



together4safety

Safety Issue Report – Skills and Knowledge Degradation due to Lack of Recent Practice

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THALES

COVID-19 SR Portfolio Safety Issue Assessment - Skills and knowledge degradation due to lack of recent practice (SI-5003)

1. Introduction

The onset of the COVID-19 pandemic in early 2020 has created an unprecedented situation for the aviation industry. With a significant reduction in air traffic, most aviation professionals have not been able to perform their normal tasks. Instead, they might be doing a substantially different job, and some might not be working at all or at a substantially reduced frequency. The extended period of low recency is affecting a large number of aviation personnel, making it different from the usual sick leave or sabbatical leave.

Despite the initial recovery over the summer of 2021, flying activities are still not taking place at the pace required to keep all aviation professionals current. While organisations are making the effort to ramp up their training activity, they have faced a multitude of challenges such as the closure of training centres, lack of simulators, and lack of available instructors and trainers whose instructional knowledge may have also eroded during this period. Furthermore, new or updated operational procedures have been developed to cope with the changes in operations. With the aforementioned training constraints, aviation professionals may not be effectively trained in the updated systems and procedures upon their return to work.

Together, this potentially creates a reduction in the skills and knowledge of aviation professionals, and with it associated safety risks.

This document provides guidance to support organisations and aviation professionals (in particular, air traffic controllers (ATCOs), commercial aircrew (flight crew and cabin crew), aerodrome operations staff, ground handling staff and maintenance engineers) in managing skills and knowledge decay as a consequence of the COVID-19 crisis. It is supported by additional Safety Promotion material such as that provided in the “Ramp-up – Be Ready, Stay Safe” Campaign launched in May 2021.

2. The impact of proficiency decay on aviation safety risks

Decay of proficiency can create a direct safety risk, as accuracy, speed and ultimately effectiveness of task performance deteriorates with the lack of practice. This is caused by a wide range of influencing factors that will be further explained in the next section.

A period of reduced or no activity can degrade skills. It can also prevent the development of further expertise or proficiency. The learning process does not end after obtaining a professional certification e.g. a type rating for a pilot. Professionals continue to learn through practice and experience, improving performance, insight, and flexibility.

A secondary effect of proficiency decay relates to spare mental capacity. Performing a specific task correctly (physically, routinely and/or cognitively) now requires more effort than when highly proficient. In aviation, highly skilled personnel rely on spare mental capacity mechanisms to be able to perform a large number of tasks successfully without cognitive overload. Proficiency decay in only a few skills, such as the application of SOPs, may lead to time management issues, reduced situational awareness, and the ability to keep ahead of the situation. In non-normal situations or emergencies, appropriate actions may not be taken due to one’s inability to analyse the situation as a result of the cognitive overload.

Furthermore, cognitive overload decreases the ability to recover from startle and surprise effects which, in turn, further reduces mental capacity, due to a negative limbic brain response, when left unmanaged.

2.1 Factors affecting proficiency decay

To understand the underlying risk mechanism of proficiency decay, several factors can be identified when considering the nature of the task, and the nature of the personnel. Both will affect the decay factors for each combination of personnel and tasks. In this section, a number of universal mechanisms are presented that may apply to all personnel. However, the effects may differ between the job types and between individuals considerably. Therefore, oversight and training efforts must be sensitive to the variance in proficiency decay, and subsequent recovery activities required. It should be noted that the research base for decay of complex skills, and in particular to aviation, is limited, and that some insights are based on comparable studies in other domains e.g. medical, military, etc. In order to reduce ambiguity, the following definitions are used¹:

- **Physical skills:** Perceptual and/or psychomotor actions and coordination (e.g. stick and rudder control, visual approaches, taxi wheel operation, detailed inspection, component disassembly)
- **Cognitive skills:** Information processing, sense making, idea generation, problem solving and/or decision making (e.g. emergency descents, fuel leaks, weather deterioration in flight, extreme temperatures, maintenance errors, boroscopic inspection assessment, NDT results assessment)
- **Knowledge:** Retrieval and/or application of step by step actions, facts and/or concepts – to highlight the two distinct groups i.e. procedural and declarative and to highlight that procedural decays at a higher rate
 - **Procedural knowledge:** Retrieval and/or application of step by step actions (e.g. memory items, flap operations, callouts, part assembly, maintenance task card)
 - **Declarative knowledge:** Retrieval and/or application of facts and/or concepts (e.g. speed limits, autopilot modes, cockpit layout, tools calibration, shelf life)

A few universal mechanisms to consider:

- Procedural tasks that require specific procedural or declarative knowledge (e.g. checklists that require more items than prescribed on paper) may be more susceptible to skill decay than higher order cognitive tasks (e.g. decision making) or perceptual/psychomotor tasks. Cognitive shortcuts for procedures decay rapidly, requiring a significant increase in cognitive resources, in particular for procedures that are normally routine. By their prescriptive nature, procedures are easily subject to slips and lapses. Procedures must be viewed as highly sensitive to proficiency decay.
- The more steps a procedure has, the more vulnerable for decay it will be. This may be called 'Sequential Complexity' in order to distinguish it from the following factor.
- Complex skills/competencies may feature less decay, on the condition that such skills have been thoroughly practised and internalised. The more skills and knowledge are integrated for performance a task, the stronger it will be. Such 'Integration Complexity' seems to relate more to continuous, dynamic tasks requiring multiple competencies that are highly connected/integrated. Higher 'Integration Complexity' induces more cognitively engaging and meaningful activity, resulting in more retention of the skill/competency.
- Low-experience personnel are more sensitive to decay manual (physical) skills that experienced personnel, as they have not developed as much muscle memory, which does retain comparatively

¹ HFM 292 RTG (in prep). Final report on skill decay. NATO HFM 292.

well when developed sufficiently. Low-experience personnel have a lower heuristic basis to rely on for cognitive competencies for problem solving and complex situations. As a result, they will require more cognitive resources to perform these tasks effectively. This is not different from normal operations, but it is an important factor that must be added to the other increases in cognitive demand.

- Age is known to reduce cognitive abilities in general, including retention. Proficiency decay is faster for older personnel but this applies to newly acquired knowledge and skills, not to already well-practised tasks (see level of expertise factor). Older personnel tend to have more difficulty acquiring and integrating new or changed procedures due to the natural decline in cognitive flexibility and learning ability with age. As such, these require more cognitive resources to perform correctly. New or changed procedures are not unlikely to have been introduced given the major change in the operational scene.
- Retention interval - the ability to remember information is proportional to its frequency of use. In essence, the longer the period of non-use, the greater the probability of decay.
- Overlearning - it refers to the amount of extra training beyond the point needed to reach competency. Overlearning has the potential to induce complacency and increase the association between stimulus and response.

Furthermore, all organisations must consider four other effects that may affect the risk of proficiency decay:

- **Self-overestimation, in both low- and high-experienced personnel.** The latter group may be more susceptible as high experience alone is not enough for recency. Help create an environment that encourages your staff to be open and honest about their own capabilities to reduce the likelihood of them over-estimating their own abilities.
- **Self-underestimation and low confidence.** This negative self-perception is an emotional cognitive load which takes away thinking power and reduces a person's ability to perform other tasks. Specifically support staff with less experience who might under estimate their own abilities as they return to work or increase their level of activity.
- **The impact on people's Wellbeing due to the ambient negative emotional load e.g. job-uncertainty, financial strain, work-life unbalance, and COVID-19 exposure concerns.** Use the resources on Wellbeing in the Ramp-up Campaign to help support the Wellbeing of staff and reduce the impact on people's ability to perform their job.
- **The combination of low recency in personnel, and new/changed procedures/operations.** This is a particularly dangerous combination of the innate increase in task demand that novelty brings, and the increased cognitive load that low-proficiency already induces. A good example is the required changes with the recent introduction of SMS requirements in continuing airworthiness. Such situations should be evaluated as a compound risk.

2.2 Sector-specific proficiency decay considerations and industry-level risk interactions

As each aviation profession faces its own unique set of challenges, the next few sections describe how each profession has been affected in terms of proficiency decay:

- [Aerodrome operator and ground handling staff](#)
- [Air traffic control officers \(ATCOs\)](#)
- [Commercial flight crew](#)

- [Cabin Crew](#)
- [Maintenance engineers](#)

It is important to be aware of the compounding effect of the degradation of skills across the different types operations. Although each type of operation must address its unique proficiency decay risks, they must also consider how risk may affect adjacent operations. The interaction of risk from the different domains inevitably contributes to the weakening of safety barriers of the European aviation industry as a whole when viewed from a systems perspective. Thus, it is in aviation community's interest to address this safety issue across the different domains in a concerted manner to manage the risk factors stemming from different domains.

2.2.1 Aerodrome operator and ground handling staff

The pandemic has resulted in widespread suspension of flights, forcing aerodromes across Europe to scale down or suspend their operations until demand for air travel picks up again. In lieu of this, a significant number of aerodrome operations staff ranging from rescue and firefighting personnel, wildlife control personnel, movement area inspectors, to follow-me drivers have been made redundant or furloughed. Furthermore, many aerodromes were compelled to change operational procedures and the use of airside infrastructure in order to adapt to the new operational reality during the shutdown period. For example, runways and taxiways were used and are still currently being used for the long-term parking of aircraft.

For ground handling staff, they are beset with additional challenges which includes weaker job security, less structured training and seasonal demand. During the shutdown period, many ground handling staff were furloughed or put on long-term leave.

