



Safely Reopening Borders

A practical guide



Executive Summary

There is an urgent need to reopen borders and enable international travel to resume. Despite positive news from preliminary trials of vaccines, there are many hurdles still to be overcome and, even in a best-case scenario, widespread vaccine roll-out may take 12-24 months. In the meantime, the economic and social impacts of the pandemic continue to become more acute such that waiting for vaccine is not a viable option.

The air travel environment is very safe; the multi-layered biosafety measures applied by the industry are highly effective such that the risks of transmission of the virus during travel are much lower than in most other settings, including other activities which have restarted.

However, many States continue to impose border restrictions, or apply quarantine measures which are costly to run while home isolation is expensive to enforce and has been shown to be ineffective. In contrast, systematic testing of international travelers, if applied properly, can significantly reduce the risk of international spread of COVID-19 through travel.

This document makes the following recommendations with regard to: [1] risk management and assessment, [2] implementing COVID testing to the air travel journey and [3] managing health credentials.

Risk Management and Assessment

Risk mitigation measures should be assessed holistically, not individually or in isolation.

- Risk assessment should take into account the relative infection rates in the two countries between which people want to travel, the volume of travel and the effectiveness of mitigation measures. Secondary risks and unintended consequences should be accounted for.
- For testing, performance values of tests should be as high as possible, ideally in excess of 99%, with 95% as a minimum cut-off for both sensitivity and specificity. States should deploy the most rapid test available and deploy new and improved technologies as they come on-stream.

Risk mitigation should be compared relative to the benefits of reopening borders and to in-country risk

- Quarantine is a major disincentive for travel and is incompatible with the objective of international travel. Home isolation without effective enforcement is ineffective at preventing community transmission from

imported cases. The World Health Organization (WHO) recommends that asymptomatic travelers should self-monitor for symptoms rather than be required to undergo quarantine.

- Where risk mitigation measures applied to international travelers reduce the expected incidence of arriving passengers below the level within the destination country, arriving passengers should not be subject to any measures over and above those applied to the population of the arriving country.

Implementing COVID testing in the travel journey

States should use the most rapid, accurate, user-friendly test available and test as close to travel as practical.

- Testing should be fast, accurate, scalable and affordable using technology that can be easily operated without creating an additional burden on healthcare systems.
- Pre-departure testing is preferable to testing on arrival as it increases passengers' confidence that they are not currently infected and reduces the possibility for them (and possibly their traveling companions) being stranded at destination. It also further minimizes the risk of the virus being transmitted during travel to or from the airport.



Protocols should be developed based on stakeholder engagement and refined based on real-world data

- Prior to deciding on a specific implementation model, local stakeholders should run planning scenarios based on available footprint, scalability, customer convenience and operational impact.
- Once a model is selected it is important to review the assumptions and monitor performance metrics regularly to ensure that demand and performance requirements can always be met. Where improvements are required, stakeholders should work collaboratively to agree on necessary enhancements.

Managing Test Results and Certificates

States should adopt a standardized global approach to health credentials.

- ICAO should design the specifications for a test certificate for travel which could be a component of a health passport and eventually be used as reference to design the specifications for a vaccine certificate. A test certificate for travelers would need to include some data elements related to test results, as well as additional elements related to a traveler's identity (a travel document number for example).
- The ideal scenario is one in which governments enable passengers to upload their test results onto a dedicated traveler portal, with interactions performed directly between passengers and health authorities.



Introduction

The SARS-COV2 virus was first detected in December 2019. In response to the threat of the virus and the COVID-19 diseases, governments have imposed sweeping restrictions, including border closures and travel restrictions in order to limit the importation of COVID-19 into their countries. This has had an unprecedented impact on the global economy as well as millions of individual and family livelihoods.

It has also had a devastating effect on the air transport industry and on international travel in particular. International air travel had dropped by 90% on 2019 levels and according to IATA's latest forecasts, traffic volumes are not expected to recover to pre-pandemic levels until 2024 at the earliest. The economic and social impacts of this disruption are dire: for example, as many as 46 million jobs supported by air travel are at risk due to the pandemic, along with up to \$1.8 trillion of economic activity supported by aviation. The need to safely reopen borders is urgent.

Since the early stages of this crisis, airlines, airports and the wider travel and tourism sector have worked closely with governments and regulators to implement a range of new health and safety protocols to enable air travel to resume safely. These measures include physical distancing, the wearing of face masks, enhanced cleaning and disinfection procedures, and optimized heating, ventilation, and air conditioning. Based on the [ICAO CART Take Off guidance](#), this multilayered set of measures has contributed to air travel being the safest mode of travel with regard to the risk of contracting COVID-19. Indeed, there have only been around 50 cases of COVID-19 reported for which transmission is believed to have been associated with a flight, out of 1.2 billion passenger journeys in 2020 and more than 50 million cases of COVID globally.

