Secure by Design

A Guide to Assessing Software Security Practices

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Agenda

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Secure by Design – General Principles

- Seeks to achieve an appropriate level of security via Risk Management approach
- Seeks to eliminate known exploitable vulnerabilities in software and related processes
- One of the hardest challenges for organizations is knowing and proving where appropriate controls and configurations are in place vs. where they're lacking
- Documenting inventory and attack surfaces is also challenging
- Addressing and remediating vulnerabilities are essential
- Security by Design is an essential core component of the CRA

Secure by Design – United States

- **Cybersecurity and Infrastructure Security Agency (CISA)**
  - Secure By Design (SbD) White Paper, April 2023, Updated Oct 2023
    - "…technology products are built in a way that ***reasonably*** protects against malicious cyber actors…"
    - 17 US and International Partners
  - SbD Pledge, May 2024
    - Software manufacturers pledge that they are ***working towards*** meeting the principles and goals of SbD
    - 346 Pledge Signers (January 2026)
- **NIST SP 800-218 V1.1, Secure Software Development Framework (SSDF), February 2022**
  - Four Groups: Prepare the Organization, Protect the Software, Produce Well-Secured Software, Respond to Vulnerabilities
  - V1.1 updated in part to support EO 14028, *Improving the Nation's Cybersecurity*, May 12, 2021; pending update in response to EO 14306, *Sustaining Select Efforts to Strengthen the Nation's Cybersecurity and Amending Executive Order 13694 and Executive Order 14144,* June 6, 2025

Secure by Design – Commercial Contributions

- **Microsoft Secure Development Lifecycle (SDL) Process, May 2012 (v5.2)**
  - Ten SDL practices to mitigate risks throughout the development lifecycle: Design, Code, Build and Deploy, Run, Zero Trust Architecture and Governance
- **SAFECode "Fundamental Practices for Secure Software Development" and "Application Software Security and the CIS Controls"**
- **Building Security In Maturity Model (BSIMM) 15, January 2025**
  - Framework with 12 practices organized into four domains: Governance, Intelligence, SSDL Touchpoints, Deployment
- **Secure By Design at Google, March 2024**
  - "…incorporate safety and security during software design, implementation and deployment…"

Secure By Design: *A Guide to Assessing Software Security Practices*

- **Practical, evaluable guidance for building software that is SbD.**
- **Aligned to NIST SSDF – overarching requirements included in all other guidance**
- **Describes activities and artifacts for:**
  - End Users/Customers – know what to ask for and what steps to take
  - Software Development Organizations – know what to do in practice
  - Government and Industry Bodies – know what specifics to look for to verify SbD
- **Activities and artifacts are broken out by maturity of the software development organization, or Development Groups (DGs)**
- **Maps ENISA roles described in *Cybersecurity Roles and Skills for NIS2 Essential and Important Entities (Mapping of NIS2 obligations to ECSF)* June 2025 to SbD roles and activities**

Why the NIST SSDF?

- Created by an open process with extensive public input
- Based on widely accepted practices for creating secure software
- Comprehensive
- General enough to apply very widely
- Specific enough so it’s possible to evaluate compliance
- Actively maintained

Development Group Model

Group	Description
DG1	Off-the-shelf/OSS reliance
DG2	Custom + third-party integration
DG3	Major investment in custom software

- Each level defines proportionate SbD practices and priorities

Evidence of Compliance

- Threat models
- Secure coding standards
- Tool outputs (static/dynamic analysis)
- Vulnerability reports & root cause analysis
- SBOMs and supply chain audits

Secure by Design Example

PS.3.2: Collect, safeguard, maintain, and share provenance data for all components of each software release (e.g., in a software bill of materials [SBOM]).

DG1 Activity:
• Maintain a list of approved third-party components.
• Maintain a list of third-party-components that are used in each product or online service and where they're used. (SBOM plus internal where used).

DG2 Activity:
• DG1 Activities.
• Use software composition analysis (SCA) tools to identify embedded third-party components and verify that only approved components are used.

DG3 Activity:
• DG 2 Activities.

Artifacts:

DG1:
• List of approved third-party components.
• SBOM for each product.

DG2/3:
• List of SCA tools and tool outputs.

Responsible Roles:

Program Manager; Release Engineer

References

- Secure by Design: A Guide to Assessing Software Security Practices - https://www.cisecurity.org/insights/white-papers/secure-by-design
- CIS Critical Security Controls v8.1 - https://www.cisecurity.org/controls/resources?crc=about-the-cis-critical-security-controls
- SAFECode Application Security Addendum: https://safecode.org/cis-controls/
- ETSI SSDIF: Proposed as ETSI standard TS 104 219

Thank You and Questions