OpenSSF
OPEN SOURCE SECURITY FOUNDATION

Addressing the OSS Security challenge

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All software under attack, via vulnerabilities & supply chain

96%

of the total codebases contained open source

84%

of codebases contained at least one open source vulnerability

Log4Shell

https://www.synopsys.com/blogs/software-security/open-source-trends-ossra-report.html
https://www.sonatype.com/state-of-the-software-supply-chain/introduction

Security of OSS

- Some defects are vulnerabilities (just like closed source)
- Also has supply chain (SC) attacks — but the most common may be surprising!
- Most common SC problem: Users download the *wrong software*
  - Typosquatting & dependency confusion
- Less common: Seized OSS developer accounts (typically stolen password)
  - We're working to deploy MFA everywhere, e.g., token giveaways
- Uncommon: Intentional submission/insertion of malicious source code
  - Multi-person OSS projects resilient
  - Linux kernel has fended off 2 attacks

Governmental Agencies World-wide Becoming Proactive

Executive Order (EO) on Improving the Nation's Cybersecurity (12/05/2021)
Executive Order (EO) on Ensuring Responsible Development of Digital Assets (3/9/2022)

- *including Quantum Computing*

www.whitehouse.gov

CYBERSECURITY & INFRASTRUCTURE SECURITY AGENCY

www.cisa.gov

CISA Cybersecurity Advisory Committee (CSAC) (6/2021)

- Cybersecurity Best Practices, Cyber Threats and Advisories

European Commission

The European Union Agency for Cybersecurity (ENISA)

- Cyber Resilience Act (9/15/2022)

外務省 Japan Ministry of Foreign Affairs

National Security Council (NSS)

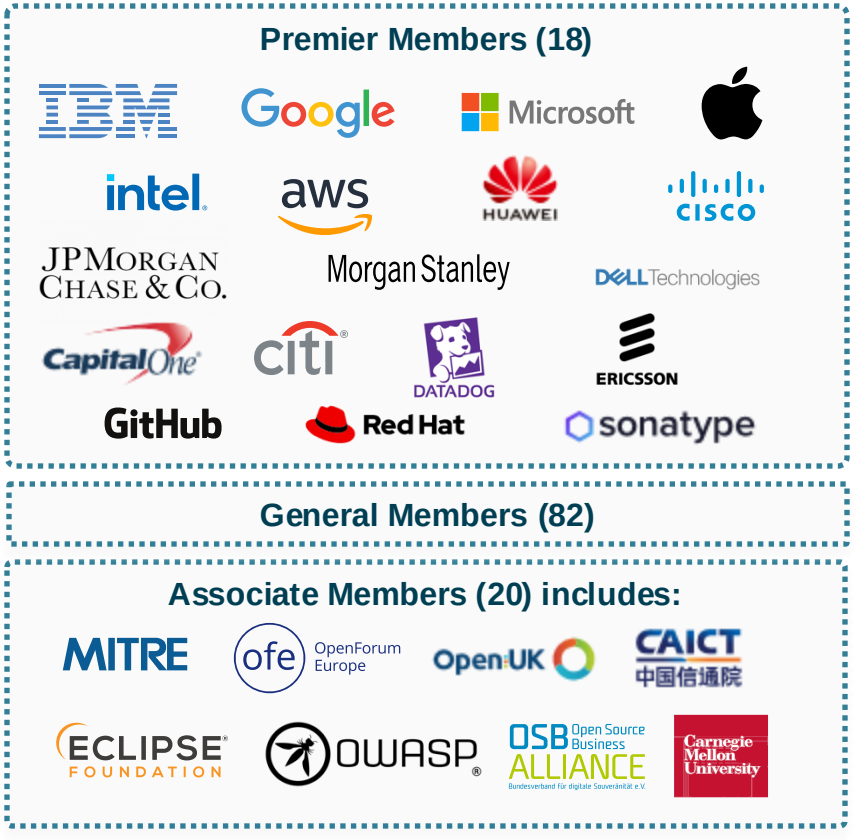
- National Security Strategy (12/16/2022)

OSS, Security, & OpenSSF

- Millions of OSS projects
- Many foundations run OSS projects relevant to security and/or DevSecOps
  - LF Foundations: Continuous Delivery Foundation, Cloud Native Computing Foundation, etc.
  - Other foundations: Apache Software Foundation, Eclipse Foundation, Python Software Foundation, OWASP, etc.