At the same time, in response to concerns about the international spread of the virus, many governments continue to impose travel restrictions focused on limiting cross-border/international travel, even where these restrictions are not supported by global or regional public health organizations. For example, many states apply blanket quarantine measures on arriving passengers despite the WHO recommending that asymptomatic travelers should self-monitor rather than quarantine.

The Collaborative Arrangement for the Prevention and Management of Public Health Events in Civil Aviation (CAPSCA) Manual on '[Testing and Cross-Border Risk Management Measures](#)', which provides guidance for governments, regulators and industry stakeholders to enable the safe reopening of international borders. This document is intended to complement the CAPSCA guidance with practical tools and recommendations to assist governments in safely reopening their borders. This guidance note covers the following areas:

- **Risk assessment** – including a framework for calculating the impact of risk mitigation measures on the risk of international spread of the virus;
- **Implementation of testing** – including a number of practical considerations based on international best practice from the many trials and pilot schemes that have been run around the world;
- A harmonized approach to **health credentials** – as a platform for mutual recognition of test results, and in time, vaccination certificates.

By following the measures and recommendations, IATA considers that states can safely reopen borders as part of a risk-managed approach and start the recovery of the many communities and economic sectors that depend on air transport.

About this report

The report is guided by the following principles:

- All measures should be outcome based, supported by scientific evidence and a robust fact-based risk assessment;
- Health screening measures should be introduced as upstream as possible, to make the travel environment 'COVID-clean' to the



greatest extent possible. Accordingly, any measures that need to be applied during the travel process should be applied prior to departure rather than on arrival;

- Collaboration is vital:
 - Among governments to implement internationally consistent, mutually accepted measures is essential to restoring air connectivity and passenger confidence in air travel;
 - Between governments and industry, particularly to ensure the practicable development and implementation of operational measures.
- Measures should only be in place for as long as deemed necessary: all measures should be re-evaluated under a fixed schedule. When more effective and less disruptive measures become available, they should be implemented at the earliest opportunity and defunct measures removed;
- Existing roles and responsibilities of governments, airlines and airports should be respected in implementing the response to COVID-19.



Chapter 1: Risk Management and Assessment

Introduction

The CAPSCA Manual on [‘Testing and Cross-Border Risk Management’](#) makes a number of important recommendations relating to risk management and assessment, specifically a) that states perform a Risk Assessment using epidemiologic criteria, b) that states consider their risk tolerance as a part of their risk assessment and c) that states use their risk assessment and risk tolerance in determining the application of a multi-layered risk management strategy.

This section provides practical advice related to risk assessment in the context of cross-border travel, including a risk management model for states to evaluate the cost-benefit of opening borders without quarantine.

Key Considerations

Safety is the aviation industry’s number one priority, and this applies equally to health safety. The aviation industry has a long and strong track record of applying risk management principles to safety and security, and these principles are equally applicable to the COVID-19 pandemic. By applying an extensive, multi-layered set of biosafety measures, the risk of transmission of the virus onboard has been further reduced to the extent that the WHO has acknowledged that the air travel experience is safe.

At the same time, the WHO is clear that the world needs to learn to live with COVID-19, economies have to open up, people have to work, trade has to resume. There is no zero-risk way to do so and it is likely that the arrival of COVID vaccines will not eliminate risk completely. The WHO acknowledges that there is a trade-off that countries have to make; the risk of a traveler arriving and potentially starting another chain of transmission against the obvious benefit of allowing travel from a social and an economic point of view.

Testing and other measures can facilitate the reopening of international borders as part of a risk-management approach, without the need for quarantine which is a huge brake and disincentive of travel.

CAPSCA has concluded that risk mitigation is an appropriate response strategy for governments to adopt. This section accepts this recommendation and uses it as a valuable starting point.

Risk Assessment Framework for international travel

Establishing the baseline level of risk

The starting point for risk assessment is to understand the baseline level of risk in the absence of any mitigations. In the context of international travel during the COVID-19 pandemic, the following factors may be relevant:

- The incidence of the disease in the origin country at the time of travel (this can be assessed in absolute terms or relative to the incidence of COVID-19 in the destination country);
- Traffic volumes between two countries.

For the purposes of this framework, it is assumed that the multi-layered approach applied to the travel experience itself is effective in mitigating the risk of transmission of the virus during travel. This assumption is considered credible in view of the strong empirical evidence that the risk of transmission during air travel is very low indeed.

