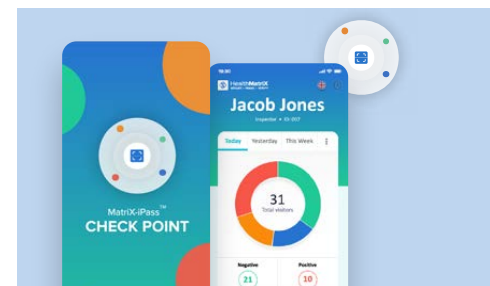
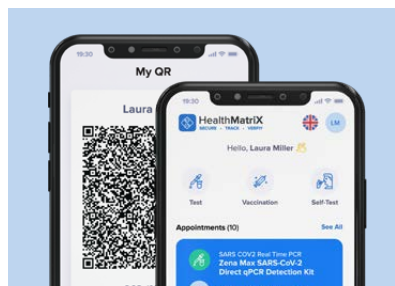




**HealthMatrix**  
SECURE • TRACK • VERIFY

**MatriX-iPass™**

**A Pandemic management solution that can be used to manage any infectious disease**



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# Executive Summary

MatriX-iPass™ is a feature-rich communicable disease test and vaccination management solution that can be used as a national/corporate disease monitoring and outbreak management system. It consists of three apps that monitor the booking of tests, remote testing, certification; they also control access and detect counterfeit negative certificates.

Everything is kept together by a Health Mirror™ module that allows authorised users to monitor the state of the outbreak in real time and make decisions that are fit for purpose given the latest trends. MatriX-iPass™ does not just manage a pandemic or an epidemic of COVID-19; it can also be used for many other contagious diseases such as malaria, yellow fever, dengue, etc.

The system consists of three modules:

- (1). The Patriot App, to book (and eventually pay) for tests or vaccination and download health certificates that validate the outcome. This App includes Ai-Med-Cert-C, an AI-based remote testing module that arranges AI supervised home molecular tests and organises reliable QR-based results certification.
- (2). The Checkpoint App, where authorised users can check that only people with a valid negative test can access premises. It can also prevent the use of counterfeit certificates since all the certificates issued in the Patriot App can be verified in the MatriX-iPass™ database.
- (3). The Health Mirror™, a feature-rich infectious disease test and vaccination management solution that can be used as a national/corporate disease monitoring and outbreak management system. The Module has a dashboard that allows authorised users to monitor the state of the epidemic in their organisation.

MatriX-iPass™ simplifies supervised home testing™ and COVID certification issuance. It also reduces the virus spread because people who test positive at home do not travel to a testing site. The AI supervision gives reliability to the certification, and the “early warning” gives organisations more time to manage the absence of a member of staff who tests positive.

# Introduction

Variants have been a feature of the evolution of COVID-19. Each new variant has been more contagious than the previous one. Massive testing, test certification, vaccination have become the primary tools used by governments to contain the spreading of each variant as much as possible. However, being fully vaccinated does not exempt people from spreading COVID even when they show no symptoms. Testing has become the only way to establish “safe environments” for people to gather, whatever the number of people gathering, whatever the reason to gather.

For instance, people were invited to work from home, but not everybody can work from home. Many businesses and government agencies decided to test staff as they came to work in the morning. On-site testing is not only impractical but can lead to transmission of the illness because staff waits in line to be tested and may be near somebody who is completely asymptomatic, and therefore have no idea that they might test positive for COVID. Anybody who tests positive before they enter the organisation premises would have travelled there and may have unintentionally passed it onto others. Moreover, organisations need to set up testing facilities that hopefully will only be required for a relatively short time.

Governments have the problem of scaling testing facilities. Testing facilities must be expanded quickly to cope with a new wave of contagion, only to be reduced again when the level of infections goes down.

Testing is an integral part of managing any epidemic, but it is not the only measure. MatriX-iPass™ is a platform that consists of two apps and a disease monitoring and outbreak management platform, featuring a dashboard that permits to analyse and report data. An organisation can monitor how the epidemic spreads among its staff and stakeholders and decide to increase or relax containment measures.

