RSAConference™2024

San Francisco | May 6 – 9 | Moscone Center

THE ART OF POSSIBLE

SESSION ID: GRC-R05

SBOMs: Navigating the Evolving Landscape of Software Bill of Materials

#RSAC

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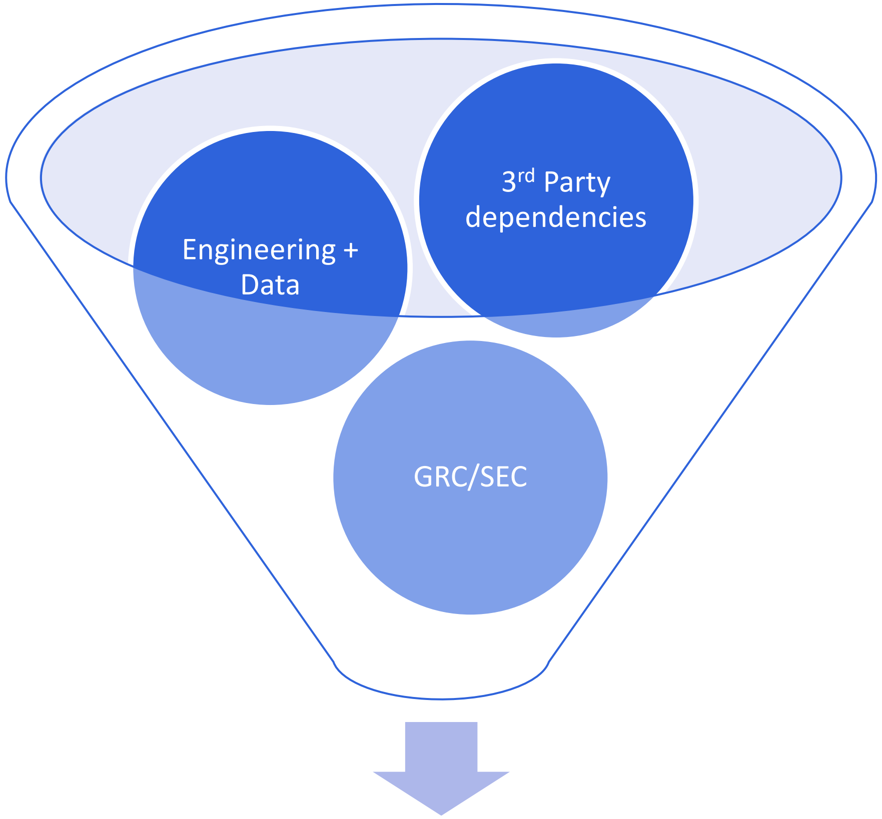
Mental Model

