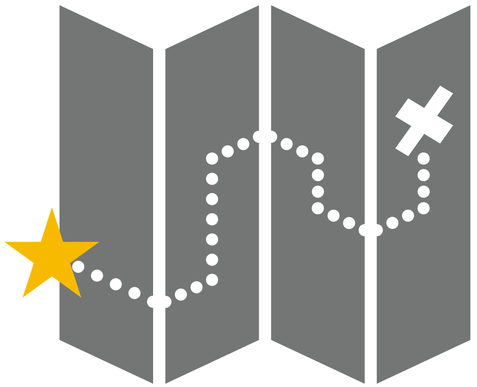
June 14, 2023

ONRAMPS & ADOPTION

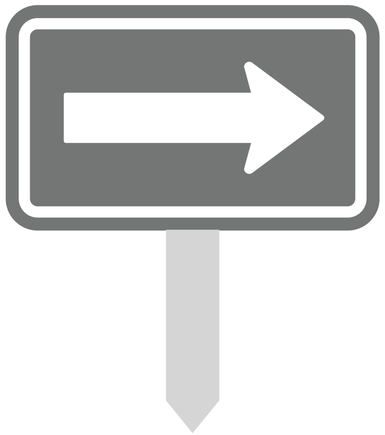
Community Working Groups (CISA Phase)

Audra Hatch, Joshua Corman

ONRAMPS & ADOPTION – MISSION / VISION / GOALS



Starting Point



Sign Posts

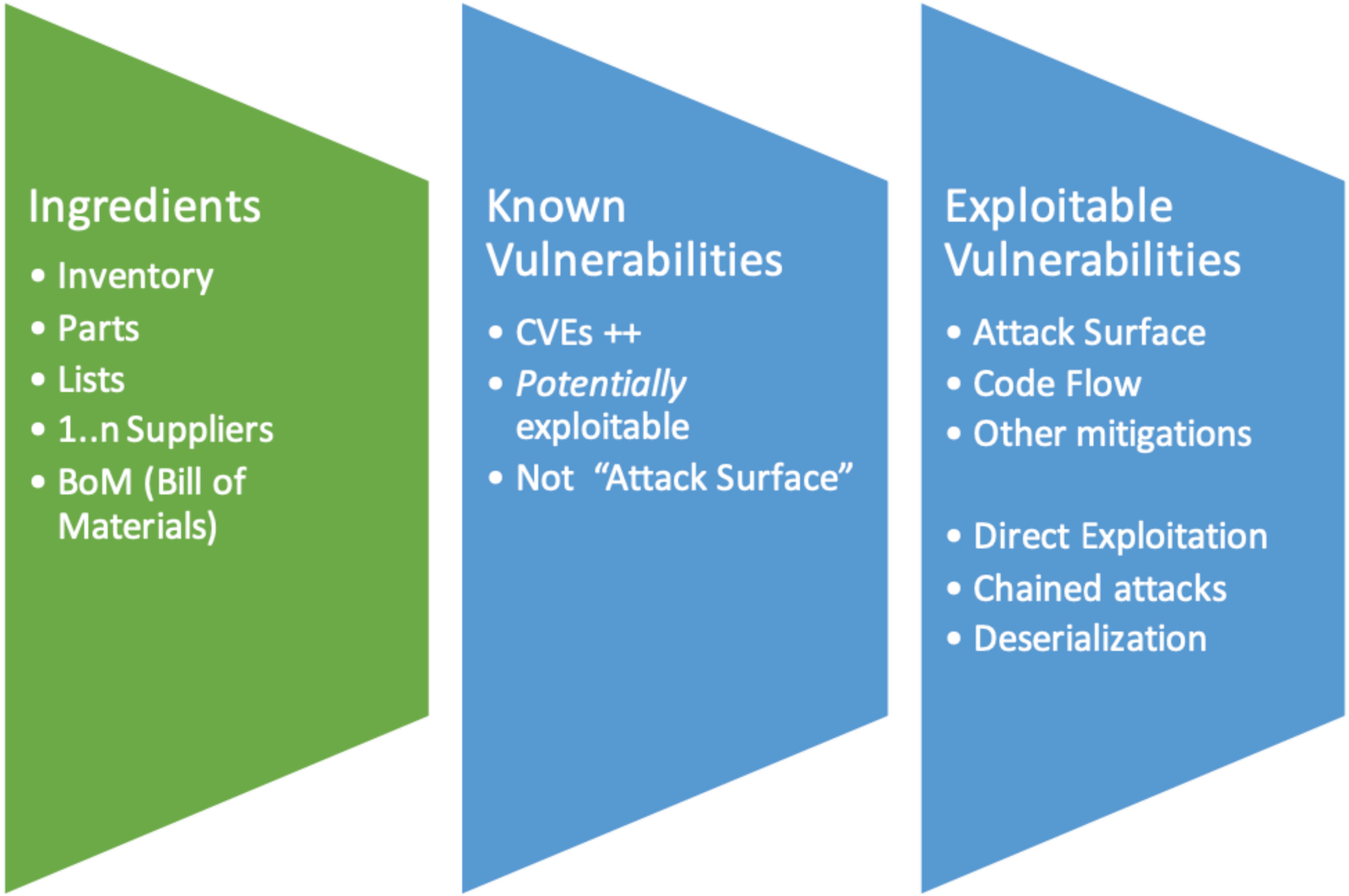
Identify & Bridge Gaps

EMPATHY & IMPEDANCE MISMATCH

BIDIRECTIONAL MINDFULNESS & EMPATHY

PAST

SBOM (AND BEYOND)



SBOM IS HERE

“The future is already here — it’s just not very evenly distributed.”

– William Gibson

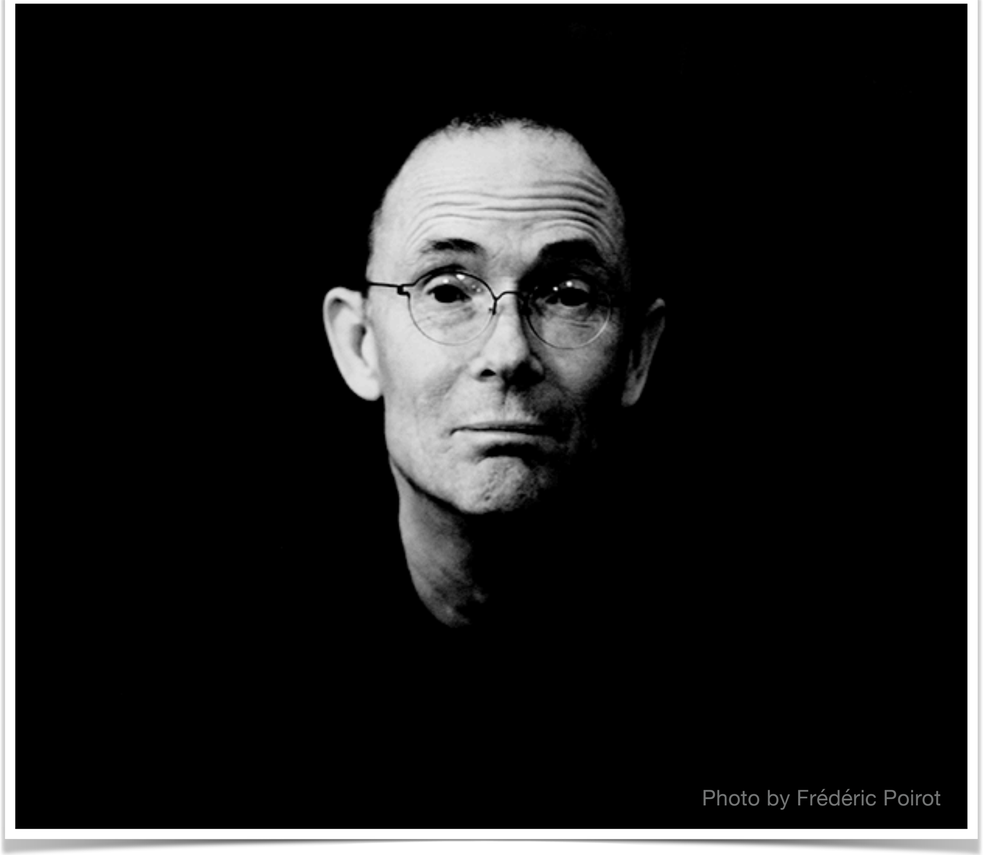
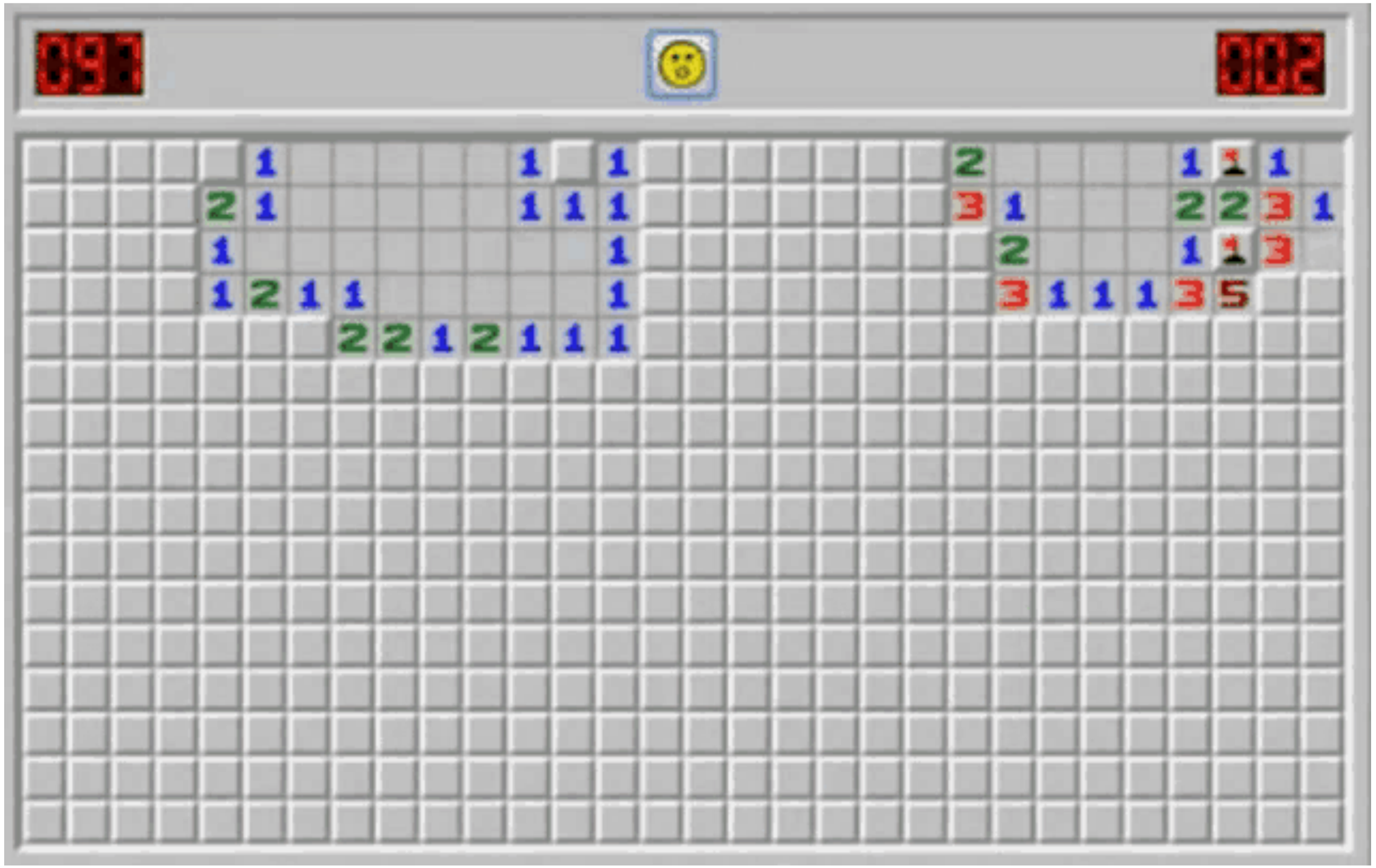
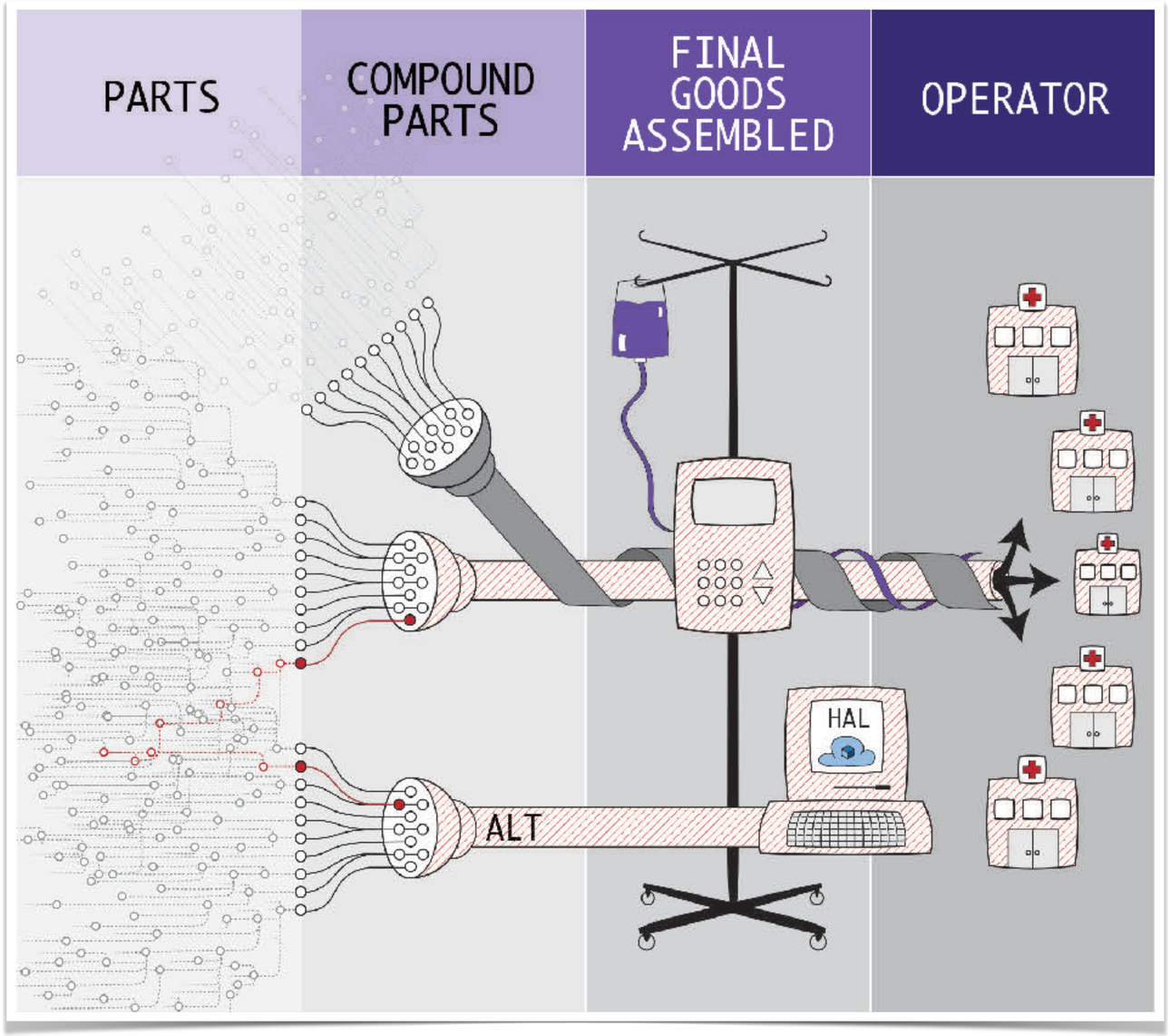


