DG DIGIT

Unit.B2 (Interoperability & Digital Government)

Open Source Software Country Intelligence Report

Singapore

2023

This research was carried out by OpenForum Europe for the Interoperable Europe initiative under the Digital Europe Programme. The report provides an overview of open source software (OSS) in Singapore as of October 2023. This report was enriched with the kind contribution of Harish Pillay and Open Government Products' Team.

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Authors

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Axel Thévenet (axel@openforumeurope.com)

Ciarán O'Riordan (ciaran@openforumeurope.com)

Jaakko Karhu (jaakko@openforumeurope.com)

Paula Grzegorzewska (paula@openforumeurope.com)

Contact OSOR

EU-OSOR@ec.europa.eu

OSOR https://joinup.ec.europa.eu/collection/open-source-observatory-osor

@OSOReu

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Executive Summary

Singapore has created a strong digitalisation programme over the last ten years and has evolved its digital strategy to adapt to various difficulties in the implementation of digital solutions in its public sector. Overall, its agencies have adopted a robust entrepreneurial approach to using open source, which has naturally evolved to meet the government's needs. Additionally, the utilisation of open source is influenced by individuals who have a strong affinity for it within agencies.

Under the Smart Nations and Digital Government Group's responsibility, the government's digital policy is being designed and implemented by a dedicated agency, GovTech. Open Government Products is the main entity responsible for the development of open source solutions, adopting a new approach to government product development to achieve faster results.

There are policies that mandate the use of open source or make it a requirement in procurement by government agencies, and Singapore also showcases a very strong use of open source products in practice. Although not limited to the Open Government Products unit, the development of open source solutions has been strongly accelerated by this unit. In its latest policy, the Digital Government Blueprint, the government calls for the adoption of open source to facilitate interoperability of the administration's systems.

On an international level, Singapore is collaborating with regional partners to further develop ICT solutions together and has developed solutions such as FormSG. Overall, the use of open source is common in various areas of digital administration such as identity management, public health, robotics, AI and mobility.

Actors

This section presents the key governmental bodies responsible for setting OSS policies and the main strategic players that work together with the government at all levels to raise awareness of OSS.

Policy makers

- Ministry of Communications and Information (MCI)[1] is the Singaporean ministry responsible for overseeing ICT technology and the government's digital policy. It establishes policies and produces research on digital affairs and the development of the country's digital infrastructure.

- Smart Nation and Digital Government Group (SNDGG),[2] established in May 2017, is overseen by a Ministerial Committee made of the ministers in charge of communications and information, public

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[1] Ministry of Communications and Information - Singapore
[2] Smart Nation Singapore

service, GovTech Singapore and a senior minister.[3,4] This committee was created to accelerate the implementation of the Smart Nation Programme, merging the existing Smart Nation and Digital Government Office (SNDGO) with the Government Technology Agency of Singapore (GovTech) which acts as an implementing agency. It also comprises staff from the Ministry of Finance's Digital Government Directorate, and the Ministry of Communications and Information's Government Technology Policy department. The SNDGG mission leads the development of digital government's services and coordinates the work related to the use and implementation of open source in practice.

Strategic players

- GovTech[5], or Government Technology Agency of Singapore, is the implementating body, part of the SNDGG, which is responsible for the delivery of the government's digital services. First created as a replacement of the Infocom Development Authority (IDA) of Singapore in 2016,[6] it serves to implement the Smart Nation programme.[7]

- Open Government Products[8] is an independent unit of GovTech, tasked with accelerating the digital transformation of the Singapore Government by applying an experimental approach to IT development. It is the main open source actor in the Singaporean government. Founded in 2019,[9] it maintains various open source solutions and has created a yearly hackathon.[10]

- Government Digital Services[11] is a unit of GovTech that is responsible for the development of digital services for the nation. While some of its responsibilities were transferred to Open Government Products in 2017, it is still active and has maintained several open source solutions since 2016.[12]

Policy and legal framework

This section summarises the main OSS-related policies and legal acts in Singapore, including the first known milestones in this domain. The list is presented in chronological order, starting from the most recent milestone.