As traffic picks up gradually and staff start to return to work, it is necessary to ensure that both aerodrome operator and ground handling staff possess the skills required to execute their duties. In addition, staff have to be trained in the new procedures and complete the required proficiency checks. However, the lack of competent instructors and assessors creates an additional challenge for the aerodrome operators and ground handling companies during this period.

The introduction of new procedures to adhere with the health measures imposed by local authorities in aerodromes also adds an additional layer of complexity in training both aerodrome operator and ground handling staff as they have to understand the differences in the previous measures vis-à-vis the new measures.

2.2.2 Air traffic control officers (ATCOs)

During this period of reduced activity, ATCOs are expected to experience reduced currency and competency due to:

- Low levels of traffic resulting in limited number of ATCO duty shifts and hours in position
- Exposure to different traffic patterns, modes of operations e.g. medical flights and aircraft with different performance specifications
- Preferred deployment of ATCOs with more than one endorsement due to their flexibility

In addition, ATCOs may not be up to date with the latest changes in airspace and procedures after extended period of absence e.g.

- Applicability of airspace organisation and/or rules and procedures during the recovery phase

- Updated drones regulations in some countries to cope with emergency situations
- Changes to navigation procedures
- Winter/summer specific procedures which are refreshed regularly

The key concern for this profession is the pace at which ATCOs can regain the necessary currency and/or competencies to adapt to higher levels of traffic. This concerns the frequency at which training, both On-the-Job Training (OJT) and classroom, can be organised and conducted in a manner which complies with prevailing health restrictions. A thorough assessment of remote training alternatives should be done.

Given the slow recovery of air traffic, ATCOs may refresh their competencies through daily practice, complemented by short theoretical trainings about the less common scenarios, including unusual runway configurations and high demand. Nonetheless, the lower levels of traffic is still an impediment in fulfilling unit rating requirements, in yearly hours or in exerting the specific unit endorsement. ANSPs could consider introducing shorter shift patterns to allow more staff to remain current.

Another key concern is the erosion of OJT Instructors' competence after a prolonged period of not providing OJTs to ATCO trainees as little or no OJT is conducted during this period. OJTs may go on, but performance levels cannot be reached due to lack of traffic. In addition to this, the mode of operation in which an instructor is providing OJT may not be fully compatible with the physical distancing measures. The concern of proficiency decay is also valid for competence assessors. Thus, emphasis should be given to these professionals retaining their own ATC skills before they assess others.

2.2.3 Commercial flight crew

In terms of skills and capacity degradation, flight crew have been impacted to a greater extent compared to ATCOs as a large proportion of flight crew have been furloughed or placed on prolonged leave with little or no flying during the shutdown period.

The uncertainty in the recovery of the aviation industry and in some cases financial strain can become a significant emotional burden to flight crew, and adds to their cognitive load if and when they resume flying. With little or no contact with flying duties for a prolonged period of time, flight crew are likely to experience a high cognitive task demand when they do return to the cockpit. In the context of a highly prescriptive and procedure-heavy working environment, the risk of slips, lapses and errors can be significant.

Flight crew proficiency may suffer from the significant decrease of actual flights, but this is also exacerbated by many restrictions in Flight Simulator Training Devices (FSTDs) during this period, due to COVID-19 travel and social distancing restrictions. Access to these simulators is and will probably remain a problem in the future due to the prevailing health measures, which limits the number of available slots worldwide. Presently, FSTDs are almost exclusively used to run this training, and as slots remain limited and training demand grows with the gradual scaling to normal operations, there is the risk of training bottleneck and subsequent personnel unavailability.

2.2.4 Cabin Crew

The COVID-19 pandemic created restriction for commercial air operations together with passenger decline lead to a situation where air operators were forced to furlough their cabin crew or to put them on an extended leave. This unprecedented situation precluded cabin crew from regularly practicing their profession and applying theoretical as well as practical knowledge.

At the same time various the COVID-19 pandemic health and safety measures have made it more challenging for operators to provide cabin crew training that would ensure the same level of safety as before the pandemic.

In addition, cabin crew members now are exposed to frequent changes in the COVID-19 pandemic related procedures that adds more information and strain to cabin crew flight duties. In the times of constant changes and information overload, as well as absence from flying, cabin crew actions could become more error-containing. It could create further additional stress as well as self-assurance decay and could leave an effect on the performance of other aviation professionals, like flight crew and technicians, possibly creating safety issues across aviation.

Air services are slowly resuming and in view of the particular circumstances created by the pandemic, cabin crew return to flying makes cabin crew actions and decisions more prone to slips, lapses or mistakes, therefore it is crucial that:

- Air operators consider cabin crew return to flying as a part of their organisation's Safety Management System by identifying risks and appropriately mitigating them, where required; and
- Air operators and cabin crew members consider best practices proposed in the section 6 of this Safety Issue Report, in order to reduce risks of skill and knowledge degradation.

