National Digital Identity and Government Data Sharing in Singapore

A Case Study of Singpass and APEX

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EXECUTIVE SUMMARY

The ability of an individual to reliably prove their identity is crucial to ensure access to services and exercise rights. The foundational ID systems that enable people to do this also help government agencies and businesses to improve how services are delivered, streamline processes, and reduce leakages and fraud. As countries digitalize, and the number and importance of end-to-end online transactions grow, the mechanisms used to prove identity in the physical world are not as reliable in the digital world. Digital ID systems, which allow people to prove their officially recognized identity online and without a physical interaction, have therefore become key enabler for the inclusive digital transformation of countries.

Similarly, as highlighted in the 2021 World Development Report, Data for Better Lives, governments can be better at responding to the needs of citizens and businesses by being able to seamlessly and securely exchange data.[1] Such data re-use can not only increase the efficiency of government services and operations; it can also unlock innovation by the private sector, civil society, and individuals. It is for this reason that governments around the world have built data sharing platforms of various types, including with linkages to digital identity to enable people to exercise consent and control over their personal data.

This case study describes Singpass, Singapore's national digital identity (NDI), and API Exchange (APEX), the government's data sharing platform. It highlights not just how they work but also how they work together. Built by the Government Technology Agency of Singapore (GovTech), both products have helped to improving the lives of Singaporeans and residents, and to enabling government agencies and businesses to offer better services. This has contributed greatly to Singapore becoming a leading digital government, economy, and society, which are the three pillars of its Smart Nation Initiative.

The section on Singpass, which began in 2003 simply as a username and password login system to access government websites, shows how it has evolved over time. This is an important characteristic of its success, as Singapore has not attempted to build a new identity system, but rather to create a digital version of the foundational ID system that people use in their everyday life. This experience

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[1]   World Bank, 2021. *World Development Report 2021: Data for Better Lives*. https://www.worldbank.org/en/publication/wdr2021

offers important lessons and may be adapted by other countries with equally strong foundational ID systems, bearing in mind the need to design for local political, legal, social, and economic conditions.

The success of Singpass is evident in its adoption. 97 percent of the eligible population (or 4.5 million citizens and residents) uses the Singpass application to access more than 2,000 public and private sector services online, ranging from financial services to healthcare, education, business services, and transportation. More than 350 million transactions are completed each year, and transactions that previously took days or hours to complete, often requiring physical visits, now take minutes and can be performed from anywhere with an internet connection. A document wallet has recently been added, enabling citizens and residents to store their identity cards, driving license, and COVID-19 vaccination documentation—and more documents will soon be added. This document wallet is accessed more than 300,000 times a month and is growing in popularity.

Singpass also empowers Singaporeans and residents to provide consent to sharing their data held in government databases via the Myinfo product. This has led to reductions in the cost and time for transactions with government agencies and businesses. Approximately 200,000 Myinfo transactions take place per day. The time it takes to apply for services using Myinfo has decreased by up to 80 percent, with businesses also reporting significant cost savings and up to a 15 percent higher approval rating from their customers.

The section on APEX, which is an application programming interface (API) gateway for government agencies to share and re-use data transparently, securely and seamlessly, shows how it has enabled public services to be more efficient. For example, APEX is a key backbone for the functioning of Singpass, including onboarding (validating information with the foundational ID system) and Myinfo transactions. The number of APIs supported through APEX has surpassed 2,000, from over 45 different agency projects, approximately half of all government agencies in Singapore. The level of traffic has surpassed 100 million transactions per month, with peaks on average exceeding 300 million transactions per month.

GovTech is constantly looking for ways to improve Singpass and APEX. Alternative models for Singpass are under consideration, including federated and decentralized architectures. Other plans include introducing authorization services for businesses, expanding the digital wallet, and establishing cross-border interoperability with other countries. Similarly, GovTech will be piloting the use of APEX within the private sector and will be moving non-sensitive functionalities to the cloud to improve scalability.

