

Review of potential hazards associated with recovery to normal air traffic services (ATS) following disruptions resulting from the COVID-19 pandemic.

1. This document¹ provides air navigation services providers (ANSPs) with guidance to facilitate efforts to return to normal operations following disruptions resulting from the COVID-19 pandemic. In this respect, the document identifies potential hazards that may be encountered during the transition, for management of the associated risks, and is presented for consideration by States as part of their safety management system (SMS); *Annex 19 – Safety Management* and *Safety Management Manual (SMM)* (Doc 9859) refer.
2. Whilst some of the potential hazards will be specific to one particular operational environment, there will be hazards that could occur globally. Similarly, the potential hazards are not restricted to one particular local, national or regional level, or even within the boundaries of a single ATM system. The hazards are also not necessarily independent of each other. Some of the items in the list can be considered as “disruptors” that could affect higher-level operational hazards/ risk.

¹ The Eurocontrol Safety Team document “List of potential hazards associated to the recovery of normal operations following COVID-19 restrictions” formed the basis of this guidance.

Recovery to normal air traffic services (ATS) following disruptions resulting from the COVID-19 pandemic – potential hazards

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
Hz-01	Capacity imbalances and unusual traffic patterns at regional level.	Different pace of capacity recovery by ANSPs. Insufficient coordination with ATFM unit, other ANSPs, aircraft operators, military and airport operators.	Re-evaluate capacity and notify concerned parties. Develop structured meetings to discuss weekly (or more often, if needed) the different aspects, coordinating and planning the capacity increase.
Hz-02	Planned ATC sector configuration inadequate to actual traffic demand.	Airports have had to accept many grounded aircraft, so capacity on the ground is temporarily reduced. Insufficient and/or inefficient simulated scenarios/exercises for the changing traffic density and pattern.	Consider holding flow planning meetings twice a day: one in the morning for post-ops analysis and one in the afternoon for the next day. Reinforce and expand collaborative decision making (CDM) cells including a wide range of stakeholders at different level:
Hz-03	Pre-tactical ATFM measure(s) inadequate to actual traffic demand.	Low predictability of traffic evolution. The high volatility of predictions implies that any adjustments to system capacity are very difficult to be made reasonably in advance.	<ul style="list-style-type: none"> • Airport CDM • En-Route CDM • Overall Network CDM (See the Simplified CDM Procedure at https://www.icao.int/safety/COVID-19OPS/Pages/ATM.aspx) Coordinate between adjoining ACCs common transition plans in phases, dependant on agreed airspace availability and ATM capability. Tactical update to the planned sector configurations and ATFM measures. (For example) European Network Operations Plan - 2020 Recovery Plan (https://www.eurocontrol.int/publication/network-operations-plan-2020-recovery-plan) and related coordination and planning arrangements.
Hz-04	Insufficient number of operational and technical staff to meet the increasing demand in the	Disproportionate demand due to cancellation of COVID-19 pandemic-related restrictions (country-based/region-based) and significant number of staff locally still under quarantine.	ATFM measures (capacity decrease). Regular health checks. General hygienic measures constantly promoted. Availability of hands-cleaning points in the buildings and staff rooms.

