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

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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 significant reduction in air traffic, most aviation professionals are no longer able to perform their normal tasks. Instead, they might be doing a substantially different job, and some might not working at all or at a substantially reduced frequency. The extended period of low recency is both long and affects a large number of aviation personnel, making it different from the usual sick leave or sabbatical leave.

In addition, training may not be taking place at the pace required to keep aviation professionals current. While organisations are making the effort to ramp up training activity, they face a multitude of challenges 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 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 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 flight crew, aerodrome operations staff, ground handling staff and maintenance engineers) in managing skills and knowledge decay in the context of the COVID-19 crisis.

2. The risk mechanism of proficiency decay

Decay of proficiency can have a direct safety risk, as accuracy, speed and ultimately effectiveness of task performance deteriorates with the lack of practice. This variation is caused by the influencing factors explained in the next section.

A period of reduced or non-practice can degrade skills, and 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, improving performance, insight, and flexibility.

A possible 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 may lead to time management issues, reduced situation 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 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 used[1]:

- **Physical skills:** Perceptual and/or psychomotor actions and coordination (e.g. stick and rudder control, visual approaches, taxi wheel operation)
- **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)
- **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)
    - **Declarative knowledge:** Retrieval and/ or application of facts and/or concepts (e.g. speed limits, autopilot modes, cockpit layout)

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 well when developed sufficiently. Low-experience personnel have a lower heuristic basis to rely

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

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.

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

1. **Self-overestimation, in both low- and high-experienced personnel.** The latter may be more susceptible as experience is not a good heuristic for recency.
2. **Self-underestimation and low confidence.** This may be more applicable to low-experience personnel. This negative self-perception is an emotional cognitive load which detract from the cognitive resources available to perform other tasks.
3. **Ambient negative emotional load e.g. job-uncertainty, financial strain, work-life unbalance and COVID-19 exposure concerns.** These also detract from the cognitive resource available to perform other tasks.
4. **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. 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
- 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

Flight crew may not fully appreciate the extent to which their skills and capacity have degraded during the shutdown period. 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 suffers 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 a severe training bottleneck and subsequent personnel unavailability.

2.2.4 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.

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 have been assessed to be insufficient 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)

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
- 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 or Ground Handling Company do?

1. Check that all staff have attended updated recurrent courses, which includes new health and safety measures or changes in operations.
2. 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.
3. Introduce mandatory pre-shift briefings to update personnel of recent and on-going changes.
4. For Aerodrome Operators, ensure the implementation of proficiency checks to verify the competence of the operators. Ground Handling Agents can also consider implementing such proficiency checks.
5. For Aerodrome Operators, ensure the implementation of internal audits to verify that the correct procedures have been implemented and respected by staff. Ground Handling Agents can also consider implementing such internal audits.

6. Identify reference point personnel who provide peer-to-peer support in answering work-related questions during the shifts.

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)

What can ANSPs do?

- During periods of low traffic:
  - Organise refresher training on simulators for operational matters such as procedures and recent changes
  - Implement tactical rostering which takes into account ATCO experience and skills
  - Roster simulator sessions with high traffic loads as part of regular shifts
  - Ensure Local Competence Assessors (LCAs) and for OJT Instructor (OJTIs) retain their operational competence through refresher training and prioritising them on shift
- As traffic increases (to consider in addition to the best practices for low traffic):
  - Modify roster to increase number of ATCO on shift every day or shorten shifts
  - Ensure sufficient stand-by shifts

What can ATCOs do?

- Ask for simulator session or OJT hours when you doubt your competence
- Brief yourself thoroughly before each shift
- Do not leave inexperienced colleagues on their own

6.3 Commercial Flight Crew

While the pandemic has impacted air operations significantly, it presents a timely opportunity to advance particular innovations in flight crew training to reduce the training load on FSTDs 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 Alternative Training and Quality Programs (ATQP) and (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, ATQP and 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 cuing 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 and possible EASA guidance. 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 carriers.

Should the use of automation during the return to service phase be promoted, flight operators should conduct ample 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 unserviceability of automatic systems cannot be ruled out, and as such flight crews must still be able to safety 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 (protective pairing), delaying of high risk routes and limiting ad-hoc roster changes
- Expand the training/refresher footprint beyond minimum requirements (without increasing FFS demand) by using alternative (lower-fidelity) training media (e.g. AR/VR/fixed-based simulation) in the short term[2]
- Use of performance-based Alternative Training and Qualification Programmes (ATQP) and Evidence-Based Training (EBT) (not applicable to all organisations)
- 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
- Integrate 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 while regaining their full proficiency
- 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 should apply basic threat and error management principles and 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?

- Conduct mental rehearsal, in formal training, self-training and operations briefings/preparation
- Be proactive in assessing your own training needs and informing your airlines if you require refresher 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 od 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 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 extend 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, Maintence 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:

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

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 identifty 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