RSAConference2022
San Francisco & Digital | June 6 – 9

TRANSFORM

SESSION ID: **PDSC-M-06**

New Guidelines for Enhancing Software Supply Chain Security Under EO 14028

Cherilyn Pascoe

Senior Technology Policy Advisor
National Institute of Standards and Technology

Jon Boyens

Deputy Chief, Computer Security Division
National Institute of Standards and Technology

Disclaimer

Presentations are intended for educational purposes only and do not replace independent professional judgment. Statements of fact and opinions expressed are those of the presenters individually and, unless expressly stated to the contrary, are not the opinion or position of RSA Conference LLC or any other co-sponsors. RSA Conference does not endorse or approve, and assumes no responsibility for, the content, accuracy or completeness of the information presented.

Attendees should note that sessions may be audio- or video-recorded and may be published in various media, including print, audio and video formats without further notice. The presentation template and any media capture are subject to copyright protection.

Certain commercial entities, equipment, or materials may be identified in this document in order to describe an experimental procedure or concept adequately. Such identification is not intended to imply recommendation or endorsement by NIST, nor is it intended to imply that the entities, materials, or equipment are necessarily the best available for the purpose.

Why is Software Security Important?

BRIEFING ROOM

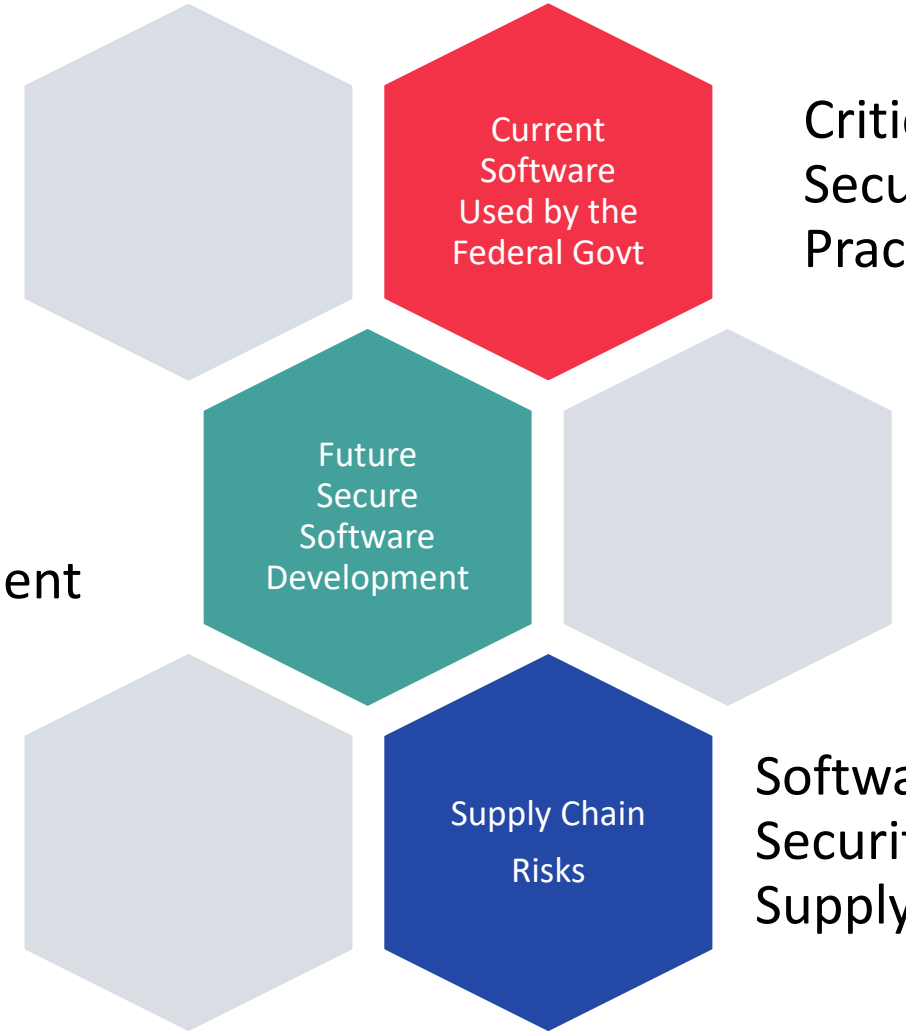
Executive Order on Improving the Nation's Cybersecurity