Photo by Frédéric Poirot

BOMBS & VISIBILITY



WE'RE ALL IN A SUPPLY CHAIN – MOST OF US ARE IN THE MIDDLE




R 1 3 5
2 4

Produce

The person or organization that creates a software component or software for use by others

[write/create/assemble/package]

Produce

The person or organization that creates a software component or software for use by others

[write/create/assemble/package]

Choose

The person or organization that decides the software, products, and/or suppliers for use

[purchase/acquire/source/select/approve]

Produce

The person or organization that creates a software component or software for use by others

[write/create/assemble/package]

Choose

The person or organization that decides the software, products, and/or suppliers for use

[purchase/acquire/source/select/approve]

Operate

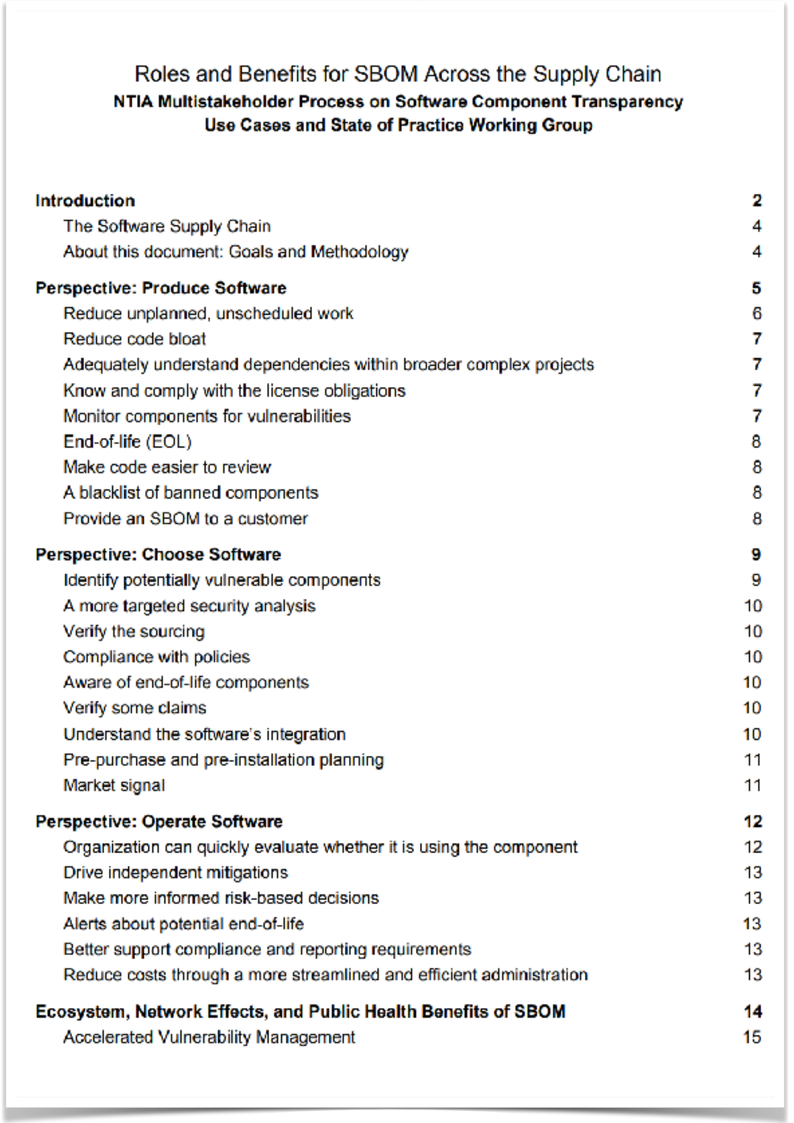
The person or organization that operates the software component or software

[uses/monitor/maintain/defend/respond]

Benefits	Produce	Choose	Operate
Cost	Less unplanned, unscheduled work	A more accurate total cost of ownership	More efficient administration
Security Risk	Avoid known vulnerabilities	Easier due diligence	Faster identification and resolution. Know if and where specific software is affected.
License Risk	Quantify and manage licenses and associated risk	Easier due diligence	More efficient, accurate response to license claims
Compliance Risk	Easier risk evaluation. Identify compliance requirements earlier in lifecycle	More accurate due diligence, catch issues earlier in lifecycle	Streamlined process
High Assurance	Make assertions about artifacts, sources, and processes used	Make informed, attack-resistant choices about components	Validate claims under changing and adversarial conditions

USE CASES, ROLES & BENEFITS

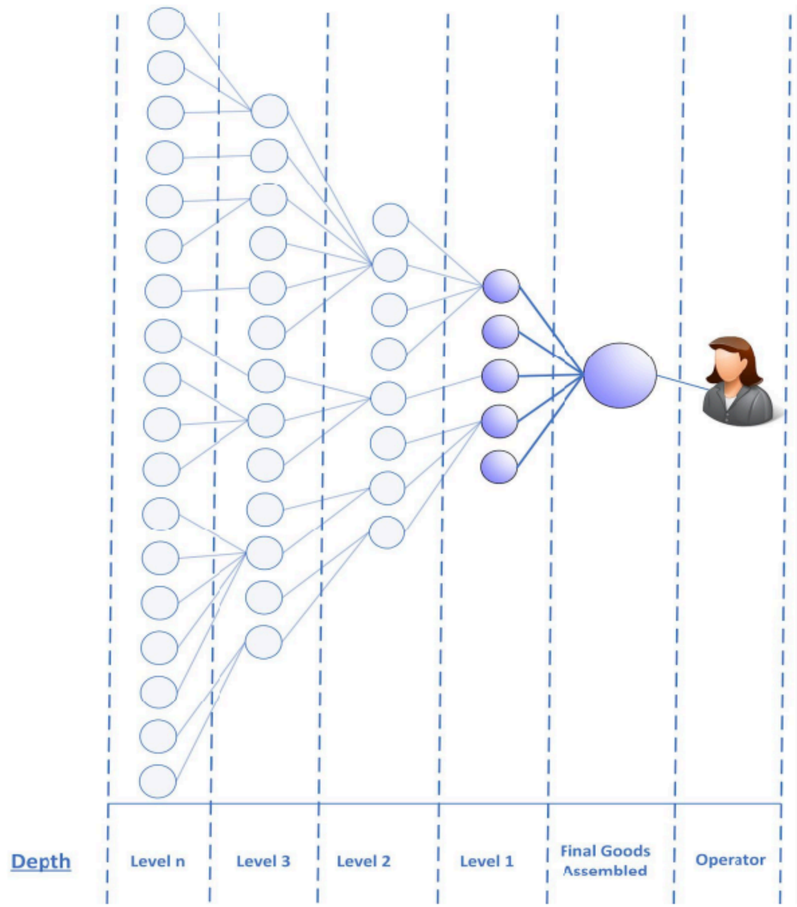
- Captures use cases for SBOM throughout the software supply chain
- Describes SBOM Personas and related benefits for those who:
  - Produce Software
  - Choose Software
  - Operate Software
- Also details Ecosystem, Network Effects, and Public Health Benefits of SBOMs
- Details Related Efforts (Updated and published separately on ntia.gov/sbom)
- SBOM Depth vs. Effectiveness
- High Assurance Use Cases



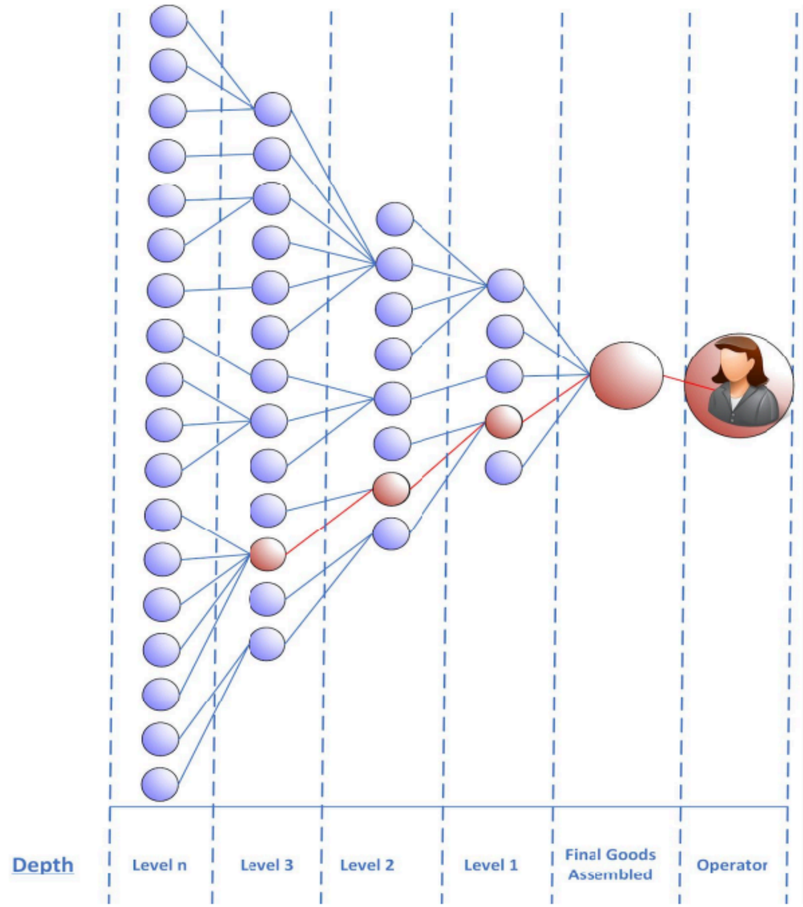
Roles and Benefits for SBOM Across the Supply Chain

NTIA Multistakeholder Process on Software Component Transparency
Use Cases and State of Practice Working Group

DEPTH / LIMITATIONS



Limited visibility enables less awareness of risk

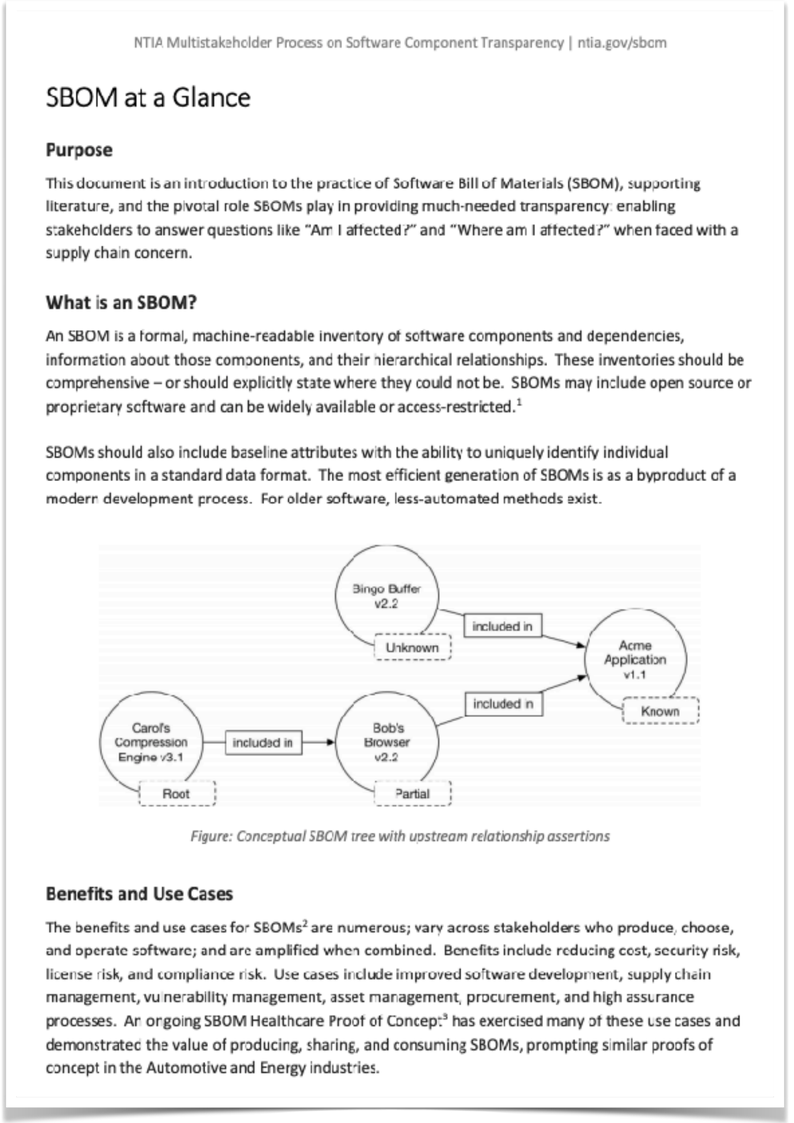


More complete visibility enables more complete awareness of risk

SBOM AT A GLANCE

- Intro to SBOMs, supporting literature, and the pivotal role of SBOMs for supply chain transparency
  - What is an SBOM?
  - Benefits & Use Cases
  - Baseline Component Information
  - Machine-Readable Formats & Tools
  - Sharing & Exchanging
  - Learn More

- Published on ntia.gov/sbom



SBOM at a Glance

Purpose

This document is an introduction to the practice of Software Bill of Materials (SBOM), supporting literature, and the pivotal role SBOMs play in providing much-needed transparency: enabling stakeholders to answer questions like "Am I affected?" and "Where am I affected?" when faced with a supply chain concern.