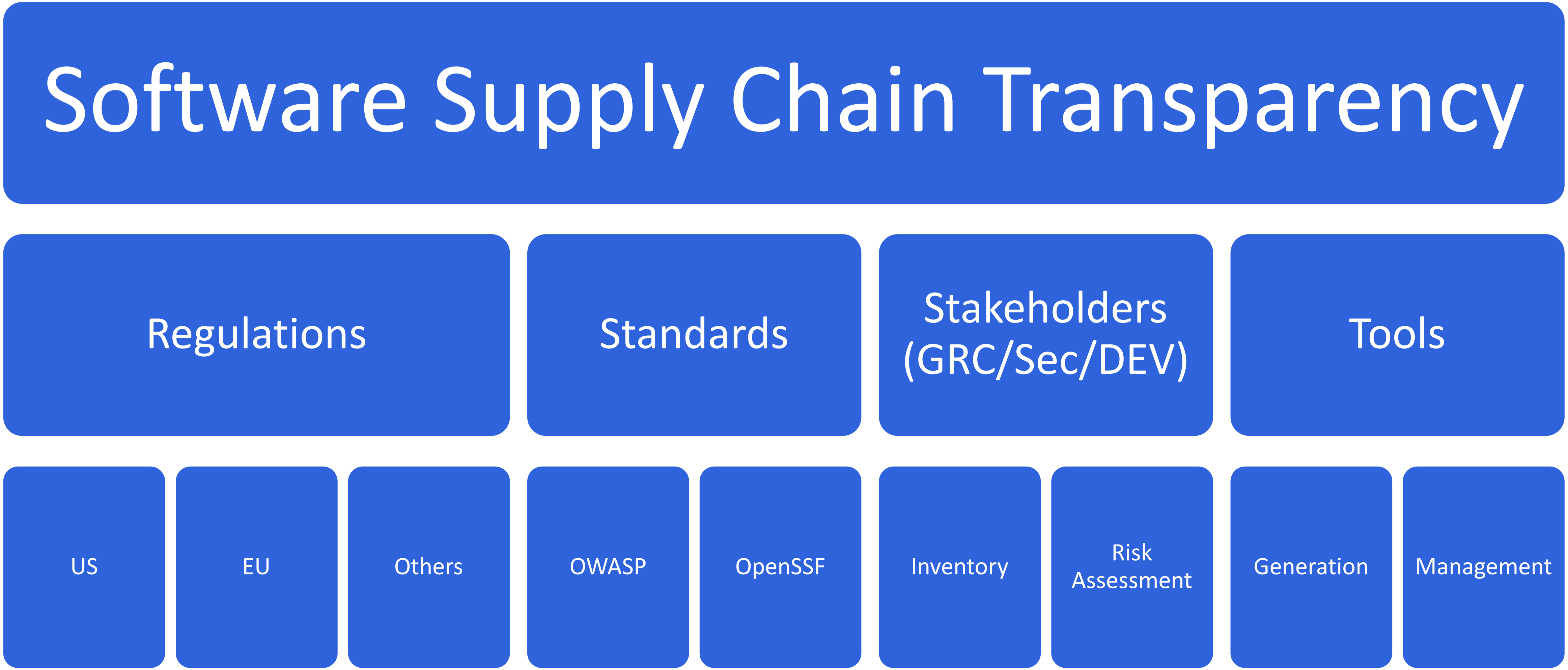
HOW TO ORGANIZE OUR THOUGHTS ON SOFTWARE SUPPLY CHAIN TRANSPARENCY

Supply Chain Transparency



Software

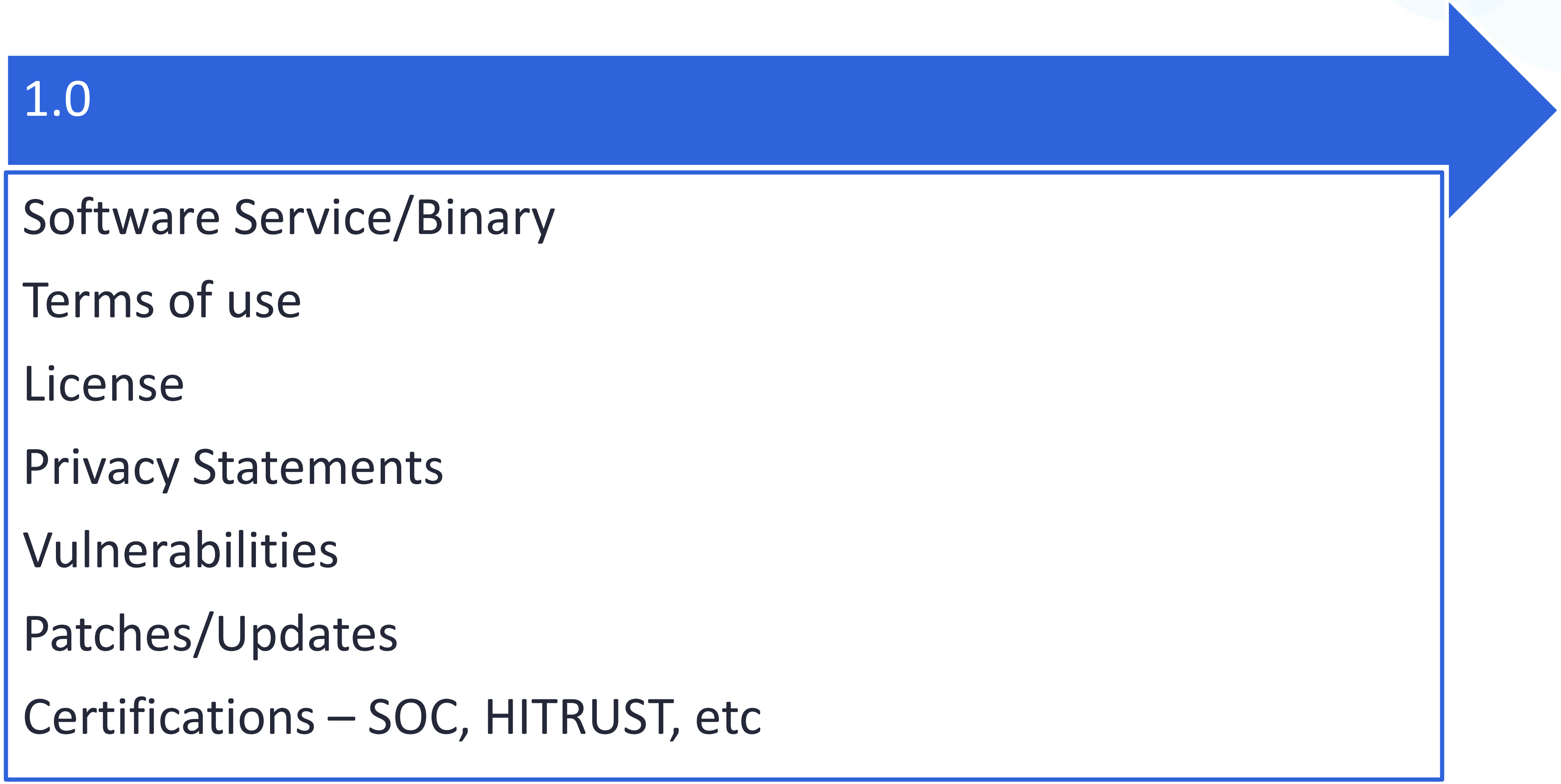
Agenda



Software Supply Chain Transparency

- Regulations
  - US
  - EU
  - Others
- Standards
  - OWASP
  - OpenSSF
- Stakeholders (GRC/Sec/DEV)
  - Inventory
  - Risk Assessment
- Tools
  - Generation
  - Management