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
	transition period and beyond it.	<p>Number of staff reduced (e.g. retired, furloughed) to alleviate financial impact.</p> <p>COVID-19 infection, which cannot be prevented due to impossibility to ensure physical separation at the sector positions.</p> <p>Underlying controller medical condition goes unchecked/ unnoticed for extended period.</p> <p>Controller medical checks by AME postponed or delayed and medical certificate expires.</p> <p>No physical separation possible during position handover/takeover at the same controller working position.</p> <p>Increased risk of affecting others could provoke absenteeism (observed with some medical staff in hospitals).</p> <p>Pending validation of controller skills (language proficiency, simulator emergency training, OJTI refresher).</p> <p>Staff training postponed or delayed.</p> <p>Prolonged OJT because, for a long time, the traffic will be too low and not easy to train/assess the trainee's skills.</p> <p>Training becomes extremely difficult to plan in the simulator and in the operations rooms.</p>	<p>If feasible, set up roster for controllers to work in small teams; if one team member gets infected, only this team is affected.</p> <p>If feasible, plan for 4-person controller crew available for a 2-person sector to limit the contacts as far as possible.</p> <p>If feasible, ensure physical separation in the recreation rooms. Consider cleaning; how often/when.</p> <p>Use of contingency capacities and sector configuration.</p> <p>Set clear priorities for training ramp-up to fulfil training demand according to operational priority needs.</p> <p>Assess feasibility of remote training alternatives.</p> <p>In coordination with the appropriate ATS authority reduce the number of hours required per endorsement over 180 days (e.g. to 30 hours until 1st September) and/or extend medical certificate validity; see ICAO Quick Reference Guide - Controller recency requirement extension</p> <p>Request the appropriate ATS authority to permit option for "Renewal assessment" in simulator.</p> <p>Temporarily reduce or eliminate facilities where staff might regularly congregate, in order to minimise danger of infection.</p> <p>If possible, increase ventilation and air filtering in ops room or other facilities where staff spend longer periods of time and air tends to be stagnant or recirculated (major factor for virus spread and infection).</p>
Hz-05	ATCO unable to maintain full situational awareness for timely conflict detection and	<p>Controllers unable to maintain their operational skills during the disruption due to reduced traffic.</p> <p>Controllers exposed to different traffic patterns and methods of operation.</p>	<p>Special training (e.g. simulator training), which can emulate the medium-high traffic levels, and new/changed tools/system functions</p> <p>Dedicated measures for recently qualified controllers, or controllers returning from prolonged absence from operational duties.</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
	<p>resolution in the entire area of responsibility, in particular in traffic spike periods.</p>	<p>Limited number of controller duty shifts and hours in position during the disruption.</p> <p>Extension of temporary solutions, applied during the disruption, into the transition period without proper safety risk assessment.</p> <p>Big difference in accumulated hours on duty for different controllers, due to preferring to roster controllers with multiple endorsements (who can cover more than one position) during the disruption.</p> <p>Controllers providing services to aircraft with different performance dynamics/requirements, e.g. military or medical flights.</p> <p>Change in the nominal aircraft performance because of shifting airline priorities, cost of fuel etc.</p> <p>Situation may be aggravated by implementation of changes to the controller tools or of new tools and system functions that controllers are not yet sufficiently skilled to use due to the lack of operational experience caused by limited number of flights during the disruption.</p> <p>Weather formations (e.g. CBs) developing very quickly will increase the complexity of the traffic and exacerbate above factors.</p> <p>Controllers unable to concentrate during traffic peaks or rise of workload, or when confronted with unexpected situation, possibly due to domestic concerns or emotional state.</p>	<p>Lower the maximum sector load until skills recover.</p> <p>Make sure flights are and remain established on conventional patterns within the area of responsibility and at interfaces as far as practicable.</p> <p>Remain vigilant for, and recognise, new behaviour and habits that might have emerged during the low traffic period, in order that appropriate actions can be taken.</p> <p>Open more sectors than normally necessary in order to:</p> <ul style="list-style-type: none"> • maintain a minimum and continuous service level; • ensure controllers remain current on all sectors; and • avoid any potential impact of loss of operational skills. <p>Apply ATFM measures, if necessary.</p> <p>Extend operational evaluation and acceptance period for new equipment.</p> <p>Monitor submitted flight plans and ensure that controllers are well briefed on unusual flights and their performance characteristics and required procedures.</p> <p>Ensure rosters are as complete as possible in order to have extra staff available for splitting sectors in peak demand.</p> <p>Availability of controllers for covering shortfalls in staffing should be coordinated in advance</p>
Hz-06	Controller overload and fatigue.	Extended interval of working at sector position, less breaks.	<p>Lower the maximum sector loads until skills' recovery.</p> <p>Apply ATFM measures, as necessary.</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
