



ATO-AOC Partnership Including Instructor Provisioning White Paper

COVID-19 Return to operations

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Acronyms

AOC	Air Operator Certificate/ Air Operator Certificate holder (operator)
ATO	Approved Training Organization (includes Flight Training Organizations (FTOs) and Type Rating Training Organizations)
ATPL	Airline Transport Pilot License
CBTA	Competency-Based Training and Assessment
CPL	Commercial Pilot License
CRM	Crew Resource Management
FFS	Full Flight Simulator
FTO	Flight Training Organization
FSTD	Flight Simulation Training Devices
OE	Operating Experience
LIFUS	Line Flying under Supervision
MPL	Multi-crew Pilot License
SMS	Safety Management System
UPRT	Upset Prevention and Recovery Training

COVID-19 RETURN TO OPERATIONS

ATO-AOC Partnership Including Instructor Provisioning

1. Introduction

1.1. Background

In 2018, forecasts were predicting that passenger numbers could double to 8.2 billion by 2037¹. As a result, airlines were seeking innovative strategies to manage the anticipated traffic augmentation and increased staffing demand, to ensure safety and growth.

Given the magnitude of the expected demand for qualified staff, IATA SFO, Training and Licensing conducted first, investigations via a pilot survey to identify the challenges faced by IATA member airlines and, second, proposed mitigations measures to the associated risks represented by the potential lack of pilots.

In 2020, the COVID-19 crisis has obviously put on hold the urgent need for large numbers of pilots, but it has illustrated the necessity for the best usage of all training capacities, to include all the material and human resources. Therefore, the content of this white paper originally drafted with the support of the IATA Pilot Training task Force (PTTF) in the context of the 2018 pilot shortage has been slightly amended to support the 2020 “post COVID” return to operations.

This white paper is a complement to the two following White Papers:

- White Paper: Ensuring the quality of training when classroom instruction is delivered via virtual classroom
- White Paper: Refresher Competency-Based training and assessment (CBTA) simulator session for “post COVID” operational recovery

These White Papers are available on our website: <https://www.iata.org/pilot-training-licensing>

¹ IATA Forecast Predicts 8.2 billion, Press Release No 62, 24 October 2018

Pilot shortage survey

The survey contained five sections: background, attraction and retention, selection (pilot aptitude testing), licensing training and regulatory.

In total, there were 97 respondents who were Chief Operating Officers and SVP Flight Operations at airlines. The following list presents the number of respondents from each IATA region:

- Africa (9)
- Asia Pacific (11)
- Commonwealth Independent State (5)
- Europe (25)
- Latin America and Caribbean (12)
- Middle East (7)
- North America (13)
- North Asia (15)

The survey showed that, on average, the respondents' pilot population break-down was:

- Ab Initio (35%)
- Military (11%)
- Professional (54%)

1.2. Licensing training challenges

ATO/FTO Capacity Limitations

Operators are experiencing licensing training limitations at the ATO/FTO level. The two main limitations are related to the availability of qualified instructors and training tools (aircraft, simulators, etc.). 42.27% of the survey respondents declared experiencing licensing training capacity limitations at the ATO/FTO level.

Furthermore, when operators were asked about the specific limitations that they were experiencing at the ATO/FTO level, the top limitation identified (75%) concerns the availability of qualified instructors.

Ab initio Programs

Currently, only 41.24% of the respondent operators are engaged in providing or sponsoring ab initio programs. Operator partnership with ATOs and sponsorship of ab initio programs is one way in which industry can come together to help alleviate shortages, but it is also a

way for operators to have direct input into the trainees' programs in order to enhance standardization of potential new hire pilots from the onset of their career.

Multi-crew Pilot License (MPL)

Only 61.46% of respondents declare that their State recognizes MPL, which means that 39.54% have not regulated the MPL.

Training Gap

39.18% of the respondents consider that there is a gap between the licensing requirements and their airline's performance standards. Partnering with ATOs can have the added benefit of introducing the trainee to the operator's standard operating procedures and company policies early in their training, e.g. the MPL program.

Requests and suggestions from Operators

The survey results showed that operators believed that IATA should support them in their efforts to mitigate the forecasted pilot shortage and to enhance performance standards. The respondents provide some suggestions where IATA could play a role, as listed below:

- Increase the quality of the initial training by improving the training standards
- Increase the number of ATOs/FTOs
- Promote airline sponsorship of ATOs/FTOs
- Support the enhancement of ATOs/FTOs and airline partnership to ensure that the training meets the airline's performance requirements (increase airlines involvement during initial training)
- Promote the expansion of MPL in States where regulations do not exist
- Promote global training modernization towards competency-based training

2. Global Challenges and Mitigation Measures

First, the survey indicates that 39.18% of the respondents consider that there is a gap between the licensing requirements and their airline's performance standards. This means that licensed pilots released by training organizations need a significant amount of additional training during the operator conversion course to reach the operator's performance standards.

Secondly, the survey shows that only 41% of the respondents are engaged in providing or sponsoring ab initio training. A deeper analysis has demonstrated that operators that have their own ATO/FTO, or a contract with an ATO/FTO, are significantly more satisfied by the

performance standards of the pilots trained in those ATOs/FTOs, compared to the operators who have no link with ATOs/FTOs.

Thirdly, only 61.46% of the respondents declare that their State recognizes the Multi-Crew Pilot License (MPL). MPL, endorsed by ICAO in 2006, is the first license to apply the competency-based training and assessment principles. To achieve efficiency, MPL requires a strong partnership between the training organization and the operator.

These three elements, combined with IATA members' requests and suggestions, emphasize the benefits of enhancing the partnership between operators and training organizations, and the necessity to continue to promote more State recognition of MPL.

Additionally, there is a very strong signal from our member airlines concerning the lack of qualified instructors at the training organization level. Hence, this white paper proposes solutions to enhance the ATO-AOC partnership, including instructor provisioning.

The content of the White Paper is applicable to both traditional and competency-based training.