MatriX-iPass™ Patriot app allows registered users to book vaccination, testing at testing sites, and remote testing. The registration process is very straightforward; once registered, users can also add family members, and pay for tests online. The information gathered (complying with privacy rules such as GDPR in Europe, and HIPAA in the United States of America) allows an organisation to monitor the outbreak of the disease. Reliable, safe and secure remote testing alone can reduce



contagion; not only those who test positive can stay home and not spread the disease, but the app provides a verifiable certification that can be used to allow users who test negative freedom of movement within the organisation. MatriX-iPass™ can be deployed at country level by a government or at corporate level by an organisation that wants to manage the outbreak amongst their staff. Being identified as positive before a member of staff leaves home for work also gives more time to an organisation to manage the absence of that particular member of staff.

## Remote testing is convenient and makes business sense

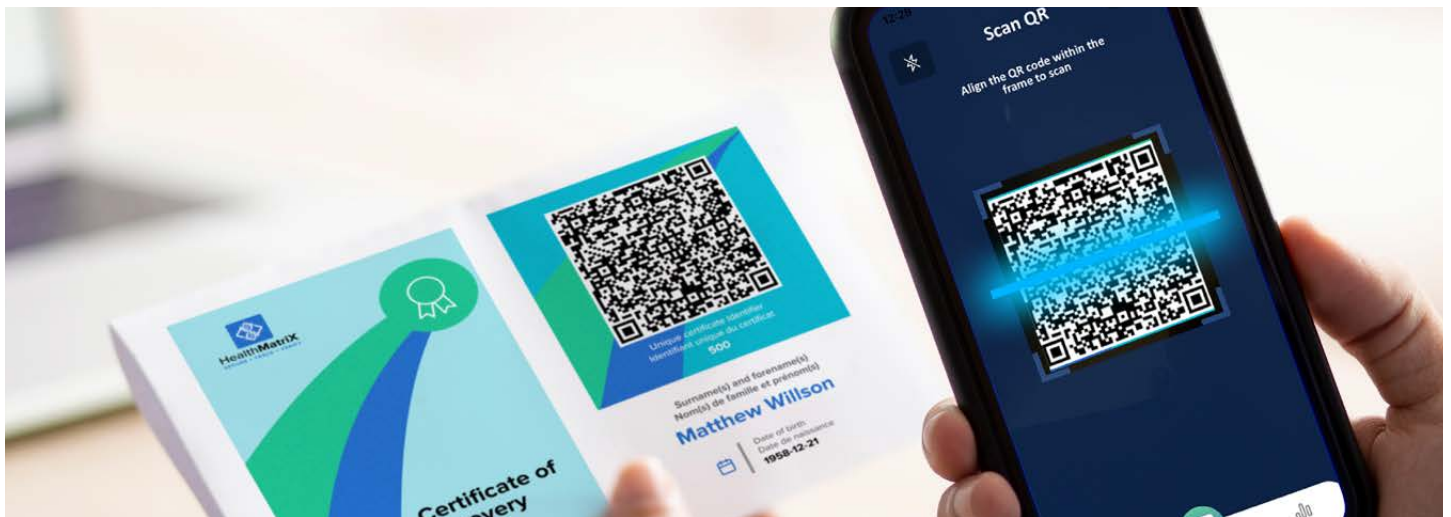


The increased requirement to test is not permanent. Testing facilities have been opened when the number of cases rose rapidly and closed once the number of cases had gone down. Reliable and verifiable remote tests free governments and organisations of any kind from creating or expanding on-site testing facilities and still make sure that their staff only comes to work if they tested negative. The community gains if people travel to work only if they are negative. There are several advantages to the organisation. They have more time to manage the absence of the person that tested positive. If there is a high confidence level that only people who tested negative can access corporate premises, there can be relative freedom of movement inside the company. It is particularly useful for roles that cannot work from home or where social distancing can be a potential issue, like in manufacturing). Last but not least, they save on the cost of maintaining testing facilities on company's

premises large enough to test all the workers as they come into work.

Reliable and supervised remote testing that can provide a trusted certificate complete with QR code that can also meet specific entry requirements for international travel. Testing facilities for travellers, either before or after their journey, present the same issues as testing facilities for governments or corporates; demand varies depending on the number of cases, variants, etc. It is almost impossible to change the infrastructure at the same speed demand changes. Invariably, whatever the reasons to run a test centre, there will be periods when the availability of testing slots is too low to meet demand and periods where demand is too low to make full use of the testing infrastructure.