MAY 12, 2021 • PRESIDENTIAL ACTIONS

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. Policy. The United States faces persistent and increasingly sophisticated malicious cyber campaigns that threaten the public sector, the private sector, and ultimately the American people's security and privacy. The Federal Government must improve its efforts to identify, deter, protect against, detect, and respond to these actions and actors. The

Software Security Standards and Guidance



Critical Software Security Practices

Secure Software Development

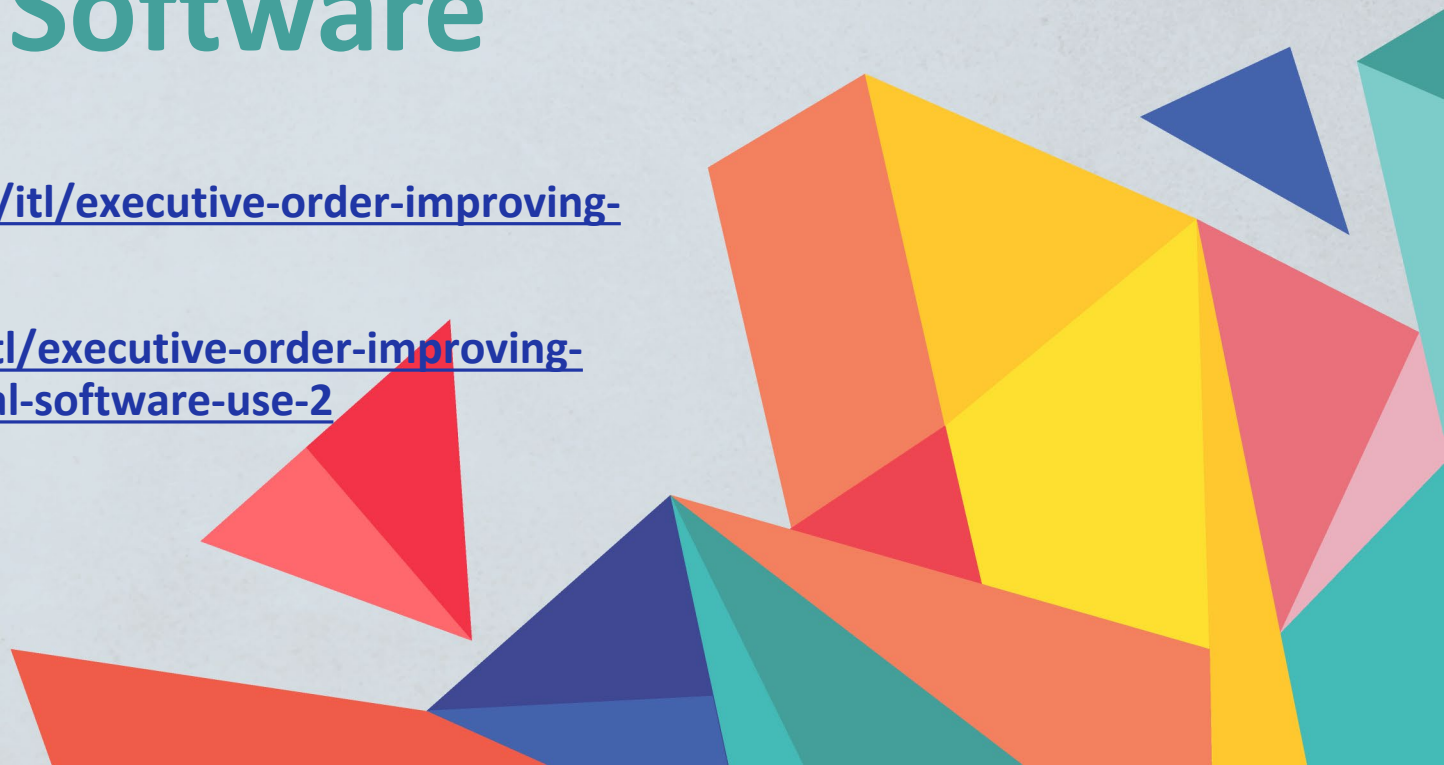
Software Security in Supply Chains

RSAConference2022

Critical Software Security Measures: Existing Software

Critical Software Definition: https://www.nist.gov/itl/executive-order-improving-nations-cybersecurity/critical-software-definition

Critical Software Security: https://www.nist.gov/itl/executive-order-improving-nations-cybersecurity/security-measures-eo-critical-software-use-2



EO-Critical Software Measures

Motivation

- Even though EO-critical software may be developed using recommended secure development practices, it still needs to be secured in agencies' operational environments.