- Memorandum of cooperation with Japan, 2022:[13,14] Signed by the Digital Agency of Japan and the Government Technology Agency of Singapore, this memorandum of cooperation aims to support

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[3] In this case, Teo Chee Hean, former deputy prime minister.
[4] SNDGG Ministerial Committee
[5] Government Technology Agency
[6] Government Technology Agency Act 2016 - Singapore Statutes Online The IDA was separated between GovTech and the Infocomm Media Development Authority.
[7] Our Journey
[8] Open Government Products
[9] Hongyi Li
[10] Hack for Public Good
[11] Government Digital Services, Singapore – Medium
[12] Government Digital Services, Singapore · GitHub
[13] シンガポール共和国・プットゥチェリーGovTech担当大臣とデジタル分野における協力覚書（MoC）の署名を行いました
[14] MEMORANDUM OF COOPERATION BETWEEN THE DIGITAL AGENCY OF JAPAN AND THE GOVERNMENT TECHNOLOGY AGENCY OF THE REPUBLIC OF

the sharing of solutions between the two countries. The declaration calls for the support of open, inclusive and transparent government, which includes promoting open standards and open source technology. The cooperation was continued in 2023 with a meeting between both countries' digital ministers regarding the exchange of views on the use of e-IDs.[15]

- Digital Government Blueprint, 2018:[16] Updated in 2020, this document defines 14 key performance indicators to describe the advancement of digitalisation in Singapore. It calls, among other aspects, for an interoperability-based strategy that would leverage open source.

- Smart Nations Initiative, 2014:[17] Launched during the speech of Singapore's then Prime Minister, the first step of the Initiative was the creation of the Smart Nation and Digital Government Group. It is based on 3 key pillars: Digital Economy, Digital Government and Digital Society.[18] Its objectives regarding Digital Government were developed in the subsequent Digital Government Blueprint.

- eGovernment Masterplan 2011-2015, 2011:[19] The master plans set the direction of digital governance technologies for Singapore over a fixed number of years. This is the fifth such plan for digitalisation and precedes the subsequent Smart Nations Initiative. It focuses on the government's development of its own cloud solution for the delivery of digital services. The plan was produced by the MCI. After originally exploring existing commercial solutions, the plan opts for a cloud solution that would be developed in-house.

Open source software initiatives

This section presents an overview of the main OSS-related initiatives in Singapore. The list is presented in chronological order, starting with the most recent initiative.

- AI Verify, 2022:[20] Started as an internal project for the Infocomm Media Development Authority (IMDA),[21] AI Verify is an AI governance testing framework and a software toolkit. Developed in consultation with commercial entities, the solution was published under an open source licence[22] in 2023 with the creation of the AI Verify foundation by IMDA.[23, 24] The objective is for the foundation to help foster an open source community around the project and potentially help develop it further.

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[15] Mr. KONO Taro, Minister for Digital Transformation, visited the Republic of Singapore
[16] DIGITAL GOVERNMENT BLUEPRINT "A SINGAPORE GOVERNMENT THAT IS DIGITAL TO THE CORE, AND SERVES WITH HEART" Digitalisation is
[17] https://web.archive.org/web/20160318193506/http://www.pmo.gov.sg/mediacentre/transcript-prime-minister-lee-hsien-loongs-speech-smart-nation-launch-24-november
[18] Pillars of a Smart Nation
[19] https://www.tech.gov.sg/files/media/corporate-publications/2016/01/eGovBOOK1115.pdf
[20] What is AI Verify
[21] Artificial Intelligence in Singapore | IMDA - Infocomm Media Development Authority
[22] GitHub - IMDA-BTG/aiverify: AI Verify
[23] AI Verify Foundation
[24] Speech by Minister Josephine Teo at the Opening of the Personal Data Protection Week

- Open source Robotics Middleware Framework (RMF) and ROS-Industrial adoption, 2023:[25,26] The National Robotics Programme (NRP),[27] a multi-agency national programme that takes on the end-to-end development of differentiating robotics enablers and solutions in Singapore, adopted the open-rmf[28] and ROS-Industrial[29] software to help manage the orchestration of robot fleets and manage robot traffic.[30]

- sgID, 2021:[31] An Open Government Products project, sgID is a digital identity verification and authorisation service using government-verified data that's integrated into the SingPass app which is also released as open source.[32,33]

- TradeTrust, 2021:[34] This is a framework that incorporates internationally recognised standards,[35] facilitating the connection between governments and businesses with a public blockchain. This connection enables secure compatibility for electronic trade documents across various digital platforms. It is based on the OpenAttestation standard.[36]

- OpenTrace, 2020:[37] This is the reference implementation of BlueTrace,[38] a privacy-preserving protocol for epidemiological contact tracing to fight Covid-19. TraceTogether, implements this protocol through a client app to facilitate contact-tracing. Published in response to public requests, the TraceTogether app source code, published in January 2021, was also made publicly available by GovTech.[39]