Supply Chain Transparency Artifacts



1.0

Software Service/Binary

Terms of use

License

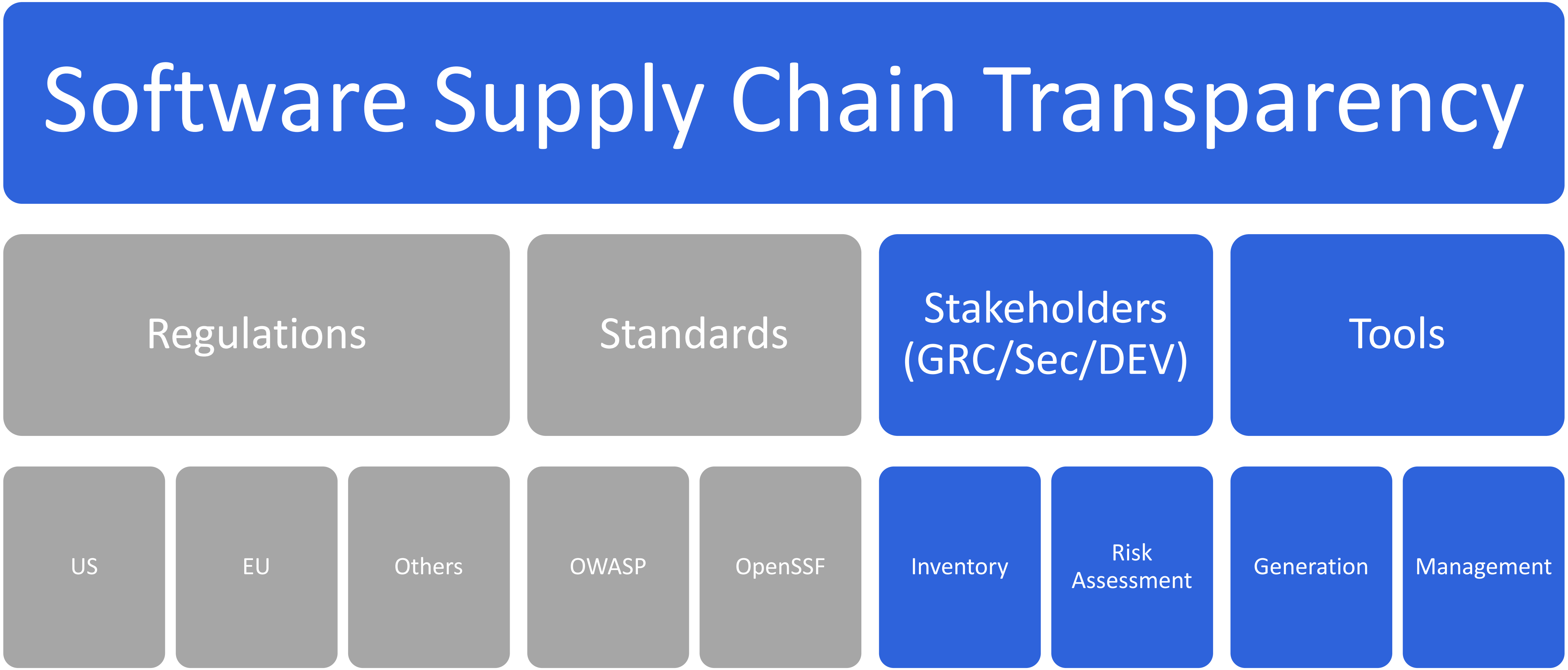
Privacy Statements

Vulnerabilities

Patches/Updates

Certifications – SOC, HITRUST, etc

Agenda



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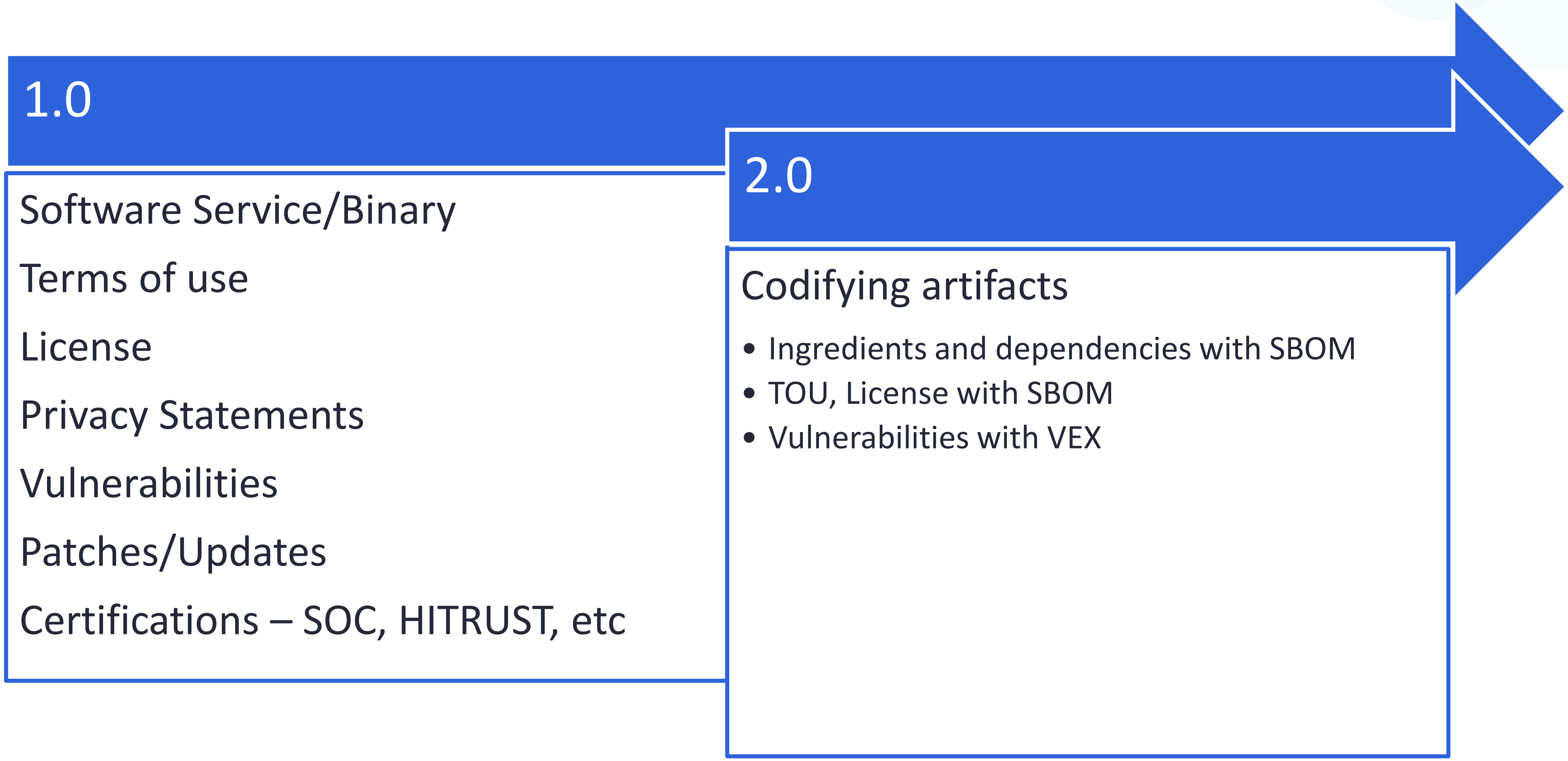
Accountability/Trust/Liability

- Accountability
  - TOU
  - License
  - Privacy Policy
- Trust
  - Certifications
  - FDA – Medical Device software
- Liability
  - Private contract controlled by License