Determining the impact of risk mitigation measures

The next stage is to apply mitigation measures in order to reduce the level of importation risk. In the current context of cross-border travel, the two most relevant measures for consideration are testing and quarantine, noting that within each of these broad categories a range of different alternative scenarios exist. Depending on the measure (or combination of measures) chosen and

their effectiveness, the level of risk mitigation can be determined.

As there is currently no single solution that can effectively mitigate the risks of COVID-19 transmission and measures are being implemented as multi-layered packages, it is important that risk assessment considers these combinations of instruments holistically and not in isolation.

Identifying secondary risks

It may be that certain measures will result in secondary challenges, which will also need to be risk-managed. For example, testing will lead to a certain number of false positive cases, creating a need for a secondary or confirmatory protocol to avoid those affected passengers being denied travel automatically. Any secondary protocols will need to be conducted in such a way so as to minimize the risk of transmission.

Identifying unintended consequences

Similarly, it may be that certain measures have unintended consequences, which could undermine the overall objectives of the risk mitigation strategy or the overall effort to restart international travel. For example, there is very considerable evidence that quarantine is a powerful deterrent to travel and therefore the introduction of quarantine requirements is likely to represent a risk to efforts to restart international travel.

Calculating residual risk

Once the impact of risk mitigation measures has been taken into account, including accounting for the impact of any secondary risks or unintended consequences, the level of residual risk can be calculated. In the context of international travel, this can be expressed in a number of ways:

- a) Relative to the baseline risk;
- b) In terms of the expected incidence of arriving passengers relative to the incidence of COVID-19 within the population of the destination country. Where risk mitigation measures reduce the expected incidence of arriving passengers below the level within the destination country, arriving passengers should not be subject to any measures additional to those applied to the population of the arriving country;

- c) In terms of the number of infected passengers who would be 'imported' into the destination country, either in absolute terms or relative to the number of healthy travelers would be allowed to travel. The latter measure would provide an indication of the compatibility of the proposed approach with the objective of safely resuming international travel.

Recommendation: Risk mitigation measures should be assessed holistically, not individually or in isolation. Risk assessment should take account of the relative infection rates in the two countries, the volume of travel and the effectiveness of mitigation measures. Secondary risks and unintended consequences should be accounted for.

Recommendation: Where risk mitigation measures applied to international travelers reduce the expected incidence of arriving passengers below the level within the destination country, arriving passengers should not be subject to any measures additional to those applied to the population of the arriving country.

Modelling the restart of international air travel

In order to be able to model the risk assessment outlined above, a number of parameters need to be understood:

- i. COVID incidence in both departure and arrival countries;
- ii. Bilateral traffic between the two countries, adjusting for the anticipated level of industry restart;
- iii. Proportion of asymptomatic and incubating passengers;
- iv. Effectiveness of mitigation measures, in particular testing and quarantine.

COVID incidence

The incidence of COVID-19 in both departure and arrival countries reflects the number of new cases being reported over a specified period of time, typically reported as a measure over seven or 14 days during the COVID pandemic.

Where the incidence in the departure country is lower than or equal to that in the arrival country there is limited rationale for the imposition of border measures as an arriving traveler is statistically less likely than a member of the local community to be infected with SARS-COV2. In this setting, COVID-testing can be an additional mitigation measure.

Where the incidence in the departure country is higher than the arrival country, COVID-testing can contribute to risk equalization such that the effective incidence of the disease among inbound passengers is lower than the prevalence of COVID within the arrival country.

A relevant consideration is the number of passengers who may be asymptomatic, that is who may be infected with COVID-19 without displaying any symptoms. US Centers for Disease Control and Prevention (CDC) estimates suggest that 40% of cases may be asymptomatic while other estimates are much higher. A screening strategy such as that proposed for international travel would be more likely to detect such cases than testing strategies in which only symptomatic persons and their close contacts are tested.

There are several sources of data on COVID incidence at national or sub-national level, including:

- ECDC: <https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>
- Harvard: https://globalepidemics.org/wp-content/uploads/2020/06/key_metrics_and_indicators_v4.pdf

Bilateral traffic

In order to understand the level of risk associated with reopening international borders, the level of bilateral traffic in a given market is also of interest. Linked to this, it is important to consider that traffic will take time to recover to 2019 (i.e. pre-pandemic) levels. Therefore, assumptions also need to be made about the level of restart that is anticipated.

Proportion of asymptomatic and incubating passengers

The baseline level of incidence should be adjusted to reflect the number of both asymptomatic and incubating passengers:

- Estimates of the proportion of asymptomatic or non-reported cases vary widely. In addition to the way in which the virus manifests in infected persons, under-reporting is a function of the availability of testing within a given country.
- Currently available evidence suggests that the virus is detectable in infected persons up to 48 hours before the person develops symptoms (if indeed they do develop symptoms). This creates a window of typically 48-72 after infection before an infected person becomes detectable. These cases will not be captured by screening or testing.