		<p>Not enough standby personnel to cover a temporary lack of staff.</p> <p>Extension of temporary solutions, applied during the disruption (e.g. single person operation), into the transition period without proper safety risk assessment.</p> <p>Increased operational pressures to generate minimum delays in order to avoid negative economic impact on airlines.</p> <p>Briefing time may overrun as crew reacquaint themselves with NOTAM packs resulting in departure delays, which may overload some sectors when demand is already high and controller skills are reduced.</p> <p>Social distancing measures impact availability and efficiency of the rest facilities.</p>	<p>Consider setting up outdoor resting facilities, where fresh air and open spaces have a much-reduced infection spreading potential, if weather permits.</p>
Hz-07	<p>Significant increase in controller workload to handle flights suffering technical issues, VFR and training flights.</p>	<p>After a period of long stay on the ground and with only a brief aircraft technical check an increase of technical issues inflight may be seen.</p> <p>Increased number of VFR flights (e.g. GA pilots attempting to accumulate their necessary flight hours).</p> <p>Increased number of training flights for commercial pilots.</p>	<p>Coordinate restrictions for VFR and training flights (e.g. restrict those to times of low demand, airspaces/sectors with less demand).</p> <p>ATFM measures.</p>
Hz-08	<p>Inadequate inter-sector and inter-unit operational coordination.</p>	<p>Different controller skill levels across sector groups and ATS units.</p> <p>ATS units may not transition to normal operations at the same time/pace.</p> <p>Diminished controller skills to work/coordinate in multi-sector environment with several division levels of super-imposed sectors.</p>	<p>Simulation sessions with busy traffic and multi-layer/-sector coordination.</p> <p>Gradual opening up of sectors and sector suites.</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
		<p>Weather formations (e.g. CBs) developing very quickly will increase the complexity of inter-sector and inter-unit coordination.</p> <p>Limited civil-military coordination due to limited military flights during the confinement period.</p>	
Hz-09	Impeded intra-ATC sector team collaboration.	Implementation of social distancing rules.	<p>Trialling and safety risk assessment of the measures to identify potential issues and appropriate mitigations.</p> <p>Provide targeted team resource management sessions.</p> <p>Separate ops room sector positions by utilising spare working positions, if feasible.</p> <p>Consider separating ops room sector positions by transparent screens, if feasible (consider possible impediment to communication).</p>
Hz-10	Controller/OPS supervisors' confusion about applicable airspace organisation and/or rules and procedures during the transition period.	<p>Changes implemented during the disruption are not settled in the controllers' minds, because they had no opportunity to get used to them.</p> <p>Incomplete briefing on controller return to work after extended period of absence (operational and personal).</p> <p>Rules regarding drones updated in some countries in response to the pandemic situation.</p> <p>Most probably there will be 2-3 AIRACs implemented while the disruption last.</p>	<p>Find ways to communicate with controllers while they are at home - the briefing overload on return to work can be overwhelming.</p> <p>If time and effort permits, create online briefing modules.</p> <p>Mandatory pre-shift briefing to absorb any recent and on-going changes.</p> <p>Postpone implementation of planned significant changes to airspace organisation and/or procedures (e.g. new PBN procedures).</p> <p>Earlier commencement of shift to ensure time for thorough briefing.</p>
Hz-11	Supervisors (controller, ATSEP and Flight data) with reduced competence in handling less-than-standard situations due to the long lean traffic periods.	<p>Interference during bad weather.</p> <p>CB avoidance.</p> <p>Training postponement.</p>	<p>ATFM measures (demand management).</p> <p>Supervisor-specific training on team resource management.</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
Hz-12	Inadequate on-the-job training for controllers.	<p>Ineffective OJT because, for a long time, the traffic will be too low and not easy to train/assess the trainee's skills.</p> <p>OJTI competence/skills reduced due to long period of training interruption.</p> <p>Reduced capacity to provide OJT due to low number of valid OJTI endorsements.</p> <p>Inefficient training process due to pandemic-related social distancing measures.</p> <p>Postponed controller training due to lack of resources.</p>	<p>Agree with the appropriate ATS authority on the extension of OJTI endorsements.</p> <p>Plan for the trainee controllers, whose qualifications have been postponed or training suspended.</p>