2.1. ATO-AOC partnership and arrangements in detail

The expanding role of airline flight training is broadening its focus from initial licensing training solely, to the job or career perspective. The aim of an ATO-AOC partnership is to achieve a level of expertise (competence) that enables a successful completion of the type rating and Line Flying under Supervision (LiFUS) on the initial aircraft types following the training. This ATO-AOC co-operation and partnership is important to close the gap between licensing requirements and the operator's performance standards, for both safety and efficiency reasons.

Many Operators have traditionally outsourced their ab initio and initial type rating training requirements to ATOs acting as 'third-party' training providers. An increasing number of independent ATOs recognize that close connections and relationship with the potential employer are needed to support both the standard of training and the placement of the graduated cadet or trainee into the airline. This applies equally to the self-sponsored 'whitetail' or airline-designated/sponsored cadet or trainee.

Partnerships and agreements between ATOs and operators exist on many levels. ATOs and operators will normally formalize their arrangements through a contract or other types of arrangements. This is normally required by all Licensing States when the provision of any

type of flight crew training is conducted by the ATO for the operator. The following is a non-exhaustive list of areas where arrangements and contracts will exist:

- Pilot selection, assessment and aptitude testing
- Development and provision of manuals
- Instructional Systems Design support
- MPL training
- CPL/IR (frozen ATPL) training
- ATP, Type rating (U.S. model)
- “Advanced Training” to cover initial type rating training, operator conversion and recurrent training
- Advanced training (U.S. model)
- Upset Prevention and Recovery training
- Aircraft (Base) training
- Instructor training
- CRM training
- Command upgrade training
- ATO-AOC feedback loop

The relationship between ATOs and Operators may require a Licensing Authority to introduce regulations to ensure that responsibility and accountability of safety measures are met when training activities are sub-contracted by one party to another, e.g., by the operator to the ATO for the provision of recurrent training, or by the ATO to the operator for the provision of Aircraft (Base) training.

The following sections provide details on the ATO-AOC arrangement for each element of the above list.

2.1.1. Pilot selection, assessment and aptitude testing

Pilot aptitude testing (PAT) should be designed by the operator, and the operator should be heavily involved through the entire process. An ATO or independent vendor can carry out the testing, but the operator should set the testable competencies and performance standards. At the moment, only the MPL requires an ATO-AOC arrangement. From a business perspective, the nature of any other arrangements between ATO and AOC should allow the operator to better define the aptitude testing criteria and selection process.

The operator defines the principles, in other words the goals, sequence, and content of the PAT, including measuring dimensions and cut-off criteria. For example, an AOC using CBTA would ensure that the partnering ATO uses CBTA principles for the screening process. PAT

can be performed by the AOC, the ATO, or a third-party provider. The AOC and the ATO must be aligned to ensure that all the stakeholders' needs are met.

Effective PAT highly reduces expensive late-training terminations by vetting candidate pilots; it also provides a minimum entry standard. If the standard, or the selection process are compromised, remedial training and terminations are statistically higher. In periods of pilot shortages, AOCs rely on consistent and competent pilot graduates to directly serve the need for service of the AOC as well as supporting fleet growth.

Note: IATA has published the [3rd Edition of the PAT](#) which includes the methodology to assess the ability of the applicant to develop the pilot competencies under a CBTA program.

2.1.2. Development and provision of manuals

The ATO and the AOC should provide the trainee with the latest version of the airline's relevant training manual and operation manuals. The ATO and AOC should also collaborate in the development of a common shared manual (format and content).

Note: A contractual agreement to define the ownership of the content developed should be put in place between the ATO and the AOC.

The value of documentation commonality between the ATO and AOC is related to training efficiency, by referring to a single operational documentation framework from the beginning of the course. Hence, facilitating the integration of the pilot students in their future airline working environment. Moreover, referring from the beginning of the training to commercial air transport regulations and standards permits to avoid the retention of specific general aviation requirements that the applicant will never apply during his/ her professional career.

2.1.3. Instructional Systems Design (ISD) support

In November 2020, ICAO will release amendments to Annex 1 and Doc 9868, PANS-TRG, which will permit to extend the CBTA principles to all licenses and operators training. In this context, the ATO or operator developing a CBTA course must be driven by an Instructional Systems Design (ISD) process, as described in PANS-TRG, Attachment C to Chapter 2.

There is a number of effective ISD models in use today. The following ADDIE framework proposed by ICAO is a framework that is generally applied, although there are other frameworks that could be used.



This structured approach to course design and continuous enhancement sustains CBTA, which is a dynamic and holistic approach to pilot training that provides a progressive and continuous development and assessment of the trainee's pilot competencies.

The pilot competencies are the individual and team countermeasures to prevent, identify and mitigate threats and errors; and the development of the pilot competencies will permit to better prepare pilots for unexpected situations.

CBTA courses are characterized by an emphasis on the standard of performance and its measurement, and the development of training to specified performance standards.

ISD support means that ATOs and AOCs should put in place proper collaboration to ensure that the training specifications, the adapted competency model, and the training and assessment materials delivered by the ATO sustain the operator's safety and training objectives.

For theory training, current models of ATO-AOC partnerships contain for example, requirements for teaching staff, contents, standardization concepts, types of teaching, lesson schedules, course sizes, timeframes, failure policies, internal tests and legal aspects.

Compared to traditional licensing programs, competency-based training programs facilitate increased integration of AOC procedures and culture. Training alignment between the ATO and the AOC reduces OE training sectors, training disruptions and additional training costs. Also, when ATOs manage training on behalf of the AOC, it reduces the burden on airline resources.

2.1.4. MPL training

The ISD process for MPL is outlined in ICAO Doc 9868 and follows the ADDIE framework. Development of MPL programs are essentially reverse-engineered with the transport-category aircraft outcome clarified as the starting point. The developers then review each of the four phases of an MPL program and establish clear objectives for each phase of training. In a competency-based training program, these phase objectives are the gatekeepers of the training progress. Each phase then builds on the objectives of the

previous phase until meeting the overall course objectives, which are directly tied to the AOC, and operation of the specific transport-category aircraft.