Effectiveness of Mitigation Measures

Tests

There are two-purposes of COVID testing: i) where testing is carried out before departure, to further limit the potential transmission of COVID-19 during travel by ensuring that flights are 'COVID clean' and ii) to reduce the risk of translocation of the disease. IATA recommends testing as close to the time of departure as possible, as testing too far in advance of travel reduces the effectiveness of pre-departure screening.

There are several different types of testing technology that can be used for screening international travelers. While Polymerase chain reaction (PCR) technology performs very well for diagnostic testing of suspected cases, it is ill-suited to screening of travelers, as it is slow, invasive and expensive to perform. Antigen tests are both quicker and cheaper, and this area continues to evolve rapidly with additional new approaches in development and existing testing technologies constantly improving their performance and enhancing their ease of use.

Test performance is typically expressed with reference to the sensitivity and specificity of the test in question:

- Sensitivity is the likelihood that a test will correctly identify a person with COVID-19 – this is important in determining the number of



infected passengers who would be detected and how many would be missed;

- Specificity is the likelihood that a test correctly identifies a person without the disease – in a travel context, this measure is important as it gives an indication of the expected number of false positive cases and thus passengers for whom a secondary or confirmatory protocol would be required.

Test effectiveness can vary over time. In particular, none of the existing tests for COVID-19 are able to detect the virus in the 2-3 days immediately after infection, while the infected person is incubating the virus. This should be considered in the risk assessment.

In order to maximize the efficiency of testing, performance values for peak sensitivity and specificity should be as high as possible – ideally in excess of 99%, but with a minimum of 95%.

Quarantine

The effectiveness of quarantine is primarily a function of duration and compliance. *A priori*, the longer the period of quarantine the greater its effectiveness as a mitigation strategy. However, it is relevant to distinguish between government-controlled quarantine (in a quarantine hotel or other government-run facility) and self-isolation at home. While government-controlled quarantine has been shown to be highly effective in mitigating importation risk, there is growing evidence that compliance with home isolation is very low, particularly if the isolation period is 14 days as is the case in many countries.

Moreover, there is very clear evidence that quarantine is a major disincentive to travel, with markets that have introduced quarantine requirements seeing a fall in traffic that is virtually identical to countries that have closed their borders completely. This unintended consequence and the incompatibility of quarantine with a meaningful resumption of international travel, as well as the economic sectors which depend on international travel, should be considered in the risk assessment.

WHO does not recommend that asymptomatic travelers should quarantine, but rather they should self-monitor for symptoms for 14 days after arrival

and adhere to national protocols. Only contacts of confirmed cases should quarantine.

Recommendation: Performance values of tests should be as high as possible, ideally in excess of 99%, with 95% as a minimum cut-off. States should deploy the most rapid test available and deploy new and improved technologies as they come on-stream.

Recommendation: Quarantine is a major disincentive for travel and is incompatible with the objective of international travel. Home isolation without effective enforcement is ineffective at preventing community transmission from imported cases. WHO recommends that asymptomatic travelers should be required to self-monitor for symptoms rather than undergo quarantine.

Illustrative Example of Pre-Departure Testing

To demonstrate how these elements can be combined into an assessment of the scale of importation risk, consider the following example of traffic between the United Kingdom and Canada.

Establishing the Baseline Level of Risk

- In November 2020, the incidence of COVID-19 was four times higher in the UK compared to Canada (469 cases per 100,000 of population over 14 days in the UK compared to 113 cases in Canada).
- Assuming that 40% of cases are asymptomatic (per US CDC recommendations), the true level of incidence in the UK would be estimated at 657 cases per 100,000 population.
- Taking 2019 as a reference point for pre-pandemic traffic levels, 1.4 million passengers travelled between the UK and Canada, equivalent to 3,800 passengers per day. As it is not expected that traffic levels will recover to 2019 levels until 2024 at the earliest, assume 50% of 2019 levels for modelling purposes.
- Accordingly, the baseline level of risk translates to an expected level of importation of COVID from the UK into Canada would be 15 passengers per day in the absence of any mitigation measures.



Applying a Pre-Departure Test as a Risk Mitigation Measures

- Assume a test with sensitivity of 95% and specificity of 95% in line with the CAPSCA Manual.
- Assume further that 20% of infected passengers are incubating the virus and therefore not detectable at the time of testing.
- Based on these assumptions, we would expect the following outcomes:
 - 12 true positive tests;
 - 1 false negative test;
 - 2 incubating passengers who would not be detected by the test;
 - 94 false positive tests for which a secondary or confirmatory protocol would be required;
 - 1,900 healthy passengers who would test negative and be able to travel freely.

