inoperative landing
- Relevant UPRT exercises

IATA recommends that under EBT, the above-mentioned events be considered as training topics with a B frequency (see 2.4.1) and be positioned during the MT phase of the EBT module. The pilots qualified to operate in either seat should perform the maneuver training phase by alternatively operating the aircraft from the left and the right seat as per the following example:

Module 1		Module 2		Module 3		Module 4		Module 5		Module 6	
EVAL / SBT	MT	EVAL / SBT	MT	EVAL / SBT	MT	EVAL / SBT	MT	EVAL / SBT	MT	EVAL / SBT	MT
Left-Hand Seat		LHS	RHS	Left-Hand Seat		LHS	RHS	Left-Hand Seat		LHS	RHS

This approach ensures that the pilot operates the aircraft from both operating seats each year and allows for a wider exposure to aircraft drills and procedures that would not normally be the pilot's responsibility. This approach complies with the EU regulation for EBT.

Developing EBT MT to accommodate operations from either pilot seat includes:

- Assessment of the training need through review of the respective aircraft generation table of assessment and training topics for the maneuver training phase as well as any additional elements required by the CAA for operating in both pilot seats.
  Items required by traditional training programs are already incorporated in the EBT maneuvers training table.
- Design the composition and structure of the MT phase across the whole EBT program to include the training events, their delivery sequence, scenario elements and the schedule using the frequency guidance published for the MT phase.
- Develop the training and assessment materials based on the operator's adapted competency model, including training notes, exercise briefings, etc.
- Implement the module and conduct the training while ensuring a robust tracking system is in place to ensure compliance with the training design.

Guidance to manage the modules for augmented flight crews

For long haul operators with a network requiring augmented flight crews, during the controlled rest of the Commander only two First Officers may be present as active pilots on the flight deck (i.e., around 30% of the cruise flight time). At least one of the F/Os must be qualified to operate from the left-hand seat during flight in cruise (generally above flight level 200). For the pilot competency development of the F/O operating regularly during augmented flight crew operations, it should be possible to occasionally conduct EBT modules with two F/Os occupying the left and right pilot seats.

The CAA approval may require that the operator considers the following elements:

- At least one of the pilots is qualified and approved to relieve the Commander as per applicable regulations
- The pilot acting on the left-hand seat is assessed only as Pilot Monitoring during the departure and arrival phases of the flight
- All training topics required for the MT phase are performed as Pilot Flying from the right-hand seat, except for maneuvers required in abnormal or emergency situations (e.g., manual emergency descent or UPRT elements) which may be trained from both seats
- The scenarios should be adapted to the specific crew composition
- At least every second module should be conducted in standard crew composition (i.e., with a Commander) to enable training and assessment as Pilot Flying during the departure and arrival phases in the EVAL and/or SBT

Step 10: Module design

Description: The EBT project team commits the course developers to design the EBT modules.

The EBT course developers should design the modules according to the principles described in the previous paragraph "EBT program design general" (Preamble to Step 9 and Step 10).

All modules and lesson plans should be evaluated (dry run) by a group of IEs before the delivery of the training, to ensure that anticipated timings and FSTD fidelity permit to achieve the training objectives.

Special attention should be given to the guidance and training materials for IEs and pilots. Specifically, for the EVAL, both, IEs and pilots, should have access to the operator's standard flight data file (weather data, NOTAMs, etc.) in order to prepare and to conduct the EVAL flight profile in a realistic way.

Evaluation Phase (EVAL)

The purpose of the EVAL is to assess competence, determine training system effectiveness and identify individual training needs. The EVAL should be designed so that a flight crew, operating in a non over-demanding operational and environmental context (see Step 3, characterization of the context complexity), is not overly challenged. On completion of the EVAL, any areas that do not meet the required level of performance, should become the focus of the MT and SBT phases. If all competencies are assessed at or above the required level of performance, the focus of subsequent training should be to further enhance the pilot competencies.

IATA recommends that all competencies be assessed during the EVAL in order to identify individual training needs. This recommendation is aligned with the EU regulation for EBT.

The ideal balance in a three-year EBT program cycle is to balance the training and assessment of the competencies, to ensure that the training topics and associated scenarios permit to regularly challenge the 9 competencies, over the 3-year period. The course developers should balance the focus of evaluations on two to three competencies by systematically ensuring that all competencies have been addressed over the 3-year period. However, the assessment of all competencies should be possible in any module by choosing appropriate scenario elements, system malfunctions and approaches.

Once the operator has sufficient data, targeted competencies may be selected to ensure that the program design addresses the most cited weaker competencies and observable behaviors. Course developers should ensure that each scenario and option is weighed to a similar difficulty level for the entire pilot population.

The development of real-time realistic scenarios, which enable the pilots to utilize all resources at their disposal, is a key element to the evaluation. The evaluation phase should consist of a line-oriented flight scenario (or scenarios) during which there are one or more occurrences to assess all competencies and identify individual training needs.

The assessment of all the competencies requires that both pilots act as Pilot Flying (PF) and Pilot Monitoring (PM). A change of the PF can be achieved either by:

- Creating two independent scenarios, or
- A reposition within a flight (this reposition may also include a clearance of system malfunctions experienced during the first part), or
- A single flight scenario with a change of PF and PM duties at a predetermined point of the flight

The first scenario in the EVAL should commence with a normal aircraft pre-flight set up with full operational flight plan information provided to the crew. This helps build realism and allows the pilots time to assimilate their environment. There are other possible commencement points for the EVAL, but great care should be exercised to ensure that the crew is given time to fully prepare and assimilate the environment before the evaluation begins. The pilots should be regularly exposed to all phases of flight across the EVAL phases of the EBT triennial approved program.

It is intended that only a limited number of training topics be selected as the assessment vehicle, and that the scenario devised for each pilot should be conducted in real time. Consideration should also be given to the benefit of scenarios that are time-constrained, especially when the focus is on competencies WLM and LTW. Where aircraft malfunctions are considered for this phase, they should be drawn from a traditional, determined list from the aircraft manufacturer and not from unforeseen scenarios.

Maneuvers training phase (MT)

The critical elements of each maneuver are described in the matrix of Appendix G.V. This phase has a focus on skill retention and addresses mainly the competencies FPA, FPM and PRO.

It is important to maintain the focus on skill, and not to turn this into a LOFT-style training. Once the pilot has completed the critical part of the maneuver successfully, the aim has been achieved. Repositioning of the flight simulation, to focus training on the intended maneuvers will be a commonly used FSTD feature

for this phase. Every effort should be made to provide a relaxed environment free from the normal LOFT style considerations, wherein the crew can practice skills with coaching where necessary.

Note: *When moving from traditional training programs without repositions to EBT, frequent repositions during the MT phase are likely to be criticized by IEs and pilots. Therefore, to ensure the acceptance of the EBT program:*

- *Repositions should be thoughtfully planned during module design*
- *The initial EBT IE standardization should emphasize the pilot's need for sufficient time and standardized processes to accommodate with the new situation (e.g., responsibilities for aircraft system/configuration changes, requirements to brief the new position/condition and next maneuver)*
- *The communication plan to the pilots should emphasize the focus of the MT compared to the other EBT module phases*

Scenario-based training phase (SBT)

This training should consist of line-oriented flight scenarios during which one or more threats may be introduced. Details are specified in Appendix G.V. The contents of this training should be adapted to develop the competencies identified during the EVAL.

The goal of SBT is to develop competencies and the confidence for effective management of threats and errors to enhance the pilot's ability to cope with both predictable and unforeseen situations. To enable competency-specific training, the module design for SBT should allow the IE to choose scenarios, or scenario elements, that have specific competencies in focus, while fulfilling all required training topics for this phase. The IEs may be given some flexibility to adapt the module within the required training topics, as long as they remain within the framework of the competencies and system malfunctions, e.g., they can slightly change the conditions.

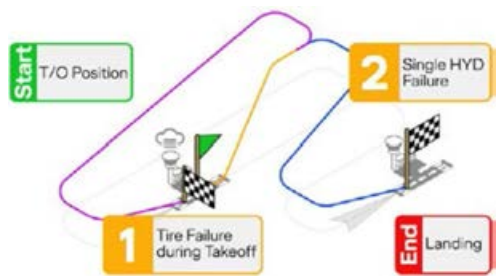
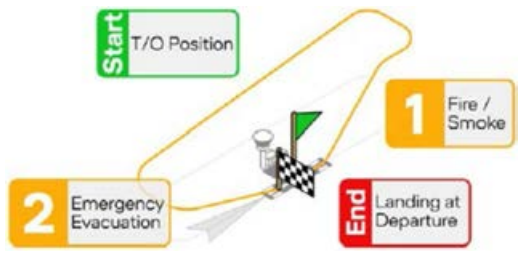
The underlying philosophy of individually tailored training within this phase is the identification of the pilot's individual training needs during the EVAL phase. Tailored training enhances competency development even for those pilots who have not demonstrated deficits during the EVAL phase.

Concerning the competency development at the individual pilot level, the course design should use the following solutions for the SBT scenarios.

Solution 1:

The content of the scenario is totally prescriptive, but the IE can choose different options within the scenario to develop different competencies. Each option places special emphasis on specific pilot competencies while all options realize the same assessment and training topics. The IE selects the option according to the pilot's performance, demonstrated during the EVAL phase.

Example

<table>
<tr><th colspan="2">Scenario options within a totally prescriptive scenario</th></tr>
<tr><th>Option 1: Special emphasis on SAW and LTW</th><th>Option 2: Special emphasis on COM and WLM</th></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">The IE selects the option according to the pilot□s performance demonstrated during the EVAL phase.</td></tr>
</table>

Solution 2:

The content of the scenario is partially prescriptive, and the scenario allows the IE to develop the pilot's competencies with the instructor "toolbox". This toolbox provides the IE with a set of events-exercises that permits to place special emphasis on the competencies that have been identified as "to be enhanced" during Session 1 of the module. The IE selects the exercises that place special emphasis on specific pilot competencies.

Example

Instructor "toolbox" within a partially prescriptive scenario										
Scenario event	**Time**	**KNO**	**PRO**	**COM**	**FPA**	**FPM**	**PSD**	**LTW**	**SAW**	**WLM**
Uncontained engine failure	10 min									X
Smoke event	10 min		X				X	X	X	X
Pilot incapacitation during take-off roll	5 min						X			X
The IE selects the *exercises* according to the pilot's performance demonstrated during day 1.										

A more detailed example is shown in Appendix G.VII.

The scenarios of the SBT phase may be more demanding compared to the EVAL, in order to challenge the pilot's competence and to build confidence within a line operations simulated environment. They should maximize exposure to a variety of situations according to the priorities determined through analysis, for the purpose of enabling learning and developing competence and resilience. Special emphasis should be given to scenarios that involve a broad set of competencies.

Development and assessment of the Pilot Monitoring (PM) role

The PM plays a vital role in operational safety. One of the objectives of the EBT program is to devote special attention to the development and enhancement of this role.

IATA recommends that ATOs/AOCs place special emphasis on the PMs' role in general. Further details are available in the IATA Guidance Material (GM) for Improving Flight Crew Monitoring.

This guidance material indicates that monitoring is embedded within all competencies of the Pilot Competency Framework, including, but not limited to the following observable behaviors:

Monitoring within the Pilot Competency Framework
Application of Procedures and Compliance with Regulations – OB 1.5 Monitors aircraft system status
Communication – OB 2.3 Conveys messages clearly, accurately and concisely – OB 2.4 Confirms that the recipient demonstrates understanding of important information – OB 2.5 listens actively and demonstrates understanding when receiving information – OB 2.8 Uses and interprets non-verbal communication
Aeroplane Flight Path Management, automation and manual control – OB 3.2 & 4.2 Monitors and detects deviations from the intended flight path and takes appropriate action – OB 3.6 & 4.7 Effectively monitors automation / flight guidance systems, including engagement and automatic mode transitions
Leadership and Teamwork – OB 5.3 Engages others in planning – OB 5.6 Addresses and resolves conflicts and disagreements in a constructive manner – OB 5.7 Exercises decisive leadership when required – OB 5.10 Applies effective intervention strategies to resolve identified deviations

Monitoring within the Pilot Competency Framework
Problem Solving and Decision Making – OB 6.2 Seeks accurate and adequate information from appropriate sources – OB 6.3 Identifies and verifies what and why things have gone wrong, if appropriate – OB 6.7 Monitors, reviews and adapts decisions as required
Situation Awareness and Management of Information – OB 7.1 Monitors and assesses the state of the aeroplane and its systems – OB 7.2 Monitors and assesses the aeroplane's energy state, and its anticipated flight path – OB 7.3 Monitors and assesses the general environment as it may affect the operation – OB 7.4 Validates the accuracy of information and checks for gross errors – OB 7.5 Maintains awareness of the people involved in or affected by the operation and their capacity to perform as expected
Workload Management – OB 8.7 Monitors, reviews and cross-checks actions conscientiously

The following excerpt from the IATA GM for Improving Flight Crew Monitoring refers to course design:

- Predictive monitoring (expected threats) and reactive monitoring (unexpected/pop-up and latent threats) are needed to manage threats in a safe, effective, and efficient way. Typical examples are threats resulting from dispatch, weather, crew, technical, etc., challenges.
- Scenarios should be designed around effective monitoring in a complex/dynamic environment. Consideration should be given to how and when information will be presented to the flight crew and in what form (i.e., aural, visual, color coded or a pre-flight text). Other things to clearly define and take into account during module design include common and possible conditions that can lead to monitoring lapses, and available tools and strategies (i.e., CRM skills, SOPs, etc.) that can help flight crew cope with possible monitoring weaknesses.
- Line-oriented scenarios are useful to evaluate predictive monitoring. Introducing threats (such as weather, technical deviation and dispatch) in the flight preparation papers should allow the IE to assess the crew's ability to identify major threats in the flight profile at this stage. In this situation, monitoring activities will be centered on planning and reviewing countermeasures such as planning, inquiring, briefings, and contingency management of the potential threats. A typical example is the management of a bad weather situation, which should be identified during flight preparation.
- For pop-up threats, the flight crew should identify the pop-up threat in a timely manner and the monitoring will focus on reviewing and modifying countermeasures such as evaluation of plans.
- Simple training and evaluation exercises are useful to assess reactive monitoring because error detection is centered on execution of countermeasures such as cross-check, use of checklist, announcement, corrections, take over, etc. A common example of this is the unsuccessful localizer engagement scenario during ILS approach.

In-Seat Instruction (instructor-induced instruction)

Effective monitoring and error detection are increasingly important when operating highly reliable automated aircraft. During the MT and SBT phases of an EBT module, In-Seat Instruction (ISI) may be used as a method to train monitoring and cross-checking, and specifically for upset recovery training.

Note: *As the acronym ISI is used worldwide in EBT regulations, this guide continues to use ISI. However, as pointed out below, ISI does not always require the instructor to occupy the pilot's seat. Therefore, IATA proposes the wording "instructor-induced instruction".*

ISI should follow a predetermined scripted scenario, which can be achieved by:

- The response of one pilot to simple instructions provided confidentially by the instructor, for example to simulate pilot incapacitation, or
- By the instructor occupying a pilot seat and performing pre-determined exercises acting as PF or PM for the purpose of demonstration and of intervention by the other pilot, or

- Positioning the aircraft outside the normal operating envelope (e.g., for upset recovery training) and providing appropriate support for CM1 or CM2 actions (e.g., RTO). This is in line with avoiding negative training.

ISI is a major enhancement to traditional FSTD operation where instructors normally remain at the instructor operating station, far removed from the trainees, operating seats and flight controls. ISI creates a better training platform for learning and allows timely intervention and repetition when required.

To avoid mistrusts between the pilots, ISI should be performed only during specific scenarios, clearly identifiable to the pilots. The exercises should be carefully scripted in a manner that does not cause any negative training transfer.

Where a pilot is instructed to play a role, there should be no assessment of this function. Where a pilot is expected to respond to an error induced by ISI, there should be no negative consequences to any assessment of performance for the duration of ISI. Once ISI has ceased and/or control is transferred, subsequent performance may be assessed in the normal way.

Examples are given in Appendix G.V and should be confined to simple acts or omissions for the purpose of eliciting active and effective monitoring and, where necessary, intervention by the pilot monitoring. Topics marked "ISI" are intended to be the focus of instructor-induced instruction. In these cases, topics should be combined to create an ISI scenario to be used at the determined frequency. The scenarios should be realistic and relevant for the purpose of demonstrating and reinforcing effective flight path monitoring. Demonstrated role-play should contain realistic, not gross, errors leading at times to a mismanaged aircraft state, which can also be combined with upset management training.

Note: *The crew's experience during ISI is highly dependent on the instructor delivering the program. A motivated and competent instructor will be able to effectively train aircraft monitoring and error detection during ISI. These are increasingly important in risk mitigation tools while operating highly reliable automated aircraft. ISI enables pilots to not only practice psychomotor skill-based exercises under the supervision of an instructor, but it also enables the crew to practice verbalizing effective flight path monitoring and error detection.*

Resilience development

The EBT program as a whole, but in particular the SBT phase, should be designed observing the following principles:

- Resilience, surprise, and unexpected events: The simulator session should allow variations so that the pilots are not familiar with the scenarios presented in the simulator session. To preserve program integrity and fairness, variations should be the focus of EBT program design. They should not be left to the discretion of individual instructors.
- Resilience and decision-making (dilemma): The EBT program should be designed in such a way that at least in every second module the crews are exposed to a scenario where multiple non-optimal solutions are possible, with some unfavorable conditions attached to each solution. This situation challenges the competency Problem Solving and Decision Making (PSD).

Alternative scenario elements

It is not mandatory to implement the example scenario elements from ICAO Doc 9995, those scenarios are proposed to facilitate the design of the EBT program by the operators, who may develop alternative scenario elements that are more relevant to their operations, based on their own data. However, the course developers should ensure that when implementing alternative scenarios, the desired outcome of the training topic is achievable.

The IATA CBTA Guide for Flight Crew Training provides a mapping from task to competencies, and from threats to competencies, which supports the design of alternative scenario elements by ensuring the identification of the competencies that are supposed to be demonstrated during the realization of a scenario.

Step 11: Implementation of the EBT program

Description: The EBT project team commits the training department and the flight standards department to define the policy and procedures applicable to the EBT program.

The following paragraphs provide recommendations to address the EBT program procedures applicable for the implementation and the conduct of EBT. The precise scope and limitation of the procedures should be agreed in partnership with the CAA. The training and logistical difficulties of only fleet-wide versus operator-wide trials should be considered.

Note: *Section 5 describes in detail how the IEs deliver the EBT program. The CBTA project team monitors this activity.*

Enrolment of pilots in the EBT program

General concept

The concept of enrolment in EBT originates from the need to formalize the pilots' licensing revalidation and renewal aspects under an EBT program.

For the purpose of this guide:

- "Enrolment" means the administrative action carried out by the operator where a pilot participates in the operator's EBT program
- "Enrolled pilot" means the pilot that participates in the EBT recurrent training program

These definitions comply with the EU regulation for EBT.

Generally, enrolment occurs when a pilot commences the first EBT module after the formal EBT program start.

Enrolment for pilots at the end of a conversion course

Enrolment of a pilot may be based on the following options:

1. A pilot performing the EBT module at the end of a non-CBTA type rating course, of which Session 1 meets all the authority requirements for the associated type rating skill test
2. A pilot performing the EBT module latest six months after passing the type rating skill test/operator proficiency check of a non-CBTA type rating/operator conversion course
3. A pilot completing a competency-based type rating course including all the type rating skill test requirements

Option 1. This option is a challenge as the integration of the type rating skill test requirements into Session 1 of an EBT module generates a high volume of events combining skill test items and training topics to be performed within the time slot allocated to FSTD. This option may necessitate to extend the FSTD time slot.

Option 2. This option is recommended for operators having already implemented an EBT program, as this option permits to avoid the challenge of option 1.

Option 3. This option applies to CBTA-based type rating and operator conversion courses. It represents the optimum and consistent implementation of the competency-based principles. Ideally, the type rating course/operator conversion course is designed in such a way that the pilot demonstrates the level of performance required by the operator at the end of the course, during the EBT module sessions. The type rating skill test items should be performed during the course in accordance with the approval of the CAA.

Note: *For option 3, the CBTA-based type rating and operator conversion course should be designed in accordance with the IATA CBTA Guide for Flight Crew Training.*

De-enrolment

De-enrolment occurs when a pilot leaves the operator's EBT program, and the operator is no longer responsible for the administrative action for license revalidation under the EBT program.

De-enrolment may occur due to:

- A pilot leaving the operator
- A pilot not demonstrating an acceptable level of competence
- A deliberate action from the operator to de-enroll a pilot, e.g., due to termination of the EBT program, pilot conversion to another aircraft type, administrative reasons after prolonged absence of a pilot, etc.
- Prolonged absence of a pilot, exceeding the contingency procedures stated below

If a pilot fails to demonstrate an acceptable level of competence and leaves the operator's EBT program, the pilot should be informed not to exercise the privileges of that type rating.

EBT Module Scheduling

Pilot scheduling

Planning Sessions 1 and 2 of an EBT module with the same pilots and on consecutive days is recommended by IATA, based on the following considerations:

PRO	CON
Training perspective	
• Tailored training is proactively delivered during Session 2 on observed deficiencies during Session 1. • Higher pilot satisfaction and confidence due to the proactive tailorization of the training during Session 2. • Performance improvements from Session 1 to Session 2 are easier to manage during two consecutive days. • Support of "learning from the positive", as the tailored training is also applicable for pilot already demonstrating high performance. • Better training quality and enhanced resilience development during Session 2, as the assessment has been done during Session 1.	– Less frequent training, compared to four events evenly distributed over 12 months. This aspect is particularly relevant for long haul pilots. – Training effectiveness during Session 2 may be low if pilots had a negative experience during Session 1.
Operational perspective	
• Schedule planning merits due to less man days when training is not delivered at the homebase. • Lower travel costs when training is not delivered at homebase. • No schedule change required when performance demonstrated during Session 1 is below adequate and can be recovered during Session 2.	– Probable scheduling constraints (scheduler needs to consider rest time after Session 1, less flexible as two consecutive days are blocked).

IE Scheduling

The IATA training committee members discussed extensively the pros and cons of the conduct of an EBT module by the same IE during Session 1 and Session 2. The following template provides the training and operational perspective aspects that have been assessed by the IATA experts. Most members of the IATA training committee have elected to conduct the EBT module with the same IE during the two sessions on consecutive days. Nevertheless, there may be reasons to start the mixed EBT implementation with different IEs.

When the module is planned with different IEs, clear handover procedures between Session 1 and Session 2 should be implemented to ensure effective pilot competency development during Session 2.

Planning for the same IE to conduct Sessions 1 and 2 of an EBT module is recommended by IATA, based on the following considerations:

PRO	CON
Training perspective	
• EBT is designed as a complete training module dedicated to the pilot competency development during the training phases (MT and SBT). • EBT's objective is to achieve "more training, and less checking"; it is important that the trainees, even when being evaluated, are not in the "check mind". Having the same IE during both sessions facilitates the achievement of the objective. • A consistent training delivery from assessment and facilitated debriefing during Session 1 to a tailored training during Session 2 enhances the overall learning experience during the module. • Content of Session 2 can be prepared in advance, by the IE as the same coach for the entire module. • During Session 2, no second initial assessment is required, as the instructor already knows the pilots' training needs. • It is easier for the IE to grasp the entire Session 2 training objectives, asses the performance and give integrated feedback across the module. • The trainees have a better appreciation of their competencies' development across the phases of the module.	– An IE conducting the entire module may be biased during Session 2. – One IE may generate a less diverse learning experience compared to two different IEs.
Operational perspective	
• Handover procedures from Session 1 are only required in case of unforeseen circumstances. • IE's expertise with the entire EBT module content develops faster and is broader. • Training efficiency is improved as less EBT IEs are needed. • The acceptance of the EBT program by the pilots and the IEs is facilitated because the learning experience is reinforced by having the same IE coaching the pilot during the entire module.	– Cannot be implemented, if IE requirements defined by the CAA are different during Session 1 and Session 2. – More examiners needed during mixed implementation, as both days are performed by an examiner. – Risk of higher costs due to reduced scheduling flexibility. – Potential scheduling constraints using same instructor two consecutive days.

Handover procedures

When the EBT module is conducted by two different IEs, information regarding the pilot's performance and needs in terms of competency development from Session 1 should be transmitted to the IE conducting Session 2 to allow for tailored training. The ATO/AOC should implement "handover" procedures and associated tools to ensure the transmission of the relevant information.

Example

A summary of Session 1 performance assessment done by IE 1 is available in the Session 2 electronic template for IE 2.

The pilots' performance data is generally accessible to the IEs through electronic records. Otherwise, the training department should provide the information in another format such as paper records or by communicating specific training objectives tailored to the pilot's needs.

It is important to consider that the second IE has got enough time to interpret the information received and, if necessary, adapt the training program to the individual needs of the pilots.

Contingency procedures

The EBT program should include contingency procedures for unforeseen circumstances that could affect the delivery of the EBT modules (e.g., simulator breakdown, sick pilot or IE) and prolonged pilots' absence.

The contingency procedures should also cover the situation where the pilot demonstrates a performance below the performance level defined by the operator.

Module interruption

In case of unforeseen interruption of a module at any point, the missing parts of the module should be re-scheduled. The pilot may continue line flying until the expiry of the validity period unless the performance observed was below the performance level defined by the operator. If the interruption results in an IE change, the operator should ensure that the IE completing the module is provided with details of the pilots' performance demonstrated before the interruption of the module.

Operator sample 1

Interruption	Simulator breakdown / Pilot absence	Instructor/Evaluator (IE) absence
Before/during Session 1	Try to schedule another simulator/pilot If not possible: – Use the slot of Session 2 to conduct Session 1 with the same pilots and IE. – Reschedule Session 2 as a single event as close as possible to Session 1.	Try to schedule another IE. If not possible: – Use the slot of Session 2 to conduct Session 1 with another IE. – Reschedule Session 2 as a single event as close as possible to Session 1.
After Session 1	Reschedule Session 2 as a single event as close as possible to Session 1.	Schedule another IE to complete the EBT module. If not possible: – Reschedule Session 2 as a single event as close as possible to Session 1.
During Session 2	Reschedule Session 2 as a single event as close as possible to Session 1	Reschedule Session 2 as a single event.
Rescheduling of Session 2 should preferably take place within 30 days, otherwise a complete EBT module shall be rescheduled.		
Generally, no single cockpit-crew is allowed. If only one pilot is present: The training event may be conducted according to individual wishes but must never be counted as OPC or EBT-module day.		

Operator sample 2

Contingency procedures for unforeseen circumstances that may affect the delivery of the module
(a) In case of missed EBT modules and recency training, training will be managed in accordance with the operator policy.
(b) In case of unforeseen interruption of a module at any point (e.g., sim breakdown or IE illness), the missing parts of the module should be rescheduled prior to the pilot-specific EBT module expiry date.
The pilot may continue line flying until the expiry of the validity period, unless the performance observed was below the minimum acceptable level.
A schedule interruption will most likely result in a different IE conducting Session 2 of the EBT module. IEs should familiarize themselves with the Session 1 report prior to delivering Session 2 in order to ensure an appropriate training focus.

Recency requirements missing

If a pilot is non-compliant with regards to operational elements required by Annex 6 (i.e., recent experience and/or aerodrome, route, area recency requirements), a CBTA refresher session should be scheduled which has to include the necessary means to fulfil the requirements (e.g., 3 take-offs and landings).

This session is optional for longer absences below 90 days.

EBT modules missed by the pilot

The following paragraphs propose CBTA training solutions depending on the number of EBT modules missed by the pilot and on the validity of the pilot's license. They provide an effective competency-based training path to maintain the pilot's enrollment in the EBT program.

The CBTA training solutions below were developed originally during the COVID period and were endorsed by ICAO to facilitate the management of training and licensing to ensure safe operations.

The following template presents the CBTA training solutions recommend by IATA. Appendix H gives further guidance regarding the different components of the proposed training solutions.

CBTA Training solutions for missed EBT modules				
Topic	**Situation 1**	**Situation 2**	**Situation 3**	**Situation 4**
Missed modules	1 module	1 module	1 to 2 modules	3 to 5 modules
License validity	Valid	Expired < 90 days	90 days ≤ Expired < 1 year	1 year ≤ Expired < 3 years
Ground refresher		Optional	X	X
FSTD refresher		Optional[1]	X[2]	X
FSTD consolidation			Optional[3]	X[3]
FSTD EBT module	EVAL phase only[0]	X	X	X
LIFUS			X[4]	X

[0] To conduct line operation, the pilot should perform the EVAL phase of the module and complete the module before the expiration date of the license validity (this solution originates from EU regulations)

[1] Recommended when last flight was performed >60 days

[2] Should include the recent experience and (as applicable aerodrome/route/area recency requirements)

[3] Based on the performance demonstrated during the FSTD CBTA refresher session

[4] Recommended when last flight has been performed beyond 6 months

Note: *Refer to Appendix H for a detailed description of the different components. Local CAA regulations may require more specific procedures (e.g., current European EBT regulations are more detailed regarding license revalidation requirements in case of missing modules).*

One module is missed but the license or rating is still valid

Situation 1: When a pilot has missed one module, at least the missing EVAL should be rescheduled before the pilot resumes line operations. The MT and SBT of the missed module should be completed within a given timeframe defined in the operator's procedures (e.g., 30 days), but at the latest before the expiry date of the pilot's license or rating. This solution originates from the EU regulation for EBT.

One or more module(s) missed, and the license or rating validity has expired

IATA recommends that the AOC/ATO approved for renewal of the license or type ratings conducts competency-based refresher training for the pilots to renew their license or rating while ensuring their enrollment

within the EBT program is maintained. The CBTA refresher training proposes a progressive and tailored training solution depending on the pilots' competencies needs. (Refer to the template above.)

Situation 2: When a pilot has missed one module and the license or type rating has expired by less than 90 days, the renewal of the license or rating should be performed during the operator's current EBT module. A CBTA refresher session is recommended when the last flight was performed more than 60 days ago.

Situation 3: When a pilot has missed one or two modules, and when the license or type rating has expired by less than one year but more than 90 days:

- The content of the CBTA refresher training should be the following:
  - A ground training refresher consisting of the missed ground training elements or a specific refresher program
  - A CBTA refresher session including a competency assessment
- The renewal of the license or rating should be performed during the operator's current EBT module

Situation 4: When a pilot has missed three to five modules and when the license or type rating has expired by more than one year but less than three years:

- The content of the CBTA refresher training should be the following:
  - A ground training refresher consisting of the missed ground training elements or a specific refresher program
  - A CBTA refresher session
  - A CBTA consolidation session G.VII
- The renewal of the license or rating should be performed during the operator current EBT module
- IATA recommends as well that the pilot performs line flying under supervision (LIFUS) to demonstrate competence and confidence during normal line operations

Six modules missed

Situation 5 (not shown on the template): A pilot who has missed six consecutive EBT modules should be de-enrolled from the EBT program, and the relevant requalification requirements for traditional training programs should apply (i.e., the pilot has to repeat parts or all sessions of the type rating/operator conversion course).

Consequences of competency assessment

The operator's training policy should describe the process to monitor and to ensure that the pilot's performance is consistently demonstrated at or above an adequate level of performance. The training should be adapted to individual needs in order to continuously develop the pilot's competencies and ensure the maintenance of an adequate (or better) level of performance.

The operator's training policy should describe the outcome of the competency assessment based on the different levels of performance as defined in their adapted competency model (e.g., ineffectively/minimal acceptable/adequately/effectively/exemplary manner). The training policy should describe at least the two following situations:

- The pilot has demonstrated an adequate (or better) level of performance across all competencies (e.g., all competencies are graded 3 or above on a 5-point scale). The training objectives of the EBT module are achieved.
- The pilot has demonstrated a level of performance below an adequate level in one or more competencies (e.g., one or more competencies are graded below 3 on a 5-point scale). The training objectives of the EBT module are partially achieved (or not achieved). The training policy should describe the remedial actions required to address deficiencies in performance.

Examples of training policies

Example of policy for the management of performance below adequate (grade 3)
A tailored training (that may include remedial training) is required for: – Any competency graded 1, or – Two successive grades 2 in a same competency, or – Any competency graded 2 if the trainer evaluates that the trainee will not be able to demonstrate an adequate performance (grade 3) during the next training or evaluation session

Example of an Operator Policy for EBT training objectives achievement
EBT IEs shall ensure minimum competency standard has been met and objectives for MT and SBT are accomplished by the end of the module. Although EVAL, MT and SBT can be taken in their individual parts, if there is a combination of training to proficiency for EVAL and OAWAP for MT and SBT, or excessive instructor input has been required to meet the exit standard, the module shall be recorded as being unsuccessful. ***Note**: OAWAP means Objectives Achieved with Additional Practice. This would categorize a performance where the standard had been met but with more instructional input than normally expected – i.e., some instructor input required above and beyond that expected for the set objective.*

Example of policy for pilot performance below adequate in an EBT module			
Situation	**Not competent**	**Not released for line operation**	**Grade 2 and released for line ops**
Competency grading	– At least one GRADE 1 any phase (EVAL/MT/SBT)	– More than four competencies with GRADE 2 in any SIM session, or – More than one GRADE 2 in SBT or prior interruption of the EBT Module	– Four GRADE 2 in EVAL, – One GRADE 2 in SBT or prior interruption of the EBT Module, or – At least one GRADE 2 in two out of three consecutive EBT Modules
Consequence of grading	– Pilot not released for line operations	– Pilot not released for line operations	– Pilot released for line operations
Responsibility	Training Manager/Chief Flight Instructor	Training Manager/Chief Flight Instructor	Chief Training Captain of respective type
Flow of information	– Instructor/Evaluator O Chief Training Capt. O Crew scheduling – Chief Training Captain O Training Manager O Head of Fleet	– Instructor/Evaluator O Chief Training Capt. O Crew scheduling – Chief Training Captain O Training Manager O Head of Fleet	– Instructor/Evaluator O Chief Training Capt. – Chief Training Captain O Training Manager
Actions	– Competency analysis – Training Committee – Assistance & Extra training prior next flight duty – Repetition of entire EBT Module after successful Extra training	– Competency analysis – Training Committee – Assistance & Extra training prior next flight duty – Released for line ops after successful Extra training	– Competency analysis – Training Committee – Assistance & Extra training in a timely manner

Recurrent ground training

Technical ground training

The philosophy of EBT is that the qualified FSTD should be used to the maximum extent possible for assessing and developing crew competence. To repeat simple malfunctions and use the FSTD environment

as a procedure training device is to deny the benefit of the FSTD as a learning tool, and for this reason the equivalency of malfunctions system was developed (see Step 7), to reduce unnecessary requirements to "tick boxes" against each listed malfunction of the ATA chapters.

The following recommendations have been inserted from the European EBT regulations which introduced a performance-based ground training concept.

The objective of the technical ground training program is to ensure that pilots have adequate:

- Knowledge of aircraft systems and the operational procedures and requirements; and
- Awareness of (a) the most significant accidents or incidents that could affect their operations following the TEM model or an alternative risk model agreed with the authority; and (b) the occurrences in the airline or occurrences from other airlines that may be relevant for their operations, accident/incident and occurrence review.

The technical ground training should:

- Be conducted as part of a 3-year program
- Allow a customization of syllabi, based on evidence both internal and external to the operator
- As a minimum, allow the pilot to receive technical ground training every 12 months

The technical ground training syllabi should be delivered using different methods and tools:

- The selection of the method and tools results from a combination of the learning objectives and the target group receiving the training (WHAT needs to be trained and WHO needs to be trained).
- The selection of the appropriate method and tool should be driven by the desired outcome in terms of adequate knowledge.
- The delivery of the technical ground training syllabi should include the methods or tools to verify if the pilot has acquired the objective of the technical ground training program. This may be achieved by means of a questionnaire, assessment of application of the competency Application of Knowledge (KNO) or other suitable methods.

The measurement and evaluation of the training system performance through the feedback process should include the performance of the technical ground training.

Integration of CRM training

IATA Operational Safety Audit (IOSA) Standards presently specify that operators shall ensure that:

- Flight crew members complete training and, when applicable, an evaluation in crew resource management (CRM), including Threat and Error Management, using facilitators that have been trained in human performance and human factors principles
- Flight crew members complete training in CRM skills, which may be accomplished as part of simulator, aircraft and/or line training, as applicable

Operators implementing EBT may demonstrate compliance with CRM requirements by showing how recurrent CRM is integrated within the operator's EBT program. An operator example, based on European CRM and EBT regulations, is provided in Appendix G.VI.

Line evaluation of competence

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.

The following recommendations have been inserted from the European EBT regulations:

- Each pilot shall periodically undertake a line evaluation of competence in an aircraft to demonstrate the safe, effective and efficient conduct of normal line operations described in the operations manual. The line evaluation of competence substitutes the line check. For successful completion of the line

evaluation of competence, the pilot shall demonstrate an acceptable level of performance in all observed competencies.

- The line evaluation of competence shall be conducted by a suitably qualified commander nominated by the operator that is standardized in EBT concepts and the assessment of competencies (line evaluator). The line evaluator should have a valid line evaluation of competence and should receive an acceptable training based on the EBT IE training. The EBT assessment of competence is not required. The line evaluator training may be included in the EBT ICAP.

Note: *The wording "normal line operations" does not refer to malfunctions; it refers to a normal flight (no test flight, no maintenance flight, etc.).*

Step 12: Review of training effectiveness

Description: The EBT project team commits the IEs and course developers to evaluate the EBT program. Once implemented, training metrics are analyzed at a predetermined frequency, to establish training system effectiveness and, where necessary, make corrections to the program.

Note: *Effectiveness, according to ISO 9000, is defined as the "extent to which planned activities are realized and planned results are achieved".*

EBT programs target to deliver competent pilots that have demonstrated the achievement and maintenance of the organization's competency standard.

The achievement of the organization's competency standard should permit to reliably predict that the pilots conduct safe and efficient operations. Consequently, the consistent demonstration by a cohort of pilots of an adequate level of performance across all competencies of the adapted competency model should be the basic criteria to evaluate the effectiveness of the program.

The training metrics should be composed of the competency metrics, the observable behaviors metrics and the TEM metrics. The analysis of these metrics should ensure the continuous enhancement of the program by identifying the trends regarding trainees' performance during the course delivery.