Supply Chain Transparency Artifacts



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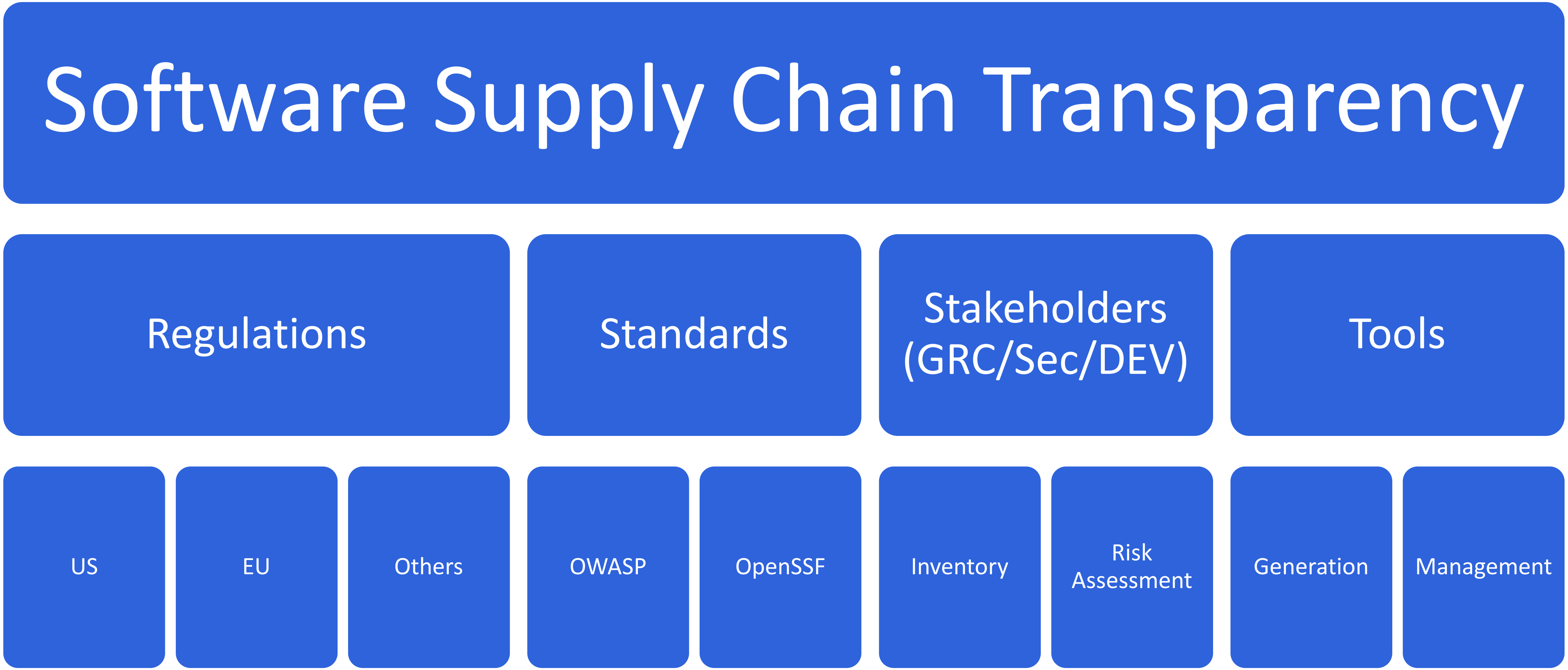
Certifications – SOC, HITRUST, etc

2.0

Codifying artifacts

- Ingredients and dependencies with SBOM
- TOU, License with SBOM
- Vulnerabilities with VEX

Agenda



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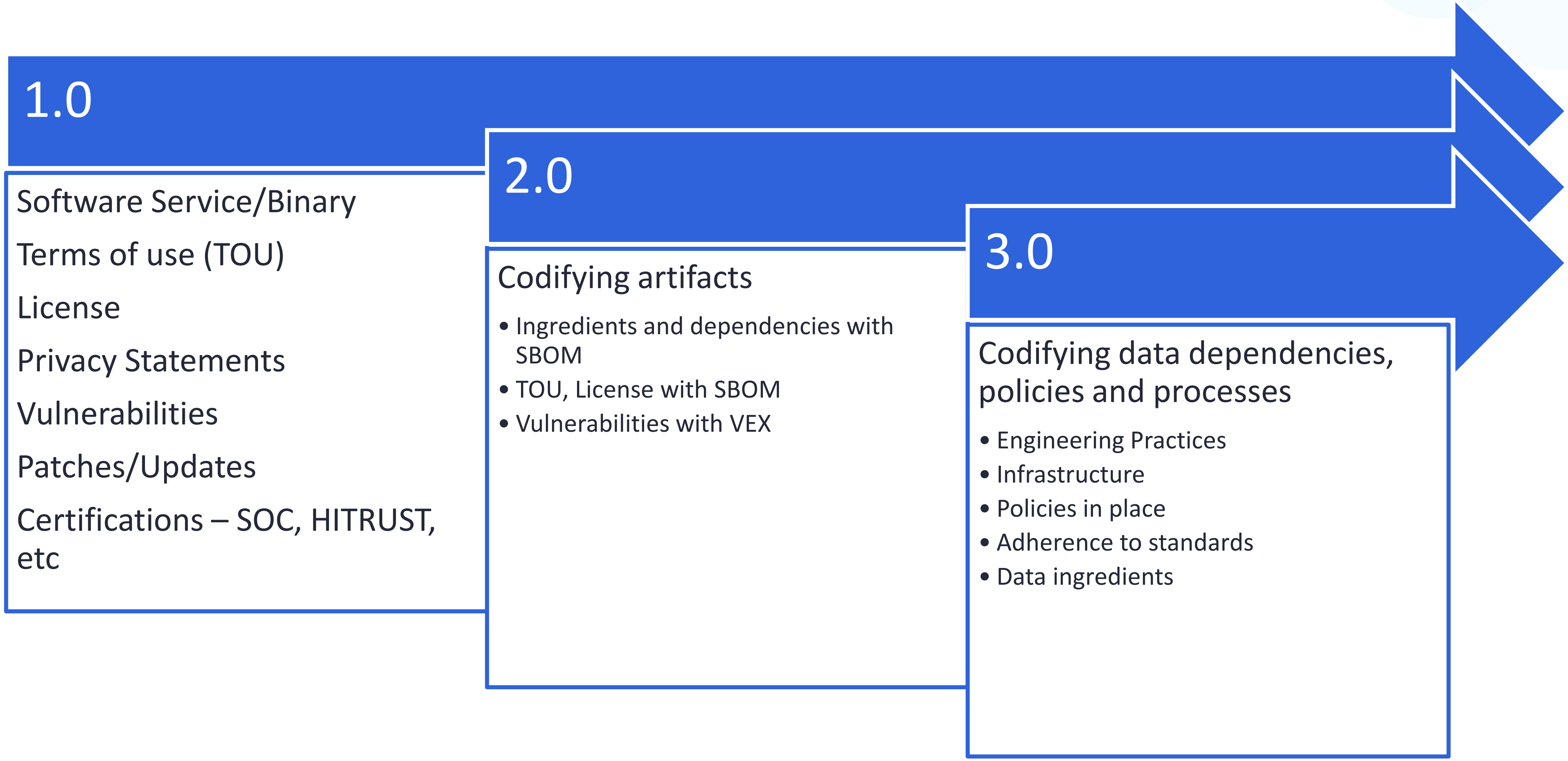
Accountability/Trust/Liability