Calculating the residual risk

- Following on from the calculations above, the residual risk from reopening UK-Canada travel with pre-departure testing would be three imported cases per day.
- The residual incidence of inbound passengers from the UK would equate to 97% of the incidence in Canada, such that an arriving passenger would be no more likely to be infected with SARS-COV2 than a member of the local community, despite a starting incidence differential of 4:1.
- In addition, by virtue of screening all travelers, pre-departure testing would be expected to detect an average of three asymptomatic cases which would not be picked-up if testing is restricted to symptomatic cases only, thereby offsetting some of the cases of infection that may be missed by testing.

Chapter 2: Implementing COVID testing

Introduction

COVID testing provides a solution which can enable governments to reopen borders safely in a way which minimizes the risk of international spread of COVID-19.

A number of different implementation models for COVID testing have been trialed around the world. Although experience with the deployment of testing capacities in the air transport environment is still limited, several valuable conclusions can already be drawn. This section provides several considerations and best practices that should be applied to ensure that where testing is applied safely and in a way which minimizes disruption to passengers.

Performance criteria for COVID testing as part of the air travel journey

To be suitable for use as part of the travel process, tests should meet the following criteria:

- **Accuracy:** very high levels of reliability, both in terms of sensitivity (minimal number of false negatives) and specificity (minimal number of false positives). Test accuracy should be certified by reputable national or international authorities. Whilst a high sensitivity is required to ensure the effectiveness of the process, an operationally viable testing process needs to rely on a high specificity level to avoid passengers (and potentially their travel companions) having to cancel their trip due to an incorrect diagnostic. In order to maximize the efficiency of testing, performance values for peak sensitivity and specificity should be as high as possible – ideally in excess of 99%, but with a minimum of 95%.
- **Speed:** In order to avoid unnecessary disruption to the travel process, rapid tests should be favored when they are deployed in the airport environment. The sampling should be done rapidly, and the results should be processed within minutes. Testing technology continues to evolve rapidly, and authorities should be open to the possibility of adopting faster technologies if these become available.
- **Scalability and availability:** The implemented solution should have a capacity able to meet the initial demand and be scalable over time (simultaneous processing of several hundreds

of tests per hour) in order to avoid delays and passenger inconvenience.

- **Ease of use and acceptance:** The testing process should be designed to be as straightforward as possible to implement in order to minimize the impact on passenger experience and to ensure the consistency and effectiveness of the process. This must include clear communication to passengers on what they should be expected to do. As testing techniques continue to evolve, non-invasive solutions like use of saliva should be favored to increase passenger acceptance.
- **Affordability:** The cost of testing should not constitute a barrier to travel and should be kept as low as possible both in terms of hardware and operational resources required to conduct the tests. Where testing is a mandatory requirement, the WHO's International Health Regulations (IHRs) state that neither passengers nor carriers should bear the cost of testing.

Recommendation: COVID-19 testing should be fast, accurate, scalable and affordable using technology that can be easily operated without creating an additional burden on healthcare systems.

When to test: pre-departure or post-arrival?

COVID-19 testing before departure is the preferred option as it will create a "clean" environment throughout the travel process. This also increases passenger confidence by reducing the risk of



passengers (and possibly their traveling companions) being stranded at their destination.

Although testing on arrival is not recommended, this section does outline some practical considerations should governments decide to deploy testing on arrival, preferably on a selected / random basis.

Recommendation: Pre-departure testing is preferable to testing on arrival as it ensures that the air travel environment is 'COVID-clean' and contributes to increased passenger confidence.

Where to test: Location of the testing facility

A number of deployment models have been trialed/rolled out in many jurisdictions to cope with a testing demand and could be summarized as follow.

At the airport

All the required capacity is deployed at the departure or arrival airport depending on the local requirements.

Benefits	Challenges
Testing is incorporated into the existing airport experience.	Impact on airport capacity and footprint
Communication and standardization of test results as well as trust may be less problematic as the airport is a controlled environment.	Scalability
Does not create additional requirements for passenger prior to the day of travel and/or arrival at the airport	Testing methodology must be as fast as possible to: limit the operational impact provide a level of confidence in passenger's mind that they will be in possession of their test result prior to travel

Off airport

Off airport models can be summarized as models where passengers use testing services that are not integrated in the airport environment.