What is an SBOM?

An SBOM is a formal, machine-readable inventory of software components and dependencies, information about those components, and their hierarchical relationships. These inventories should be comprehensive – or should explicitly state where they could not be. SBOMs may include open source or proprietary software and can be widely available or access-restricted.[1]

SBOMs should also include baseline attributes with the ability to uniquely identify individual components in a standard data format. The most efficient generation of SBOMs is as a byproduct of a modern development process. For older software, less-automated methods exist.

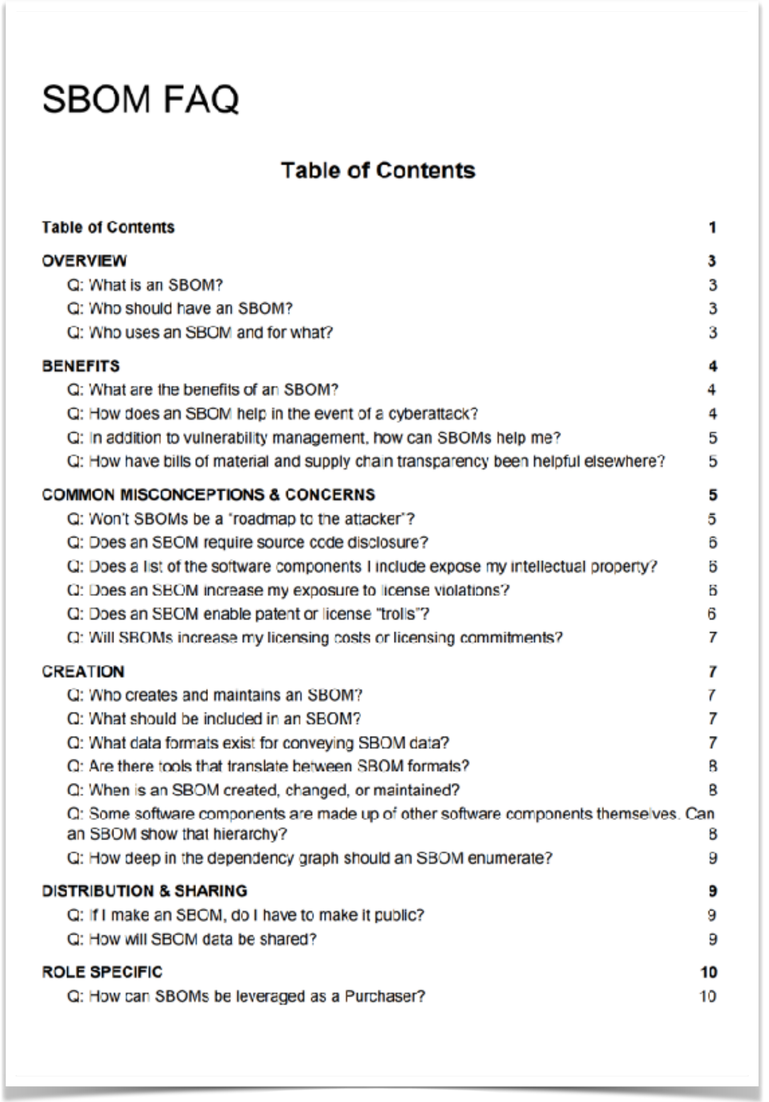
Figure: Conceptual SBOM tree with upstream relationship assertions

Benefits and Use Cases

The benefits and use cases for SBOMs[2] are numerous; vary across stakeholders who produce, choose, and operate software; and are amplified when combined. Benefits include reducing cost, security risk, license risk, and compliance risk. Use cases include improved software development, supply chain management, vulnerability management, asset management, procurement, and high assurance processes. An ongoing SBOM Healthcare Proof of Concept[3] has exercised many of these use cases and demonstrated the value of producing, sharing, and consuming SBOMs, prompting similar proofs of concept in the Automotive and Energy industries.

SBOM FAQ

- Frequently asked questions about:
  - SBOMs
  - Benefits & Roles
  - Common Misconceptions & Concerns
  - Creation
  - Distribution & Sharing
  - Related Efforts
- Updated draft available for review and feedback
- Published on ntia.gov/sbom



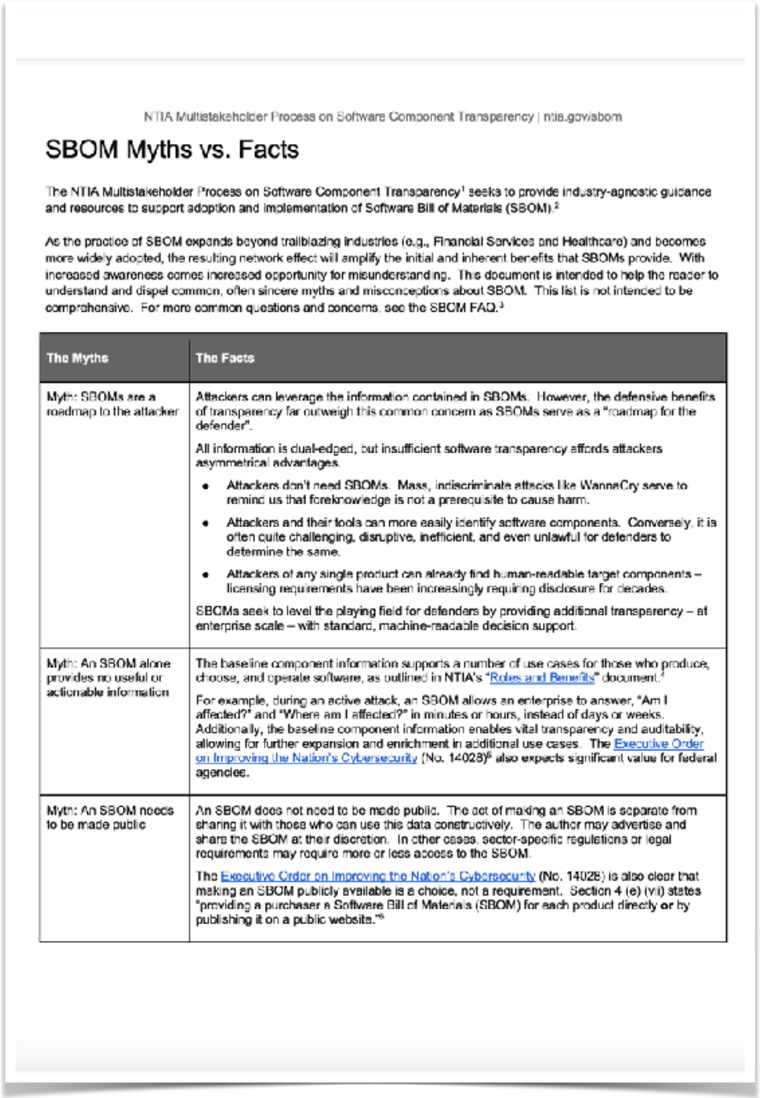
SBOM FAQ

Table of Contents

SBOM MYTHS VS. FACTS

- Intended to help the reader to understand and dispel common, often sincere myths and misconceptions about SBOM.

- Published on ntia.gov/sbom



NTIA Multistakeholder Process on Software Component Transparency | ntia.gov/sbom

SBOM Myths vs. Facts

The NTIA Multistakeholder Process on Software Component Transparency[1] seeks to provide industry-agnostic guidance and resources to support adoption and implementation of Software Bill of Materials (SBOM).[2]

As the practice of SBOM expands beyond trailblazing industries (e.g., Financial Services and Healthcare) and becomes more widely adopted, the resulting network effect will amplify the initial and inherent benefits that SBOMs provide. With increased awareness comes increased opportunity for misunderstanding. This document is intended to help the reader to understand and dispel common, often sincere myths and misconceptions about SBOM. This list is not intended to be comprehensive. For more common questions and concerns, see the SBOM FAQ.[3]

The Myths	The Facts
Myth: SBOMs are a roadmap to the attacker	Attackers can leverage the information contained in SBOMs. However, the defensive benefits of transparency far outweigh this common concern as SBOMs serve as a "roadmap for the defender". All information is dual-edged, but insufficient software transparency affords attackers asymmetrical advantages. • Attackers don't need SBOMs. Mass, indiscriminate attacks like WannaCry serve to remind us that foreknowledge is not a prerequisite to cause harm. • Attackers and their tools can more easily identify software components. Conversely, it is often quite challenging, disruptive, inefficient, and even unlawful for defenders to determine the same. • Attackers of any single product can already find human-readable target components – licensing requirements have been increasingly requiring disclosure for decades. SBOMs seek to level the playing field for defenders by providing additional transparency – at enterprise scale – with standard, machine-readable decision support.
Myth: An SBOM alone provides no useful or actionable information	The baseline component information supports a number of use cases for those who produce, choose, and operate software, as outlined in NTIA's "Roles and Benefits" document.[4] For example, during an active attack, an SBOM allows an enterprise to answer, "Am I affected?" and "Where am I affected?" in minutes or hours, instead of days or weeks. Additionally, the baseline component information enables vital transparency and auditability, allowing for further expansion and enrichment in additional use cases. The Executive Order on Improving the Nation's Cybersecurity (No. 14028)[5] also expects significant value for federal agencies.
Myth: An SBOM needs to be made public	An SBOM does not need to be made public. The act of making an SBOM is separate from sharing it with those who can use this data constructively. The author may advertise and share the SBOM at their discretion. In other cases, sector-specific regulations or legal requirements may require more or less access to the SBOM. The Executive Order on Improving the Nation's Cybersecurity (No. 14028) is also clear that making an SBOM publicly available is a choice, not a requirement. Section 4 (e) (vii) states "providing a purchaser a Software Bill of Materials (SBOM) for each product directly or by publishing it on a public website."[6]

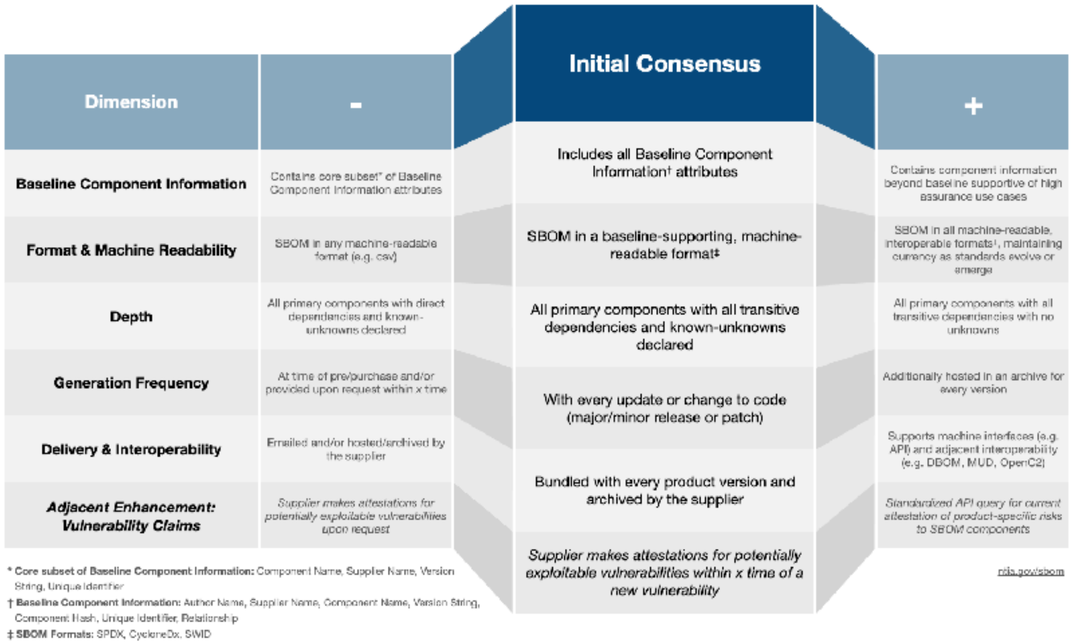
MINIMUM ELEMENTS

NTIA Multistakeholder Process	NTIA for Executive Order
Author Name	Author of SBOM Data
Timestamp	Timestamp
Supplier Name	Supplier Name
Component Name	Component Name
Version String	Version of the Component
Component Hash	-
Unique Identifier	Other Unique Identifier(s)
Relationship	Dependency Relationship

SBOM OPTIONS & DECISION POINTS

- Purpose
  - To frame the dimensions for what is possible with modern development practices
  - To support more consistent and effective articulation of needs between requesters and suppliers of SBOMs

- Published on ntia.gov/sbom



Dimension	-	Initial Consensus	+
Baseline Component Information	Contains core subset* of Baseline Component Information attributes	Includes all Baseline Component Information† attributes	Contains component information beyond baseline supportive of high assurance use cases
Format & Machine Readability	SBOM in any machine-readable format (e.g. csv)	SBOM in a baseline-supporting, machine-readable format‡	SBOM in all machine-readable, interoperable formats‡, maintaining currency as standards evolve or emerge
Depth	All primary components with direct dependencies and known-unknowns declared	All primary components with all transitive dependencies and known-unknowns declared	All primary components with all transitive dependencies with no unknowns
Generation Frequency	At time of pre/purchase and/or provided upon request within x time	With every update or change to code (major/minor release or patch)	Additionally hosted in an archive for every version
Delivery & Interoperability	Emailed and/or hosted/archived by the supplier	Bundled with every product version and archived by the supplier	Supports machine interfaces (e.g. API) and adjacent interoperability (e.g. DBOM, MUD, OpenC2)
Adjacent Enhancement: Vulnerability Claims	*Supplier makes attestations for potentially exploitable vulnerabilities upon request*	*Supplier makes attestations for potentially exploitable vulnerabilities within x time of a new vulnerability*	*Standardized API query for current attestation of product-specific risks to SBOM components*