Experienced ATOs utilize subject matter experts for each phase and develop an MPL training program suited to fit the pilot persona, the AOC's culture and SOPs, and the ATO's geographic profile. There is flexibility to ownership and approval of the program and the different phases of the program, which depend on the nature of the specific contract between the ATO and the AOC.

The advantage of the MPL training is the implementation of the airline standards from the beginning of the training. Even though the MPL is clearly identified as an industry-oriented systemic approach to increase capacity and quality, some States still restrict State student loans to CPL/IR training.

IATA publishes an [MPL Global Course Tracker](#) that keeps track of all the MPL programs offered worldwide. An IATA [MPL implementation guide](#) is also available on our website.

2.1.5. CPL / IR (frozen ATPL) training

When ATOs provide ab initio and initial type rating training, leveraging their own regulatory approvals to qualify students towards airline operations, the minimum regulatory requirements are not always considered sufficient to train the student to the level that the airlines expect. To help reduce any perceived gaps, IATA supports the introduction of CBTA into licensing and initial type rating training at ATOs (see 2.1.3) at the earliest opportunity. In cases where there are multiple ATOs working with a single AOC, the AOC should have a Program Advisory Committee to ensure that the respective ATOs' training program, competency model, performance standards and training outcomes are suited to their operations.

Further development of hard law regulations has to be pursued in order to ascertain suitable regulations for intended or unintended interruptions in competency-based training under the responsibility of the individual ATO.

2.1.6 ATP, Type rating (U.S. model)

The U.S. approach to flight school and type rating training is segmented. Flight school training is typically structured towards the issuance of pilot certificates, whilst AOC and type rating training is focused on crew member qualification. When a Part.141 flight school provides ab initio training they do so using their own regulatory approvals to qualify students for a certificate under Part.61. Although Part.142 training centers can be contracted by an AOC to provide initial type rating training, it is done under the specific approvals of the AOC's (Pt.121 & Pt.135) approved program. Furthermore 80% of airline (Pt.121) pilots currently train under the Advanced Qualification Program (AQP). AQP is considered to be competency-based, driven by data, and has been a very successful model for about 30 years.

Whenever possible, initial type rating training should endeavor to integrate into the training topics the most relevant threats that the pilot may encounter during operations. It is therefore desirable for the AOC to provide the Pt.142 training center with realistic and relevant scenarios to support Line Oriented Flight Training (LOFT) exercises.

Aircraft (Base) training does not exist in the U.S., under the FAA system. Approvals under programs that incorporate advanced simulation training (allowing up to zero flight time training) are conducted as part of the initial type rating certification, followed by OE and line check, which in combination establish crew member qualification under the particular AOC.

Instructors under Pt.141 flight schools are required to hold instructor certificates. However, instructors under a Pt.121 operator or Pt.142 training center certificate are required to hold an Airline Transport Pilot (ATP) certificate and an instructor qualification, as approved by the FAA under each certificate holder for which they are conducting training.

Successful collaboration between Pt.141 flight schools and Pt.121 AOCs provide opportunities for future crew members to obtain the experience necessary to bridge the gap between the time of issuance of their CPL and the issuance of their ATP certificate. Crew members flying for a Pt.121 AOC are required to hold an ATP.

2.1.7 "Advanced Training" to cover initial type rating training, operator conversion and recurrent training

The so called "Advanced Training" describes the training that is delivered by an ATO (or may be subcontracted to an ATO), but it is a clear "operator centric" training that is delivered when the pilot joins the operator, when the pilot changes aircraft type during his career path, or when the pilot maintains his qualification during recurrent training.

Hence, beyond the pure technical elements that are mostly trained by the ATO, the type rating course, the conversion course and the recurrent training should also integrate, as training topics, the most relevant threats that pilots may encounter during operations.

Therefore, the AOC should provide to the ATO realistic and relevant scenarios when defining the Line Oriented Simulation part of the type rating and conversion courses. For this purpose, the AOC should use its SMS to provide proper training scenarios or topics to the ATO. In terms of recurrent training, the implementation of Evidence-Based Training (EBT) permits to train the most relevant training topics identified by a global safety analysis, under the umbrella of a CBTA program.

Advanced training effectiveness and efficiency implies, first, that the ATO instructors are standardized in regard to the operator's operational procedures (SOPs) and the operator's policy, as well as being knowledgeable on the operator's context of operations. This can be achieved by the ATO instructors, or at least a core team of ATO instructors, attending the AOC conversion course and observing line operations, either during line operations or during Line Oriented Flight Simulations.

Secondly, the ATO instructors should be knowledgeable about and able to apply the operator's standard of performance. This aspect is of utmost importance because ATOs instructors are used to licensing performance requirements that focus mainly on technical skills and that are based on flight path deviation criteria. Per opposition, many operators have already moved to competency-based assessment where performance criteria consist of Observable Behaviors (OBs), conditions and competency standards. This major difference in pilot performance measurement necessitates significant additional training for the ATO instructors-evaluators delivering training to the operator customer. It is worth noting that operators may also have adapted the competency-based assessment system to their operations' needs, meaning that the ATO instructors may have to handle several operators' performance standards. In this case, it is recommended to allocate to each ATO instructor a limited number of operator-customers.

Thirdly, the flight training devices should be configured as closely as possible to the AOC's fleet. When using an ATO that provides training to multiple AOCs, it may not be possible to have training devices that are in the exact configuration needed to match the AOCs' fleet. The FSTDs used by the ATO might differ from the aircrafts operated by the AOC in terms of variants, systems, maneuvers and procedures. In this case and depending on the magnitude of the differences between the ATO's FSTD fleet and the AOC's aircraft fleet, the ATO in collaboration with the AOC should provide information, briefing notes and guidance on how to handle these differences.

Moreover, by regulation, the FSTD operator must consider aircraft differences and these differences must be covered as part of the training curriculum.

the operator must consider aircraft/FSTDs differences and these differences must be covered as part of the training curriculum. The ATO and AOC should identify together the differences between the FSTDs, and the aircrafts intended to be used for training, and develop a difference training to be performed by the trainee latest before the start of the Line Training under Supervision (LiFUS) or Line Operational Evaluation (LOE).