Practically, the analysis of these metrics should provide evidence to the organization about the competencies that are globally effective countermeasures regarding threats and errors management and about the competencies that globally contributed to the reduction of safety margins due to the mismanagement of specific threats and errors.

The measurement of training effectiveness should be performed by comparing the progress and the levels of performance achieved by the different pilot populations. Beyond training modules and individual training needs, data analysis offers a wide range of possibilities, e.g., in specific states and comparisons:

- Against safety performance levels
- Within/between fleets
- Within/between ranks
- Within/between airlines
- With similar experience (in total and on type)
- Clustering and movement between clusters
- With other or among IEs

Further areas of application are evolutions and trends, e.g.:

- After training program changes
- Within training campaigns
- Periodic summaries
- Performance changes after time

The measurement of effectiveness is complex, as the performance outcomes

(a) between the legacy system and the EBT program, and/or

(b) between different EBT modules

have to be compared by common training metrics, however the "difficulty levels" of the training programs/ EBT modules may differ.

This measurement can be done by comparing the progress and final competency results of the pilots. Data validity of this method presumes that the difficulty level of the different modules is comparable and that the IEs are well standardized (for details see Step 15).

Another option would be a practical evaluation at the end of an EBT module which is performed by a standardizer who has not participated in the module. This method can be compared with LOSA and its benefits. With this method the factors of improper standardization and possible IE bias are minimized and only the outcome of the practical evaluation serves as an indicator of how effective the training has been.

Data from the line evaluation of competence are important to measure the effectiveness of the EBT program in operations. It may include data from the line operations monitoring process.

It is also vital that a subjective feedback system be established, enabling both pilots under assessment and training and the IEs to provide feedback. This process is part of the buy-in considered essential for safety improvement and the partnership between all parties.

Note: *To compare the EBT system with the legacy system, a measurement at the "event level" can form a suitable approach: Level 3 metrics may be used, considering the first look attempt during the EVAL phase and the initial exercises during the MT phase, instead of the final competency level. Therefore, simply comparing the grading results of EBT modules having items of the legacy system integrated with modules without such items of the legacy system is not recommended.*

Step 13: Measurement of training system performance

Description: The EBT project team commits the Nominated Person Crew Training (NPCT)/Director of Training to report on the training system performance post EBT program implementation.

The NPCT/Director of Training, supported by the training managers, analyzes EBT data to evaluate the effectiveness and efficiency of the EBT program.

Additionally, the NPCT/Director of Training, supported by the training managers and in collaboration with the Head of Safety, analyzes the training data and the safety data to evaluate the value of the training system to maintain or enhance safety in operation.

Finally, the NPCT/Director of Training defines the training system performance by integrating the measurement of the training effectiveness, the measurement of the training efficiency, and the collaborative analysis of the operational and safety data.

Training system performance

The purpose of any licensing and operator training is to ensure an adequate level of safety in operations. In the context of EBT program implementation, the characterization of training system performance should integrate the following definitions:

- The competency is a dimension of human performance that is used to reliably predict successful performance on the job, and
- EBT is characterized by a performance orientation, emphasis on standards of performance and their measurement, and the development of training to the specified performance standards.

Therefore, the training system performance should determine whether the training permits to achieve the specified performance standards and to maintain safe operations.

While the course evaluation in Step 12 relates to effectiveness within the training system, training system performance should also integrate the measurement of training efficiency and should be complemented by the analysis of the data collected in operations. The operational and safety data analysis allows the

operator and or training organization to challenge the value of the training system to maintain or to enhance safety in operations.

Note: *Efficiency, according to ISO 9000, is defined as the "relationship between the result achieved and the resources used". Efficiency complements effectiveness by integrating the amount of resources that were necessary to achieve or to improve the effectiveness of the course.*

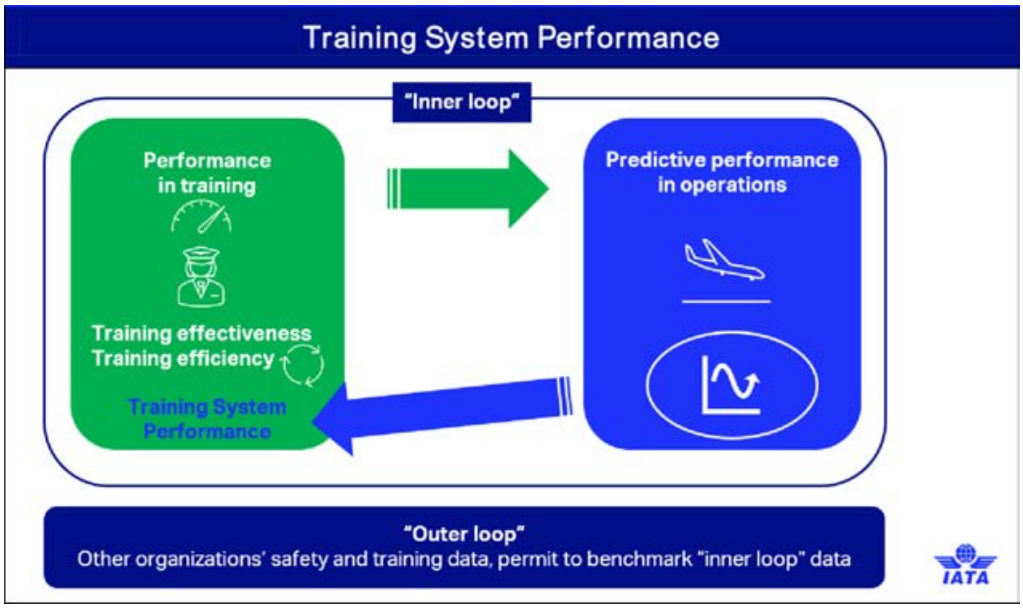
Specifically, the EBT training metrics that are used to measure the training effectiveness should also be used to benchmark the operational and safety data analysis. This data collected in the training context should be interpreted in conjunction with the operational data, providing evidence on the pilots' performance to manage threats and errors in operations.

Practically, the training system's performance definition can be supported using TEM metrics collected during a training session and comparing them with safety data on the prevalence of those events in line operations. For example, TCAS events in the training context compared to the ones gathered by the safety department.

The training data has become more and more integrated into each organization's SMS. Therefore, all the relevant data streams collected by an organization should be analyzed under the umbrella of the ATO's or AOC's SMS. Hence, the "inner loop" relates to the organization's own training, operational and safety data collection and analysis, while the "outer loop" relates to the relevant data streams that are available outside the organization, which include international organizations' data, state safety recommendations, OEM guidance, etc.

Note: *When an AOC subcontracts its operator training to an ATO, the data collected in the training context belongs to the AOC and is part of the inner loop.*

The figure below illustrates the relationship between training effectiveness, training efficiency and training system performance. For further guidance on training effectiveness and efficiency refer to the IATA CBTA Guide for Flight Crew Training, Chapter 5.



Analysis of the training and safety data

The data collection and analysis generally need to cover various types of data, both from within the training activity and from the flight operations and the SMS.

Operational data may serve as an indicator of the effectiveness of a training system. However, the simple idea of evaluating and comparing the number of events is not a suitable way, as other variables (such as

changes of aircraft types and destinations, environmental threats, culture changes, etc., within the operator) have to be considered and reviewed before reaching conclusions about training effectiveness.

The collaborative safety and training data analysis imposes a strong connection between the training department and the safety department. This link is often difficult to establish as the two departments do not use the same taxonomy: training is competency-based, whereas safety is event-based/event-driven. Specifically, the alignment of training and safety taxonomies should be implemented to facilitate data exchange and data interpretation from both, the safety and training departments.

For example, several operators have already adopted the pilot competencies as flight crew countermeasures in their safety taxonomy (accident/incident analysis, occurrence reporting, etc.), while training organizations have adopted the IATA safety taxonomy to encode the CBTA TEM metrics. These initiatives should permit to save resources during the analysis within the "inner loop" and facilitate global international data analysis within the "outer loop".

Where this alignment in taxonomies has not yet been achieved, the safety and training departments should consider the following steps for collaborative analysis:

- Use operational events (e.g., flight data recorder deviations) to identify the most relevant operational risks and associated geographical areas of occurrence.
- "Translate" these operational risks into competency-based training needs, (e.g., by applying root cause analysis) to provide CBTA inputs for the training program improvement.

Furthermore, evidence from operational events can be mirrored by specific training events that may be integrated into future EBT modules, to allow a comparison of training and operational data.

To integrate safety event or report data into competency-based training, the classification and assessment steps of the ORCA process described in Chapter 2.8 should be used when analyzing these data.

A strategy to mitigate the gap between competency-based training and event-driven operations/safety management could be the establishment of regular data sharing meetings ("evidence meetings") among all relevant operational and training stakeholders. These meetings are intended to perform Step 2 and Step 3 as mentioned above.

Operator sample for responsibilities regarding training system performance

The EBT system performance is measured and evaluated. Training System Performance is monitored during Evidence Meetings.

The objectives of Evidence Meetings are to:

- Identify trends and ensure corrective action where necessary
- Identify collective training needs
- Review, adjust and continuously improve the training program
- Gain feedback from technical ground training (including Safety and Emergency Procedures [SEP])
- Further develop the training system

Evidence Meeting	Nominated Person "Crew Training", Training Manager (TM), Head of Cabin Crew Training, Safety, Security & CRM Training, Representative of Flight Safety Department, Fleet Representatives, EBT Managers, Data Analyst	2/year

Training effectiveness may also be deducted from examining first look (first attempt) results of specific training events (using level 3 metrics, as specified in Step 12 and comparing them with the prevalence of those events in line operations. TCAS events during the EBT session may serve as an example. These events are well comparable with the ones gathered by the safety department.

An "event-evaluation" during the EVAL, or at the beginning of the MT phase, shows whether the effectiveness of the training system is robust enough to keep the level of performance from one training session to the next. Thus, it can be concluded that the line operation (in between the training sessions) is performed at the same level of performance.

Additionally, data gained from the outer loop might be used to benchmark the training system's performance. Many opportunities to share relevant operational and training data between organizations exist but the relevance of data from other operators depends on the similarity of aircraft types, destinations, training programs and other factors. While other organizations' data may be valuable, a cautious approach should be taken not to drive the training program too extensively based on such external data.

Data protection

Whatever data concerned, handling of any data, its protection, transfer, and storage needs to be regulated, as well as data ownership, data identification, and de–identification. Moreover, as training data is part of the safety data within the SMS, the relevant protection requirements apply to both safety and training data.

The objective of protecting the EBT data is to avoid its inappropriate usage, in order to ensure the continued availability of such data to maintain and improve pilot competencies.

Identifying specific sets of data considered suitable, as well as their source and purpose for collection, requires considering existing agreements, or may lead to the development of particular agreements between aircraft operators, pilot representatives, ATOs and regulators or other stakeholders.

European EBT regulations require, and IATA recommends, an operator data access and security policy (including a procedure to prevent disclosure of crew identity), which should:

(a) Restrict information access to authorized persons

(b) Include the measures to ensure the security of the data (e.g., information security standard)

(c) Be agreed by all parties involved (airline management and flight crew member representatives nominated either by the union or the flight crew themselves)

(d) Be in line with the organization's safety policy in order not to make available, or not to make use, of the EBT data to attribute blame or liability

The operator may integrate the security policy within other management systems already in place (e.g., information security management).

Step 14: Continuous improvement of the training program

Description: The Nominated Person Crew Training, supported by the training managers, ensures that the training system performance measurement results in a continuous improvement of the EBT program.

As indicated in the previous steps, the EBT program should be reviewed periodically and potential changes considered, based on internal or external safety and/or training data. EBT modules are built on data gathered in previous modules, authority approval-required content from a predefined compliance matrix, and inputs from stakeholders such as operations and safety departments.

The training system feedback process may highlight areas for particular focus during the adaptation of the EBT program.

In this context, triggers for a change of elements are set based on the analysis of data. An authority-approved compliance matrix and training data collected thus lead from one training module to another. Grades achieved by trainees propose a performance-corresponding adaption of training elements within the compliance matrix, leading to an increase in competency and safety.

If overall and individual grades expose areas in need of improvement, EBT offers the possibility for these areas to be put in focus in the next program module. If certain competencies, e.g., Workload Management (WLM) show a decay after phases of inactivity, such as during the COVID pandemic, these competencies can be specifically addressed in the next session or the next training module.

While overall trends lead to changes in general program content, individual results will lead to tailored assistance, both backed by data.

Data reflecting each individual trainee's progress helps identify individual training needs, which can then be addressed in a further training event. The evaluation of a trainee's individual level of competency leads to facilitated debriefings, which then lay the foundations for tailored briefings for the consecutive lesson and consequently lead to the development of the competencies concerned. Within the context of EBT, this can even incorporate previous experience made on any type at any time. It does not even require for the IE to have any personal knowledge of the trainee.

Mixed and baseline EBT programs

While mixed and baseline EBT programs do not require operator-specific modification of the EBT training topics and competencies, they do not relieve the operator from making use of inner loop data for the EBT program and from considering state safety recommendations, OEM guidance, etc.

Operator example for responsibilities regarding training program improvement

The nominated person "Crew Training" and his/her subdivisions ensure continual improvement of the training and evaluation program.

To achieve this goal, at least the following measures should be taken:

- Monitoring, recording and evaluation of results of successful and unsuccessful flight crew evaluations
- Monitoring of training deficiencies and evaluation trends (simulator, aircraft and line operations)
- Monitoring of internal reports containing feedback, either received by flight reports or other means

Furthermore, the nominated person "Crew Training" shall ensure, that formal and regular communication occurs between and among management, instructors, examiners and pilots to achieve continual improvement of ground, simulator and aircraft training.
When information on necessary improvements is received, the revision process should be initiated.

Care should be exercised if deviations from the recommended priorities or frequency are made. Data analyzed during the creation of EBT was considerable and encompassed a wide range of types of operation. The priorities indicated in the assessment and training topic matrix were created with a careful analysis and should only be adjusted when there is compelling data indicating the need for a deviation.

Development of an enhanced EBT program

An enhanced EBT program is an EBT program where the assessment and training topics matrix contained in Appendix G.IV is adapted. Adaptation may be necessary to:

- Mitigate a specific operational risk identified by the Authority, operator or OEM
- Maintain the suitability of the EBT program

Any adaptation must be approved by the CAA, and duly sustained by a safety case.

Enhanced EBT program development requires the determination of results from the analysis of data in order to develop training scenarios and the identification of the competencies of special emphasis for the management of these scenarios.

In addition to the baseline EBT program, the information and data used to create the training scenarios should be derived according to the principles laid out in the previous steps of this Section.

One method to perform the development of the enhanced EBT program may be:

(a) Completion of the steps required in 3.1.

(b) Identification of threats and errors to be considered in a risk and training analysis.

(c) Execution of a risk and training analysis, as described in the Data Report for Evidence-Based Training.

(d) Development of the training guidance: This can include all threats and errors listed in the risk and training analysis; for each training maneuver or scenario, measurable performance criteria for the

competencies should be defined; each training maneuver and scenario should have appended to it the competencies of special emphasis to its management; and

(e) Definition of the enhanced EBT program: This includes the outline guidance for the training programs and the assessment of trainee performance, in addition to information for instructors conducting the training; it is assumed that the training and assessment described will be conducted in an FSTD qualified to ICAO Level VII according to the *Manual of Criteria for the Qualification of Flight Simulation Training Devices* (Doc 9625), Volume I – Aeroplanes.

On completion of program implementation, all available measurement and tracking tools should continue to be utilized to chart enhancements and degradations in pilot performance and the deployment of competence. These tools also can be utilized to facilitate further program development and customization.

Step 15: EBT IE recurrent standardization and ICAP

Description: The IEs complete annual recurrent standardization to continuously enhance the IEs competence to conduct EBT and to ensure the consistency of instructor assessments.

IE recurrent standardization

The EBT IE recurrent standardization should be a combination of the following:

- Essential CBTA components that should be stable over time (e.g., role of competencies within the TEM model, competency assessment process, etc.), and that are already available in the initial standardization
- Updated components that are not stable over time because they are the result of previous course delivery evaluation and/or training data analysis

Specifically, the evaluation of the EBT IE standardization and the training metrics related to the IE's assessment should be analyzed to place emphasis on the relevant IEs competencies during the recurrent standardization.

At regular intervals, not to exceed three years, the IE should undergo a recurrent assessment of competence, conducted during the delivery of a practical EBT session.

The EBT IE recurrent standardization should also ensure the consistency of the IE's assessment. This relates to following concepts.

Instructor-rater reliability

Instructor inter-rater reliability (IRR) describes the degree of agreement, consensus, or homogeneity between raters. The term inter-rater reliability can be used interchangeably with the term "concordance".

Note: *While inter-rater reliability is the common terminology in statistics and academia, concordance has recently become more prevalent in European EBT literature.*

The importance of instructor inter-rater reliability has been widely emphasized in the industry. Strong inter-rater reliability is a prerequisite for high training data quality and further safeguards the accuracy of assessments, which allows for training data to be meaningfully interpreted and performance trends to be derived over time.

Poor inter-rater reliability is an indicator for the training management to:

- Initiate remedial actions in order to increase training data quality
- Interpret any current EBT findings with caution

To ensure the data integrity for IE concordance, the operator should maintain data traceability for each group of IEs (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 is different. It may be necessary to apply the same principles to other groups (e.g., mature versus young IEs).

Assessment consistency

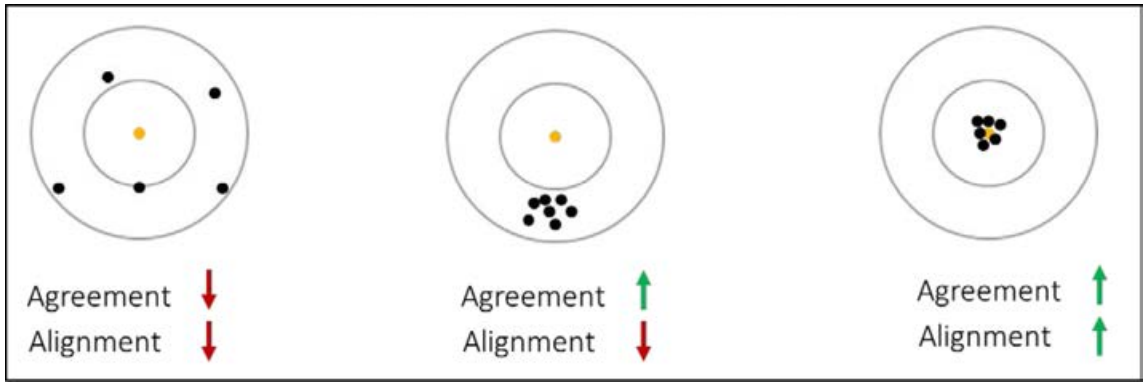
Consistency of assessments necessitates:

- An agreement between raters, and
- An alignment of the raters towards the same standard

While the former ensures that a group of several IEs reaches similar conclusions on an observed specific level of performance, the latter ensures that the IE group agreement is valid and aligned with the operator standard of reference defined for this specific level of performance.

The examples below provide an illustration of IEs' agreement and alignment.

Note: *The center of the target (yellow dot) represents the operator's standard of reference defined by the organization. The black dots represent the IEs' individual assessment regarding the observed level of performance.*



- The example on the left indicates that IEs do not agree on the level of performance observed. In this case, the IEs' assessments are scattered across several different levels of performance which are not aligned with the standard defined by the organization.
- The example in the center shows high agreement, with individual IEs assessing the specific level of performance that they observed similarly. They are, however, not aligned with the operator's standard of reference (the assessment reported by the IEs group is either higher or lower compared to the standard).
- The example on the right illustrates the IEs group agreement on the observed specific level of performance and alignment with the operator's standard of reference for the specific level of performance. This situation illustrates high IRR and represents one of the aims of the EBT IE standardization.

Additional training to the entire IE community or individual IEs should be provided if either agreement or alignment are found to be weak for one or more competencies.

Instructor Concordance Assurance Program (ICAP)

In the context of the global expansion of CBTA, including EBT, training data has become an essential source of information for the SMS. As the accuracy and correctness of the training data are fundamental aspects for an effective SMS, and as today the training data is mainly collected by an instructor, several regulators moving to EBT recommend that AOCs/ATOs delivering EBT measure and assure instructor assessment consistency, which in Europe is called "Instructor Concordance Assurance Program" (ICAP).

The role of an ICAP is to ensure that all EBT IEs are properly qualified to perform their tasks by using appropriate metrics. In particular, the ICAP training data analysis should indicate the IE-group assessment homogeneity (agreement) and the IE assessment accuracy (alignment).

The ICAP should be able to identify areas of weak inter-rater reliability to drive improvement in the reliability and validity of the assessments performed by the IEs.

Appendix I provides details on how to implement an ICAP.

Section 5 - IE Conduct of EBT

This section provides guidance for IEs on how to deliver an EBT module in an FSTD, and on facilitation as the preferred instructional method under this program.

Moreover, this section proposes a method to facilitate the OBs data collection, supporting the competency assessment and associated grading.

5.1 Briefing

5.1.1 Briefing objectives

In order to achieve the training objectives of each phase of the EBT module session, the IE should conduct a briefing to:

- Ensure that the pilots are in a conducive learning environment
- Understand the pilots' individual needs
- Ensure that the pilots have a clear mental picture about the training objective

The briefing contributes to the global training efficiencies by optimizing the resources (media, FSTD, ...).

Specifically, the IE should ensure that the pilots have a clear understanding of:

- The phase of the EBT module that is the purpose of the session: EVAL, MT, or SBT
- The training objectives related to each phase in terms of competency standard

5.1.2 Instructor Observable Behaviors (IOBs) demonstration during briefing

To sustain the briefing, the IE should demonstrate, among others, the following OBs:

- IOB 2.1 Applies TEM in the context of instruction/evaluation
- IOB 2.2 Briefs on safety procedures for situations that are likely to develop during instruction
- IOB 2.6 Briefs on training devices or aircraft limitations that may influence training, when applicable
- IOB 2.9 Manages time, training media and equipment to ensure that training objectives are met
- IOB 3.2 States clearly the objectives and clarifies roles for the training
- IOB 3.4 Applies instructional methods as appropriate
- IOB 3.6 Adapts the amount of instructor inputs to ensure that the training objectives are met
- IOB 3.8 Continuously assesses trainees' competencies
- IOB 3.12 Provides positive reinforcement
- IOB 4.3 Manages trainees' barriers to learning
- IOB 4.4 Encourages engagement and mutual support
- IOB 4.5 Coaches the trainees
- IOB 5.2 Ensures that the trainees understand the assessment process
- IOB 5.4 Assesses trainees' competencies

5.1.3 Recommended briefing sequence

The following guideline for CBTA training events was developed by IATA experts, which may be adopted and used for EBT training events.

Recommended BRIEFING sequence for CBTA including EBT training events	
Introduction	– Health and safety – If applicable, open questions from previous training sessions – General overview of the training event
Training Objectives	– Which competencies are to be trained? – Which training topics/tasks/events are chosen to train the competencies, why are they suitable? – Which level of performance is expected (or what the trainee should be able to do at the end of the training event)? – Which conditions apply for the training? ○ Operational and environmental context ○ Tools, systems, equipment (Aircraft/FSTD, Manuals, e-tools, etc.) ○ Level of support provided by the instructor
TEM focus in accordance with training objectives (selection of task/ event)	– Which *threats* can be anticipated, based on the operational/environmental context? – Which common *errors* could happen during the training? – Which potential *reductions of safety margins* could develop from the mismanagement of threats and errors? – Which competencies and OBs are critical to manage the expected threats and common errors and to recover from potential reduction of safety margins?
Human factors/ resilience	– Where necessary, discuss strategies to absorb and adapt to disruptions.
Detailed tasks analysis	– Discuss, if needed: flight profile, maneuvers/air exercises, procedures, technical aspects, conditions, flight parameters, …
Summary	– Summarize the key aspects with confirmation of trainees' understanding
Feedback	– Ask for feedback regarding the briefing content

5.2 FSTD training

Once EBT is implemented, the pilots are provided with focused opportunities to practice procedures under normal, abnormal, and training conditions. Pilots, through normal procedures, are provided with the opportunity to practice specific behaviors every time they fly. This promotes the development of competencies that an operator has identified as essential for good performance within its operational environment. In addition, pilots are provided with the opportunity to practice good behaviors under emergency and abnormal conditions when undergoing EBT training in an FSTD.

IEs should balance their attention between both PF and PM roles and maximize learning opportunities, which are often revealed when both pilots are busy with particular tasks, sometimes to the exclusion of effective flight path monitoring.

As a reminder from Section 4, Step 3, the template below proposes the potential instructional methods to be applied by the IE during an EBT module.

EBT Module Phase	Evaluation Phase (EVAL)	Training Phases (MT / SBT)
Level of support from the IE	N/A	Low to High
Instructional Method	The IE provides guidance for the conduct of the flight profile of the EVAL	All instructional methods depending on the pilot's needs

5.2.1 Evaluation (EVAL) phase

The purpose of the EVAL phase is to:

- Observe and assess pilot competencies
- Collect data to further develop and validate the effectiveness of the training system, and
- Identify individual training needs

IEs should be assigned to carry out assessments to determine that all required competency standards have been achieved. On completion of the EVAL any areas that do not meet the required competency standard should become the primary focus of subsequent training. When the required competency standard has been demonstrated across all the competencies, the IE should select the competency(ies) to be further developed to achieve the highest level of performance.

During the EVAL of the session, the IE should not give any instruction to the pilots or interrupt. Instead, the IE should focus on observation, running the scenario and playing the role of external parties (ATC, cabin crew, etc.) where necessary.

If the IE must intervene, the effect of this intervention on the pilot's performance should be taken into account.

5.2.2 Maneuvers Training (MT) Phase

The purpose of the MT is to practice and develop the handling skills necessary to fly critical flight maneuvers and associated procedures, according to predetermined performance criteria established by the operator or training organization. Flight path control may be accomplished by a variety of means, including manual aircraft control and the use of auto flight systems.

The MT, as a separate phase, allows training to be accomplished with greater efficiency. It does not consist of LOFT-style training but allows the time to practice and improve performance in motor skill-based exercises.

The IE should behave as an active trainer, utilizing learning opportunities whilst ensuring that the desired level of competency is achieved.

Experience has demonstrated that frequent repositions during MT are often criticized by IEs and pilots. Therefore, sufficient time and standardized processes (e.g., responsibilities for aircraft system/configuration changes, requirements to brief the new position/condition and next maneuver) should be promulgated for the IEs and pilots to accommodate with the frequent repositioning imposed by the MT phase.

5.2.3 Scenario-Based Training (SBT) Phase

The purpose of the SBT is to develop the competencies for effective management of threats and errors to enhance the pilots' ability to cope with both predictable and unforeseen situations.

The IE should choose scenarios or scenario elements that focus on specific competencies, based on the competency-specific performance observed during the EVAL phase. These options should be integrated by module design, as indicated in Section 4, Step 10: Module design.

Operator example for competency-specific scenario options

Focus competency map			SBT 1			SBT 2			SBT 3			SBT 4
			a	b	c	a	b	c	a	b	c	all options
0	KNO	Application of Knowledge	X	X	X	X	X	X	X	X	X	X
1	PRO	Procedure Application and Compliance			X						X	X
2	COM	Communication		X					X			X
3	FPA	Flight Path Management – Automation				X	X	X				
4	FPM	Flight Path Management – Manual	X	X	X						X	X
5	LTW	Leadership and Teamwork	X						X			
6	PSD	Problem Solving and Decision Making				X			X			
7	SAW	Situation Awareness & Information Mgmt.					X					X
8	WLM	Workload Management	X							X		X

Note: Application of Knowledge (KNO) as underlying competency is required for all scenarios and will be considered especially during briefing/debriefing.

Note: The scenario outlines contain references to OBs. These references are created from a course design perspective and are not intended for use as checklist items. Observation and assessment of other OBs of the same or other competencies are specifically **not** excluded.

In contrast to the EVAL, during the SBT the IE should intervene or interrupt where necessary to enable the development of the pilots' competencies or enhance the learning experience.

5.3 Observable Behavior (OB) collection

The following paragraphs elaborate on the value of the collection and analysis of the level 2 grading metrics for any CBTA program, including EBT, as many organizations are considering different options for the IE to effectively collect the OBs.

The importance of the OB collection relates directly to:

- The competency assessment process, which mandates that the instructor observes, records, and classifies the OBs
- The competency assessment which is the combination of the number of OBs demonstrated and their frequency of demonstration and the consequential outcome of the TEM

  Therefore, many organizations are discussing specifically the two following options:

  1. Systematically collecting the OBs demonstrated when required
  2. Systematically collecting the OBs that have not been demonstrated when required

  Both options, 1) and 2), are relevant as they sustain:
- The goal of any CBTA program, including EBT, and the general competency assessment principles
- The achievement of CBTA/EBT benefits by **encouraging and enabling** individual aviation professionals to reach their highest level of operational capability
- The assessment method by **motivating** the trainees and **identifying strengths** and **weakness** (**identifying gaps** as learning opportunities)

5.3.1 OB collection options and volume of data

Options 1) and 2) must also be challenged by assessing the volume of OBs to be collected by the IE conducting the training.

It is reasonable to assume that the majority (# 80%) of the competency assessments would conclude to the demonstration of an adequate or an effective level of performance, while a minority (# 20%) of the assessments would conclude to a low (minimum acceptable or ineffective) or high (exemplary) level of performance.

Option 1) systematically collecting the OBs demonstrated when required, imposes the collection of many, most or all the OBs for any performance level above adequate. This situation concerning approximately 80% or more of the competency assessment is not manageable by the IE and the value of further analysis taking into consideration such volumes remains doubtful.

Option 2) systematically collecting the OBs that have not been demonstrated when required (the so called "missing" OBs), imposes the collection of many or most of the OBs for any performance below adequate. This situation, which represents approximately 20% or less of the competency assessment is manageable by the IE, and the value of the analysis is obvious as it supports the implementation of remedial actions to recover an adequate level of performance.

The following template illustrates the volume of OBs to be collected for options 1) ["demonstrated" OBs column] and option 2) ["missing" OBs column] based on a realistic assumption. The blue and red rectangles indicate the level of performance mandating numerous OBs collection depending on the option.

Performance Levels	Corresponding Grades	"Demonstrated" OBs Collection (at a minimum)	"Missing" OBs Collection (at a maximum)	% of the population (e.g.)
Exemplary	5	all	none	# 5 %
Effective	4	Most	Few	#40%
Adequate	3	Many	Some	#40%
Mini acceptable	2	Some	Many	#10%
Ineffective	1	Few	Most	# 5 %

5.3.2 Third option for OB collection

This paragraph elaborates on a third option, which applies the concept of special emphasis by identifying the critical OBs that sustain the different levels of performance.

As a reminder, the competency assessment is the combination of the number (how many dimension) of OBs demonstrated and their frequency of demonstration (how often dimension) and the consequential outcome of the Threat and Error Management (outcome of TEM dimension).

Experience has shown that the demonstration of:

- Adequate and above performance is always the result of the regular (or more) demonstration of the required OBs, and
- Below adequate performance is often the result of the regular non demonstration of the required OBs, and/or the punctual non-demonstration of specific OBs that have a direct impact on safety (e.g., non-demonstration of OB 5.10 Applies effective intervention strategies to resolve identified deviations, when required)

In this context, the third option for OB collection would be that the IE identifies the OBs that have been critical to justify the level of performance.

In the case of the adequate and above performance, the IE would select the OBs that have been demonstrated the most frequently.

In the case of below adequate performance, the IE would select the OBs that have been "missing" most frequently and/or the specific "missing" OBs that have led to any safety margin reduction.

The IE should identify those critical OBs during the classification stage of the competency assessment process.

The value of the identification of the critical OBs sustaining the level of performance is the following:

- For the training managers, in the case of weak performance, it permits to implement effective and efficient remedial actions by having visibility on the "missing" OBs that must be trained to recover an adequate level of performance.
- For the training managers, in the case of adequate and above performance, it permits to identify the trainees that have the prerequisites for specific upgrades or duties (e.g., the training department looking for line instructors would favor the captains that demonstrate regularly and most frequently certain OBs from the competency Workload Management).
- For the instructor and for any performance, it permits to sustain the debriefing of the session and to provide actionable, potential subsequent solutions. Additionally, it permits to justify a consistent rational for any level of performance and subsequent grading.
- For the trainees and for any performance, it permits to have clear visibility on their strengths and weaknesses.

The following template illustrates the proposed third option for OB collection, which ensures a consistent application of the CBTA principles and provides most relevant data to the organization, while placing a reasonable level of effort on the instructor population.

Performance Levels	Corresponding Grades	"Demonstrated" OBs Collection (at a minimum)	"Missing" OBs Collection (at a maximum)	% of the population (e.g.)
Exemplary	5	all	none	# 5 %
Effective	4	Most	Few	#40%
Adequate	3	Many	Some	#40%
Mini acceptable	2	Some	Many	#10%
Ineffective	1	Few	Most	# 5 %

Record the critical OBs that have sustained adequate and above performance

Record the critical OBs that are necessary to recover adequate performance

5.3.3 Conclusion

As the training data that sustains the competency assessment and further enhancement of any CBTA program, including EBT, is essentially based on the OBs metrics, each organization should define a policy regarding the management of the CBTA training data and associated procedures for the collection and recording of the OBs.

Both, options 1) and 2), which propose a systematic demonstrated or missing OB collection, have limitations. Option 1) to systematically collect the OBs demonstrated when they were required is not manageable by the IE, due to the volume of data to manipulate. Option 2), to systematically collect the OBs that have not been demonstrated when they were required, is manageable by the IE in terms of volume of data but could discourage the trainee on the long run by illustrating exclusively what has been missing.

The third option, which applies the concept of special emphasis to record OBs that have been critical for the achievement of the different levels of performance, could be a way forward as it motivates the trainee by identifying both strengths and weakness, while encouraging and enabling pilots and IEs to reach their highest level of operational capability.

5.4 Debriefing

5.4.1 Debriefing objectives

The objectives of the debriefing are:

- To state whether the trainees have achieved the training objectives
- To ensure that the trainees are aware of their own performance
- To formalize the level of performance achieved by the trainees
- To ensure that the trainees have the means to improve their performance

The debriefing is also the opportunity for the IE to get direct feedback from the trainees about their performance.

Reflecting on performance throughout an EBT module is key to the development of the pilots. Reflection during the debrief empowers and encourages the trainees to reflect on the lessons learned once away from the training facility.

During a debrief, the pilots are encouraged to practice competency-based self-assessment (root cause analysis) and to deconstruct their actions to better understand their performance. It is important to emphasize why good performance has been demonstrated, so that the behaviors may be engrained and repeated. Too often the IE tends to take positive outcomes for granted and concentrate on the negative outcomes or on any area that needs improvement. In case of weak performance, the IE should commit the trainee to identify:

- The contributing factors to the poor performance
- The solution to better perform in the future

The debriefing should be competency-based, objective/factual, comprehensive (leaving no doubt to the outcome or what happened), prioritized (importance of what occurred, not when it occurred). There can be no doubt that the real effectiveness of training is in the reflection phase afterwards.

EBT sessions should provide for adequate time to be directed towards assimilation of the lessons learned, and adjustment of strategies, actions or processes prior to Session 2, and at the conclusion of the module.

The overall goal of the debrief is that pilots understand their performance and gain confidence in their abilities.

5.4.2 Debriefing elements

The debriefing should comprise a fair and unbiased review based on observed behaviors and facts. A debriefing is successful if the pilots have a clear understanding of their performance, particularly in areas that can be improved.

The debriefing should be a facilitated discussion where pilots should be encouraged to assess themselves.

The IE provides feedback to the flight crew to encourage the changes needed and provides specific recommendations to improve individual pilot's performance.

In CBTA programs, the focus during debriefings changes from analyzing tasks/events to competencies. The IE should facilitate the trainees' performance self-assessment. IEs should adapt their facilitation approach to focus on questions related to the competencies, such as:

- "How good was your manual flying (FPM)?" - "How good was your Situation Awareness (SAW)?" Which, for example, would be followed by "How did this affect your XYZ-recovery?"
- "How well did you apply your procedures (PRO)?" - "Which non-normal maneuver was especially difficult?" - "Why?" - "What could you have done to make it less difficult?"
- "How effective was your Workload Management (WLM)?" - "Which event was most challenging?"

The TEM model is a very effective tool during the debriefing for the pilots to better understand their performance in the operational context because the pilots apply their competencies to perform their tasks, and to manage the threats and errors in order to avoid undesired aircraft states.

Therefore, IEs are encouraged to use the TEM model to enhance the quality of the briefing and debriefing. During the briefing, IEs should ask the pilots which threats and errors they would expect, which undesired aircraft states could arise and, most important, which competencies they plan to apply/use, in order to maintain the safety margins in the given scenario. During the facilitated debriefing, pilots should reflect on how successful they were in applying their competencies as countermeasures and explore possibilities for optimization in future scenarios.

With the consent of the pilots, animated playback systems and videos can be used to target and develop competencies and understand individual and flight crew performance. Once the debriefing is completed, the videos or playback systems data should be erased unless the participants agree to the contrary.

5.4.3 Instructor Observable Behaviors (IOBs) demonstration during debriefing

To sustain the debriefing, the IE should demonstrate, among others, the following OBs:

- IOB 3.8 Continuously assesses trainee's competencies
- IOB 3.9 Encourages the trainee to self-assess
- IOB 3.11 Applies trainee-centered feedback techniques (e.g., facilitation, etc.)
- IOB 3.12 Provides positive reinforcement
- IOB 4.5 Coaches the trainees
- IOB 5.3 Applies the competency standards and conditions
- IOB 5.4 Assesses trainee's competencies
- IOB 5.5 Performs grading
- IOB 5.6 Provides recommendations based on the outcome of the assessment
- IOB 5.7 Makes decisions based on the outcome of the summative assessment
- IOB 5.8 Provides clear feedback to the trainee

5.4.4 Debriefing sequence

The debriefing should commence with a statement as to whether the phase has been successfully completed, or if additional training is required. The IE should state the reason for additional training required and the effect on their pilot privileges.

Note: The grading should be done after the facilitated debriefing.