* **Core subset of Baseline Component Information:** Component Name, Supplier Name, Version String, Unique Identifier
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‡ **SBOM Formats:** SPDX, CycloneDx, SWID

ntia.gov/sbom

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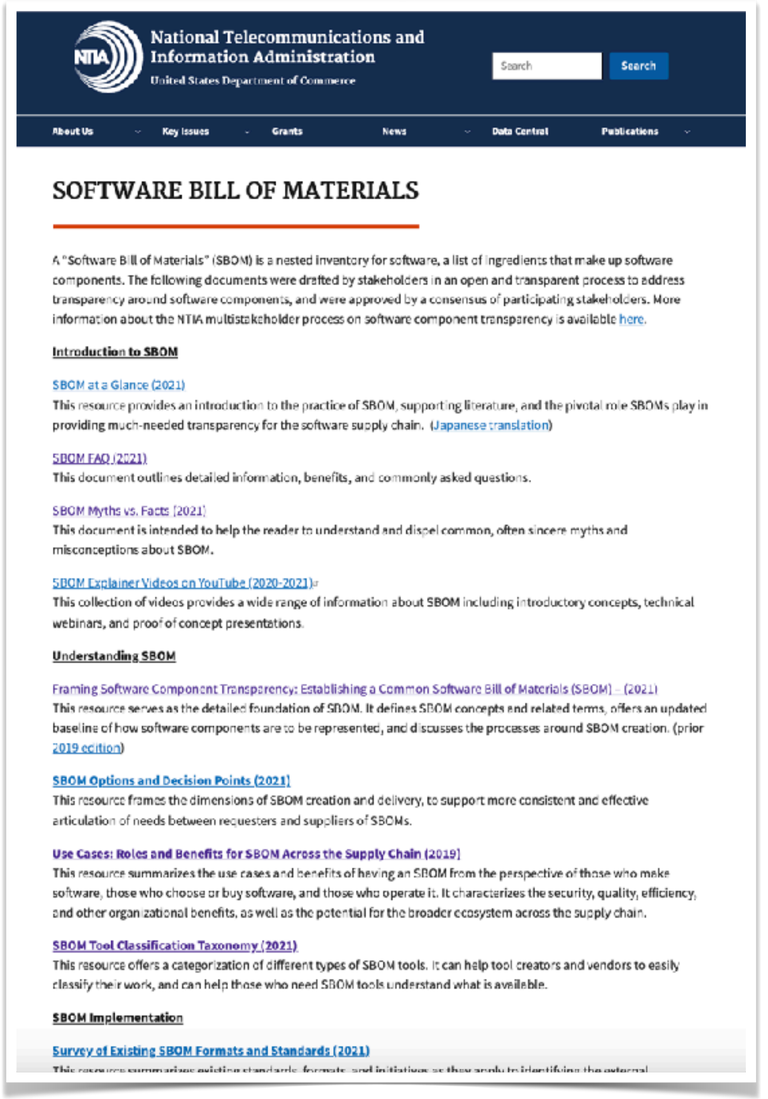
SBOM-ADJACENT TOPICS

- Anomalous Software Detection
- BSA Framework
- BSIMM
- CISQ
- CVE
- CycloneDx
- DBOM
- DevSecOps
- End of Life Management
- FDA Premarket Guidance
- FS-ISAC Controls
- Hardware BOMs
- ISO Security Standards
- Joint Security Plan (JSP)
- License Management
- MDS2
- MITRE's Deliver Uncompromised
- MUD
- NERC CIP 13
- NIST SSDF
- OpenC2
- OpenChain
- OWASP Component Analysis
- OWASP SCVS
- Package URL
- Procurement
- Runtime monitoring
- SAFE Code 3rd Party Guidance
- SBOM Integrity Monitoring
- SCAP
- SCRM
- Software Dependencies
- Software Heritage
- SPDX
- Supply Chain Attack Detection
- SWID
- Vulnerability Management
- Vulnerability Prioritization
- WP.29

NTIA RESOURCES

- Additional NTIA Publications, including:
  - Explainer Videos
  - Framing SBOMs
  - Use Cases, Roles & Benefits
  - Tool Classification Taxonomy
  - Survey of Existing Formats & Standards
  - Software Supplier & Consumer Playbooks
  - How-to Guide for SBOM Generation
  - Sharing & Exchanging SBOMs
  - Software Identity
  - Overview of Vulnerability and Exploitability Exchange (VEX)
  - Healthcare Proof of Concept Reports

- Published on ntia.gov/sbom



CISA RESOURCES

- Working Group Drafted:
  - Vulnerability Exploitability eXchange (VEX) Use Case Document
  - Vulnerability Exploitability eXchange (VEX) Status Justification Document
  - Minimum Requirements for Vulnerability Exploitability eXchange (VEX)
  - Types of Software Bill of Materials (SBOM)
- CISA & Partener Drafted:
  - Software Bill of Materials (SBOM) Sharing Lifecycle Report
- Published on cisa.gov/sbom

PRESENT

WHAT WE'RE WORKING ON

- **Today's Highlights:**
  - News, Events, Presentations, & Resources
  - Vertical-Specific Primers
  - SBOM Calendar
  - FAQ Draft for Review
  - Crawl / Walk / Run
  - Procurement / Acquisition Primer for SBOM
- **Ongoing Efforts:**
  - Working Group Socratic Reviews
  - FAQ
  - News
  - SBOM Calendar & Events
  - Industry-Specific Primers
  - Capturing SBOM Wants / Needs /Fears
  - Related Efforts Update
  - Presentations & Overviews
  - Virtual Engagement Opportunities

NEWS, EVENTS, PRESENTATIONS, & RESOURCES

Presentations

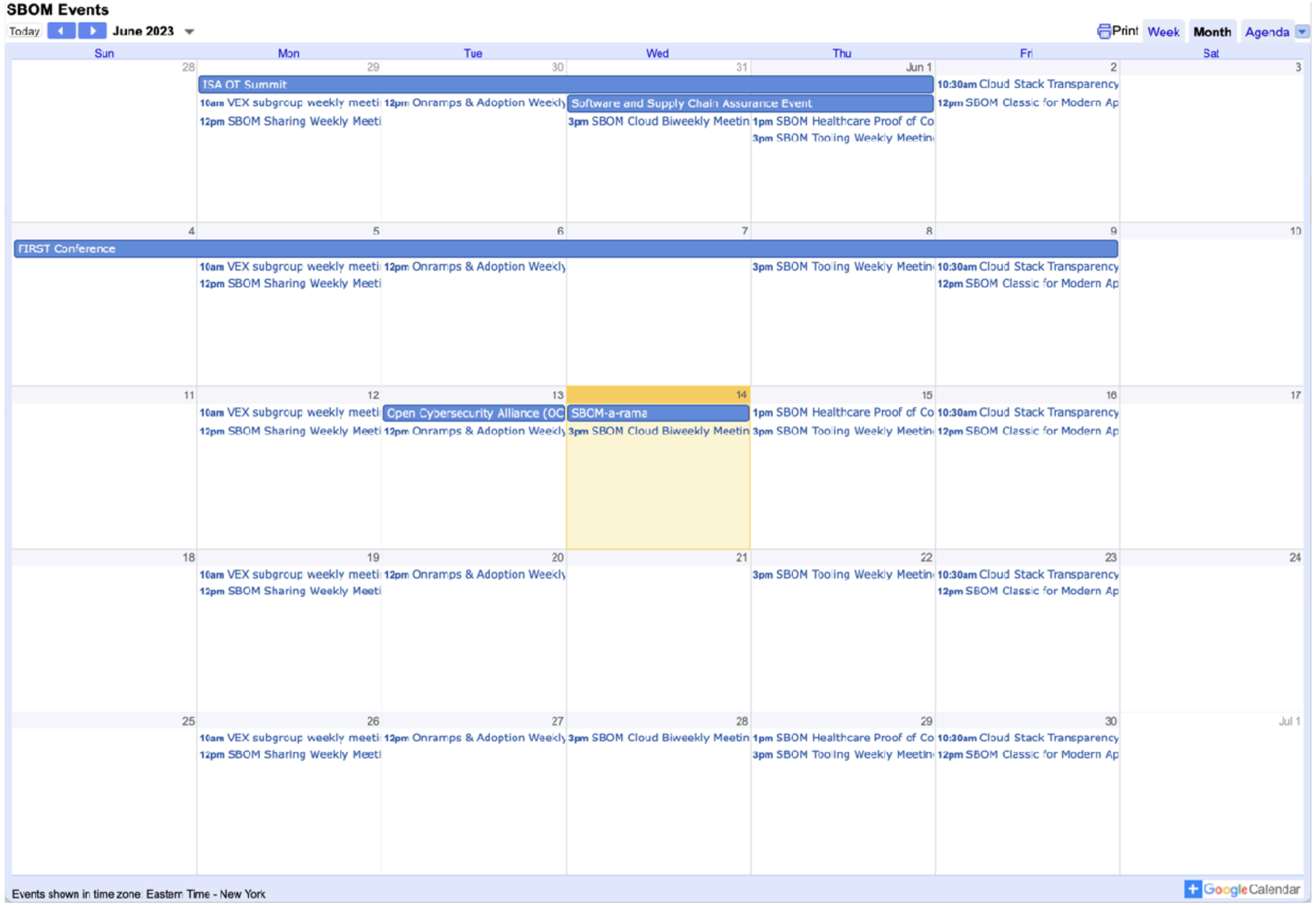
- SBOM-a-rama
- Overview of SBOM Types Publication
- Overview of CISA/DOE Sharing Landscape Publicaton
- Overview of VEX Minimum Elements Publication
- Auto ISAC POC Update
- Log4j - Topo Presentation
- GUAC Presentation | Q&A
- United Nations: "Stronger Together: Collaboration for a Cyber-Safe World"
- ESF Supply Chain
- Sounil Presentation and Discussion
- Auto-ISAC POC Update (Presentation from 2021 Auto-ISAC Cybersecurity Sumn
- Overview of CISA Secure by Design Secure by Default Publication

NEWS, EVENTS, PRESENTATIONS, & RESOURCES

Resources

- CISA Self Attestation Form - Request for Comments
- SLSA v1.0 Release
- FDA Refuse to Accept (RTA) Policy
- European: Cyber Resilience Act
- Secure Open Source SW Act of 2022
- FDA Pre-Market Guidance
- BOD 23-01 Asset Management & Vulnerability Mgt.
- White House OMB Memo
- NSA ODNI CISA Supply Chain Document (Sept 1)
- NDAA Language, House and Senate
- SPDX Announces 3.0 Release Candidate with New Use Cases
- Software Bill of Materials (SBOM) Sharing Lifecycle Report
- Minimum Requirements for Vulnerability Exploitability eXchange (VEX)
- Types of Software Bill of Materials (SBOM)
- Security-by-Design and -Default
- Japanese SBOM Guidance - Request for Comments
- IMDRF Principles and Practices for Software Bill of Materials for Medical Device
- IMDRF Principles and Practices for the Cybersecurity of Legacy Medical Devices
- PATCH Act via Appropriations Bill

SBOM EVENTS CALENDAR



SBOM EVENTS CALENDAR

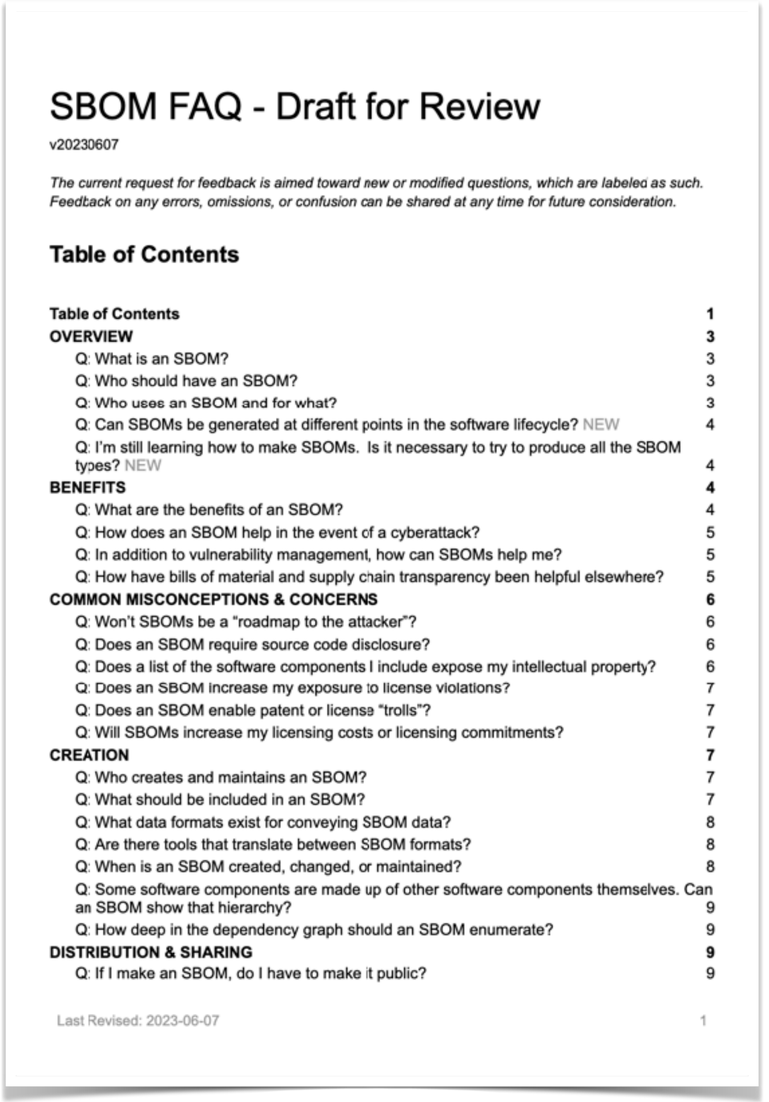
- View SBOM Events Calendar: https://bit.ly/sbom-calendar-public
- Subscribe to SBOM Events Calendar: https://bit.ly/sbom-calendar-subscribe

- To submit SBOM-related events or talks for inclusion, email details and/or forward an existing calendar invitation to:
  - sbom.calendar@gmail.com

  - Include:
    - Event Title, Time, & Time Zone
    - Location & Cost, if applicable
    - Description
    - Link to registration or more information

SBOM FAQ UPDATE – DRAFT FOR REVIEW

- Contains:
  - FAQs previously vetted and approved as part of the NTIA SBOM efforts
  - Nine new questions drafted as part of the CISA working groups
- Current request for feedback is aimed toward **new or modified** questions
- Feedback on any errors, omissions, or confusion can be shared at any time for future consideration



SBOM FAQ - Draft for Review

v20230607

The current request for feedback is aimed toward new or modified questions, which are labeled as such. Feedback on any errors, omissions, or confusion can be shared at any time for future consideration.