- Accountability
  - TOU
  - License
  - Privacy Policy
  - SBOM/VEX – Transparency into the ingredients and process
- Trust
  - Certifications
  - FDA – Medical Device software
  - Attestations – Transparency into compliance
- Liability
  - Private contract controlled by License
  - Legal framework to incentivize compliance

Supply Chain Transparency Artifacts



1.0

Software Service/Binary

Terms of use (TOU)

License

Privacy Statements

Vulnerabilities

Patches/Updates

Certifications – SOC, HITRUST, etc

2.0

Codifying artifacts

- Ingredients and dependencies with SBOM
- TOU, License with SBOM
- Vulnerabilities with VEX

3.0

Codifying data dependencies, policies and processes

- Engineering Practices
- Infrastructure
- Policies in place
- Adherence to standards
- Data ingredients

Regulations

Regulations - Accelerating Evolution

- EO 14028 - Improving the Nation’s Cybersecurity
  - National Institute of Standards and Technology (NIST) Special Publication (SP) 800-218: Secure Software Development Framework (SSDF)
  - NTIA minimum requirements
  - Office of Management and Budget (OMB) Memorandum M-23-16
  - Dept of Homeland Security, Department of Energy, HH
  - FDA / Medical Devices - Consolidated Appropriations Act and Patch Act 2022 (Protecting and Transforming Healthcare Act)

Regulations - Accelerating Evolution

- EU
  - BSI - The German IT Security Act 2.0
  - National Cyber Security Centre Finland SBOM Guidelines
  - Cyber Resilience Act 2024

    Manufacturers of the products with digital elements shall: (1) identify and document vulnerabilities and components contained in the product, including by drawing up a software bill of materials in a commonly used and machine-readable format covering at the very least the top-level dependencies of the product.
  - Digital Operational Resilience for the Financial Sector 2024

Regulations - Accelerating Evolution

- Australia
  - Australian Cyber Security Centre - ISM-1730: Software bill of materials

Evolution of Incentives to secure SDLC

- * Software provider accountability
  - Moved from private domain to public domain
  - Provided legal framework
  - Deterministic liability

