



Airport Think Tank of ENAC Alumni | Chair: [Gaël Le Bris](#), C.M., P.E.

COVID-19 Task Force | Coordinator: Gaël Le Bris (WSP USA)

Participants (Alumni): Faude Adanhounsounou (Airbus), Mathilde Bécourt (student), Pierre Bougeard (student), Julie Cabanel (CGX Aero), Lise Gascard (To70), Philippe Fonta (SCRUM-Consult), Paul Guéneau (Heathrow Airport), Jules Heller (Groupe ADP), Martin Lavrilloux (WSP UK), Babacar Ndiaye (Mahera Education), Loup-Giang Nguyen (WSP USA), Alexandra Ott (Mott MacDonald), Olivier Sciara (UAF&FA), Vincent Zonco (Groupe ADP)

Participants (Non-Alumni): Patty Clarke (PANYNJ), Mike Gernant (PANYNJ), Jorg Guesnet (ENAC), Ernie Heymsfield (University of Arkansas), Paul Khera (Alaska DOT), Rohini Kumarage (City of Austin), Andrew Ndolo (MCAA), Beathia Tagoe (WSP USA)

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Preparing Airports to the Post-COVID-19 Era

Ensuring Immediate Safety and Developing Long-Term Resilience

The purpose of this paper is to analyze the current impacts of the COVID-19 crisis on airports, discuss the path to short-term recovery, prepare airports to the return of the flying public amid the COVID-19 pandemic, propose principles to safeguard the health safety of both airport workers and passengers, and explore solutions to increase the long-term resilience of aviation to future epidemics and pandemics. The document features references to and a list of relevant resources from international organizations, governmental agencies, and the industry.

1. Current Impacts on Airports

1.1 This is an Unprecedented Crisis

A crisis can be characterized by its "depth" (e.g., fall in air demand, revenue, or Revenue Passenger Kilometers capacity), its duration, and the shape of the recovery. The severity of COVID-19 is unprecedented in all of these three criteria at the same time. ICAO's [Collaborative Arrangement for the Prevention and Management of Public Health Events in Civil Aviation \(CAPSA\)](#) has provided detailed regional assessments of current impacts and regularly revised forecasts on the recovery. The fall in air traffic is significant, and above 90% for most commercial airports. Port Authority of New York and New Jersey (PANYNJ) reports a drop of about 95% in passenger traffic for April-May 2020 compared to the 2019 activity in the same period. London Heathrow observes a similar decrease (-97%). This situation has lasted for over two months now, and there is still a lot of uncertainty on the path to recovery.

In order to maintain the level of service and minimize the operating costs, airports with large facilities have consolidated their operations and closing terminals as needed. At London Heathrow (LHR), Terminals 3 and 4 are not accessible to the public, and only one runway of two is operative. Passenger services are suspended until at least the end of June at Paris-Orly (ORY), and the remaining operations in the greater Paris are regrouped at Paris-Charles de Gaulle (CDG) Terminals 2B, 2D, 2E and 2F. Many airports have no traffic at all and are closed to the public until further notice. Several routes are not served anymore – except in some countries due to regulatory obligations. In the United States, the Department of Transportation has relaxed some of these rules to prevent airlines from flying empty aircraft. The obligation to use allocated slots to maintain these rights have been waived as well during the pandemic.

After a brutal wave of global flight cancellations in April and May 2020, we might observe a limited recovery in June and July 2020 based on the published airline schedules and ICAO forecasts. However, this restart might remain timid and precarious in the short-term – as it can be in Asia that was ahead in the pandemic. Many countries and large metropolitan areas are still under lockdown or some form of stay-at-home recommendation. Until a vaccine is found and disseminated broadly, many passengers will not feel safe and will not be willing to expose themselves. A lot of volatility should be expected, especially with international flights that could resume – and then be suspended again if new outbreaks are identified.

Low-cost carriers might recover first. Legacy carriers will reduce their offer and resume services on the busiest and most profitable routes first. New air carriers might take off, especially on secondary routes – e.g., Breeze Airways. The availability of cheaper airworthy second-hand aircraft phased out by their former operators might also fuel business cases for new airlines.

1.2 Aviation is on the Frontline

Ted Stevens Anchorage International Airport (ANC) is temporarily the busiest airport in the world. Indeed, air cargo activity is maintained and even increased on some routes with the global trade of medical supplies and personal protective equipment (PPE). Airports have been accommodating air freight charter flights, including Very Large Aircraft (e.g., Antonov An 124 and An 225). Many air carriers have been using passenger aircraft to carry cargo in the cabin – a usage that is allowed by the ICAO and national aviation authorities under certain rules. Some are considering more durable conversions to fly these aircraft until the passenger demand is back.