When testing is required:

- Prior to departure: passengers will arrive at the airport compliant with their test requirements.
- On arrival: passengers may leave the airport untested and will have to take their test in designated facilities within a specific timeframe and quarantine whilst waiting for the results (if applicable)

Benefits	Challenges
No impact on airport footprint	Some passengers may arrive at the airport without having taken a test
Easily scalable	Increased importance of challenges associated with standardization and communication of test results

Airlines, airports and other stakeholders can develop partnerships with testing providers that are widely available to facilitate access to the passengers	Air transport stakeholders are not in control of the deployed capacity
Lay-out and operational efficiency of the test facility do not impact on airport operation	Off-airport testing not well suited to testing upon arrival as it would require directing passengers to specific testing facilities
	Test results may not always be obtained within the timeline imposed by the state of destination.

Mixed model

In addition to the two models described above, is the one where passengers have the option to take their test at facilities located at and off-the airport.

Benefits	Challenges
Tests conducted off-airport can help to lower the operational impact of testing implementation	Combination of the challenges identified in both models above
Provides flexibility to industry stakeholders to design the best process for given location and operational requirements	Capacity planning requires an understanding of the ratio of passengers that will test on and off airport
Provide flexibility and alternatives to the traveling public	

Selection of a deployment model

The decision whether to conduct testing at the airport terminal itself or off-airport (or in the vicinity) depends on a number of considerations;

- Demand for testing:** The volume of passengers affected by testing requirements will vary from one airport to another depending of the routes that are operated and associated specific requirements of departure and arrival countries. To ensure successful deployment of testing capacity, airlines, airports and other stakeholders should communicate regularly about their expectations for route destinations and passenger volumes so that changes in the required volume of testing demand can be planned well in advance.
- Footprint requirement and availability:** Depending on the volume of traffic (and therefore testing required), the footprint needed will vary considerably. Footprint requirement is a function of the following variables:
 - Demand for testing;
 - Speed of processing at the testing facility;
 - The ratio of passengers that have already a test result when they arrive at the airport (in case of a model where tests are implemented prior to departure).
- Scalability:** When it is foreseen that the testing demand will increase significantly through time, it is important to understand how a testing facility could be scaled up. A convenient location for a small demand might not be suitable for an increased volume. Selecting an



area that could scaled up to cope with an increased demand is important.

the pre-existing processes (e.g.: downstream capacities, transaction times).

- **Customer convenience:** Local stakeholders may want to offer options to their customers and not force them into a single process (e.g. airlines partnering with testing service providers delivering specific passenger experience).
- **Impact on operation:** Implementing testing in the airport environment influences a number of

Recommendation: Prior to deciding on a specific implementation model, local stakeholders should run planning scenarios based on available footprint, scalability, customer convenience and operational impact. Once a model is selected it is important to review the assumptions regularly with stakeholders to ensure that the demand can always be met.

Airport testing: Process Breakdown

From a process perspective, the common elements to passenger testing are as follow:



- **Registration:** the point where the passenger must demonstrate their eligibility to enter the testing facility and communicate the information required to proceed with the testing process. Note that the registration process could be initiated earlier in the travel journey through an online process.
- **Sampling:** the action to collect a sample from the passenger (e.g. nasopharyngeal swab, saliva sample collection etc.).
- **Analysis:** the time required to process a sample and get a result. This can vary significantly from one type of test to another.
- **Results:** The process through which a passenger and authorized parties are informed about a test result.

Communication of requirements prior to travel

It is likely that, whether tests are performed at or off airports, there will be queues, and passenger processing times will be longer than pre-COVID. IATA recognizes that the passenger experience during COVID is, and will continue to be, different to what it was before the pandemic. In this context, clear and timely communication to passengers is essential.

Recommendation: Health authorities should provide information about testing requirements including any exemptions, notably for children. Airlines and airports should also actively

communicate relevant information to passengers such as recommended time to arrive at the airport, test sites locations, documents to bring, designated waiting areas etc.

Registration

Passenger registration and access control is one of the steps in the testing process that has the most impact on the operation. Depending on local requirements, this step could include a lengthy data collection process such as contact tracing information, medical questionnaire, etc.

In a deployment model where passengers are tested at airports, the registration process could become the bottleneck. Designing an effective



registration process is a key element of a successful deployment. For example, to minimize process time at registration, passengers should be invited to pre-register and fill their data before going to the testing facility.

Recommendation: Airline and airports should communicate the process for registering for testing to passengers and provide the link to any web portal or mobile application where available. When booking an appointment, passengers should receive all the appropriate instructions about the process including the expected waiting time before obtaining the results.

Sampling

Where testing is deployed in the airport environment, the fastest, most accurate testing technology should be used in order to facilitate the integration of testing requirements in the passenger journey.

Efficient queue management will be essential to maximize the utilization of the testing facility, instill confidence in customers waiting for their results and minimize the impact on airport and airline operations. Experience has demonstrated positive results of ground located wayfinding elements and proper visual signage.