Purpose and scope

- Define "critical software" for use by federal agencies.
- Scope applies to the protection of agencies' deployed EO-critical software. **Development and acquisition are out of scope.**
- The EO directs NIST to issue guidance and further directs OMB to **require** federal agencies to comply with that guidance. OMB has provided instructions on how federal agencies should identify their critical software and adopt required NIST security measures (OMB M-21-30, August 2021).

Critical Software Security Measures Snapshot

EO-Critical Software Security Measures	
Software Security Measure	Federal Government Informative References
Objective 1: **Protect** software/platforms from unauthorized access and usage	
Objective 2: **Protect** the confidentiality, integrity, and availability of data	
Objective 3: **Identify** and maintain to protect from exploitation	
Objective 4: Quickly **detect, respond to, and recover** from threats and incidents	
Objective 5: **Strengthen** understanding and performance of humans' actions that foster security	

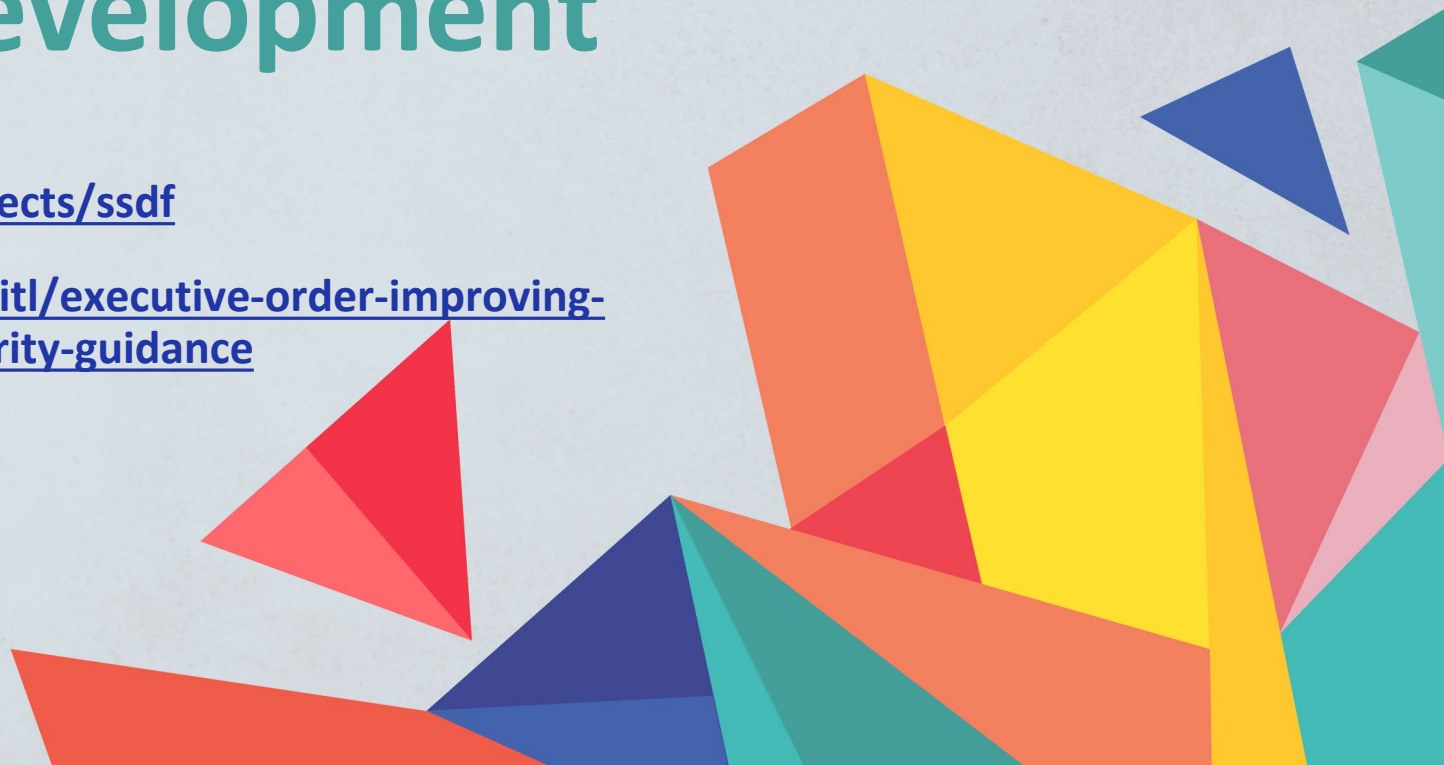
Objective 1: Protect EO-critical software and platforms from unauthorized access and usage.	
Security Measure 1.1: Use MFA that is verifier impersonation-resistant for all users and administrators of EO-critical software and EO-critical software platforms.	•**NIST,** Cybersecurity Framework: PR.AC-1, PR.AC-7 •**NIST,** SP 800-53 Rev. 5, Security and Privacy Controls for Information Systems and Organizations: AC-2, IA-2, IA-4, IA-5