- Open Source Security Foundation (OpenSSF)
  - “Collaboration and working both upstream and with existing communities to advance open source security for all”

Open Source Security Foundation

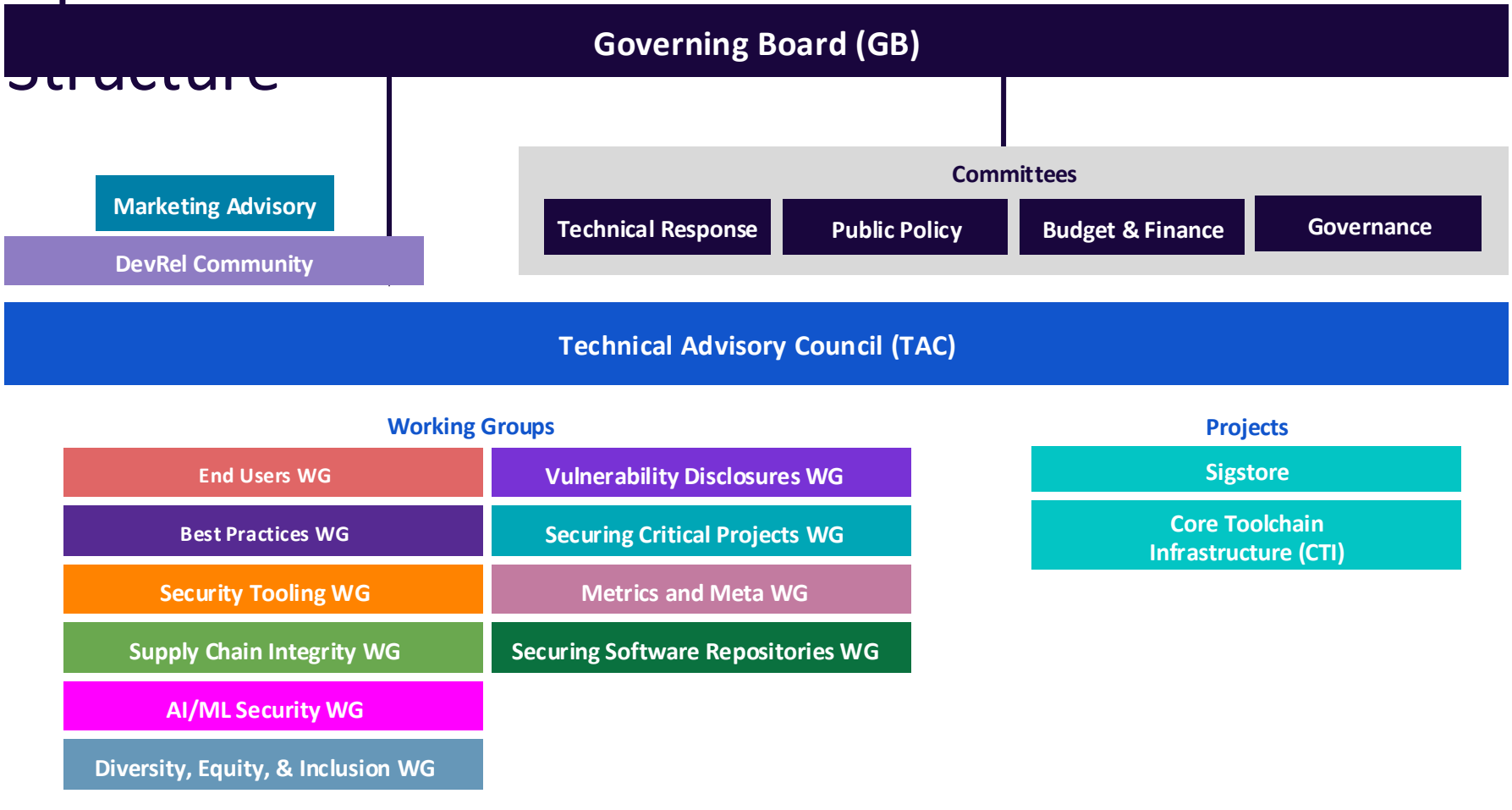


https://openssf.org/about/members/

OpenSSF
OPEN SOURCE SECURITY FOUNDATION

- **August 2020** – Formed under the The Linux Foundation
  - *"The Open Source Security Foundation (OpenSSF) is a cross-industry forum for a collaborative effort to improve open source software security."*
  - Originally, an OSS "Coalition" of companies comprised of **"organic" work groups**
- **Dec 2021** – **OpenSSF "2.0" -** Election of Governing Board (GB) with expanded membership and funding
  - Jamie Thomas, GM Systems Strategy and Development, IBM elected GB Chair
- **Sep. 2023** – OpenSSF Membership Exceeds 110 with Many New Members Dedicated to Securing Open Source Software

OpenSSF Structure



Working Groups, Projects, & SIGs

1. FOUNDATIONAL INFORMATION

2. ENGAGE

3.