Smaller airports serving remote communities are vital to connecting the latter to the world. Operations are continuing to bring them supplies and perform medical evacuations. Their healthcare facilities typically have extremely limited capacity and equipment, and they could not stand a peak of activity due to COVID-19. In Alaska, RavnAir flew [a network of community airports](#) but had to stop operations in April. Other flight operators are mobilizing to replace the bankrupted regional airline on vital services. In Brazil, aerodromes are used to move patients from isolated communities to larger hospitals. For instance, Manaus is serving as a medical hub for the State of Amazonas.

Airports are at the core of this fight. Paris-Orly (ORY) is closed to the passenger traffic but is used as a hub for medical evacuations and supplies. Several airports have been receiving special flights of larger cargo aircraft with healthcare devices and PPE. The Brazilian Association of Civil Aviation Pilots (ABRAPAC) and the Brazilian Association of Air Taxis, Regional Operators, and Maintenance (ABTAER) are coordinating [Operação Dínamo Brasil](#) – an effort to support to the fight against COVID-19 with air taxi pilots. London Heathrow (LHR) and Gatwick (LGW) have made their car parks available for the government to set up drive-through testing for Londoners.

1.3 Airports are Adapting Quickly

Airports have worked on reducing their operating costs by downscaling their operations and furloughing a significant part of their workforce. To remain sustainable, they will have to modify their long-term cost base, which might include a reduction of the workforce through severance packages for non-vital employees, voluntary redundancies, early retirement, etc. However, these plans should not prevent the ability to meet future demands and expectations when aviation restarts. For instance, London Heathrow (LHR) is drafting a new organization that addresses this challenge while reducing operating expenses.

The stakeholders and concessionaires are at risk as well. Some of them are not being helped by national relief plans. The Chicago City Council's Aviation Commission has decided to waive the April and May rent and fees for concessionaires agreeing to keep their employees. The minimum annual guarantee on concessions will be deferred. Impacts will affect the broader business community benefiting from airports. For instance, according to the [World Tourism Organization](#) (UNWTO), 217 major destinations had restrictions in place as of April 2020. Over 45% have totally or partially closed their borders to tourism.

Airport finances are being depleted due to the lack of traffic generating revenues. In many countries, governments have taken measures to support the industry. In Canada and Brazil, where private firms operate public airport assets, the rent and concession fees are waived. In the United States, the [CARES Act](#) includes 10 billion USD in funds to be awarded as [airport economic relief](#). Among eligible airports, the PANYNJ has been cleared for receiving 450 MUSD that will cover about 90 days of operating expenses. Metropolitan Washington Airports Authority (MWAA) will receive approximately 230 MUSD that will be used to keep the airports in reliable and safe operation, and potentially some of this money can be used to offset the lack of Passenger Facility Charge (PFC) collection. The CARES Act also has provisions to increase the federal share to 100 percent for the project eligible for the Airport Improvement Program (AIP). A map of the CARES funding allocation is [available online](#).

During the period of recovery that might take up to five years, airports and other project owners (e.g., air carriers) might be more inclined to use delivery methods that transfer risks to third parties, e.g., construction management at-risk (CMAR), design-build (DB), design-build-operate (DBO), and similar arrangements.

1.4 Business is Not as Usual

According to ACI World, over 75% of commercial airports worldwide have some agreement with air carriers on the parking of overflow aircraft. Several general aviation and some military facilities have been used for storing grounded airliners and private aircraft. Airports have a limited airfield capacity. For instance, London Heathrow has parked about 130 aircraft – mostly in maintenance areas and on stands. British Airways – the main air carrier – is storing the rest of its fleet at several airports, including Bournemouth Airport (A320 family) and Châteauroux-Centre "Marcel Dassault" Airport (A380). These overflow aircraft must not endanger the remaining operations. Also, adequate measures shall be put in place to safeguard the aircraft and airfield assets, especially when planes are parked on areas not designed for supporting prolonged static loads (e.g., runways and taxiways). [ACI World](#), [Airbus](#), the [FAA](#), and [WSP USA](#) have released guidance and best practices on the matter. The return to regular operations will require specific inspections and procedures on both the aircraft and the pavement.