The following guideline for CBTA training events was developed by IATA experts, which may be adopted and used for EBT training events:

Recommended DEBRIEFING sequence for CBTA training events	
Introduction	– State if the training objectives were achieved or not – State the debriefing agenda and set time limits – Solicit topics the trainees would like to cover during the de-briefing
Trainee's self-assessment	– Review the *competencies* stated in the training objectives and ask the trainees to self-assess their performance (you may begin with LTW); focus on the positive
Facilitated debriefing	– *Replay*: Let the trainees tell how the training event went and whether there were any problems: ○ Select suitable tasks/events/occurrences of the lesson to illustrate how well the trainees performed (OBs) in the relevant competencies – *Reconstruct*: Let the trainees tell why they have done something in a certain way: ○ Use the experienced threats, potential errors and reduction of safety margins to discuss which competencies and OBs have been applied for the TEM ○ Discuss resilience aspects, ask which behavior helped maintain or restore the safety margins after disruptions during the lesson – *Reflect*: Involve the trainees in the learning process by having them reflect on what they have learned: ○ Ask: What did you learn? What could you have done differently? ...) – *Redirect*: Commit the trainees to consider the future application of their training experience: ○ Ask: What can you do with the experience gained during this training, what would you do differently in the future? ...) ○ Where necessary, provide recommendations for improvement ○ Summarize by highlighting "lessons learned" and emphasizing the positive Note: • Avoid detailed discussions about all competencies and events, focus on key behaviors • Ensure that all trainees actively participate and receive specific feedback on their performance • Exercise patience, and do not be reluctant to probe into key areas where individual and/or trainee improvement is needed
Summary	– Summarize the key learning points and recommendations to the trainees – Look ahead, what are the training objectives for the next few sessions, assign any study items in preparation
Feedback	– Ask for feedback regarding lesson design and performance of the instructor

5.5 Competency Assessment and associated Grading

The content of this chapter is applicable to the pilot and to the IE competency assessment.

IATA provides more details in the guidance material: Competency Assessment and Evaluation for Pilots, Instructors and Evaluators.

5.5.1 Principles

The following principles should be implemented and monitored by the AOC or the ATO to ensure the effectiveness of the EBT program. The statements in bold are key elements for the IE's initial and recurrent standardization and for the continuous monitoring of the IE's performance.

- Clear performance criteria are used to assess competence. The adapted competency model establishes these performance criteria.
- An integrated performance of the competencies is observed. The pilot undergoing assessment must demonstrate all competencies and their seamless interaction with each other.
- **Multiple observations are undertaken**. To determine whether or not a pilot has achieved the interim and/or final competency standard, multiple observations must be carried out.

- **Assessments are valid**. All competencies that comprise the adapted competency model must be assessed. **There must be sufficient evidence** to ensure that the pilot achieves the competency and meets the interim and/or final competency standard.
- **Assessments are reliable**. All IEs should reach the same conclusion when performing an assessment. All IEs should be trained and monitored to achieve and maintain an acceptable level of inter-rater reliability.

5.5.2 Process

To assess the pilot's performance, the IE should apply the following process:

- **Observe** performance (behaviors) during the training or evaluation.
- **Record** details of effective and ineffective performance (behaviors) observed during the training or evaluation ("record" in this context refers to the IE taking notes).
- **Classify** observations against the OBs and allocate the OBs to each competency (or competencies).
- **Assess** the performance by determining the root cause(s) for low and high performance according to the competency framework. Low performance would normally indicate the area of performance to be remediated in subsequent training.

The assessment should be accomplished by relating the observed pilot's behavior to the competencies outlined in Appendix B. The determination of the pilots' performance should be made solely with reference to defined standards established by the operator or training organization.

Note: *Depending on the training objective, the IE guidance may indicate competencies which may be irrelevant to be assessed or recorded. In that case, the IE will record "N/O" (not observable).*

When transitioning to CBTA/EBT, IEs need to recognize that there is no continuous summative assessment during an EBT module. The focus needs to shift away from constant evaluation. EBT involves observing, recording, classifying, and assessing the pilot's performance over the complete session and not evaluating each event; 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.

5.5.3 Method

IATA recommends applying the following methodology to ensure the maximum level of consistency and objectivity to assessments performed in a CBTA program.

To assess how well the pilot demonstrated the competency during training or evaluation, the IE should assess the associated OBs of each competency against the following dimensions, by determining:

- How many OBs the trainee demonstrated when they were required
- How often the trainee demonstrated the OB(s) when they were required
- What was the outcome of the threat management and error management relating specifically to the competency being assessed

The competency assessment (HOW WELL) is the combination of the number of OBs demonstrated and their frequency of demonstration and the consequential outcome of the TEM relating specifically to the competency being assessed.

- The "HOW MANY" dimension provides evidence related to the acquisition of the competency
- The "HOW OFTEN" dimension provides evidence related to the robustness of the competency
- The "Outcome of TEM" dimension provides evidence related to the effectiveness of the competency as individual and team countermeasure against the threats and errors

Word Pictures of "HOW MANY" dimension

The following word pictures support the competency assessment methodology by providing a scale for the "**HOW MANY**" dimension regarding a number of OBs demonstrated when required:

HOW MANY
few, hardly any
some
many
most
all, almost all

Word Pictures of "HOW OFTEN" dimension

The following word pictures support the competency assessment methodology by providing a scale for the "**HOW OFTEN**" dimension regarding a frequency of OBs demonstrated when required:

HOW OFTEN
rarely
occasionally
regularly
regularly*
Always, almost always

regularly* This regularly* is interpreted as very often

Word Pictures of "OUTCOME of TEM" dimension

The following word pictures support the competency assessment methodology by providing a scale for the "**Outcome of TEM**" dimension relating specifically to the competency being assessed:

OUTCOME of TEM relating specifically to the competency being assessed	The demonstrated Observable Behaviors relating specifically to the competency being assessed
unsafe situation	❑ Did not allow a timely management of the threats or errors ❑ This led to (or could have led to**) an unacceptable reduction of the safety margin.
not an unsafe situation	❑ Did not allow, on few occasions, a timely management of the threats or errors ❑ This led to (or could have led to**) a limited and momentary reduction of the safety margin.
safe	❑ Allowed the anticipation and mitigation of many expected threats, the recognition and mitigation of the unexpected threats and the timely detection and correction of the errors. ❑ This led to (or could have led to**) the maintenance of the safety margin.
safe*	❑ Allowed the anticipation and mitigation of most expected threats, the recognition and mitigation of the unexpected threats and the promptly detection and correction of the errors. ❑ This led to (or could have led to**) an improvement of the safety margin.
enhance safety	❑ Allowed the anticipation and mitigation of all expected threats, the recognition and mitigation of the unexpected threats and the immediate detection and correction of the errors. ❑ This led to (or could have led to**) an enhancement of the safety margin.

Note:

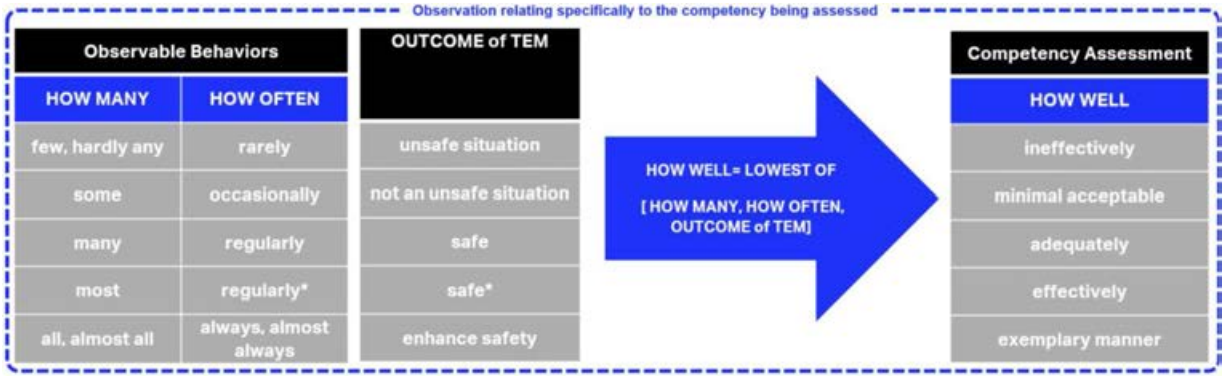
- **safe***: This word picture (safe*) illustrates a more pro-active safety level.
- **or could have led to**** must be used to:
  - Integrate the outcome of TEM dimension when the conditions of training are significantly limited, e.g., classroom, part task trainer, …

– Ensure that the OUTCOME of TEM dimension relates specifically to the competency being assessed

During the competency assessment, the TEM model assists the IE understand the interrelationship between safety and the trainee's performance in dynamic and challenging operational contexts.

5.5.4 Competency Assessment: Abbreviated word pictures

The competency assessment is illustrated by the **"HOW WELL"** terminology, which reflects the lowest level of each dimension (**"HOW MANY"** - **"HOW OFTEN"** - **"OUTCOME of TEM"**).

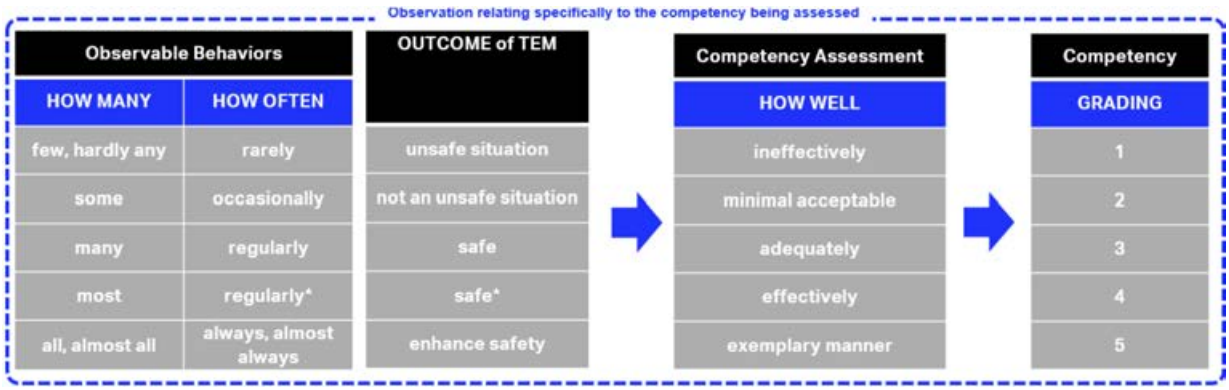


5.5.5 Grading

Definition and Process

Grading means that the IEs allocate a number to the performance achieved by the pilot during the competency assessment, relating specifically to the competency being assessed. The aim of the grading is to facilitate a harmonized and consistent training data analysis.

Therefore, IEs should consider grading as a method to collect training data, not as a means to provide feedback to the trainees.



When and which level to grade

In an EBT module, formative and summative assessments are performed. However, there is a distinction between assessments within mixed EBT implementation and baseline EBT:

- In mixed EBT, the license is revalidated after the EVAL and MV phases of the module. The outcome of Session 1 is therefore a PASS/FAIL decision of the IE regarding the proficiency check. Generally, flight tolerances are still the regulatory benchmark. However, the pilot's competency grades also serve as a formative assessment because they form the basis for the subsequent training during the SBT phase.

- In baseline EBT, formative assessments are performed during the entire module, with summative assessment(s) as defined by the operator and/or the authority. IATA recommends a summative assessment at the end of the EBT module.

The following templates provide recommendations regarding the training data (metrics) to be collected and the level of performance to be achieved. The templates indicate the type of assessment (formative or summative, as described in Chapter 2.8.1) depending on the organization of the EBT modules.

- Option 1 illustrates the IATA recommendation where the EBT module is conducted during two consecutive days with the same IE.
- Option 2 illustrates an EBT module conducted during two non-consecutive days, which allows line operations between Session 1 and Session 2.

Option 1: EBT module conducted during two consecutive days by the same IE (IATA recommendation)

OPTION 1 – valid during mixed implementation				
	EVAL	**MV**	**SBT**	**Line operations**
Type of assessment	Formative	Formative	Summative	
Traditional proficiency check	PASS/FAIL			
Metrics to be collected	Level 0 Level 1 Level 2 Level 3	 Level 2 Level 3	Level 0 Level 1 Level 2 Level 3	
Required level of performance	Interim competency standard		Final competency standard	

OPTION 1 – valid during baseline EBT				
	EVAL	**MT**	**SBT**	**Line operations**
Type of assessment	Formative	Formative	Summative	
Metrics to be collected	 Level 1 Level 2 Level 3	 Level 2 Level 3	Level 0 Level 1 Level 2 Level 3	
Required level of performance	Interim competency standard		Final competency standard	

Option 2: EBT module conducted during two non-consecutive days allowing line operations between Session 1 (generally dedicated to EVAL and MT) and Session 2 (dedicated to SBT)

OPTION 2 – valid for all EBT stages				
	EVAL	**MT/MV**	**Line operations**	**SBT**
Type of assessment	Summative	Summative		Summative
Traditional proficiency check	PASS/FAIL			
Metrics to be collected	Level 0 Level 1 Level 2 Level 3	Level 0 Level 2 Level 3		Level 0 Level 1 Level 2 Level 3
Required level of performance	Final competency standard			Final competency standard

The essential differences between option 1 and option 2 are the following:

- Option 1 permits to define an interim competency standard that may be lower compared to the recommended final competency standard which is "adequate" (corresponding to a grade 3).

  Example: Under option 1, it is possible that the interim competency standard would be "minimal acceptable" (corresponding to a grade 2) for few competencies as the IE should further develop pilot competencies during the SBT phase up to the achievement of the final competency standard recommended to an "adequate level of performance" (corresponding to grade 3).
- Operators electing option 2 should define the interim competency standard to "adequate" (corresponding to grade 3), as the pilots are supposed to conduct line operations after the first session composed by the EVAL and the MT phases.
- Consequently, the type of assessment is also different depending on the chosen option: For option 1, a formative assessment is possible after the EVAL and MT phases as the same IE conducts the entire EBT module, while a summative assessment is mandatory for option 2 as the formalization of the pilot competence is necessary for the return to line operation.

Notes:

1. *During the MT/MV phase, only a limited number of competencies may be observed and graded. Therefore, no level 1 metrics are considered to be collected.*
2. *European EBT regulations for baseline EBT presently require that grades be determined during each EBT module as follows:*
   - *EVAL – overall performance of the phase for each competency at level 1 grading metrics.*
   - *MT – overall performance of the phase at level 0 grading metrics. When the phase is graded "not competent", it requires level 2 grading metrics.*
   - *SBT – overall performance of the phase for each competency at level 1 grading metrics, unless just culture and the necessary non-jeopardy environment during training may be compromised. In that case, level 0 grading metrics.*

Where any competency is graded below the minimum acceptable level of performance, additional level 2 grading metrics must be recorded.

5.6 Instructional methods

5.6.1 Instruction and level of support by the IE

In order to develop the pilots' competencies effectively, IEs use a variety of instructional methods. Curricula should contain guidance to match the training objectives with the optimum method of instruction.

IEs should master all available methods and should have the flexibility to select the most appropriate one to achieve the training objectives.

As indicated in 2.6.2, the conditions related to the amount of support or assistance a trainee can expect from the IE shall be defined for each training event as per ICAO provisions. Therefore, IATA recommends correlating the IE's level of support to recognized instructional technics.

The template below illustrates the allocation of three different levels of IE support (Low, Medium and High) to five instructional technics.

Instructional method	Description	Level of IE support
Demonstrate (Show)	The instructor or the training media performs or directs the execution of a task, procedure, or maneuver to the trainees. In addition, facilitation is used to verify knowledge and to check understanding. Trainees will demonstrate the acquisition of the competencies.	High
Explain (Tell)	The instructor, or the training media, provides information verbally to the trainees or (whenever facilitation seems not suitable in particular circumstances) recalls/reminds them of key points already acquired during the course. Questions are used to either establish current knowledge or to check understanding. Trainees will demonstrate the acquisition of the competencies.	High
Facilitate	Facilitation technique 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.	Variable, depending on the trainees needs
Discover with assistance	The instructor, or the training media, provides trainees with objectives and conditions. Using their existing competencies, trainees "figure out" appropriate solutions and means to achieve the objectives. The instructor intervenes only when necessary to ensure achievement of the objectives and to minimize inefficiency.	Medium
Discover without assistance	The instructor or the training media provides trainees with objectives and conditions. Using their existing competencies, trainees "figure out" appropriate solutions and means to achieve the objectives. The instructor or training media verifies the outcomes.	Low

During the training phases of an EBT module, the IE may assist the pilots in their competency development; however, during the EVAL phase and at the end of the module, the pilots should show the required level of performance without assistance from the IE.

5.6.2 Demonstrate/explain versus facilitate/discover

The following elaborates on the different instructional methods, why they are needed and guidance to apply them.

Facilitation means that trainees are given the opportunity to discover what they are doing and the effect it has on others and on the task, so that they can make the decision to alter their behavior or reinforce any positive behavior.

While the techniques with a high level of instructor support target a direct execution by the trainee, facilitation and discover trigger an indirect execution; the trainees are encouraged to finding their own solution and then to execute it. The better the instructional questioning and listening, the more effective the trainees' understanding, execution and retention.

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

- As an educational principle, any training that aims at attitude or behavioral change will be less effective through telling and explaining, than by enabling pilots to find out an adequate behavior themselves. CBTA extended the traditional training of aviation personnel beyond a pure task-based focus towards developing a set of technical and non-technical competencies. While technical competencies can be effectively trained by traditional techniques (show/tell/explain, etc.), the non-technical competencies (soft skills) are much better developed when the IE triggers the trainees' capacity for self-analysis, which allows the trainees to find the answers by themselves.
- Any training event should prepare and enable the trainees to self-assess their performance. This enables them to develop 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 IE being present.

- Facilitation during debriefing of a training event may support the instructor in the root cause analysis of certain outcomes of crew activity or behavior and to address the correct competencies. Such facilitation is particular useful if the instructor considers a variety of possible triggers for an observed crew behavior.

The facilitation technique is more effective than the showing and telling technique because the pilot's involvement and experiences are actually part of the learning process. Showing and telling complement facilitation if the trainees need more IE support to achieve the training objective(s).

The facilitation technique is not just for the poor performer or for the development of attitude but can be equally used to reinforce effective behavior because it gives trainees an understanding of why they are good, which encourages their continued development.

The first crucial prerequisite for effective facilitation is the IE's capability to model a desired output into questions and a dialogue to stimulate the trainees understanding and own commitment. The second prerequisite is to apply facilitation only with enough time to allow mental processing by the trainees. Therefore, facilitation should be the preferred technique during briefing and debriefing of a training event. During a training event the IE should control the session progress in a way that allows facilitation when feasible

The differences between the different instructional methods are highlighted in the following table.

	Demonstrate/Explain	Facilitate/Discover
How does the instructor communicate?	Telling, showing (demonstrating)	Enabling the pilots to find the solution by themselves
What is the aim?	Transfer knowledge and develop skills	Develop insight/self-analysis to find a solution or behavioral change
Who knows the subject?	Instructor	Both instructor and pilot
Who has the experience?	Instructor	Both instructor and pilot
What is the relationship?	Authoritarian	Equal
Who sets the agenda?	Instructor	Both instructor and pilot
Who talks the most?	Instructor	Pilot
What is the timescale?	Finite	Infinite
Where is the focus?	Instructor – task	Pilot – performance and behavior
What is the workload?	Moderate	High
What are instructors' thoughts?	Judgmental	Non-judgmental
How is progress evaluated?	Observation	Guided self-assessment

5.6.3 Facilitation skills

The various skills required to use facilitation as an effective instructional technique are as follows.

Questioning

Asking the right questions at the right time is a fundamental skill of facilitation and these are examples:

Type	Purpose	Response	Example
Open	To get a more accurate and fuller response.	Unknown but they will say more than a few words.	"What, when, why, where, who, how"
Closed	To check understanding and to control the discussion.	Can be "Yes", "No" or specific data.	"Did you, were you, had you"
Probing/ building	To obtain further information.	More in depth response.	"Tell me more, why was that, explain"
Summarizing	To confirm agreement.	Yes	"Is what you mean, have you agreed?"

Things to avoid in questioning:

- *Leading*, e.g., "Would you not agree that…?"
- *Multiple*, e.g., "What did you say next and what was displayed on the radar…?"
- *Rhetorical*, e.g., "You will remember what I am saying, won't you…?"
- *Ambiguous*, e.g., "How long was it before the leak started…?"

Active listening

It has often been said that hearing is done with the ears whereas listening is done with the mind. The term active listening means that a person concentrates carefully on what is being said, in order to fully understand the other person. LISTEN, the following mnemonic, helps to capture key points:

1. **L**ook interested
2. **I**nquire with questions
3. **S**tay on target
4. **T**est understanding
5. **E**valuate the message
6. **N**eutralize your thoughts, feelings and opinions

Body language

Reading body language and managing one's own body language are essential skills when facilitating. An instructor should know when a trainee is uncomfortable, confused, interested, distracted or bored. Furthermore, it is important that an instructor is able to manage his/her own body language so that it is congruent with what they are saying and so that the messages being transmitted are accurate and consistent.

Observation of behavior

The ability to observe and discuss behavior and attitudes rather than technical issues is an important skill that trainers need to develop to become effective at facilitation. It is not unusual for instructors who are not used to facilitation to feel a certain amount of embarrassment when first attempting this. As attitudes (as exhibited by behaviors) are a less precise competency to measure, there is no better way of demonstrating appropriate behavior than role-modeling. This is because the trainee can observe what this behavior is and experience the positive effects on themselves. Furthermore, in order to maintain credibility as an instructor, it is important that appropriate behavior is demonstrated as a form of role modeling.

Giving and receiving criticism

There may be occasions when it is appropriate and constructive to give trainees direct criticism, and this should be carefully handled. Similarly, an instructor should be able to receive criticism well, in order to develop.

Continuous development

In order to ensure continuous improvement in facilitation skills, the recommended method is to seek feedback from trainees. This must be done genuinely otherwise nothing useful may be gained. A measure of whether an instructor is doing this well is whether in fact any feedback is given.

Some advice for effective facilitation in a debriefing

Dos	Don'ts
– Give an introduction – Encourage self-analysis (research indicates that it is the best form of learning) – State that participation from the trainees is needed – Allow pilots to set the agenda order by asking: • Which parts of the session they want to discuss? • What went well? – Use open questions (who, where, when, what, why, how) – Deepen the discussion with supplementary questions – let them analyze – Ask what happened / why it happened / what could we improve on – listen and encourage – Use names, nods, smiles, eye contact – Sit forward to show interest – Use silence/pauses (sit back and allow them time to think for several seconds) – Mix instruction with facilitation for issues on which the trainees do not have the knowledge – Summarize the discussion to meet training aims	– Miss the introduction – it is the most common way to spoil facilitative training – Lecture – Use your chronological agenda – Short-change high performing crews with a quick debrief – Interrupt – Answer your own questions (if they don't reply, instead reword the question) – Just use question and answer – Do the thinking for them

Self-check
– Who is talking most – you or them? – Have you used at least two questions per issue (to deepen discussion)? – Are the pilots doing the analysis themselves? – Are the training points being covered? – Have the pilots spoken to each other? – Has positive behavior been reinforced?

Appendix A - Safety Risk Assessment (SRA) examples

This Appendix is intended to support operators implement EBT, Step 1: Implementation plan and safety risk assessment.

A.I Operator sample before start of mixed implementation (excerpt)

Ref	Identified Task	Task Frequency (select from drop-down list)	Hazard	Consequence	People/ Equipment at risk	Evaluate Existing Severity (select from drop-down list)	Evaluate Existing Probability (select from drop-down list)	Existing Risk Category Index (auto-calculates from sev & prob)	Existing controls	Enhanced Safety Risk Control & Mitigations	Enhanced Severity (select from drop-down list)	Enhanced Probability (select from drop-down list)	Enhanced Risk Category Index (auto-calculates from sev & prob)	Further action reqd by whom & when (see options list below)	Acceptance and implementation of enhanced Safety Risk Control & Mitigations	Documentation of Change Requirements
1	**Transition from 'OEM/Legacy' to Evidence Based Training (EBT) Transition Courses**	Low frequency (L)	**Hazard 1.** Errors or ommissions occur during move from pre-viously 'Original Equipment Manufacturer (OEM)'/Regulator constructed courses to an Evidence Based training (EBT)/ Emirates Airline constructed course.	**Hazard 1- Consequence 1.** Mandatory OEM or Regulator specified training event/item inadvertently om-mitted/removed from the new EBT course.	Course students	Major (C)	Improbable (2)	2C Review	Course construc-tion achieved drawing on existing course footprints. Mandatory training events/ items specified by either OEM or Regulator remain in place.	**Hazard 1- Consequence 1- Mitigation 1.** For each 'revised' course, a 'Delta' between course compared training items was constructed. These 'Deltas' were based on one of three parameters: 1. Any training event reduced in frequency from 'legacy' course. 2. Any training event moved to reduced fidelity Synthetic Training Device (STD) (ie. FFS to FBS). 3. Any training event potentially removed from the course. For all negative 'Delta' training events alling into any of the above categories, an individual Risk Assessment (RA) was conducted.	Minor (D)	Extremely Improbable (1)	1D Acceptable	Review of Course structure and con-tent due February 2018, in line with EBT Implementation Review.	Periodic (Six Monthly) Review required.	
2a	**Instructor Engagement**	High frequnecy (H)	**Hazard 1.** Training Department examiners and instructors fail to recognise and engage with Evidence Based Training concept and methodology.	**Hazard 1- Consequence 1.** Benefits and advantages of EBT 'competency based training' not realised.	Operating Flight Crews	Major (C)	Remote (3)	3C Review	Current Examiner/ Instructor 'Standardisation' meetings take place every 'Phase' (6mths). Training concepts and methodologies reviewed and discussed.	**Hazard 1- Consequence 1- Mitigation 1.** 'Trainer Refresher Seminar (TRS)' contributes to further 'standardisation' of instructors and allows further development and training of instuctors in respect of EBT programme. TRS occurs annually for all instructors.	Minor (D)	Improbable (2)	2D Acceptable	Ongoing (ie. annually) review of instructor training guidance and best practise.	Periodic (Six Monthly) Review required.	

Ref	Identified Task	Task Frequency (select from drop-down list)	Hazard	Consequence	People/ Equipment at risk	Evaluate Existing Severity (select from drop-down list)	Evaluate Existing Probability (select from drop-down list)	Existing Risk Category Index (auto-calculates from sev & prob)	Existing controls	Enhanced Safety Risk Control & Mitigations	Enhanced Severity (select from drop-down list)	Enhanced Probability (select from drop-down list)	Enhanced Risk Category Index (auto-calculates from sev & prob)	Further action reqd by whom & when (see options list below)	Acceptance and Implementation of enhanced Safety Risk Control & Mitigations	Documentation of Change Requirements
2b	As above	As above	As above	As above	As above	Major (C)	Remote (3)	3C Review	As above	**Hazard 1- Consequence 1- Mitigation 2.** Publication of the Emirates Flight Training - Evidence Based Training Instructors Handbook (Conversion and NaC Courses) is a comprehensive guide and reference document that provides a detailed approach to EBT and competency based training. It will be reviewed and revised as applicable.	Minor (D)	Improbable (2)	2D Acceptable	Ongoing (ie. annually) review of instructor training guidance and best practise.	Periodic (Annual) Review required.	
3a	**Technology**	Medium frequency (M)	**Hazard 1.** Training delivered on Synthetic Training Device will be at a different (previous or earlier) modification state to that on in service aircraft.	**Hazard 1- Consequence 1.** Flight Crews faced with unfamiliar or unseen systems or fault resolution issues, to that trained during transition course.	Flight Crews/In service aircraft.	Minor (D)	Reasonably Probable (4)	4D Review	Current transition course references OEM sourced technical data. Revisions and updates to STD are provided by STD OEM.	**Hazard 1- Consequence 1- Mitigation 1.** Difference between modification states of STD and aircraft have been identified and significance understood. Some STD updates will negate current STD/ aircraft delta. Alternative & additional training modules available to bridge gap where continued difference in STD and line aircraft may be experienced.	Minor (D)	Remote (3)	3D Review	Review of current STD standards and equivalent aircraft modification states	Review Required	
3b	As above	As above	As above	**Hazard 1- Consequence 2.** Instructor reference material unable to identify differences between STD and aircraft modification states.	Flight Crews/In service aircraft.	Minor (D)	Reasonably Probable (4)	4D Review	Current transition course references OEM sourced technical data. Revisions and updates to STD are provided by STD OEM.	**Hazard 1- Consequence 2- Mitigation 1.** Where differences in STD and aircraft modification states are identified in "1" above, additional training material required for delivery by instructor to trainees that details and highlights these differences.	Minor (D)	Remote (3)	3D Review	Review of current instructor provisioned training material and equivalent aircraft modification states	Review Required	

Ref	Identified Task	Task Frequency (select from drop-down list)	Hazard	Consequence	People/ Equipment at risk	Evaluate Existing Severity (select from drop-down list)	Evaluate Existing Probability (select from drop-down list)	Existing Risk Category Index (auto-calculates from sev & prob)	Existing controls	Enhanced Safety Risk Control & Mitigations	Enhanced Severity (select from drop-down list)	Enhanced Probability (select from drop-down list)	Enhanced Risk Category Index (auto-calculates from sev & prob)	Further action reqd by whom & when (see options list below)	Acceptance and Implementation of enhanced Safety Risk Control & Mitigations	Documentation of Change Requirements
3c	As above	As above	**Hazard 2.** EBT Concept identifies a Knowledge, Skill or Attitude (KSA) currently not supported by existing equipment.	**Hazard 2- Consequence 1.** Additional equipment required. Additional training resources required.	Flight Crews/In service aircraft.	Major (C)	Remote (3)	3C Review	Existing training profile and re-sourcing capable of adapting to training need.	**Hazard 2- Consequence 2- Mitigation 1.** Where revisions and developments to training programmes are identified, none have been the subject of 'immediate' implementation. As such, a period of transition and introduction is available to resource equipment, establish training expertese and roll out the revised/enhanced programme. (UPRT is a relevant example of such training equipment and training resource introduction).	Minor (D)	Improbable (2)	2D Acceptable	Continuous review and assessment of new and innovative training techniques and equipment will be required. This should be available within the Training Department.	Periodic (Six Monthly - TRC) Review required.	
4a	Organisation	Medium frequency (M)	**Hazard 1.** Emirates Airline is the industry 'lead' with respect to introduction and implementation of EBT in both Recurrent **and** Conversion Course methodology. Other organisations in the wider 'external environment' may not recognise and have the expertese to understand EBT methodology.	**Hazard 1- Consequence 1.** External (and Internal) Audit organisations may be unfamiliar with audit processes when measuring against an EBT profile.	Negligible	Minor (D)	Remote (3)	3D Review	Internal Audit Programme provides a Quality Compliance review and remains in place.	**Hazard 1- Consequence 1- Mitigation 1.** Relevant and focused training can be provided to both external and internal auditors, to ensure the elements of an EBT training programme are understood.	Minor (D)	Improbable (2)	2D Acceptable	Review of current STD internal and external audit standards and recommended practises would be required.	Periodic (Six Monthly) Review required.	Internal and external audit standards reviewed against current processes
4b	As above	As above	As above	As above	As above	Minor (D)	Remote (3)	3D Review	As above	**Hazard 1- Consequence 1- Mitigation 2.** IOSA Standards Manual (ISM) Edition 11, published September 2017 includes an Evidence Based Training (EBT) element and guidance material.	Minor (D)	Improbable (2)	2D Acceptable	Review of current STD internal and external audit standards and recommended practises would be required.	Periodic (Six Monthly) Review required.	Internal and external audit standards reviewed against current processes.
4c	As above	As above	**Hazard 2.** Emirates Airline 'corporate culture' is resistant to change with respect to introduction and implementation of EBT.	**Hazard 2- Consequence 1.** Corporate Culture restrains and negates introduction of EBT, preventing full benefits being realised.	Individuals and Organisation.	Minor (D)	Remote (3)	3D Review	Organisation previously demonstrated ability for change during rapid corporate growth.	**Hazard 1- Consequence 1- Mitigation 1.** Understanding and acceptance that Emirates Airline can be a 'Learning Organisation', specifically with respect to EBT implementation, will contribute to a successful programme rollout.	Minor (D)	Improbable (2)	2D Acceptable	Review and understanding of other departments understanding of the EBT Project, its methodology and positive benefits for the airline.	For review by Project Manager.	N/A

Ref	Identified Task	Task Frequency (select from drop-down list)	Hazard	Consequence	People/ Equipment at risk	Evaluate Existing Severity (select from drop-down list)	Evaluate Existing Probability (select from drop-down list)	Existing Risk Category Index (auto-calculates from sev & prob)	Existing controls	Enhanced Safety Risk Control & Mitigations	Enhanced Severity (select from drop-down list)	Enhanced Probability (select from drop-down list)	Enhanced Risk Category Index (auto-calculates from sev & prob)	Further action reqd by whom & when (see options list below)	Acceptance and Implementation of enhanced Safety Risk Control & Mitigations	Documentation of Change Requirements
5	Interfaces	Medium frequency (M)	**Hazard 1.** Interaction between internal departments (Flight Operations, Network Control Centre (NCC), Safety and Regulatory) prevents or hinders Project completion on schedule or provides significant delay.	**Hazard 1- Consequence 1.** Commercial and/or Training Programme disrupted or compromised.	Training Courses delayed, training output reduced.	Negligible (E)	Remote (3)	3E Acceptable	Existing Training programme remains in place. Switchover date can be altered.	**Hazard 1- Consequence 1- Mitigation 1.** Whilst change from current conversion course to EBT planned, this date can be moved and is not contingent on other departments or their input with respect to EBT rollout. There is no impact anticipated with respect to delayed courses.	Negligible (E)	Improbable (2)	2E Acceptable	Course plan and schedule under review by Project Manager.	None required.	Depends on Risk outcome. Probably nil.
6a	Political Visibility and Stakeholder Involvement	Medium frequency (M)	**Hazard 1.** Politically sensitive to internal stakeholders.	**Hazard 1- Consequence 1.** Reputational damage, in event Project not delivered or significantly delayed.	Training Courses delayed, training output reduced.	Negligible (E)	Remote (3)	3E Acceptable	Project oversight via SVP Trg, delagated to Training Standards Management team to implement.	**Hazard 2- Consequence 1- Mitigation 1.** Project team drawn from existing fleets and Training Standards to ensure day to day management and project progression.	Negligible (E)	Frequent (5)	5E Acceptable	Oversight management and review available via Standards Training Management.	None required.	None identified.
6b	As above	Medium frequency (M)	**Hazard 2.** Independent Oversight or Significant outreach/external input required.	**Hazard 2- Consequence 1.** Project hindered or delayed due independent/regulator oversight restrictions and review.	Negligable	Minor (D)	Improbable (2)	2D Acceptable	Current continuous dialogue with Regulatory Authority precludes requirement for further and additional dialogue with respect to this Project.	**Hazard 2- Consequence 1- Mitigation 1.** Project Manager (PM) will provide additional updates and progression reports to the Regulator, ensuring project slowdown or curtailment unlikely from this source.	Negligible (E)	Extremely Improbable (1)	1E Acceptable	Project Manager (PM) responsible for Regulator comunications and dialogue.	None requried.	During project progression, any changes or Regulator influenced inputs will be introduced and addressed by PM.
6c	As above	Medium frequency (M)	As above	As above	Negligible	Minor (D)	Improbable (2)	2D Acceptable	As above	**Hazard 2- Consequence 1- Mitigation 2.** With respect to course construction; courses are based on industry data and no Regulatory or OEM requirements have been removed.	Negligible (E)	Extremely Improbable (1)	1E Acceptable	Project Manager (PM) responsible for Regulator comunications and dialogue.	None required.	During project progression, any changes or Regulator influenced inputs will be introduced and addressed by PM.
6d	As above	Medium frequency (M)	**Hazard 3.** Additional External Authority (for example: IOSA) Impact Review required.	**Hazard 3- Consequence 1.** Project considered 'Non-Compliant' due change/modification of 'Third Party', but not immediate oversight, Aviation Regulatory body (ie IATA, FAA).	Negligable	Minor (D)	Improbable (2)	2D Acceptable	Relevant Aviation Authorities in this respect are IATA, EASA, FAA and Australian(?). Continuous Regulatory Compliance and Regulator Directives review on publication ensures compliance issues are recognised and implemented.	**Hazard 3- Consequence 1- Mitigation 1.** Project Manager (PM), with support of Training Department Regulatory and Compliance Officer (RACO) should review input of Aviation Authority directives and adopt/implement as required. This ensures continuous compliance is retained.	Negligible (E)	Extremely Improbable (1)	1E Acceptable	Project Manager (PM) responsible for Regulator comunications and dialogue.	None required.	During project progression, any changes or Regulator influenced inputs will be introduced and addressed by PM.