Table of Contents

Last Revised: 2023-06-07 1

SBOM FAQ UPDATE - DRAFT FOR REVIEW

- SBOM FAQ for feedback: bit.ly/sbom-onramps-faq-june2023
- Feedback Due: June 28, 2023
- Please provide feedback via “Add a comment” on Google Document:

- Please also nominate new FAQs for future iterations.

	Produce	Choose	Operate
Crawl	NTIA A&A Participants	NTIA A&A Participants	NTIA A&A Participants
Walk			
Run			

	Produce	Choose	Operate
Crawl	NTIA A&A Participants CISA Participants	NTIA A&A Participants CISA Participants	NTIA A&A Participants CISA Participants
Walk	CISA Participants		CISA Participants
Run	CISA Participants		CISA Participants

PROCUREMENT/ACQUISITION PRIMER FOR SBOM

PERSONAS AND BENEFITS

Supply Chain Personas

- Three supply chain personas [2]:
  - Producers
  - Choosers
  - Operators
- Procurement and Acquisition tend to fall under "Choosers"
- It is common to represent more than one persona

Chooser Benefits

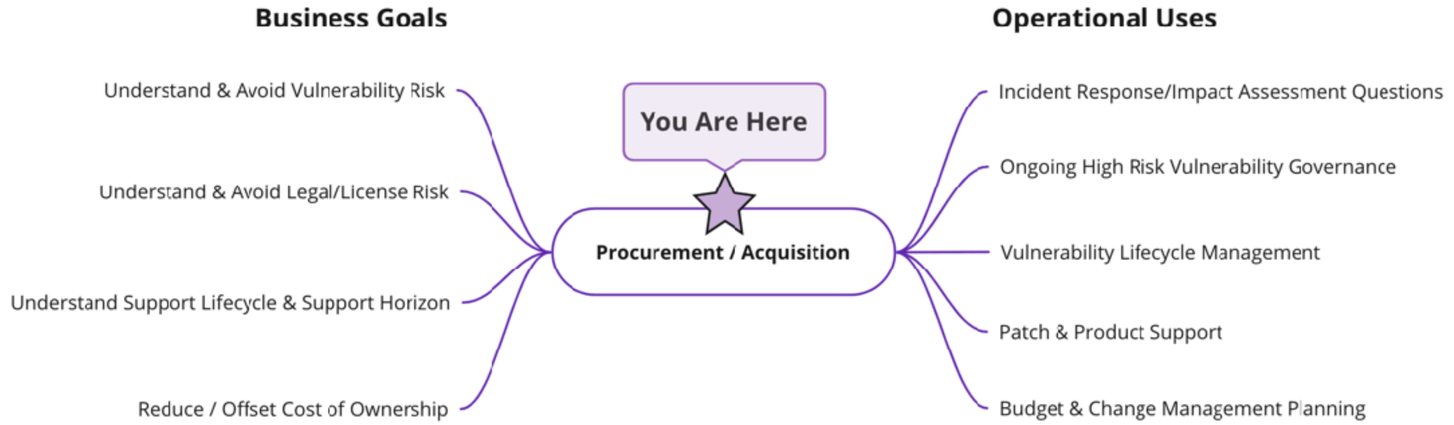
- Simplified way to support plural current and future needs of the business with less effort and less complexity
- Streamlined, consistent artifacts
- More protections via attestations and/or updates to contractual commitments
- When SBOM is missing, new negotiation and leverage points for overall procurement processes

Downstream Operator Benefits

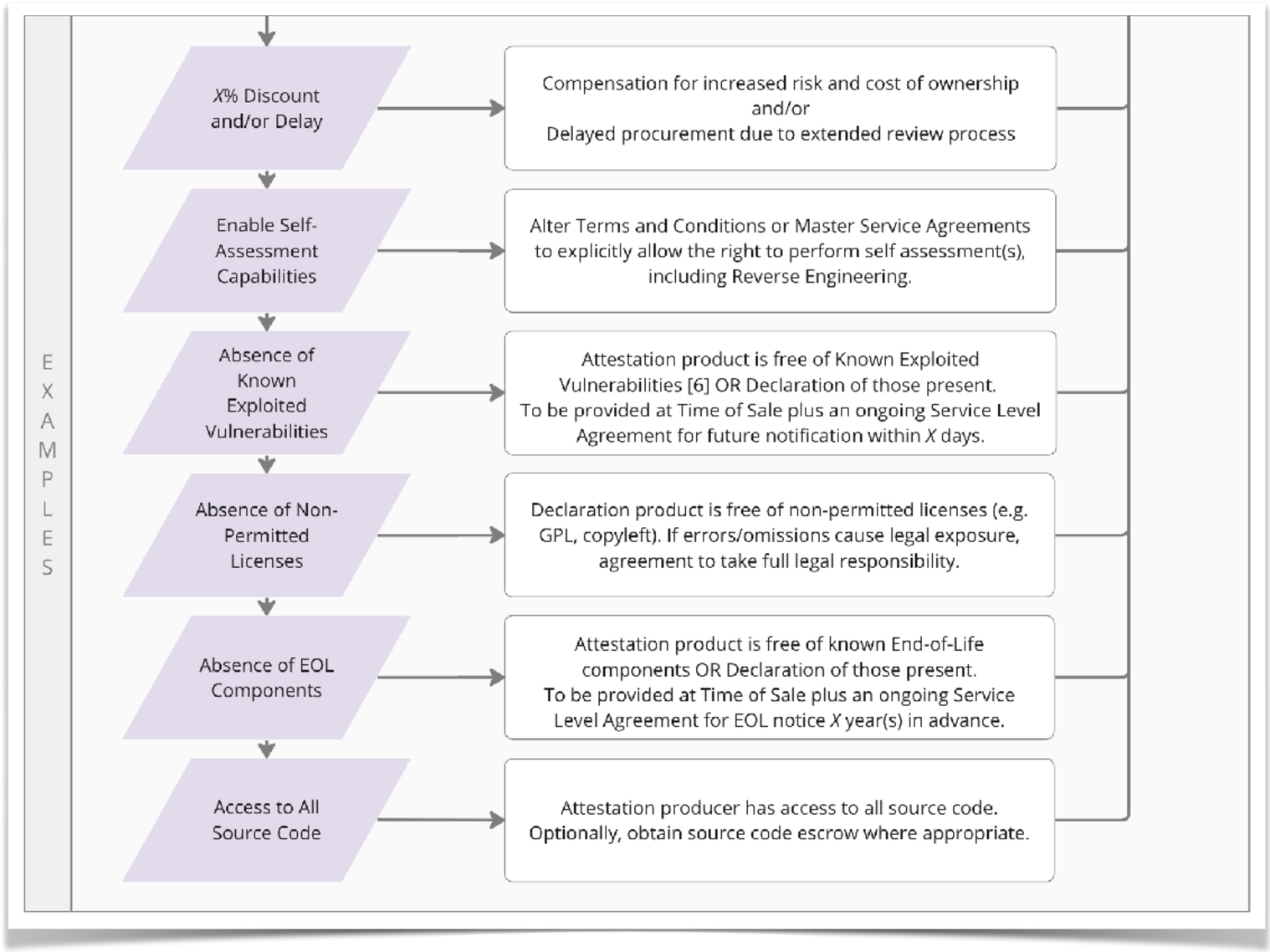
- Enables operators to perform ongoing assessment and quantification of risks inherent in software
- Manage mitigations for vulnerabilities
- Lower operating costs due to improved efficiencies
- Reduce unplanned, unscheduled work

BUSINESS GOALS & THE ROLE OF PROCUREMENT

Choosers play a brief but important role. At the intersection of business goals and business operations, procurement is advantageously positioned to obtain SBOMs for an organization. Requesting SBOMs at time of purchase and/or contract renewals yields outsized benefits: one SBOM request benefits plural stakeholders, and SBOMs enable the business to answer questions both now and in the future. Examples of business and operational use cases are provided below.



PROCUREMENT/ACQUISITION PRIMER FOR SBOM



ONGOING EFFORTS

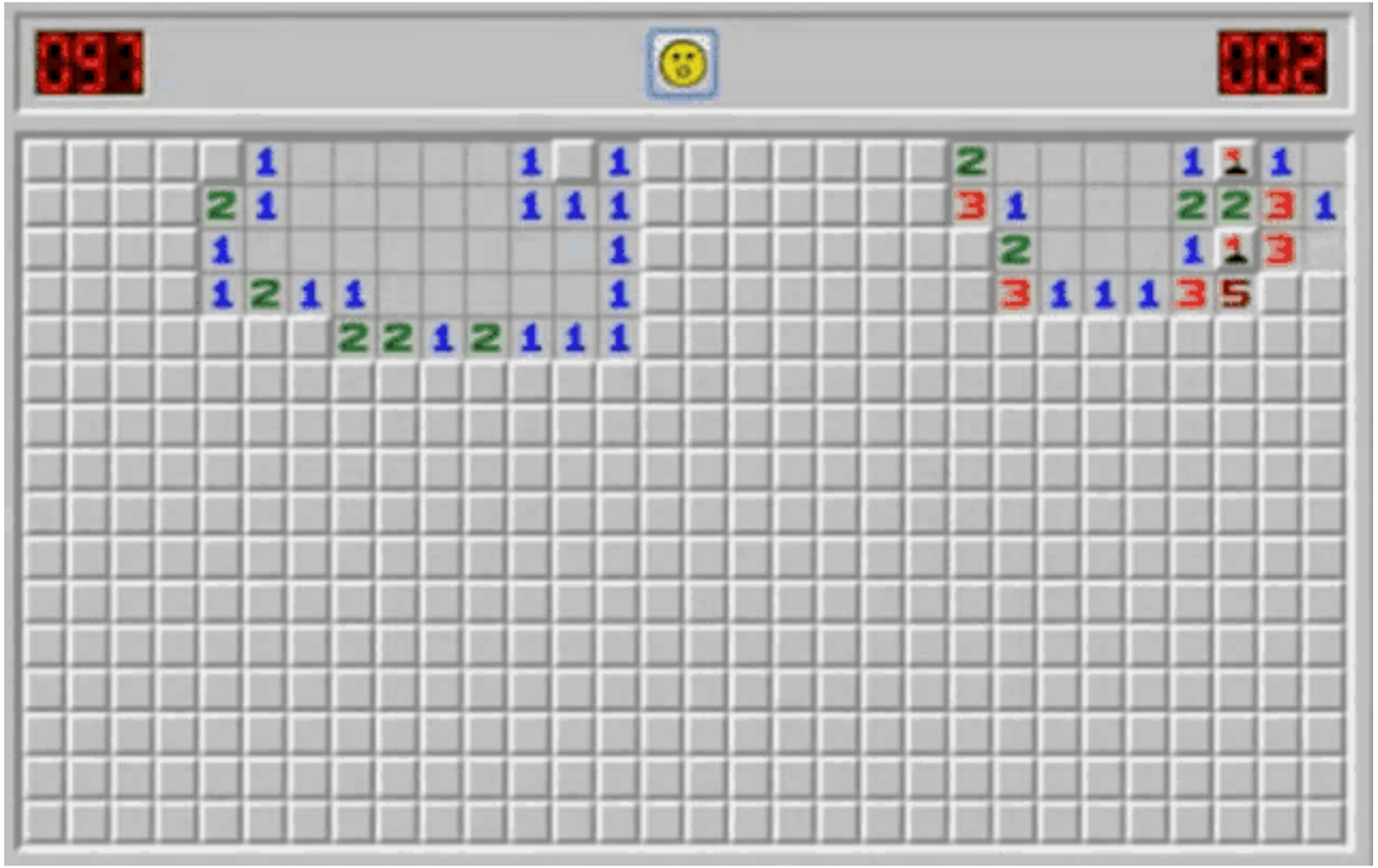
- FAQ
- News
- SBOM Calendar & Events
- Industry-Specific Primers
- Working Group Socratic Reviews
- Capturing SBOM Wants / Needs /Fears
- Related Efforts Update
- Presentations & Overviews
- SBOM-related Resources
- Virtual Engagement Opportunities
  - Webinars, Podcasts, Conferences, Recordings, Other
  - Conference and Event Talks with Links
  - e.g. List of RSAC 2023 talks about and related to SBOM & Software Supply Chain