Hz-13	Increased stress for operational and technical staff.	<p>ANSP cash flow problems impact on salaries and social security – dissatisfaction, uncertainty, pessimism, etc.</p> <p>Fear and/or anxiety about the uncertainty of the future; for the profession, way of life, and for the world to come after de-confinement.</p> <p>Potential changes to social agreements in place.</p> <p>Fear of infection following reports of new positive cases of COVID-19 in the local community.</p> <p>Confinement, bringing mental overload because of the necessity to work, educate children, and ensure the management of the household.</p> <p>Mental affection caused by isolation and concern for the family members that one cannot visit.</p> <p>Dramatic individual perception and anxiety about COVID-19 infection risk</p> <p>Loss of colleague, relative or friend.</p> <p>Fear of a second wave of the pandemic.</p>	<p>Provide psychological help.</p> <p>Provide materials and information to promote mental and physical wellbeing.</p> <p>Stress management programme.</p> <p>Peer-to-peer platforms.</p> <p>Mentoring.</p> <p>Promote awareness of stress precursors and notification of stress related conditions or safety events as soon as possible.</p> <p>Position handovers made on different controller working positions at least one metre apart.</p> <p>Regular decontamination of the operations room, including of the controller working positions before next operational use.</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
		<p>Changes occur in rapid succession without having time to adjust before the next one.</p> <p>Weary of seeing the expected and hoped-for changes behind schedule.</p> <p>Severe depression (feeling of uselessness).</p> <p>Over-enthusiasm (being exhilarated by the return to work and not taking sufficient margins).</p> <p>Subconscious concerns that erode mental capacity and when left unaddressed could lead to increased absenteeism.</p> <p>Concerns that enforced sanitary measures are not adequate.</p> <p>Safety considerations not prioritised above political and economic factors.</p> <p>Delayed or partial maintenance of equipment due to lack of technical staff, spare parts or financial constraints.</p>	
Hz-14	Lower quality or delay of safety deliverables (investigation reports, safety risk assessments, safety analysis, safety reports, etc.).	<p>Significant reduction in safety investigators' activity and decrease in their investigation skills.</p> <p>Insufficient number of specialist staff.</p> <p>Flaws in safety deliverables due to the remote working method (e.g. functional hazard assessment by teleconference).</p>	<p>Implement group investigations for all significant occurrences irrespective of the investigators' allocation to ATS units.</p> <p>Relax notification/document submission deadlines, in agreement with the appropriate ATS authority.</p> <p>Independent review of the safety deliverables by increased number of specialists from all the relevant domains: ATS, OPS, CNS, IT systems, HF, etc.</p> <p>Postpone implementation of planned changes to the functional system.</p> <p>Prioritise change implementation according to the risk to operations, if non-implemented.</p>
Hz-15	Increased equipment failure rates and	<p>Lack of preventive maintenance during the disruption.</p> <p>Postponement of corrective maintenance for some equipment (e.g. due to financial constraints).</p>	<p>Verify the requirements for cleaning materials for sensitive equipment and other surfaces.</p> <p>Coordination of system maintenance activities (back to lower traffic demand periods).</p> <p>Deploy safe and efficient cleaning methods and ensure cleaning material availability.</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
	<p>compromised equipment maintenance.</p>	<p>Spare parts for equipment maintenance not available (due to delivery issue or financial constraints).</p> <p>Current maintenance contract may expire and may not be extended or new contracts put in place due to suspension of all public procurements.</p> <p>No possibility for on-site technical assistance and equipment health check by a third party.</p> <p>Potential damage to operational equipment when carrying out cleaning protocols to restrict virus transmission.</p> <p>Planned system changes/improvements not implemented.</p> <p>Changes implemented during the disruption, to take advantage of reduced traffic, reveal undetected bugs when load increases leading to equipment failure or suboptimal configurations.</p> <p>Insufficient number of technical and support staff.</p> <p>Diminished ATSEP system knowledge and maintenance skills.</p> <p>Return to “normal” loads of some sensitive equipment can lead to defect, due to long time of operation in underload conditions.</p> <p>Increase in the number of interventions on the network by suppliers (as already observed before/after holidays) after cancellation of COVID-19-related restrictions, could cause network failures.</p> <p>Operational tests of new equipment/system features conducted during the disruption could have been compromised due to the lean traffic. A significant rise in</p>	<p>Properly instruct cleaning staff (in-house/external).</p> <p>Postpone planned changes to the equipment and implementation of new equipment, where feasible.</p> <p>Ensure proper availability of technical experts with the needed competence.</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
		the traffic level could help reveal issues not identified before.	
Hz-16	Insufficient operational equipment resources (e.g. controller working positions) at the ATS unit.	<p>When room size and layout cannot support application of the new rules for physical separation/social distancing of staff, opening of needed ATC sectors could be prevented.</p> <p>Potential conflict between new cleaning policies and the need for access to the operational resources. (Flight strips as well as other tools and equipment could be considered as a transmission vector.)</p> <p>Cleaning materials run out or cleaning cannot 'keep up' with operational use, such that the resources have to be temporarily 'quarantined'.</p> <p>Need to maintain the ATC back-up facility in operational readiness.</p>	<p>Move operations to the back-up ATC facility during main ATC facility disinfection works.</p> <p>Simulator room/training centre configured as a contingency operations room.</p> <p>Accurate study in new controller working position ergonomics/requirements.</p> <p>Deploy safe and efficient cleaning methods for cleaning of working positions and tools.</p> <p>ATFM measures.</p> <p>Update company contingency plan with regard to pandemic conditions to ensure sufficient operational equipment and human resources.</p>