Any country wishing to build their own NDI and government data sharing platform should consider their own national requirements and may adapt or learn from the experience of Singapore (as well as other countries), rather than directly replicating their approach. Some key takeaways from the experience with Singpass and APEX include:

- ▶ Evolution: gradually improving products and services, based on experiences and lessons, rather than trying to solve too many problems at the same time.
- ▶ Prioritizing user experience: investing time and other resources across the development lifecycle to understand what users want and expect, especially among vulnerable users.
- ▶ Focusing on use cases: driving adoption by identifying where the most value will be generated.
- ▶ Identifying authoritative sources of data in government: developing common data standards and identifying the most reliable sources for each data attribute, rather than replicating information across databases.
- ▶ Technology and skillsets: adopting open technologies where appropriate and continuously investing in people.
- ▶ Responsibly adopting technologies: using new technologies when relevant rather than when they become available.

NDI and data exchange platforms are a key part (along with digital payments) of what has become known as digital public infrastructure (DPI), the solutions that enable the effective provision of essential society-wide functions and services in the public and private sectors. This case study highlights how Singapore has successfully developed its DPI to improve the lives and livelihoods of its citizens and residents and boost its economic competitiveness.

CALL FOR COLLABORATION

Countries and international organizations interested in collaborating with GovTech on NDI and government data sharing projects can contact GovTech via email at info@tech.gov.sg

# SINGAPORE'S NATIONAL DIGITAL IDENTITY: **singpass**

Overview of Singpass

Singpass comprises the smartphone application and a back-end managed by GovTech. The smartphone application is the user-facing component, which is accessible for free to all Singapore citizens, permanent residents, and Foreign Identification Number (FIN) holders aged 15 and older. It enables users to leverage their legal identity to carry out a wide range of online and face-to-face transactions with government agencies and businesses. Singpass was first launched in 2003 as a username and password to sign into government websites and has since significantly evolved.

Today, Singpass includes several products and features for citizens and residents, including:

▶ **Login:** Users can verify their identity online in a secure and trusted manner when transacting with websites and smartphone applications of government agencies and businesses. Verification can be performed using a six-digit PIN code or the phone unlock mechanism, such as a fingerprint or selfie, on most devices.

▶ **Verify:** User identity is verified for a face-to-face transaction and the secure transfer of personal information through scanning of QR codes or tapping near-field communication (NFC) devices.

▶ **Myinfo:** Manages the use and sharing of personal data for simpler online transactions; data is pulled in real time from authoritative sources, and consent is facilitated through Login or Verify. For example, this feature can be used to pre-fill forms.

▶ **Identiface:** A stronger method of authentication than Login or Verify that uses face verification based on the latest facial image enrolled with the Immigration and Checkpoints Authority (ICA).

Figure 1 Singpass Home Screen
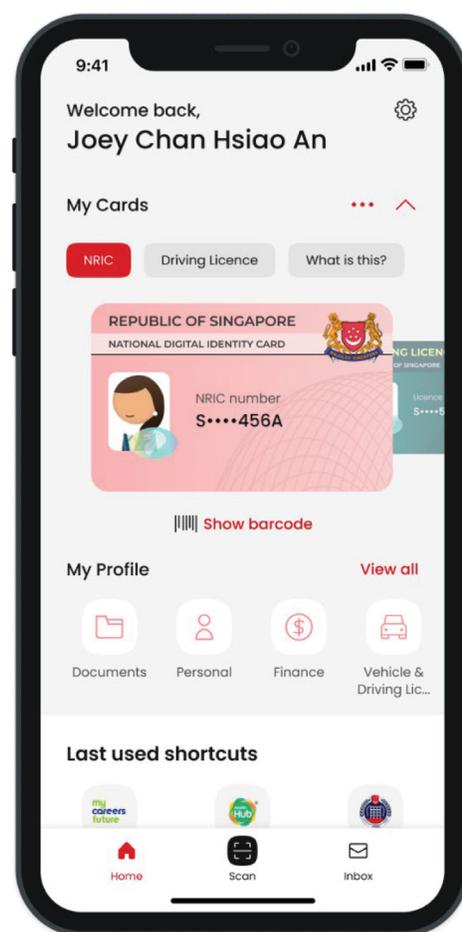
- ► **Digital IC:** Enables users to present a digital version of their National Registration Identity Card (NRIC) or FIN card.
- ► **Sign:** Users can create secure electronic signatures using a preferred third party digital signing tool compliant with Singapore's Electronic Transactions Act.
- ► **Document Wallet:** Users can store digital versions of other official documents, such as a driving license and HealthCerts (including COVID-19 vaccination certificates).
- ► **Notify:** This feature enables users to receive push notifications and alerts from government agencies, as well as information related to Singpass transactions.
- ► **Shortcuts:** Users are able to log in directly to commonly used digital government services, such as the Central Provident Fund (CPF) for social security, HealthHub for health services and records, and the Inland Revenue Authority of Singapore (IRAS) MyTax Portal.