FUTURE

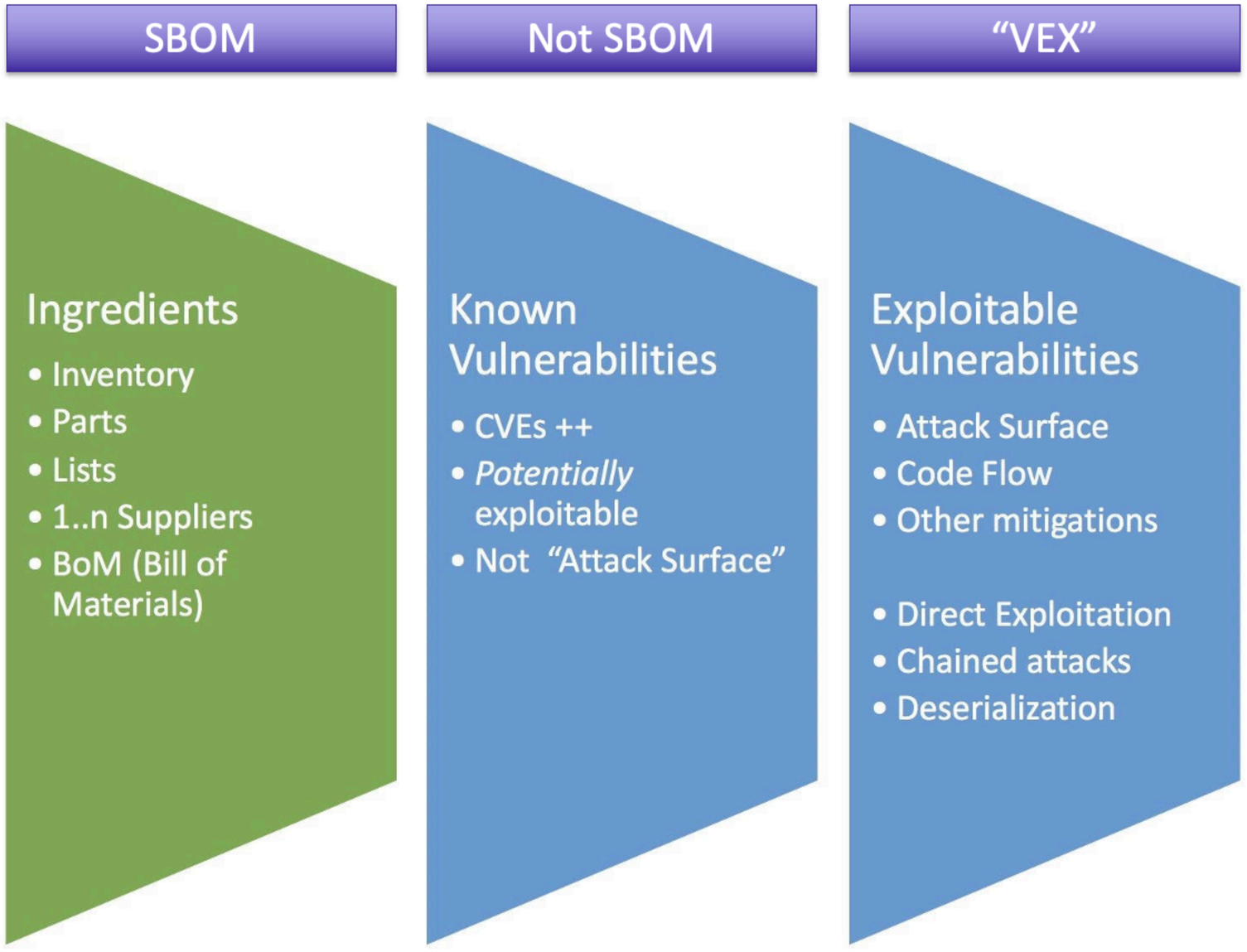
FUTURE INITIATIVES & IDEAS FOR 2023

- Workgroup Welcome Guide
- History/Timeline of SBOM
- SBOM Journeys & Testimonials
- Explainer Videos
- Stakeholder-Specific Resources for Under-Resourced
- SBOM Toy Examples/Starter Kit for Tool Testing
- “I have an SBOM. What’s next?” Materials
- Graduated Expectation Management
  - What SBOM Can/Can’t Do
  - What to Expect of SBOM Now and with Future, Iterative Improvements
  - Ensuring SBOMs meet consensus
- Related/Adjacent Effort Tracking and Improvement
- SBOMs for Firmware & Embedded Systems
- Industry/Supply-Chain Specifics

BOMBS & VISIBILITY



Excerpt from “The Opposite of Transparency” https://youtu.be/qk2vo7ir1cI



IMG SRC: Josh Corman NTIA.gov 2018

Excerpt from "The Opposite of Transparency" https://youtu.be/qk2vo7ir1cI

DevOps Enterprise Journal - log4j

Attribution

… This talk is based on an IT Revolution Forum paper

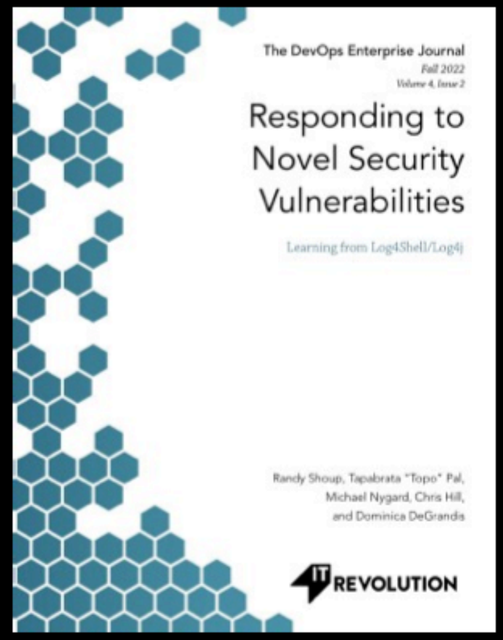
IT Revolution - DevOps Enterprise Forum - 2022

"Responding to Novel Security Vulnerabilities - Learning from Log4Shell"

By

Randy Shoup, Topo Pal, Michael Nygard, Chris Hill, Dominica DeGrandis

https://myresources.itrevolution.com/viewer/?id=006657146



@TopoPal

Link to Topo's Talk: https://www.linkedin.com/posts/tapabratapal_log4shell-response-patterns-learnings-from-activity-7072789564397916161-5_Fu

Excerpt from "The Opposite of Transparency" https://youtu.be/qk2vo7ir1cI

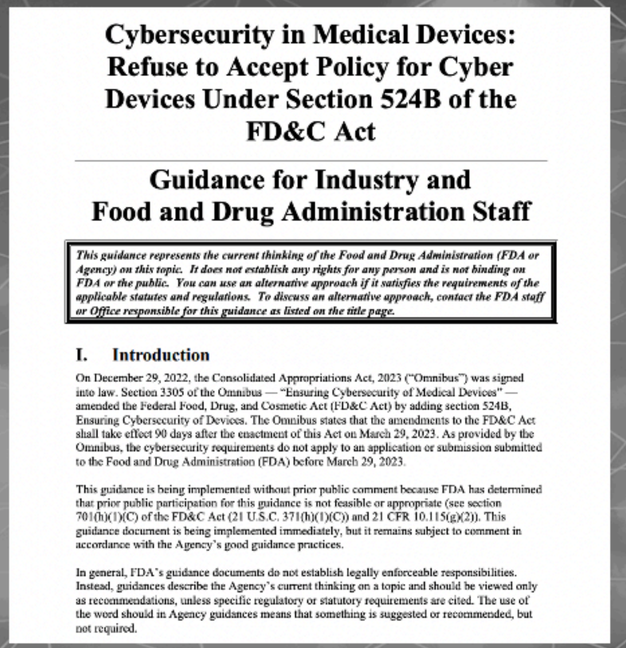
~~Symptoms (& smokescreens?)~~ Heart of the Hydra

Excerpt from “The Opposite of Transparency” https://youtu.be/qk2vo7ir1cI

Your favorite “First Principle” for Cybersecurity?

Excerpt from “The Opposite of Transparency” https://youtu.be/qk2vo7ir1cI

PATCH Act… ++
Law of the Land



Cybersecurity in Medical Devices: Refuse to Accept Policy for Cyber Devices Under Section 524B of the FD&C Act

Guidance for Industry and Food and Drug Administration Staff

This guidance represents the current thinking of the Food and Drug Administration (FDA or Agency) on this topic. It does not establish any rights for any person and is not binding on FDA or the public. You can use an alternative approach if it satisfies the requirements of the applicable statutes and regulations. To discuss an alternative approach, contact the FDA staff or Office responsible for this guidance as listed on the title page.

I. Introduction

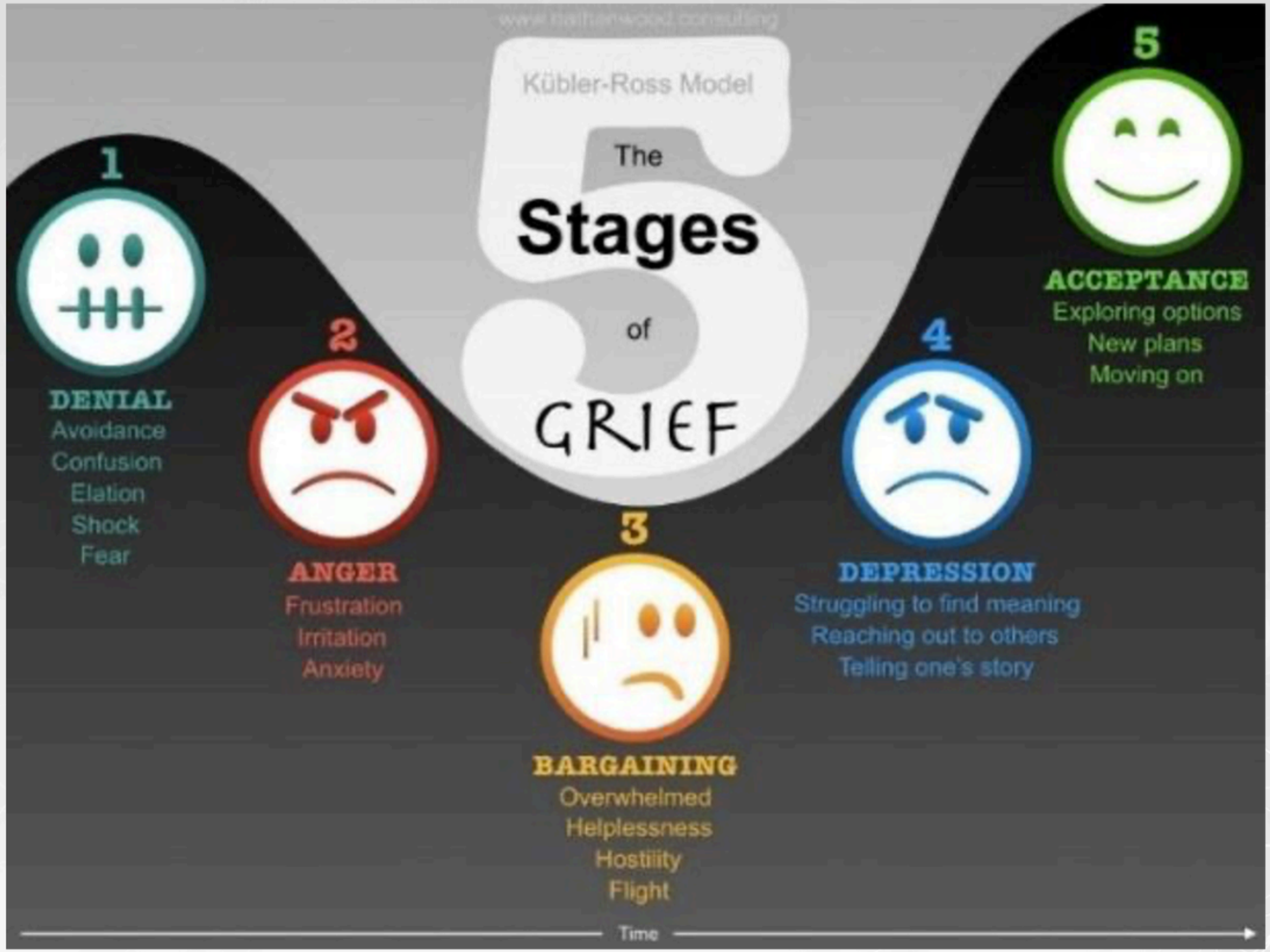
On December 29, 2022, the Consolidated Appropriations Act, 2023 ("Omnibus") was signed into law. Section 3305 of the Omnibus — "Ensuring Cybersecurity of Medical Devices" — amended the Federal Food, Drug, and Cosmetic Act (FD&C Act) by adding section 524B, Ensuring Cybersecurity of Devices. The Omnibus states that the amendments to the FD&C Act shall take effect 90 days after the enactment of this Act on March 29, 2023. As provided by the Omnibus, the cybersecurity requirements do not apply to an application or submission submitted to the Food and Drug Administration (FDA) before March 29, 2023.

This guidance is being implemented without prior public comment because FDA has determined that prior public participation for this guidance is not feasible or appropriate (see section 701(h)(1)(C) of the FD&C Act (21 U.S.C. 371(h)(1)(C)) and 21 CFR 10.115(g)(2)). This guidance document is being implemented immediately, but it remains subject to comment in accordance with the Agency's good guidance practices.

In general, FDA's guidance documents do not establish legally enforceable responsibilities. Instead, guidances describe the Agency's current thinking on a topic and should be viewed only as recommendations, unless specific regulatory or statutory requirements are cited. The use of the word should in Agency guidances means that something is suggested or recommended, but not required.

I AM THE Cavalry

Excerpt from "The Opposite of Transparency" https://youtu.be/qk2vo7ir1cI



Excerpt from "The Opposite of Transparency" https://youtu.be/qk2vo7ir1cI

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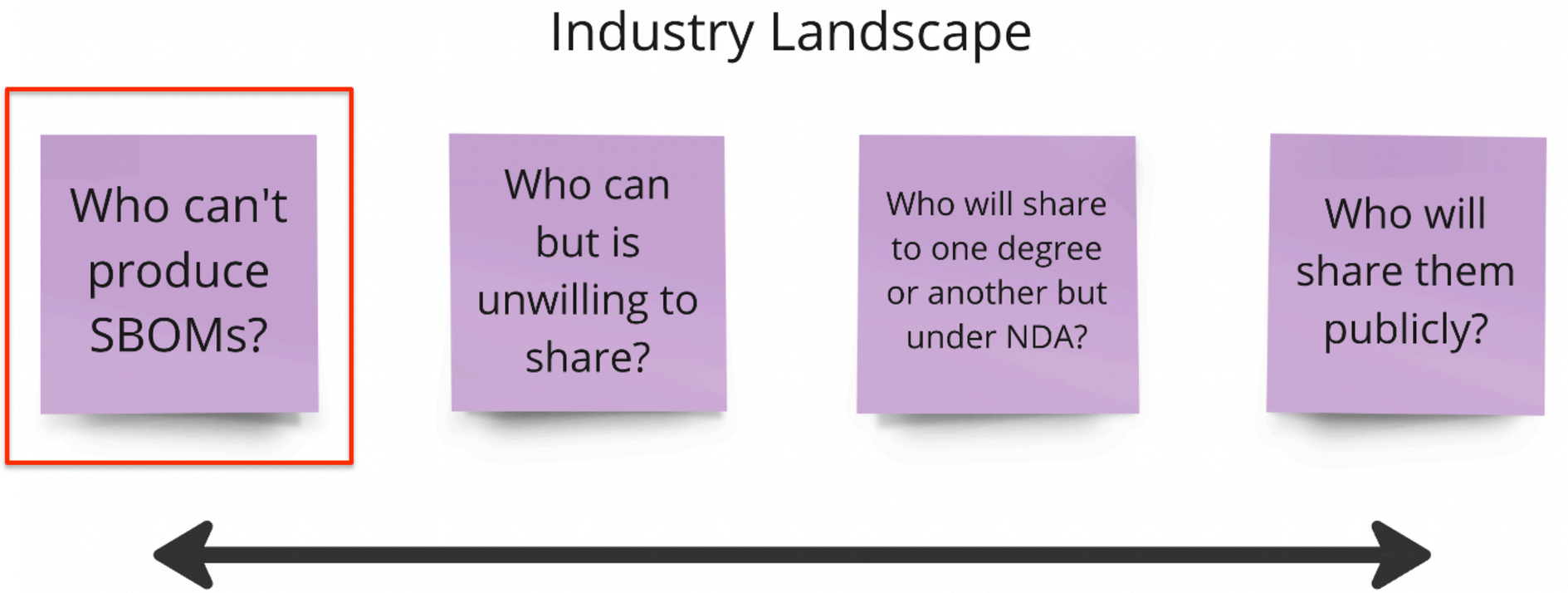
A journey? Graduated expectations over time?