Ref	Identified Task	Task Frequency (select from drop-down list)	Hazard	Consequence	People/ Equipment at risk	Evaluate Existing Severity (select from drop-down list)	Evaluate Existing Probability (select from drop-down list)	Existing Risk Category Index (auto-calculates from sev & prob)	Existing controls	Enhanced Safety Risk Control & Mitigations	Enhanced Severity (select from drop-down list)	Enhanced Probability (select from drop-down list)	Enhanced Risk Category Index (auto-calculates from sev & prob)	Further action reqd by whom & when (see options list below)	Acceptance and Implementation of enhanced Safety Risk Control & Mitigations	Documentation of Change Requirements
6e	As above	Medium frequency (M)	**Hazard 4.** Aircraft Original Equipment Manufacturer (OEM) do not recognise or endorse the Project Objectives.	**Hazard 4- Consequence 1.** Project hindered or delayed due OEM resistance to modification/ amendment of their manufacturers	Training Courses delayed, training output reduced.	Minor (D)	Improbable (2)	2D Acceptable	One OEM already moving to an EBT perspective in their course construction.	**Hazard 4- Consequence 1- Mitigation 1.** With one OEM (Airbus) already moving toward an EBT perspective and the other (Boeing) fully supportive and actively involved in supporting the EK EBT Project, likelihood of OEM course rejection limited.	Minor (D)	Extremely Improbable (1)	1D Acceptable	Project Manager (PM) responsible for Regulator comunications and dialogue.	None required.	During project progression, any changes or Regulator influenced inputs will be introduced and addressed by PM.
7	Doctrine	Medium frequency (M)	**Hazard 1.** Reporting Culture risks data submission engagement from flight crew.	**Hazard 1- Consequence 1.** Insufficient or inaccurate data applied to providing EBT 'databank'.	Flight Crews/In service aircraft.	Major (C)	Reasonably Probable (4)	4C Review	Current data gathering references primarily ASR data. Some Quality Audits available	**Hazard 1- Consequence 1- Mitigation 1.** Inclusion and review of greater detail of available data sources. Enhanced data sources will require accurate and detailed review of FDM, Quality and Engineering Reviews, as well as existing ASR data input. All elements will require to be classified into Risk Based assessments.	Major (C)	Remote (3)	3C Review	PM Review, in conjunction with Training Department and Fleet. Structure and essence of Reporting Culture should be reviewed	None required.	TBA
8	Funding	Low frequency (L)	**Hazard 1.** Funding Assessment insufficient or further appraisal required.	**Hazard 1- Consequence 1.** Project delayed or significantly slowed in progress due funding constraints.	Negligible	Minor (D)	Improbable (2)	2D Acceptable	Previous detailed estimate and project resource assessment conducted.	**Hazard 1- Consequence 1- Mitigation 1.** Project Team participants form majority of funding required resource that will have been applied to project cost. Commercial programme will dictate, with degree of certainty and advance notice, whether refinement and/ or reduction of this available resource will be required.	Minor (D)	Improbable (2)	2D Acceptable	Reviewed by EBT PM, with respect to request for and release of resource on month-by-month basis.	None required.	None required.
9	Time Scale/ Schedule	Low frequency (L)	**Hazard 1.** Implementation date not achieved.	EBT rollout plan and course commencement not achieved.	Trainees	Minor (D)	Improbable (2)	2D Acceptable	Project Plan is 36 months. Implementation is 24 months from Project start. Scope within existing plan to move implementation date without compromising Project Objectives.	**Hazard 1- Consequence 1- Mitigation 1.** Regular (monthly) reviews on Project progress in place. Time line continuously under review and scope within project to move implementation date remains available up to Project End Date (August 2017).	Minor (D)	Improbable (2)	2D Acceptable	Reviewed by SVP Trg and EBT PM on month-by-month timeline. Any project slip should, be identified early and with sufficient scheduled time to implement appropriate change if required.	None required.	None required unless project timeline alters

Ref	Identified Task	Task Frequency (select from drop-down list)	Hazard	Consequence	People/ Equipment at risk	Evaluate Existing Severity (select from drop-down list)	Evaluate Existing Probability (select from drop-down list)	Existing Risk Category Index (auto-calculates from sev & prob)	Existing controls	Enhanced Safety Risk Control & Mitigations	Enhanced Severity (select from drop-down list)	Enhanced Probability (select from drop-down list)	Enhanced Risk Category Index (auto-calculates from sev & prob)	Further action reqd by whom & when (see options list below)	Acceptance and Implementation of enhanced Safety Risk Control & Mitigations	Documentation of Change Requirements
10a	Project Team Participants	Medium frequency (M)	**Hazard 1.** Project participants contain insufficient individual and collective skill sets to progress project.	**Hazard 1- Consequence 1.** Complexity of Project requires Project Management Skill sets that are unavailable.	Negligeable	Minor (D)	Improbable (2)	2D Acceptable	Project Manager possesses project management skill sets, as does Training Standards Department leadership, with overall responsibility for project management.	**Hazard 1- Consequence 1- Mitigation 1.** Whilst moderate to high level project management skill sets required, within respective project sub-teams (aircraft type and standards department representation), sufficient skill sets exist, under guidance, to progress appropriately.	Minor (D)	Improbable (2)	2D Acceptable	PM retains discretion to alter team participants. Additional internal resource can be added, if considered appropriate.	None required.	Only applicable if participants change.
10b	As above	As above	As above	**Hazard 1- Consequence 2.** Insufficent availability of project participants, on a month-by-month scheduling, restricts project progress and continuity.	Negligable	Minor (D)	Reasonably Probable (4)	4D Review	Project participants identified and defined as required on a monthly basis.	**Hazard 1- Consequence 2- Mitigation 1.** Advance scheduling and identification of project participants forwarded to crew scheduling 'planners', providing visibility of commercial programme impact. Protection of the project team members confirmed by 'planners' in advance.	Minor (D)	Remote (3)	3D Review	PM will be advised of any restrictions to individual participants availability on a month-by-month basis.	None required.	None
11	Quality Requirements	Medium frequency (M)	**Hazard 1.** High level of 'Quality Control' detail not achievable.	**Hazard 1- Consequence 1.** Project output requires further review and amendment prior to implementation, compromising delivery	Negligable	Minor (D)	Improbable (2)	2D Acceptable	Internal Quality Control requirements already understood and planned to.	**Hazard 1- Consequence 2- Mitigation 1.** Internal Regulation & Compliance continuously monitored within Emirates Training Department. Achieved by dedicated Regulatory & Compliance Officer (RACO) position.	Minor (D)	Improbable (2)	2D Acceptable	PM review and necessary implementation.	None required.	None
12	Regulatory Involvement	Low frequency (L)	**Hazard 1.** Precedence setting methodology (EBT) change unacceptable to Regulatory Authority.	**Hazard 1- Consequence 1.** Project does not achieve regulatory approval, preventing EBT implementation.	Organisation (EK)/Trainees	Minor (D)	Improbable (2)	2D Acceptable	Regulatory contact and dialogue already in place and frequent.	**Hazard 1- Consequence 2- Mitigation 1.** Regulator fully appraised of project, its' objectives and timeline prior to project launch. No objections were raised prior to project launch, or its' principle aims and objectives.	Minor (D)	Extremely Improbable (1)	1D Acceptable	PM Review and appropriate action in event of Regulator challenge to project output.	None required.	None

Ref	Identified Task	Task Frequency (select from drop-down list)	Hazard	Consequence	People/ Equipment at risk	Evaluate Existing Severity (select from drop-down list)	Evaluate Existing Probability (select from drop-down list)	Existing Risk Category Index (auto-calculates from sev & prob)	Existing controls	Enhanced Safety Risk Control & Mitigations	Enhanced Severity (select from drop-down list)	Enhanced Probability (select from drop-down list)	Enhanced Risk Category Index (auto-calculates from sev & prob)	Further action reqd by whom & when (see options list below)	Acceptance and Implementation of enhanced Safety Risk Control & Mitigations	Documentation of Change Requirements
13a	Additional Training Need/ Concept Identified	Low frequency (L)	**Hazard 1.** EBT adoption identifies a previously unrecognised/ unknown 'Knowledge, Skill or Attitude' (KSA).	**Hazard 1- Consequence 1.** Identified Training Need requires additional training and/or methodology change.	Organisation (EK)/Trainees	Major (C)	Improbable (2)	2C Review	Knowledge, Skills and Attitude currently continuously monitored. EBT designed to train and develop Knowledge and Skills.	**Hazard 1- Consequence 1- Mitigation 1.** Training Department can amend/revise or adopt required training methods and concepts. Specific training objectives can be altered to reflect any new training needs.	Major (C)	Extremely Improbable (1)	1C Acceptable	PM Review, in conjunction with Training Depatment and Fleet.	None required.	None
13b	As above	As above	As above	**Hazard 1- Consequence 2.** 'Attitude' skillset requires further and additional training/assessment that remains outside current scope of EK Training Department.	Organisation (EK)/Trainees	Major (C)	Improbable (2)	2C Review	'Attitude' to training and pilot role covered within HF Training during conversion and subsequent recurrent training.	**Hazard 1- Consequence 2- Mitigation 1.** Training Department can identify "attitude to training" by an individual trainee. This can be addressed directly within Training Department. Feedback available to Fleet who could amend/revise recruitment process.	Major (C)	Extremely Improbable (1)	1C Acceptable	PM Review, in conjunction with Training Depatment and Fleet.	None required.	None

A.II Operator sample when transitioning from mixed implementation to baseline EBT

Appendix 10: Possible changes in Training Topic frequency*

ORE required

Subject (acc. FCL Appendix 9 / SPA / ORO)	Mixed I.	Full EBT	Remarks
1.4 Checklists prior engine start, starting procedures	A	(C)	C, if in Appx. 9 verification module Risk is assumed as negligible (P0/S2)
1.6 Before Takeoff Checks	A	(A)	EVP 1 starts before takeoff in all modules, therefore no change
2.5.2 Engine Failure between V1 and V2	A	B (Gen 4) A (Gen 3)	Gen 4: E/F after V2 every 2nd module Gen 3: B747-767, CRJ
2.6 Rejected take-off	A	B	
3.8.3.4/5 Manual OEI 3D Operations, 4.4 Manual OEI go-around + 5.5. OEI Landing	A	B	Decision by ORE Group: OEI approach and landing will be A-item also in Full EBT
3.8.4 2D Operations	A	B	3D RNP in every 2nd module (except CRJ)
6 CAT II/III (SPA.LVO)	A	B	B for LV APP (except for A/C with HUD) LV TO tbc
Either Seat Qualification (ORO.FC.235)	A	B	

*A = every 6 months, B = every 12 months (every EBT cycle), C = every 36 months

Bow Tie Model

Risk	② Threat (cause for a hazard)	① Hazard (unwanted state)	③ Conseq. (resulting from a hazard)
1 P0-E S5	Engine Failure V1 – V2 (Birdstrike, tech. failure)	Engine Failure recovery between V1 and V2 not performed correctly	A/C crash on/off runway
	Fatigued crew		A/C damage due to terrain contact
	Deficient E/F recovery skills (V1 - V2)		Bad media reputation
2 PE S4	Major system malfunction / birdstrike during T/O	RTO not performed according to procedures	Runway excursion
	Runway incursion / ATC "Stop" Call		A/C damage
	Deficient manual RTO skills		Bad media reputation
3 PE S5	Engine Fail/Shutdown during flight	OEI Go-around flown incorrectly	A/C crash on/off runway
	OEI Go-around required		Loss of control during go-around
	Deficient OEI G/A skills		Bad media reputation
4 P0-Pe S4	Low visibility conditions	Low Visibility Approach not aborted correctly (not for A220, CRJ, other types w/ HUD)	A/C crash on/off runway
	System malfunction during LV APP		A/C damage due to terrain contact
	Deficient LVO knowledge / skills		Bad media reputation
5 P0-E S5	Engine Failure during takeoff after V1	RHS qualified crew member not recovering engine failure correctly close to ground	A/C crash on/off runway
	Commander as PF on RHS		A/C damage due to terrain contact
	Deficient E/F recovery skills from RHS		Bad media reputation
6 P0-E S5	Adverse conditions close to ground (CW, Ceilg.)	RHS qualified crew member not landing safely	Runway excursion
	Commander as PF on RHS		A/C crash on/off runway
	Deficient manual landing skills from RHS		A/C damage due to terrain contact
7 PE S5	Non-ILS/GLS Instrument App flown	2D App Ops not flown correctly	A/C damage due to terrain contact
	2D App Ops required due to sys malfunction		A/C crash off runway (CFIT)
	Deficient 2D App Ops skills		Bad media reputation

Risk Matrix

Probability Level	Severity Level S5	S4	S3	S2	S1	S0	SWR PROBABILITY
P5	A	A	B	C	D	E	E - Very Likely
P4	A	A	B	C	D	E	D – Likely for S3
P3	A	B	C	D*	E	E	D – Likely except S3
P2	A	B	C	D	E	E	C – Possible for S3
P1	B	C	D	E	E	E	C – Possible except S3
P0	C	C	D	E	E	E	B – Unlikely
Pe	C	D	E	E	E	E	A – Very Unlikely
SWR SEVE-RITY	VERY HIGH (5)	HIGH (4)	MODE RATE (3)	LOW (2)	VERY LOW (1)	NIL	*NIL – Negligible = E-risk*

R 1, 3, 5, 6, 7 → Mitigation acc. ALARP-principle

R 2, 4 → Monitoring

Mitigations

Risk No.	Mit. No.	Mitigation	Responsible (Name & Department)	When / how often
1	M1	Engine Fail training will be performed every 6 months for every A/C-type, but not always between V1 and V2. Gen 4 A/C recoveries will be after V2 in full IMC and therefore require advanced flying skills and offer options for more realistic E/F, based on evidence	AG Course Design (xxx)	Permanent from 1st Full EBT module
2	M2	Optional RTO (surprise) will be included on Day 2 (SBT) for one module	xxx	Permanent from 1st Full EBT module
3	M3	OEI approach and landing will be performed every module, better OEI training by more options for OEI APP + LDG	xxx	Permanent from 1st Full EBT module
4	M4	Autoland Warning Light compliance is covered in ISI of module 5. LOFT-style LVO Scenario may be integrated in EVP/SBT of module 6 to cover more competencies than previously done in MVP	xxx	Permanent from EBT module 5
5/6	M5	RHS OEI pattern will be replaced by different tasks covering FPM (e.g. raw data ILS, E/F during cruise, balked landing, G/A, TCAS)	xxx	Permanent from 1st Full EBT module
all	M6	Task based evaluation is replaced by competency based assessment in EBT modules, focus competencies FPM, PRO, FPA are trained in replaced MTP time, based on varying scenarios.	xxx	Permanent from 1st Full EBT module
all	M7	Proactive communication for changes in Full EBT (possible loss of pilots confidence and a deterioration of pilots resilience is covered by varying additional exercises, covering same competencies)	Responsible EBT manager	Before start of Full EBT
all	M8	Data collection and analysis every EBT module (task grading)	Data analyst of each operator	Permanent from 1st Full EBT module
all	M9	Development of additional Task Grading options (event-based questions)	yyy	Permanent from 1st Full EBT module
7	M10	2D App Ops is replaced by 3D App Ops every 2nd module to cover realistic Non ILS/GLS approach operations presently not targeted in FCL App. 9	xxx	Permanent from 1st Full EBT module

Appendix B - Competencies and Observable Behaviors

This Appendix is intended to support operators implement EBT, Step 3: Development of an adapted competency model and grading system.

The following tables contain an example of an adapted competency model for EBT, without conditions and competency standards, which can be used for the recurrent training of pilots in an FSTD. The models are based on the ICAO competency framework for aeroplane pilots and IEs contained in ICAO Doc 9868 (PANS-TRG).

Note 1: Demonstration of the competencies can be assessed using the OBs, which should meet the required level of performance, described in the performance criteria established by the AOC/ATO for its specific operation. OBs may include but are not limited to the OBs listed in the table below.

Note 2: OBs are performed to a criterion, e.g., accurately or correctly, generally not stated.

Note 3: The competencies and OBs in the table are not listed according to any pre-defined priority. OBs may include but are not limited to the OBs listed in the tables below.

Application of Knowledge (KNO)

Underpinning the pilot competencies is the "application of knowledge" which collectively refers to the ability of the pilot to:

- Recall and proactively update relevant knowledge; and
- Apply acquired knowledge to the operational environment, including TEM

Throughout all phases of EBT, an operator or ATO must progressively develop, assess and debrief the pilots on their KNO, recording at least strengths, weaknesses and any remedial action.

Note: *IATA has adapted the ICAO competency framework for aeroplane pilots by adding the competency KNO. This adaptation was considered necessary by both operators and training organizations to ensure that the pilots demonstrate their knowledge and understanding of relevant information, operating instructions, aircraft systems and the operating environment. This adaptation by IATA of the ICAO aeroplane pilot competency framework has been endorsed by all regulators applying CBTA principles and procedures.*

B.I Pilot Competencies

Competency	Description	Observable behavior (OB)
Application of knowledge (KNO)	Demonstrates knowledge and understanding of relevant information, operating instructions, aircraft systems and the operating environment.	OB 0.1 Demonstrates practical and applicable knowledge of limitations and systems and their interaction OB 0.2 Demonstrates required knowledge of published operating instructions OB 0.3 Demonstrates knowledge of the physical environment, the air traffic environment including routings, weather, airports and the operational infrastructure OB 0.4 Demonstrates appropriate knowledge of applicable legislation OB 0.5 Knows where to source required information OB 0.6 Demonstrates a positive interest in acquiring knowledge OB 0.7 Is able to apply knowledge effectively
Application of procedures and compliance with regulations (PRO)	Identifies and applies appropriate procedures in accordance with published operating instructions and applicable regulations.	OB 1.1 Identifies where to find procedures and regulations OB 1.2 Applies relevant operating instructions, procedures and techniques in a timely manner OB 1.3 Follows SOPs unless a higher degree of safety dictates an appropriate deviation OB 1.4 Operates aeroplane systems and associated equipment correctly OB 1.5 Monitors aircraft systems status OB 1.6 Complies with applicable regulations OB 1.7 Applies relevant procedural knowledge
Communication (COM)	Communicates through appropriate means in the operational environment, in both normal and non-normal situations.	OB 2.1 Determines that the recipient is ready and able to receive information OB 2.2 Selects appropriately what, when, how and with whom to communicate OB 2.3 Conveys messages clearly, accurately and concisely OB 2.4 Confirms that the recipient demonstrates understanding of important information OB 2.5 Listens actively and demonstrates understanding when receiving information OB 2.6 Asks relevant and effective questions OB 2.7 Uses appropriate escalation in communication to resolve identified deviations OB 2.8 Uses and interprets non-verbal communication in a manner appropriate to the organizational and social culture OB 2.9 Adheres to standard radiotelephone phraseology and procedures OB 2.10 Accurately reads, interprets, constructs and responds to datalink messages in English
Aeroplane Flight Path Management, automation (FPA)	Controls the flight path through automation.	OB 3.1 Uses appropriate flight management, guidance systems and automation, as installed and applicable to the conditions OB 3.2 Monitors and detects deviations from the intended flight path and takes appropriate action OB 3.3 Manages the flight path safely to achieve optimum operational performance OB 3.4 Maintains the intended flight path during flight using automation while managing other tasks and distractions OB 3.5 Selects appropriate level and mode of automation in a timely manner considering phase of flight and workload OB 3.6 Effectively monitors automation, including engagement and automatic mode transitions

Competency	Description	Observable behavior (OB)
Aeroplane Flight Path Management, manual control (FPM)	Controls the flight path through manual control.	OB 4.1 Controls the aircraft manually with accuracy and smoothness as appropriate to the situation OB 4.2 Monitors and detects deviations from the intended flight path and takes appropriate action OB 4.3 Manually controls the aeroplane using the relationship between aeroplane attitude, speed and thrust, and navigation signals or visual information OB 4.4 Manages the flight path safely to achieve optimum operational performance OB 4.5 Maintains the intended flight path during manual flight while managing other tasks and distractions OB 4.6 Uses appropriate flight management and guidance systems, as installed and applicable to the conditions (See Glossary) OB 4.7 Effectively monitors flight guidance systems including engagement and automatic mode transitions
Leadership and Teamwork (LTW)	Influences others to contribute to a shared purpose. Collaborates to accomplish the goals of the team.	OB 5.1 Encourages team participation and open communication OB 5.2 Demonstrates initiative and provides direction when required OB 5.3 Engages others in planning OB 5.4 Considers inputs from others OB 5.5 Gives and receives feedback constructively OB 5.6 Addresses and resolves conflicts and disagreements in a constructive manner OB 5.7 Exercises decisive leadership when required OB 5.8 Accepts responsibility for decisions and actions OB 5.9 Carries out instructions when directed OB 5.10 Applies effective intervention strategies to resolve identified deviations OB 5.11 Manages cultural and language challenges, as applicable
Problem Solving and Decision Making (PSD)	Identifies precursors, mitigates problems; and makes decisions.	OB 6.1 Identifies, assesses and manages threats and errors in a timely manner OB 6.2 Seeks accurate and adequate information from appropriate sources OB 6.3 Identifies and verifies what and why things have gone wrong, if appropriate OB 6.4 Perseveres in working through problems while prioritizing safety OB 6.5 Identifies and considers appropriate options OB 6.6 Applies appropriate and timely decision-making techniques OB 6.7 Monitors, reviews and adapts decisions as required OB 6.8 Adapts when faced with situations where no guidance or procedure exists OB 6.9 Demonstrates resilience when encountering an unexpected event

Competency	Description	Observable behavior (OB)
Situation Awareness and Management of Information (SAW)	Perceives, comprehends and manages information and anticipates its effect on the operation.	OB 7.1 Monitors and assesses the state of the aeroplane and its systems OB 7.2 Monitors and assesses the aeroplane's energy state, and its anticipated flight path OB 7.3 Monitors and assesses the general environment as it may affect the operation OB 7.4 Validates the accuracy of information and checks for gross errors OB 7.5 Maintains awareness of the people involved in or affected by the operation and their capacity to perform as expected OB 7.6 Develops effective contingency plans based upon potential risks associated with threats and errors OB 7.7 Responds to indications of reduced situation awareness
Workload Management (WLM)	Maintains available workload capacity by prioritizing and distributing tasks using appropriate resources.	OB 8.1 Exercises self-control in all situations OB 8.2 Plans, prioritizes and schedules appropriate tasks effectively OB 8.3 Manages time efficiently when carrying out tasks OB 8.4 Offers and gives assistance OB 8.5 Delegates tasks OB 8.6 Seeks and accepts assistance, when appropriate OB 8.7 Monitors, reviews and cross-checks actions conscientiously OB 8.8 Verifies that tasks are completed to the expected outcome OB 8.9 Manages and recovers from interruptions, distractions, variations and failures effectively while performing tasks

B.II Instructor/Evaluator (IE) competencies

IE Competency	Description	Observable behavior (IOB)
Pilot Competencies	Refer to Appendix B.I	Refer to observable behaviors in the Pilot Competencies section
Management of the learning environment	Ensures that the instruction, assessment and evaluation are conducted in a suitable and safe environment	IOB 2.1 Applies TEM in the context of instruction/evaluation IOB 2.2 Briefs on safety procedures for situations that are likely to develop during instruction/evaluation IOB 2.3 Intervenes appropriately, at the correct time and level (e.g., progresses from verbal assistance to taking over control) IOB 2.4 Resumes instruction/evaluation as practicable after any intervention IOB 2.5 Plans and prepares training media, equipment and resources IOB 2.6 Briefs on training devices or aircraft limitations that may influence training, when applicable IOB 2.7 Creates and manages conditions (e.g., airspace, ATC, weather, time, etc.) to be suitable for the training objectives IOB 2.8 Adapts to changes in the environment whilst minimizing training disruptions IOB 2.9 Manages time, training media and equipment to ensure that training objectives are met

IE Competency	Description	Observable behavior (IOB)
Instruction	Conducts training to develop the trainee's competencies	IOB 3.1 References approved sources (operations, technical, and training manuals, standards and regulations) IOB 3.2 States clearly the objectives and clarifies roles for the training IOB 3.3 Follows the approved training program IOB 3.4 Applies instructional methods as appropriate (e.g., explanation, demonstration, facilitation, discover with assistance, discover without assistance) IOB 3.5 Sustains operational relevance and realism IOB 3.6 Adapts the amount of instructor inputs to ensure that the training objectives are met IOB 3.7 Adapts to situations that might disrupt a planned sequence of events IOB 3.8 Continuously assesses trainee's competencies IOB 3.9 Encourages the trainee to self-assess IOB 3.10 Allows trainee to self-correct in a timely manner IOB 3.11 Applies trainee-centered feedback techniques (e.g., facilitation, etc.) IOB 3.12 Provides positive reinforcement
Interaction with the trainees	Supports the trainees' learning and development and Demonstrates exemplary behavior (role model)	IOB 4.1 Shows respect for the trainees (e.g., for culture, language, experience) IOB 4.2 Shows patience and empathy (e.g., by actively listening, reading non-verbal messages and encouraging dialogue) IOB 4.3 Manages trainees' barriers to learning IOB 4.4 Encourages engagement and mutual support IOB 4.5 Coaches the trainees IOB 4.6 Supports the goal and training policies of the operator/ATO and Authority IOB 4.7 Shows integrity (e.g., honesty and professional principles) IOB 4.8 Demonstrates acceptable personal conduct, acceptable social practices, content expertise, a model for professional and interpersonal behavior IOB 4.9 Actively seeks and accepts feedback to improve own performance
Assessment and Evaluation	Assesses the competencies of the trainee and Contributes to continuous training system improvement	IOB 5.1 Complies with Operator/ATOs and Authority requirements IOB 5.2 Ensures that the trainee understands the assessment process IOB 5.3 Applies the competency standards and conditions IOB 5.4 Assesses trainee's competencies IOB 5.5 Performs grading IOB 5.6 Provides recommendations based on the outcome of the assessment IOB 5.7 Makes decisions based on the outcome of the summative assessment IOB 5.8 Provides clear feedback to the trainee IOB 5.9 Reports strengths and weaknesses of the training system (e.g., training environment, curriculum, assessment/evaluation) including feedback from trainees IOB 5.10 Suggests improvements for the training system IOB 5.11 Produces reports using appropriate forms and media

Appendix C - Communication plan template

This Appendix is intended to support operators implement EBT, Step 4: Communication plan (courtesy of Airbus).

OPERATOR: XXXXX

Ref	Communication	Audience	Objectives	Schedule		Duration (if relevant)	Format	Responsibility
				When	Frequency			
0	**FLIGHT TRAINING ANALYSIS [FTA] = Pre- EBT implementation analysis**							
0,1	Information related to EBT project	Authority	Proactive Communication with Authority in order to faciliate the EBT implementation	Before the start of the FTA	Once	-	Visionconference or face-to-face meeting and Presentations	Accountable Manager or Operator Training Manager
0,2	Kick Off Meeting	Operator Management (Safety-CMM-Flight OPS-etc) Other Project Stakeholders	Introduce the management of the EBT implementation Project and Operator specifities and organization understanding.	At the start of the FTA	Once	3 hours	Visionconference or face-to-face meeting and Presentations	EBT Manager
0,3	EBT Awareness for manager	Operator Management	EBT Impact on Flight Operations and Training and required resource (Human and Materials). EBT project management	During Flight Training Analysis Phase	Once	2 hours	Face-to-face meeting or visioconference and Presentations	EBT Manager
0,4	FTA Status Report	Operator Training Manager Other Project Stakeholders	Report status, identify issues.	During the Flight Training Analysis Phase	Once every 2 weeks	1 hour	Face-to-face meeting or visioconference	EBT Manager
0,5	FTA Final Report	Operator Management (Safety-CMM-Flight OPS-etc) Operator Training Manager Other Project Stakeholders	Final Report related to the pre-EBT implementation analysis	At the end of the Flight Traiing Analysis	Once	2 hours	Meeting & associated documents (Implementation Plan, Gap Assessment, and eventually associated documents as required by regulators)	EBT Manager

Ref	Communication	Audience	Objectives	Schedule		Duration (if relevant)	Format	Responsibility
				When	Frequency			
0	**FLIGHT TRAINING ANALYSIS [FTA] = Pre- EBT implementation analysis**							
0,6	Application Letter	Authority	Formal application for Mixed EBT	At the end of the Flight Traiing Analysis	Once	-	Letter	Operator Training Manager
0,6	Formal Application with Authority	Authority Operator Management (Safety-CMM-Flight OPS) where neces-sary Operator EBT Manager	Introduction of the Implementation Plan and its assocaited risk assessment, and define the required meeting and interactions betweeen operaotr and auhority	At the end of the Flight Traiing Analysis	Once	3 hours	Face-to-face meeting or visioconference	Operator Training Manager
0,7	Initial Pilot Communication	Operator's pilot (in-cluding instructors)	Awareness related to EBT	At the end of the Flight Traiing Analysis	Once	-	Bulletin-Leaflet	EBT Manager
0,8	Initial Management Communication	Operators staff other than Pilots	Awareness related to EBT project	At then end of the Flight Training Analysis	Once	-	Bulletin-Leaflet	EBT Manager

Ref	Communication	Audience	Objectives	Schedule		Duration (if relevant)	Format	Responsibility
				When	Frequency			
1	**Project Monitoring**							
1,1	EBT Project - Comittee Sterring	Operator Management (Safety-CMM-Flight OPS) Training Manager	Report status, present deliverables, feedback, identify issues and develop strategy to solve, next step. Updated implementation Plan and its associated risk assessment	Throughout all the EBT implementation phase	Once a Quarter	4 hours	Face-to-face meeting or visioconference	EBT Manager
1,2	EBT Project status report	Training Manager Instructors SMEs	Report status, present deliverables, feedback, identify issues and develop strategy to solve, next step. Updated implementation Plan and its associated risk assessment	Throughout all the EBT implementation phase	Once every 2 weeks	1 hour	Face-to-face meeting or visioconference	EBT Manager
1,3	EBT Project status report with Authority	Authority EBT Manager SMEs where necessary	Report Status, present delivrables, Authority feedback. Updated implementation Plan and its associated risk assessment	Throughout all the EBT implementation phase	Once a quarter	2 hours	Face-to-face meeting or visioconference	Operator Training Manager
1,4	EBT project Status for Pilot	Pilots	EBT Principles Communicate current Status	Throughout all the EBT implementation phase	Once a semester	-	Bulletin-Leaflet	EBT Manager
1,5	EBT Project Status for Operator Staff	Operator Satff impacted by EBT project (Safety - CMM - Flight Ops)	EBT principles and Training Effectiveness Communicate current Status	Throughout all the EBT implementation phase	Once a semester	-	Bulletin-Leaflet	EBT Manager
1,6	Application Letter for EBT	Authority	Formal application for baseline EBT (from Mixed EBT)	At the end of Mixed EBT implementation taks	Once	-	Letter	Operator Training Manager

Appendix D - EBT IE initial standardization guidance

This Appendix is intended to support operators implement EBT, Step 5: EBT IE initial standardization.

D.I Initial standardization requirements

The following requirements are based on the IATA Instructor and Evaluator Training Guidance Material and Best Practices, Chapter 4.5, and are consistent with European EBT regulations for an EBT instructor course.

Note: *According to the European EBT guidance material, the training course may be a minimum of 14 hours (training alone) and the recommended length is between 21 to 24 hours (training plus assessment of competence).*

The EBT IE course should be delivered by a qualified EBT IE and comprise both theoretical and practical training. At the completion of the training course, the applicant instructor should:

1. Have knowledge of EBT, including the following underlying principles:
   - Threat and error management
   - Competency-based training
   - Learning from positive performance
   - Building resilience, and
   - Data-driven training
2. Demonstrate knowledge of the structure of an EBT module
3. Demonstrate knowledge of the method of training delivery for each phase of an EBT module
4. Demonstrate knowledge of the principles of adult learning and how they relate to EBT
5. Conduct objective observations based on the adapted competency model, and document evidence of observed performance
6. Relate specific performance observations of competencies
7. Analyze trainee performance to determine competency-based training needs and recognize strengths
8. Evaluate performance using the competency-based assessment and grading system
9. Apply appropriate teaching styles for the different EBT phases to accommodate trainee learning needs
10. Facilitate trainee's learning, focusing on specific competency-based training needs
11. Conduct a debrief using facilitation techniques

An IE may be given credit for parts of the above if the IE has previously demonstrated competence in those topics.

D.II Initial EBT IE course footprints

Generic example

General

The following is intended as an example of the integration of EBT focused training described in D.I above, within an ab initio instructor training program. The example describes only the relevant objectives and focus areas. It is assumed that any ab-initio training course will develop the IE competencies described in Appendix B.II.

The objective is to develop the ability to train aviation-based knowledge and skills and attitudes, including human factors. By the end of the course instructor trainees will be able to:

- Make adequate preparation for the conduct of training
- Use different training techniques

- Develop effective relationships with trainees
- Clearly define the objectives of a training session
- Understand trainees needs and how they want to be trained
- Transfer information and key messages effectively and efficiently
- Manage a training session appropriately
- Understand the subject of human factors and behavior
- Manage CRM issues on training sessions
- Manage difficult situations and people effectively
- Assess a trainee's performance against a defined standard
- Recognize the importance of making accurate and timely progress reports
- Know how to continuously develop their own training skills
- Understand the knowledge, skills and attitudes of an effective instructor, and
- Understand learning processes and styles

The course is intended to develop a clear but practical understanding of the learning process and the critical importance of the role of an IE in providing an effective environment, in addition to root cause analysis, the use of facilitation techniques, and the assessment of outcomes using video role play and live debriefing.

Ab-initio IEs training program

Day 1	Day 2
– Learning processes and styles: Theory on how people learn, the process they go through and the different ways that people prefer to learn. – Training experiences: Identifying knowledge, skills and attitudes required of an IE. – Elements of effective training: Identifying and prioritizing what is important for effective training. – Communication: Recognizing the difficulty of communications and developing effective communications.	– Understanding behavior: Understanding principles of behavior and how people behave in various situations. – Managing behavior: Developing skills for managing difficult situations and people. – Training preparation: Learning what to consider and how to prepare for training. – Body language: Understanding the importance of body language and techniques for improving your capability in this subject.
Day 3	**Day 4**
– Human factors: Understanding what human factors are and how they can be categorized. – Crew resources management: Introduction to EBT competencies and learning how to assess a crew. – Instruction: Developing instructional competencies/ techniques.	– Facilitation: Understanding the importance of facilitation and when the technique should be used. – Questioning: Understanding different types of questions and when to use them. – Developing facilitation skills: Exercises in facilitation. – Receiving and giving feedback: Learning how to receive and give feedback.
Day 5	
– Issues specific to flight instruction: Identifying the issues specific to flight instruction and how to manage them. – Common errors and problems: Being prepared for common errors and problems associated with trainees and how to manage them. – Report writing and data capture: Learning how to write adequate training reports. – Practical training exercises: Utilizing all instructional techniques learnt during the course including briefing, demonstration and training, and debriefing.	

IEs transitioning from traditional training to EBT

The following abbreviated course is intended as an example for instructors already qualified, prior to the introduction of EBT. It is assumed that the instructor is already qualified and has been assessed as competent according to ICAO Doc 9868 (PANS-TRG).

Day 1	Day 2
– Review of instructional techniques course Measure of understanding and refresher on learning from initial course. – Trainee learning styles Identifying the different trainee learning styles and how to adapt. – Instructional skills Developing instructional and briefing skills. – EBT Competencies Full understanding of competencies, how they are assessed and the grading process. – Competency assessment Practice in assessing competencies.	– Review of training techniques Review of the differences between directed instruction and facilitation. – Situational training Understanding how to adapt training to different training situations. – Competency assessment and debriefing. Practice in competency assessment and debriefing using facilitation of real crew activities.
Day 3	
– Competency assessment and debriefing. Continued practice in competency assessment and debriefing using facilitation. – Final exercises Briefing, instruction and developing debriefing skills including assessment of competencies.	

Operator Example 1

Day 1

Content	Learning Objectives	Method
Unit 00 Introduction		**45 min**
– Welcome – Self-introduction – Organizational matters – Daily schedule	Participants get to know each other and the seminar schedule.	– Lecture – Conversation
Unit 01 EBT Instructor/Evaluator		**75 min**
– EBT Instructor/Evaluator (EBT-IE) Training – Extension of the EBT-IE – Responsibilities of the EBT-IE – Instructor Competencies	Participants know the term EBT-IE, know how to become and remain an EBT-IE, and know their responsibilities. They know the IE Competencies against which they are assessed during the Competency Assessment.	– Lecture – Conversation – Group work – Presentation by participants – Exchange
Unit 02 EBT Basics		**45 min**
– EBT Principles – EBT Implementation	Participants know the difference between task- and competency based. They know the four principles of EBT and how EBT was introduced.	– Lecture – Conversation

Unit 03 Structure of EBT Modules		90 min
– Training requirements – a puzzle with many dimensions – Levels of documentation – EVAL and MT with relevant competencies – SBT with relevant competencies	Participants learn about the multidimensional nature of regulatory requirements for training and understand the importance of the Master Compliance list and other documentation. They know the different phases of the EBT module, their objectives, and the appropriate teaching methods for each.	– Lecture – Conversation

Unit 04 Full EBT		45 min
– Competency Report – Low Grade Policy – Enrolment in the EBT System	Participants know the components of the Competency Report, how to proceed with Low Grades, and how pilots become and remain enrolled in EBT.	– Lecture – Conversation

Unit 05 Line check / Line Evaluation		45 min
– Line check – Line Evaluation – Understanding of roles – Documentation	Participants know their role (with possibilities of influence and impact) in Line Evaluation and how it is documented and about the consequences of Low Grades.	– Lecture – Conversation – Exchange and discussion

Day 2

Content	Learning Objectives	Method

Unit 06 Targeted observation		135 min
– Competencies and Observable Behaviors (OBs) – Conduct of Assessment (ORCA)	Participants deal with the competencies and OBs and learn to observe them in a differentiated manner.	– Lecture – Group work with presentation and discussion

Unit 07 Differentiated assessment		60 min
– Assessment Method – Competency Assessment and Grading – Grading Scale	Participants know the assessment process, grading scale, the meaning of each grade and methodology to arrive at a grade.	– Lecture – Discussion – Video-based evaluation exercise with discussion

Unit 08 Didactics		60 min
– Didactic principles – Tasks of an instructor – Learning styles and activation of trainees – Possibilities of transcripts	Participants refresh the didactic basics of TRI Part 1, learn about different ways of transcribing and know that the chronology of observations has to be translated to the competencies structure.	– Lecture – Conversation – Exchange and discussion

Unit 09 Competency Assessment during Conversion Training		75 min
– Phase-specific assessment – Final completion standards – Interim completion standards	Participants – Learn completion standards and know where to find them – Evaluate individual competencies for crew members based on the videos they have seen and discuss them – Consider and discuss the benchmark regarding the training status	– Lecture – Conversation – Video-based evaluation exercise with discussion

Day 3

Content	Learning Objectives	Method

Unit 10 Competency Assessment – Overall Grading		75 min
– Recap – Competency Assessment at the end of conversion training	For the first time, the participants create an overall assessment for both crew members as a result of 3 video samples.	– Lecture – Assessment exercise in individual work – Exchange and discussion – Online poll

Unit 11 Competency Grading		105 min
– Grading exercise EVAL – Concordance – Excursus ICA – Grading Exercise MT	Participants learn to create competency gradings. They can compare their benchmarks with the other participants and also get to know the training management opinion as a benchmark. Participants learn about Concordance and ICAP.	– Individual work – Exchange and discussion – 2 video-based exercises – Online poll

Unit 12 Competency Based Debriefing		180 min
– Goals, structure and components of a debriefing – Increase activity level – Facilitation-techniques (DOs and DON'Ts) – Creating the competency report – Options for conducting competency-based debriefings – Selection of debriefing contents	Participants know the requirements for a competency-based debriefing. They know what belongs to a good preparation of the debriefing and know the way to a good debriefing result. They conduct a debriefing, grade and receive structured feedback. They are also able to debrief competency-based in a short form.	– Lecture – Conversation – Individual work – Exchange and discussion – Video-based evaluation exercise with discussion – Debriefing exercise in groups – Short debriefing exercise in plenum

Operator Example 2

Initial standardization training

Prior to conducting assessment and training within the Emirates' EBT program, the EBT instructor shall undergo EBT Initial Standardization training consisting of the below two components:

- EBT Instructor Training; and
- EBT Assessment of Competence

Course entry requirements

In order to complete the initial EBT Standardization program IEs shall:

- Hold a CAR-FCL instructor or examiner certificate
- Be considered suitable by the relevant Fleet Training Manager following the selection process documented in the Flight Training Process and Procedures Manual

Overview

EBT INSTRUCTOR COURSE				
Day Specific	**Hours**	**Event Details**	**Resource**	**Trainer Qualification**
DAY 1	8	EBT INSTRUCTOR CORE DAY 1	CLASSROOM	STC
DAY 2	8	EBT INSTRUCTOR CORE DAY 1	CLASSROOM	STC
DAY 3	6	EBT SESSION 1 OBSERVATION	FFS	STC
DAY 4	6	EBT SESSION 2 OBSERVATION	FFS	STC
DAY 5	6	EBT SESSION 1 CONDUCT UNDER SUPERVISION	FFS	STC
DAY 6	6	EBT SESSION 2 CONDUCT UNDER SUPERVISION	FFS	STC
DAY 7	6	EBT INSTRUCTOR – UNDERGOING ASSESSMENT of COMPETENCE	FFS	STC

Appendix E - Equivalency of Malfunction examples

This Appendix is intended to support operators implement EBT, Step 7: Equivalency of malfunctions.

