From One-Size-Fits-All to Right-Sizing: Adapting OSCAL for the Singapore Government's Tech Standards

Hunter Nield, Distinguished Engineer

Eugene Lim, Lead Security Engineer

GOVTECH SINGAPORE

About Us

Hunter Nield

Distinguished Engineer, GovTech

Hunter is a Distinguished Engineer at the Government Technology Agency of Singapore, where he helps lead the Engineering and DevOps Centre of Excellence.

Eugene Lim

Lead Security Engineer, OGP

Eugene is a cybersecurity professional and white hat hacker who builds resilient appsec programmes in the day and researches product security at night.

GOVTECH SINGAPORE

GovTech and OGP

GOVTECH
SINGAPORE

GovTech builds tech to improve the lives of Singaporeans and supports public agencies' efforts in driving digital transformation.

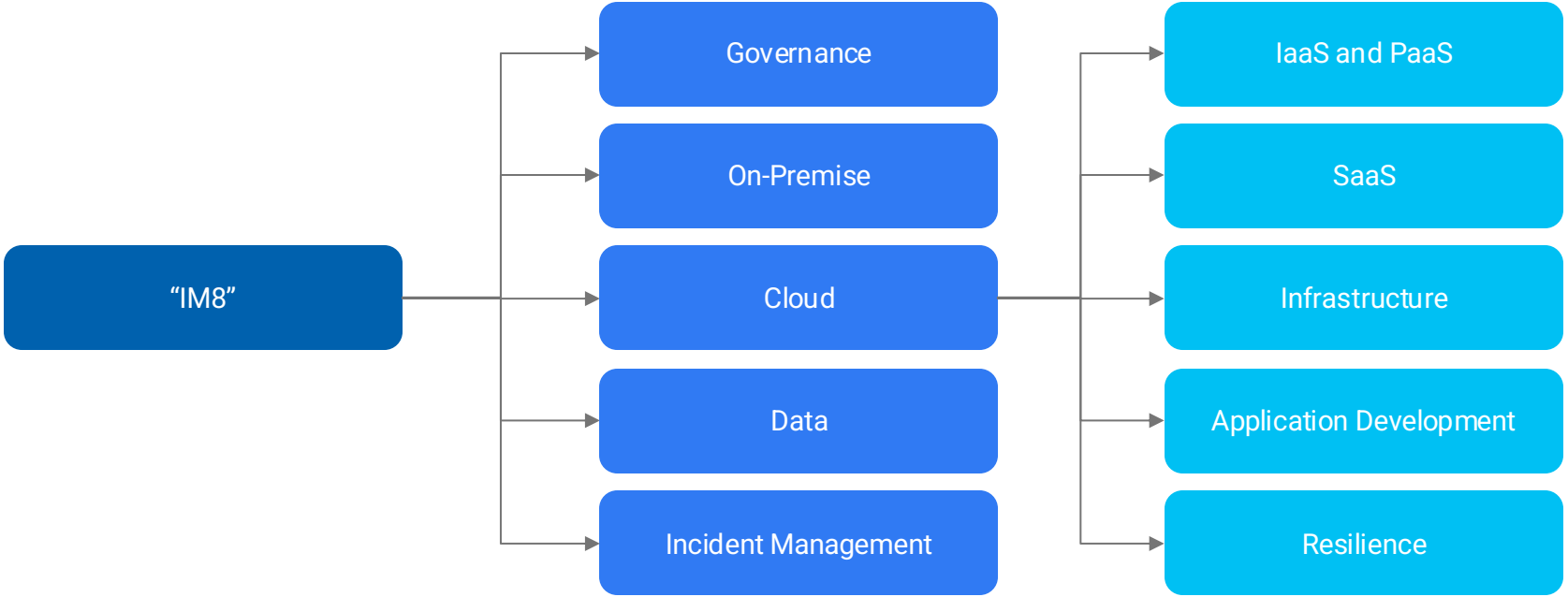
OPEN
GOVERNMENT
PRODUCTS

Open Government Products is an experimental development team that builds technology for the public good.

