

Currently, the entire world is feeling the impact of the dangerous new coronavirus, COVID-19. Private and public organizations are developing new technologies and solutions as well as adapting existing ones, which will allow the collection of as much data as possible to help control the spread of the virus. These data are guiding the strategic decisions that will help fight the disease at an international level.



**In this article, we explore global technological readiness for the effective management of COVID-19, planned steps to ease the lockdown, new technology options, and ultimately, solutions for the post-pandemic era.**

## WHAT DO NEW TECHNOLOGY SOLUTIONS FOR COVID-19 CRISIS MANAGEMENT LOOK LIKE, AND HOW EXACTLY WILL THEY HELP MANAGE THE PANDEMIC?

Several health and government organizations are implementing biometric-based Quarantine Management Systems. These solutions have been provided to the authorities as mobile applications that can perform needed identity assurance for other applications that aggregate data on a population's health status at the national level. Governments are using these applications as a source of information to make decisions on tailored action planning and the provision of necessary aid to its citizens.

An example of a successful implementation of a COVID-19 management solution is a mobile app developed by Maharaja Associate and powered by TECH5 biometric technologies that include face recognition and liveness detection. The app has been deployed in cities like Ahmedabad and Rajkot in the Gujarat State of India that has a population of 62.7 million people and can be scaled nationwide once proven effective.

**This app was conceived to assist municipalities and enforcement agencies in providing safety to its citizens by keeping track of health conditions as well as allowing citizens to confirm proof-of-presence. Individuals now can remotely verify their identity, quickly and accurately, with just their mobile phones, and notify the authorities on their status, health conditions and location. In this way individual updates can be collected on a regional and national level to help the government track the spread of COVID-19 and keep the pandemic under control.**



1. A citizen self-enrolls with the official app, providing personal data and a face image.
2. The Government entity requests the citizen to submit proof-of-presence.
3. The citizen provides geolocation, live face image and information about health status.

## BUT ARE THESE MEASURES ENOUGH?

Despite the positive impact of implementing innovative solutions with the aim of reducing the spread of the virus, many countries are not yet ready to phase out national lockdowns – the main measure used today to combat the pandemic. International air travel has practically come to a stop, educational institutions, offices, restaurants and shops are closed, and public events have been cancelled or rescheduled.

Forecasting agencies are making gloomy predictions regarding the financial impact that the lockdown will have on the global economy. For example, Oxford Economics projects that the world's GDP will shrink by 2.8% in 2020. The consensus is that these necessary, albeit extreme measures, are not sustainable in the long run without the risk of pushing the world into the largest global economic crisis since the Second World War. Today's economic reality already has seen 26.5 million Americans filing for unemployment claims in the last five weeks in accordance with The Situational Threat Report Index from Bain's Macro Trends Group, many European governments urge the issuance of a joint debt instrument to face a crisis which may shrink the euro economy by 9% this year, and China's economy contracted in the first quarter of 2020 – the first time since records began in 1992, according to World Economic Forum surveys.

World's GDP in 2020  
**-2.8%**

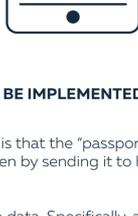
Unemployment claims in the USA  
**26.5mln**

European economy in 2020  
**-9%**

Any plan to ramp up the economy and reduce losses must necessarily incorporate solutions to bring people back to the workforce in a safe and controlled manner. In addition to tending to those individuals infected with COVID-19, and hospitalizing those who are seriously ill, it is equally essential to identify those citizens who have already been infected with the virus as well as the many individuals who carry the virus asymptomatically. For these reasons, beyond just testing for the presence of the virus, it is imperative to conduct large-scale COVID-19 antibody testing. This approach, which in countries like South Korea has already proven effective in combating the virus, has the added advantage of collecting the necessary statistics to obtain a complete record of citizens having immunity to COVID-19.

The use of such data in combination with the latest technologies can become an effective tool for countries to bring citizens who can no longer become infected with the COVID-19 virus, or infect others, to a normal life.