## Counterfeit test certificates



Remote testing comes with a risk of fraud. Somebody else may take the test instead of the person who is supposed to take the test. False certificates can be bought on the internet. Some of those who bought them tested positive; others never took a test, to begin with. Before the Omicron variant appeared, the bulk of counterfeit test certificates was used to circumvent travel restrictions. In April 2021, an article stated that at least 100 people every day used false COVID certification to enter the United Kingdom.<sup>1</sup> Towards the end of 2021, many European governments introduced restrictions to people who could not show vaccine certification, the so-called Green Pass, or evidence of a negative test. That has expanded the market beyond the need to circumvent travel restrictions. An article quoting Europol stated that

<sup>1</sup> <https://news.sky.com/story/covid-19-at-least-100-fake-coronavirus-test-certificates-are-used-by-uk-arrivals-every-day-it-is-revealed-12282433>



fraudulent test certificates could be bought for about £100.00 in November 2021.<sup>2</sup> In India, state governments shut down laboratories that were selling fake certificates.<sup>3,4</sup> Unfortunately, fake certificates have been sold since travel restrictions were imposed in 2020.<sup>5</sup>

MatriX-iPass™ certification can be easily checked through the cloud-based database. Access control authorities can check the authenticity of certificates with a simple QR-code scan.

<sup>2</sup> <https://www.europol.europa.eu/media-press/newsroom/news/europol-warning-illicit-sale-of-false-negative-covid-19-test-certificates>

<sup>3</sup> <https://qz.com/india/1993757/indians-are-using-fake-covid-19-results-to-travel-skip-exams/>

<sup>4</sup> <https://www.dw.com/en/covid-how-is-india-tackling-a-surge-in-fake-test-reports/a-59214657>

<sup>5</sup> <https://www.travelandleisure.com/travel-news/travelers-using-counterfeit-covid-test-results>

# Matrix-iPass™

There are several components to Matrix-iPass™, as shown in the diagram below.

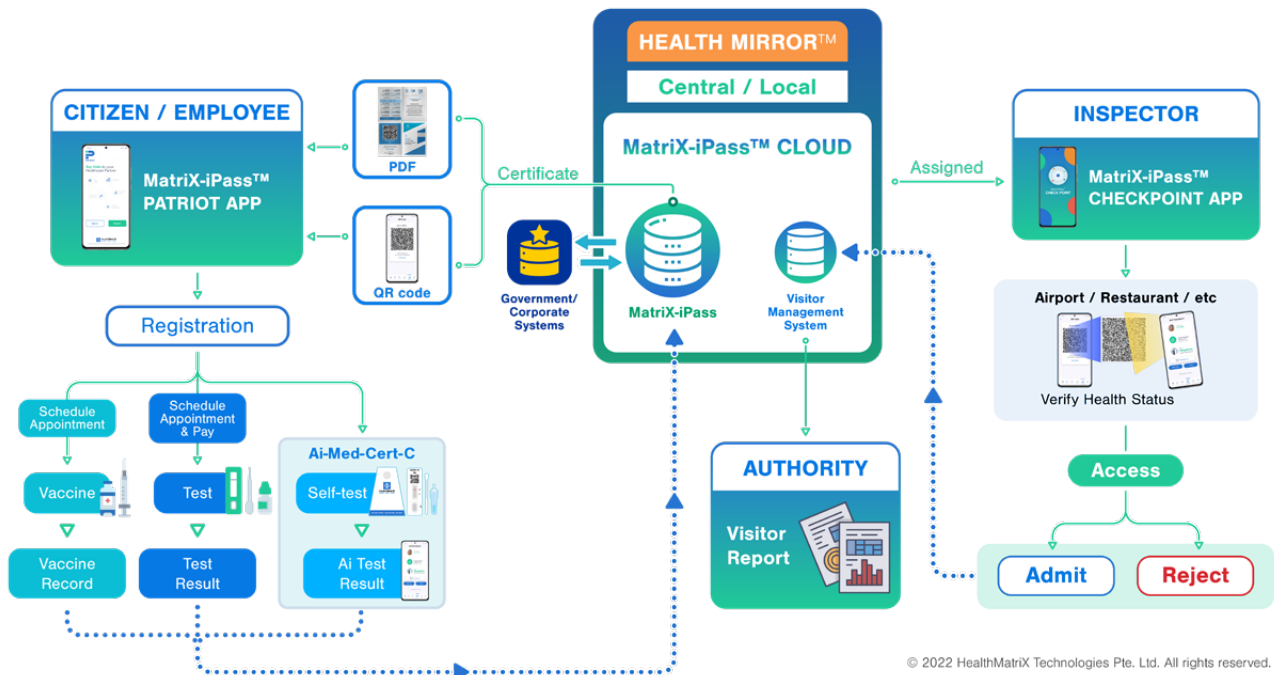
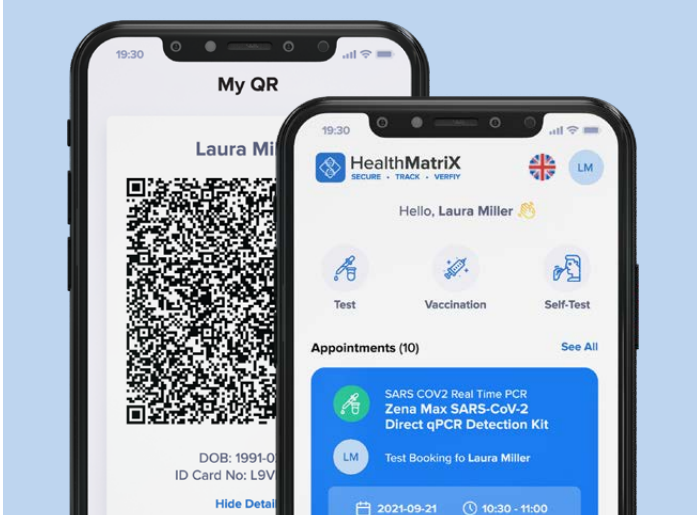