Challenges of One-Size-Fits All

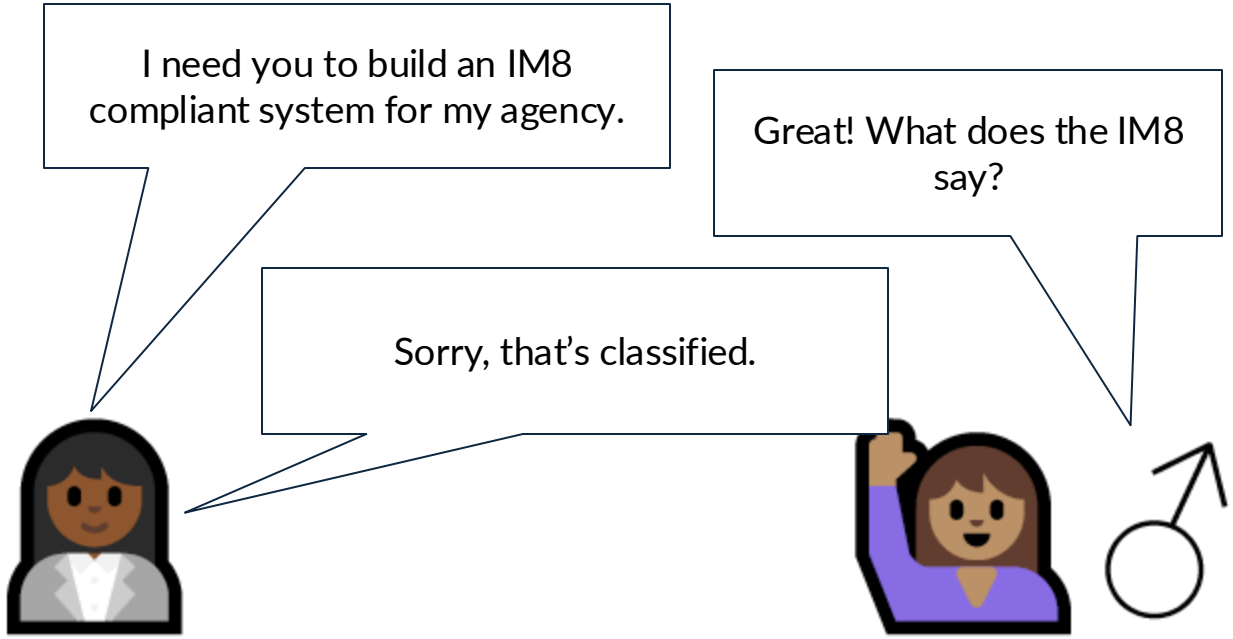
GOVTECH
SINGAPORE

The Instruction Manual for Infocomm Technology and Smart Systems (ICT&SS) began as internal policies, standards and guidelines that evolved organically and rapidly.



GOVTECH SINGAPORE

“IM8” began as a set of controls internal to the Singapore Government’s systems, rather than a vendor-facing compliance programme.



GOVTECH SINGAPORE

The one-size-fits-all monolithic format created structural problems, such as duplication and desynchronisation.

Cloud Application Development Control X

"Set up Static Application Security Testing to scan source code…"

On-Premise App Development Control Y

"Include the following capabilities in practising DevSecOps:

g) Static Application Security Testing (SAST) tools;"

Third Party Management Control Z

"The CI/CD pipeline shall minimally have:

b) Static Application Security testing tools;"

GOVTECH SINGAPORE

Lack of impact-tiering, implementing components, and system type distinctions created awkward control phrasing and design that impacted readability and usability.

"For systems classified CONFIDENTIAL and above, perform an account review every X days. For all other systems, perform an account review every Y days. For agencies that use an automated mechanism, review the notification rules and perform validation tests every Z days."

"Implement the following 13 secure coding practices: …"

Workarounds were created to express complexity, creating more complexity.

G: Control X##

denotes this is not applicable to SaaS

G denotes a guideline and is non-mandatory

Control Y** C10

** denotes this is not applicable for all cloud services

C10 denotes compliance by 1 Jan 2020

Control Z CX

CX denotes compliance timelines that do not fall in the categories C1 to C11 and are defined separately

GOVTECH SINGAPORE

The OSCAL schema resolved many of these challenges.

Duplication

Common control catalog as a source of truth

Risk Tiering

Profiles to apply risk levels and must-/should-/good-to-have designation

System Types

System security plans and parameters to provide additional customisation

GOVTECH SINGAPORE

Customisations to our OSCAL approach

GOVTECH
SINGAPORE

One change to OSCAL conventions came from a structural issue.