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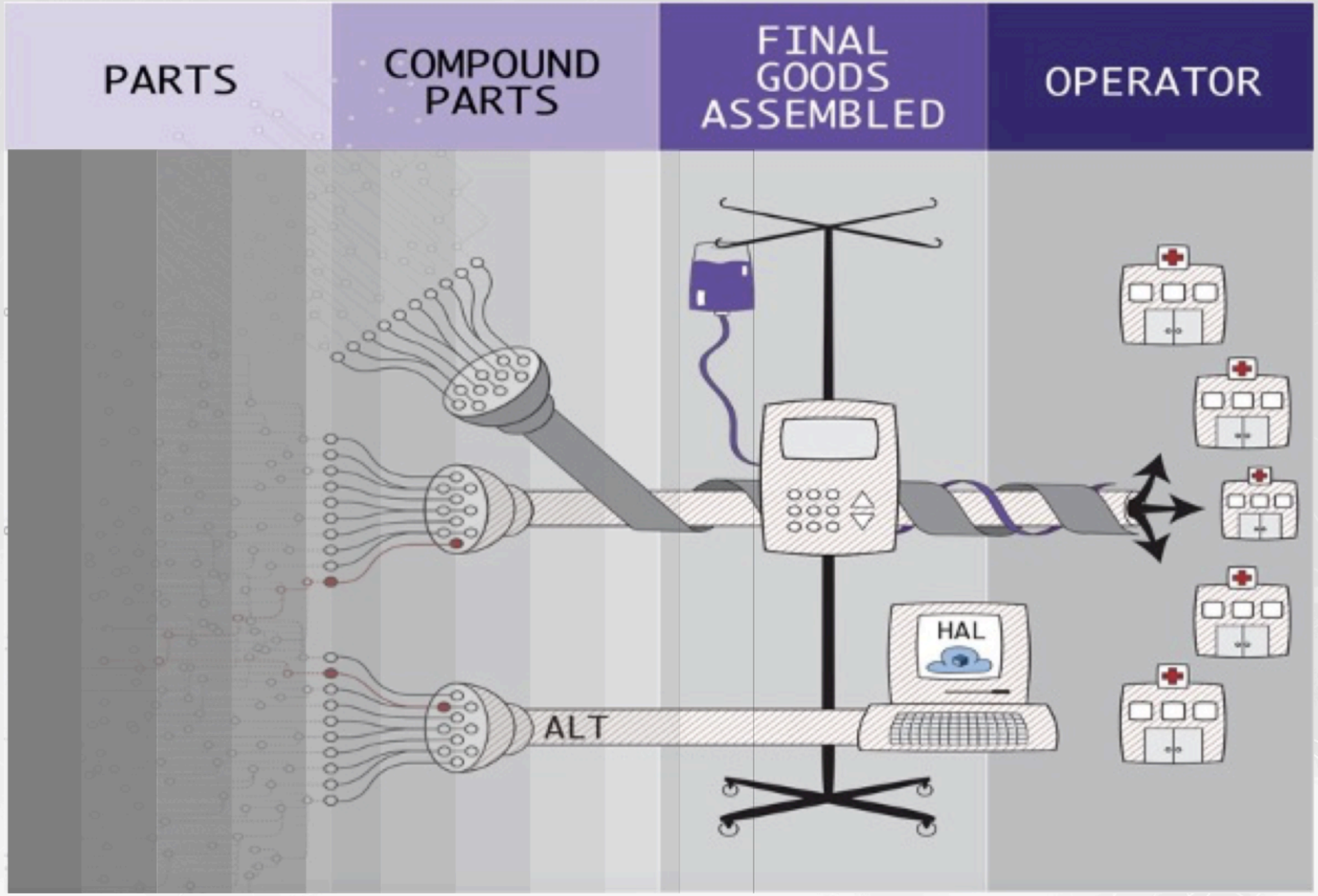

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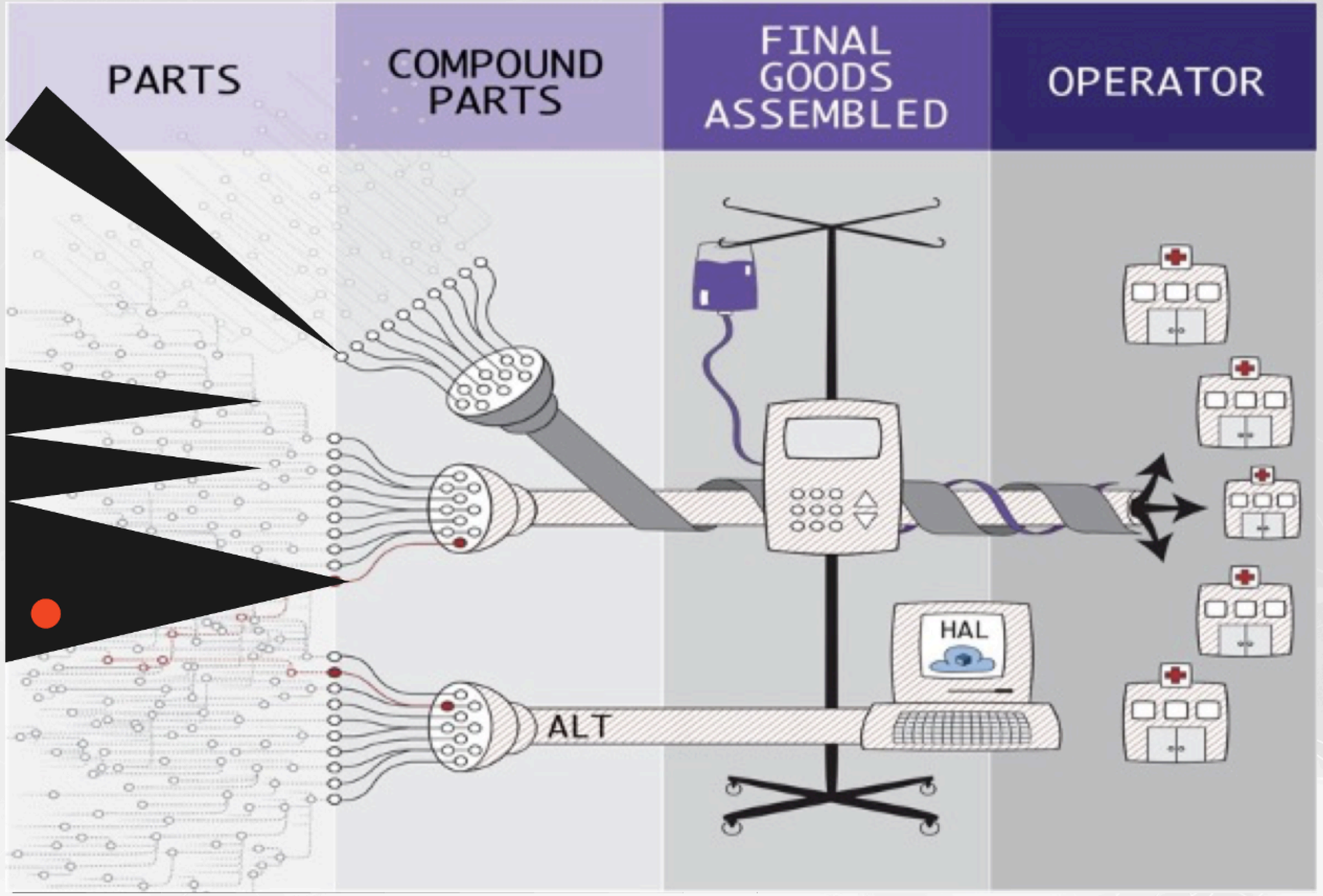

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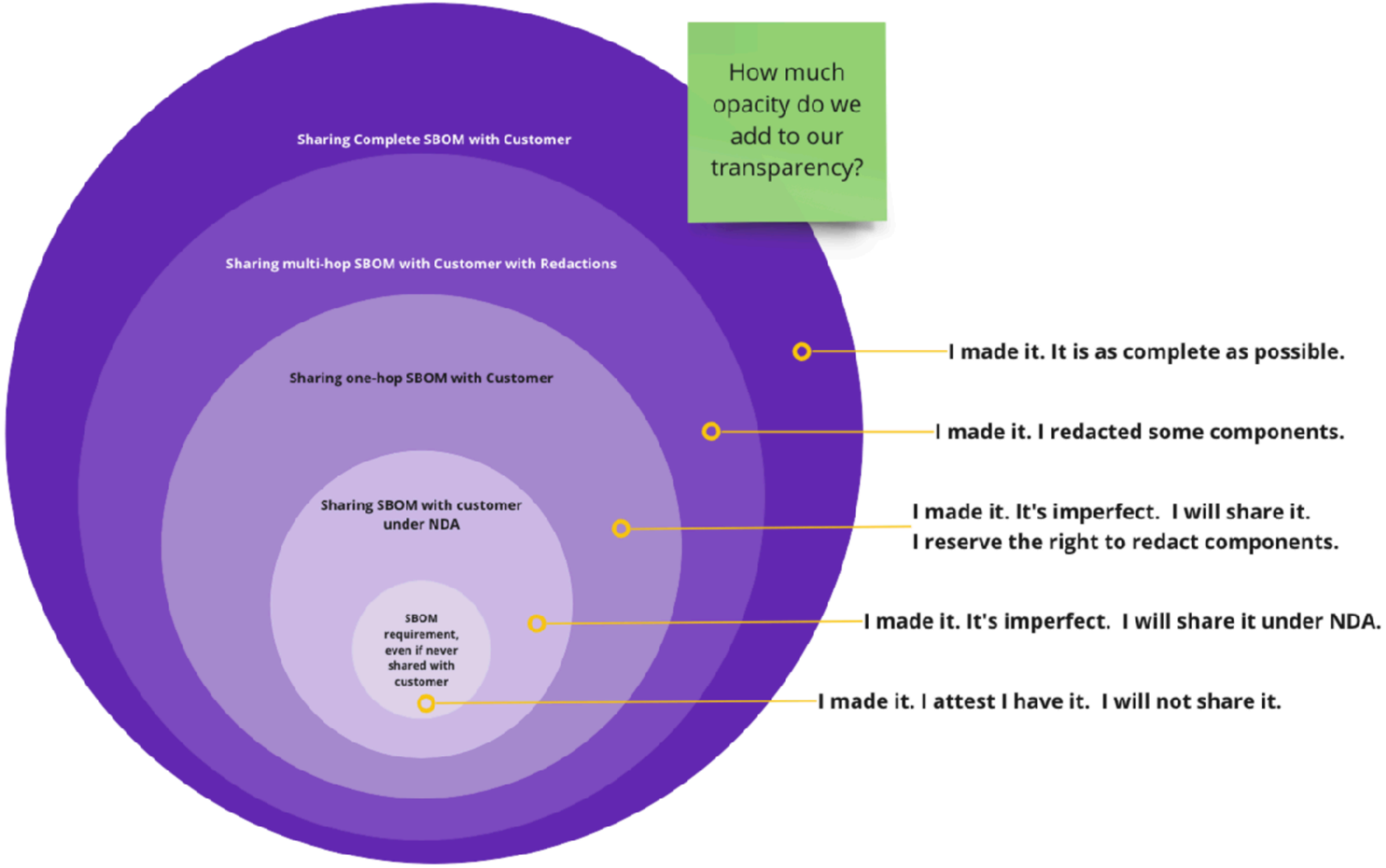
Rings of Expanding Value for SBOM



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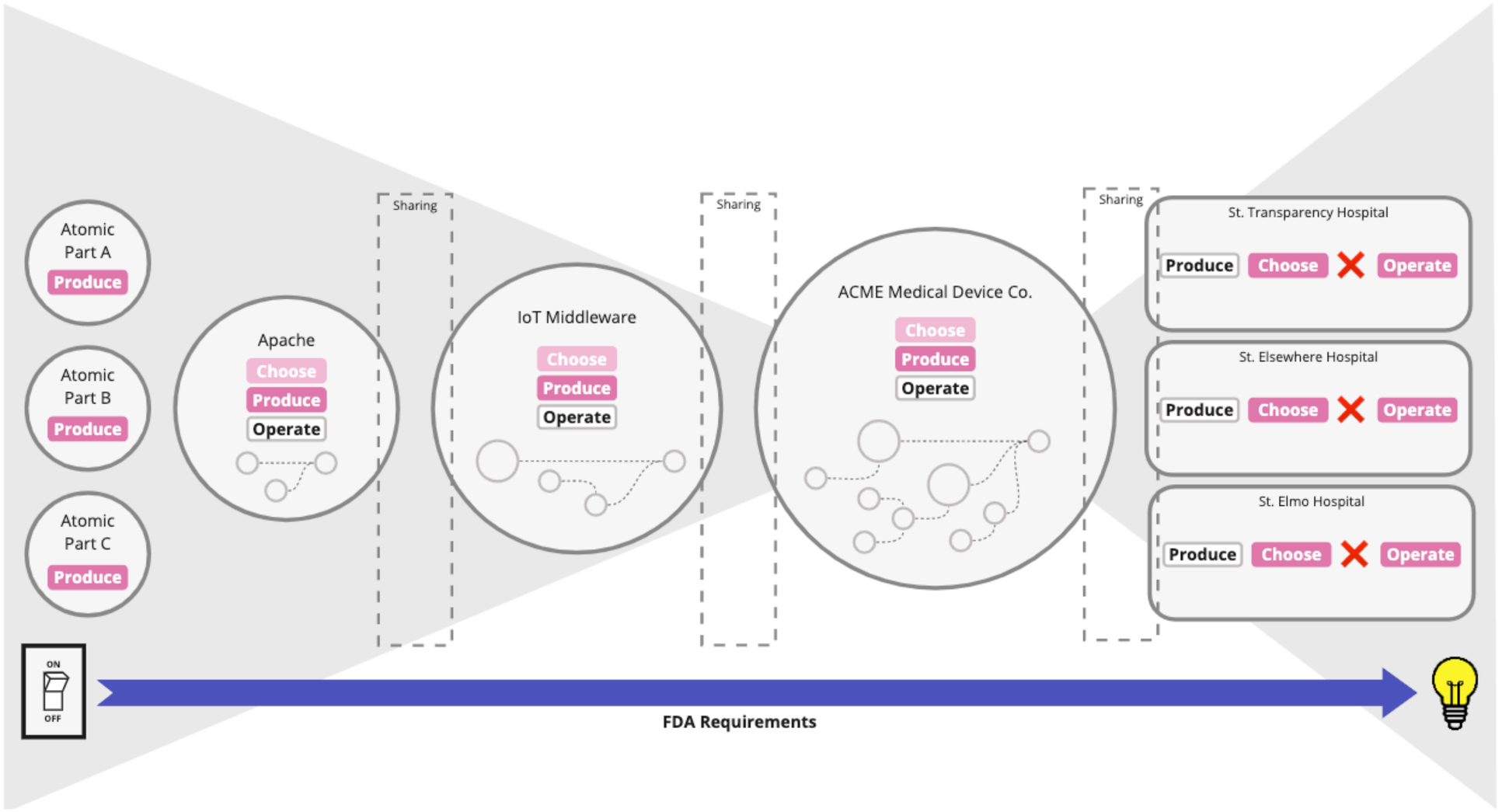
FDA USE CASE / UNIFIED FIELD THEORY