RSAConference2022

Secure Software Development

SSDF V 1.1 (SP 800-218): https://csrc.nist.gov/Projects/ssdf

Secure Software Guidance: https://www.nist.gov/itl/executive-order-improving-nations-cybersecurity/software-supply-chain-security-guidance



Secure Software Development Framework

Motivation

- Help an organization adopt a risk-management approach to document its secure software development practices today and define its future target practices.

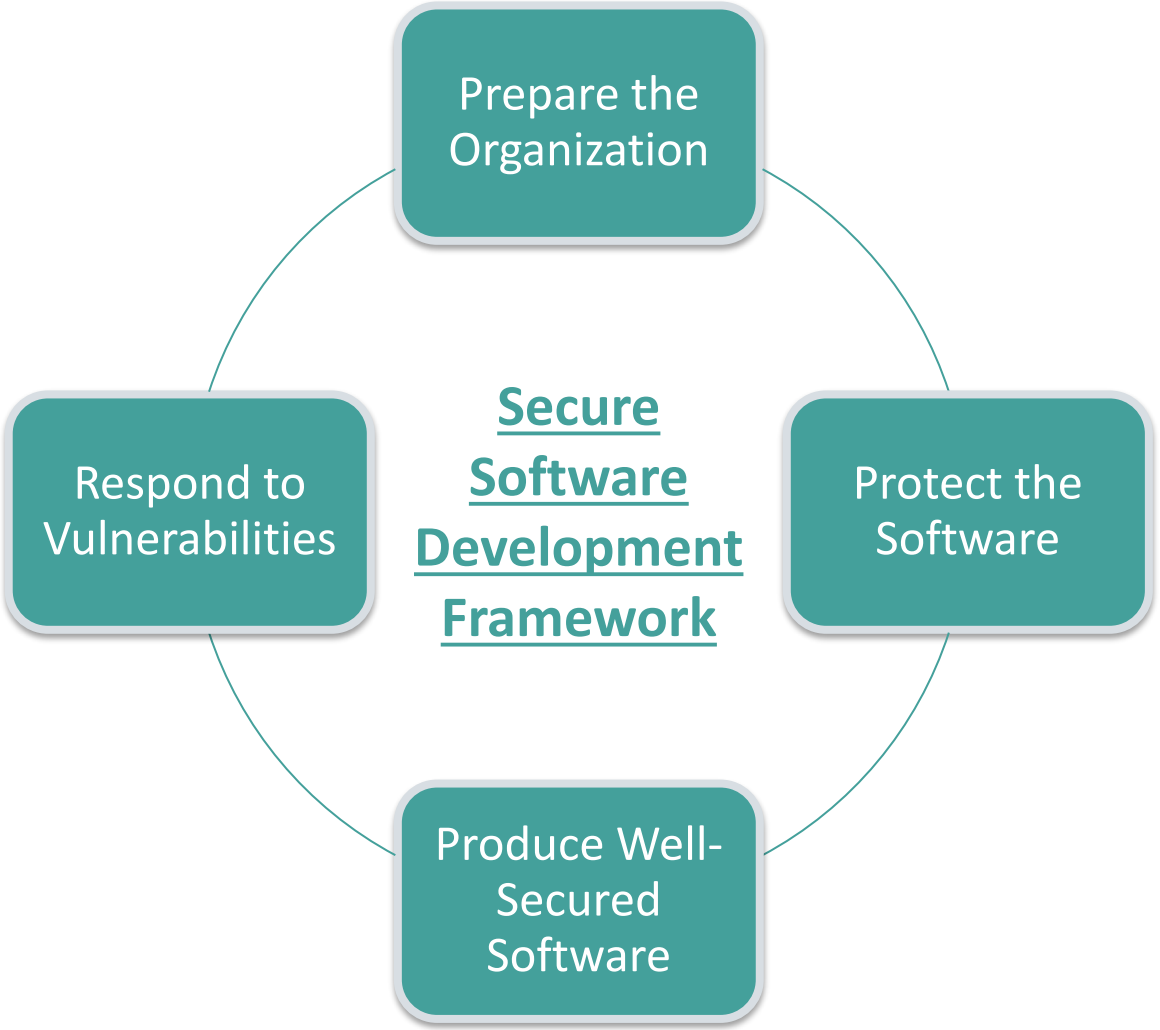