2.1.8 “Advanced (AOC) training” (U.S. model)

“Advanced training” in the context of this document describes the AOC-specific training that is typically delivered by a Pt.121 AOC. Pt.121 AOCs can contract out to Part.142 training centers to deliver training, or parts of training, under the AOCs’ training program.

Recurrent and upgrade training should integrate, as training topics, the most relevant threats that the pilot may encounter during operations. Therefore, the AOC should provide the Pt.142 training center with realistic and relevant scenarios when defining the Line Oriented Simulation part of recurrent and upgrade training.

Advanced ‘operator-specific’ training effectiveness and efficiency implies that the Pt.142 training center’s instructors are standardized to the AOC’s operational procedures (SOPs), the operator policies, are knowledgeable about the AOC’s context of operations, and that they have completed a contract instructor qualification program. The training center must also be authorized to conduct the specific programs, and these are included in the operations specifications of the AOC.

Finally, any flight training device approved for use under the AOC should be configured as closely as possible to the AOC’s fleet. Any differences should be identified and incorporated into the AOC’s training program.

2.1.9 Upset Prevention and Recovery Training (UPRT)

With loss of control in-flight (LOC-I) accident statistics and data, UPRT training is now mandatory in EASA ab initio training (both MPL and ATP/CPL/IR programs) and initial type rating training programs. For the FAA, under Pt.60 and Pt.121, UPRT is one element of the training required under Extended Envelope (EET).

At the global level, most NAAs require AOCs to conduct FFS UPRT training in accordance with ICAO Doc 10011.

Throughout the pilot career path, UPRT is delivered at several stages:

1. On-aeroplane UPRT in Phase 1 of the MPL or during the ATP/CPL course
2. Non-type specific UPRT in FSTDs in Phases 2 and 3 or during instrument training and bridge courses as part of the CPL course
3. Type-specific UPRT in an FFS during type rating training
4. Type-specific UPRT in an FFS during recurrent training of the AOC

UPRT on FSTDs and on-aeroplane UPRT should complement each other; prevention and recovery strategies should be applied consistently on all platforms.

The UPRT on-aircraft training program requirements are now becoming part of the initial licensing process and carry a heavy resource burden. Previous instructor experience requirements, fully aerobatic aircraft (highly recommended), instructor training requirements and appropriate safety and operational procedures to support an on-aircraft UPRT program is a resource consuming business. ATOs and specialist UPRT providers are therefore best resourced to manage this training to ensure ab initio pilots are appropriately trained in upset prevention and recovery.

Successful UPRT as a whole is a collaborative system of training, where:

- on-aircraft ab initio training provides exposure to counter-intuitive recoveries with dynamic-tactile exposure within the ATO or specialist provider;
- initial type rating simulator training within the ATO or AOC reinforces prevention and OEM recommended recovery techniques; and
- the AOC or ATO reinforces identification, communication and prevention during the recurrent training cycle.

UPRT requires the engagement of both the ATO and AOC and/or specialist provider and further illustrates the need for a consistent partnership.

Refer to the [IATA Guidance Material and Best Practices for the Implementation of UPRT](#) for technical details.

2.1.10 Aircraft (Base) training

Base training is generally a component of the type rating course and, therefore, part of the ATO approved program. In most cases, the AOC provides the aircraft (Multi-Pilot Aircraft) to perform the Base training, which consists of patterns around the airport. Therefore, Base training engage both ATO and AOC and illustrates the need for consistent partnership.

Base training is an important element in the development of a newly trained pilot. It must meet the minimum regulatory requirements, but the program should be designed to ensure that the trainee is fully competent in the operations during this phase. The following guidance may be applied by the ATO and the AOC:

The required level of competency of a student pilot is assessed by observing the following:

- (a) application of knowledge
- (b) application of regulations and procedures
- (c) communication
- (d) aeroplane flight path management – automation
- (e) aeroplane flight path management – manual control
- (f) leadership and teamwork
- (g) problem-solving and decision-making
- (h) situational awareness (SA) and information management
- (i) workload management

The competencies referred to in points (b) and (e) above are particularly relevant during Base training.

This means that the focus is on observing the student pilot perform take-offs and landings in accordance with the standard operating procedures (SOPs) and recommended techniques of the original equipment manufacturer (OEM).

Consistency and repeatability of all the competencies listed above is achieved if the student pilot is able to perform at least three successive take-offs and landings demonstrating the required observable behaviors.

Mature MPL programs that can provide base training operational and safety data are eligible to request a reduction in the total amount of takeoffs and landings from the initial 12 to as low as 6. Several programs have benefited from the reduction in base takeoff and landings.

Base training implies specific risks that need to be managed to maintain a high level of safety. For example, the type rating instructors should maintain recent experience in base training delivery and high-performance standards, which are demonstrated through additional FSTD training.

From a safety management perspective, both ATO and AOC should analyze jointly the events that happen during Base training flights operations (ATO side) and line operations (AOC side) that follow base training, as recorded in their respective SMS.

2.1.11 Instructor training

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

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

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

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

Developing both pilot and instructor-evaluator competencies through a globally harmonized system of competencies will contribute to improve the quality of training, enhance safety and also increase training efficiency.

Instructors and evaluators should demonstrate the following IECs during ground training and flight training:

- Pilot competencies
- Management of the learning environment
- Instruction
- Interaction with the trainees
- Assessment and evaluation

The operators and ATOs will define the level of performance to be achieved by the instructor and evaluator in their relevant approved manuals.

For more detailed information, please download the [IATA Guidance Material for Instructor and Evaluator Training](#).

The specific guidance for instructor transitioning from “Traditional Training” to CBTA (including EBT) can be found in ANNEX 1 of this document.

Beyond the pure technical instructor training mentioned above, the ATO and the AOC should make sure that the ATOs instructors have the knowledge of the AOC’s SOPs, performance standards and context of operations. The details provided in chapter 2.1.7 “Advanced Training” for instructors are applicable to all ATO instructors.