E.I OEM example

The following table is an excerpt from the Airbus A320 FLIGHT CREW TRAINING STANDARDS Manual, version 1.4. It lists all of the Airbus abnormal and emergency procedures of the FCOM used as the reference for this FCTS version.

Note: *Operators implementing EBT shall refer to the original document!*

The "PROCEDURES" column indicates the procedure title as it appears on the Engine/Warning Display (E/WD) and in the QRH.

For each procedure, 5 columns indicate if an EBT characteristic is considered applicable based on the Airbus analysis:

- A column with the letter "I" identifies the "Immediacy" characteristic
- A column with the letter "L" identifies the "Loss of instrumentation" characteristic
- A column with the letter "D" identifies the "Degradation of aircraft control" characteristic
- A column with the letter "M" identifies the "Management of consequences" characteristic
- A column with the letter "C" identifies the "Complexity" characteristic

A letter "Y" meaning "YES" indicates when a characteristic is considered applicable to a procedure.

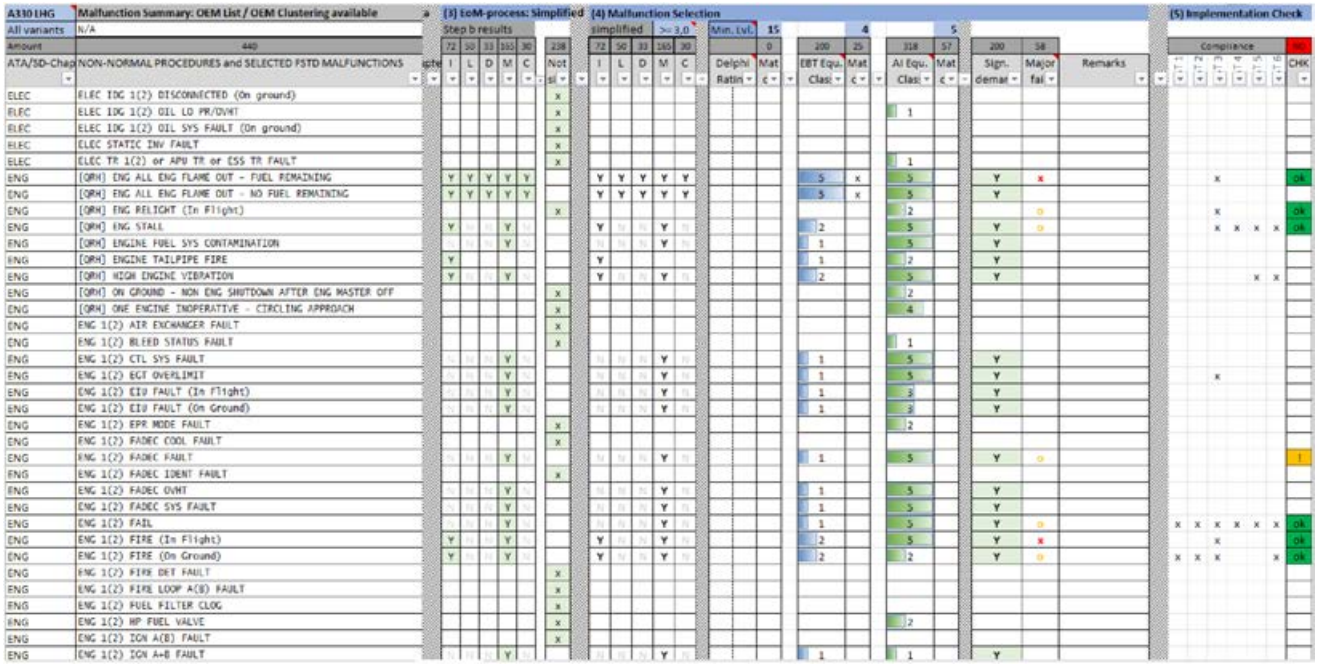
A letter "N" meaning "NO" indicates when a characteristic is considered not applicable to a procedure.

A320/FCOM/PROCEDURES/ABNORMAL and EMERGENCY PROCEDURES Issue Date: 04 SEP 2018 Training MSN 9791 Training reference standard 2.0.0		EBT Characteristics				
		I	L	D	M	C
AIR	AIR BLEED 1(2) OFF	N	N	N	N	N
AIR	AIR COND CTL 1(2) - A(B) FAULT	N	N	N	N	N
AIR	AIR ENG 1(2) BLEED ABNORM PR	N	N	N	N	N
AIR	AIR ENG 1(2) BLEED FAULT	N	N	N	N	N
AIR	AIR ENG 1(2) BLEED FAULT (BLEED NOT CLOSED)	N	N	N	N	N
AIR	AIR ENG 1(2) BLEED HI TEMP	N	N	N	N	N
AIR	AIR ENG 1(2) BLEED LEAK	N	N	N	N	N
AIR	AIR ENG 1(2) BLEED LO TEMP (Opposite Bleed Available)	N	N	N	N	N
AIR	AIR ENG 1(2) BLEED LO TEMP (Opposite Bleed not Available)	N	N	N	N	N
AIR	AIR ENG 1(2) BLEED NOT CLSD	N	N	N	N	N
AIR	AIR ENG 1(2) HP VALVE FAULT	N	N	N	N	N
AIR	AIR ENG 1(2) LEAK DET FAULT	N	N	N	N	N
AIR	AIR ENG 1+2 BLEED FAULT	Y	N	N	Y	N
AIR	AIR ENG 1+2 BLEED FAULT (LEFT LEAK and RIGHT LEAK)	Y	N	N	Y	N
AIR	AIR ENG 1+2 BLEED FAULT (LEFT LEAK)	Y	N	N	Y	N
AIR	AIR ENG 1+2 BLEED FAULT (RIGHT LEAK)	Y	N	N	Y	N
AIR	AIR ENG 1+2 BLEED LO TEMP	Y	N	N	Y	N
AIR	AIR FWD(AFT) CRG VENT FAULT (If Installed)	N	N	N	N	N
AIR	AIR L(R) WING LEAK	N	N	N	N	N
AIR	AIR L(R) WNG LEAK DET FAULT	N	N	N	N	N
AIR	AIR PACK 1(2) FAULT	N	N	N	N	N
AIR	AIR PACK 1(2) OFF	N	N	N	N	N
AIR	AIR PACK 1(2) OVHT	N	N	N	N	N
AIR	AIR PACK 1(2) REGUL FAULT	N	N	N	N	N
AIR	AIR PACK 1+2 FAULT	N	N	N	Y	N
AIR	AIR X BLEED FAULT	N	N	N	Y	N
APU	APU AUTO (EMER) SHUT DOWN	N	N	N	N	N
APU	APU FIRE DET FAULT	N	N	N	N	N
APU	APU FIRE LOOP A(B) FAULT	N	N	N	N	N
APU FIRE	APU FIRE	Y	N	N	Y	N
AUTO FLT	AUTO FLT A/THR LIMITED	N	N	N	N	N
AUTO FLT	AUTO FLT A/THR OFF	N	N	N	Y	N
AUTO FLT	AUTO FLT AP OFF	Y	N	N	Y	N
AUTO FLT	AUTO FLT FAC 1(2) FAULT	N	N	N	N	N
AUTO FLT	AUTO FLT FAC 1+2 FAULT	Y	N	Y	Y	Y
AUTO FLT	AUTO FLT FCU 1(2) FAULT	N	N	N	N	N
AUTO FLT	AUTO FLT FCU 1+2 FAULT	N	Y	N	Y	N

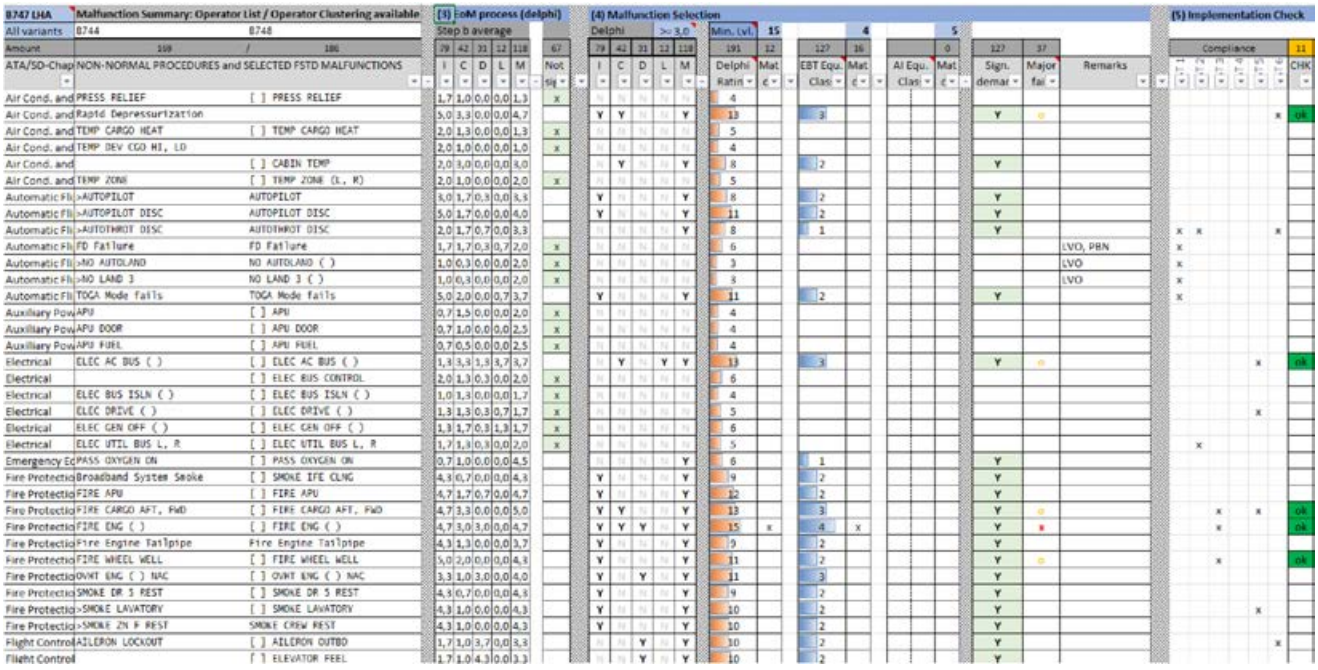
A320/FCOM/PROCEDURES/ABNORMAL and EMERGENCY PROCEDURES Issue Date: 04 SEP 2018 Training MSN 9791 Training reference standard 2.0.0		EBT Characteristics				
		I	L	D	M	C
AUTO FLT	AUTO FLT REAC W/S DET FAULT	N	N	N	N	N
AUTO FLT	AUTO FLT RUD TRIM 1(2) FAULT	N	N	N	N	N
AUTO FLT	AUTO FLT RUD TRIM SYS	N	N	N	Y	N
AUTO FLT	AUTO FLT RUD TRV LIM 1(2)	N	N	N	N	N
AUTO FLT	AUTO FLT RUD TRV LIM SYS	N	N	N	N	N
AUTO FLT	AUTO FLT TCAS MODE FAULT	N	N	N	N	N
AUTO FLT	AUTO FLT YAW DAMPER 1(2)	N	N	N	N	N
AUTO FLT	AUTO FLT YAW DAMPER SYS	N	N	Y	Y	Y
AVIONICS SMOKE	AVIONICS SMOKE	Y	Y	Y	Y	Y
BLEED	BLEED MONIT SYS 1(2) FAULT	N	N	N	N	N
BLEED	BLEED MONITORING FAULT	N	N	N	N	N
BRAKES	[MEM] LOSS OF BRAKING	Y	N	N	N	N
BRAKES	[QRH] ASYMMETRIC BRAKING	N	N	N	N	N
BRAKES	[QRH] RESIDUAL BRAKING	N	N	N	N	N
BRAKES	BRAKES A/SKID N/WS FAULT or ANTI SKID N/WS OFF	N	N	N	N	N
BRAKES	BRAKES ALTN BRK FAULT	N	N	N	N	N
BRAKES	BRAKES ALTN L(R) RELEASED	N	N	N	N	N
BRAKES	BRAKES AUTO BRK FAULT	N	N	N	N	N
BRAKES	BRAKES BRK Y ACCU LO PR	N	N	N	N	N
BRAKES	BRAKES HOT	N	N	N	Y	N
BRAKES	BRAKES NORM BRK FAULT	N	N	N	Y	N
BRAKES	BRAKES NORM+ALTN FAULT	N	N	N	Y	N
BRAKES	BRAKES PARK BRK FAULT (If Installed)	N	N	N	N	N
BRAKES	BRAKES PARK BRK LO PR	N	N	N	N	N
BRAKES	BRAKES PARK BRK ON	N	N	N	N	N
BRAKES	BRAKES RELEASED	N	N	N	Y	N
BRAKES	BRAKES SYS 1(2) FAULT	N	N	N	N	N
BRAKES-N/WS	BRAKES-N/WS MINOR FAULT	N	N	N	N	N
C/B	C/B TRIPPED	N	N	N	N	N
CAB PR	[QRH] CABIN OVERPRESSURE	Y	N	N	Y	N
CAB PR	CAB PR EXCESS CAB ALT	Y	N	N	Y	N
CAB PR	CAB PR EXCESS RESIDUAL PR	Y	N	N	N	N
CAB PR	CAB PR LDG ELEV FAULT	N	N	N	N	N
CAB PR	CAB PR LO DIFF PR	N	N	N	N	N
CAB PR	CAB PR OFV NOT OPEN	N	N	N	N	N
CAB PR	CAB PR SAFETY VALVE OPEN	N	N	N	Y	N
CAB PR	CAB PR SYS 1(2) FAULT	N	N	N	N	N
CAB PR	CAB PR SYS 1+2 FAULT	N	N	N	Y	N

E.II Operator example with/without OEM information

The following tables provide excerpts of the Equivalency of Malfunctions process for one aircraft type with existing OEM information (A330) and for an aircraft type without existing OEM information (B747). The two methodologies described in Section 4, Step 7, were used. A malfunction difficulty level was determined in following ways: OEM-based rating (A330, "AI Equivalency class") / SME-based rating (B747, "Delphi Rating"), and the number of malfunction characteristics regarded as significant ("EBT equivalency class").



A330 LHG	Malfunction Summary: OEM List / OEM Clustering available	(3) EoM-process: Simplified	(4) Malfunction Selection	(5) Implementation Check
All variants	N/A	Step b results	simplified	Compliance
Amount	440	72 50 33 155 30 238	72 50 33 155 30	Min. Lvl. 15 4 5
ATA/SD-Chap	NON-NORMAL PROCEDURES and SELECTED FSTD MALFUNCTIONS	I L D M C Not	I L D M C	Delphi Rating 0 Mat 200 25 EBT Equ. Class Mat 318 57 AI Equ. Class Mat 200 58 Sign. demar Major fai Remarks CHK
ELEC	ELEC IDG 1(2) DISCONNECTED (On ground)	x		
ELEC	ELEC IDG 1(2) OIL LO PR/OVHT	x		1
ELEC	ELEC IDG 1(2) OIL SYS FAULT (On ground)	x		
ELEC	ELEC STATIC INV FAULT	x		
ELEC	ELEC TR 1(2) or APU TR or ESS TR FAULT	x		1
ENG	[QRH] ENG ALL ENG FLAME OUT - FUEL REMAINING	Y Y Y Y Y	Y Y Y Y Y	5 x 5 Y x ok
ENG	[QRH] ENG ALL ENG FLAME OUT - NO FUEL REMAINING	Y Y Y Y Y	Y Y Y Y Y	5 x 5 Y
ENG	[QRH] ENG RELIGHT (In Flight)	x		2 o x ok
ENG	[QRH] ENG STALL	Y Y	Y Y	2 5 Y o x x x x ok
ENG	[QRH] ENGINE FUEL SYS CONTAMINATION	Y	N Y	1 5 Y
ENG	[QRH] ENGINE TAILPIPE FIRE	Y	Y	1 2 Y
ENG	[QRH] HIGH ENGINE VIBRATION	Y Y	Y Y	2 5 Y x x
ENG	[QRH] ON GROUND - NON ENG SHUTDOWN AFTER ENG MASTER OFF	x		2
ENG	[QRH] ONE ENGINE INOPERATIVE - CIRCLING APPROACH	x		4
ENG	ENG 1(2) AIR EXCHANGER FAULT	x		
ENG	ENG 1(2) BLEED STATUS FAULT	x		1
ENG	ENG 1(2) CTL SYS FAULT	Y	N Y	1 5 Y
ENG	ENG 1(2) EGT OVERLIMIT	Y	N Y	1 5 Y x
ENG	ENG 1(2) EIU FAULT (In Flight)	Y	N Y	1 3 Y
ENG	ENG 1(2) EIU FAULT (On Ground)	Y	N Y	1 3 Y
ENG	ENG 1(2) EPR MODE FAULT	x		2
ENG	ENG 1(2) FADEC COOL FAULT	x		
ENG	ENG 1(2) FADEC FAULT	Y	N Y	1 5 Y o 1
ENG	ENG 1(2) FADEC IDENT FAULT	x		
ENG	ENG 1(2) FADEC OVHT	Y	N Y	1 5 Y
ENG	ENG 1(2) FADEC SYS FAULT	Y	N Y	1 5 Y
ENG	ENG 1(2) FAIL	Y	N Y	1 5 Y o x x x x x x ok
ENG	ENG 1(2) FIRE (In Flight)	Y Y	Y Y	2 5 Y x x ok
ENG	ENG 1(2) FIRE (On Ground)	Y Y	Y Y	2 2 Y o x x x x ok
ENG	ENG 1(2) FIRE DET FAULT	x		
ENG	ENG 1(2) FIRE LOOP A(B) FAULT	x		
ENG	ENG 1(2) FUEL FILTER CLOG	x		
ENG	ENG 1(2) HP FUEL VALVE	x		2
ENG	ENG 1(2) IGN A(B) FAULT	x		
ENG	ENG 1(2) IGN A+B FAULT	Y	N Y	1 1 Y



B747 LHA	Malfunction Summary: Operator List / Operator Clustering available		(3) EoM process (delphi)	(4) Malfunction Selection	(5) Implementation Check
All variants	B744	B748	Step b average	Delphi	Compliance
Amount	169	/ 186	79 42 31 12 118 67	79 42 31 13 118	Min. Lvl. 15 12 4 16 0
ATA/SD-Chap	NON-NORMAL PROCEDURES and SELECTED FSTD MALFUNCTIONS		I C D L M Not	I C D L M	Delphi Rating Mat EBT Equ. Class Mat AI Equ. Class Mat Sign. demar Major fai Remarks CHK
Air Cond. and	PRESS RELIEF	[ ] PRESS RELIEF	1,7 1,0 0,0 0,0 1,3 x	N N N N N	4
Air Cond. and	Rapid Depressurization		5,0 3,3 0,0 0,0 4,7	Y Y N N Y	13 3 Y o x ok
Air Cond. and	TEMP CARGO HEAT	[ ] TEMP CARGO HEAT	2,0 1,3 0,0 0,0 1,3 x	N N N N N	5
Air Cond. and	TEMP DEV CGO HI, LO		2,0 1,0 0,0 0,0 1,0 x	N N N N N	4
Air Cond. and		[ ] CABIN TEMP	2,0 3,0 0,0 0,0 3,0	N Y N N Y	8 2 Y
Air Cond. and	TEMP ZONE	[ ] TEMP ZONE (L, M)	2,0 1,0 0,0 0,0 2,0 x	N N N N N	5
Automatic Fli	>AUTOPILOT	AUTOPILOT	3,0 1,7 0,3 0,0 3,3	Y N N N Y	8 2 Y
Automatic Fli	>AUTOPILOT DISC	AUTOPILOT DISC	5,0 1,7 0,0 0,0 4,0	Y N N N Y	11 2 Y
Automatic Fli	>AUTOTHROT DISC	AUTOTHROT DISC	2,0 1,7 0,7 0,0 3,3	N N N N Y	8 1 Y x x x
Automatic Fli	FD Failure	FD Failure	1,7 1,7 0,3 0,7 2,0 x	N N N N N	6 LVO, PBN x
Automatic Fli	>NO AUTOLAND	NO AUTOLAND ( )	1,0 0,3 0,0 0,0 2,0 x	N N N N N	3 LVO x
Automatic Fli	>NO LAND 3	NO LAND 3 ( )	1,0 0,3 0,0 0,0 2,0 x	N N N N N	3 LVO x
Automatic Fli	TOGA Mode fails	TOGA Mode fails	5,0 2,0 0,0 0,7 3,7	Y N N N Y	11 2 Y x
Auxiliary Pow	APU	[ ] APU	0,7 1,5 0,0 0,0 2,0 x	N N N N N	4
Auxiliary Pow	APU DOOR	[ ] APU DOOR	0,7 1,0 0,0 0,0 2,5 x	N N N N N	4
Auxiliary Pow	APU FUEL	[ ] APU FUEL	0,7 0,5 0,0 0,0 2,5 x	N N N N N	4
Electrical	ELEC AC BUS ( )	[ ] ELEC AC BUS ( )	1,3 3,3 1,3 3,7 3,7	N Y N Y Y	13 3 Y o x ok
Electrical		[ ] ELEC BUS CONTROL	2,0 1,3 0,3 0,0 2,0 x	N N N N N	6
Electrical	ELEC BUS ISLN ( )	[ ] ELEC BUS ISLN ( )	1,0 1,3 0,0 0,0 1,7 x	N N N N N	4
Electrical	ELEC DRIVE ( )	[ ] ELEC DRIVE ( )	1,3 1,3 0,3 0,7 1,7 x	N N N N N	5 x
Electrical	ELEC GEN OFF ( )	[ ] ELEC GEN OFF ( )	1,3 1,7 0,3 1,3 1,7 x	N N N N N	6
Electrical	ELEC UTIL BUS L, R	[ ] ELEC UTIL BUS L, R	1,7 1,3 0,3 0,0 2,0 x	N N N N N	5 x
Emergency Eq	PASS OXYGEN ON	[ ] PASS OXYGEN ON	0,7 1,0 0,0 0,0 4,5	N N N N Y	6 1 Y
Fire Protectio	Broadband System Smoke	[ ] SMOKE IFE CLNG	4,3 0,7 0,0 0,0 4,3	Y N N N Y	9 2 Y
Fire Protectio	FIRE APU	[ ] FIRE APU	4,7 1,7 0,7 0,0 4,7	Y N N N Y	12 2 Y
Fire Protectio	FIRE CARGO AFT, FWD	[ ] FIRE CARGO AFT, FWD	4,7 3,3 0,0 0,0 5,0	Y Y N N Y	13 3 Y o x x ok
Fire Protectio	FIRE ENG ( )	[ ] FIRE ENG ( )	4,7 3,0 3,0 0,0 4,7	Y Y Y N Y	15 x 4 x Y x ok
Fire Protectio	Fire Engine Tailpipe	Fire Engine Tailpipe	4,3 1,3 0,0 0,0 3,7	Y N N N Y	9 2 Y
Fire Protectio	FIRE WHEEL WELL	[ ] FIRE WHEEL WELL	5,0 2,0 0,0 0,0 4,3	Y N N N Y	11 2 Y o x ok
Fire Protectio	OVHT ENG ( ) NAC	[ ] OVHT ENG ( ) NAC	3,3 1,0 3,0 0,0 4,0	Y N Y N Y	11 3 Y
Fire Protectio	SMOKE DR 5 REST	[ ] SMOKE DR 5 REST	4,3 0,7 0,0 0,0 4,3	Y N N N Y	9 2 Y
Fire Protectio	>SMOKE LAVATORY	[ ] SMOKE LAVATORY	4,3 1,0 0,0 0,0 4,3	Y N N N Y	10 2 Y x
Fire Protectio	>SMOKE ZN 4 REST	SMOKE CREW REST	4,3 1,0 0,0 0,0 4,3	Y N N N Y	10 2 Y
Flight Control	AILERON LOCKOUT	[ ] AILERON OUTBD	1,7 1,0 3,7 0,0 3,3	N N Y N Y	10 2 Y x
Flight Control		[ ] ELEVATOR FEEL	1,7 1,0 4,3 0,0 3,3	N N Y N Y	10 2 Y

Appendix F - Equivalency of Approaches example

This Appendix is intended to support operators implement EBT, Step 8: Equivalency of approaches.

EBT-Phase	Type	Approach description	Characteristic	Flt Method	Min. Freq.[1]	Remarks
MT/MV	A	2D RNP	Degraded guidance	2D	B (A)[2]	RNP and flight method 2D combined
		Standard Visual	Degraded guidance	**2D**	**C**	EBT 4, LHA: 2/4/6
all types	B	**Raw Data ILS/GLS**	Degraded guidance	**3D**	**C**	EBT 5, LHA: 1/3/5
	SPA	LVO		3D	B (A)[2]	RNP AR: tbd
Operator/type-specific	SPA	PBN (AR), Non-CDFA[3]	Degraded guidance	3D	B	Presently N/A (see CAT.OP.MPA.115)
		Steep > 4.5°	Unusual design	2D / 3D	B	Full: EBT 1/3/5 (see CAT.POL.A.245)
	A/B	**Steep 3.6°-4.5°/ High Alt[3]**	Unusual design / low freq.	2D / 3D	**C**	EBT 3 (if appl., only steep > 4.5°)
	B	(Degraded) HUD operation	Degraded guidance	3D	acc. OSD	(A220, B787)
EVAL/SBT	A	**Circling**	Degraded guidance	**2D**	**C**	EBT 3
		NPA, cold temperature corrected	Low frequency	**2D / 3D**	**C**	EBT 1
all types[3]		**Visual from unusual position**	Degraded guidance	**2D**	**C**	EBT 4, required by FRA CF
	SPA / B	LVO	Low frequency	3D	B	LVO and App type B combined
Operator/type-specific[3]	A	**Curved**	Unusual design	2D / 3D	**C**	EBT 1
		Unusual rwy design[4]	Unusual design	2D / 3D	**C**	EBT 6 (SR: narrow runway)
		CFO / LDA	Unusual design	2D	**C**	as appl.
	(SPA)	**PRM**	Low frequency	**3D**	**C**	EBT 4

Notes: Grey = Basic legal / OSD requirement – **Blue = LHG → inclusion of Equivalency of Approaches (EoA) analysis**
[1] Higher frequency, if necessary based on SMS data and/or authority/OSD requirements (e.g. for steep approaches ≥4,5°)
[2] A during Mixed Implementation, B in Full EBT
[3] Airports based on type-specific route network. Infrequently visited airfields should be integrated, if available in FSTD
[4] One or more of the following criteria: slope > 0.5%, rwy width < 45m, rwy length < 2.000m, no centerline lights, no TDZ lights, unusual markings

Appendix G - EBT program development guidance

This Appendix is intended to support operators implement EBT:

- Step 9: Assessment and training topics distribution, and
- Step 10: Module design

Using the data in this Appendix, operators can develop recurrent training programs based on the EBT concept. It is imperative that the recommendations provided in this guide are well understood by developers of an EBT program.

Note: *According to European EBT regulations, program design during mixed implementation should demonstrate as a minimum:*

- Traditional proficiency check elements are included in the mixed EBT program
- EBT training topics and frequencies are included
- There should be a reasonable contextualization of the example scenarios based on the real operation performed by the operator and feedback from the SMS
- Data provided by the EBT system is used to design the EBT program (e.g., if deficiencies are found in one competency across the fleet/pilot rank/airline, the future EBT modules should reinforce this competency)

Background – Prioritization

Prioritization of the training topics is probably the most important result from the EBT data analysis. It is a key part in the process for translating data into useful events and scenarios to assess and develop pilot performance in recurrent training programs. This result is the first rigorous attempt to rank parameters such as threats, errors and competencies, along with factors affecting accidents and serious incidents, from multiple data sources systematically to formulate a recurrent training program.

The EBT Data Report and its amendment (2021) show the feasibility of collecting an adequate set of operational and training data; developing the necessary methods to analyze that data, while corroborating results to produce a criticality ranking of training topics. The prioritization process occurs for each aircraft generation by ordering critical parameters to highlight differences and commonality. There is sufficient flexibility in the process to allow enhancement according to mission, culture and type of aircraft. The data are also used to build scenarios for use in recurrent assessment and training conducted in an FSTD qualified for the purpose according to the Manual of Criteria for the Qualification of Flight Simulation Training Devices (Doc 9625), Volume I – Aeroplanes.

The process used is transparent and repeatable and results in a unique prioritization, according to aircraft generation. Three levels of priority A, B and C were used to determine the frequency of pilot exposure to the defined training topics within a 3-year rolling recurrent training program.

For the creation of the EBT recurrent training program, a cautious approach was taken, and the suggested frequency of training is higher than the results indicate unless the corroborating data is very strong. If the data are quite strong in the generation that demands more training, the training category in the adjacent generation is upgraded.

Note: *Operational and training data from multiple sources indicate that pilots operating the more modern generation aircraft need less time to perform certain maneuvers. However, modern generation aircraft are more complex, and therefore pilots need more time to achieve a defined level of competency operating the aircraft in all levels of automation/laws. While the number of assessment and training topics is slightly less in early aircraft generations, the training time in the FTSD should be largely the same.*

G.I Aircraft Generations

The EBT program considers the differences between aircraft generations by tailoring the recurrent training program to the particular aircraft generation. The following is representative of the generations of aircraft considered within this guide.

Generation	Definition	Types
Generation 4 – Jet	From 1988 EFIS cockpit – FMS equipped FADEC Fly-by-wire control systems Advanced flight envelope protection Integrated auto flight control system – navigation performance, and terrain avoidance systems	A318/A319/A320/A321 (including neo), A330, A340-200/300, A340-500/600, A350, A380, Bombardier C Series (Airbus A220), B777, B787, COMAC C919, Embraer E170/E175/E190/E195
Generation 3 – Jet	From 1969 EFIS cockpit – FMS equipped FADEC Integrated auto flight control system – navigation performance, and terrain avoidance systems Basic flight envelope protection – stick shaker/pusher	A310/A300-600, B717, B737-300/400/500, B737-600/700/800 (NG), B737 MAX, B747-400, B747-8, B757, B767, BAE 146, MD11, MD80, MD90, Fokker F70, F100, Bombardier CRJ Series, COMAC ARJ21, Embraer ERJ 135/145
Generation 3 – Turboprop	From 1992 EFIS cockpit – FMS equipped EEC/ECU or higher engine control Integrated auto flight control system – navigation performance and terrain avoidance systems Basic flight envelope protection – stick shaker/pusher	ATR 42-600, ATR 72-600, Bombardier Dash 8-400, BAE ATP, Saab 2000
Generation 2 – Jet	From 1964 Integrated auto flight system. EEC/ECU or higher engine control Analogue/CRT instrument display Basic flight envelope protection – stick shaker/pusher	A300 (except A300-600), BAC111, B727, B737-100/200, B747-100/200/300, DC9, DC10, Fokker F28, L1011
Generation 2 – Turboprop	From 1964 Analogue/CRT instrument display EEC/ECU Basic flight envelope protection – stick shaker/pusher Integrated auto flight control system	ATR 42, ATR 72 (all series except-600), BAE J-41, Embraer 120, Fokker F27/50, Bombardier Dash 7 and Dash 8-100/200/300 Series, Convair 580-600 Series, Saab 340, Shorts 330 and 360
Generation 1 – Jet	From 1952 First commercial jets. Manual engine control Analogue instrument display Not integrated auto flight control system Basic flight envelope protection – stick shaker/pusher, attitude warning	DC8, B707

G.II Using the assessment and training matrices

The following table describes the component elements in the column headings of the matrices as follows:

Component	Description
Assessment and Training Topic	A topic or grouping derived from threats, errors or findings from data analysis, to be considered for assessment and mitigation by training. Topics marked with "ISI" are those considered only as part of a defined in-seat instruction or demonstration exercise.
Frequency	The priority of the topic to be considered in an EBT program, according to evidence is linked to a recommended frequency. There are three levels of frequency: A – assessment and training topic to be included with defined scenario elements during every EBT module B – assessment and training topic to be included with defined scenario elements during alternate EBT modules (i.e., at least three times in the three-year cycle and at least once within each three consecutive modules); and C – assessment and training topic to be included with defined scenario elements at least once in the three-year cycle of the EBT program
Flight phase for activation	The flight phase for the realization of the critical threat or error in the assessment and training scenario as set out in Appendix G.V.
Description	A description of the training topic (includes type of topic, being threat, error or focus).
Desired outcome	Simple evaluative statements on the desired outcome (includes performance criteria or training outcome).
Example scenario elements	A list of example scenarios addressing the training topic. This list contains only key elements of sample scenarios.
Competency map	Competencies marked are those considered critical in managing the scenario. They were determined according to the following: a) those competencies considered most critical to the successful management of the defined threat or error; or b) those competencies most likely to be linked to the root cause of poor performance, in the case of unsuccessful management of a defined threat or error.

Note: *The competency map can also be used to determine which scenarios or combinations of scenarios may be used in developing particular competencies.*

The following table describes the flight phases for the realization of the critical threat or error in the assessment and training scenarios.

Abbreviation	Flight Phase	Description
ALL	All	Any or all phases of flight
GND	Flight planning, pre-flight, engine start and taxi-out	Ground phases up to when the crew increases thrust for the purpose of taking-off.
	Taxi-in, engine shut-down, post-flight and flight closing	From the speed that permits the aircraft to be maneuvered by means of taxiing for the purpose of arriving at a parking area until the crew completes post-flight and flight closing duties.
TO	Take-off	This phase begins when the crew increases the thrust for the purpose of taking-off. It ends after the speed and configuration are established at a defined maneuvering altitude or to continue the climb for the purpose of cruise.

Abbreviation	Flight Phase	Description
CLB	Climb	This phase begins when the crew establishes the aircraft at a defined speed and configuration enabling the aircraft to increase altitude for the purpose of cruise. It ends with the aircraft established at a predetermined constant initial cruise altitude at a defined speed.
CRZ	Cruise	The cruise phase begins when the crew establishes the aircraft at a defined speed and predetermined constant initial cruise altitude and proceeds in the direction of a destination. It ends with the beginning of descent for the purpose of an approach.
DES	Descent	This phase begins when the crew departs the cruise altitude for the purpose of an approach at a particular destination. It ends when the crew initiates change in aircraft configuration and/or speed to facilitate a landing on a particular runway.
APP	Approach	This phase begins when the crew initiates changes in aircraft configuration and/or speeds, enabling the aircraft to maneuver for the purpose of landing on a particular runway. It ends when the aircraft is in the landing configuration and the crew is dedicated to land on a specific runway. It also includes go-around where the crew aborts the descent to the planned landing runway during the approach phase. Go-around ends after speed and configuration are established at a defined maneuvering altitude or to continue the climb for the purpose of cruise.
LDG	Landing	This phase begins when the aircraft is in the landing configuration and the crew is dedicated to touchdown on a specific runway. It ends when the speed permits the aircraft to be maneuvered by means of taxiing for the purpose of arriving at a parking area.

G.III EBT program overarching principles

EBT training program design overarching principles should be applied for the development of any EBT module.

These overarching principles regroup several training topics from the 1st Edition of the EBT Data Report (2014) and are foundational components of any EBT program as they relate directly to the pilot competencies training and assessment.

In particular, the following training topics are no longer trained in isolation since Amendment 7 to ICAO Doc 9868 (PANS-TRG) clarified the relation between CRM training, pilot competencies and Threat and Error Management. Amendment 7 to ICAO Doc 9868 (PANS-TRG) also provided guidance for CBTA (including EBT) course development regarding the integration of TEM and surprise elements with the goal to enhance pilot resilience.

- Competencies non-technical (CRM)
- Compliance
- Workload, distraction, pressure
- Monitoring and cross-checking
- Surprise
- Aircraft system management

The following simplified assessment and training matrix is applicable to the airplane generation described in G.I for the design and delivery of all EBT modules (equivalent to frequency A) and for all flight phases.

Topic	Description	Desired outcome	Remark
Pilot Competencies **Note**: This encompasses training topic competency non-technical (CRM)	ICAO competency framework for aeroplane pilot licenses, ratings and recurrent training (ICAO Doc 9868 PANS-TRG Part II, section 1, Chapter 1)	The pilot demonstrates the competencies to the final competency standard defined by the operator's adapted competency model approved by the authority.	The competencies of the approved adapted competency model provide individual and team countermeasures to threats and errors and undesired aircraft states. CRM skills are embedded in the approved adapted competency model.
Compliance	Compliance means conforming to rules, procedures, limitations, and clearances. An operator will typically require that flight crews comply with all operational procedures and instructions unless there is an urgent and compelling reason not to do so.	The desired outcome from an intentional or unintentional compliance event would be that the pilots – recognize that a non-compliance has occurred – make a verbal announcement – take appropriate action – restore a safe flight path if necessary – manage the consequences	EBT training program designers should consider scenarios where the pilots' cognitive load (resources required by the mental processes of perception, memory, judgement, and reasoning) significantly increases to challenge the pilot's ability to detect and correct the potential noncompliance errors. **Note**: The cognitive load is considered to be significantly increased when it is well above the cognitive load induced by the application of the normal standard operating procedures. EBT Instructors should use noncompliance errors as a learning opportunity during the facilitated debrief to identify the root cause and to provide the means to improve performance.
Workload, distraction, pressure	High workload, distraction and pressure can arise through various means, from a system malfunction, adverse weather or low performing ATC controller, or a combination of these.	The pilot demonstrates the competency Workload Management to the final competency standard defined by the operator's adapted competency model approved by the authority.	EBT training program designers should consider scenarios where the pilots' workload significantly increases in order to challenge the pilot's demonstration of the competency Workload Management. **Note**: The workload is considered to be significantly increased when it is well above the workload induced by the application of the normal standard operating procedures.