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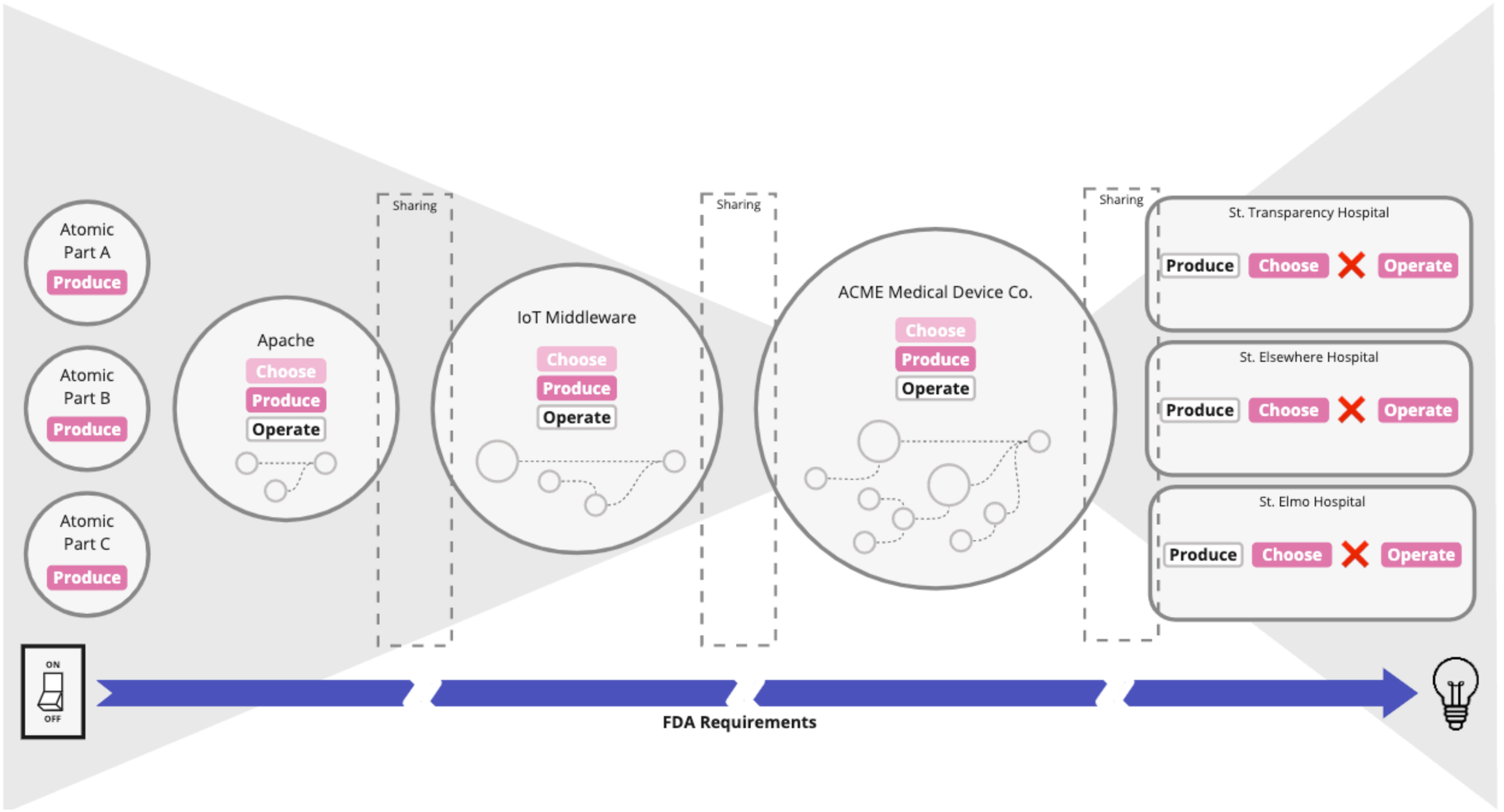

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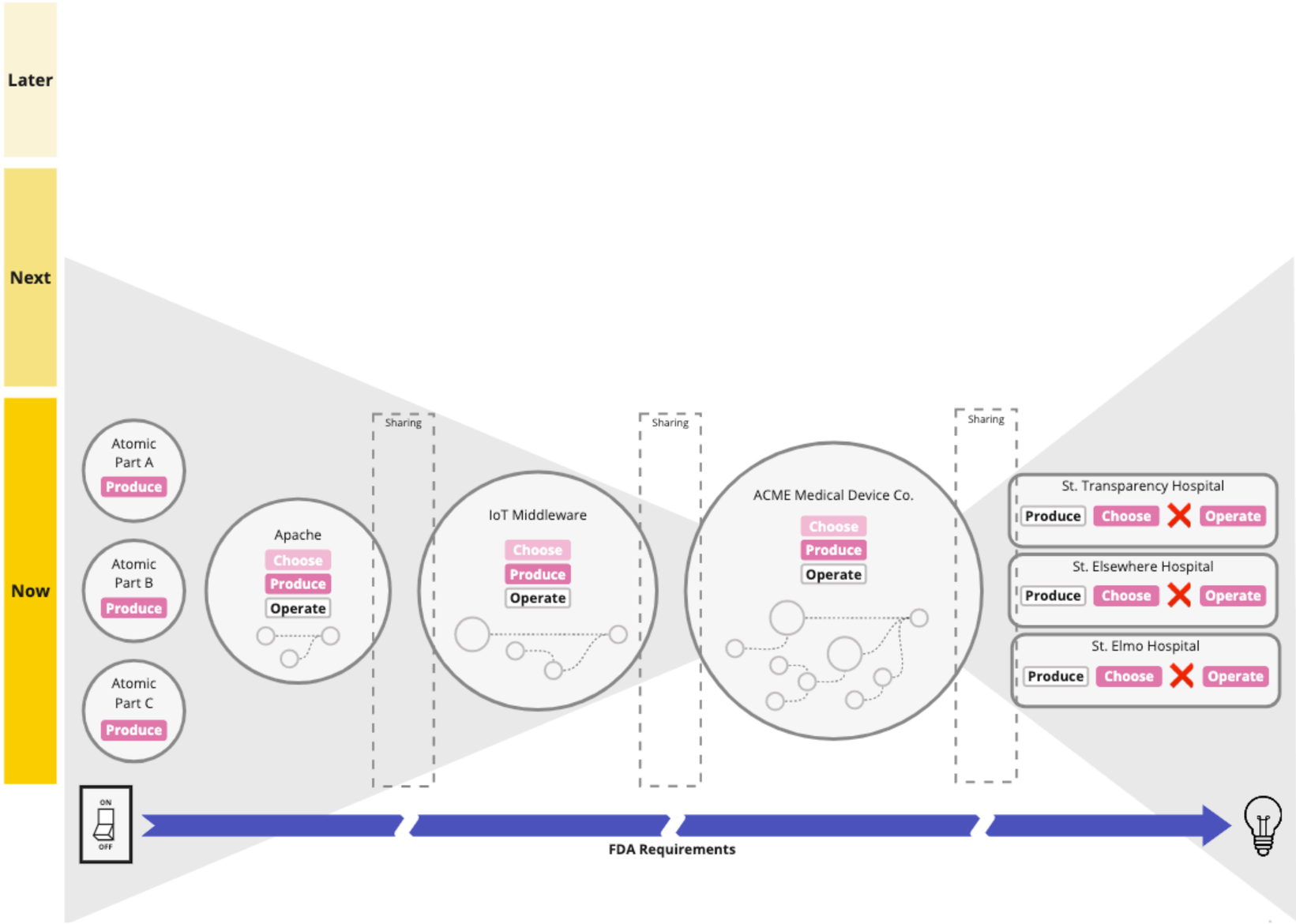

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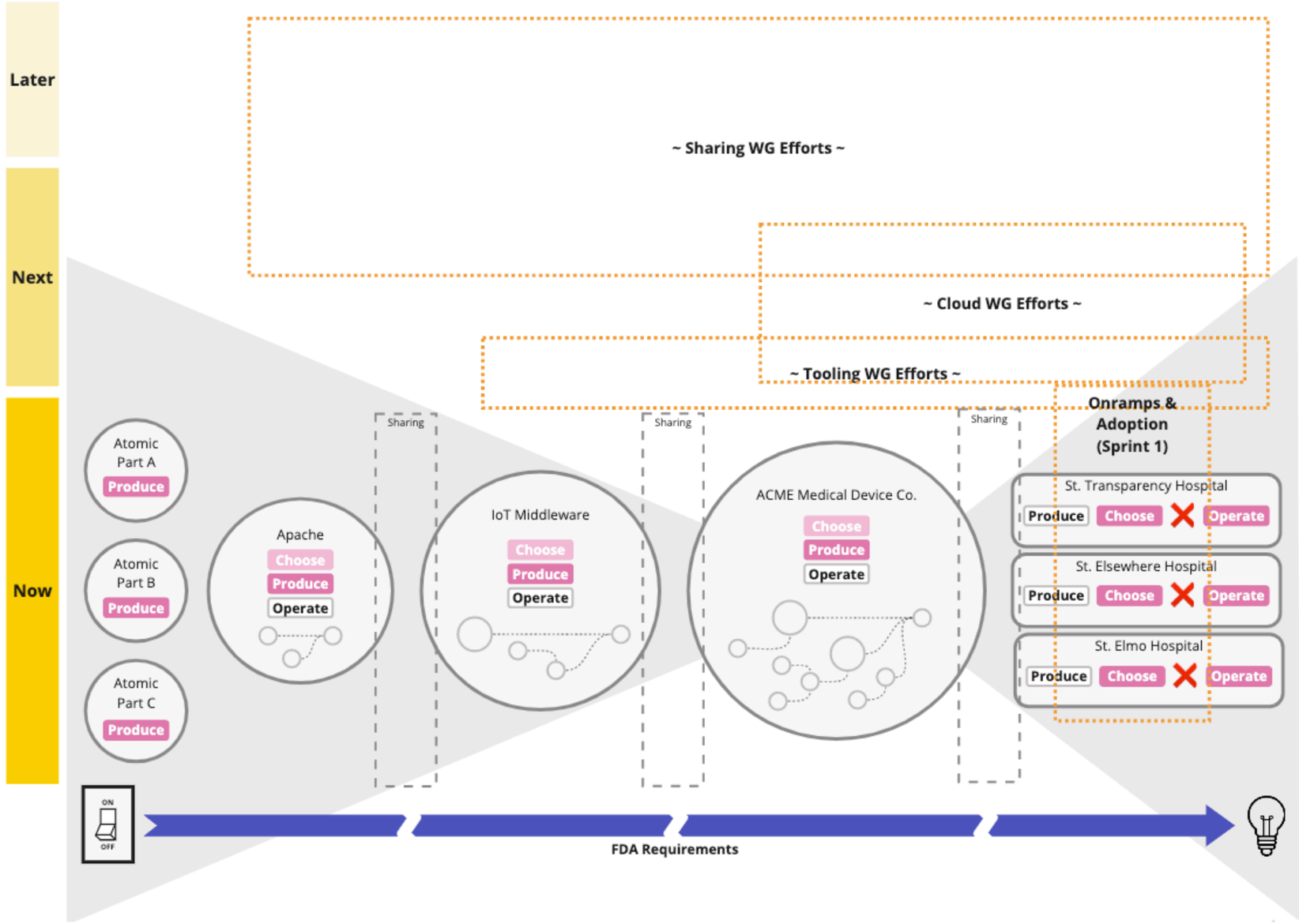

COMMUNITY ASK

- How you can help Onramps & Adoption:
  - We are seeking **new participants** and **project leads** for ongoing efforts
    - Especially Procurement/Acquisition
    - Testimonials
  - Provide feedback on the SBOM FAQ Draft for Review
  - Submit upcoming events to the SBOM Calendar
  - Introductions to creative colleagues and contributors (e.g. marketing, design, developer relations, etc.) + new industry participants

- How can Onramps & Adoption help you?
  - What other resources do you need?
  - How can we improve existing resources?
  - Do our future initiatives and priorities align with yours?

RESOURCES

- NTIA Publications
  www.ntia.gov/sbom
- CISA Publications
  www.cisa.gov/sbom
- FAQ
  - Published
  - Draft for Review
- SBOM Calendar
- Join our call and/or See Meeting Notes for News, Events, and Presentations

JOIN US

- Onramps & Adoption Meeting
  - Tuesdays at 12:00 PM ET
  - Join the working group:
    - Email: SBOM@cisa.dhs.gov
  - Running Meeting Notes:
    - bit.ly/sbom-onramps-meeting-notes

THANK YOU!

Q & A