Integrating, as much as possible, an ATO's instructor into the AOC has proven to enrich the instructors' experience, engagement and knowledge of the operation, which is then transmitted to the trainee. Exposure to line operations in the jump-seat, or even part-time flying for the AOC, has been an effective method to enrich the ATO's instructors, for the benefit of the trainee, as well as for creating additional career perspectives for the instructors themselves.

2.1.12 Crew Resource Management (CRM) training

When Crew Resource Management (CRM) training is performed by a contracted third party, the operator should ensure that the content of the course and the way it is delivered by the CRM trainers adequately reflect the specific company and safety culture, as well as the associated regulations and policies. This requires a close relationship between the operator and the third party conducting the training.

CRM training is part of almost all types of training. Close collaboration between the operator and the third party conducting the training is also required as hazards and risks identified in the operator's management system should be included and updated on a regular basis in the relevant parts of the CRM training.

If the third party is also conducting the CRM training in the FSTD, the operator and third party conducting the training should establish a process to ensure that the CRM crew performance in the non-technical competencies is assessed and fed back to the operator as a continuous effort to increase the quality of the training and the safety and efficiency of the operation. The assessment and grading process of the operator should be followed.

If the operator has implemented Competency-Based Training and Assessment (CBTA), the CRM skills are embedded in the CBTA system. The operator's crews training should emphasize the competencies and observable behaviors relevant to CRM, and instructors of the third party should be trained in applying the operator's competency framework.

This will ease the transfer of the crew performance data into the operator's safety management system. Therefore, the operator should ensure that the instructors of the third party conducting the training are familiar with and competent to train and assess the trainees using the specific competency framework of the operator.

The operator should be informed if the third party conducting the training intends to conduct CRM training with trainees from different companies. If it is the case, the operator should ensure that the CRM training content is specific to the relevant flight operation and to the trainees concerned.

Please note the integration of CRM skills in CBTA as per ICAO PANS-TRG DOC 9868: From a competency-based training 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.

2.1.13 Command upgrade training

The commander is the ambassador of the company with respect to its crews and its customers. As a leader he represents the company's values and culture perceived by the crews and the customers. Therefore, the training of the commander is of paramount importance.

Hence, if the commander upgrade training is subcontracted by the AOC to an ATO, the operator should ensure first, that its policy is properly trained, and second that the competencies of the applicant commander are assessed and developed during the upgrade training.

Concerning the operator's policy, the operator should ensure that the ATO delivers training on the most commonly stated topics related to the commander role in the operation manual. These can be grouped into the following three areas:

- Duties, responsibilities, accountability and authority of the commander
- Leadership
- Problem solving and decision making

Secondly, the future commander needs to be trained and assessed in all nine pilot competencies to the operator's final competency standard. However, command training will put special emphasis on those competencies that are success critical for a commander, because they are related to his additional scope of work.

An analysis of the pilot competencies and the observable behaviors relevant for the commander showed that the majority of behaviors that are critical for the commander can be found in the following three competencies:

- Leadership and Teamwork
- Problem Solving and Decision Making
- Workload Management

Consequentially the operator should ensure that the ATO's training curriculum puts special emphasis on these three competencies.

All other competencies remain important; they also contain OBs relevant for command training. Based on the nature of the operation, company culture and other factors, each operator may determine its individual training focus.

The IATA Guidance Material and Best Practices for Command Training gives further guidance for the design of pilot development programs and competency-based approach to Commander training. A copy of this guidance can be downloaded for free from the Pilot Training and Licensing webpage: <https://www.iata.org/pilot-training-licensing>

CRM (the effective utilization of all available resources) supports the command upgrade training, therefore, the recommendations in section 2.1.12 CRM training above also apply to the command upgrade training.

2.1.14 ATO-AOC feedback loop

ATO-AOC Feedback Loop

The establishment of a subjective feedback system is integral to the partnership agreement between an ATO and an AOC. This enables both, the students under training and assessment and the instructors, to provide feedback. This process is part of the buy-in considered essential for safety improvement and the working relationship between both parties. The use of this feedback loop and the collection and analysis of training data in both licensing, initial type rating and operator-specific training and assessment, is the foundation of CBTA programs as well as traditional training. ATOs and AOCs are hence able to further develop and enhance their training programs to achieve safer training outcomes.

Training Data

Collection of training data and the ability to perform data analytics is becoming more and more important as the training industry moves towards CBTA, customized and even adapted or individual training. ATOs and AOCs are beginning to implement data-driven approaches to training in order to continuously improve the learning experience, the training curriculum and lesson plan development, as well as enhancing the overall Safety Management System. This evolution gives ATOs and AOCs the possibility to analyze dashboards, powered by software systems and Artificial Intelligence (AI), to enable actionable training insights and analytics.

When an AOC partners with an ATO, it is important that the training data and associated analytics provided by the ATO be integrated with other training and operational data, and feedback held within the AOC.

Training data collection and analysis should respect best practices related to anonymization and de-identification.

Collection and Analysis of Training Data

Training data produced from within the training function of an ATO or AOC is a valuable source of data. Taking full advantage of such data requires robust and well-calibrated training metrics. These metrics should be analyzed at a predetermined frequency to establish training system effectiveness, and where necessary, make adjustments and improvements to the training program. Typical metrics include:

- (i) differences in success rates between specific courses, aircraft types and training topics
- (ii) distribution of errors for various training scenarios
- (iii) student skill retention capability versus skill type
- (iv) the student's feedback, which provides a different perspective as to the quality and effectiveness of the training product
- (v) an instructor feedback system to measure the effectiveness of the instructor standardization process

Training metrics are an invaluable component in supporting any type of training program. Under a CBTA program, training metrics supplement operational data; demonstrating the importance of the specific competencies applied to real operations.

Integration of Analysis between the ATO and AOC

Any data system used has its strengths, weaknesses and bias. In order to overcome shortcomings of individual data analysis, whether it is training data related to flight data analysis, flight deck monitoring or safety reporting systems, analysis methods should be used in an integrated manner. For example, flight data analysis could well identify problems without providing the reason as to why they have occurred, while flight deck monitoring and/or a confidential reporting system could well reveal the root causes and help define the most effective training improvements and remedies.