**One of the most promising concepts in this context is the introduction of an "Immunity Passport"**. Immunity to COVID-19 is a major driver for a "next normal" according to McKinsey&Company "COVID-19: Implications for business" survey. Many countries are defining this concept in a similar fashion. Namely, the data of citizens with a positive antibody test result are enrolled into a specific government database managed by the Ministry of Health or other qualified Government institution. Each individual registered in the database is then issued an "Immunity Passport" that will be valid within the country or geographical region. Holders of such "passports" will be allowed to end full self-isolation, get back to work, move freely around the country and return to their usual lifestyle.



## WHAT CAN BE THE REQUIREMENTS FOR THIS KIND OF SOLUTION TO BE IMPLEMENTED WORLDWIDE?

Given that we live in a digital world, the first requirement that must be met is that the "passport" **should be electronic**. This will allow for the document to be issued to a citizen by sending it to his/her web device. And/or mobile device.

The next critical requirement for the "passport" is the safe storage of citizen data. Specifically, all information stored on any device or storage medium must be encrypted such that the data is kept private and accessible only to those authorized to verify the document (e.g. police).

## IS THERE OTHER INFORMATION ABOUT A CITIZEN THAT SHOULD BE STORED IN THE "PASSPORT" IN ADDITION TO THE POSITIVE TEST RESULT FOR VIRUS ANTIBODIES?

In addition to a citizen's test result and basic biographical data, such as name, surname, gender and date of birth, the "Immunity Passport" should also store **a unique identifier**. For example, the "passport" could store a photo of the holder's face for visual inspection, or for even greater security, one or more biometric templates, such as face, voice or fingerprint recognition.

Given that adequate Internet connectivity is not always available, one of the most critical requirements for successful use of the "Immunity Passport" is that authentication should also be possible **completely offline**.

The solution should be **flexible** and allow for easy update of stored data. For example, if new test results need to be added, the data contained in the "Immunity Passport" should be able to be quickly updated by request from the authorized issuing entity.

Equally important is **the level of readiness** of the solution for implementation on a national and global scale. Given the urgency of the matter, there will be no time for developing highly complex technology platforms. Furthermore, the solution should be **affordable** for rapid implementation in every country, **software-only, cost-effective and easy to integrate**.

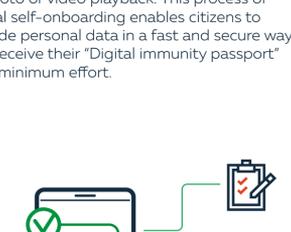
## ARE THERE SUCH TECHNOLOGY SOLUTIONS AVAILABLE ON THE MARKET TODAY?

To contribute to the global movement of "flatten the curve", we at TECH5 are aggressively and continuously working on technologies that will facilitate the next critical phase of bringing life back to some level of normality, which is as important as controlling the pandemic itself. And, today we have a **ready-to-implement solution** that may not just become the platform for a "Digital Immunity passport" but has the potential to become the "Digital Passport" itself: **the TECH5 Digital Identity toolkit**.

## HOW DOES THE TECH5 DIGITAL IDENTITY TOOLKIT CONTRIBUTE TO THE CONCEPT OF A "DIGITAL IMMUNITY PASSPORT"?

THE FOLLOWING DESCRIBES A POSSIBLE SCENARIO:

The Ministry of Health or another agency authorized to issue an "Immunity Passport" builds a database of citizens who have tested positive for COVID-19 antibodies, which likely means they have some level of immunity. Along with sending the test results, the person is invited to complete a questionnaire and provide their data electronically requesting issuance of an "Immunity Passport".