Hz-17	Unexpected behaviour of decision-support tools due to unusual traffic patterns experienced in recovery situation.	Unusual routes, flight profiles or trajectories may not be treated appropriately by the existing rules for usual traffic flows established in FDPS or decision support tools.	<p>Prior simulation/replay of unusual trajectories expected/experienced could help identify unexpected tool behaviour and provide proper guidance to controllers on how to cope.</p> <p>Optimise system/tool parameters, if practicable.</p>
Hz-18	Lack of or reduced contracted services and maintenance/supplier support. For example, MET services (such as lack of timely reception of meteorological information), facility maintenance services,	The contractor may not return to the same operational levels as needed, e.g. not providing H24 service or providing partial or lower quality service. In the extreme case, service provision may be interrupted.	<p>Consider delay on project deliveries in case of a supply contract.</p> <p>Establish urgent coordination with the service provider to ensure service is restored as soon as possible.</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
	network services, communication services, system support arrangements.		
Hz-19	Operational performance/parameters of navigation aids (e.g. ILS) and MET instruments and equipment not meeting the required standard, which is not detected in a timely manner.	<p>While flight inspection checks should generally be feasible even during the disruption, under certain circumstances (e.g. cross-border operations), postponement of flight inspection checks may occur and may lead to exceeding the nominal flight inspection intervals, and in some cases even to unserviceability of some navigation aids.</p> <p>Improper maintenance of air navigation aids (e.g. due to reduced numbers of aerodrome personnel.)</p> <p>Calibration of MET instruments (and indicators) and equipment for measuring and assessment not possible.</p>	<p>Establish a health and safety protocol to protect ground and on-board staff.</p> <p>Prioritize flight inspection missions. For example prioritize regular missions over new implementation projects (new facilities and procedures); among regular missions, prioritize those addressing facilities that are approaching the flight inspection due date, particularly in the case of ILS Category III facilities; among those, prioritize facilities of primary importance; etc.</p> <p>Consider temporary extension of the nominal inspection intervals, after engineering evaluation and/or ground maintenance reinforcement.</p> <p>Request the urgent inspection and, if needed, the calibration and/or maintenance of MET instruments and equipment.</p>
Hz-20	Delayed certification of particular services or equipment and delayed implementation of changes that need prior approval by the appropriate ATS authority.	Increased workload of the appropriate ATS authorities that had to limit their operations and postpone some work due to the COVID-19 pandemic.	Timely communication to appropriate ATS authorities about planned changes, including equipment and new services, and prioritisation of work.
Hz-21	Increased wildlife presence on/near some runways or taxiways that are seldom used or not used at all during the disruption.	<p>Wildlife prevention programme not followed in full during the confinement period.</p> <p>Bird Control Unit plan and effort might not be adequate for increased wildlife risk.</p>	<p>Detailed visual inspection of the manoeuvring area and surrounds before resuming operations.</p> <p>Notification to ATC for warning to flight crews of possible increased presence of birds (e.g. in ATIS).</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
Hz-22	Increased number of runway incursions.	<p>Lack of training or ‘rusty’ skills of aerodrome personnel returning to work after unemployment.</p> <p>Flight crews used to continuous taxing onto runways during reduced traffic.</p> <p>Pressure on controllers and traffic participants on the manoeuvring area due to the reduced runway throughput by closed taxiways (used for aircraft parking) and increased aircraft turn-around time.</p> <p>Parked aircraft infringing the ILS critical/sensitive area and/or the line of sight of air traffic control.</p>	<p>Refresher training for aerodrome personnel working airside on the prevention of runway incursions.</p> <p>Inspection of ILS critical/sensitive areas before use of the respective runway.</p>
Hz-23	Confusion due to unusual ground movements and taxi routes on the airport movement area.	<p>Large number of parked aircraft on apron or even on taxiways, runways or other surfaces.</p> <p>Signage and markings visibility may be obstructed (by vegetation and/or parked aircraft).</p> <p>Reduced availability of airports services, in particular ‘follow-me’ service.</p> <p>Unexpected (by pilots and vehicle drivers) movement restrictions.</p>	<p>Information on closed parts of the manoeuvring area made available through a NOTAM.</p> <p>Detailed controller briefings.</p> <p>Close coordination with airport operator.</p> <p>Establish a virtual airport operations centre (this can be as simple as regular coordination teleconferences as described in the Simplified CDM Procedure at https://www.icao.int/safety/COVID-19OPS/Pages/ATM.aspx).</p>