Collecting and analyzing all the necessary training data, in combination with operational data, requires close liaison between the ATO and the AOC.

Measurement of Training System Performance

A process for the measurement of the training system performance should be implemented or adapted to meet the demands of the specific type of training, e.g., for measuring performance throughout the range of competencies under a CBTA program. Where possible, it is desirable to establish a baseline for the training system performance prior to its implementation, so that system performance in areas of focus can be effectively

measured. Any adapted or new system should be tested and adjusted before implementation, as part of the partnership agreement between the ATO and AOC.

To support the achievement of overall desired airline performance standards, some form of combined ATO-AOC project/review team should be committed to define the parameters for feedback, collection and use of training data on the basis of regular reviews.

2.2. Instructor provisioning (instructor shortage)

Pilot instructors are professionals authorized to provide practical training to a student for an aviation license, rating or endorsement. Instructors play a critical role in the delivery of the training curriculum. They are the link between the organization and the trainees in the delivery of training programs. They help students develop the necessary competencies to operate safely, effectively and efficiently when performing their roles. As such, it is critical that suitable qualified instructors are recruited and retained.

Prior to COVID-19, it was estimated that over the next decade, global aircraft orders and deliveries would be substantial, and the number of additional pilots required worldwide was estimated at over 250,000. Although growth in some regions of the world is slower than in others, the demand for pilots was still high. Whilst it is crucial that the challenge of pilot supplies be addressed, the correlating effect is such that the demand for highly qualified instructors in all training sectors and at all levels of the industry is also increasing. Future increases in the demand for pilots (specifically airline pilots) will lead to instructors moving into better paid airline jobs, as pilots; resulting in a reduction in the supply of instructors, which in return can cause an increase in the cost of training and further restrict the supply of pilots. A shortage of instructors undermines the concept that is fundamental to the efficiency of modern pilot training; to have suitably qualified professionals to deliver training, specifically in the context of CBTA implementation. Modern reduced-content pilot training courses are a trade-off between reduced content and the continuity of instruction that such courses are designed to deliver.

Demographic-driven retirements from the instructor career, together with the constant attraction for instructors to move to an airline pilot career, will affect the ability to deliver traditional training programs within the time-focused regimes envisaged by the regulations.

It is therefore imperative that the industry be able to get maximum value from instructor resources and instructor training. In this context, it is important to mention the evolution of descriptors of instructor and evaluator competencies, a relatively new addition to the total system improvement being implemented in the industry. As is the case for CBTA in pilot training, this is a complete framework of competencies, with competency descriptions and related observable behaviors applied to instructor training, assessment and qualification

which should be viewed as a mechanism to be used by ATOs and AOCs to help support career pathway models for instructors. Please refer to Section 2.1.11 above. Further information on CBTA for Instructors and Evaluators is available in the IATA [Guidance Material for Instructor and Evaluator Training](#).

With fewer instructors available, their number advancing through the instructor hierarchy decreases, which in turn means less experienced instructors available to train the new instructors. The instructor supply chain is therefore put at risk, and the training industry will need to find solutions to address this situation. Making the instructing role a viable career path is vital to ensuring a reliable source of well-trained pilots in the future.

[ATO-AOC innovative partnership approaches to support pilot and instructor career paths](#)

Airlines and ATOs should partner to provide innovative pathways to become pilots and entry-level flight instructors. These pathways should be flexible and innovative. They should comprise the assessment, selection, licensing and instructor qualification of the potential pilot. The pilot can then commence employment as a flight instructor in the ATO prior to being hired by the airline. One of the intentions is to make the profession more accessible to a broader range of candidates with diverse backgrounds and experiences.

Such approaches may open up the profession to people who would not normally have had the opportunity, leverage best practices in training, including CBTA, and remove some of the economic and social barriers so that those with the natural aptitude can pursue their ambitions.

Traditional training models require pilots to make a significant financial investment over numerous years without the guarantee of a job. Innovative approaches can be designed to bring more predictability, lower overall cost, and a guarantee of a job to aspiring pilots.

In addition, instructors reaching the end of their career could become instructors in the simulators for a period of time before retiring. Operators can also employ senior airline pilots reaching the retirement age as flight instructors.

In the next 5-10 years, thousands of airline pilots worldwide will be reaching the age of mandatory retirement. Many of them will likely elect to continue a career in aviation. ATOs and operators should look for ways to encourage retiring pilots to engage in flight instruction as a retirement job and should build pathways between airlines and ATOs for this purpose.

ATO instructor investment, career pathways and instructor provisioning services

Social and economic factors now play an important role in society in general, and this is no different in the aviation sector as professionals consider quality of life improvement strategies or specific career pathway models. The larger and more experienced ATOs have a natural interest in attracting and retaining instructors of the highest competency and invest heavily in order to provide pilot training services in all the sectors outlined in this document. Some of the factors that influence investment in the instructor workforce are:

- Differences in age or medical condition between active pilots and instructors
- Pilots and instructors do not always compete for the same jobs
- ATOs provide different channels to hire instructors
- Instructor provisioning contracts with the airlines
- ATO-AOC instructor and pilot resource-sharing models associated with both training duties and flying duties (cyclical and counter-cyclical)

These ATOs focus on rigorous instructor sourcing, screening, training and retention, and continually invest to improve their core of instructors. Career mapping allows the ATO to attract and motivate instructors, retain their expertise by offering clear development paths which also aids succession planning, and strengthens the partnership with AOCs as a reliable and trusted training services provider.

This investment means instructor provisioning partnerships can be facilitated utilizing a core of instructors who are standardized with the required knowledge and skills to deliver the AOC's training programs, whilst the AOC's pilots are operationally available instead of assigned to instructional duties. This results in more efficient training delivery and minimal production loss for the AOC.

Regulatory

States should take steps to modernize regulations by transitioning from the current hour-based flight training to the use of CBTA methods as the primary reference for training completion. This would encourage training focused on pilot competency and promote the quality of pilots and instructors, and it would target the actual skill set required on the job.