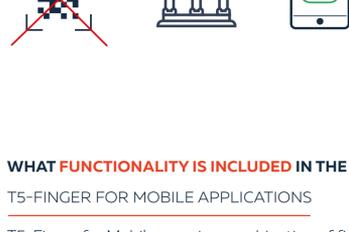
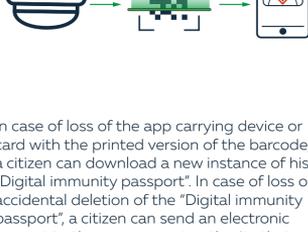


A citizen completes a questionnaire through a personal account of a mobile app followed by biometric capture – such as face and/or fingerprint. Touchless T5-Face and T5-Finger technologies allow the capture of biometric data without any purpose-built device and having to visit a registration office. Fingerprint and face liveness detection services then ensure that the provided images are authentic and not the result of photo or video playback. This process of digital self-onboarding enables citizens to provide personal data in a fast and secure way and receive their "Digital immunity passport" with minimum effort.

A "Digital immunity passport" is generated by the appropriate government entity and dispatched to the citizen's personal account from where it can be downloaded to a mobile device and used offline. The data carrier of the TECH5 "Digital immunity passport" is a high definition barcode created with T5-IDencode technology that stores data in encrypted format and protected by biometrics. Storage of the "Digital immunity passport" on a mobile device is highly secure because it is only possible to read the encrypted information with a certified and accredited application, access to which will be available only to accredited representatives, such as border control police checking documents on entry-exit.



Police officers and other authorized personnel can use the T5-IDdecode Mobile app to read the citizen's "Digital immunity passport", conduct a visual inspection by comparing the photo in the "passport" with the person presenting the passport, as well as running face and fingerprint verification checks. The entire process can be completed entirely offline.



In case of loss of the app carrying device or card with the printed version of the barcode, a citizen can download a new instance of his "Digital immunity passport". In case of loss or accidental deletion of the "Digital immunity passport", a citizen can send an electronic request to the government authority that issued the passport and receive a new one. In order to ensure that the same person is not enrolled twice in the database, upon receipt of each new application, face and fingerprint images can be matched against the entire database for a de-duplication check.

## WHAT FUNCTIONALITY IS INCLUDED IN THE TECH5 DIGITAL IDENTITY TOOLKIT?

### T5-FINGER FOR MOBILE APPLICATIONS

T5-Finger for Mobile apps is a combination of fingerprint capture, liveness detection and recognition technologies that delivers identity verification by fingerprints using a mobile device, all within a couple of seconds.

#### HOW IT WORKS:

- 1 | A person captures images of his/her fingerprints with a standard camera of a mobile device and mobile app for onboarding.
- 2 | Fingerprints are detected from the captured image, captured, quality checked, and converted into a template(s) after passing a liveness check: liveness detection technology is integrated with the mobile app and protects against spoofing attacks.
- 3 | Once the fingerprint images have passed the liveness check, they are converted into templates (are optionally) sent to a server for a deduplication check and enrolment (digital onboarding) or used locally on the device in a verification check against reference templates stored in the barcode if the person was already enrolled (offline authentication).
- 4 | In the example of a new enrolment, the server generates a barcode with the fingerprint templates (T5-IDencode) that can be sent by email or in printed format to the user. The entire process is highly intuitive and takes only a few seconds.

T5-Finger recognition technology is **highly accurate (99,96%)** and ranked in the TOP-tier of most accurate fingerprint recognition algorithms in the world (NIST PFTII, 2019).

T5-Finger mobile capture technology can be used as an **alternative to classic hardware-based scanners** that are purpose-built for capturing fingerprints for remote/online enrolment.



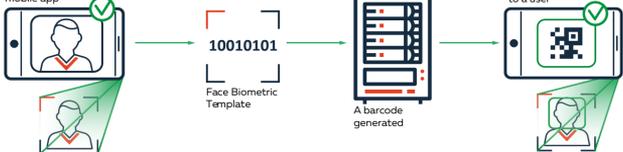
### T5-FACE FOR MOBILE APPLICATIONS

T5-Face Mobile is a combination of highly accurate face detection, capturing and recognition functions supported by liveness detection technology for fast and secure Digital Onboarding and verification by face within seconds, just by using an app and camera on a mobile device.