Hz-24	Reduced terrain and obstacle clearance limits.	<p>Controller less proficient in providing the required terrain clearance when instructing a flight on a radar heading or on a direct route due to low demand during the disruption.</p> <p>Obstacle clearance limits at the airport obstructed by parked aircraft.</p>	<p>Refresher briefing for controllers.</p> <p>Inspection and assessment by specialists (procedure designers) of the compliance with obstacle clearance requirements before commencement of the runway operations.</p>
Hz-25	Improper handling of emergencies by all involved parties.	Lack of full scale or partial emergency response plan exercises during the disruption.	<p>Coordinate plan for emergency response plan exercises.</p> <p>Controller briefings.</p> <p>Close coordination with Airport Operator (virtual airport operations centre).</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
		<p>Obstructed (e.g. by parked aircraft) emergency access roads of rescue and firefighting vehicles to the active runway(s).</p> <p>Reduced availability of firefighting services at airports due to reduction of airport personnel or material supply caused by the financial impact of COVID-19-related restrictions (could result in change of airport categorisation).</p>	
HZ-26	Inadequate alerting service.	<p>Reduced capability and skills during the crisis period.</p> <p>The occasional use of the service may mean that it drops out of focus and priority during return to normal operations.</p>	Review the capabilities, processes, procedures and skills required to provide alerting service.
HZ-27	Confusing aeronautical information regarding availability of airspace and airport resources.	<p>Continuous changes related to the COVID-19 pandemic - state borders opening/closing, airports opening/closing, changing RFFS category, etc.</p>	<p>Close coordination with ATFM/ACC and airport operator/border control authorities.</p> <p>Virtual airport operations centre/CDM.</p> <p>Create dedicated daily NOTAM checking position.</p>
HZ-28	Inadequate aeronautical information regarding usual airspace design evolution.	<p>Aeronautical information management might have suffered from a lack of staff to accomplish AIS data publication in a timely manner to fit aeronautical information update needs and to reflect actual updates within publications.</p> <p>It might induce discrepancies within FMS database as well as within ATM systems.</p>	<p>Cross check data from different sources (AIP, commercial data providers, etc.)</p> <p>Increase coordination and collaboration between ATS units for AIRAC cycle test sessions.</p> <p>Controller briefing.</p>
HZ-29	Flight plan inconsistent with applicable airspace, route or airport availability and conditions.	<p>Multiple AIRAC changes since the period of COVID-19 disruption began result in loss of route restriction awareness by aircraft operators and flight planning services.</p>	<p>Close co-ordination between FMS data providers, aircraft operators, ANSPs and flight planning services during the transition period and safety risk assessments of AIRAC changes.</p> <p>Postpone implementation of planned significant changes to airspace organisation and/or procedures (e.g. new PBN procedures).</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
		<p>Flight planning tools not updated to the latest AIP amendments and COVID-19-related NOTAMS about airspace, route and airport availability.</p> <p>Reduced aircraft operator familiarisation of restrictions associated with operations into and out of airports classified as class B or C aerodromes.</p>	
HZ-30	Increased number of airspace infringements by GA pilots.	<p>Piloting and navigation skills diminished due to the GA flight ban during the crisis in some states.</p> <p>Situation could be aggravated by a rapid return to high volumes of GA activity during summer period.</p> <p>GA pilots will have to “unlearn” behaviour that was accepted during the disruption - GA flights may have been allowed into airspace to which they would normally not have access due to too much IFR traffic.</p>	<p>Set guidelines or limits for GA operations or accommodation within controlled airspace to manage the heterogeneity of operations within controlled and uncontrolled airspaces. (Especially for VFR flights, establish rules to limit traffic on certain platforms, to forbid transit within or access to certain airspaces, etc.)</p> <p>Clear communication with and information to all the GA organisations before implementing any restrictions to GA flights.</p> <p>Ensure appropriate ATS authority support for preventive campaign.</p>
HZ-31	Incorrect aircraft navigation.	<p>Aircraft FMS database not updated according to the last AIP amendment (missing or incorrect ATS routes or waypoints, missing or not up-to-date standard instrument departures and arrivals, etc.).</p> <p>Multiple AIRAC changes since disruption began result in loss of route-restriction awareness by flight operations officers and pilots.</p> <p>Similarly to ATC, diminished pilot skills after a period of no flying, or due to recruitment of new pilots from overseas with lower familiarity of airspace, etc.</p>	<p>Close co-ordination between FMS data providers, aircraft operators and ANSPs during the transition period, and safety risk assessments of AIRAC changes.</p> <p>Only allow limited use of RNAV approach procedures during the initial phase of the transition period.</p> <p>If feasible, postpone implementation of planned significant changes to airspace organisation and/or procedures (e.g. new PBN procedures).</p>
HZ-32	Partial loss of air-ground communication.	Diminished English language skills and phraseology discipline.	<p>Online English language courses for non-native speakers.</p> <p>Flight crew refresher training/briefing for CPDLC.</p>