Furthermore, to promote the flight instructor career path, States could include regulatory changes to facilitate airline pilots' employment as part-time instructors. This could be beneficial for pilots who are looking for a better work-life balance, and help experienced pilots transmit their knowledge, skills and attitude.

Airlines could also consider a change in their seniority rules to allow seniority, or parts, thereof to be transferred from ATOs to AOCs. With this system, experienced pilots could serve as flight instructors while maintaining their level of pay.

3 Conclusion

This white paper highlights the benefits of an enhanced ATO-AOC partnership, including instructor provisioning, and proposes solutions to achieve it.

The enhancement of the ATO-AOC partnership was one of the requests expressed by the operators in order to ensure that the initial training meets the airline's performance standards. The key elements that have been elaborated in chapter 2.1 to support the enhancement of the ATO-AOC partnership can be summarized by a global extension of CBTA principles from pilot aptitude testing, through initial licensing training and advanced training.

CBTA implies a robust instructional system design, competent instructional staff and managers, and proper training data collection and analysis. This white paper provides guidance to implement CBTA for mutual benefit of the operators and the training organizations. Taking into account that CBTA is a new training methodology and that CBTA implementation will happen in the context of multiple organizations delivering it, it is of utmost importance that IATA supports its members by ensuring that CBTA is properly delivered at the ATO level. From a practical perspective, this could be achieved by an "accreditation system" delivered to training organizations delivering qualitative CBTA. Please find in Annex 2 the rationale for CBTA implementation.

On the instructor's side, as the availability of high-quality instructors will certainly remain a challenge in the post COVID context, it is important to investigate different measures to recruit, train and retain instructors, such as:

- defining better career paths, including developing structured perspectives for instructors to become part of the AOC's workforce
- adopting/developing competency-based training and assessment programs

On the regulatory side, we should take into consideration regulatory changes to facilitate training and licensing, remaining as close as possible to ICAO standards without additional requirements, adopting quality-based requirements for pilots, and not mandating additional regulatory burden on pilots and training organizations

ANNEX 1

Guidance for Instructor transitioning from “Traditional Training” to CBTA (including EBT)

Instructors and evaluators play a crucial role in the delivery of CBTA. The personnel delivering CBTA must undergo initial and recurrent training and standardization to ensure effective application of the CBTA training methodology.

CBTA Instructor — Initial Standardization

Before delivering the operator’s or training organization’s CBTA program, the instructor should successfully complete the CBTA instructor initial standardization program comprising CBTA instructor training and a CBTA competency assessment.

CBTA instructor training

The CBTA instructor-training course must be delivered by a qualified CBTA instructor.

The CBTA instructor training course should comprise both theoretical and practical training.

At the completion of CBTA instructor training, the applicant CBTA instructor should:

- (1) have knowledge of CBTA, including the following underlying principles:
 - threat and error management,
 - learning from positive performance;
 - building resilience; and
 - data-driven training;
- (2) demonstrate knowledge of the structure and training delivery methods for each phase of the operator/ATO CBTA program (including the ISD);
- (3) demonstrate knowledge of the principles of adult learning and how they relate to CBTA;
- (4) conduct objective observations based on a competency framework, and document evidence of observed performance;
- (5) relate specific performance observations (Observable Behaviours) of competencies;
- (6) analyze trainee performance to determine competency-based training needs and recognize strengths;
- (7) evaluate performance using the competency-based grading system;
- (8) apply appropriate teaching styles during training to accommodate trainee learning needs;
- (9) facilitate trainee learning, focusing on specific competency-based training needs; and
- (10) conduct a debrief using facilitation techniques appropriate to CBTA.

An instructor may be given credit for some of the topics above if the instructor has previously demonstrated competence in those topics.

CBTA competency assessment

Prior to conducting training and assessment within a CBTA program, the CBTA instructor should undergo a competency assessment. The assessment should be made during a practical training session supervised by a person nominated by the operator or the ATO and is acceptable to the Licensing Authority.

CBTA INSTRUCTOR — RECURRENT STANDARDISATION

The CBTA instructor should complete annual (or specific term approved by the authority) refresher training in the elements of the initial CBTA instructor standardization. This training should serve as one way to continuously improve or maintain the standardization across instructors on teaching and grading. The recurrent training should incorporate de-identified grading data to show where grading is consistent or where there is inconsistency. Use of example scenarios in the recurrent training that demonstrate appropriate grading have shown to be helpful in calibrating the instructor workforce. Providing individual instructor grading data in comparison to the entire population of instructors can also be a useful tool to help individual instructors see how they perform compared to their peers. This recurrent training could also incorporate feedback received from pilots that received the training and a review of relevant inter-rater reliability data.

The CBTA instructor should undergo a CBTA competency assessment, during the conduct of a practical training session, at regular intervals not to exceed three years.

ANNEX 2

Rationale for CBTA implementation

Background

More than a decade ago the aviation training community realized the advantages of performance based CBTA compared to task- or hours-based training and checking. The MPL published by ICAO in 2006, was the first license based on CBTA followed by Evidence-Based Training (EBT), in 2013 as the first recurrent training approach based on CBTA.

Since ICAO published Amendment 5 to PANS-TRG, General provisions for competency-based training and assessment, in 2016 and it defined the role of the pilot competencies in the context of Threat and Error Management (TEM) in 2018, the way forward was paved for a global implementation of CBTA.

Context

In 2018, IATA estimated that the number of passengers could double to 8.2 billion by 2038. This forecast is expected to cause a rapid fleet expansion which, combined with high retirement rates for all aviation disciplines, will create potentially substantial aviation skills shortages. Additionally, the increase of automation, the progress made in the area of artificial intelligence and the emergence of new concepts for operations should generate more operational complexity and may lead to significant changes to jobs characteristics. In this context, CBTA is clearly one of the mitigation measures against the unwanted consequences of this anticipated aviation skill shortage.