Analysis / processing of samples

As samples are being analyzed a number of factors need to be considered to optimize the efficiency of the process selected:

1. Laboratory environment

Where a laboratory is required to process the samples:

- the lab capacity should match the sampling process capacity
- the lab should be located at a convenient distance from the sampling protocol area

2. Rapid testing

When rapid testing is deployed, scalability and efficiency of the overall testing process requires carefully balancing the sampling capacity with the result processing capacity. As an example, disposable rapid testing kits usually require some manual interventions after the sampling process and may require more workload than the testing itself. Precise assessment of testing performance

will support an optimum allocation of staffing resources and minimal queue formation.

3. Segregation of passengers during result processing

When the testing process doesn't require passengers to be physically present in the testing facility to receive their result, they should not be required to stay isolated from other passengers provided that they observe the health protection requirements in place locally, such as mask wearing and social distancing. Depending on the capacities available, test results processing time and other operational and regulatory factors, passengers may be allowed to leave the testing facility while waiting for the test results.

Where test results may be provided within 30-45 min, passengers should be allowed to process through the boarding gate provided they obtain their results prior to embarkation. Waiting for the results away from the testing facility lowers the impact on operations as the footprint required to deploy the facility doesn't need to include a specific waiting area for the tested passengers.

Recommendation: Wherever practical, passengers should be allowed to leave the testing facility as soon as the sampling is completed in order to minimize congestion and facilitate social distancing.

Results

A number of countries already allow passengers to upload their test results on a dedicated COVID-19 government portal. After verification, the government issues a token which confirms the passenger's status. The verification / authentication of the test results should be performed in such a way to minimize delays and disruption on departure and arrival. Given the importance of testing as a key component for the safe re-opening of borders, it is important that states recognize the validity of tests performed outside of their jurisdiction along with the associated results. These issues are discussed further in chapter 3 of this document.



Handling of positive test results at the airport

Health authorities will have to work with airports and airlines to design protocols to deal with passengers tested positive. For example, in the case of a positive response to an antigen test, passengers could be subjected to a subsequent molecular test at the same site and have to remain in isolation until the outcome of the second test is validated. That should not create inconvenience for the staff and the other passengers.

Passengers and their traveling companions who may not be able to fly when tested positive, could be offered flexibility by airlines to re-accommodate their travel plans in these exceptional circumstances.

Transfer Passengers

Passengers holding a negative test certificate on departure compliant as required by the country of destination should not be subjected to another test during transfer.

'Emergency' testing on arrival

Despite the many benefits of pre-departure testing compared to testing on arrival, initial experience shows that it is highly recommended for countries to consider providing some testing capacity on arrival to handle exceptional issues generated by factors beyond passengers' and/or airlines' control, such as delays or other operational disruption and avoid potential complications associated with such scenarios.

Whilst such emergency testing capacity should ideally be deployed along the arrival process at the airport (e.g. prior to entry border controls), other deployments models could be considered especially if the testing requirements rely on PCR tests and associated long processing times (e.g.: off-airport clinics, testing capacity at airport hotels).

Performance measurement and continuous improvement plan

Airlines, airports and other stakeholders should agree on a number of performance metrics to assist in the swift identification of process bottlenecks and support subsequent improvement planning.

At a minimum, the following performance metrics should be monitored on a regular basis:

1. Staff Efficiency
2. Surface Efficiency
3. Sustainable throughput of testing facility
4. Passenger Transaction Time:
 - Queuing times
 - Testing transaction times

These performance metrics should provide both industry stakeholders and regulatory authorities with a sufficient overview of the performance of the testing operation.



Chapter 3: Managing Test Results and Certificates

Introduction

Where a negative test is required as a condition of travel, the government of the arrival country needs to know that travelers hold a recent negative test result prior to departure. Airlines also require this information before allowing the passenger to travel. Trust in the validity of test results and certificates is critical to the recognition of health credentials. However, analogous to the current travel authorization processes in many countries, airlines should be neither responsible nor liable for ensuring the validity of the document.

As countries implement COVID testing there is a need to standardize the way that test results are communicated from the traveler to a government. Aviation is a sector with a high level of standardization, which is a critical facilitator of smooth cross-border operations and interlining. A consistent global approach also encourages safety and security as well as offering increased predictability for passengers.

Challenges

There are four main practical issues that are faced by travelers and industry stakeholders:

1. Understanding the health requirements for a given journey;
2. When testing is required on departure, sharing of test results between laboratories, passengers and appropriate regulatory authorities in a trusted, secured and confidential manner;
3. Understanding which laboratories are certified to perform the test and where such facilities are located;
4. Enabling passengers to securely store and share their test results.