Topic	Description	Desired outcome	Remark
Monitoring and cross checking	Monitoring is a cognitive process to compare an actual to an expected state. Monitoring and cross checking are embedded in the ICAO competency framework for aeroplane pilot licenses, ratings and recurrent training (ICAO Doc 9868 PANS-TRG Part II, section 1, Chapter 1) Monitoring and cross checking require knowledge, skills and attitudes to create a mental model and to take appropriate action when deviations are recognized.	The pilots – recognize mismanaged aircraft state. – take appropriate action if necessary – restore desired aircraft state – identify and manage consequences **Note**: Special emphasis is placed on the demonstration by the pilot of the following Observable Behaviors (OB): OB1.3, OB1.4, OB1.5, OB2.1, OB2.4, OB2.8, OB3.2, OB3.6, OB4.2, OB4.7, OB6.7, OB7.1, OB7.2, OB7.3, OB8.7, OB8.8	In-seat instruction (ISI) may be used as a method to train monitoring and cross checking. Scripted role-play scenarios encompassing the need to monitor flight path excursions from the instructor pilot (PF), detect errors and make appropriate interventions, either verbally or by taking control as applicable. The scenarios should be realistic and relevant and are for the purpose of demonstration and reinforcement of effective flight path monitoring. Demonstrated role-play should contain realistic and not gross errors, leading at times to a mismanaged aircraft state, which can also be combined with upset management training
Surprise **Note**: Surprise should be distinguished from "Startle" which is defined as the initial short-term, involuntary physiological and cognitive reactions to an unexpected event that commence the normal human stress response.	"Surprise" means the emotionally based recognition of a difference in what was expected and what is actual. The data analyzed during the development of this guide and of the EBT concept indicated substantial difficulties encountered by crews when faced with a threat or error, which was a surprise, or an unexpected event.	Pilots demonstrate their ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse event and disruptions. Special emphasis is placed on the demonstration of OB 6.9 Demonstrates resilience when encountering an unexpected event	EBT training program designers should ensure that pilots are exposed to unexpected events or an unexpected sequence of events during every EBT module. Wherever possible, consideration should be given towards variations in the types of scenarios, times of occurrences and types of occurrences, so that pilots do not become overly familiar with repetitions of the same scenarios. Variations should be the focus of EBT program design, and not left to the discretion of individual instructors, in order to preserve program integrity and fairness
Aircraft system management	Aircraft system management describes the normal and abnormal system operations, based on defined instructions and standard operating procedures. The underlying foundation for successfully managing aircraft systems is knowledge of systems and understanding of the interactions between systems. Aircraft system management relates directly to the competency "Application of procedures and compliance with regulations" and the application of knowledge.	The pilot demonstrates the competency "Application of procedures and compliance with regulations" to the final competency standard defined by the operator's adapted competency model approved by the authority. The pilot demonstrates his ability to: – recall and proactively update relevant knowledge; and – apply acquired knowledge to the operational environment, including TEM.	This is not considered as a stand-alone topic. It links with the topic "compliance". Where a system is not managed according to normal or defined procedures, this is determined as a non-compliance.

G.IV Generation-specific assessment and training matrix

This section provides the recurrent assessment and training matrix according to the particular airplane generation. A list of such airplanes is in G.I. The matrix supports the EBT implementation process Step 9: Assessment and training topics distribution over a 3-year period.

Notes:

1. *Given the very small number of turbo-jet aeroplanes of the first generation in current use in commercial air transport operations and the lack of appropriate FSTD for recurrent training, it has not been deemed possible to provide an assessment and training matrix for those aeroplanes.*
2. *This Appendix is based on ICAO Doc 9995 Manual for Evidence-based Training, Edition 2 (draft Sep 2023). ICAO Doc 9995, Edition 1 and European EBT regulations currently use a slightly different Assessment and Training Topic table. Operators should ensure that they implement the assessment and training topic matrices required by the relevant CAA for the development of their EBT program.*

Assessment and training topic matrix (MT/MV phase)		**Frequency according aircraft generation**				
Assessment and training topic	**Description (includes type of topic, being threat, error or focus) / remarks**	**4 Jet**	**3 Jet**	**3 Prop**	**2 Jet**	**2 Prop**
Rejected take-off	Engine failure after the application of take-off thrust and before reaching V1.	A	A	A	A	A
Failure of critical engine between V1 & V2 (until stabilized)	Failure of a critical engine from V1 and before reaching V2 in lowest CAT I visibility conditions.	A	A	A	A	A
Failure of critical engine between V1 & V2 (until engine-out procedures complete)	Failure of a critical engine from V1 and before reaching V2 in lowest CAT I visibility conditions.	B	B	B	B	B
Emergency Descent	Initiation of emergency descent from normal cruise altitude.	C	C	C	C	C
Go-around	Go-around, all engines operative.	A	A	A	A	A
Engine-out approach & go-around	With a critical engine failed, manually flown normal precision approach to DA, followed by manually flown go-around, the whole maneuver to be flown without visual reference.	A	A	A	A	A
Engine-out landing	With a critical engine failed, normal landing.	A	A	A	A	A
Adverse weather	Thunderstorm, heavy rain, turbulence, ice build up to include de-icing issues, as well as high temperature conditions. The proper use of use of anti-ice and de-icing systems should be included generally in appropriate scenarios.	A	A	A	A	A
Automation management	The purpose of this topic is to encourage and develop effective flight path management through proficient and appropriate use of flight management system(s), guidance and automation including transitions between modes, monitoring, mode awareness, vigilance and flexibility needed to change from one mode to another. Included in this topic is the means of mitigating errors described as: mishandled auto flight systems, inappropriate mode selection, flight management system(s) and autopilot usage.	A	A	A	A	A

Assessment and training topic matrix (MT/MV phase)		Frequency according aircraft generation				
Assessment and training topic	**Description (includes type of topic, being threat, error or focus) / remarks**	**4 Jet**	**3 Jet**	**3 Prop**	**2 Jet**	**2 Prop**
Error management and mismanaged aircraft state	By scenario design, pilots should have the opportunity to practice the right techniques and attitudes related to error management through pilot performance, and that instructors have the opportunity to assess and train this topic in a realistic environment. In addition, the operator may also develop scripted role-play scenarios in the form of ISI. These scenarios cater for the need to monitor flight path excursions from the instructor pilot (PF), detect errors and make appropriate interventions, either verbally or by taking control as applicable. The scenarios should be realistic and relevant, and are for the purpose of demonstration and reinforcement of effective flight path monitoring. Demonstration scenarios may also be used. Demonstrated role-play should contain realistic and not gross errors, leading at times to a mismanaged aircraft state, which can also be combined with upset management training.	A	A	A	A	A
Go around management	Any threat or error that can result in circumstances that require a decision to go-around, in addition to the execution of the go-around. Go-around scenarios should be fully developed to encourage effective leadership and teamwork, in addition to problem solving and decision making, plus execution using manual aircraft control or flight management system(s) and automation as applicable. Design should include the element of surprise and scenario-based go-arounds should not be predictable and anticipated. This topic is completely distinct from the go-around maneuver listed in the MT section that is intended only to practice psychomotor skill and a simple application of the procedures.	A	A	A	A	A
Manual aircraft control	Controls the flight path through manual control.	A	A	A	A	A
Unstable approach	Reinforce stabilized approach philosophy and adherence to defined parameters. Encourage go-arounds when crews are outside these parameters. Develop and sustain competencies related to the management of high energy situations.	A	A	A	A	A
Adverse wind	Adverse wind/crosswind. This includes tailwind but not ATC misreporting of the actual wind.	B	B	C	B	C
Aircraft system malfunctions, including operations under MEL	Any internal failure(s) apparent or not apparent to the crew. Any item cleared by the MEL but having an impact upon flight operations. E.g., thrust reverser locked. Malfunctions to be considered should have one or more of the following characteristics: – Immediacy – Complexity – Degradation of aircraft control – Loss of primary instrumentation – Management of consequences	B	B	B	B	B
Approach, visibility close to minimum	Any situation where visibility becomes a threat.	B	B	B	?	C
Landing	Pilots should have opportunities to practice landings in demanding situations at the defined frequency. Data indicates that landing problems have their roots in a variety of factors, including appropriate decision making, in addition to manual aircraft control skills if difficult environmental conditions exist. The purpose of this item is to ensure that pilots are exposed to this during the program.	B	B	B	B	B

Assessment and training topic matrix (MT/MV phase)		Frequency according aircraft generation				
Assessment and training topic	**Description (includes type of topic, being threat, error or focus) / remarks**	**4 Jet**	**3 Jet**	**3 Prop**	**2 Jet**	**2 Prop**
Runway or taxiway condition	Contamination or surface quality of the runway, taxiway, or tarmac including foreign objects.	B	B	C	C	C
Terrain	Alert, warning, or conflict.	B	B	C	C	B
Upset Prevention and Recovery (UPRT)	An airplane upset is defined as an undesired airplane state in flight characterized by unintentional divergences from parameters normally experienced during line operations or training. An airplane upset may involve pitch and/or bank angle divergences as well as inappropriate airspeeds for the conditions. **Note.** – Required UPRT elements and respective components are listed in ICAO Doc 10011, table 2-1. The elements are numbered with letters from A to K. Each element is made up of several numbered components. To comply with the requirements, include elements in a B frequency, such that all elements are covered over a period not exceeding 3 years. According to the principles of EBT, covering one component should satisfy the requirement to cover the whole element of recognizing and preventing the development of upset conditions.	B	B	B	B	B
Windshear recovery	With or without warnings including predictive. A wind shear scenario is ideally combined into an adverse weather scenario containing other elements.	B	B	B	B	C
ATC	ATC error. Omission, miscommunication, garbled, poor quality transmission, all of these act as distractions to be managed by the crew. The scenarios should be combined where possible with others of the same or higher weighting, the principal reason being to create distractions.	C	C	-	-	-
Engine failure	Any engine failure or malfunction that causes loss or degradation of thrust that impacts performance. This is distinct from the engine-out maneuvers described in the maneuvers training section above, which are intended only for the practice of psychomotor skill and reinforcement of procedures in managing engine failures.	C	C	C	B	B
Fire and smoke management	This includes engine, electric, pneumatic, cargo fire, smoke or fumes.	C	C	C	B	C
Loss of communications	Lost or difficult communications. Either through pilot mis-selection or a failure external to the aircraft. This could be for a few seconds or a total loss.	-	-	C	C	C
Managing loading, fuel, performance errors	A calculation error by one or more pilots, or someone involved with the process, or the process itself, e.g., incorrect information on the load sheet.	C	C	C	C	C
Navigation	External NAV failure. Loss of GPS satellite, ANP exceeding RNP, loss of external NAV source(s)	C	C	C	C	C
Operations and type specific	Topics covered by the equivalency of approaches process, or additional topics mandated by the OEM or the Authority.	C	C	C	C	C
Pilot Incapacitation	Consequences for the non-incapacitated pilot.	C	C	C	C	C
Traffic	Traffic conflict. ACAS RA or TA, or visual observation of conflict, which requires evasive maneuvering.	C	C	C	C	C

G.V Scenario elements and competency map

This section assists operators perform the EBT implementation process, Step 10: Module design by providing example scenario elements and a related competency map for the assessment and training topics listed in section G.IV.

EBT module design should be based on the assessment and training topics required for the specific module. The combination of scenario elements allows operators to design scenarios which involve the required set of competencies.

Note: *Not all scenario elements and related competencies may be fully applicable for each aeroplane generation and each aeroplane type within a specific generation. Examples are:*

- Predictive wind shear warning: The required system may not be available for all aeroplanes of an operator, even of the same aeroplane type.
- Wind shear encounter: Depending on available aeroplane systems and OEM/Operator-specific procedures, this maneuver may be flown manually or with the autopilot.
- ACAS warning requiring crew intervention: Depending on the aircraft type, a Resolution Advisory may be flown manually or with the autopilot, even for aeroplanes within the same aeroplane type (e.g., automatic mode available for newer, but not for older A320).
- Emergency Descent: Depending on the aircraft type, this maneuver may be flown manually or with the autopilot, even for aeroplanes within the same generation (e.g., automatic mode only available for A350/A380).

As not all possible variations can be considered in the following table, the operator may:

- Select scenario elements during the module design process which are applicable for the operator-specific aeroplane types, and
- Modify the competency map with regards to FPM vs. FPA, as mandated by the operator-specific procedures

ICAO-defined scenario elements

The following table is an excerpt from ICAO Doc 9995 Manual for Evidence-based Training, Edition 2 (draft Sep 2023).

Note: *ICAO Doc 9995, Edition 1, and the European EBT regulations currently use a slightly different Assessment and Training Topic table with integrated scenario elements and competency maps (as referenced in this section G.V). Operators should ensure that they implement the assessment and training topic matrices required by the relevant CAA for the development of their EBT program.*

Assessment and training topic	Description (includes type of topic, being threat, error or focus)	Desired outcome (includes performance criteria OR training outcome)	Example scenario elements	Flight phase for activation	Competency Map							
					PRO	COM	FPA	FPM	LTW	PSD	SAW	WLM
SCENARIO ELEMENTS AND COMPETENCY MAP (Manoeuvres training phase)												
Rejected take-off	Engine failure after the application of take-off thrust and before reaching V1	Demonstrate manual aircraft control skills with smoothness and accuracy as appropriate to the situation Detect deviations through instrument scanning Maintain spare mental capacity during manual aircraft control Maintain the aircraft within the flight envelope Apply knowledge of the relationship between aircraft attitude, speed and thrust	From initiation of take-off to complete stop (or as applicable to procedure)	TO	x			x				
Failure of critical engine between V1 & V2	Failure of a critical engine from V1 and before reaching V2 in lowest CAT I visibility conditions		The manoeuvre is considered to be complete at a point when aircraft is stabilised at normal engine-out climb speed with the correct pitch and lateral control, in trim condition and, as applicable, autopilot engagement	TO	x			x				
Failure of critical engine between V1 & V2	Failure of a critical engine from V1 and before reaching V2 in lowest CAT I visibility conditions		The manoeuvre is considered to be complete at a point when aircraft is stabilised in a clean configuration with engine-out procedures completed	TO	x			x				
Emergency descent	Initiation of emergency descent from normal cruise altitude		The manoeuvre is considered to be completed once the aircraft is stabilised in emergency descent configuration (and profile)	CRZ	x		x	x				
Engine-out approach & go-around	With a critical engine failed, manually flown normal precision approach to DA, followed by manually flown go-around, the whole manoeuvre to be flown without visual reference		This manoeuvre should be flown from intercept to centreline until acceleration after go-around. The manoeuvre is considered to be complete at a point when aircraft is stabilised at normal engine-out climb speed with the correct pitch and lateral control, in trim condition and, as applicable, autopilot engagement* (describe generally critical part of manoeuvre)	APP	x			x				
Go-around	Go-around, all engines operative		High energy, initiation during the approach at 150 to 300 m (500 to 1000 ft) below the missed approach level off altitude	APP	x		x	x				
			Initiation of go-around from DA followed by visual circuit and landing	APP	x		x	x				
			During flare/rejected landing	APP	x		x	x				
Engine-out landing	With a critical engine failed, normal landing		Initiation in a stabilized engine-out configuration from not less than 3 NM final approach, until completion of roll-out	LDG	x			x				

Assessment and training topic	Description (includes type of topic, being threat, error or focus)	Desired outcome (includes performance criteria OR training outcome)	Example scenario elements	Flight phase for activation	Competency Map							
					PRO	COM	FPA	FPM	LTW	PSD	SAW	WLM
EXAMPLE SCENARIO ELEMENTS AND COMPETENCY MAP (Evaluation and scenario-based training phases)												
Adverse Weather	Thunderstorm, heavy rain, turbulence, ice build up to include de-icing issues, as well as high temperature conditions. The proper use of use of anti-ice and de-icing systems should be included generally in appropriate scenarios.	Anticipate adverse weather Prepare for suspected adverse weather Recognize adverse weather Take appropriate action Apply appropriate procedure correctly Assure aircraft control	Predictive wind shear warning before take-off, as applicable	GND	x	x				x		
			Adverse weather scenario, e.g., thunderstorm activity, precipitation, icing	TO		x			x	x		x
			Wind shear encounter during take-off, not predictive	TO	x			x			x	
			Predictive wind shear warning during take-off	TO	x	x				x	x	
			Crosswinds with or without strong gusts on take-off	TO	x			x				
			Turbulence that increases to severe turbulence	CRZ		x			x		x	x
			Wind shear encounter scenario during cruise	CRZ	x		x			x	x	x
			Reactive wind shear warning during approach or go-around	APP	x		x	x			x	
			Predictive wind shear warning during approach or go-around	APP	x	x				x	x	
			Thunderstorm encounter during approach or on missed approach	APP	x					x	x	
			Increasing tailwind on final (not reported)	APP	x	x				x	x	
			Approach and landing in demanding weather conditions, e.g., turbulence, up and downdrafts, gusts and crosswinds including shifting wind directions	APP				x		x	x	
			Non-precision approach in cold temperature conditions, requiring altitude compensation for temperature, as applicable to type	APP	x	x					x	
			Crosswinds with or without strong gusts on approach, final and landing (within and beyond limits)	APP LDG	x			x		x		
			In approach, unexpected braking action 'good to medium' reported by the preceding aircraft	APP		x				x	x	x
			Moderate to severe icing conditions during approach effecting aircraft performance	APP	x	x				x	x	
			Reduced visibility even after acquiring the necessary visual reference during approach, due to rain or fog	APP	x	x				x		

Assessment and training topic	*Description (includes type of topic, being threat, error or focus)*	*Desired outcome (includes performance criteria OR training outcome)*	*Example scenario elements*	*Flight phase for activation*	**Competency Map**							
					PRO	*COM*	*FPA*	*FPM*	*LTW*	*PSD*	*SAW*	*WLM*
EXAMPLE SCENARIO ELEMENTS AND COMPETENCY MAP (Evaluation and scenario-based training phases)												
Automation management	The purpose of this topic is to encourage and develop effective flight path management through proficient and appropriate use of flight management system(s). guidance and automation including transitions between modes, monitoring, mode awareness, vigilance and flexibility needed to change from one mode to another. Included in this topic is the means of mitigating errors described as: mishandled auto flight systems, inappropriate mode selection, flight management system(s) and autopilot usage.	Know how and when to use flight management system(s), guidance and automation Demonstrate correct methods for engagement and disengagement of auto flight system(s) Demonstrate appropriate use of flight guidance, auto thrust and other automation systems Maintain mode awareness of auto flight system(s), including engagement and automatic transitions Revert to different modes when appropriate Detect deviations from the desired aircraft state (flight path, speed, attitude, thrust, etc.) and take appropriate action. Anticipate mishandled auto flight system Recognize mishandled auto flight system. Take appropriate action if necessary Restore correct auto flight state Identify and manage consequences	ACAS warning, recovery and subsequent engagement of automation	ALL	x		x					
			FMS tactical programming issues, e.g., step climb, runway changes, late clearances, destination re-programming, executing diversion	ALL	x		x					
			Recoveries from TAWS, management of energy state to restore automated flight	ALL	x		x	x				
			Amendments to ATC cleared levels during altitude capture modes, to force mode awareness and intervention	ALL	x		x				x	
			Late ATC clearance to an altitude below acceleration altitude	TO	x		x				x	
			Engine-out special terrain procedures	TO APP	x		x				x	
			Forcing AP disconnect followed by re-engagement, recovery from low or high speed events in cruise	CRZ	x		x	x			x	
			Engine failure during or after initial climb using automation	CLB	x		x					
			Engine failure in cruise to onset of descent using automation	CRZ	x		x					
			Emergency descent	CRZ	x		x					
			Managing high energy descent capturing descent path from above (correlation with unstable approach training)	DES APP	x		x				x	
			No ATC clearance received prior to commencement of approach or final descent	APP	x		x				x	
			Reactive wind shear and recovery from the consequent high-energy state	APP	x		x				x	
			Automation fails to capture the approach altitude in descent (e.g., last altitude before the FAP). Ideally, the failure occurs when the workload is high (e.g., configuration of the aircraft for final approach).	APP					x	x	x	x
			Non precision or infrequently flown approaches using the maximum available level of automation	APP	x		x					
			Gear malfunction during approach. Competency FPA may or may not be included depending on the impact of such malfunction on the automation (e.g., approach planned with Autoland, including autobrake)	APP		x	(x)			x		x
			ATC clearances to waypoints beyond programmed descent point for a coded final descent point during an approach utilising a final descent that is commanded by the flight management system.	APP	x		x				x	
Go-around management	Any threat or error which can result in circumstances which require a decision to go-around, in addition to the execution of the go-around. Go-around scenarios should be fully developed to encourage effective leadership and teamwork, in addition to problem solving and decision making, plus execution using manual aircraft control or flight management system(s) and automation as applicable. Design should include the element of surprise and scenario-based go-arounds should not be predictable and anticipated. This topic is completely distinct from the go-around manoeuvre listed in the manoeuvres training section that is intended only to practice psychomotor skill and a simple application of the procedures		Adverse weather scenario leading to a reactive wind shear warning during approach	APP	x	x					x	x
			Adverse weather scenario leading to a predictive wind shear warning during approach or go-around	APP	x	x					x	x
			Adverse weather scenario, e.g., thunderstorm activity, heavy precipitation or icing forcing decision at or close to DA/MDA	APP	x					x	x	x
			DA with visual reference in heavy precipitation with doubt about runway surface braking capability	APP	x					x	x	x
			Adverse wind scenario resulting in increasing tailwind below DA (not reported)	APP		x		x		x		
			Adverse wind scenario including strong gusts and/or crosswind out of limits below DA (not reported)	APP		x		x		x		
			Adverse wind scenario including strong gusts and/or crosswind out of limits below 15 m (50 ft) (not reported)	APP		x		x		x		
			Lost or difficult communications resulting in no approach clearance prior to commencement of approach or final descent	APP	x		x				x	
			Birds: large flocks of birds below DA once visual reference has been established	APP				x		x	x	
			System malfunction, landing gear malfunction during the approach	APP	x	x				x		x

Assessment and training topic	Description (includes type of topic, being threat, error or focus)	Desired outcome (includes performance criteria OR training outcome)	Example scenario elements	Flight phase for activation	Competency Map							
					PRO	COM	FPA	FPM	LTW	PSD	SAW	WLM
EXAMPLE SCENARIO ELEMENTS AND COMPETENCY MAP (Evaluation and scenario-based training phases)												
Manual aircraft control	Controls the flight path through manual control	Desired competency outcome: Demonstrates manual aircraft control skills with smoothness and accuracy as appropriate to the situation Detects deviations through instrument scanning Maintains spare mental capacity during manual aircraft control Maintains the aircraft within the normal flight envelope Applies knowledge of the relationship between aircraft attitude, speed and thrust	Flight with unreliable airspeed, which may be recoverable or not recoverable	ALL	x			x			x	
			Alternate flight control modes according to malfunction characteristics	ALL	x			x				x
			ACAS RA to descend or ATC calls for immediate descent (preferably during climb which requires a significant change in aircraft attitude).	ALL	x	x		x				
			ACAS RA to climb or ATC calls for immediate climb (preferably during descent which requires a significant change in aircraft attitude).	ALL	x	x		x				
			TAWS warning when deviating from planned descent routing, requiring immediate response	DES	x			x	x			
			Scenario immediately after take-off which requires an immediate and overweight landing	TO		x	x	x	x	x		x
			Adverse wind, crosswinds with or without strong gusts on take-off	TO	x			x				
			Adverse weather, wind shear, wind shear encounter during take-off, with or without reactive warnings	TO	x			x			x	
			Engine failure during initial climb, typically 30-60 m (100-200 ft)	TO	x	x		x				x
			Wind shear encounter scenario during cruise, significant and rapid change in windspeed or down/updrafts, without wind shear warning	CRZ	x		x			x	x	x
			Adverse weather, wind shear, wind shear encounter with or without warning during approach	APP	x		x	x			x	
			Adverse weather, deterioration in visibility or cloud base, or adverse wind, requiring a go-around from visual circling approach, during the visual segment	APP	x	x	x	x		x	x	x
			Interception of the glide slope from above (correlation with unstable approach). FPA may be required if intercept is possible with automation	APP			x	x			x	x
			Adverse wind, crosswinds with or without strong gusts on approach, final and landing (within and beyond limits)	APP LDG	x			x		x		
			Adverse weather, adverse wind, approach and landing in demanding weather conditions, e.g., turbulence, up and downdrafts, gusts and crosswinds including shifting wind directions	APP LDG				x		x	x	
			Circling approach at night in minimum in-flight visibility to ensure ground reference, minimum environmental lighting and no glide slope guidance lights	APP LDG								
			Runway incursion during approach, which can be triggered by ATC at various altitudes or by visual contact during the landing phase	APP LDG	x			x			x	
			Adverse wind, visibility, type specific, special consideration for long bodied aircraft, landing in minimum visibility for visual reference, with crosswind	LDG	x	x		x			x	
			System malfunction, auto flight failure at DA during a low visibility approach requiring a go-around flown manually	LDG	x		x	x			x	
			Approach planned with autoland, failure below 1 000 ft requiring a manual go-around and an immediate landing due to fuel shortage	APP LDG	x		x		x		x	x
			In-seat instruction: Insufficient engine failure recovery, forcing the pilot monitoring to take over the flight controls	TO		x		x			x	x
			In-seat instruction: Unstable approach on short final or long landing, forcing the pilot monitoring to take over the flight controls	APP LDG		x		x			x	x
Error management and mismanaged aircraft state	By scenario design, pilots should have the opportunity to practice the right techniques and attitudes related to error management through pilot performance, and that instructors have the opportunity to assess and train this topic in a realistic environment. In addition, the operator may also develop scripted role-play scenarios in the form of ISI. These scenarios cater for the need to monitor flight path excursions from the instructor pilot (PF), detect errors and make appropriate interventions, either verbally or by taking control as applicable. The scenarios should be realistic and relevant, and are for the purpose of demonstration and reinforcement of effective flight path monitoring. Demonstration scenarios may also be used. Demonstrated role-play should contain realistic and not gross errors, leading at times to a mismanaged aircraft state, which can also be combined with upset management training	Observe the pilot's behaviour: how the pilot is mitigating errors, performing cross-checking, monitoring performance and dealing with a mismanaged aircraft state, in order to ensure that observed deviations, errors and mistakes are taken as learning opportunities throughout the programme. Monitor flight path excursions. Detect errors and threats through proper cross-checking performance. Make appropriate interventions either verbally or by taking control if applicable. Recognize mismanaged aircraft state. Take appropriate action, if necessary Restore desired aircraft state Identify and manage consequences	In-seat instruction: Deviations from the flight path, in pitch attitude, speed, altitude, bank angle	ALL	x	x					x	
			Deviations from the flight path, in pitch attitude, speed, altitude, bank angle	ALL	x	x					x	
			In-seat instruction: Simple automation errors (e.g., incorrect mode selection, attempted engagement without the necessary conditions, entering wrong altitude or speed, failure to execute the desired mode) culminating in a need for direct intervention from the PM, and where necessary taking control.	ALL		x					x	
			In-seat instruction: Unstable approach or speed/path/vertical rate not congruent with required state for given flight condition	APP	x	x					x	x
			In-seat instruction: Demonstration exercise – recovery from bounced landing, adverse wind, strong gusts during landing phase, resulting in a bounce and necessitating recovery action from the PM	LDG	x			x			x	

Assessment and training topic	*Description (includes type of topic, being threat, error or focus)*	*Desired outcome (includes performance criteria OR training outcome)*	*Example scenario elements*	*Flight phase for activation*	**Competency Map**							
					PRO	*COM*	*FPA*	*FPM*	*LTW*	*PSD*	*SAW*	*WLM*
EXAMPLE SCENARIO ELEMENTS AND COMPETENCY MAP (Evaluation and scenario-based training phases)												
Unstable approach	Reinforce stabilised approach philosophy and adherence to defined parameters. Encourage go-arounds when crews are outside these parameters. Develop and sustain competencies related to the management of high energy situations		ATC or terrain related environment creating a high energy descent with the need to capture the optimum profile to complete the approach in a stabilised configuration	DES APP	x		x				x	
			ATC or terrain related environment creating a high energy descent leading to unstable conditions and requiring a go-around	DES APP	x		x				x	
			Approach and landing in demanding weather conditions, e.g., turbulence, up and downdrafts, gusts and crosswinds including shifting wind directions	APP				x		x	x	
			Increasing tailwind on final (not reported)	APP	x	x				x	x	
			Crosswinds with or without strong gusts on approach, final and landing (within and beyond limits)	APP LDG	x			x		x		
Adverse wind	Adverse wind/crosswind. This includes tailwind but not ATC mis-reporting of the actual wind	Recognize adverse wind conditions Observe limitations Apply appropriate procedures Maintain directional control and safe flight path	Take-off with different crosswind/tailwind/gust conditions	TO						x		x
			Take-off with unreported tailwind	TO		x			x			
			Crosswinds with or without strong gusts on take-off	TO	x			x				
			Wind exceeding limits on final approach (not reported)	APP	x	x				x	x	
			Wind exceeding limits on final approach (reported) in manual aircraft control	APP	x	x		x		x		
			Increasing tailwind on final (not reported)	APP	x	x				x	x	
			Approach and landing in demanding weather conditions, e.g., turbulence, up and downdrafts, gusts and crosswind including shifting wind directions	APP				x		x	x	
			Adverse wind scenario resulting in increasing tailwind below DA (not reported)	APP		x		x		x		
			Adverse wind scenario including strong gusts and/or crosswind out of limits below DA (not reported)	APP		x		x		x		
			Adverse wind scenario including strong gusts and/or crosswind out of limits below 15 m (50 ft) (not reported)	APP		x		x		x		
			Crosswind with or without strong gusts on approach, final and landing (within and beyond limits)	APP LDG	x			x		x		
Aircraft system malfunctions, including operations under MEL	Any internal failure(s) apparent or not apparent to the crew Any item cleared by the MEL but having an impact upon flight operations. E.g., thrust reverser locked Malfunctions to be considered should have one or more of the following characteristics: – Immediacy – Complexity – Degradation of aircraft control – Loss of primary instrumentation – Management of consequences	Recognize system malfunction Take appropriate action including correct stop/go decision Apply appropriate procedure correctly Maintain aircraft control Manage consequences Apply crew operating procedure where necessary. Respond appropriately to additional system abnormals associated with MEL dispatch	For full details see the Equivalency of Malfunction methodology and results.	ALL	Intentionally blank							
			MEL items with crew operating procedures applicable during take-off	TO	x					x		
			Response to an additional factor that is affected by MEL item (e.g., system failure, runway state)	TO		x		x		x		
			Malfunction during pre-flight preparation and prior to departure	GND	x					x	x	
			Malfunction after departure	CLB	x					x	x	
			Malfunctions requiring immediate attention (e.g., bleed fault during engine start, hydraulic failure during taxi)	ALL	x				x			x
			Fuel leak (management of consequences)	ALL	x				x		x	
			Take-off high speed below V1	TO	x				x	x		
			Take-off high speed above V1	TO	x					x		
			During taxi to the runway, a spurious brake temperature announcement. Correct brake temperature before the failure.	GND					x	x	x	
			Tire failure during take-off	TO					x	x		x
			Malfunction during ~~in~~itial climb	TO	x					x		
			Malfunction on approach	APP	x					x		x
			Malfunction during go-around	APP	x					x		x
			Malfunction during landing	LDG	x	x		x		x	x	
Approach, visibility close to minimum	Any situation where visibility becomes a threat	Recognize actual conditions Observe aircraft and/or procedural limitations Apply appropriate procedure if applicable Maintain directional control and safe flight path	Approach in poor visibility	APP	x		x	x				x
			Approach in poor visibility with deteriorations necessitating a decision to go-around	APP	x		x	x				
			Landing in poor visibility	LDG				x		x	x	

Assessment and training topic	*Description (includes type of topic, being threat, error or focus)*	*Desired outcome (includes performance criteria OR training outcome)*	*Example scenario elements*	*Flight phase for activation*	**Competency Map**							
					PRO	*COM*	*FPA*	*FPM*	*LTW*	*PSD*	*SAW*	*WLM*
EXAMPLE SCENARIO ELEMENTS AND COMPETENCY MAP (Evaluation and scenario-based training phases)												
Landing	Pilots should have opportunities to practice landings in demanding situations at the defined frequency. Data indicates that landing problems have their roots in a variety of factors, including appropriate decision making, in addition to manual aircraft control skills if difficult environmental conditions exist. The purpose of this item is to ensure that pilots are exposed to this during the programme	Landing in demanding environmental conditions, with malfunctions as appropriate	This topic should be combined with the adverse weather topic, aircraft system malfunctions topic or any topic that can provide exposure to a landing in demanding conditions	LDG	Intentionally blank							
Runway or taxiway condition	Contamination or surface quality of the runway, taxiway, or tarmac including foreign objects	Recognize hazardous runway condition Observe limitations Take appropriate action Apply appropriate procedure correctly Assure aircraft control	Planned anticipated hazardous conditions with dispatch information provided to facilitate planning and execution of appropriate procedures	GND TO LDG						x		
			Unanticipated hazardous conditions, e.g., unexpected heavy rain resulting in flooded runway surface	GND TO LDG		x			x	x		
			Take-off on runway with reduced cleared width due to snow	TO	x			x	x		x	
			Stop / go decision in hazardous conditions	TO					x	x		x
Terrain	Alert, warning, or conflict	Anticipate terrain threats Prepare for terrain threats Recognize unsafe terrain clearance Take appropriate action Apply appropriate procedure correctly Maintain aircraft control Restore safe flight path Manage consequences	ATC clearance giving insufficient terrain clearance	ALL	x	x			x			
			Demonstration of terrain avoidance warning systems	ALL						x	x	x
			Engine failure where performance is marginal leading to TAWS warning	TO CLB		x		x				x
			ATC provides a wrong QNH	DES		x					x	
			"Virtual mountain" meaning the surprise element of an unexpected warning. Care should be exercised in creating a level of realism, so this can best be achieved by an unusual and unexpected change of route during the descent	DES						x	x	x
Upset Prevention and Recovery Training (UPRT)	An aeroplane upset is defined as an undesired aeroplane state in flight characterized by unintentional divergences from parameters normally experienced during line operations or training. An aeroplane upset may involve pitch and/or bank angle divergences as well as inappropriate airspeeds for the conditions. *Note: – Required UPRT elements and respective components are listed in ICAO Doc 10011, table 2-1. The elements are numbered with letters from A to K. Each element is made up of several numbered components. To comply with the requirements, include elements in a B frequency, such that all elements are covered over a period not exceeding 3 years. According to the principles of EBT, covering one component should satisfy the requirement to cover the whole element of recognizing and preventing the development of upset conditions.*	Early recognition and prevention of upset conditions: – Recognize upset condition – Take appropriate action – Assure aircraft control – Maintain or restore a safe flight path – Assess consequential issues – Manage outcomes	*Note 1. – Upset prevention exercises may be trained in EVAL and SBT, upset recovery may be trained in MT and SBT phases* *Note 2. – The example scenario elements may be done in ISI, as non-ISI or a combination of both. If done in ISI: The instructor should position the aircraft within but close to the edge of the validated training envelope before handing control to the trainee to demonstrate the restoration of normal flight. Careful consideration should be given to flying within the validated training envelope.*		Intentionally blank							
			Upset recognition: 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	ALL			x	x			x	x
			Upset recognition and recovery – Severe wind shear or wake turbulence during take-off or approach	TO APP			x	x		x	x	
			Upset recognition and recovery – as applicable and relevant to aircraft type, demonstration at a suitable intermediate level, with turbulence as appropriate; practice steep turns and note the relationship between bank angle, pitch and stalling speed	CLB DES				x			x	
			Upset recognition and recovery – at the maximum cruise flight level for current aircraft weight, turbulence to trigger overspeed conditions (if FSTD capability exists, consider use of vertical wind component to add realism)	CRZ			x	x		x	x	
			Upset recognition and recovery – high-altitude ACAS RA (where the RA is required to be flown in manual flight)	CRZ	x			x			x	x
			Upset recognition and recovery – at the maximum cruise flight level for current aircraft weight, turbulence and/or significant temperature rise to trigger low speed conditions (if FSTD capability exists, consider use of vertical wind component to add realism)	CRZ	x			x			x	
			Upset recognition and recovery – demonstration at a normal cruising altitude, set conditions and disable aircraft systems as necessary to enable trainee to complete stall recovery according to OEM instructions	CRZ	x			x			x	
			Upset recognition and recovery – demonstration at an intermediate altitude during early stages of the approach, set conditions and disable aircraft systems as necessary to enable trainee to complete stall recovery according to OEM instructions	APP	x			x			x	
			Recovery from a wake turbulence position with high-bank angle	APP	x		x	x			x	