This is the reason why, the IATA has supported to the Total Systems Approach (TSA) which stands for the application of CBTA across all aviation disciplines in general, and to all modules and roles of a pilot's entire career. Hence, the defined competencies for pilots, instructors and evaluators should consistently be applied contently throughout pilot aptitude testing, initial (ab-initio) training, type rating training and testing, command upgrade, recurrent and evidence-based training and instructor and examiner selection and training.

Benefits of CBTA

Safety

The shift in term of safety benefit from traditional prescriptive task-based training to CBTA is mainly due to the extension of the scope and nature of the training and the enhancement of the measurement of the performance.

The traditional training, which is hour driven and task based, focuses on training mainly three technical elements as there are handling skills, automation management and application of procedures. Afterward, the content of the checking (skill test or proficiency check) is based on the restitution of specific exercises encompassing these three elements. Measurement of performance is mainly based on a set of fixed predetermined criteria represented by the flight path deviation numeric tolerances.

In contrast, CBTA targets to assessing, developing and enhancing a set of essential competencies to perform the pilot job. These competencies include situational awareness, communication, workload management, leadership and decision making, which are considered as non-technical skills but are crucial for safety in operations.

CBTA also uses more scenario-based training to be trained with more realism and facilitation techniques by the instructor to support the pilot's development. Pilots trained in this way enhance their competence and increase their confidence. Therefore, they are more resilient when they must manage unexpected situations.

Additionally, under CBTA the performance of the pilot is determined with more accuracy by using objective, observable performance criteria that state whether (or not) the desired level of performance has been achieved.

Effectiveness and Efficiency

CBTA implicitly provides dynamic, effective and efficient programs because it respects the instructional system design concept. In particular, the ADDIE principles (analyze, design, develop, implement and evaluate) ensure that the training program is adapted to the organization and pilot needs while making best usage of training media and devices. Therefore, CBTA drives and enables pilots to reach their highest level of performance during all their training and potentially beyond the training, during their operational duties.

CBTA's effectiveness and efficiency is also based on the consistent use of the same set of competencies during the entire career path of the pilot, from aptitude testing, to PPL, CPL, MPL, ATPL, through operator training and for pilot Instructor/Evaluator as well. This consistent use of pilot and instructor competencies facilitates training data exchange, the benchmark of training metrics and the training data analysis to enhance individual course, a company's training pathway and the performance of the global training system.

The areas in which CBTA can improve the effectiveness and efficiency of training are:

- Creation of a progressive training continuum in which the training output from one phase matches the input requirements of the next and ensures cross-linkage of recurrent and additional courses, avoiding the need for back instruction of 'holes', duplication, overlap, etc.
- The engineering course design which drives iterative course improvement identified through feedback and data analytics and by adaption to ensure courses address the latest industry and trainee needs and technical advances
- Greater training and assessment through-out courses, which enables individualized supportive development rather than jeopardy environment resulting in fewer unexpected training delays and reduced pilot stress at test milestones
- Greater operational realism and application in training, ensuring that the training objectives can be applied, competencies advanced and resilience developed.
- Selection of training tools based on suitability to best meet the required training specifications of that section of training, whilst also enabling the innovation and development of future training devices
- Comprehensive performance enhancement for trainees and instructors covering all areas of their job

Trainee Centered

CBTA follows a training plan with some inbuilt flexibility, and each pilot competency in all stages and phase of training. As such the pilot:

- takes advantage of a training tailored to his individual needs
- gains greater confidence in his ability to manage the unexpected and builds resilience
- is more motivated through the individualization of training and use of applied and relevant scenarios
- is supported and mentored to continuously improve in all areas, and, where feasible, the training plan and time allocation is shifted toward the areas of the trainee's weakness and /or concerns, maximizing the effectiveness of the instructional contact time

Transparency and accuracy

Per definition CBTA is characterized by a performance orientation with an emphasis on standards of performance and their measurement. Hence, under CBTA clear performance criteria are established for assessing competence. Each performance criterion consists of an observable behavior, a condition(s) and a competency standard. In some phases of training, the attainment of some knowledge learning objectives is also measured through written examination or oral assessments.

The performance criteria are commonly aligned and agreed among all stakeholders involved: the CAAs, the ATOs, the AOCs, the pilots and the instructors and all the stakeholders in order to have a clear view on the overall objectives.

The instructors continuously assess and develop the trainee's competencies with consistency in a wide variety of contexts. Moreover, under CBTA, the instructors and evaluators are "calibrated" to achieve a high degree of *Inter-rater reliability*

These CBTA principles provide a significant enhancement with respect to the transparency and the accuracy of the training and assessment methodology.

Summary

CBTA is an alternative to the traditional training methodology. CBTA is expected to contribute to the professional development of pilots, improve the quality of training and consequently enhance safety in operations.

The following table summarizes some of the main differences between traditional training and CBTA:

Traditional Training		CBTA
<p>Defined list of training objectives to accomplish.</p> <p>Prescribed training time assumes objectives completed at normal pace</p>	Methodology	<p>Competency-based</p> <p>Performance-based</p> <p>Fixed prescribed competency standard to be achieved regardless of time.</p>
Based on regulatory requirements that must be satisfied	Training Focus	Focuses on competencies that must be demonstrated
Aircraft systems and phase of flight emphasis across multiple training platforms	Courseware Focus	Emphasis on one consistent set of competencies across multiple training platforms
Task demonstration assumes competence	Competencies	Training directed to competency
Technical skills and CRM, assumed proficient upon completed training objective	Technical Skill	Involves one set of competencies which encompass the former technical, non-technical and CRM skills
TEM trained as events in various modules	Threat & Error Management	TEM fully integrated with the pilot competencies being serving as countermeasures
Focus on systems and airmanship applied to aircraft	Pilot Development	Training intended to develop pilot resilience
Remedial training based upon observed deficiencies. Exercises/tasks during training repeated until proficient	Remedial training	Root cause analysis of unsatisfactory performance, and remedial training to achieve competency by using various task or scenarios
Assessment based upon lesson progress. Formal evaluation at end of course	Assessments and evaluations	Continuous assessment based upon competency acquisition. Formal evaluation at end of course