2.2.5 Maintenance Engineers

Due to a prolonged break in carrying out maintenance tasks, maintenance staff may have their skill sets and/or ability to recall knowledge weakened. This could be due to eroded hand/eye coordination (proprioception), a lowering of task familiarity or flawed reliance on memory that is usually applied in performing tasks. Maintenance Engineers may be more prone to individual errors or mistakes which, if performing maintenance on flight controls for example could lead to an in-flight event.

This may be exacerbated by task unfamiliarity with so many aircraft being stored / preserved that need to come out of storage. In addition, many aircraft were placed in storage for an indeterminate period, resulting in a lack of clarity regarding the maintenance schedule which should be performed.

With traffic picking up during the recovery period, there is growing pressure on maintenance organisations to service and release aircraft. This may result in procedural short cuts, less rigorous checking and approving aircraft with potential defects and/or omitted maintenance tasks. This takes place at a time when maintenance engineers may also be:

- Unclear with some procedures related to returning aircraft to service after indefinite storage
- Out of practice even when familiar with maintenance operations

3. Importance of Safety Culture in mitigating proficiency decay

As personnel are the backbone of an organisation, the safety culture of an organisation inevitably affects how personnel execute their tasks and perceive safety. It is especially important for organisations to provide the right incentives during the recovery period to encourage staff to ask for help within the organisation when they face issues in the execution of their tasks after a prolonged break. Some personnel may underestimate the extent to which their proficiency has decayed or the potential repercussions of their eroded skills and knowledge on the safety of the system.

A positive safety culture will reinforce the importance of their actions on safety and encourage personnel to be proactive in maintaining their level of proficiency to the best of their ability. This includes self-assessment and highlighting any potential skills and knowledge gap to the organisation. While safety culture is intangible and may sometimes be perceived to be less important than tangible mitigations, it is a strong complement to the different initiatives below as it creates a positive feedback loop within the organisation. Again, the organisational aspects of the Ramp-up Campaign are specifically designed to support organisations with this challenge.

4. Main areas of improvement which are applicable to all aviation domains

Proper policy and support from Accountable Manager (AM) and senior management are essential during the Return to Normal Operations (RNO) phase and the next phase. No action will be effective if this aspect is not effectively implemented. It is important to convince AM and senior management of the need and responsibility concerning sufficient continuous training, both theoretical and practical, even in this period where financial and staffing are reduced. If implemented well, it is an effective measure to maintain skills and knowledge

Existing training programmes alone may be not enough to cope with skills and knowledge degradation during this exceptional period as they have been designed to ensure that personnel are sufficiently competent to carry out their tasks in 'normal' situations.

In addition, many new or updated procedures have been introduced as a result of the pandemic. Thus, it is important for organisations across all aviation domains to conduct a review of existing and updated procedures and ensure that personnel are trained in the new/updated procedures. This should be followed up with periodic safety performance checks/tests to verify the competence of personnel and internal audits to ensure that the correct procedures have been implemented and respected by personnel.

5. Proposed best practices which are applicable to all aviation domains

Aviation organisations can consider adopting the following best practices to address proficiency decay experience by their staff. These best practices may not be applicable to all organisations, thus it is important to take your organisation's nature of operations and key challenges into account when considering which best practices to adopt.

- **When personnel are on furlough or long-term leave**
 - Communicate changes to furloughed personnel or personal placed on long-term leave, to avoid overwhelming personnel with information immediately before working
 - Maintain training activities to prevent or slow down the decay of knowledge
 - Promote digital and remote training/briefing content webinars for critical training areas
 - Introduce periodic refresher training and integrate new or changed operations early in refresher training

- **When preparing personnel to return to work**
 - Ensure gradual return to normal operations to allow for re-familiarisation
 - Identify which skills and persons are most at risk, and provide tailored training as much as reasonably possible
 - Stimulate and facilitate mental rehearsal, in formal training, self-training and operations briefings / preparation
 - Introduce self-reflection and -assessment programs to detect /prevent over- and under-confidence
 - Introduce mandatory pre-shift briefings to update personnel of recent and on-going changes

- Increase supervision or support staff
- **Other best practices for organisations and National Aviation Authorities (NAAs)/National Supervisory Authorities (NSAs)**
 - Postpone planned changes to equipment and procedures which are not critical or relevant to the pandemic
 - Risk-based assessment should be conducted for deviations from existing training programmes. It is also important to ensure that the deviations are still in line with existing regulations and/or exemptions.
 - NAAs/NSAs to ensure that exemptions are issued only after risk assessments have been conducted (see EASA's article on [Risk Assessments Based on Previous Normal Operations are No Longer Valid](#) for more guidance)

Additionally, to help the situation in your organisation, consider these aspects on “People and Wellbeing” and “Skills and Training” from the Ramp-up Campaign.