> A “must-have” for a low-risk system may not be a “must-have” for a medium-risk system.

GOVTECH SINGAPORE

Since the risk materiality level of a system is linked to the level of enforcement, we couldn't use a single profile set.

Level 0

"Must Have"

No deviation allowed

Level 1

"Should Have"

Deviation allowed after agency committee approval

Level 2

"Good to Have"

Optional

GOVTECH SINGAPORE

This led to more verbosity at the profile level.

GOVTECH SINGAPORE

Moving from a one-site-fits-all compliance model to a risk-based, right-sized approach required bridging and change management.

I just want you to tell me what to do.

This is too much freedom!

I'm not equipped to make risk assessments.

GOVTECH SINGAPORE

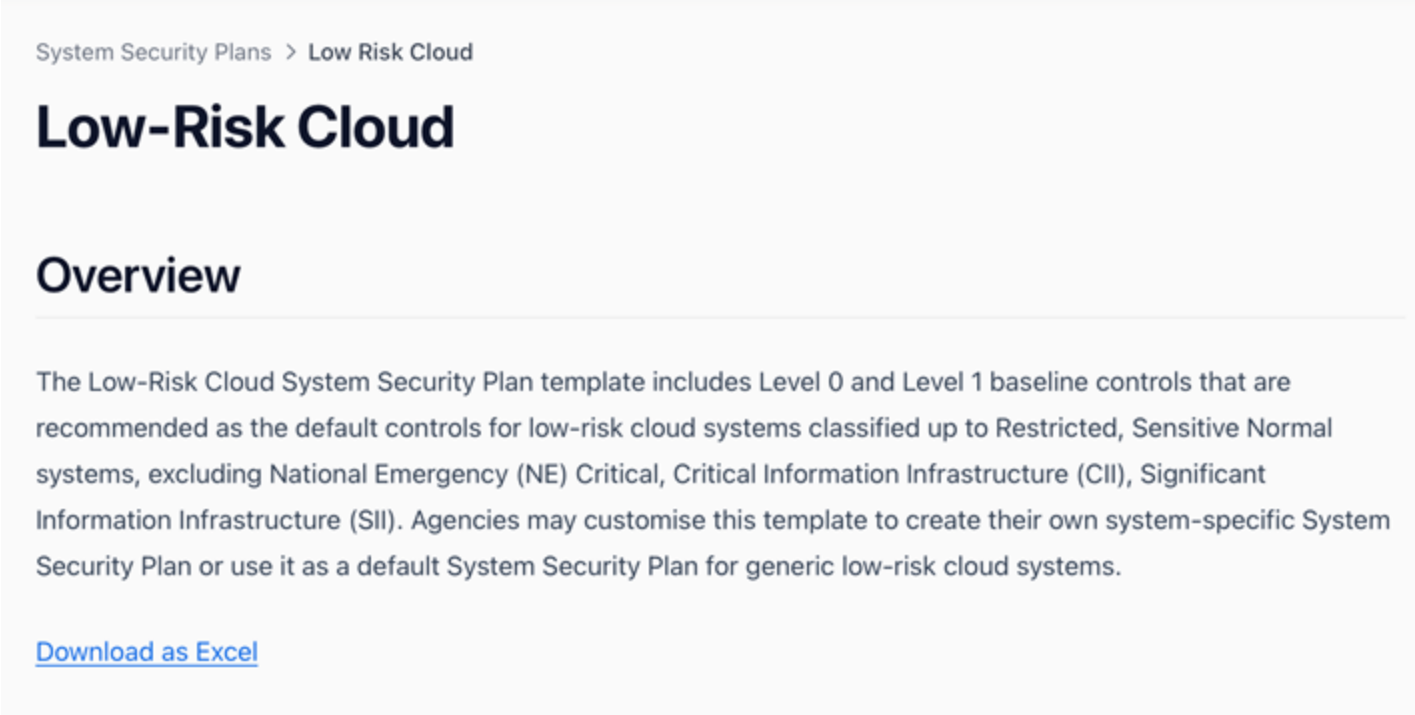
We added a risk-statement property to guide agencies, and ran risk assessment workshops.

Statement: The requirements that must be implemented by the system.