Assessment and training topic	*Description (includes type of topic, being threat, error or focus)*	*Desired outcome (includes performance criteria OR training outcome)*	*Example scenario elements*	*Flight phase for activation*	**Competency Map**							
					PRO	*COM*	*FPA*	*FPM*	*LTW*	*PSD*	*SAW*	*WLM*
EXAMPLE SCENARIO ELEMENTS AND COMPETENCY MAP (Evaluation and scenario-based training phases)												
Wind shear recovery	With or without warnings including predictive. A wind shear scenario is ideally combined into an adverse weather scenario containing other elements.	Anticipate potential for wind shear Avoid known wind shear or prepare for suspected wind shear Recognize wind shear encounter Take appropriate action Apply appropriate procedure correctly Assure aircraft control Recognize out of wind shear condition Maintain or restore a safe flight path Assess consequential issues and manage outcomes	Predictive wind shear warning during take-off	TO					x	x		
			Wind shear encounter during take-off	TO	x				x	x		
			Wind shear encounter after rotation	TO						x		x
			Predictive wind shear after rotation	TO					x	x		
			Predictive wind shear during approach	APP	x				x	x		
			Wind shear encounter during approach	APP	x				x	x		
ATC	ATC error. Omission, miscommunication, garbled, poor quality transmission. All of these act as distractions to be managed by the crew. The scenarios should be combined where possible with others of the same or higher weighting, the principal reason being to create distractions.	Respond to communications appropriately Recognize, clarify and resolve any ambiguities. Refuse or question unsafe instructions. Use standard phraseology whenever possible	ATC role-play: the instructor provides scripted instructions, as a distraction to the crew	ALL	x	x			x			
			Controller error, provided by the instructor according to a defined scripted scenario	ALL	x	x				x	x	
			Frequency congestion, with multiple aircraft using the same frequency	ALL		x						
			Destination temporarily closed	APP					x	x	x	x
			Rescue and firefighting services (RFFS) level reduction at destination	CRZ		x			x		x	
			Runway change before the interception of the localiser or similar navigation aid in azimuth	APP			x		x		x	x
			Stray dogs at the opposite threshold runway	GND TO		x			x		x	
			Poor quality transmissions	ALL		x						
Engine failure	Any engine failure or malfunction, which causes loss or degradation of thrust that impacts performance. This is distinct from the engine-out manoeuvres described in the manoeuvres training section above, which are intended only for the practice of psychomotor skill and reinforcement of procedures in managing engine failures	Recognize engine failure Take appropriate action Apply appropriate procedure correctly Maintain aircraft control Manage consequences	Take-off low speed	TO	x			x		x		x
			Take-off high speed below V1	TO	x			x		x		x
			Take-off above V1	TO	x					x	x	x
			Initial climb	TO	x					x	x	
			Engine malfunction	APP	x					x		x
			Engine failure ~~in~~ during cruise (FPA or FPM depending on use of autopilot)	CRZ	x		(x)	(x)			x	
			Multiple engine failure during CRZ (volcanic ash, recoverable). FPM may or may not be included depending on the impact on automation.	CRZ				(x)	x	x	x	x
			On landing	LDG				x				
Fire and smoke management	This includes engine, electric, pneumatic, cargo fire, smoke or fumes	Recognize fire, smoke or fumes Take appropriate action Apply appropriate procedure correctly Maintain aircraft control Manage consequences	Fire in cargo or cabin/cockpit at gate	GND	x	x				x		x
			Fire during taxi	GND	x	x				x		x
			Fire with no cockpit indication	GND	x	x				x		x
			Take-off low speed	TO	x			x	x	x		
			Take-off high speed below V1	TO	x			x	x	x		
			Take-off high speed above V1	TO	x				x	x		
			Initial climb	TO	x				x	x		
			Cargo or avionics compartment fire	CRZ						x	x	x
			Engine fire ~~in~~ during approach (extinguishable)	APP		x				x		
			Engine fire ~~in~~ during approach (non-extinguishable)	APP		x			x	x		
			Lithium battery fire in the cockpit or cabin compartment	CLB CRZ DES	x	x			x	x		x
			Flight deck or cabin fire	APP		x			x	x		
			Any of the example scenario elements above ending in an evacuation	GND		x			x	x		x

Assessment and training topic	*Description (includes type of topic, being threat, error or focus)*	*Desired outcome (includes performance criteria OR training outcome)*	*Example scenario elements*	*Flight phase for activation*	**Competency Map**							
					PRO	*COM*	*FPA*	*FPM*	*LTW*	*PSD*	*SAW*	*WLM*
EXAMPLE SCENARIO ELEMENTS AND COMPETENCY MAP (Evaluation and scenario-based training phases)												
Loss of communications	Lost or difficult communications. Either through pilot mis-selection or a failure external to the aircraft. This could be for a few seconds or a total loss	Recognize loss of communications Take appropriate action Execute appropriate procedure as applicable Use alternative ways of communications Manage consequences	Loss of communications during ground manoeuvring	GND	x	x						
			Loss of communications after take-off	TO	x					x		
			Loss of communications during approach phase, including go-around	APP	x	x				x	x	
Managing loading, fuel, performance errors	A calculation error by one or more pilots, or someone involved with the process, or the process itself, e.g., incorrect information on the load sheet	Anticipate the potential for errors in load/fuel/performance data Recognize inconsistencies Manage/avoid distractions Make changes to paperwork/aircraft system(s) to eliminate error Identify and manage consequences	This can be a demonstrated error, in that the crew may be instructed to deliberately insert incorrect data, for example to take-off from an intersection with full length performance information. The crew will be asked to intervene when acceleration is sensed to be lower than normal, and this may be part of the operator procedures, especially when operating mixed fleets with considerable variations in MTOM	ALL	x	x						x
			Wind report with take-off clearance not consistent with prior performance calculation. ATC, cabin crew or other people are pushing crew to take-off quickly.	TO	x				x		x	x
			Environmental change during taxi (e.g., heavy rain) not consistent with prior take-off performance calculation	GND							x	x
			Fuel ground staff on industrial action. Only limited amount of fuel available, which is below the calculated fuel for the flight.	GND					x	x	x	x
			Crew advise during taxi out that there is a change of the load sheet figures. The crew may have limited time due to a calculated take-off time (CTOT) – ATC Slot.	GND	x							x
			Braking action reported 'medium'. The information is transmitted just before take-off. The flight is subject to a CTOT – ATC slot.	GND					x		x	x
Navigation	External NAV failure. Loss of GPS satellite, ANP exceeding RNP, loss of external NAV source(s)	Recognize a NAV degradation. Take appropriate action Execute appropriate procedure as applicable Use alternative NAV guidance Manage consequences	External failure or a combination of external failures degrading aircraft navigation performance	GND	x		x			x	x	
			External failure or a combination of external failures degrading aircraft navigation performance	TO CLB APP LDG		x			x	x	x	
			Standard initial departure change during taxi. The flight may be subject to a CTOT – ATC slot.	GND					x		x	x
			Loss of runway lighting below decision height	APP		x				x	x	
			No fly zone: when the crew changes control frequency, the new ATCO informs the crew that they are flying over an unannounced 'no fly zone' that is not included in the NOTAMs. (To trigger such an event, the context may be as follows: an unexpected military conflict in the territory the aircraft is flying over or the crew is forced to re-route in flight and the new route flies over a city that has an important event such the Olympic games, a G20/G7 submit, or the route is flying near a space rocket launch close to the time of the launch, like the Guiana Space Centre, Cape Canaveral, etc.).	CRZ					x	x	x	
Operations or type specific	Topics covered by the equivalency of approaches process, or additional topics mandated by the OEM or the Authority	Intentionally blank	Intentionally blank		Intentionally blank							
Pilot incapacitation	Consequences for the non-incapacitated pilot	Recognize incapacitation Take appropriate action including correct stop/go decision Apply appropriate procedure correctly Maintain aircraft control Manage consequences	During take-off	TO	x	x			x	x		
			During approach	APP	x			x				x
Traffic	Traffic conflict. ACAS RA or TA, or visual observation of conflict, which requires evasive manoeuvring	Anticipate potential loss of separation Recognize loss of separation Take appropriate action Apply appropriate procedure correctly Maintain aircraft control Manage consequences	ACAS warning requiring crew intervention	CLB CRZ DES		x				x	x	x
			Dilemma: Visual acquisition of conflicting traffic followed by an ACAS warning (resolution advisory) triggered by the same or other traffic. Even if the traffic is in sight, the pilot should follow the RA.	CLB CRZ DES	x		x	x				
			While in descent, ACAS traffic advisory of an aircraft below. The crew should not initiate an avoidance manoeuvre based on a 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.	CLB CRZ DES	x				x	x		

Additional scenario elements

This table contains additional scenario elements developed by IATA member airlines which are not included in the current Assessment and Training Topic tables provided by ICAO and the European EBT regulations (as of status September 2023).

Training topic	Example scenario elements	Flight phase	PRO	COM	FPA	FPM	LTW	PSD	SAW	WLM	Source
Adverse weather	Weather deterioration (winter), need to re-calculate take-off performance, holdover time	GND	x	x			x	x	x	x	JL
	RWY change due to wind / rwy condition, requiring new take-off data, FMS inputs, etc.	GND	x	x			x		x	x	JL
	Alternate airport closure	DES, APP	x					x	x		JL
	Diversion with changing alternate weather scenario after go-around	APP		x			x	x	x	x	LH
	Visibility change (below minimum) before FAF.	APP	x	x				x	x		SC
	Increasing tailwind on approach without ATC notification	APP		x	x	x			x		EK
	the autopilot disengaged due to turbulence, during the turn while intercepting final course at (LOC*) mode	APP			x		x				CZ
	gusty wind, make the approach unstable	APP				x		x			CZ
	icing condition, left and right engine vibration high, then one engine stall(unrecoverable)	CRZ	x				x	x			CZ
Automation management	Low altitude level off after liftoff	CLB			x	x		x			JL
	Autopilot mode failure (i.e., ALT CAP or ALT*)	ALL	x		x	x			x		EK
	Incorrect QNH supplied by ATC on RNP approach	APP		x	x	x		x	x		EK
	Non-precision approach in hot/cold temperature conditions	APP	x	x	x				x		JL
Go-around management	Runway incursion (vehicle, aircraft)	APP	x			x			x		JL
	Baulked landing after touchdown	APP	x		x	x	x		x	x	
	ATC instruction during simultaneous parallel approach.	APP	x		x	x					JL
	Go-around call above go-around altitude (discontinued approach)	APP	x		x			x	x		OZ
	Go-around with TOGA switch failure (Type specific)	APP			x	x	x		x		EK
	Go-around call at or right below go-around altitude (go-around or discontinued approach)	APP	x		x			x	x		OZ
	No landing clearance due to frequency congestion or loss of communication	APP	x		x				x		LH
	Loss of adequate visibility below DA	LDG	x			x			x		LH
	System malfunction during LV APCH below DA/Alert Hight, RWY in sight	LDG	x		x			x	x		LH
	cloud ceiling change (below DA/minimum descent altitude [MDA]) after FAF	APP	x	x					x		SC
	visibility change (below minimum) after FAF	APP	x	x				x	x		SC

Training topic	Example scenario elements	Flight phase	PRO	COM	FPA	FPM	LTW	PSD	SAW	WLM	Source
Manual aircraft control	Single engine approach, landing or go-around	APP	x		x	x					JL
	System malfunction, causing approach and landing with degraded aircraft controls	ALL	x			x					LH
	Breakout from precision runway monitor (PRM) approach	APP	x	x		x					LH
	Baulked landing	LDG									
	Control wheel malfunction during taxi/landing.	GND, LDG	x	x		x					SC
Error management, mismanaged aircraft state	In-seat instruction: Flap/slat mis-operation (by PM instructor)	CLB, APP									JL
	ISI: Scripted errors made by instructor during take-off and departure that requires effective monitoring and intervention by trainee in the PM role.	TO, CLB		x			x				EBT Data Report
	ISI: Subtle incapacitation: e.g., instructor is PM and doesn't respond to flap retraction call during climb; instructor is PF and doesn't initiate deceleration to final approach speed on approach.	TO, CLB, APP, LDG	x	x			x			x	EBT Data Report
	Upset prevention: Instructor led exercise to practice high altitude manual flight, including in a degraded flight control law.	CRZ				x					EBT Data Report
	ISI: Scripted errors or omissions made by the instructor during malfunctions during the cruise, for example engine failure	CRZ		x	x	x	x			x	EBT Data Report
	ISI: Demo of a runway switch followed by at least one further switch with each crew member as PM. Introduce some scripted errors during the second approach that requires effective monitoring and intervention.	APP		x			x			x	EBT Data Report
	ISI: Demo of a mishandled glideslope intercept from above; further demo to highlight appropriate prevention and recovery technique.	APP	x		x						EBT Data Report
	ISI: Altimeter setting by mistake.	TO, CLB, APP, LDG	x						x	x	SC
Unstable approach	Increasing tailwind on final (reported)	APP	x	x							LH
	In-seat instruction (ISI): High speed approach, landing configuration too low, or other parameters out of limits	APP	x	x					x		LH
	Visual Approach from an unusual (high) position	APP		x		x		x	x		LH
	An unexpected lasting tailwind on the long final	APP						x	x		CZ
	later approach clearance, leading to high energy in final profile	APP	x		x		x	x			CZ
	Visual Approach at night without PAPI intermittently	APP				x		x	x		CZ

Training topic	Example scenario elements	Flight phase	PRO	COM	FPA	FPM	LTW	PSD	SAW	WLM	Source
Adverse wind	Unable to follow ALT constraint due to wind change	CRZ		x	x				x		JL
	Wind change, approaching VMO/MMO	CRZ		x	x				x		JL
	Wind change, approaching	APP, LDG									
	Approach and landing with Flight Management Computer (FMC) generated winds exceeding tailwind limit with tower reported winds within tailwind limit.	APP, LDG	x			x	x		x		EBT Data Report
	Increasing turbulence with increasing wind gusts.	APP, LDG				x			x		EBT Data Report
	Wind conditions requiring Circling Approach	DES, APP	x		x	x			x		LH
	headwind increase just passing 200 AGL rapidly in typhoon condition in heavy weight	TO				x		x	x	x	
	gusty wind, wind change from tailwind 20 knots to headwind 20kts	APP	x			x		x			CZ
	The head wind increases rapidly during flaps retraction	CLB	x		x				x		CZ
	suddenly extreme wind change from tailwind to crosswind	CRZ	x						x		CZ
	head wind increases while setting landing flap	APP				x		x	x		CZ
	Wind change, approaching flaps limit/stall speed.	APP, LDG				x			x		SC
Aircraft system malfunctions, including operations under MEL	Malfunctions requiring immediate attention (e.g., abnormal engine start, brake/ wheel fault during taxi or near V1, unable to retract gear)	ALL	x	x				x	x		JL
	TO - incorrect airspeed indication below V1	TO	x	x		x		x	x		JL
	TO - inadequate thrust (thrust lever stucking, TOGA mode failure)	TO	x	x		x		x	x		JL
	TO - airspeed unreliable after liftoff	TO	x	x		x	x	x	x	x	JL
	Unclear system malfunction in cabin, with (IP induced) different opinions about consequences for flight	CLB, CRZ		x			x	x			LH
	Malfunction - Flap Slat (drive, asymmetry, skew)	CBL, APP	x	x				x	x		JL
	Slow decompression (bleed, pack)	CRZ	x	x				x	x		JL
	Partial gear up landing required	APP	x	x			x	x			LH
	Fuel leak suspected	ALL	x	x				x	x	x	JL
	System malfunctions which are not annunciated or covered by an abnormal procedure	ALL		x			x	x	x		LH
	Malfunction before approach, affecting approach capability	CRZ, DES	x					x	x		LH
	Unreliable Airspeed indications until landing	ALL	x	x		x		x	x	x	LH
	GA - Thrust Lever in idle position due to A/T failure	APP	x			x		x	x		JL
Approach, visibility close to minimum	Visual path information lost below 200ft (JAL issue)	LDG	x			x			x		JL
	Low visibility snow covered runway loss of runway lights at landing	LDG				x			x		EK
	Low visibility crosswind Landing	APP				x			x		JL
Landing	No flap/slat landing	LDG		x		x			x		JL
	Engine failure just prior to the flare (Bird strike)	LDG				x					EK
	Overweight landing following immediate air turn back		x	x		x	x	x	x	x	JL

Training topic	Example scenario elements	Flight phase	PRO	COM	FPA	FPM	LTW	PSD	SAW	WLM	Source
Runway or taxiway condition	Ground vehicle during take-off roll	TO				x			x		JL
Terrain	Pressurization problem or bomb warning creating the need to descent below minimum altitude (e.g., L888)	CRZ	x	x				x	x	x	LH
	Incorrect baro setting on 3D RNAV approach leading to EGPWS warning in IMC.	APP	x		x	x	x	x	x		EBT Data Report
	'Soft' go around into 'glass mountain' requiring change to TOGA for escape manoeuvre.	APP	x		x	x		x			EBT Data Report
	Curved approach/RNPAR radius to fix 'glass mountain' causing EGPWS.	APP	x		x	x		x	x		EBT Data Report
	Spurious EGPWS in VMC.	APP	x	x	x	x	x		x	x	EBT Data Report
ATC	Wrong instruction by ATC (e. g taxi instruction for opposite side of runway or already passed taxiway)	GND		x					x		OZ
	Similar callsign error (e. g take-off clearance to other aircraft call sign, when A/C hold short of runway)	ALL		x					x	x	OZ
	Sudden level-off instruction (after take-off, high altitude)	CLB			x	x			x	x	JL
	Loss of communication during departure/arrival into mountainous terrain	CLB, DES		x			x	x	x	x	LH
	Complicated RT during configuration change (e.g., flap operation)	CLB, APP	x	x					x	x	JL
	DEScent re-clearance (QNH-STD-QNH)	CLB, APP	x						x		LH
	Late approach clearance requiring G/S intercept from above	DES, APP		x			x	x	x	x	AF
	ATC instructs that the approach was cancelled at high altitude due to insufficient spacing	APP	x				x			x	SC
	Loss of comms at an FIR boundary	CRZ			x				x	x	EK
	ATC no reply when crew request deviation due to weather when is in critical situation, or relay crew to other ATC with different frequency	CLB CRZ		x			x	x			SC
Engine failure	Engine failure in cruise (high altitude, driftdown)	CRZ	x				x	x	x	x	JL
	Engine failure in cruise over critically high terrain (Himalayas)	CRZ		x	x				x	x	EK
	Engine failure during descent or approach, affecting landing capability	DES, APP	x		x			x	x		LH
	Engine failure during Go-around.	APP	x			x				x	SC
Fire and smoke management	During boarding: Auxiliary power unit (APU) trouble, smoke into the cabin	GND	x	x						x	JL
	Avionics smoke in polar/NATS/HLA region	CRZ	x	x			x			x	EK

Training topic	Example scenario elements	Flight phase	PRO	COM	FPA	FPM	LTW	PSD	SAW	WLM	Source
Managing loading, fuel, performance errors	Fuel loading error (difference to load sheet or wrong fuel distribution in tanks) The flight is subject to a calculated take-off time (CTOT) – ATC slot.	GND	x						x	x	LH
	ATC advise crew that there is a change in environmental conditions or runway state during taxi out that requires take-off performance to be re-calculated	GND	x							x	EBT Data Report
	ATIS report of degraded braking action or contaminated conditions (un-forecast) at destination onto a performance limited runway	GND	x					x		x	EBT Data Report
	Fuel supply shortage such that fuel quantity available to uplift is slightly below flight plan fuel	GND	x				x	x			EBT Data Report
	Informed of load sheet error during taxi out	GND		x			x	x		x	EBT Data Report
	Fuelling figures passed which leads to discrepancy that requires resolving	GND	x					x	x	x	EBT Data Report
	Performance calculation error, for example incorrect runway or incorrect runway starting point	GND	x					x	x		EBT Data Report
	Stabilizer/trim out of take-off limitation	GND	x					x	x	x	EBT Data Report
	Informed by company excessive aft C of G due incorrect loading	CRZ	x		x	x			x		EK
Navigation	Internal (aircraft) failure which affect navigation performance	ALL	x					x	x		JL
	Weather radar failure	ALL	x	x	x				x		EK
	GPS jamming resulting in loss of GPS signal and navigation accuracy downgrade below minimum required for flight in current airspace or to fly SID/STAR/ approach	CLB, CRZ, DES, APP	x	x	x			x	x		EBT Data Report
	Aircraft navigation equipment failure below minimum required for flight in current airspace or to fly SID/STAR/approach/oceanic airspace	CLB, CRZ, DES, APP	x	x	x			x	x	x	EBT Data Report
	SCATANA rules activated that require aircraft to comply with ATC instructions to change course, altitude or land.	CRZ	x	x			x		x	x	EBT Data Report
	5G interference effects on approach	APP	x	x	x	x			x		EK
	Glideslope signal fluctuation;	APP	x		x	x		x	x		JL
	Flight Management Computer (FMC) fail during flight.	CLB, CRZ, DES, APP	x	x	x			x	x		SC
	ND fail during flight.	CLB, CRZ, DES, APP	x	x	x			x	x		SC
	MAP fail during flight.	CLB, CRZ, DES, APP	x	x	x			x	x		SC
	IRS fail during flight.	CLB, CRZ, DES, APP									SC
Operations or type specific	RJTT approaches (LDA, VOR A circle 16L) in various conditions	APP	x	x	x	x			x	x	JL

Training topic	Example scenario elements	Flight phase	PRO	COM	FPA	FPM	LTW	PSD	SAW	WLM	Source
Pilot incapacitation	Incapacitation during rejected take-off requiring role change for evacuation management.	TO	x	x			x	x	x	x	EBT Data Report
	Incapacitation of Pilot Flying at rotation.	TO	x	x			x	x	x		EBT Data Report
	Incapacitation of PF during LVO approach.	APP	x	x	x			x			EBT Data Report
	Incapacitation of PF during Go-around.	APP	x	x	x			x		x	SC
	ISI: Somatogravic illusion on go around, PF pitches nose down.	APP		x		x		x	x		EBT Data Report
	ISI: Subtle incapacitation sensed by errors in automation.	TO, APP		x	x		x		x		EBT Data Report
	ISI: Subtle incapacitation (no call or reply standard callouts)	ALL	x					x	x		JL
	Pilot loses consciousness, leans on the control wheel	ALL	x					x	x		JL
Traffic	ACAS warning with approaching terrain	DES, APP					x	x	x		JL
	Engine out traffic conflict with ACAS set in TA only	APP			x			x	x		EK
	ACAS caution with single engine operation	ALL	x	x	x			x	x		JL
	Dilemma: Visual acquisition of conflicting traffic followed by an ACAS warning (resolution advisory) triggered by the same or other traffic.	ALL	x	x						x	AF
	While in climb/descent, ACAS caution (traffic advisory) of an aircraft above/below	CLB, DES	x	x					x		AF
	ACAS warning during parallel departure/approach.	CLB, APP	x	x					x		SC
Upset prevention and recovery	Excess bank due to wake turbulence following heavy jet	APP	x			x			x		JL
	ENG failure during holding at high altitude	CRZ	x				x	x	x	x	JL
	ACAS warning at maximum operating altitude	CRZ	x			x		x	x		JL
	Aircraft entering volcanic ash, several system malfunctions	CRZ	x	x			x	x	x	x	LH
	In-seat instruction (ISI): Dual Sidestick Input	TO, LDG	x	x		x			x	x	LH
	Multiple engine failure on short final	APP				x		x	x		JL
Windshear recovery	Windshear conditions reported by ATC during taxi out or during intermediate approach that require the crew to avoid or prepare for a possible windshear encounter.	GND, APP	x	x				x	x		EBT Data Report
	Predictive windshear alert during take-off roll, initial climb or approach.	TO, CLB, APP	x		x	x	x	x			EBT Data Report
	Reactive windshear alert during take-off roll, initial climb or approach.	TO, CLB, APP	x		x	x	x				EBT Data Report

G.VI Integration of CRM requirements

The following table provides an operator's example for demonstration of compliance with CRM requirements, based on European CRM and EBT regulations. The example was slightly modified to adapt to changes in training topics suggested by the EBT Data report amendment 2021. Further explanatory notes regarding the CRM compliance checklist are provided in the EASA Checklists for mixed and baseline EBT.

Note: *According to the European CRM requirements, CRM training should be conducted in:*

- *Non-operational environment (NON OP), e.g., classroom and computer-based), and*
- *Operational environment (OP), e.g., flight simulation training device (FSTD) and aircraft*

CRM training element	Environment		Means of compliance
	OP	NON OP	
Automation and philosophy on the use of automation	x	x	Covered by the "automation management" training topic mandated at frequency "A" by the assessment and training topic. Additionally, one module in every 3-year program is dedicated to automation (together with other competencies or alone). In the non-operational environment, the pilot will additionally review by means of Booklet or Computer-Based Training (CBT): the philosophy on the use of automation (e.g., the concept of automation, charts/statistics of the different generation of automation, case studies, technical knowledge, etc.) Note: This training element must be trained in-depth.
Case studies	x	x	The requirement will be covered: – in the non-operational environment, within the combined CRM training for flight crew and cabin crew where an accident/incident is reviewed and – in the simulator's briefing and when appropriate in the actual simulator Throughout the 3-year program, the operator has different case studies (accident or incident) where all the competencies are covered. The pilot learns the importance of a competency or group of competencies in each case study. For example, by studying an incident/accident where a competency was missing and or by studying cases where the competency was exercised to the right level, and this allows the crew to "save the day". Some of the case studies may be provided by the SMS flight safety department.
Human factors in aviation	x	x	EBT training topic A "competencies non-technical (CRM)" In the non-operational environment it is included in the combined CRM training for flight crew and cabin crew or CBT, at least once in the 3-year cycle. Interaction human-machine with the focus on the HUMAN element in the model (e.g., SHELL).
General instructions on CRM principles and objectives	x	x	EBT training topic A "competencies non-technical (CRM)" Facilitation technique is used as a means of debriefing in every simulator session. In the non-operational environment it is included in the combined CRM training for flight crew and cabin crew or CBT at least once in the 3-year cycle.

CRM training element	Environment		Means of compliance
	OP	NON OP	
Human performance and limitations	x	x	EBT training topic A "competencies non-technical (CRM)" In the non-operational environment it is included in the combined CRM training for flight crew and cabin crew or CBT at least once in the 3-year cycle. Interaction human-machine with the focus on the HUMAN element in the model (e.g., SHELL).
Personality awareness, human error and reliability, attitudes and behaviors, self-assessment and self-critique	x	x	– Personality awareness: it is trained in the combined CRM training for flight crew and cabin crew. This element is trained in a non-operational environment. This could be additionally complemented by a CBT. – Human error and reliability, attitudes and behaviors, self-assessment and self-critique: EBT fully endorses the facilitated de-briefing because it provides opportunities to the pilots for self-assessment and self-critique exercise. The grading system also provides observable behaviors that will foster this CRM training element. This element is, therefore trained in the operational environment.
Fatigue and vigilance		x	This requirement is trained by CBT and in the FRMS training.
Stress and stress management	x	x	Training topic (workload distraction pressure) frequency B. The Competency WLM is assessed every 6 months. Additionally, at least, one module in every 3-year program is dedicated to WLM (together with other competencies or alone). The briefing and de-briefing script of this module is planned in such a way that IES have opportunities to further develop this CRM element. Note: stress and stress management are not always related to Workload; that is why the non-operational environment training is additionally proposed. In the non-operational environment it is included in: – The combined CRM training for flight crew and cabin crew. – Case study/s that includes "stress and stress management". This element maybe delivered by advanced CBT (e.g., Virtual reality). The CBT explaining the theory of this element, once every 3 years.
Cultural differences		x	combined CRM training for flight crew and cabin crew
Operator's safety culture and company culture, standard operating procedures (SOPs), organisational factors, factors linked to the type of operations	x	x	Operator's safety culture and company culture training are not specifically addressed in the EBT program. To meet the objectives of this requirement operators should provide training in the non-operational environment e.g., in the form of a group discussion. Operator's safety culture, company culture, organisational factors and factors linked to the type of operations are included in the non-operational environment in the combined CRM training for flight crew and cabin crew. Standard operating procedures (SOPs) and factors linked to the type of operations are trained in the EBT simulator program, specifically, during the SBT. Furthermore, the competency PRO is graded in every simulator session. Additionally, the 3-year EBT program has one specific module dedicated to the development of this competency.

CRM training element	Environment		Means of compliance
	OP	NON OP	
Threat and error management	x	x	Annual CBT or classroom training once every 3 years. Additionally, the briefing and de-briefing in the simulator session may be guided through the TEM model (e.g., during the briefing when the IE is explaining a malfunction, he/she should identify with the pilots the hazards and possible errors; this helps a facilitated briefing).
Assertiveness, situation awareness, information acquisition and processing	x		The competency SAW is assessed in every simulator session. Additionally, one module in every 3-year program is dedicated to SAW (together with other competencies or alone). Assertiveness is partially covered through the competency COM through OB 2.1 and OB 2.4. This competency is assessed in every simulator session. Additionally, one module in every 3-year program is dedicated to COM (together with other competencies or alone). "Information acquisition and processing" is additionally trained as follows: – briefly discussed during the briefing/de-briefing by means of a presentation delivered by the instructor and – in CBT (or advance CBT such VR, chat boot, interactive scenario trainer) **Note**: When possible, the training actions above may be done together with "human performance and limitation".
Specific type-related differences	x	x	Mandated at frequency "C" by the training and assessment matrix. Additionally, the operator that provided this example includes when appropriate: – a reminder during the simulator briefing sessions by means of a presentation delivered by the IE, or – in the non-operational environment, the pilot will additionally review by means of Booklet or CBT
Monitoring and intervention	x		Mandated at frequency "A" by the "table of assessment and training topics".
Shared situation awareness, shared information acquisition and processing	x		The competency SAW is assessed in every simulator. Additionally, one module in every 3-year program is dedicated to SAW (together with other competencies or alone). SAW is additionally discussed during the briefing/de-briefing by means of a presentation delivered by the IE.
Workload management	x		Workload Management is one of the pilot competencies that must be trained throughout the EBT program. Workload is also a specific training topic in the "table of assessment and training topics" (overarching principles).
Effective communication and coordination inside and outside the flight crew compartment	x	x	COM is one of the competencies that must be trained throughout the EBT program. In the non-operational environment in the combined CRM training involving both flight and cabin crew. **Note**: this element may be credited during the emergency and safety equipment training.

CRM training element	Environment		Means of compliance
	OP	NON OP	
Leadership, cooperation, synergy, delegation, decision-making, actions	x	x	LTW is one of the competencies that must be trained throughout the EBT program. Additionally, leadership, cooperation, synergy, delegation is complemented in the combined CRM training for flight crew and cabin crew. Cooperation, synergy and delegation are additionally covered in the non-operational environment by means of CBT once in a 3-year period. Decision-making: – When the EBT program is designed in such a way that crews are exposed to a dilemma. This means crews are presented with situations where more than one possible less than ideal solutions exist, with some unfavorable conditions attached, then this element is covered in the simulator session. This training action also relates to the competency PSD. – Alternatively, the operator may develop an advanced CBT where the pilot faces a scenario/s where the pilot must take a decision/s.
Resilience development	x	x	This element is fulfilled in the simulator session by: – Training topic "surprise" (see EBT overarching principles). – Scenario-based training phase, as per definition, the SBT should develop resilience. Additionally, it will be trained in the non-operational environment during: – CBT that explains the theory of this element. Once every 3 years. – Advanced EBT (e.g., VR) for the element of surprise and startle effect that relates to resilience.
Surprise and startle effect	x	x	This element is fulfilled in the simulator session by the training topic 'surprise and startle effect' (see the table of assessment and training topics). Additional it will be trained in the non-operational environment during: – the combined CRM training for flight crew and cabin crew once in the 3 years, or the legacy CBT explaining the theory of this element. Once every 3 years, or – advanced CBT (e.g., Virtual Reality) where the pilot faces a scenario/s where the pilot experience this element.
Effective communication and coordination with other operational personnel and ground services	x	x	COM is one of the competencies that must be trained throughout the EBT program. Additionally, there are 2 training topics (ATC and Loss of Communication) frequency C and 1 training topic (Competency Non-Technical CRM) frequency A. In the non-operational environment in the combined CRM training involving both flight and cabin crew, or the operator may develop an advanced CBT (e.g., chatbot) where the pilot faces a scenario(s) where the pilot experiences this element.

G.VII EBT module design examples

IE "toolbox"

Scenario elements per topics and per competencies										
Scenario event	**Time**	**KNO**	**PRO**	**COM**	**FPA**	**FPM**	**PSD**	**LTW**	**SAW**	**WLM**
Manual Flying										
"Base training" pattern with crosswind	10 min					x				
ENG OUT ILS AP OFF, FD ON, followed by GA	10 min					x				
Aborted landing	5 min					x	x		x	
Engine Failure during TO heavy weight aircraft	10 min					x			x	
Engine Failure during TO light weight aircraft	10 min					x				
Automation management										
Glideslope intercept from above	5 min	x	x		x				x	
NPA 2D Approach	10 min	x	x	x	x					
Circling RNAV visual approach	10 min	x	x		x					
GA all engines with AP	5 min				x					
GA all engines with AP in clean flaps configuration	5 min				x					
Level bust management	5 min				x					
Cancellation of Approach mode	5 min				x					
Non-complex system failures management										
One Hydraulic circuit low level	15 min		x							
One electric generator failure	15 min		x							
Engine failure on final	10 min				(x)	(x)	x	x	x	
Complex or multiple system failures management										
Major hydraulic failures (CRZ)	35 min		x					x		x
Major electrical failures (CRZ)	35 min		x					x		x
All engines failure (CRZ)	15 min		x		x		x			x
All engines failure (initial CLB)	5 min		x			x	x			x
Landing with abnormal landing gear configuration	25 min		x					x		
Priority Management										
Uncontained engine failure	10 min									x
Smoke event	10 min		x				x	x	x	x
Pilot incapacitation during take-off	5 min						x			x
Memory Items										
RTO, engine fire V1-20Kt	5 min		x							
RTO, followed by request of evacuation by chief purser	10 min		x	x			x			
TCAS event	5 min		x		(x)	(x)				
Windshear during take-off	5 min		x		x	x				
Windshear during final approach	5 min		x		(x)	(x)				
GPWS warning	5 min		x			x				

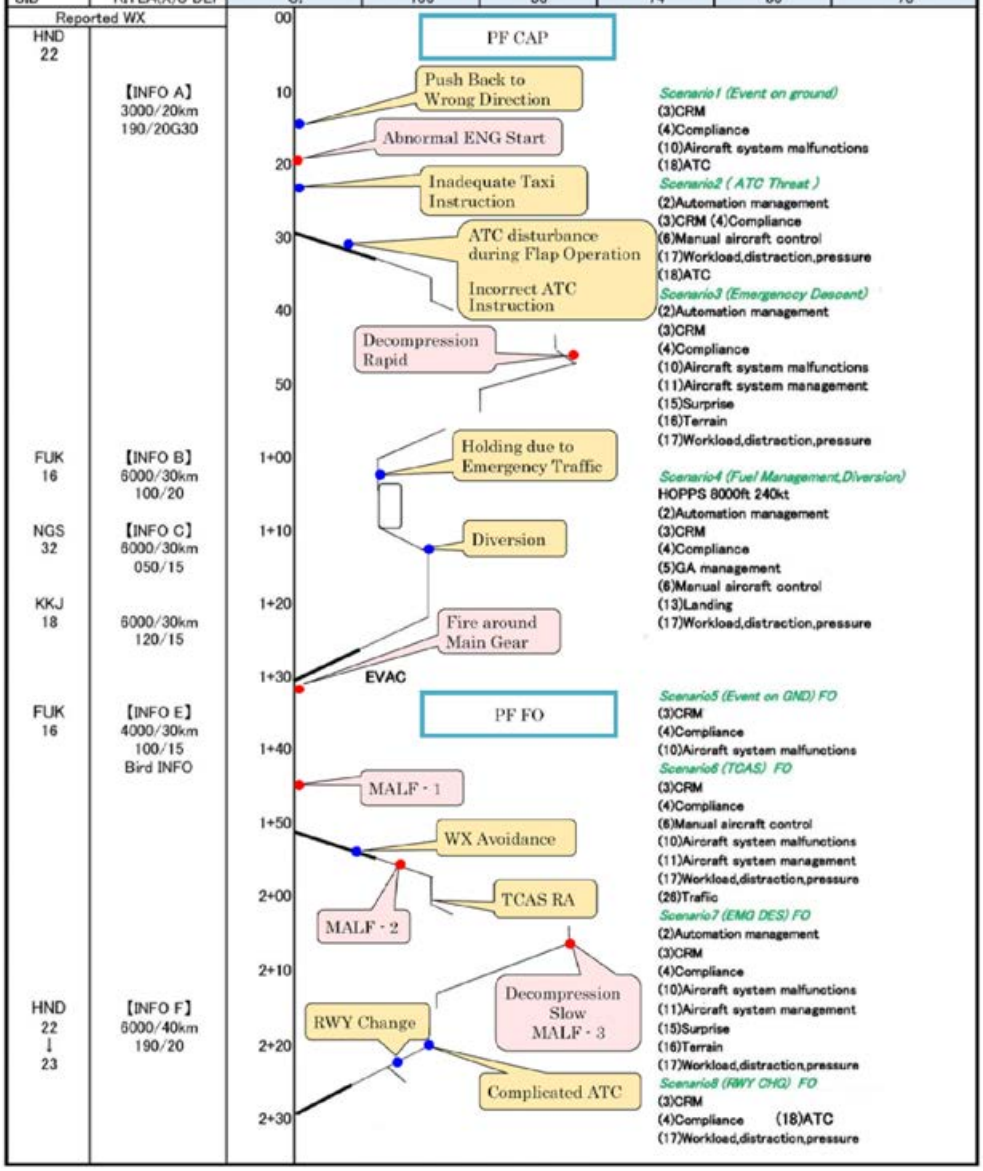
Scenario elements per topics and per competencies										
Scenario event	**Time**	**KNO**	**PRO**	**COM**	**FPA**	**FPM**	**PSD**	**LTW**	**SAW**	**WLM**
Unreliable airspeed	10 min		x	x					x	(x)
Loss of braking	5 min		x	x						
Emergency descent	10 min		x	x	x					

EVAL/SBT examples

Scenario based Training Example JAPAN AIRLINES

Scenario 1

HND-FUK	JL323 Cleared to RJFF via RITLA (X) C DEP Flight Planned Route, Maintain FLxxx / Expect FL400, SQ 2324						
FUK-HND	JL324 Cleared to RJTT via YOKATA (X) DEP YANKS Tr Flight Planned Route, Maintain FLxxx / Expect FL390, SQ 2324						
ORIGIN	RJTT		A350	B737	B767	B777	B787
DEST	RJFF	GWT	419.4	130.0	265.0	426.0	327.0
GATE	502 / 508(737)	FUEL	32.7	17.0	28.0	41.0	27.0
RWY	22	ZFW (=AZFW)	386.7	113.0	237.0	385.0	300.0
ROUTE	HNDFUK1	CG	25%	23%	23%	27%	25%
SID	RITLA(X)C DEP	CI	100	36	74	80	70