- FormSG, 2020[40]: One of Open Government Products' flagship projects, FormSG is a form builder and manager used by the Singapore government to collect data from residents and businesses. The code was forked from Typeform.[41] It has been implemented in many sectors and has been used in more than 110 million submissions.[42] This solution has been further forked and reused by the Information and Communication Technology Agency (ICTA) of Sri Lanka.[43]

[25] System Capabilities
[26] ROS-Industrial · GitHub
[27] Overview
[28] Open-RMF
[29] ROS-Industrial
[30] digital-connectivity-blueprint-report.pdf - Singapore
[31] sgID
[32] GitHub - opengovsg/sgid-client: The official TypeScript/JavaScript SDK for sgID
[33] singpass · GitHub
[34] TradeTrust · GitHub
[35] UNCITRAL Model Law on Electronic Transferable Records (2017) | United Nations Commission On International Trade Law
[36] OpenAttestation
[37] OpenTrace · GitHub
[38] BlueTrace
[39] GitHub - GovTechSG/OpenTT-Android: Repository for TraceTogether - Android source code
[40] FormSG
[41] Typeform · GitHub
[42] Protecting Citizen-Government Interactions with End-to-End Encryption | by Open Government Products
[43] https://github.com/ICTASL/FormSG

- Singapore Government Developer Portal, 2019:[44] Set up by GovTech Digital Services unit, this portal allows citizens and businesses to access products developed by the government. Among other categories, a section of the website is dedicated to open source solutions.[45]

- Isomer, 2018:[46] Developed by Open Government Products, Isomer is a website builder for government agencies to launch static websites for free. Composed of a standardised template, infrastructure and content management system, the code of Isomer is available as open source.[47]

- OpenCerts, 2018:[48] A part of Singapore's Smart Nation initiative, it enables reliable issuance and validation of tamper-resistant academic certificates. It uses blockchain to provide a single place for all individuals to verify certificates issued from any institution. OpenCerts is based on the OpenAttestation standard.[49]

- Beeline, 2017:[50] A smart mobility platform, Beeline was made open source by GovTech jointly with the Land Transport Authority (LTA).[51] It provides functionality for private transport operators and tech start-ups to easily build and integrate additional applications and functions, providing more convenient transport options for commuters.

- Data Science and Artificial Intelligence Division[52] (DSAID) open source projects, 2016:[53] Established as a capability centre in GovTech to handle AI and data science in the framework of policy governance, the DSAID has published various open source projects related to its mission. Among other projects, it has, together with the National Artificial Intelligence Office (NAIO),[54] developed a Public Sector AI Playbook[55] which encourages users to gain competence in the use of open source tools in that remit.

- Singa, 2014:[56] Developed by the NUS Database and System Research Group (NUS DBsytem), a research group in the School of Computing of the National University of Singapore (NUS), Singa is an Apache top-level project[57] for developing an open source machine learning library. Co-developed with the Chinese Zheijang University, it is a flagship Singaporean open source solution.

- Singapore's national open data collection (Data.gov.sg), 2011:[58] Displaying datasets from over 90 government agencies, the platform contains more than 100 apps that have been launched since

[44] GitHub - GovTechSG/developer.gov.sg-nm: The Singapore Government Developer Portal (Dev Portal) offers public officers, government business partners, and tech community members key resources that support their digital transformation efforts.
[45] Open-source Technologies | Singapore Government Developer Portal
[46] Isomer
[47] Isomer · GitHub
[48] OpenCerts
[49] OpenAttestation
[50] Government to open-source Beeline platform code to catalyse industry and public innovation
[51] GitHub - datagovsg/beeline-frontend: Source Code for Beeline's mobile app
[52] DSAID GovTech – Medium
[53] DSAID · GitHub
[54] gov.sg | NAIO
[55] Public Sector AI Playbook
[56] GitHub - apache/singa: a distributed deep learning platform
[57] https://projects.apache.org/project.html?singa
[58] https://beta.data.gov.sg/

the start of this initiative. Now maintained by Open Government Products,[59] Data.gov.sg has been published on GitHub since 2016.

- FOSSASIA's Open Tech Summit, 2009:[60] One of the biggest open technology conferences in Asia, the Open Tech Summit of FOSSASIA is held annually in Singapore.[61] It gathers professionals from the public and private sectors and is held by the FOSSASIA organisation, which also develops open source solutions and open hardware.[62] FOSSASIA also organises events under the name "codeheat" which are contests aiming to help develop the association's projects and invite the best developers to participate in their Open Tech Summit.[63]

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[59] Data.gov.sg
[60] FOSSASIA
[61] FOSSASIA Summit
[62] FOSSASIA · GitHub
[63] Codeheat

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