Purpose and scope

- Applies to software producers and software consumers regardless of size, sophistication
- Broadly applicable to IT, IoT, OT

Attributes

- Provides a common language and taxonomy
- Leverages existing practices from established standards and guidance

NIST Secure Software Development Framework (SSDF) Practice Groups



Software Verification

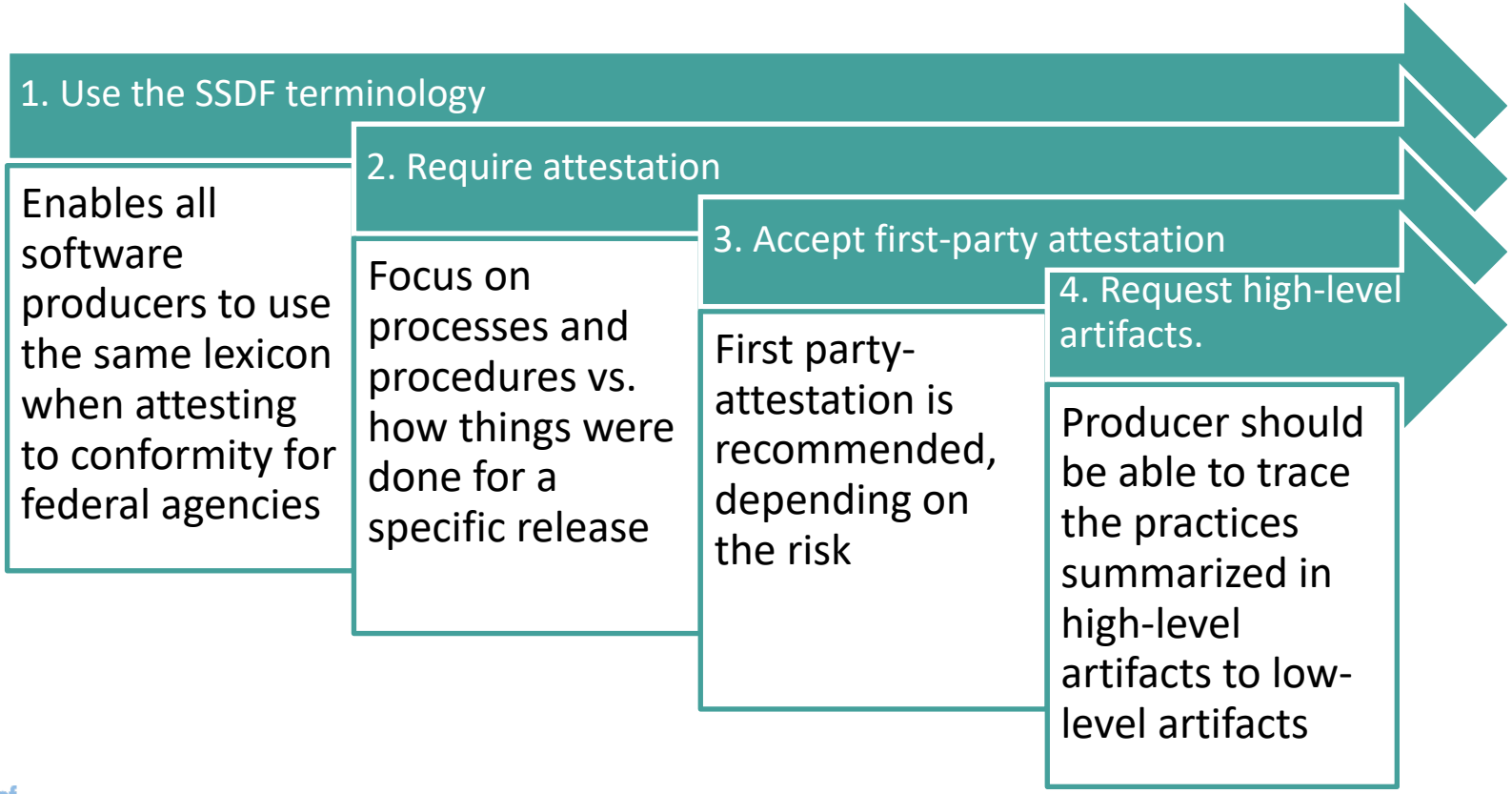
- Minimum standards recommended for verification by software vendors or developers.