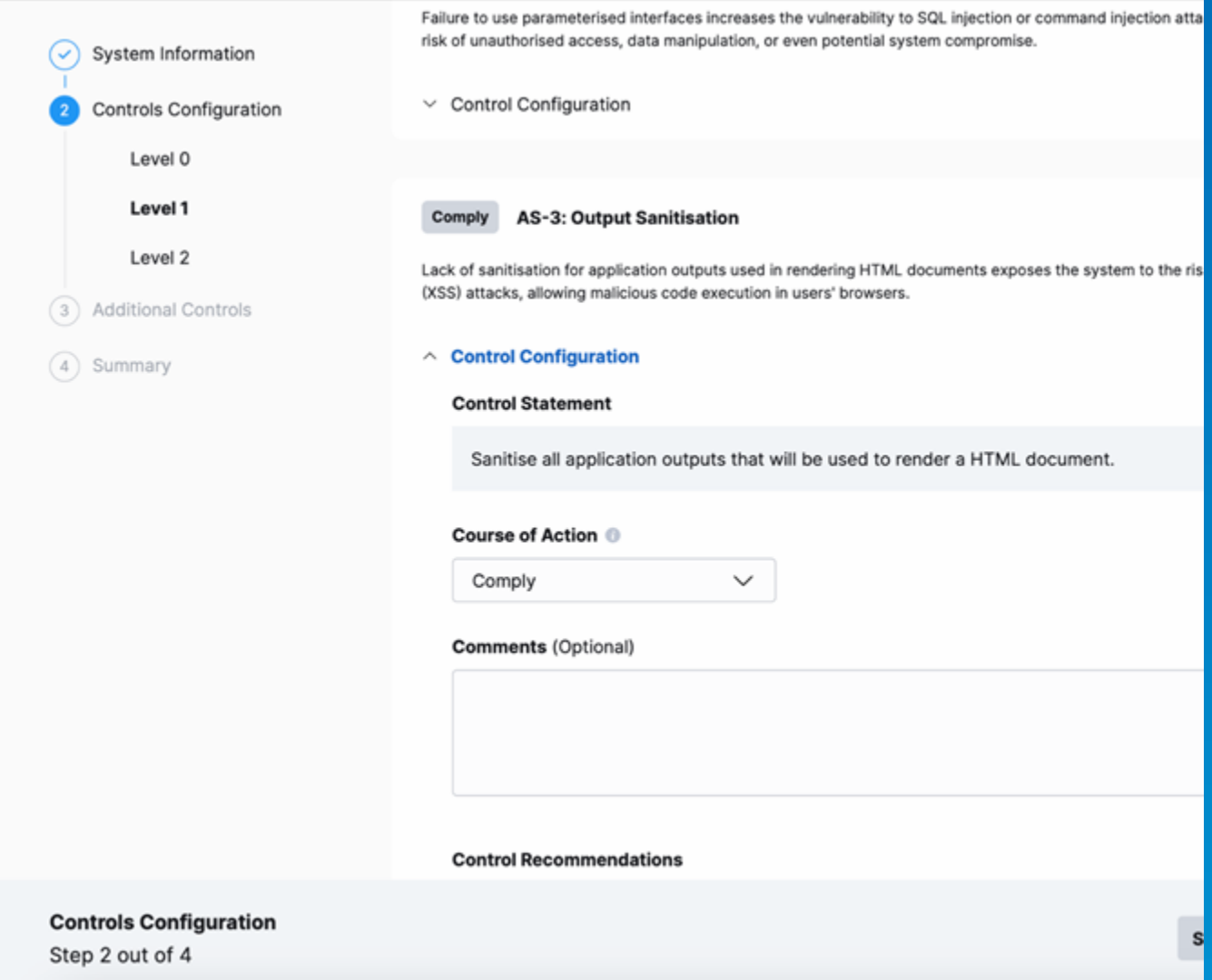
Recommendations: Additional recommendations or information to consider when selecting, implementing, assessing, and monitoring a control. This is not a mandatory or audited requirement.

Risk: The security risk mitigated by the control.

We also distributed “template SSPs” with default parameter values set at the profile and SSP levels.



GOVTECH SINGAPORE



We built an SSP editing and submission portal to facilitate central visibility and approvals.