People and Wellbeing:

- Support your staff to be fit for duty – especially in the context of skill fade, fatigue, wellbeing.
- Encourage staff to look after themselves by asking "How am I feeling", "How am I coping", "What can I do for myself and others" and by looking after yourself (Wellbeing Resource Hub)
- Encourage staff to support each other by continually reaching out to each other to offer support - especially important downroute.
- Encourage staff to seek help through medical professionals or peer support networks and ensure this is part of your organisational culture.

Skills and Training:

- Think about how your staff's skills and knowledge may have been degraded during the pandemic and what this means when activities increase. Identify situations where you might be using staff in new ways, locations or situations and what this means for your operation.
- Identify additional training you might wish to provide that you might have considered before COVID such as "Return to Work" training or wellbeing.
- Consider Leadership training for Executive team, to highlight need for visible, supportive leadership. "All in this together" needs to be lived.

6. Sector-specific best practices to mitigate proficiency decay

The next few sections describe the best practices which both the company/organisation and the individual can adopt to mitigate proficiency decay for the following aviation profession:

- [Aerodrome operator and ground handling staff](#)
- [Air traffic control officers \(ATCOs\)](#)
- [Commercial flight crew](#)
- [Cabin Crew](#)
- [Maintenance engineers](#)

These best practices may not be applicable to all organisations and individuals, thus it is important to take your organisation's nature of operations and key challenges into account when considering which best practices to adopt. It is also important to remember that the measures adopted by your organisation

should be proportionate to the size, scope, complexity of your organisation and its products, activities and processes.

6.1 Aerodrome operator and ground handling staff

What can the Aerodrome Operator, the Apron Management Service Provider or the Ground Handling Service Provider do?

1. Check that all staff have attended updated recurrent courses, which includes new health and safety measures or changes in operations.
2. Review training records and, if necessary provide refresher trainings, especially if staff return following long absences, including also e-learning training courses;
3. Create a buddy system to pair more experienced personnel who have been working during the shutdown with personnel who have just returned to operations for the first few days of work.
4. Personnel should be briefed on the new or changed procedures; to update personnel of recent and on-going changes, with an emphasis on possible changes to the infrastructure that have taken place during the lockdown period to allow them to familiarize themselves with the new working environment.
5. Ground Handling Agents can also consider implementing proficiency checks.
6. Revise the Management System's existing safety assessment and focus on the hazard of personnel skills and knowledge degradation under the change management process. For the compliance monitoring consider internal audits to verify that the correct procedures are implemented and respected by staff.
7. For Rescue and Fire fighting assess staffing levels adjusted to the most demanding aircraft in terms of rescue and firefighting aerodrome category.

Several practical examples have been developed to illustrate how the best practices can be implemented in real-life situations – see them here in this [article](#) on the EASA Together4Safety community website.

What can Aerodrome Operator and Ground Handling staff do?

- Brief yourself thoroughly before each shift and review any updates to health and safety measures or changes in operations
- Do not leave inexperienced colleagues on their own
- Be supportive to other colleagues and watch out for each other during the shift

6.2 Air traffic controller officers (ATCOs)

- During periods of low traffic:
 - Organise refresher training on synthetic training devices for operational matters such as procedures and recent changes;
 - Assess together with your ATCOs what the most important issues are. Use this information to develop targeted retraining;
 - In addition to the simulator sessions pre-recorded sessions or case-studies can be used;
 - Implement tactical rostering which takes into account ATCO experience and skills;
 - Roster simulator sessions with high traffic loads and with emphasis on less common operations as part of regular shifts;
 - Ensure Assessors and OJTIs retain competence through refresher training and by prioritising them on shift;
 - Encourage just culture incident reporting to be able to quickly address emerging issues

- In addition, from the SMS point of view, ensure that a risk assessment function captures evolving risks.
- As traffic increases (to consider in addition to the best practices for low traffic):
 - Have a recovery plan for potential increase of traffic during the summer period (both gradual and rapid recovery);
 - Plan a buffer in the capacity scenario e.g.: 10 % above foreseen traffic;
 - Modify the roster to increase the number of ATCOs on shift every day or shorten the duration of the shifts;
 - Ensure sufficient stand-by shifts;
 - Ensure availability of OJTIs to support staff that are in doubt of their competence.
- In general terms:
 - Review the UCS and UTP to reflect the current scenario or the ‘new normal’;
 - Monitor operations to detect potential operational drift that may show competence fade;
 - Identify personal and teamwork strategies adapted to local needs and potential competence fade e.g.: awareness events, seminars, webinar sessions.
- **What can you do as an ATCO?**
 - Brief yourself thoroughly before each shift;
 - Identify operational areas less practiced during this period;
 - Ask for simulator sessions, OJT hours or other support when you doubt your competence;
 - Use the process within the ANSP if competence is in doubt, e.g. provisional inability;
 - Use existing safety reporting schemes to identify any lack of competence.
- **What you can do as a CA/NSA?**
 - Review and approve the modified UCS and UTP to reflect current traffic scenarios or the ‘new normal’;
 - Verify readiness of the ATSP for a potential traffic increase;
 - Check if a recovery scenario is developed by the ATSP;
 - Ensure necessary information exchange with the ATSPs;
 - Ensure that the ATSP’s SMS captures the evolving risks.