Singpass also functions as a digital ID for legal entities. Eligible owners and officers of businesses and other entities (such as non-profit organizations and associations) can use **Login** and **Myinfo business** on behalf of a legal entity when accessing digital government services. Roles and user rights are managed through the Corppass website.

The Singpass application is available on Apple iOS, Android, and Huawei devices. Singpass, including the application and back-end, uses various technologies, including cryptography and biometrics, for convenience, security, and trust. Relying parties (RPs) can integrate with Singpass using NDI application programming interfaces (APIs). More than 85 percent of all Singpass transactions are conducted through the application, with the remaining 15 percent using two-factor authentication (2FA) methods, such as Singpass's Identiface (including through a web browser).

GOVERNMENT DATA SHARING PLATFORM – API EXCHANGE (APEX)

Overview of APEX

The ability to seamlessly and securely data is key for digital service delivery. In 2016, the government introduced a policy to split government and public-facing digital services, leading to the requirement for a bridge or gateway allowing government agencies to share data from intranet to internet-facing services. This was the catalyst for the development of a data sharing platform.

Following this decision, APEX was launched in 2017 to become the bridge between intranet and internet zones in the government network architecture, enabling agencies to share data through application programming interfaces (APIs) from the intranet to internet zone services. APEX itself acts as an API gateway where agencies can consume approved APIs for secure and seamless access to data across government.

APEX enables centralized publication, cataloguing, discovery (as a self-service model), monitoring, and security management for the APIs. In doing so, it plays a key role in the Singpass ecosystem. Furthermore, Singpass (through the Myinfo product) provides citizens and residents with control over the sharing of their personal data, which occurs through APEX in the case of government services.

When APEX was initially developed, there was no government cloud policy, hence the system was developed in-house as an on-premise solution based on the Akana API management platform (a commercial API management platform). Now, APEX cloud is being developed for less-sensitive datasets. Moving to the cloud also opens the possibility of creating an API marketplace with the private sector.

APEX is part of the Singapore Government Technology Stack (SGTS), a suite of shared and re-usable software components and infrastructure maintained by GovTech to enable government agencies to build digital services. Other examples of components of the SGTS include Singpass and the Government on Commercial Cloud (GCC). The SGTS is part of a broader framework known as Core Operations Development Environment and eXchange (CODEX), which is a shared digital platform between government agencies and the private sector for the development of better, faster, and more cost-effective digital services.

Box 1   What is an Application Programming Interface (API)

An API is a way for two or more software components to communicate with each other, including to transmit data. More specifically, an API is programming code that governs the access point to an application, which may be able to access a database. For example, if you search for a flight on a website, that website would use APIs to send a request to airlines and receive a response with offers. Well-designed APIs enable government agencies to enable access to their systems and databases for authorized users (e.g., other government agencies) while maintaining security and control.

An API gateway sits between a user and a collection of APIs and back-end services. An API gateway can accept and aggregate API calls (essentially message asking an API to provide a service or data). It is also a management tool, enabling access control and monitoring of API usage. Using the example of searching for flights, a website may access the APIs of multiple airlines and travel agencies through an API gateway.

Illustration of How an API Gateway Works
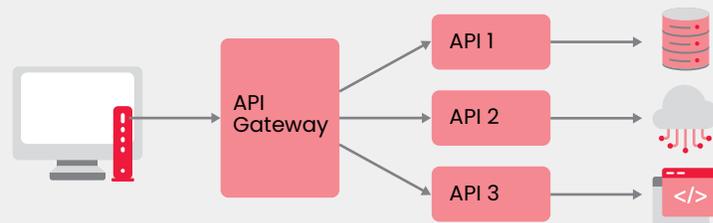
Using APEX, developers of a requesting government agency can discover APIs, apply for access, and then pull data from various agencies on demand, with pre-configured access controls set by the data source agency. A central logging system provides an overview of all API logs, allowing monitoring and trouble-shooting when necessary.

Figure 2   Screenshot Example of the APEX API Library

Read the full case study at:

go.gov.sg/singpassapexcasestudy

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