GOVTECH SINGAPORE

Implementation of Modern Policy Development

DevOps, Publishing and Deployment

GOVTECH SINGAPORE

Challenges with traditional policy development

Closed source Authoring

Word docs and Spreadsheets

Internal only

Restricted content not open to industry

Slow releases

Yearly cycle with multiple manual approval forums

GOVTECH SINGAPORE

Our journey to OSCAL

🧪 OSCAL Experiments

Standardisation and automation

2023

☁ Cloud-First Architecture

Markdown, Git and Backstage

2022

🚀 Launch

Controls open to the industry

2024

GOVTECH SINGAPORE

Engineering mindset - Adopting open source principles

Transparency

Developed in the open

Interoperability

Machine-readable standards

Community

Engaging internally and with the industry

GOVTECH SINGAPORE

Product mindset - Policy-as-product

User-centric

Understand stakeholders and their needs

Data-driven

Improve based on data collection and analytics

Collaborative

Crowdsourcing inputs and improvements

GOVTECH SINGAPORE

Applying Git and DevOps to policy development

Planning

Issue and milestone tracking

Git history, and more importantly, git blame ;)

VS

Multiple word documents emailed back and forth

Contributing

Crowdsourced commits on branches

Merge request reviews by CODEOWNERS

VS

More word documents and large approval committees

Release

Version tags for releases

Automatically generated change logs

VS

Email blasts and manual intranet website updates

GOVTECH SINGAPORE

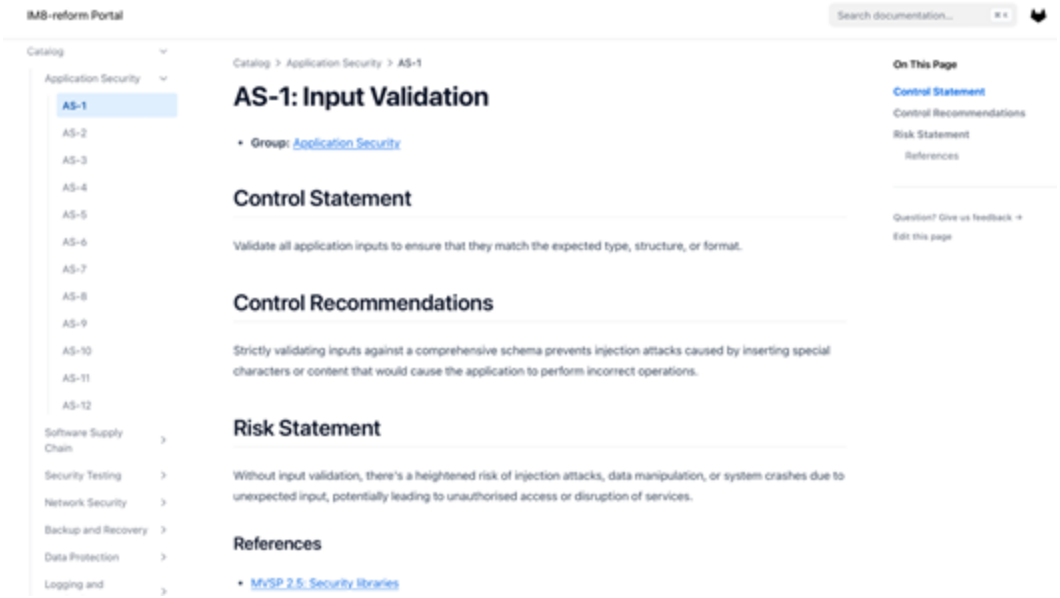
Trestle: DevOps tool for maintaining OSCAL projects

```
generate_markdown:
	trestle author catalog-generate --name im8-lite --

assemble_json:
	trestle author catalog-assemble --markdown markdow

add_ssp_control:
	trestle create -f system-security-plans/low-risk-c

merge_catalog:
	cd ./catalogs/im8-lite && \
	trestle merge -e "catalog.*" && \
	cd ../..

split_catalog:
	trestle split -f ./catalogs/im8-lite/catalog.json
	rm -r catalogs/low-risk-resolved-catalog
	rm -r catalogs/medium-risk-resolved-catalog

generate_new_uuid:
	trestle create -f system-security-plans/low-risk-c

assemble_dist: merge_catalog
	trestle assemble catalog -n im8-lite
	trestle assemble profile -n sandbox-level-0
	trestle assemble profile -n sandbox-level-1
	trestle assemble profile -n sandbox-level-2
	trestle assemble profile -n low-risk-level-0
	trestle assemble profile -n low-risk-level-1
	trestle assemble profile -n low-risk-level-2
```