Figure 1 - Matrix-iPass™ structure

HealthMatrix has created a system that provides a COVID-19 outbreak management solution.

It can support any organisation, whether government or business, in monitoring the outbreak's evolution in their ecosystem. Matrix-iPass™ is a platform to manage communicable disease test and vaccination data for government agencies, healthcare providers, and corporations. It can be adapted to monitor any type of infectious disease, not just COVID-19.

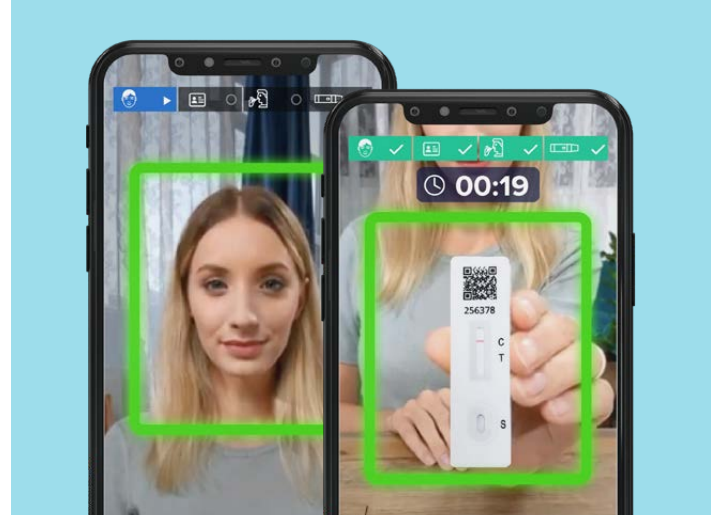
## The Patriot App



The Patriot App is a smartphone app (Android and iOS) which is used by citizens or employees to keep a record of the test results and vaccination status. The Patriot app can also be used to book appointments for the app user or its family members at test and vaccination centres. If required the app can also collect payments for test centres from the app user or health insurance companies. Registered users will access the app book (and pay) for the service they want to use. The results and the records of the event they have booked are sent to a cloud-based dashboard (see relevant sub-section below).

MatriX-iPass™ can be run at the Government level or any other type of organisation. If it is a corporate version, registration could be restricted to members of that organisation and their visitors (or clients). Certification can use personalised forms that will include a QR, name of the person taking the test (or the vaccine), date of birth, type of test, and result. Registered Users will also have access to a dashboard that allows them to manage their Patriot App users' data.

## Ai-Med-Cert-C



Ai-Med-Cert-C stands for "Artificial intelligence-backed medical certification-COVID-19." It is an Artificial intelligence-backed home self-test monitoring and online result certification process. It is the component that is primarily visible to the general public. Users can take tests through their smartphone, in the comfort and safety of their homes, and receive accurate results and reliable certification in minutes. Several rules can be integrated into Ai-Med-Cert-C to cope with different government regulations, including allowing only specific batches of test kits for remote testing.