Verification process

When governments require incoming passengers to perform a test prior to departure, there is a need for a verification mechanism to guarantee that the test has been performed according to predefined entry requirements and that it remains valid until the passenger arrives at destination. Where possible, this should be performed using a web portal or mobile application approved by the government. Passengers should be issued with a confirmation that they can show to their airline before embarkation.

Recommendation: Based on currently available options, the ideal scenario is one in which governments enable passengers to upload their test results onto a dedicated traveler portal, with interactions performed directly between passengers and health authorities.

Countries that have not reached such a level of integration may mandate airlines to verify passengers' test certificates upon departure. Today this requires a manual process which is either done at time of check-in for departing passenger or boarding for transfer passengers. These are two critical and time-sensitive moments in the passenger process and any further checks would result in additional queueing time and constraint for the airlines and airports to safely accommodate these.

Operation challenges posed by a manual verification of the test results

In the absence of standardization and automation, the verification of test results poses a number of operational challenges to carriers. This is primarily due to the nature of requirements and airlines' operations which include:

- Time constraints;
- Time differences;
- Multiple jurisdictions;
- Multiple countries;



- Multiple passenger nationalities and points of embarkation.

The main obstacle resides in correlating the information as published by states as their entry requirement rules and the information contained on a test certificate. To illustrate this a country may require passengers to provide a negative PCR test while a test certificate may indicate that the person has taken a LAMP test. Airline agents do not have the medical training necessary to validate that the information on the test result satisfy the entry requirements.

To address these challenges, it is critical to promote standardization of the specifications for test results and entry requirements. In particular:

- Standardization of the data elements specific to the test results;
- Format in which the information is displayed;
- Terminology used for entry requirements;
- An open standard for processing the information;
- The specification to secure the information and its transmission.

Recommendation: ICAO should design the specifications for a test result certificate which could be a component of a health passport and later on be used as reference to design the specifications for a vaccine certificate.

Standardized set of data requirements

Where test results are required, the following minimum set of data requirements is proposed. These elements are in addition to those already prescribed by public authorities for the purpose of providing test results.

Data element	Specification
Test taken Date	DD/MM/YYYY
Test taken Time	HH:MM
Results issued Date	DD/MM/YYYY
Results issued Time	HH:MM
Passenger's first name	(as labelled in the travel document)
Passenger's last name	(as labelled in the travel document)
Date of Birth	DD/MM/YYYY
Type of technique	Molecular – Antigen - Antibody
Method used	Nasopharyngeal swab – Saliva - Throat
Type of test	Free field
Test results	Positive or Negative
Lab Name	Free field
Lab country	Country
Lab website	URL address

Standardization of the format to present the data

Recommendation: This information should be presented in a structured, consistent and orderly manner. This is not only needed to facilitate the visual inspection of the document but also to support the automated capture, transmission and processing of the information.

As test results may be delivered in a variety of languages, it is also recommended to have these tests provided in English and possibly complemented by another language.



Terminology used for entry requirements

Recommendation: States are encouraged to align the terminology used to specify their entry requirements. This work could be supported by the ICAO facilitation panel whose objectives are to support states in implementing measures to facilitate and expedite the entry of air passenger on their territory.

Data processing based on open standards

International air transport is a complex business which by its nature involves two or more countries and may involve one or more airlines. It is therefore critical for all partners to base their solutions on commonly agreed standards. It is the only avenue to support the degree of interoperability required to conduct air transport operations in a least obstructive manner.

Recommendation: To promote cost-efficiency, solutions to transmit the information must be based on open standards accessible to all providers.

Information security and data privacy

In many jurisdictions, medical information is rightly treated as highly sensitive, personal information. Stakeholders involved in the collection, transmission and processing of the information should be mindful of these considerations.

Recommendation: A solution should adopt a passenger-centric approach where the passenger is always in control of their personal data, by providing explicit consent to its controllers, while being clearly informed about all the purposes for which the data is being processed.

Trust framework

Recommendation: As test results are linked to a passenger's digital identity, the creation, issuance, authentication and management of credentials should rely on Verifiable Credentials and Decentralized Identifiers standards published by the World Wide Web Consortium (W3C).

The associated governance framework and interoperability guidance will be formulated by international organizations such as ICAO, WHO and IATA on the basis of a global multi-industry effort of the Trust Over IP foundation (part of the Linux Foundation). Implementation of these standards will lead towards an open and transparent decentralized but not fragmented environment.

Ecosystem services, such the ones consolidating travel requirements and publishing the lists of authorized labs can be also used to support the evolving system by indicating which authorities can authenticate which test results.