6.3 Commercial Flight Crew

While the pandemic has impacted air operations significantly, it presents a timely opportunity to advance particular innovations in crew training to reduce the training load on FSTDs/Mock without compromising training quality and effectiveness. Two key areas of training innovation may help mitigate proficiency decay for flight crews:

- **Competency-Based Training (CBT).** There are several perspectives on Competency-Based Training (CBT) for maintaining proficiency of qualified personnel. CBT focuses on the desired proficiencies, and aims to use actual performance to determine the appropriate amount and timing of the training. CBT programs such as (Mixed-) Evidence Based Training (EBT) programs allow for varying degrees of tailored training in order to maximise the utility of FSTD time by training flight crew in the areas they most need reinforcing in. These programs also shift FSTD usage from checking to training, as well as expand the use of Line Oriented Flight Training (LOFT), thereby closing the bridge between training and operations. However, EBT programmes require several years for them to be fully implemented in an organisation. Thus, these programmes may

not be suitable for swift deployment to address proficiency decay during this period but are a good mid- to long-term solution which we should work towards.

- **Alternative training media.** When integrated via the EASA-proposed Aviation Blended Learning Environment (ABLE), alternative training media can potentially introduce lower level device training that offloads several tasks currently training in FSTDs. This has the propensity to directly reduce the FSTD footprint per pilot. While FSTD training traditionally involves a Full Flight Simulator, it is possible to blend and integrate different training media which may be considered of a 'lower fidelity' (e.g. VR, AR, and CBT) to deliver training of equivalent effectiveness. Certain tasks may be trained more effectively than with FSTD training alone (e.g. by virtual cueing and just-in-time information in VR cockpit training). Such training innovations may also facilitate "remote simulation" solutions, which may be able to circumvent COVID-19 physical distancing measures by digitally connecting instructors and trainees in FSTDs or other training devices.

The combination of alternative training media and competency-based training is particularly effective, as training can be optimised in both content and delivery. However, while both training innovations are actively being facilitated in existing and upcoming regulations, short term benefits (0-6 months) will primarily rely on case-by-case assessment, approval and accreditation of personnel adopting aspects of these innovations (e.g. more LOFT scenarios but no complete EBT program, or VR training for specific refresher training). In any event, both these areas of innovations require close collaboration with NAA oversight. In the medium to long term (i.e. more than 6 months), transition to CBT programs may provide well needed flexibility to legacy training programs featured at many European operators.

Should the use of automation during the return to service phase be promoted, AOC holders should conduct risk assessment and ensure that flight crew are sufficiently trained to manage the use of automation. The use of automation should not be viewed as a mitigation against low proficiency for two reasons:

- i. First, the use of automation places a significant demand on cognitive resources and may actually increase low proficiency cognitive load problems.
- ii. Second, the failure or unavailability of automatic systems cannot be ruled out, and as such flight crews must still be able to safely manage subsequent non-standard operations vis-à-vis manual flight operations.

In view of this, what can Aircraft Operators and Aviation Training Organisations do?

- Facilitate safe return to operations by means of risk-reducing crew compositions (such as pairing pilots, where at least one has recent flying experience), avoid assigning challenging destination airports to crew with reduced recency.
- Expand the training/refresher footprint beyond minimum requirements (by using alternative (lower-fidelity) training media (e.g. AR/VR/fixed-based simulation) in the short term²
- -
- Maximise use of Line Oriented Flight Training (LOFT)-centred training to familiarise flight crew with new operations and close the gap to return to operations (not applicable to all organisations)
- Adjust recurrent training to pilot performance. Pro-active evaluation of performance in FFS training is preferred (e.g. LOFT evaluation). This should be combined with close monitoring of/validation with SMS, FRMS and explicit (self-) reflection reports to gauge training sufficiency and effectiveness
- Enhance startle and surprise training in recurrent/recency training, in order to mitigate undesired aircraft states

² Long term implementation of this mitigation requires regulatory changes to formally accredit alternative training media