In 2021, a health professional supervising through a video link was the most common reliable remote testing solution that provided a certifiable result. This system protects the community from unethical tests or fraudulent certification, but it can be labour intensive. It is easy to see a scenario where a person that needs to show evidence of a negative test to go to work may find that they cannot book a supervised test at the time they wish. HealthMatrix has the solution, AI-powered video-monitored testing.

The AI engine checks every step and controls that the person self-administering the test stays in the camera view all the time and checks every step of the process. There is no actual health worker on the other side of the connection. Therefore, there is no risk of lack of available slots at the time when a person needs (or wants)



to be tested.

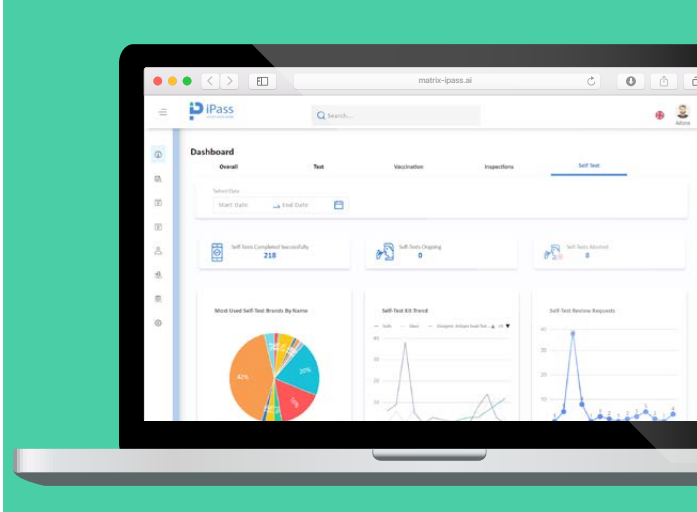
Registered users of the app would have to get their home kit for a rapid test ready, have identification readily available, and position their phone in a way that allows the camera to record the process.

Once a user has logged in and is welcomed by the app, the app takes a snapshot, followed by a photo of the user's id to verify the previous image. The pre-test checks are completed by a shot of the unused test kit QR code.

A lot of different rules can be introduced at this point. For instance, in the UK, one cannot use kits provided (free) by the National Health Service to certify COVID status for international travel. The system can check the code associated with the kit to ensure that the person self-administering the test does not use a kit that is not "authorised." If the system is white labelled to a testing provider, the rule can be further restricted to ensure that the code matches the one provided to the registered user. This feature can also ensure that only genuine kits are used and prevent fraudulent negative certifications.

The app now guides users through the whole process of testing. The user needs to stay in the camera view all the time when the test kit processes the rapid test. In the end, the user needs to take a photo of the QR code of the kit showing the test result to the camera. The engine compares the QR codes of the unused test kit photographed at the beginning with the QR code of the kit that shows the result. It then confirms the result and prepares a QR code, or another form of certification, with the user's details (name and date of birth), date and time of the test, and the test result.

## The Health Mirror™



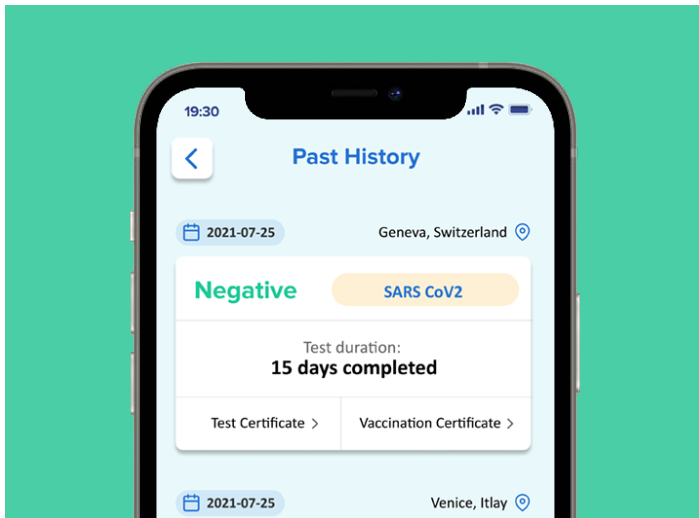
This cloud-based module collects all the information gathered by the Patriot App and the Inspector App. Authorised users will be able to access information on the state of the epidemic in their organisation, including the number of appointments for vaccines and tests, the number of remote tests, the results of remote and on-site tests, and more. It also collects the number of access rejected by the Inspector App and the number of counterfeit certificates found. It is a feature-rich communicable disease test and vaccination management solution used as a national/corporate disease monitoring and outbreak management system.