Construction projects face different fates. Many airports have suspended major capital projects to temporarily cut costs and maintain liquidity. Others have maintained key, much-needed improvements while despairing small, non-priority projects. And others are taking advantage of the lower traffic to conduct maintenance or development either on airside, terminal, and landside infrastructure. For instance, Denver International Airport is accelerating the construction of new concourse and gates. SeaTac is closing a major taxiway to expedite the delivery of its new international satellite. To protect the construction crews in the field where social distancing is often difficult to maintain, professional organizations and governmental agencies have published guidance. The Canadian Construction Association (CCA) has released [standardized protocols for construction sites](#). The Construction Management Association of America (CMAA) has made [resources available on its website](#), including templates of COVID-19 health and safety plans.

In the passenger terminal buildings, airports are following government requirements, agency guidance, and industry practices. The lower activity helps with implementing social distancing rules. However, airports are already identifying difficulties to come when regular operations resume. Bag collection is one of these bottlenecks where distancing is practically impossible to maintain most of the time. Airports have called for a reasonable and science-based approach. They have highlighted the importance of bringing back operations with new processes that are consistent with the effective level of threat to public health. Access to terminals are restricted to travelers with a boarding pass or ticket. Masks are now mandatory or strongly recommended.

2. Path to Short-Term Recovery

2.1 Key Pillars and Principles

Our task force proposes five key pillars to facilitate a successful short-term recovery:

1. **Joint Preparedness and Operational Readiness:** Airports need to prepare and train together with their stakeholders. Measures have to be consistent throughout the airport ecosystem. The local COVID-19 health and safety plan should be developed and revised following an Airport Collaborative Decision-Making (A-CDM) approach. This effort should involve the whole airport operations community – not the airport operator and air carriers only. This includes the terminal tenants and concessionaires as well. Joint readiness should consist of a COVID-19 plan and procedures, mandatory online training for staff members before returning to work, and health and safety promotion actions.
2. **Safe and Healthy Operations:** The airport community cannot protect our passengers if they are not safe and healthy themselves. It is vital to ensure the safety of the airport staff. This includes making available PPE and other safety gear, cleaning products, soap, and hydroalcoholic gel. Workspaces and staff only spaces shall be cleaned regularly. Particular attention should be given to processes that require touching objects such as touchscreens for fingerprint recognition at secured doors. Alternatively, staffed processes might be considered in the short-term. Paper-based, web-based, and smartphone applications are available to perform self-assessment before going to work. Mental health is important as well. Airport workers have been either furloughed or challenged on the frontline, stressed financially, and perhaps had to deal with COVID-19 cases within their family and close circle. We encourage supervisors to regularly take a moment to talk with their teams.
3. **Safe and Healthy Passenger Journey:** Passengers cannot and will not be back to the skies if their health and safety are not ensured. Airports and their stakeholders shall implement adequate measures achieving a high level of protection, i.e., an acceptable (and low) risk of transmission. These measures should be consistent from the curbside to the gate, in the aircraft, and then from the gate of the arrival airport to the curbside. Different procedures and practices along the passenger journey might be appropriate. Each airport is different, the aircraft environment is different, and consequently, different approaches might be justified from a risk-based perspective. However, passengers will not necessarily perceive these differences positively unless the industry explains them and present the rationales. Educating the public is as important as training our teams.
4. **Financial Sustainability:** The sustainability of the whole aviation ecosystem is being threatened by this crisis. This includes airports that should work with their national and local governments to ensure that their survival is taken into consideration when preparing relief plans and COVID-19-related policies. Airports and their stakeholders bring significant benefits to their local communities – including jobs and tax revenues. Solidarity with stakeholders is important. Concession fee waivers might be warranted to support small businesses and local employment.
5. **Internal and External Communication:** Communication is vital for informing the airport operations community and the public. This crisis is happening in the era of social media and non-curated information. Fake news is spreading faster than official announcements – and some might say 'faster than the disease itself'. Transparency, clarity, consistency, and regularity in communication are essential to successfully convey messages. Communication plans should be broad and include information to passengers via the air carriers, in mass transit systems, when arriving at the airport, and in the terminal facilities. Additional outreach can be achieved with, for instance, posts on social media, articles in local newspapers, and interviews either on airport podcasts or local television channels. Stakeholders and the airport staff should be kept informed of the evolution of the situation and be involved with the effort to organize the response.

Two principles are suggested for organizing the short-term response:

- A. **Risk-based approach:** The response should be based on science and adapted to the effective level of risk. They should consider the specificities of aviation. Excessive or inadequate directives from governments might divert resources, impede the response, slow-down the recovery, and create confusion. The efficiency of the mitigation should be monitored, and the response revised accordingly.
- B. **Consistency from the curbside to the gate:** Actions and policies should provide a consistent level of safety from the curbside to the gate and beyond. Tenants shall follow the same policies as airport and airline workers. Social distancing might have to be enforced in public transportation as well.