#### HOW IT WORKS:

- 1 | A person captures his/her face image with a standard camera of a mobile device and onboard mobile app.
- 2 | Face image is detected, captured, quality checked and converted into a template(s) after passing a liveness check: liveness detection technology is integrated with the mobile app and protects against spoofing attacks.
- 3 | Once the face image has passed the liveness check, the converted template is (optionally) sent to a server for a deduplication check and enrolment (digital onboarding) or used locally on the device in a verification check against a reference template stored in the barcode if the person was already enrolled (offline authentication).
- 4 | In the example of a new enrolment, the server generates a barcode with T5-IDencode technology that stores the face template as well as a small face image for visual inspection, compressed with the TECH5 face compression algorithm to roughly 1 kilobyte in size. The barcode can be sent by email or in printed format to the user. The entire process is highly intuitive and takes only a few seconds.

T5-Face technology is **highly accurate (99,98%)** and ranked in the TOP-tier of most accurate face recognition algorithms in the world (Facial FRVT, 2020). The superb accuracy of T5-Face technology is ensured by a combination of convolutional neural networks that utilize the most up to date architecture and progressive methods of training.



### T5-IDENCODE

T5-IDencode is a high definition barcode technology with error correction for a secure storage of demographic data, a highly compressed face image (1kb), as well as face and fingerprint biometric templates, all in an encrypted format. Data is encrypted with PKI for barcode authentication and to make sure that only authorized individuals can unlock the data that is stored.



Barcodes generated by T5-IDencode are captured and decoded using the same camera and mobile app used for finger and face capture. Despite its high-density nature for storing large amounts of data, **the barcode reading process is fast and intuitive**, comparable to reading a standard QR code.

## ARE "DIGITAL IMMUNITY PASSPORTS" RELEVANT ONLY IN THE SHORT TERM OR WILL GOVERNMENTS, BUSINESSES AND CITIZENS HAVE A USE FOR THE TECH5 DIGITAL IDENTITY TOOLKIT IN THE POST-PANDEMIC ERA?

We believe that the TECH5 Digital identity toolkit has the potential to become a powerful tool for authorities and businesses to help a safe resumption of activities in the post-pandemic era. Why? After weeks and months of quarantine in which day-to-day life – from ordering food, participating in yoga classes to following school lessons – was managed fully online, it is very likely that people will have changed their habits.

As a result, more than ever there will be an **increased need for a secure online environment**. The TECH5 Digital identity toolkit may constitute a fitting tool for this new reality that is fundamentally digital. It will be the tipping point for digital identity credentials that can replace physical documents. And, if people already have their "Digital immunity passports", theoretically speaking, they will be able to write a request to a government asking to associate this document with other essential ID documents such as a Driver License and other credentials. This updated document will become a "Citizen's Digital ID" and replace traditional physical ID tokens.



## SO WHY WOULD YOU WANT A DIGITAL ID INSTEAD OF A TRADITIONAL PHYSICAL ID?

A Digital ID can provide citizens and governments with significant benefits. First of all, a Digital ID has a very low cost of issuance in comparison with alternatives like smart card based ID cards or passports. Second, it provides flexibility of issuance. IDs can be generated within a few seconds, dispatched and delivered online, avoiding the need to go to registration centers. What about safety? Data is stored in a very secure way – in a high-density barcode protected by PKI. Third, Digital IDs are very flexible. Data stored on the ID can be updated by the government within seconds, upon request from a citizen, or with information from other government authorities. Finally, we believe that Digital ID will be key to safe and very efficient implementation of eKYC programs around the world.

Digital IDs ensure that there **will no longer be any need to carry a multitude of ID documents** because all key personal data, including biometrics, will be stored in the Digital ID in a secure and encrypted format. Furthermore, the data can be accessed and read only when authorized. As a result, the Digital ID is secured against tampering and spoofing.

There can be no doubt that this latest crisis has permanently changed the way we will operate in the world of the future. But we are ready to live in the new reality. **An integral part of this new reality will most probably include the capability of online authentication and the existence of a Digital ID that is secured and personalized in such a way to allow citizens to own and manage their own identities.** We are, in effect, inching closer to a Foundational ID paradigm, towards which the world has been moving for the last ten years.

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