It allows organisations to monitor the spreading of the disease and the uptake of the vaccine. There is information that helps the periodic revision of containment policies. Corporations running their version of MatriX-iPass™ can adjust their containment framework to keep staff and visitors safe. It will also be possible to monitor staff absence (or expectation of staff absence) due to positive tests. In this way, an organisation can effectively manage the requirement to make any changes to minimise the chances of the disease spreading or whether it is time to roll back some of those changes.

The cloud-based dashboard associated with this module tracks the visitor and regularly produces reports that show how often the dashboard has been accessed, who accessed it and what they have looked at.

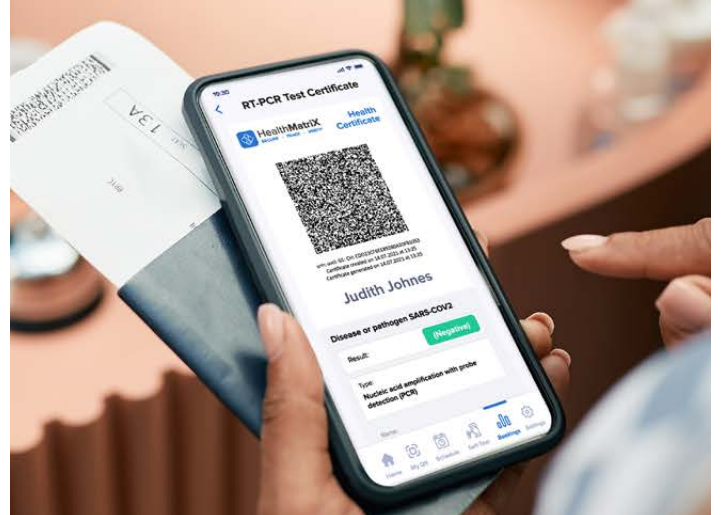
Data is managed according to strict cyber security and data privacy protocols, policies, and controls. HealthMatrix operates in compliance with ISO 27001, ISO 27701, and HIPAA.

## Checkpoint App



Last but by no means least, the App that checks the QR codes generated by Ai-Med-Cert-C, and any other certificate issued by MatriX-iPass™. Those who have the authority to control access, granting or denying access depending on the results of the tests, vaccination status, or a combination of both, will use the app to allow or block access to premises.

## Health Certificates



Many people are trying to forge health certificates to circumvent restrictions imposed by governments to control the spread of COVID-19, or any other contagious disease. Detecting counterfeit certificates can be a problem with manual verification. All the health certificates issued by MatriX-iPass™ come with a QR code that can be verified instantly using the inspector app or a normal camera to scan it. The scanned certificate will be checked against the MatriX-iPass™ database to receive confirmation that the certificate is genuine or forged.

# Case Studies

## Case Study 1: Hospital and health workers



Vaccinated individuals could still catch and spread the virus, even if they are asymptomatic themselves. Many countries require health workers to take a test before starting their shift. A hospital needs to have space to test health workers, which must be separate from testing facilities for patients or outpatients. Hospitals could use that space, and testing staff could be better employed elsewhere. Positive health workers can simply send an email of their QR code to explain their absence; they do not need to travel to work. It is not necessary for a health worker to check the QR code of the staff coming into work; access can also be facilitated using automatic scanners programmed to compare the QR code of the test with the details of the person coming into work.