2.2 Scenarios to Recovery

The priorities for the immediate recovery should be the immediate health and safety of passengers and travelers. A great deal can be achieved with a public buy-in of good social practices and compliance with government and industry guidance. However, a full recovery of aviation and the reopening of international flights will enable aviation to go further and implement additional safety nets. The concepts of COVID-19-free [Public Health Corridors](#) (PHCs) and safety "bubbles" can address these issues.

Under the PHC concept promoted by ICAO, adequate policies and procedures shall ensure that crew, aircraft, airport facilities, and passengers are 'clean' from departure to arrival – which allows to lift travel bans and remove the need for quarantine periods. It provides a way to continue vital operations such as air freight for supporting the global effort on fighting the pandemic with medical supplies.

This concept is similar to the broader safety bubble where two countries of comparable public health situations (similar indicators on and evolution of the number of cases per person, mortality, and contagion) decide to reopen their common border – e.g., the Baltic states of Estonia, Latvia and Lithuania in mid-May. Between such countries, restarting domestic flights is not riskier than flying across their common border. Australia and New Zealand have pledged to instore a Trans-Tasman COVID-Safe Travel Zone. This could be a model for safely and progressively resuming international flights worldwide.

Quarantines do not permit a sustainable restart of aviation. Concepts enabling free flows of passengers are vital. To successfully implement them, realistic, consistent, and science-based policies and procedures should be promoted and implemented. For instance, forehead temperature checks may provide an impression of higher safety. However, a body temperature over 38°C (100°F) does not necessarily mean that a passenger has coronavirus or any other infections that should trigger a refusal at boarding. On the other hand, research efforts show that many COVID-19 carriers are asymptomatic, i.e., they do not show any symptoms. Also, any protocol, including some sort of testing or assessment, should also specify how to safely handle potential carriers – especially on how and where to isolate the passenger from the public.

Systematic testing may be warranted for international arrivals. In Dubai and South Korea, a routine testing for COVID-19 for arriving international passengers are now in place. Consistency is key in the implementation of PHCs and bubbles. If two countries reopen air services under these concepts, an international passenger considered 'clean' at boarding should not be forced to follow a quarantine period upon arrival. Discussions between airport partners or of the same group are also helping with the emergence of consistent practices worldwide. Furthermore, research is urgently needed to confirm if social distancing should be implemented everywhere at the airport, or if everyone wearing masks prevent the transmission enough for tolerating shorter distancing temporarily, e.g., during the boarding process and at the bag claim.

Staying alert and monitoring the situation is important. Airports can follow the evolution of the global situation through different channels. ICAO is providing a [global COVID-19 airport status](#) and an inventory of policies in force. IATA has a [COVID-19 dashboard](#) on state and individual airport restrictions. In Europe, Eurocontrol has been publishing regular bulletins with updates on the [state and airline response](#).

2.3 Guidance and Policies

ICAO has issued guidance and documents on the COVID-19. ACI World and IATA have released a [joint approach to safely restarting aviation](#) in addition to extensive resources that feature best practices or provide detailed guidance to airports, air carriers, and their stakeholders. [ANVISA](#) (Brazil), as well as [EASA and ECDC](#) (Europe), have published airport public health and safety protocols. Other public agencies (e.g., [CARPHA](#) in the CARICOM, [CDC](#) in the U.S.) have public advisories and guidance to the public and the business communities.

Beyond these policies and recommendations, airports are conducting their own initiatives to facilitate the recovery and testing of new technologies. MWAAs have created Recovery Adaptation Committees (RAC) reporting to the Executive Board, and task forces to determine the efficiency of implemented measures, develop objectives to address identified issues, prioritize objectives and provide a timeline for projects, and develop recommendations. John Glenn Columbus International Airport (CMH), Ohio, has developed [a comprehensive document](#) providing guidance, policies, and procedures related to COVID-19 to the airport operations community.

Groupe ADP and Choose Paris Region have a [Safety Travel Challenge](#) to support solutions for safer airports and transportation. Some airports are experimenting with new solutions such as cleaning robots using disinfectants and UV light (e.g., DOH, NCE, PIT) and disinfection booths (e.g., HKG).

2.4 From the Curbside to the Gate

Prevention should start before leaving home and continue (or end) with the first and last miles. Airports should work with their airlines to inform passengers about the policies and recommendations in force at the origin and destination airports via emails and apps. In parking garages and on the curbside, safety promotion should be conducted in order to educate the passengers on social distancing before and at the airport – e.g., through roadway variable message signs (VMS).