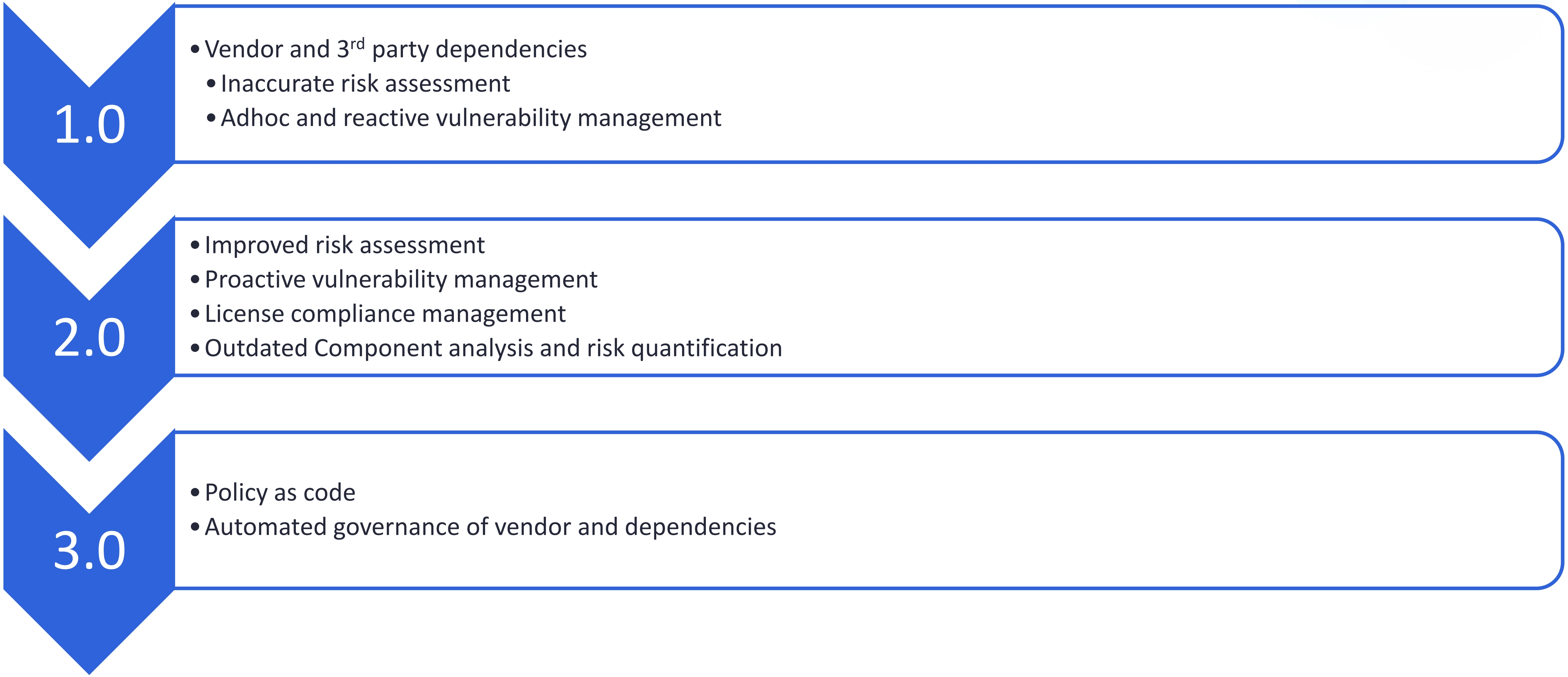
Evolving Standards

- Ingredients, License
  - Cyclone DX - OWASP
  - SPDX – OpenSSF
  - SWID - NIST
    - *NTIA minimum elements for SBOM*
- Vulnerability Exchange
  - Cyclone DX (VEX) - OWASP
  - OpenVEX - OpenSSF

Evolving Standards

- Software Supply chain maturity
  - Attesting to SDLC and compliance to standards
  - Maturity Model
    - NIST SSDF
    - SLSA – OpenSSF/Google
    - S2c2f – OpenSSF/Microsoft
  - Machine readable representation
    - In-TOTO
    - Cyclone DX

GRC



1.0

- Vendor and 3rd party dependencies
  - Inaccurate risk assessment
  - Adhoc and reactive vulnerability management