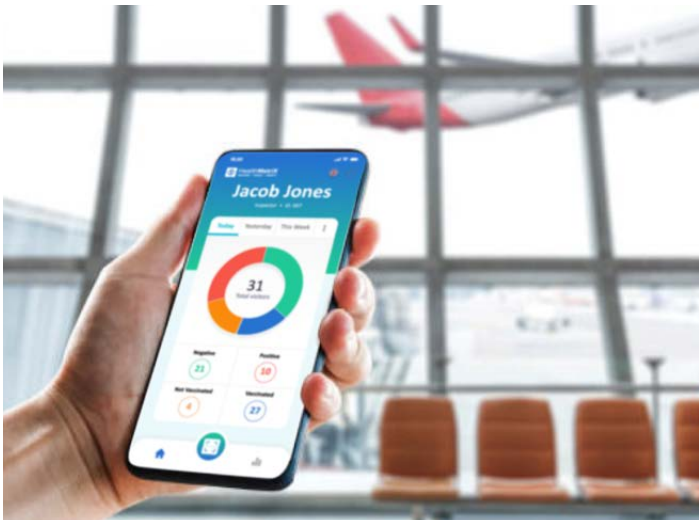
It is a cheaper system to run, secure, and does not create bottlenecks at the beginning of each shift. Moreover, the system can also test patients before they attend hospital appointments. All the aspects of staff and patient testing can be kept separate. The system can assign a specific series of test kit codes to “staff testing” or “out-patient testing.” It can also manage on-site testing appointments. The hospital can use QR codes certifying the test results to allow patients access to the relevant hospital premise. Management can also use the dashboard to generate reports that would enable them to monitor the spread of COVID (or any other contagious disease) among staff or in-patients. They can also monitor how many



out-patients had to re-arrange their appointments because they tested positive.

Last but by no means least, using remote testing means that resources that would have been dedicated to operating the testing centre can be more productively deployed elsewhere in the hospital.

## Case Study 2: Airline workers



Flight and cabin crew spend time away from their base, especially if they fly long-haul. A crew member testing positive for COVID obviously cannot work. This situation may cause delays or even cancelled flights, especially when a crew needs to take control of an aircraft after a lay-over far away from their base. The earlier an airline knows that a flight is likely to be cancelled, the better it is. Passengers may have to be transferred to alternative flights whenever possible; urgent cargo may have to be rerouted. If the flight leaves from a home base, stand-by crew members will have to be called into service instead of cancelling the flight.

A remote test taken before the crew leaves their hotel or home may provide early reassurance that things go as planned or buy some time to take care of the passengers and cargo of a cancelled or delayed flight.

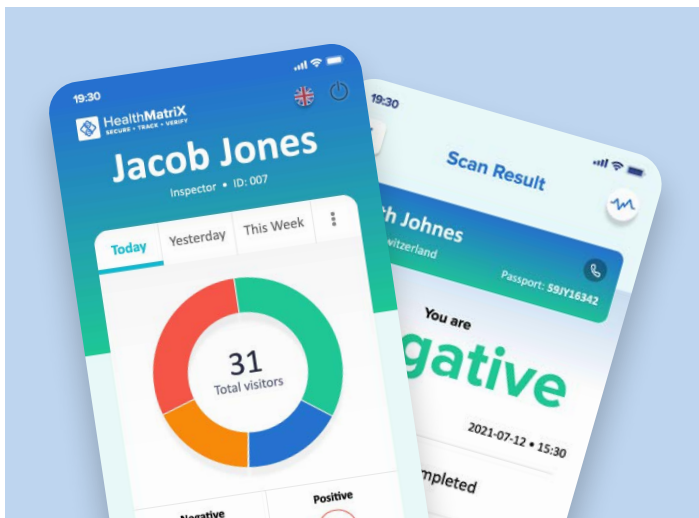
The test can also be used to validate the status of a ship crew and passengers to avoid or minimise the period of quarantine when they have reached their destination.



Safe and reliable remote testing is useful when operating from a remote airport. A scenario similar to the one described in the previous case study (hospital workers) applies to operations from the main base of an airline. It is a reliable and secure way to save setting up testing facilities which cost money, take up space, and may have to be adjusted from time to time to keep them fit for purpose. The saving in time, money, and aggravation does not impact safety or the accuracy to establish, verify, and guarantee that the working environment remains COVID-free and a flight does not become a super-spreader event.

The dashboard can also provide helpful management reports that, for instance, can support a decision to expand the number of crews on stand-by based on the average number of crew-members testing positive on a given day.