Efforts made by the aviation industry will not bear fruits if passengers are exposed to a higher risk of contamination when leaving the airport. Mass transit systems serving the airport, shuttle services, taxis, and TNCs should implement adequate measures to protect passengers and workers on the first and last miles. Airports should ensure that transit agencies consider specific actions on the lines serving airports. This should include enforcing social distancing through markings and regulators on the platforms ensuring that train cars and buses are not packed.

Check-in and bag drop-off are typical chokepoints with queues. Markers can be placed on the ground to facilitate the 1-m or 6-ft. spacing recommended by WHO and the public health agencies. At airports with self-checking and self-service drop-off, these options should be prioritized as they minimize the exposure of both the passengers and the aviation professionals. Additional separation devices (e.g., glass separators) might be needed when devices are close together.

Security screening needs to adapt to the COVID-19 era as well. Bins (or trays) reused all day are known for [hosting bacteria and viruses](#). Considerations should be given to alternative processes, or these bins should be disinfected. Equipment interacting with passengers (e.g., microwave scans) should be sanitized regularly. Screening personnel shall wear masks and gloves at all times. Agencies should massively promote simplified processes (e.g., TSA Pre-Check) to eligible travelers, facilitate the enrolment, and waive registration fees if necessary. Post-screening areas should be reorganized as far as practicable to facilitate social distancing.

Retail and concessions should apply procedures consistent with the rest of the airport. Bathrooms shall be cleaned regularly. PPE and hand sanitizer should be massively available in terminal buildings. Actions to improve air quality and air filtering can be undertaken. Airports are considering setting up the HVAC systems for increasing the airflow. In the short-term, terminal space allowances commonly used in terminal design do not enable social distancing at all steps of the passenger journey.

Hold rooms (departure lounges) were not designed to provide social distancing. Most airports have neutralized every other gate room seat to offer passenger spacing. While this might work today in low traffic scenarios, social distancing will be increasingly difficult to implement when regular operations resume. Consistent policies should be applied at the gate. Pre-boarding processes where passengers are packed in the boarding bridge in advance of the effective boarding in the plane must be suspended until further notice – unless the jetway is adequately ventilated and social distancing is possible.

2.5 Air Cargo & General Aviation

The ICAO PHC concept was developed to ensure the continuity of air cargo operations and keep vital freight supporting critical supply chains, humanitarian operations, and COVID-19 effort to move across borders. This PHC concept can help to facilitate clean air cargo operations domestically as well. Applying the same principles to passenger movements from door to door, the air cargo and shipping industry shall follow consistent policies and procedures at their facilities – including the fulfillment centers of e-commerce distributors.

General aviation airports shall adopt these measures to their specificities. Air taxi and commuter operations should follow the same general rules as the one prescribed to commercial service airports. Practices for cargo feeder operations should apply the PHC concept and rules described above. Aeroclubs should work on staggered schedules if social distancing cannot be followed and ensure that shared aircraft and equipment are disinfected accordingly.

3. Long-Term Challenges: Adapting Airports for Enhancing Resilience

3.1 Long-Term Objectives

The long-term objectives (i.e., after a vaccine or cure for COVID-19 is found) for a sustainable and resilient recovery should be the following:

- **Door-to-door consistency:** the airport is just a step on the passenger journey. Policies and procedures should be risk- and science-based, holistic up to the final destination, and consistent throughout the transportation industry.
- **Preventing the propagation of future epidemics and pandemics:** the 'new normal' at airports should promote virus-free practices and sanitation for both passengers and workers.
- **Enhancing the industrywide resilience to future epidemics and pandemics:** we shall plan, design, build, and operate with future epidemics and pandemics in mind.
- **Winning back the trust of the passengers:** the air demand will not be back to normal as long as passengers doubt the capacity of the industry to preserve their health and safety.

3.2 The World After COVID-19

New social habits will emerge after the COVID-19 crisis. Social distancing (sometimes referred to as 'physical distancing') and higher sanitation standards (e.g., regular hand washing and sanitation of public spaces) will be the new global normal, and this will continue long after an efficient vaccine or cure is found. Wearing a mask when showing symptoms of communicable diseases will be the norm – while it was rare in most parts of the world but Eastern and Southeastern Asia before the pandemic. Workers will stay and work from home when sick. These new behaviors will help mitigate or slow down the transmission of existing and future communicable diseases.