- Splits, merges, and resolves OSCAL models
- Generates final distribution files
- Validates correctness of OSCAL schema

GOVTECH SINGAPORE

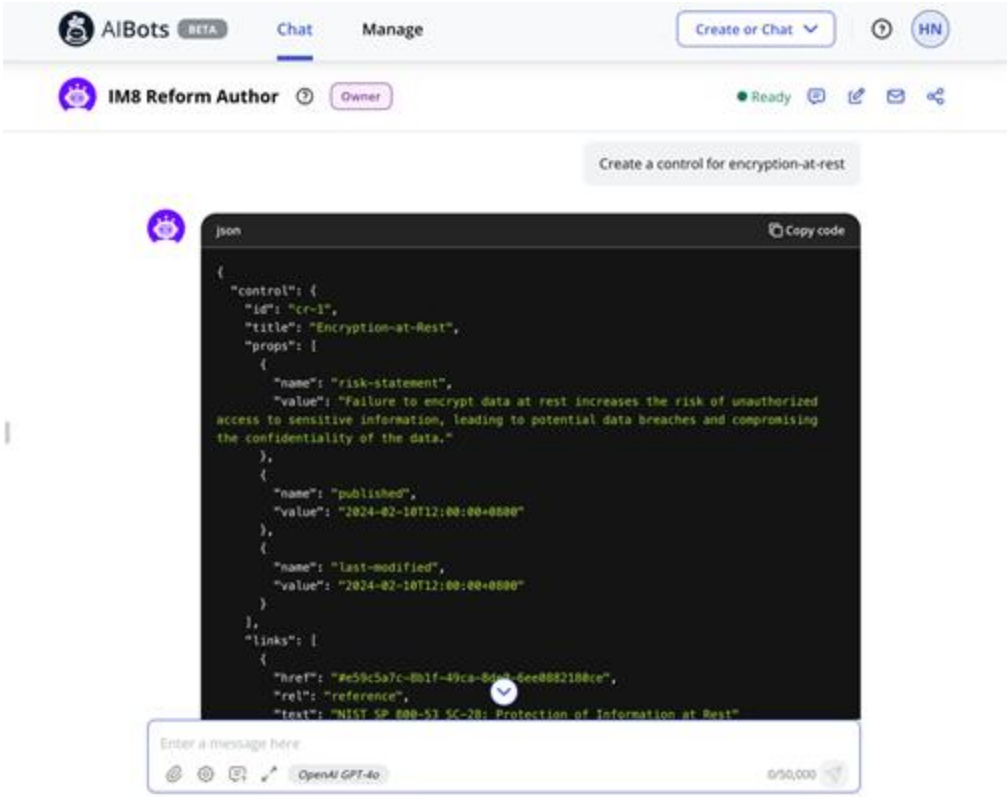
Automatically-generated review website with Next.js



- User-friendly view generated from OSCAL JSON files
- Faster search, linking, and grouping
- Built using continuous deployment with every merge to main branch

GOVTECH SINGAPORE

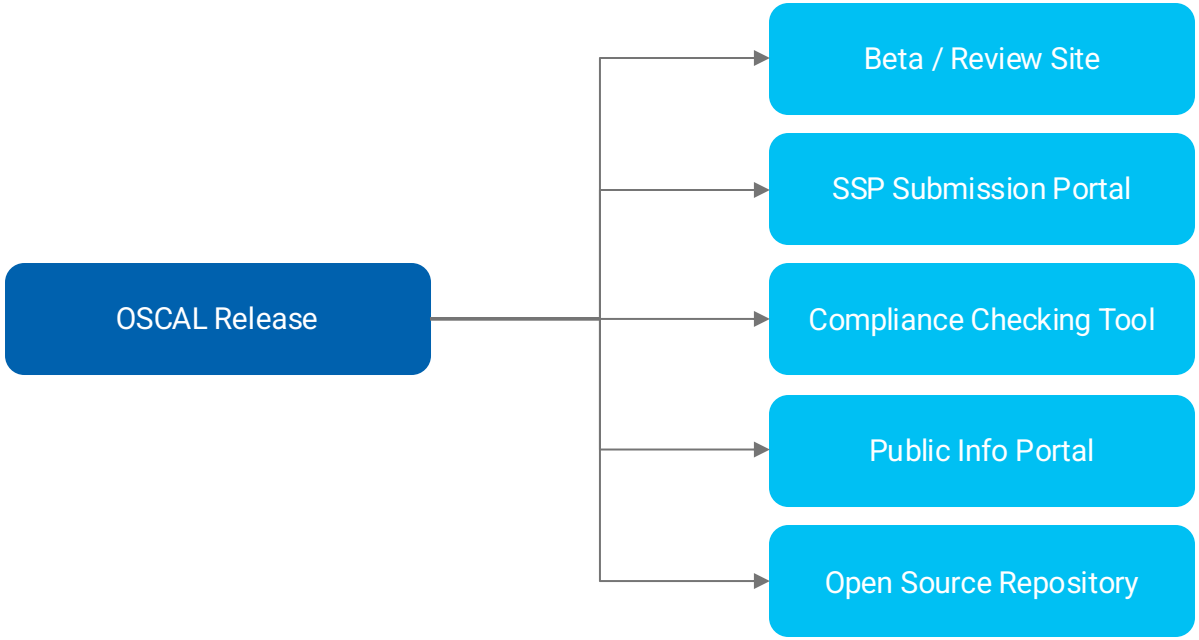
Assisting policy developers with AI tools