Vulnerability Disclosures

Efficient vulnerability reporting and remediation

I. **CVD Guides** SIGs
J. **OSS-SIRT** SIG
K. **Open Source Vuln Schema (OSV)** project
L. **OpenVEX** project
OpenVEX SIG
M. **Vuln Autofix** SIG

Best Practices

Identification, awareness, and education of security practices

A. **Secure Software Development Fundamentals courses** SIG
B. **Security Knowledge Framework (SKF)** project
C. **OpenSSF Best Practices Badge** project
D. **OpenSSF Scorecard** project
E. **Common Requirements Enumeration (CRE)** project
F. **Concise & Best Practices Guides** SIGs
G. **Education** SIG
H. **Memory Safety** SIG
AG. **The Security Toolbelt** SIG
AL. Python Hardening SIG

End Users

Voice of public & private sector orgs that primarily consume open source

Z. **Threat Modeling** SIG

Metrics & Metadata

Security metrics/reviews for open source projects

N. **Security Insights** project
O. **Metrics API** SIG
P. **Security Reviews** project

Security Tooling

State of the art security tools

Q. **SBOM Everywhere** SIG
R. **OSS Fuzzing** project
AI. **SBOMit** project
AJ. **Protobom** project

Supply Chain Integrity

Ensuring the provenance of open source code

S. **Supply-chain Levels for Software Artifacts (SLSA)** project
T. **Secure Supply Chain Consumpt Framework (S2C2F)** project
AJ. **gittuf** project

AK. **GUAC** project
AM. **Zarf** project

Securing Software Repositories

collaboration between repository operators

AB. **RSTUF** Project

Securing Critical Projects

Identification of critical open source projects

U. **List of Critical OS Prj, components, & Frameworks** SIG
V. **criticality_score** project
W. **Census** SIG
X. **Package Analysis** project
Y. **allstar** project

AI/ML Security

AI/ML Security at the Intersection of Artificial Intelligence and Cybersecurity

AD. **Model Signing** SIG

DevRel

Develop Use Cases and help others learn about security

Diversity, Equity, & Inclusion

Increase representation and strengthen the overall effectiveness of the cybersecurity workforce

Projects

Category-leading software initiatives

AE. **Sigstore**
AF. Core Toolchain Infrastructure (CTI)

Sample OpenSSF Project/SIG Results

- Education: *Secure Software Development Fundamentals* (**free** course)
- Guides:
  - *Concise Guide for Developing More Secure Software*
  - *Concise Guide for Evaluating Open Source Software*
  - *Security Baseline (WIP)*
- OSS Security Evaluation:
  - *OpenSSF Scorecard*; auto-measures OSS github.com/ossf/scorecard
  - *OpenSSF Best Practices Badge* (for OSS projects); >6,100 participating, 3 levels
  - *Supply-chain Levels for Software Artifacts (SLSA)*
- Improved tooling: *Sigstore (signing)*
- Vulnerability finding/reporting:
  - *Alpha-Omega:* proactively find/fix vulnerabilities openssf.org/community/alpha-omega
  - *Vulnerability Disclosure Guide* github.com/ossf/oss-vulnerability-guide

Is OSS or proprietary software always more secure?

- Neither. The reality is that neither OSS nor proprietary always more secure
  - If you care, evaluate
- A design principle gives OSS a *potential* security advantage
  - Saltzer & Schroeder [1974/1975] defined secure design principles still valid today
  - Open design principle: “the protection mechanism must not depend on attacker ignorance”
  - OSS better fulfills this principle
  - “Many eyes” theory can work
    - Academics, science & engineering already based on peer review
    - Security experts widely perceive OSS advantage
    - Requires reviewers who know what to look for *and* fixing the problems found
- No software is perfect, so vulnerabilities may be found in well-run projects
  - Continuous careful review is *more* likely to detect vulnerabilities over time

Many technologies at play

- SBOMs (SPDX, CycloneDX)
- Artifact Dependency Graphs (GUAC, dependency track)
- Integrity protections (sigstore, PGP, etc)
- Process-based measurements (SLSA, scorecard, HipCheck, and per-foundation guides)
- Safe consumption frameworks (S2C2F, ESF guide)

Increasing your security posture

Adopt internal policies and processes regarding Open Source use:

- Open source training: open source, open governance, licenses, participation guidelines, security best practices
- Open source clearance: scanning for licenses and vulnerabilities, scorecard
- DevSecOps: scanning for any changes to licenses, vulnerability, scorecard + generation of SBOM+SLSA Provenance

Open source is free – as in puppies

Open source is free, free as in puppies. You might get a free puppy from the shelter, but it is now your responsibility.

Similarly, with open source, you need to:

- Ensure currency with upstream
- Remediate defects and vulnerabilities as they are discovered
- Beware of creating your own fork
- Ideally, contribute fixes and improvements upstream

Get involved!

- To get involved in OpenSSF see openssf.org
  - Biweekly meetings, mailing lists, Slack
  - See our blog for what's going on: openssf.org/blog
- Many other OSS projects & foundations, e.g., Continuous Delivery
- Industry, academia, & government should work together
- The best way to influence an OSS project direction is to get involved!

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