Online chat, virtual meeting rooms, and other remote work solutions are not new. However, they have not competed for that much with face-to-face meetings so far due to social acceptance, cultural preference, and the limits of the user experience they provide. The lockdown of a large portion of the white-collar population for nearly two months all over the world might have changed this. People have become more acquainted with these technologies and more tolerant of their limitations. While they cannot replace – for now – the quality of direct face-to-face interactions during business meetings, technical workgroup sessions, and other site visits, we can expect part of the business world to prioritize more than before remote meetings against business trips.

There will be expectations toward the ability of the transportation industry to be proactive in the domain of sanitation and communicable disease awareness. Enhanced cleaning and other best practices shall be implemented as new baseline standards. Safety promotion should be visible in airport facilities. Airport operators should monitor the global situation, especially from/to regions and countries with whom they have air services. This

monitoring should take into consideration the origin and destination of passengers – not the direct services only as passengers who took a connection would not be counted otherwise.

3.3 Air Transportation in the Post-COVID-19 Era

A partial or more comprehensive reorganization of some segments of the aviation industry is inevitable. Many airlines are financially fragilized or in precarious conditions. The list of air carriers under the U.S. Chapter 11 or counterparts include Avianca (Colombia) – one of the oldest airlines still flying, Compass Airlines, Miami Air, Ravn Alaska, Trans States Airlines, and Virgin Australia. Some of these names might not fly ever again. Many of the remaining carriers have plans for reducing their fleet, network, and workforce. These changes will have a durable effect – including air services, airline alliances, etc. – with direct impact on airports. They will not be limited to airlines but include the whole aviation ecosystem – e.g., MROs and repair shops, FBOs, fueling service providers, etc. As a large number of cheaper and still airworthy airframes will be made available by the reduction of fleets, early retirement of older models, and airline bankruptcies, airline ventures might use them for starting their business or grow their fleet – which would adversely impact the overall effort of the aviation industry to reduce emissions through the introduction of greener aircraft types.

There are strong voices in Europe to 'restart the world' differently than before the COVID-19 with an increased focus on sustainability. While fighting climate change and pollution is vital for the future of our society, we should first have a rationale and proportionate approach. We must not forget that aviation has worked on reducing its footprint for decades. Policies should be objective and science based. The unique mobility and connectivity that aviation provides, its energy efficiency on longer-haul journeys, the complementarity with other modes of transportation, and its benefits to communities must be considered. Comparison with other modes should be holistic. Local aviation markets shall not be prevented from recovering because of unreasonable partisan regulation from national governments.

In the immediate post-COVID-19 period, some major stakeholders of aviation innovation might be focused on short-term issues and lack cash for bold long-term initiatives. However, decision-makers should not forget that the future of their airport starts now. Our think tank has outlined some of the long-term challenges in its research project on [The Future of Airports](#). Innovation roadmaps and long-term plans should not be abandoned because airports will need a vision when restarting.

3.4 A Risk-Based Approach for More Resilient Operations

Restarting air travel should be risk-based. Countries are already following this approach with the concept of [Public Health Corridors \(PHC\)](#) and other 'bubbles' of similar risk to public health, as described in the previous section. Systematic quarantine is not a sustainable model for reopening the world as they make most of the trips merely unrealistic – people cannot wait two weeks locked down at destination every time they need to have a business meeting or are going on vacation.

Rapidly, a more mature risk-based approach might raise as it did in aviation security. Countries should quickly disclose any outbreak of communicable disease – this is already supposed to be a WHO standard. Based on this mapping of the current health situation, selected science-based measures should be undertaken to prevent these outbreaks from turning into national epidemics or global pandemics. Local guidance should be adapted to the specific outbreak depending on the disease specificities and especially its way of spreading. However, some best practices are applicable to many of them and should be available to airports in a communicable disease toolbox. As a last resort, systematic quarantine and then travel bans should be implemented. Research is also urgently needed to confirm the efficiency of routine use of masks on preventing the spread of respiratory diseases under a level that allows limited close contact – e.g., at bag claim.

After the 9/11 attacks, scales were introduced for communicating the level of terrorist threats to the public. While a scale common to all diseases might not be possible due to the fact that each one is different in its effects,

spread, and prophylaxis, a similar approach should be implemented on health and safety with different layers of social (non-airport specific) mitigation to be activated (e.g., social distancing, mandatory masks in public places etc.) based on the threat. Policies, standards, and practices should be scalable. Smaller airports should not be forgotten. They are part of this journey to a safer and more robust aviation regarding health and safety. But they should not be imposed a regulatory burden they cannot support unless appropriate funding is provided.