- **11 recommended minimums** *(+ fixing bugs!*)
- **Background and supplemental information about each technique**
  - References for each technique
- **Beyond software verification (development, operation, assurance)**

- Threat modeling
- Automated testing
- Static Analysis: Use a code scanner to look for top bugs
- Static Analysis: Review for hardcoded secrets
- Dynamic Analysis: Run with built-in checks and protections
- Dynamic Analysis: Create “black box” test cases
- Dynamic Analysis: Create code-based structural test cases
- Dynamic Analysis: Use test cases created to catch previous bugs
- Dynamic Analysis: Run a fuzzer
- Dynamic Analysis: If the software might be connected to the Internet, run a web app scanner
- Check included software

Secure Software Attestation Guidance

- The EO directs NIST to issue guidance identifying practices that enhance the security of the software supply chain for producers and purchasers and then directs OMB to require federal agencies to comply with NIST guidelines with respect to software procured after the date of the order. NIST has guidance for attesting to conformity with SSDF and related guidance.



RSAConference2022

Cybersecurity Supply Chain Risk Management (C-SCRM) Additional Guidance

C-SCRM guidance: https://csrc.nist.gov/Projects/cyber-supply-chain-risk-management

Software Supply Chain Security under the EO: https://www.nist.gov/itl/executive-order-14028-improving-nations-cybersecurity/software-security-supply-chains

Additional Guidance for Software Supply Chain Security

Software supply chain security concepts are a critical sub-discipline within C-SCRM

EO through the lens of 800-161

- EO critical software & Measures
- Software verification
- SSDF & Attestations

Emerging Concepts

- Software Bill of Materials (SBOM)
- Enhanced Vendor Risk Assessments
- Open Source Software Controls
- Vulnerability Management

Response highlights | Associated web-based guidance (I/II)

Existing standards, tools, and recommended practices

- **EO-Critical Software**
  - Outlines targeted enhancements to existing C-SCRM guidance to support compliance with EO 14028
- **Software Cybersecurity for Producers and Users**
  - Guides federal acquirers towards SSDF v1.1 procurement activities that impact C-SCRM controls
  - Identifies risk-based scenarios in which enhanced attestation activities should be utilized
- **Software Verification**
  - Outlines targeted enhancements to existing C-SCRM guidance to support compliance with EO 14028
- **Cybersecurity Labeling for Consumers: Internet of Things (IoT) Devices and Software**
  - Provides traceability to latest web-based guidance

Response highlights | Associated web-based guidance (II/II)