## Case Study 3: Host an event COVID-free

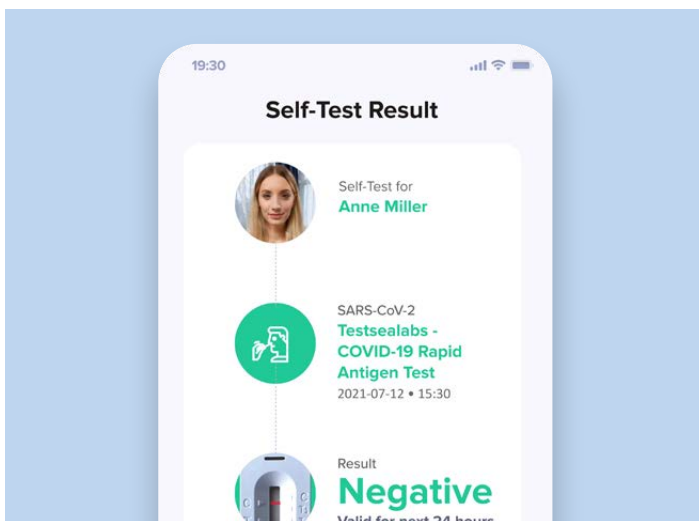


Many people are reluctant to attend gatherings for fear of catching COVID. Vaccinated people can transmit the virus when they are not sick themselves. Everybody asymptomatic but positive can pass the virus on regardless of the vaccination status. Whether it is a dinner for ten or a very large gathering in a public space, it becomes straightforward to make admittance subject to a negative result of a remote test run using Ai-Med-Cert-C. Guests or ticket holders can gain admittance only by showing a negative test result. Anybody with the right permission could check the QR code using the Checkpoint App.

Even the most risk-averse person might agree to take part, knowing that everybody else who attends the event has been certified as being free from COVID.



## Case Study 4: Make any physical location safe



MatriX-iPass™ can provide secure and reliable certification in a matter of minutes. It can be used before leaving home to go somewhere, be it a work environment, a government building, a shop, etc. Limiting access to people certified negative makes any physical location safe to attend, and nobody will risk catching the disease. It is valid for vaccinated and unvaccinated people alike. If they are certified negative, they can enter. The ease and speed of obtaining certification from a remote home test make it possible only to grant access to those with a valid negative certificate.

## Case Study 5: Monitoring outbreak in a school



In 2020 and 2021, schools were closed for extended periods. MatriX-iPass™ can help schools or entire education departments manage an outbreak and ensure that only children who tested negative access the school. Schools will also be able to adjust their containment measures quickly and keep them fit for purpose.

In many countries, minors cannot access the government COVID-19 app, which means that school children cannot get government-approved negative certificates. However, school children need to be tested frequently to control contagion since they could “take COVID-19 home with them”.

Parents can use the Patriot App to monitor their children’s tests and then certify the test results. One household head, Patriot App’s registered user, will log in to the Patriot app and select the kid’s name as a person to test. Most children do not have their ID cards, so the registered user ID could be used to verify the child’s identity. The test result will be visible by the registered user’s Patriot App and can be analysed using the Health-Mirror™ dashboard of the school or education department. The Patriot App will provide certification of the test results, and the Checkpoint App will make sure that only children who tested negative access the school.

# Avoid full country lockdown



The Case studies above can also explain how MatriX-iPass™ can help avoid lockdown in the entire country. A lockdown is needed to stop or decrease the opportunities for person-to-person transmission of the disease. Suppose only people with negative certification on that day can access shops, board trains, enter supermarkets or their office, use public transport, etc. In that case, the chances of transmission are lower because everybody that walks into a building, sings music, practises a sport, attends an event, etc., is supposed to be negative.

There is no need to have an entire country lockdown in this way. Mandating a test before leaving home can be verified by the Dashboard and the results monitored by the Checkpoint app. A remote test is easy to take (as described in the Ai-Med-Cert-C section). It can also provide anonymised, reliable information about the spread of the disease. The system can recognise if registered users tested positive for the first time (new case) or if they had previously tested positive within a specific timeframe, for instance, the previous week or the previous ten days (not a new case). This information can provide invaluable data on the evolution of the pandemic while keeping everything open and accessible only to those who tested negative.

The ease of home-testing and the reliability of the certification of its results will allow essential services, transport, shops, etc., to stay open no matter the level of the pandemic. The reliability of (anonymised) information collected by the Health Mirror™

allows governments, companies, and other organisations to respond quickly to variations in the risk level. Take appropriate measures when needed, but relax them when it is worthwhile doing so. MatriX-iPass™ is the tool to manage any type of epidemic in a single environment. It does not necessarily have to be COVID; it can support the efforts to contain contagious diseases like Yellow Fever, Malaria, Dengue, and more. It is a way to lead a life as normal as possible and safe in the full knowledge that any measures taken are genuinely fit for purpose.





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**MatriX-iPass™**



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