Ultimately, more countries might require more vaccinations than on [today's WHO list](#). The International Certificate of Vaccination (ICV) or a new type of 'Health Certificate' might become an essential piece of identification for international travels – and it could be requested by airlines for domestic flights as well if relevant for ongoing outbreaks. Airports had already developed plans and procedures on communicable diseases after the most recent outbreaks of avian flu, SARS, MERS, and Ebola. These plans and procedures should be updated regularly based on the lessons learned of COVID-19, the evolution of practices and standards, and local threat assessments. They should involve all the stakeholders, including non-airport parties such as local health and public safety agencies, as well as the healthcare community. This can be achieved through an airport communicable disease committee.

Broader national and regional plans should be set up to ensure regionwide coherence and preparedness – similarly to what was done [in Europe](#) after the eruption of the Eyjafjallajökull volcano in 2020. Operational readiness is vital for the success of these measures in the field. The local airport community and the stakeholders of aviation systems should be regularly trained. Drills and simulations should be conducted, as well.

3.5 Adapting Airport Planning and Design Practices

Planning and design criteria for passenger terminal facilities might not change much after COVID-19. Planning and designing a terminal area assuming permanent social distancing as a baseline assumption is not realistic. However, the output of discussions on bottlenecks and chokepoints on the passenger journey might be different than before. Project owners might be ready to fund adaptations and corrective works for preventing the excessive accumulation of people and facilitate – but not permanently implement – social distancing when warranted by the public health situation.

Provisions for supplementary, ad hoc health screening processes might be relevant on the passenger journey of international arrivals, or alternatively when departing as the PHC or 'bubble' concept implies that departing passengers are 'clean' (i.e., screened or tested). Specifications for such provisions might need to wait for the emergence of an international or regional consensus on health testing and screening.

Many airports have paramedics and agreements with local Emergency Medical Services (EMS) and healthcare providers. Few have a medical station and even less have a formal infirmary or hospital with medical doctors. More airport operators might consider investing in such facilities. The goal is not only to handle sick passengers, but also to process international arrivals and conduct testing when pandemic or epidemic warnings are in force. Small airports opened to foreign passengers need to find practical solutions adapted to their means and effective exposure. If not, authorities may reconsider their ability to welcome international travelers temporarily – as did the U.S. at the beginning of the COVID-19 pandemic in drastically reducing the number of ports of entry.

During the COVID-19, airports have undertaken various actions for promoting social distancing with markers on the ground, neutralizing one seat of two on rows, and installing transparent separators. Some might stay, but others may not be warranted anymore once the pandemic is over. However, in order to be resilient, equipment and furniture manufacturers should put provisions in their design for scalable and as-needed features – e.g., removable plastic screens.

The development and implementation of self-service and touchless technologies might be expedited by the lessons learned from COVID-19. Biometric identification and especially facial recognition that is touchless, might become our unique ID from the check-in to the gate. The "tunnel" concepts with sensors replacing the current

techniques of passenger screening might arrive sooner than expected. Touchless solutions are already broadly present – e.g., paper dispensers in bathrooms, and they will become more systematic.

Some innovative features that were supposed to improve the customer experience might be cleaned more frequently, be closed during periods of a higher health safety threat, or just phased out. This includes gaming areas, children’s playgrounds, etc. We will need to rethink the cleaning and sanitation of frequently touched objects and areas, such as food court tables. Depending on the configuration and operations of these facilities and services, they might be sanitized – not only cleaned – by the personnel after each client, but customers might also be invited to sanitize after themselves, or devices and robots could do the job. Some materials limit the survivability of germs and viruses – such as copper. Antimicrobial materials might be more widespread than today.

Indoor air quality will be an expectation. The design of air ventilation systems for aviation facilities should already consider airport-specific pollutants such as volatile organic compounds from jet fuel combustion. Preventing further contamination through specific features or design criteria of HVAC systems might emerge rapidly and become an industry standard. Increased air inflow and the installation of active processes (e.g., bipolar ionization) are potential features that could become best practices for future projects.

4. Conclusion

The ongoing COVID-19 crisis has not spared one single member of the broader airport ecosystem. Its impacts are unprecedented due to its importance, duration, and expected length of the recovery. As this paper is being published, many regions of the world are restarting air travel and reopening their borders. The short-term recovery cannot be successful if the immediate safety of the passengers and aviation professionals are not guaranteed, if the aviation community is not ready to reopen, and if policies and practices are not efficient. The basic principles outlined in this paper are required to achieve these objectives.