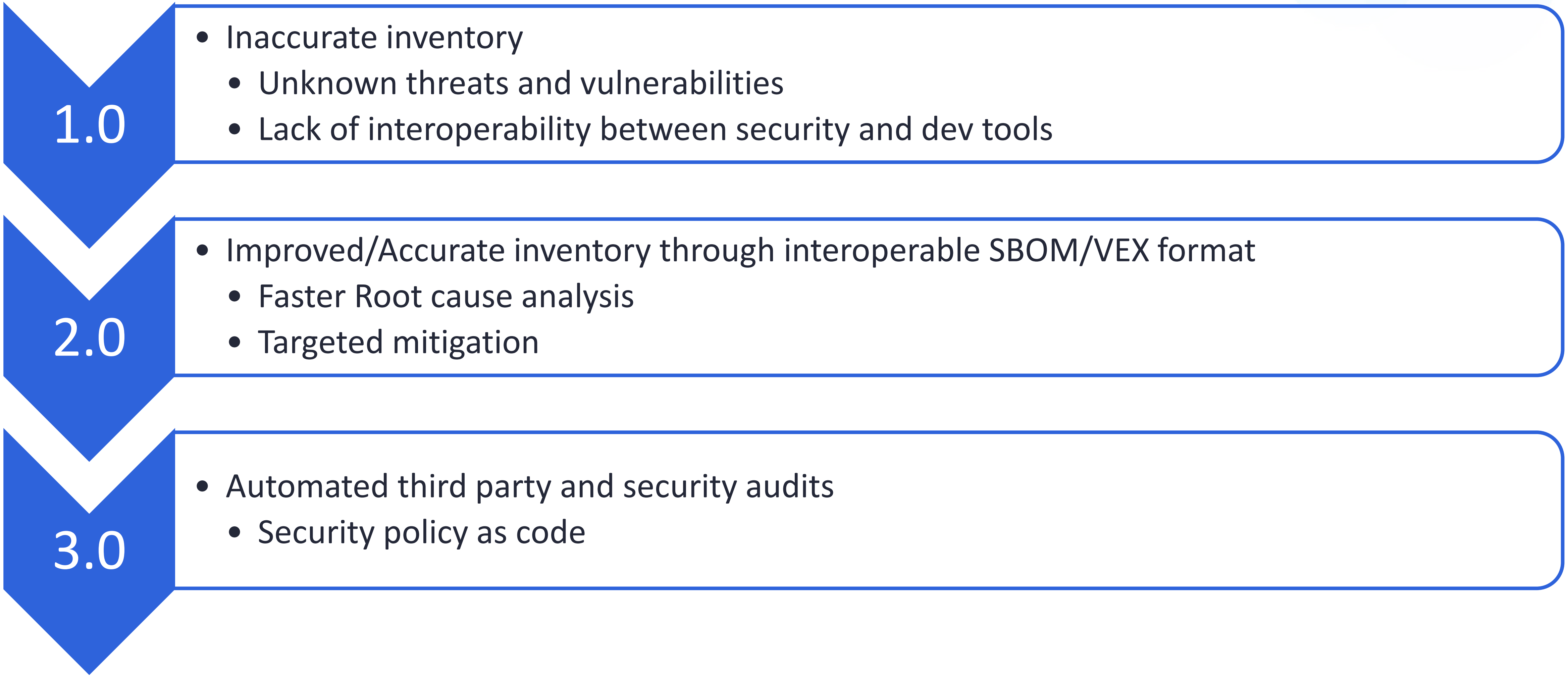
2.0

- Improved risk assessment
- Proactive vulnerability management
- License compliance management
- Outdated Component analysis and risk quantification

3.0

- Policy as code
- Automated governance of vendor and dependencies

Security



1.0

- Inaccurate inventory
  - Unknown threats and vulnerabilities
  - Lack of interoperability between security and dev tools

2.0

- Improved/Accurate inventory through interoperable SBOM/VEX format
  - Faster Root cause analysis
  - Targeted mitigation

3.0

- Automated third party and security audits
  - Security policy as code

Tools for 2.0 & beyond

- Generate / Validate
- Attestations
- Sign
- Distribute
- Consume / Manage

Tools for 2.0 & beyond – Generation / Validation

OSS Community driven

- OWASP Cyclone DX Generator - CDXGen (Apache 2.0)
  - CDX tool center
- OpenSSF SPDX SBOM Generator (Apache 2.0)

Industry driven

- Anchore Syft (Apache 2.0)
- Microsoft SBOM tool (MIT)
- Lockheed Martin Hoppr (MIT)
- ZARF (Apache 2.0)
  - Bundler

Tools for 2.0 & beyond – Attestations

- OWASP Cyclone DX Generator - CDXGen (Apache 2.0)

- Anchore Syft (Apache 2.0)
  - In-TOTO attestations
- Aqua Security Trivy (Apache 2.0)
  - In-TOTO attestations for scanners

Tools for 2.0 & beyond – Signing

- OWASP Cyclone DX Generator - CDXGen (Apache 2.0)

- OpenSSF Sigstore (Apache 2.0)

Tools for 2.0 & beyond – Distribution/Release Management

- Same as artifact distribution services
  - Docker registries
  - Package managers

Tools for 2.0 & beyond – Assured Package Service

Services offering security assurance over OSS through SBOM and provenance validation

- Sonatype Maven Central
- Google Assured OSS

Tools for 2.0 & beyond – SBOM management

OSS Community driven

- Dependency Track (Apache 2.0)

Industry driven

- FOSSA

Opportunities for OSS Community + Entrepreneurs

Providers

Tooling for distribution

- VEX data
- SBOM & Attestation Release management

Consumers

Tooling for GRC and Security

- Tools to enforce GRC policy in SDLC - using SBOM, VEX & Attestation to filter consumption of trusted
  - Container images
  - Packages
  - Runtime architectures

Opportunities for GRC/Security Practitioners

Next Week

- Identify critical components for SBOM generation
- Research and select tools for SBOM generation

3 Months

- Implement a process for SBOM generation for critical components
- Establish a process to include dependencies in SBOM.
- Develop a strategy to integrate vulnerability management with available SBOMs.
  - Identify tools to support vulnerability management with VEX and SBOMS

6 Months

- Identify tools to support generating attestations on critical component SDLC
- Establish a process of release management based on attestations generated during the SDLC

Questions ?