Evolving standards, tools, and recommended practices

- **Software Bill of Materials (SBOM)**
  - Recaps current state of SBOM maturity and outlines practical enhancements that can be taken as this capability evolves
- **Enhanced Vendor Risk Assessments**
  - Describes enhancements to bolster vendor risk assessments for federal acquirers, especially within the context of Foreign Ownership, Control, or Influence (FOCI)
- **Open Source Software Controls**
  - Suggests a range of technical and procedural controls that federal acquirers can utilize to reduce open source software risks
- **Vulnerability Management Practices**
  - Reinforces the notion that effectively implementing and enhancing this capability is a requirement for yielding the benefits of EO concepts like Zero Trust and SBOM

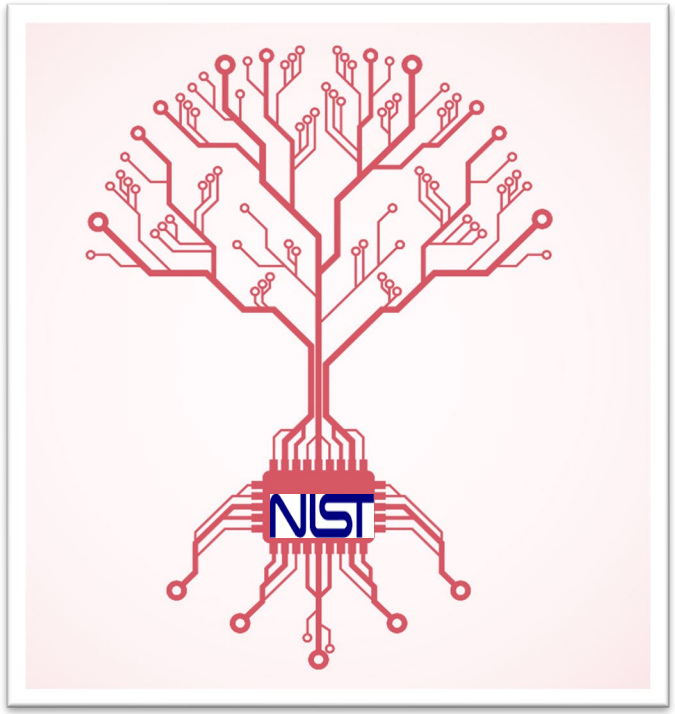
APPLY - Steps you can take

- REVIEW NIST guidance and initially ADOPT questions about the security of software your organization is developing or using.
- USE the four SSDF Practice Groups to organize communications about your existing software development or procurement.
  - “prepare the organization,” “protect the software,” “produce well-secured software,” “respond to vulnerabilities”
- Longer-term, INCORPORATE or REQUIRE that secure software development practices and cybersecurity supply chain measures be performed.
- ENGAGE by joining NIST at a workshop, submitting feedback on a publication, or joining as a collaborator at the NIST National Cybersecurity Center of Excellence.

What's Next?

- Update to NIST Cybersecurity Framework, considering supply chain issues and newer frameworks like the Secure Software Development Framework (SSDF) and the Privacy Framework.
- More on the National Initiative for Improving Cybersecurity in Supply Chains (NIICS), public-private partnership on supply chain.
- Leverage secure software efforts at the National Cybersecurity Center of Excellence, including to zero in on open-source software security challenges.
- Launch of Cybersecurity and Privacy Reference Tool (CPRT) to provide a consistent format for accessing the reference data of NIST cybersecurity publications like the SSDF.

Celebrating our 50th Anniversary



The year 2022 marks **50 years** of NIST's cybersecurity research and the development of cybersecurity and privacy standards and guidance.

Our work has helped better secure the state of technology that exists today—while providing the platform for the secure technology development of tomorrow.

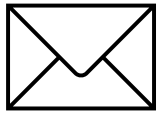
Celebrate with us all year long!

- Website: nist.gov/cybersecurity/50th-anniversary-cybersecurity-nist (events, resources, and blogs all in one place!)
- Follow @NISTcyber on Twitter and use #NISTCyber50th
- Subscribe for our GovDelivery updates (use URL above)

Stay in Touch!

- NIST relies heavily on stakeholders. NIST holds public workshops, seeks comments on draft documents, and welcomes direct interactions.

www.nist.gov/cybersecurity



Cybersecurity-Privacy@nist.gov