One of the biggest challenges of the post-COVID-19 era will reside in the capacity of the aviation industry to learn from this event to increase its resilience toward future epidemics and pandemics. Airports need to adapt to the ‘new normal’ but also reinvent themselves to anticipate new COVID-19 outbreaks and future communicable diseases. Lessons learned from the current pandemic can be used for enhancing the way we plan, design, and operate airports. These additional measures and new practices must be risk-based, consistent, and realistic to safeguard the health and safety of the passengers and aviation professionals efficiently.

5. Additional Resources

- [ACI World Governing Board Resolution urging relief for airports from impact of COVID-19 and calling for coordinated programme of recovery](#), ACI World, April 2020
- [Airport Information Technology recommendations during COVID-19](#), Advisory Bulletin, ACI, March 2020
- [Airport Operational practice – Example for Managing COVID-19](#), ACI World, 2020
- [Airport Public Health Preparedness & Response](#), ACRP Legal Research Digest 34, TRB, 2018
- [Airside Safety and Operations under COVID-19](#), Advisory Bulletin, ACI World, April 2020
- Le Bris, G. [Best Practices on the Temporary Parking of Overflow Aircraft](#), WSP USA, April 2020
- [BASC Session on Air Quality, Climate Variability, and COVID-19](#), The National Academies of Sciences, Engineering, and Medicine, May 28, 2020
- [Coronavirus 'SARS-CoV-2' Infections – Operational Recommendations](#), SIB No. 2020-02R4, EASA, April 2020
- [Council Aviation Recovery Taskforce \(CART\) Report](#), ICAO, June 2020
- [COVID-19 Aviation Health Safety Protocol](#), Operational guidelines for the management of air passengers and aviation personnel in relation to the COVID-19 pandemic, Issue No. 01, EASA/ECDC, May 2020
- Fabre, C. & Jubin, F.-X. [COVID-19: Aircraft long-term storage – Asset preservation](#), Airbus, 2020
- [COVID-19: Relief measures to ensure the survival of the airport industry](#), Policy Brief, ACI World, Feb. 2020

- [Economic impact of COVID-19 on the airport business](#), Advisory Bulletin, ACI World, May 2020
- [Emergency Preparedness and Contingency Planning Handbook](#), 1st Edition, ACI World, 2014
- [Flight Plan to Recovery: Preparing Airports and Their Business Partners for the Return of the Flying Public](#), ACRP Insight Event, Transportation Research Board, May 28, 2020
- [Guidance for African Airports Restart](#), Version 1, ACI Africa, May 2020
- [Guidance for ground handling during COVID-19](#), Edition 4, IATA, May 2020
- [Guidance for ground handling return to service](#), Edition 1, IATA, May 2020
- [Guidance for the transport of cargo and mail on aircraft configured for the carriage of passengers](#), Edition 3, IATA, May 2020
- [ICAO Handbook for CAAs on the Management of Aviation Safety Risks related to COVID-19](#), Doc 10144, ICAO, May 2020
- [Implementing a Public Health Corridor to Protect Flight Crew During the COVID-19 Pandemic \(Cargo Operations\)](#), EB 2020/30, ICAO, May 2020
- [Infectious Disease Mitigation in Airports & on Aircraft](#), ACRP Report 91, TRB, 2013
- [Mitigating the risks created by overflow aircraft parking](#), Advisory Bulletin, ACI World, April 2020
- [Preparation of Aerodromes to Resume Operations](#), SIB No. 2020-07, EASA, May 2020
- [Preparing Airports for Communicable Diseases](#), ACRP Synthesis 83, TRB
- [Processo nº 25351.910780/2020-09](#) – Atualiza as medidas sanitárias a serem adotadas em aeroportos e aeronaves, para enfrentamento ao novo coronavírus SARS-CoV-2 (COVID-19), Nota Técnica Nº 101/2020/SEI/GIMTV/GGPAF/DIRE5/ANVISA, Anvisa, May 2020
- [Quarantine Facilities for Arriving Air Travelers](#), ACRP Report 5, TRB, 2008
- [Review of Aviation Safety Issues Arising from the COVID-19 Pandemic](#), EASA, June 2020
- [Safely restarting aviation – ACI and IATA joint approach](#), ACI World/IATA, May 2020
- [Safe Work Playbook](#), ‘An interactive guide for COVID-19 pandemic preparedness and response’, Columbus Regional Airport Authority, April 2020
- [Temporary Parking of Overflow Aircraft](#), National Part 139 Cert Alert No. 20-02, U.S. FAA, 2020
- [The Future of Airports: a Vision of 2040 and 2070](#), ENAC Alumni, April 2020

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