- A custom AI bot outputting controls in OSCAL JSON format.
- Useful starting point for non-technical policy developers.

GOVTECH SINGAPORE

Publishing to downstream projects from a single source



GOVTECH SINGAPORE

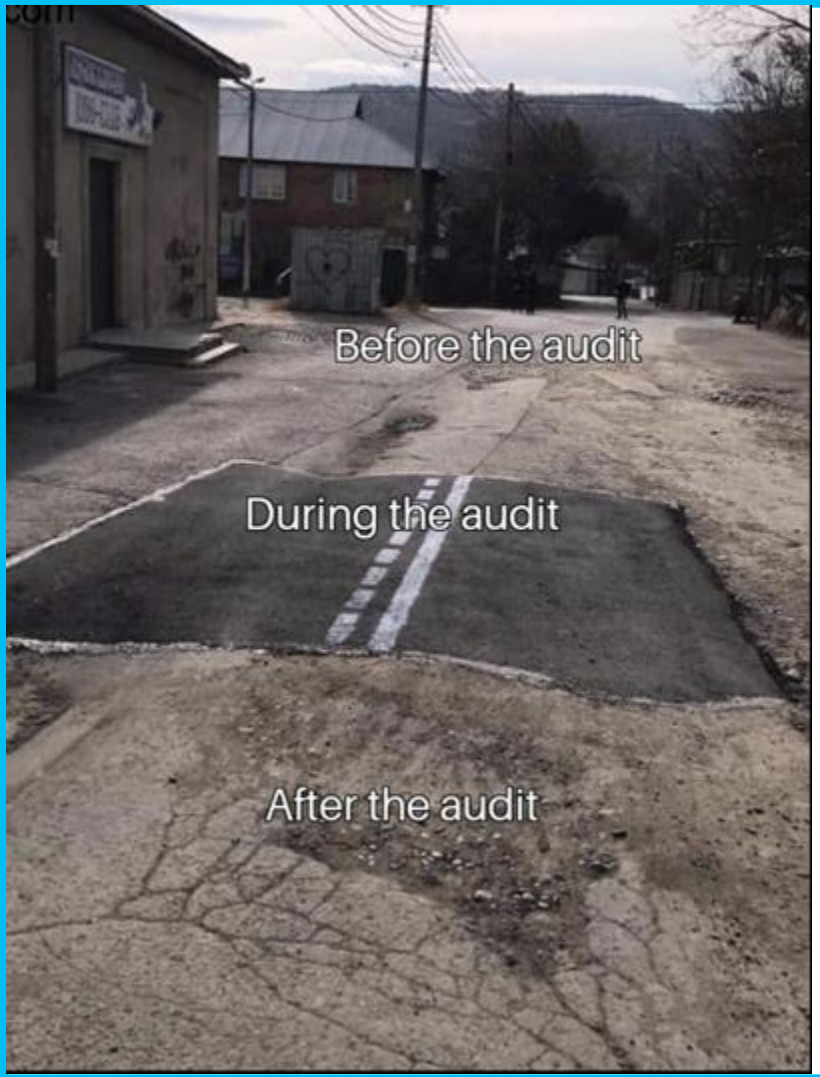
Lessons learned

- Governance teams are not familiar with Git or JSON. Willing to learn but training and helper tools needed.
- Users approach controls with different goals - some just want to be told what to do, others want greater flexibility because they know what they want.
- LLMs can help accelerate but still need oversight.