- Promote digital and remote training and briefing content webinars for critical training areas, online briefings (reference EASA Guidance on Virtual Classroom). This includes periodic refresher training and new or changed operations early in refresher training
- Review type-specific and company SOP's in order to reduce the cognitive workload or provide more time to flight crew to complete their tasks while regaining their full proficiency
- Where it is applicable for an aircraft type, consider emphasising the importance of manual flying techniques during the return-to-service phase. For the sake of safety, operators should permit and encourage manual flight operations emphasizing that when deciding to fly manually, crews take into account the various factors affecting operational workload. Factors to consider include:
 - Weather conditions, terrain, and/or other environmental threats
 - Time of day
 - Psychological and/or physiological factor
 - Level of crew experience
 - Traffic density
 - Condition of the aircraft, and/or any non-normal conditions
 - Air Traffic Control and/or instrument procedural challenges
 - Any other operational threats

The pilot in command (PIC) must use good judgment to consider the factors described above and to decide, on a case-by-case basis, when it is appropriate to conduct manual flying. Pilots may conduct manual flight with all approved combinations of automation based on aircraft equipage; e.g., autopilot off, auto-throttle on.

What can flight crew do?

- Maintaining up to date with airline's documentation and operational briefing,
- Conducting mental rehearsal
- Be proactive in assessing your own training needs and informing your airlines if you require training on a specific procedure or specific activity
- Strictly follow SOPs
- Make extensive use of your operator's internal report system to ensure that he is aware of all possible issue you are experiencing during the return to normal
- Slow down and take your time to complete your task when you feel under pressure, if possible
- Be supportive to your colleague

6.4 Cabin Crew

What can air operators do?

Air operator can consider the following best practices:

- Ensure that your cabin crew members are properly trained and checked before returning to flying.
- Make sure that all the latest information and changes to the procedures is timely and properly communicated to the cabin crew.
- Give cabin crew enough time to prepare for their return to flying.
- Even though your operations are occasional, adjust your roster planning, by ensuring that cabin crew is regularly assigned for flying and performing their duties.
- Provide your cabin crew with additional training (e.g. online training, safety videos, briefing content webinars for critical training areas (e.g: the new COVID-19 pandemic related

procedures, handling of unruly passengers etc.)) thus helping to bridge theoretical and/or practical training with actual flying that has not taken place for prolonged time.

- Make sure that cabin crew has sufficient experience on the aircraft type when planning cabin crew for flight. When cabin crew returns to duties, give preference to the aircraft type on which the cabin crew has more and/or most recent experience.
- Consider planning mixed crews including cabin crew members that have been flying during the pandemic together with cabin crew members that have been absent from their flying duties.
- If possible, consider planning longer pre-flight crew briefings for crews that have been long absent from flying.
- Complement regular pre-flight crew briefings with additional safety/emergency procedure discussions.
- Make sure that cabin crew are equally distributed throughout the cabin considering their experience and recency.
- Consider planning cabin crew member after their prolonged absence in addition to the minimum required cabin crew members, so that they can re-familiarise themselves with the aircraft and their duties.
- Consider a line check for cabin crew members with a prolonged absence from flying.
- Should the use of automation during the return to service phase be promoted, conduct ample risk assessment and ensure that your cabin crew are sufficiently trained to manage the use of automation.
- Communicate with your cabin crews to find out if there is anything else you can do as an operator to decrease risks from your crew potential knowledge and skill degradation.

What can cabin crew do?

Cabin crew can consider the following best practices:

- Give yourself sufficient time before the flight to review the cabin crew procedures and to familiarise yourself with your air operator's latest cabin safety communications.
- Always ask in case anything is unclear.
- Make sure you timely report for your duties and actively participate in your pre-flight briefing. Pre-flight briefings are very important. Pre-flight briefings also help to tune crew members for team performance. Awareness of the particularities of the crew composition helps to prioritise duties and to efficiently distribute responsibilities.
- Don't assume if you are not convinced. Don't hesitate to ask for help or answers.
- Perform 'silent review' before the critical phases of flight (i.e. take-off and landing) with special attention to the new procedures.
- Reflect your performance after you have finished your duties and, if needed, discuss it with your colleagues.
- Help whenever you see that your peer is in doubt or struggling completing a particular task after his/her absence.

6.5 Maintenance Engineers

What Maintenance Organisations can do?