	Hazard description	Possible COVID-19 pandemic-related causal and contributory factors	Examples of Mitigations
		<p>Reduced pilot familiarity with radio frequency Change-over-Points (CoPs) in the operational environment due to low hours of flying.</p> <p>Due to low hours of flying, pilot familiarity with CPDLC Log-on procedures may be reduced. In addition, handling of Log-on failures and disconnections not as efficient.</p> <p>Reduced capability/serviceability of ground and satellite based CPDLC service providers due to COVID-19-related restrictions on operational and maintenance personnel.</p>	
Hz-33	Ineffective aircraft safety nets.	Aircraft Safety System Serviceability such as TCAS/ACAS low due to prolonged ground layover periods.	

Bowtie diagram for recovery to normal air traffic services (ATS) following disruptions resulting from the COVID-19 pandemic (Amsterdam Schiphol airport)

The link below leads to a “Bowtie” diagram² that can be used in safety risk assessments to analyse and demonstrate causal relationships in high risk scenarios – in this case, the challenge of returning air traffic services to normal.

This particular diagram is specific to Amsterdam-Schiphol Airport, and as such contains acronyms, and references to organisations and locations on the airport, which may be unfamiliar to other parties. Rather than being a general template, it has been included to provoke thought and ideas. It should, however, prove useful to ANSPs in order to assist in not overlooking potential threats and hazards.

It should be noted that each actor with safety responsibilities within the Schiphol organisation will produce a similar diagram for their area of operations. These will then all be coordinated by a safety office to ensure that no threats are missed, and work is not duplicated.

The colour coded rankings (for example, ‘good’, ‘poor’, ‘medium’, ‘low contribution’) refer to the estimated effectiveness of the barriers (i.e. the chance that a barrier could prevent a threat becoming an event).

[Amsterdam Schiphol airport COVID-19 HIRM bowtie chart](#)

² Reproduced with permission of LVNL