Improving the rulebook was only the start...

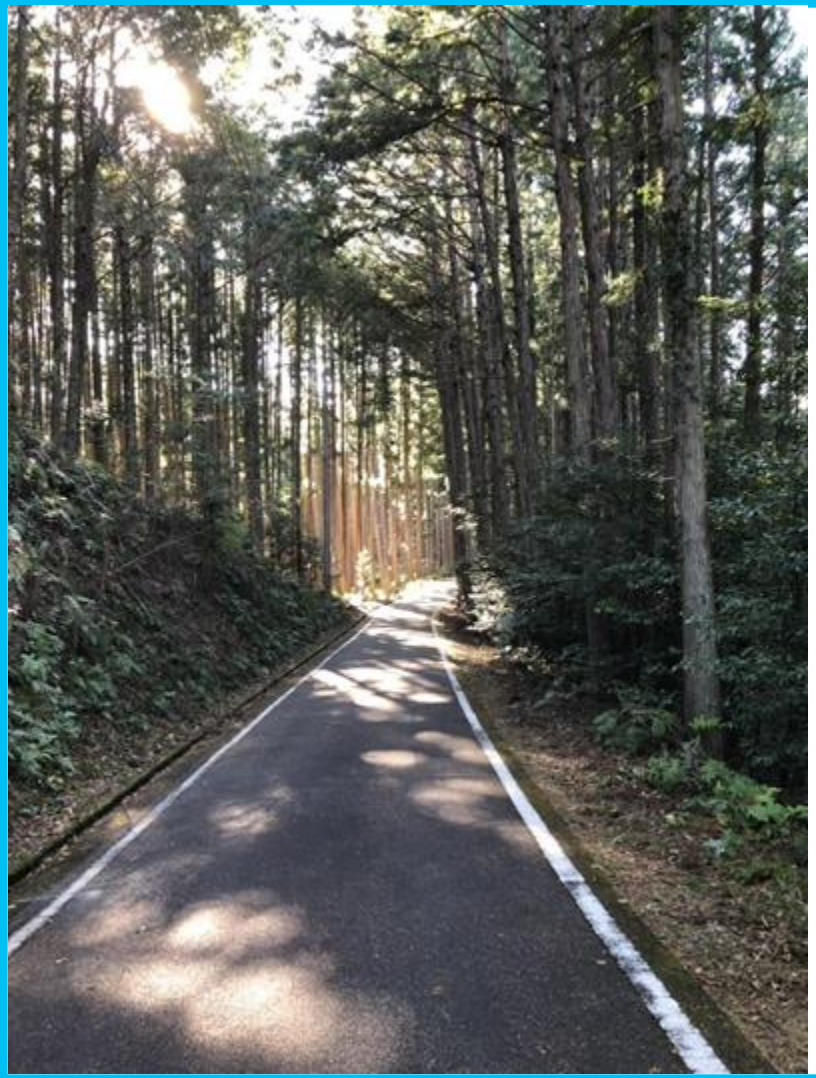
Where to next?

GOVTECH SINGAPORE



The road ahead

GOVTECH SINGAPORE



Continuous Compliance

GOVTECH SINGAPORE

Compliant → Secure

GOVTECH SINGAPORE

For Discussion - Modernising audit and compliance

- Beginning to adopt the OSCAL Assessment Layer
- Exploring a framework or SDK for evidence fetchers and checkers with archival storage.
- Evaluating GRC vs Opensource vs Custom built
- Operationalising approval workflows and coupling to profile levels

GOVTECH SINGAPORE

For Discussion - Platforms and shared responsibility

- Govtech runs a number of central platforms. Currently each system running on a platform needs to be assessed from scratch.
- Exploring Components, Certifications and leveraged authorisation.
- Culture and practice change needed for platform teams to share components or SSPs.
- Partner engagement for Component Definitions

GOVTECH SINGAPORE

Open to the public

Github Repo

Information Portal

GOVTECH SINGAPORE

GOVTECH
SINGAPORE