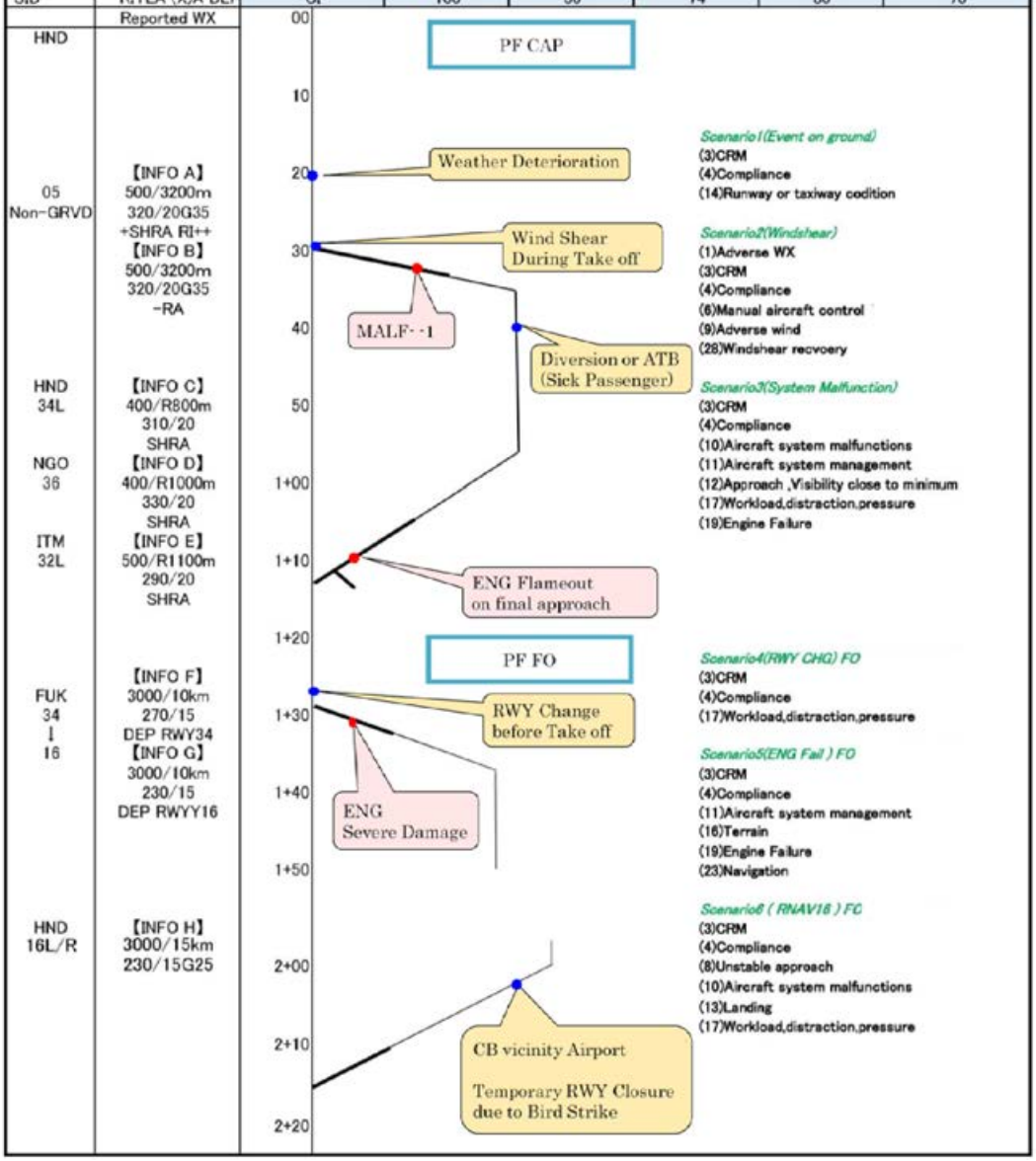


Scenario based Training Example JAPAN AIRLINES

Scenario 2

HND-FUK	JL319 Cleared to RJFF via RITLA (X) A DEP Flight Planned Route, Maintain FLxxx / Expect FL400, SQ 2324
FUK-HND	JL320 Cleared to RJTT via YOKATA (X) DEP YANKS Tr Flight Planned Route, Maintain FLxxx / Expect FL390, SQ 2324

			A350	B737	B767	B777	B787
ORIGIN	RJTT						
DEST	RJFF	GWT	385.7	130.0	265.0	426.0	327.0
GATE	801	FUEL	35.7	17.0	28.0	41.0	27.0
RWY	05	ZFW (=AZFW)	350	113.0	237.0	385.0	300.0
ROUTE	HNDFUK1	CG	25%	23%	23%	27%	25%
SID	RITLA (X)A DEP	CI	100	36	74	80	70



EM1 EVALUATION / SCENARIO BASED TRAINING TIMELINE (IP/CA version)

L PF R	EVALUATION / SCENARIO BASED TRAINING			
PHASE	EVENT	A/P	A/T	F/D
GND HKD TWR 118.35	TM: **Initial Set Up** PO: RJCH RWY 12 Gate 3 AC: ZFW: 52.0 Tons, ZFWCG: 28.0% FUEL: 13.0 Tons, GWCG: 26.7% ST: **SNOW** DAY SCENE WX: 160/18, vis 900m BR 0/-3 29.97inHg (1009hPa) braking action "POOR" on taxiway, Runway 12 braking action "MEDIUM" SE: Adverse Weather **Option All Scenario Element 1** **Cold weather cockpit preparation**			
0:10 GND HKD TWR 118.35	**SET Aircraft System Malfunctions, Including Operations Under MEL** **Option 1 Scenario Element 2** IP MEL 26-13-01 APU FIRE DETECTION LOOP **Option 2 Scenario Element 2** IP MEL 27-51-01A SFCC FLAP CHANNEL CA set simulator malfunction: "ATA 27-Flight Controls-FLAP SYS FAULT-2" **Option 3 Scenario Element 2** IP MEL 21-52-01D PACK 1 INOP CA select PACK 1 OFF and advice PACK 1 is inoperative. **Option 4 Scenario Element 2** IP MEL 74-31-01A ENG 2 IGNITION SYSTEM A INOP CA set malfunction: "ATA 54-PowerPlant-Ignition-2A" **Option 5 Scenario Element 2** IP MEL 27-81-01 SFCC SLAT CHANNEL CA set malfunction: "ATA 27-Flight Controls-SLATS SYS FAULT-2 **Provide Fuel Sheet, Load Sheet** Start boarding and Deice/Anti-icing procedure. CA advice the aircraft is clean and advice the start time of 2nd step anti-ice procedure. **Option All Scenario Element 3** RC advice 3 passengers missing and apply **last minute change.**			
0:25 0:27	AT "EVA137 Cleared to TPE via TSUGAR1 TAPPI Y12 ARIKA Y14 FPR maintain FL200 SQ 3621"			
GND HKD TWR 118.35	**CP Cabin Secured** AT "EVA137, clear for pushback and start runway 12" After Engines start AT "Clear taxi to runway 12 via taxiway P1 T1. **Option All Scenario Element 4** Pilot report braking action **POOR** on taxiway, taxi with caution" CE should limit taxi speed below **5kts**. AT "EVA137 clear for takeoff runway 12, wind 160/18.			
0:35				

L PF R	EVALUATION / SCENARIO BASED TRAINING
TC HKD DEP 127.9 CLM	After airborne: SE Aircraft System Malfunctions, Including Operations Under MEL **Option 1 Scenario Element 5** IP Set malfunction after airborne: " **L/G GEAR NOT UPLOCKED**" **"ATA32-Landing gear-Retraction Fault-Nose"** Armed at Landing Gear Lever select UP **Option 2 Scenario Element 5** IP Set malfunction after airborne: "F/CTL FLAP FAULT/LOCKED" **"ATA27-Flight Control-FLAPS Locked(WTB)"** Armed at Flap Lever select 0 **Option 3 Scenario Element 3** IP Set malfunction after airborne: "AC BUS 1 FAULT" **"ATA24-Electric-AC BUS FAULT-1"** Armed at altitude passing 5000ft **Option 4 Scenario Element 5** IP Malfunction: "CARGO DOOR OPEN" caused "DOOR LEAK" Set malfunction **"ATA52-Cargo Door Open(SWITCH)-Fwd Cargo"** PLUS **"ATA21-DOOR LEAK-Cabin Altitude V/S +300fpm"** Armed at altitude 6000ft. **Option 5 Scenario Element 5** IP Set malfunction after airborne: "F/CTL SLAT LOCKED" **"ATA27-Flight Control-SLATS Locked(WTB)"** Armed at Flap Lever select 0
0:55 LDG HKD TWR 118.35	When crew complete the ECAM provides the weather information as follows: Adjust weather if CM2 is going to make the landing. **Scenario element 6:** **RJCH: LOC Z RWY12 190/8 3km OVC008 -1/-3 29.79in** **Or: LOC Z RWY12 190/16 5km OVC008 -1/-3 29.79in** **RJCC: LOC Z RWY01R 040/7 3km OVC008 -1/-3 29.79in** **Or: LOC Z RWY01R 070/16 6km OVC008 -1/-3 29.79in**
1:10	**EVALUATION / SCENARIO BASED TRAINING continued on next page**

Appendix H - Training program design for pilots after long absence

Section 4, Step 11 "Contingency procedures", provides a template for required training elements after long absence within an EBT program. This Appendix gives further information regarding their content and possible course design, following the TA-SE (Training Areas of Special Emphasis) concept.

Background

The IATA "Guidance for Post-COVID Restart of Operations: CBTA Training Solutions", Edition 2, provided training solutions for operators and their pilot population to recover competence and confidence after a long absence. The proposed training solutions:

- Present incremental training options that are adapted to each pilot's individual situation in regard to ICAO's Annex 6 and Annex 1 standards compliance
- Should be assessed by the safety and compliance management system of the operator to ensure that the training options are suitable to the operator's pilot population and, where necessary, complemented
- Respect the competency-based training and assessment (CBTA) principles and are applicable to both traditional training and advanced training methodologies

H.I Ground training refresher

Principles

The ground training content should always be adapted and proportionate to the duration of the absence of a pilot (refer to the template pilot situation / training solutions on page 72). The proposed solution originates from the EU regulation with reference to the license expiry period:

- In regard to situations 1 and 2 described in the Section 4, Step 11 "EBT modules missed by the pilot" template, the ground training refresher is not required or optional because the license has expired by less than 90 days. Therefore, there is no formal ground training to be recovered as the pilot received the expected ground training elements.
- In regard to situations 3 and 4, the ground training refresher is mandatory because the license has expired by 90 days or more. Consequently, there is formal ground training to be recovered as the pilot did not receive the expected ground training elements.

Components

Ground training includes several components. Some components are related to the delivery and acquisition of specific knowledge elements (e.g., aircraft system, operator policy and procedures, UPRT academic topic, etc.). Other components integrate on the job training by adding skills and attitude training to the knowledge elements, such as Safety and Emergency Procedures (SEP) training, and Crew Resources Management (CRM) training.

Knowledge components

When designing the ground training refresher, the operator should consider reviewing and reinforcing following topics:

- Aircraft systems, limitations and procedures (normal, abnormal and emergency)
- Operational policy and associated procedures
- Safety events

- UPRT academics, if necessary
- Special Approval (SPA) related knowledge, if necessary

Note: *SPA concerns the following operations: performance-based navigation (PBN), minimum operational performance specifications (MNPS), reduced vertical separation minima (RVSM) airspace, low visibility operations (LVO), extended range operations with two-engine aeroplanes (ETOPS), and transport of dangerous goods (DGR)*

The Observable Behaviors marked **bold** below should be used to define the training objectives of the knowledge part of the ground training refresher.

OB 0.1	Demonstrates practical and applicable knowledge of limitations and systems and their interaction
OB 0.2	**Demonstrates required knowledge of published operating instructions**
OB 0.3	**Demonstrates knowledge of the physical environment, the air traffic environment including routings, weather, airports and the operational infrastructure**
OB 0.4	Demonstrates appropriate knowledge of applicable legislation
OB 0.5	**Knows where to source required information**
OB 0.6	Demonstrates a positive interest in acquiring knowledge
OB 0.7	Is able to apply knowledge effectively

Safety and Emergency Procedures (SEP) component

When designing the ground training refresher, the operator should consider reviewing and reinforcing following topics:

- Actual donning of a lifejacket, where fitted
- Actual donning of protective breathing equipment, where fitted
- Actual handling of fire extinguishers of the type used
- Instruction on the location and use of all emergency and safety equipment carried on the aircraft
- Instruction on the location and use of all types of exits, security procedures

Crew Resource Management (CRM) component

When designing the ground training refresher, the operator should consider the CRM training elements that should be reviewed and reinforced in accordance with the different pilot situations. The magnitude of the CRM refresher training may vary significantly depending on the time elapsed since the pilot's last CRM training.

In the EBT program context, CRM training is largely embedded in the FSTD training and should be characterized by a performance orientation, with emphasis on standards of performance and their measurement, and the development of training to the specified performance standards.

H.II FSTD training and assessment

Principles

The FSTD training content should always be adapted and proportionate to the duration of the absence of a pilot (refer to the template pilot situation/training solutions in Section 4, Step 11, paragraph "EBT modules missed by the pilot").

For a pilot being absent for more than 90 days, it is expected that a competency assessment and consolidation is necessary to recover and perform successfully during a regular EBT module.

The session design, especially for the consolidations session(s) should take into account the EBT module design principles and specifically the two design solutions for the SBT phase described in Section 4, Step 10.

Components

The FSTD training is composed by the CBTA refresher session followed, when necessary, by one or more CBTA consolidation sessions.

- The **CBTA refresher session** is foundational, as this session has been designed to train and assess the pilot competencies in the context of pilots with limited training and operational exposure, and who need to recover the recent experience requirements (3 take-offs and landings during the last 90 days).

  Therefore, the CBTA refresher session is optional for situation 2, but recommended when the pilot's last flight was performed several weeks ago (e.g., beyond 60 days). In this case the goal is to develop the pilot's flight path management competencies and reinforce maximum pilot confidence.
- The **CBTA consolidation session**(s) is a complement to the CBTA refresher session when the pilot's performance needs to be further enhanced. The number of CBTA consolidation sessions is determined by the operator based on the pilot's training needs.

  Therefore, the CBTA consolidation session(s) is proposed for situation 4 because it is expected that the CBTA refresher session will not be enough to recover competence and confidence. *Moreover, the CBTA consolidation session(s) is always an option after any CBTA refresher session where remedial training is needed.*
- Pilots in situations 3 and 4, having missed one or more EBT modules, should participate in the regular **EBT module** in place at the operator after their absence, to be fully requalified within the EBT program. If the pilots' license has to be renewed, the EBT module should be performed by an EBT instructor with examiner privileges.

For all sessions, it is assumed that:

- the pilots' documentation is up to date and the operator has provided the pilots with the necessary policy and operational procedure knowledge refresher
- the pilots have received the training program sufficiently in advance to prepare the session, and
- the training sessions are conducted in an FSTD approved by the CAA to conduct the EBT program

FSTD sessions overview

The following tables provide an overview of the FSTD CBTA Refresher and CBTA Consolidation sessions mentioned above.

FSTD refresher session	
Assumptions	– The flight crew composition is two pilots. If there is only one pilot to be trained, the IE may act as pilot from one of the pilot seats. – The pilots may have lost partially or totally their recent experience (3 takes-off and 3 landings during the last 90 days). – The pilots had limited training or operational experience in the last 6 months or more. – The AOC and the ATO have criteria based on previous global competence and experience to define the pilot population eligible to this session (e.g., pilot is not under remedial training). – The AOC and the ATO design the session with some spare time to allow for the IE to adapt to the pilot's needs. For example, the IE further develops pilot competencies or the pilot requests to train specific events to gain confidence.
Special emphasis	Training and assessment of all competencies, focus on PRO, FPM, SAW, WLM **Note:** The special competency emphasis for FSTD is the result of an analysis of the pilot competencies and their associated OBs, combined with the training need, of an average already qualified pilot population lacking both training and operational experience.
Global training objective	The pilot must be able to conduct normal and abnormal operations in accordance with the performance standard defined by the AOC, in an FSTD approved by the CAA for EBT programs, under realistic conditions that are representative of the nature and the complexity of their operational and environmental context.

FSTD refresher session	
Detailed training objectives	– The pilot must be able to conduct normal SOPs in an operational context in accordance with the performance standard under real time operational conditions. – The pilot must be able to perform abnormal SOPs including emergency procedures in operational context, in accordance with the performance standard under operational conditions. At least one of the abnormal procedures should have an impact on aircraft performance. – The pilot must be able to manage the flight path manually and with automation, in accordance with the performance standard under operational conditions, including a combination of precision, non-precision and visual approaches.
Conditions	For all exercises mentioned above, the IE's support and intervention are acceptable at the beginning of the session, but pilots must be fully autonomous at the end of the session.
Assessment and training topics	Missed B/C topics The CBTA refresher and consolidation sessions should include as many, if not all, B and C topics of the EBT modules the pilot has missed when being absent.

FSTD consolidation session(s)	
Assumptions	– The CBTA consolidation session(s) is delivered after the CBTA refresher session. – The flight crew composition is two pilots. – The pilots may need to recover some assessment and training topics that are related to the EBT program or operator-specific Special Approvals (SPA). – The pilots had limited training or operational experience for 12 months or more.
Special emphasis	Training and assessment of all competencies, competency focus (tailored training) is based on assessment results of the CBTA refresher session.
Global training objective	The pilots must be able to conduct normal and abnormal operations, including SPA, in accordance with the performance standard defined by the AOC, in an FSTD approved by the CAA for EBT programs, under realistic conditions that are representative of the nature and the complexity of their operational and environmental context.
Detailed training objectives	– The pilot's performance demonstrated during the CBTA refresher session must be enhanced (or consolidated) to demonstrate consistently the performance standards defined by the AOC across all pilot competencies. – The pilot must demonstrate a level of performance that exceeds the minimum license proficiency checks standards. – The pilot must be able to perform normal SOPs, in accordance with the performance standard, under real time operational conditions using a representative operator network (including network that necessitate an area, route and aerodrome (ARA) qualification). – The pilot must be able to perform abnormal SOPs including emergency procedures that place a significant demand on a proficient crew, in operational context and in accordance with the performance standard. – The pilot must be able to manage the flight path manually and with automation, in accordance with the performance standard under operational conditions, using a combination of precision, non-precision and visual approaches (including approaches that require special approval).

FSTD consolidation session(s)	
Conditions	For all exercises mentioned above, the IE's support and intervention are acceptable at the beginning of the session, but pilots must be fully autonomous at the session end.
Assessment and training topics	**Missed B/C topics** The CBTA refresher and consolidation sessions should include as many, if not all, B and C topics of the EBT modules the pilot has missed when being absent. **Absence-related emphasis** It is expected that the CBTA consolidation session(s) may be used to recover some SPA and UPRT training elements that must be performed in an FSTD. When designing the FSTD training, the operator should consider the UPRT elements and the following topics, which must be trained or checked to maintain the associated SPA: – Performance-based navigation (PBN) – Minimum operational performance specifications (MNPS) – Reduced vertical separation minima (RVSM) airspace – Low visibility operations (LVO) – Extended range operations with two-engine aero planes (ETOPS) – Transport of dangerous goods (DGR)

H.III Line Flying Under Supervision (LIFUS)

Principles

LIFUS or Supervised Line Flying (SLF) training is an integral part of the EBT program as it provides a vehicle for pilots to consolidate competence and confidence in line operations. The aim of LIFUS is to allow the trainee to regain practical experience and exposure to the operator's route structure. By the end of the LIFUS, the trainee will have demonstrated the ability to undertake effectively normal rostered duties.

The number of sectors should be tailored to the needs of the pilot as an individual, taking into account their experience with the operation, the complexity of the network and the period of time since the last operational duties. The training designer should ensure sufficient exposure to the network to meet the global training objective of the LIFUS element. LIFUS is also a method to recover Area, Route and Aerodrome qualification and associated recency.

LIFUS overview

LIFUS overview	
Special emphasis	Training and assessment of all competencies, focus on competencies SAW and WLM **Note:** The special competency emphasis for LIFUS is the result of an analysis of the pilot competencies and their associated OBs, combined with the training need of an average already qualified pilot population lacking both training and operational experience for more than 12 months and having received ground and FSTD refresher training.
Global training objective	The pilots must be able to conduct normal operations in accordance with the performance standard defined by the AOC or the ATO, in an aircraft, during normal line operations.

LIFUS overview	
Detailed training objectives	The pilot must be able to: – Perform normal SOPs in all phases of flight, in accordance with the performance standard – Manage the flight path manually and with automation, in accordance with the performance standard under operational conditions – Demonstrate a competent standard of operational and regional knowledge, including published operating instructions, and where to source required information – Appropriately manage workload in order to maintain proper situational awareness during operations – Achieve safe and efficient line operations by demonstrating an effective decision-making process – Perform effectively monitoring duties and use appropriate intervention strategy (when necessary) to maintain safe aircraft operations throughout all phases of flight – Demonstrate effective communication by conducting interactive threat-based briefings and using correct R/T procedures and phraseology at all times – Demonstrate commercial awareness
LIFUS syllabus	The LIFUS syllabus should consist of ground training and line training to ensure that flight crews are qualified to operate in areas, on routes or route segments and into the airports used by the operator. This is achieved by means of the following: – For the less complex routes, familiarization by self-briefing with route documentation, or by means of programed instruction; and – For more complex routes, in-flight familiarization as a commander, co-pilot or observers under supervision, or familiarization in a Synthetic Training Device using a database appropriate to the route concerned. The achievement of LIFUS competency requires Knowledge, Skills and Attitude elements. Knowledge is built from previous experience and throughout the ground training phase. LIFUS provides an opportunity to expand this knowledge base and to apply it to develop and reinforce practical line skills.

Example topics to be considered for inclusion in a LIFUS syllabus

Cold Weather Operations

- Identify when de-icing and/or anti-icing is required
- Demonstrate knowledge of the de-icing and anti-icing procedure and its application
- Show knowledge of how to determine runway surface conditions
- Demonstrate application of cold temperature altitude corrections

Adverse Runway Conditions

- Determine runway condition
- Apply runway condition to performance calculations (Take-off and Landing)
- Demonstrate knowledge of contaminated runway procedures and limitations (aircraft and company)

Continuous Descent Approach (CDA)

- Apply CDA techniques
- Demonstrate knowledge of stabilization requirements
- Locate airport-specific requirements (e.g., minimum RoD)

DARD

- Demonstrate proficiency in determining 1EO and 2EO ceilings
- Interpret flight plan DARD output and be able to apply an escape strategy in a practical manner
- Interpret ND and VD terrain information and en-route charts to determine safe altitudes
- Understand aircraft oxygen system requirements and demonstrate correct application of the related pre-flight checks

FANS/CPDLC/ADS

- Determine CPDLC capability of aircraft (FANS 1/A, ATN B1)
- Demonstrate proficiency in the use of CPDLC functions in normal situations
- Locate any FIR-specific Datalink requirements
- Determine the primary and secondary communication methods in Datalink environments and establish contact with them as appropriate
- Demonstrate a basic understanding of performance-based communication and surveillance (PBCS), including areas of use and required equipment
- Demonstrate knowledge of CPDLC/ADS use in emergency or abnormal situations

High Frequency (HF) Comms

- Identify areas where HF is used
- Demonstrate proficiency in HF communication and the use of SELCAL

High Elevation Airports (> 5,000' AMSL)

- Demonstrate knowledge of the effects of operating into high elevation airports, including density altitude consideration
- Demonstrate an ability to apply strategies to mitigate the effect of high elevation on aircraft performance

IATA In-Flight Broadcast Procedure (IFBP)

- Demonstrate ability to locate where IFBP is applicable and proficiency in its application
- Demonstrate understanding of additional operating procedures/contingencies associated with IFBP areas

Adverse Weather (Adverse Runway conditions covered as separate topic)

- Demonstrate knowledge and application of departure/arrival hazardous weather guidance
- Demonstrate knowledge of turbulence procedures relating to aircraft (overspeed, severe turbulence) and cabin management

North Atlantic High-Level Airspace (NAT HLA)

- Demonstrate awareness of required aircraft capability/equipment for a NAT flight
- Demonstrate ability to locate and apply FIR communication and navigation procedures in the various NAT FIRs, including methods of obtaining an oceanic clearance and HF comms
- Demonstrate proficiency in entry and cross-checking of FMS waypoints, including in the event of a re-route
- Demonstrate knowledge on the application of Oceanic procedural requirements during the various phases of flight
- Demonstrate understanding of NAT contingency procedures

Polar Operations

- Demonstrate an understanding of the impact of space weather on polar operations (at pre-flight planning stage and in-flight)
- Identify communication options and their potential limitations within the polar region
- Identify navigational specificities to polar flight
- Identify areas where cold fuel may be expected and demonstrate an understanding of the fuel system in such a case
- Demonstrate an awareness of nearest alternate airports during a polar flight

PBN

- Determine required equipment for a given RNP/RNAV capability
- Interpret the aircraft's monitoring of navigation performance
- Identify when amendment of the RNP field in the FMS may be required
- Identify actions to be taken in the event of a downgrade in navigation capability

RVSM

- Demonstrate knowledge of required equipment and actions in the event of any failure
- Identify allowable tolerances of altitude indications
- Identify any considerations to operating in RVSM airspace

Thunderstorms and Weather Radar

- Demonstrate knowledge of company policy regarding thunderstorm avoidance
- Demonstrate knowledge of turbulence procedures relating to aircraft (overspeed, severe turbulence) and cabin management
- Demonstrate effective use of the WXR functions
- Demonstrate proficiency in weather analysis and avoidance based on the weather radar display (ND and VD)
- Understand the limitations of the weather radar

UPRT

- Demonstrate an understanding of the relevant environmental hazards, such as:
  - Clear Air Turbulence (CAT)
  - Intertropical Convergence Zone (ITCZ)
  - Thunderstorms
  - Microbursts
  - Wind shear
  - Icing
  - Mountain waves
  - Wake turbulence, and
  - Temperature changes at high altitude

- Be familiar with the evaluation and management of the associated risks of the relevant hazards above; and the available mitigating procedures related to the specific route, route area, or aerodrome
- Identify an aircraft upset
- Demonstrate knowledge of upset prevention and recovery techniques
- Demonstrate knowledge of the intervention model

Metric Altimetry

- Determine appropriate PFD altimeter display above and below transition
- Apply conversions correctly (above and below transition as appropriate)

Appendix I - ICAP implementation guidance

This Appendix is intended to support operators implement EBT, Step 15: EBT IE recurrent standardization and ICAP.

Human Factors Considerations

Human Factors should be considered in instructor assessments. Two components which frequently contribute to errors in judgment are bias and noise. While bias refers to systematic deviations, noise refers to random scatter or unwanted variability in expert judgments. Nobel laureate Daniel Kahneman has contributed considerably to this field and found that the extent of disagreement among experts is usually much greater than expected, posing a serious challenge to organizations. These findings are widespread across various industries. They are equally applicable to aviation training and the way instructors form assessments.

In addition to common biases, there are different components of noise which affect the judgments of skilled experts. Variability needs to be expected in the average level of assessments by different instructors, with some being generally stricter and others more lenient ("level noise"). Further, variability needs to be expected in attitudes and responses of instructors to a particular case. An overall strict instructor may be exceptionally lenient with trainees exhibiting particular traits ("pattern noise"). Finally, unstable, within-subject variability is to be expected ("occasion noise"). Thereby, factors such as mood, sleep, fatigue, or even the weather, were found to contribute to this intra-person variability. When provided with the same data on different occasions, experts are therefore often found to contradict their own prior judgment.

Emphasis on these human factors aspects should be given in training. For instructors, this will enhance understanding and self-awareness about influences on their assessments. For training managers, this will allow for more realistic expectations towards the magnitude of variability that needs to be expected among the instructor community. The latter also directly relates to understanding human factors considerations within the instructor concordance assurance program (ICAP).

Implementation

To ensure a comprehensive understanding of inter-rater reliability, data from two sources should be derived:

Operator EBT data

Data collected from EBT sessions needs to be interpreted with limited scope. It is neither recommended to use this data for measures of alignment, nor for agreement, as the grades awarded by IEs are based on different content observed and reflect different performance of crews.

However, real EBT data can be a valuable source of information to detect obvious trends in IE gradings, such as IEs generally grading very high, very low, very centered in the middle with little spread, or grading many extremes. This data might serve as an indication of possible poor alignment or grading bias of an IE. To verify these observations, they should then be correlated with the findings from the standardized material assessment. For instance, if an IE was found to grade relatively low in real EBT data, but was always well calibrated in the standardized assessments, he/she might have coincidentally just been conducting EBT sessions with trainees whose performance required a lower grade.

Standardized material

IE agreement and alignment may only be inferred from assessments using standardized material. It is important that all IEs observe and grade the same content and receive identical instructions on the expected conduct of the assessment. The standardized assessment process is regarded as the foundation

for determining inter-rater reliability levels. It should be conducted once in every 12-month period, or if needed more frequently.

Implementation process

The figure below illustrates a process on how the ICAP could be implemented in practice.

1. Content Development

An important factor in the ICAP is the observation of the same content for all IEs. The usage of videos is the preferred method because they best transfer the environment, stress level, non-verbal communication, etc. Videos with real crews undertaking EBT may be used if available, but this may be inefficient and time consuming if certain levels of performance for specific competencies need to be targeted. Using scripted videos instead serves the advantage of addressing different performance levels and competencies in focus, thereby using the designers' time efficiently. The length of the video should ensure that sufficient evidence can be observed to grade the competencies of interest.

An operator may decide to use the same videos for all IEs, or separate ones for each fleet. In the first case, the video should be designed in a way that type-related procedures are reduced to a minimum and must be explained in advance if relevant to IEs who do not operate on the fleet featured in the video. Fleet-specific videos may allow for better procedural assessments but make it more difficult to establish concordance across the entire IE community in all other (particularly the non-technical) competencies. This approach is also time consuming as many videos need to be created and analyzed individually.

The videos should target different competencies and comply with the guidance on showing three different levels of performance for each competency within a 72-month period. Thus, areas of weak agreement in one ICAP cycle may be assessed again after having performed the concordance training with the affected IEs to determine whether standards have improved within the same competency.

2. IE Assessment

All IEs, airline and subcontracted, should have the same EBT IE initial training, and be required to participate in the recurrent concordance assessment. During the assessment, IEs should be presented with the standardized material and required to grade the observed performance. They should also receive a brief

introduction about the ICAP objective along with instructions about the expected conduct of the assessment. The operator's learning management system might serve as a suitable platform to distribute the assessment to the IE community.

The grading itself should be as close as possible to the IEs' daily EBT environment. Therefore, the usage of the same IT grading system is preferred to avoid data entry errors resulting from unfamiliarity with a different grading system or survey format. If the operator's systems permit, the videos should be restricted to a "one time only" view, as during regular EBT sessions IEs are also limited to observing a scenario only once.

Neither the targeted competencies nor the grade levels may be communicated in advance to the IEs, as possible areas of weak concordance might not be revealed in this case. IEs should mark competencies as "not observed" if insufficient evidence for grading was present in the standardized material.

3. Operator Standard of Reference

To measure alignment, first an operator's standard of reference (also known as "Gold Standard") needs to be established to determine the expected grading level of the observed performance recorded in the standardized material. The standard should be agreed upon by a team of experts which may consist of training managers and highly experienced EBT IEs. This should be performed in an in-person "standard meeting". Ample time of at least several hours up to a full day should be allocated to this meeting. A few recommendations apply:

- As an academic rule of thumb, the definition process should comprise at least ten experts. If the experts are EBT IEs as well, the discussion should take place after they have participated in the ICAP assessment.
- The standard should be defined by every operator on its own, even if material of other operators (with a standard already available) is used, in order to cope with the operators' cultural and grading philosophies.
- The agreement on the standard should be unanimous across all experts involved. The performance standard should be set for each video, each competency, and each crew (CM1/CM2).
- The justifications for the experts' decision should form the basis for the subsequent concordance training. Arguments must be available to explain to IEs why a particular grade had been decided on by the group. Thus, it is essential to record detailed minutes of the standard meeting.
- It is essential to understand that the standard has no direct influence on the measured agreement of the EBT IEs. However, the outcome of the standard meeting drives the subsequent concordance training. Therefore, the application of the ORCA process should facilitate the determination of the reference standard. It inevitably supports improvements in alignment as well as higher agreement over time.
- Friction is to be anticipated during the meeting when attempting to form an agreement among the group of experts. An impartial moderator may therefore be considered to chair the meeting. It is advisable to set the tone and establish ground rules upfront on how to address tension and conflict. The moderator should support the team in maintaining a healthy debate and ensures that concerns and disagreements are productively addressed. A representative of the human factors / CRM team may be well suited for the moderator role.

4. Statistical Analysis

Once the assessment phase and the standard meeting are completed, data analysis can commence. While appropriate methods and metrics must be established to assess concordance, the analytical complexity may vary depending on the size and complexity of the operator. In any case, assessing concordance should be a data-driven process and preferably involve statistical analysis.

Various different methods exist for calculating inter-rater reliability coefficients. Generally, the type of analysis required primarily depends on the number of raters and the scale level of ratings, among others. Suitable metrics for measuring IRR are discussed by EASA. Closer analysis showed that not all of these metrics are suitable to assess IRR across 9 competencies on a 5-point grading scale (including "not

observed"). Therefore, in addition to these metrics, the agreement coefficient by Gwet should be considered as a feasible method.

Prior to commencing any analysis, it should be ensured that a suitable method is chosen for the respective data available. Industry experience has shown that usually the expertise to conduct the ICAP-specific data analysis is not available within an operator. Therefore, it is recommended that the analysis be performed by external experts, unless an operator has applicable in-house expertise in research methods and statistics.

Concordance assessment should be conducted for all instructors combined. In addition, if applicable, it should also be investigated for different groups of instructors such as fleet and type-specific instructors, groups of different experience levels, or subcontracted instructors. Results might then reveal different levels of concordance between groups of instructors, which allows for more targeted intervention and training.

It is further recommended to use a benchmarking system when presenting concordance results, rather than purely numeric values. Various benchmark systems exist, and further reading is recommended. As an example, a common system is the Landis-Koch benchmark system (1977). It provides a conservative classification by taking into account, among others, errors of instructors who may not have participated in the assessment. This benchmark system classifies the different size of agreement with the following levels:

Agreement	Interpretation
0.8 – 1	Almost Perfect
0.6 – 0.8	Substantial
0.4 – 0.6	**Moderate**
0.2 – 0.4	Fair
0 – 0.2	Slight
-1.0 – 0	Poor

5. Insights Consolidation

After the analysis has been completed, a meeting is recommended to derive insights, recommendations, and a subsequent action plan from the findings. This should be a collaborative effort between training management and data analysts.

Special attention should be paid to reporting the insights in a way that caters for end-users who may not have statistical training. Specific terminology should be well explained and transparent to training managers. Classifications in word pictures and graphical representations may be more suited to aid interpretation compared to numbers and statistical values alone.

Depending on which benchmark system is used, thresholds are usually recommended on which result should warrant intervention. If the above-mentioned Landis-Koch benchmark system is used, classifications of "Almost Perfect" and "Substantial" indicate no severe problems in the agreement between the IEs. For a class of "Moderate", corrective actions should be taken in concordance training. Landis-Koch classes that are below "Moderate" shall be addressed in concordance training, as they indicate that IEs are either not coherent among themselves or apply the grading scale inconsistently between the pilots to be rated.

The table below provides an example on how concordance assessment results could be presented, in this case for CM1 across a 5-point grading scale. Inter-rater reliability was calculated using the Gwet coefficient and the Landis-Koch benchmarking system.

Modified operator sample

CM1 Competencies	IRR (Gwet, Landis-Koch)	% of grades assigned					
		1	2	3	4	5	NO
KNO	Substantial		6%	50%	40%	4%	
PRO	Substantial	5%	55%	36%	4%		
COM	Almost Perfect			2%	3%	95%	
FPA	Substantial	1%	1%	6%	24%	8%	60%
FPM	Moderate	8%	8%	38%	38%		8%
LTW	Moderate	1%	16%	25%	29%	4%	25%
PSD	Almost Perfect			3%	90%	7%	
SAW	Substantial			30%	50%	15%	5%
WLM	Almost Perfect			21%	56%	23%	

- The results on agreement are presented in the "IRR" column. The word pictures indicate the results derived from the assessment based on the Landis-Koch benchmark system. Most competencies obtained rather high agreement levels, classified as "Substantial" or "Almost Perfect". However, FPM and LTW highlight the need for corrective action in subsequent concordance training.
- The results on alignment are displayed in the grading columns. Yellow fields indicate the agreed standard of reference for the respective competency. The values indicate the percentage of raters that have assigned the respective grade. The example presents some notable cases:
  - The COM competency not only shows almost perfect inter-rater reliability, but also 95% alignment with the operator standard of reference. IEs are in large agreement among themselves as well as calibrated with the expected standard.
  - The PSD competency also shows almost perfect inter-rater reliability, but only 3% alignment with the operator standard of reference. IEs are high in their agreement, but the group appears to be "off target".
  - FPA and LTW competencies show very large heterogeneity among IEs, as every possible grading option was marked.

The following reasons could contribute to the case of high agreement but poor alignment:

- IEs assessed the correct competency but wrongly assessed the grading level
- IEs did not assess the correct competency
- The operator standard of reference itself might be incorrect and should be reviewed

All the above need to be addressed during concordance training. Insights from real EBT data can be taken into account as practicable.

6. IE Training

Training is one of the elements to ensure reliability within the EBT IE community and should address especially IEs not meeting the required reliability and validity.

Nevertheless, to keep the level of reliability high, it is recommended to perform training with all IEs. The previously assessed content may be a good working base for discussion, training and aligning the IEs to a consistent grading.

Using the known principles of the competency assessment process stated in Section 5, and especially root-cause analysis, enhances the training effect as IEs can understand the way and reasons for a specific assessment result. Remembering the way to this result provides them with the capability to transfer it to other assessment situations.

Evidence-Based Training Implementation Guide
ISBN 978-92-9264-877-0
Customer service: www.iata.org/cs
+1 800 716 6326

iata.org/publishing

Printed in Canada