- Adapt and continue training programme, added with specific material, e.g. importance of policy principles, communication, cooperation, culture and awareness of limitations:

- Maintain training activities and mental rehearsal to reduce anxiety and improve confidence during lockdown wherever possible. Consider staff given furlough
 - Investigate the availability and feasibility of appropriate computer based training/immersive technologies and provide the means
 - Review of and training on common maintenance errors
 - Perform 360 degree peer review of maintainer competence for specific high risk tasks and train, create awareness, provide feedback to maintainer
 - Review of return to service incidents – crashes that resulted from maintainer errors and develop / adapt training material
 - Organise / formalise team briefings on return to service, with focus on difficult ambiguous elements of procedures and instructions
 - It needs to be considered that at a certain moment ‘old’ staff are employed/hired again. They have had no or minimal skill, knowledge, procedures and changes training at all. Policy and procedure have to be put in place for that situation
- Review of procedures and instructions to highlight areas that are unclear or require complex/nested tasks – to consider procedures and instructions with more cognitive support in the steps which the engineer has to follow e.g. specific list with attention items and sign-off areas.
 - Plan the work based on a reduced tempo of operations to allow for necessary communication, additional support, increased inspections, double inspections and sign-off, more cross-checking. This would ensure a safer working environment which does to a lesser extent rely on personal skills and factors and benefits confidence.

What can Maintenance Engineers do?

Even though each approved organisation is responsible to provide their staff with sufficient and appropriate training, every single maintenance engineer has responsibilities and benefits to continue his/her competence and exercise an attitude expected in a just culture environment. In this respect, Maintenance Engineers can consider the following best practices:

- Follow applicable procedures and instructions even where organisational pressure is imminent
- Insist on adhering to safety culture principles and quality and safety policy at all times
- Report both mandatory and voluntary occurrences, including situations conflicting with human factors and human performance limitations
- Endeavour to maintain skills and knowledge, even after furlough
- Stay vigilant and aware of personal performance limitations

7. References

Please find the references and guidance material in mitigating proficiency decay specific to each aviation profession below:

- [EASA Ramp-up Campaign.](#)
- [IATA Material on Safely Restarting the Aviation Industry.](#)
- [IATA Material on Training and Skills.](#)

7.1 Aerodrome operator and ground handling staff

- [EASA SIB 2020-07R1: Preparation of Aerodromes to Resume Operations](#)

- [EASA SIB 2020-13: Provision of Groundhandling Services at Aerodromes](#)
- [ICAO Quick Reference Guide on Recurrent Dangerous Goods Training](#)
- [ACI Advisory Bulletin on Airside Safety and Operations under COVID-19](#)

7.2 Air traffic control officers (ATCOs)

- [Eurocontrol Network Operations Recovery Plan - 2020](#)
- [ICAO Quick Reference Guide on ATCO Recency Requirement Extension](#)
- [ICAO Quick Reference Guide on ATCO Training Alleviation as a Consequence of COVID-19 Spread](#)
- [EASA Guidance on Virtual Classroom Training and Distance Learning \(Issue 1\)](#)
- [EASA Guidance for maintenance of ATCO skills](#)

7.3 Commercial flight crew

- [EASA Guidelines on Temporary Exemptions Pertaining to Flight Time Limitations in the Context of COVID-19 \(Issue 2\)](#)
- [EASA Guidance on Virtual Classroom Training and Distance Learning \(Issue 1\)](#)
- [ICAO Quick Reference Guide on Aeroplane Recent Experience – Pilot-in-command Area, Route and Aerodrome \(ARA\) Qualifications](#)
- [ICAO Quick Reference Guide on Flight Crew Member Training Programmes](#)
- [ICAO Quick Reference Guide on Recent Experience Requirements – Pilot-in-command, Co-pilot and Cruise Relief Pilot](#)
- [ICAO Quick Reference Guide on Variations to Existing Flight and Duty Time Limitations](#)
- [EOFDM WGB – Guidance for the Implementation of FDM Precursors \(Revision 3\)](#) which can be used to help identify areas where pilots require more training e.g. rotation/de-rotation technique, approach management, inadequate flight control input, etc.

7.4 Maintenance engineers

- [EASA SIB 2020-14: Pitot-Static Issues After Storage due to the COVID-19 Pandemic.](#)

8. Log of changes

Issue	Date of issue	Summary of changes
2	04.08.2021	References to Safety Promotion material such as the “Ramp-up – Be Ready, Stay Safe” Campaign launched in May 2021 is provided throughout the document where relevant.
2	04.08.2021	Chapters 2 and 6: information related to Cabin Crew added.
2	04.08.2021	2.1 aspects relevant for maintenance added.
2	04.08.2021	Chapter 5 – addition of specific references to the “Ramp-up – Be Ready, Stay Safe” Campaign on “People and Wellbeing” and “Skills and Training”.
2	04.08.2021	6.1 updated text for Aerodrome operator and ground handling staff: SMS and compliance rather than audits. Focus on training and use wording from SIB.

		Do not distinguish between ADR, AMS and GHSP. Introduced AMS that was missing.
2	04.08.2021	6.2 updated text as per current guidance for ATCOs.
2	04.08.2021	6.3 updated text for flight crew.
2	04.08.2021	Chapter 7 – references updated.