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TRANSFORM

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Tooling Up – Getting SBOMs to scale

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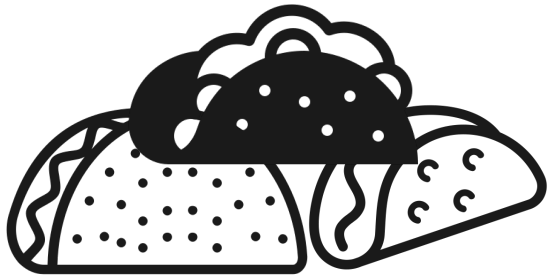
Paying attention or looking for lunch?

- Remind me what an SBOM is again?
- Motivation
- Tooling taxonomies
- Challenges & open questions for SBOM automation
- Next steps for the tooling ecosystem
- *What you can do*



SBOMs provide transparency in the SW market

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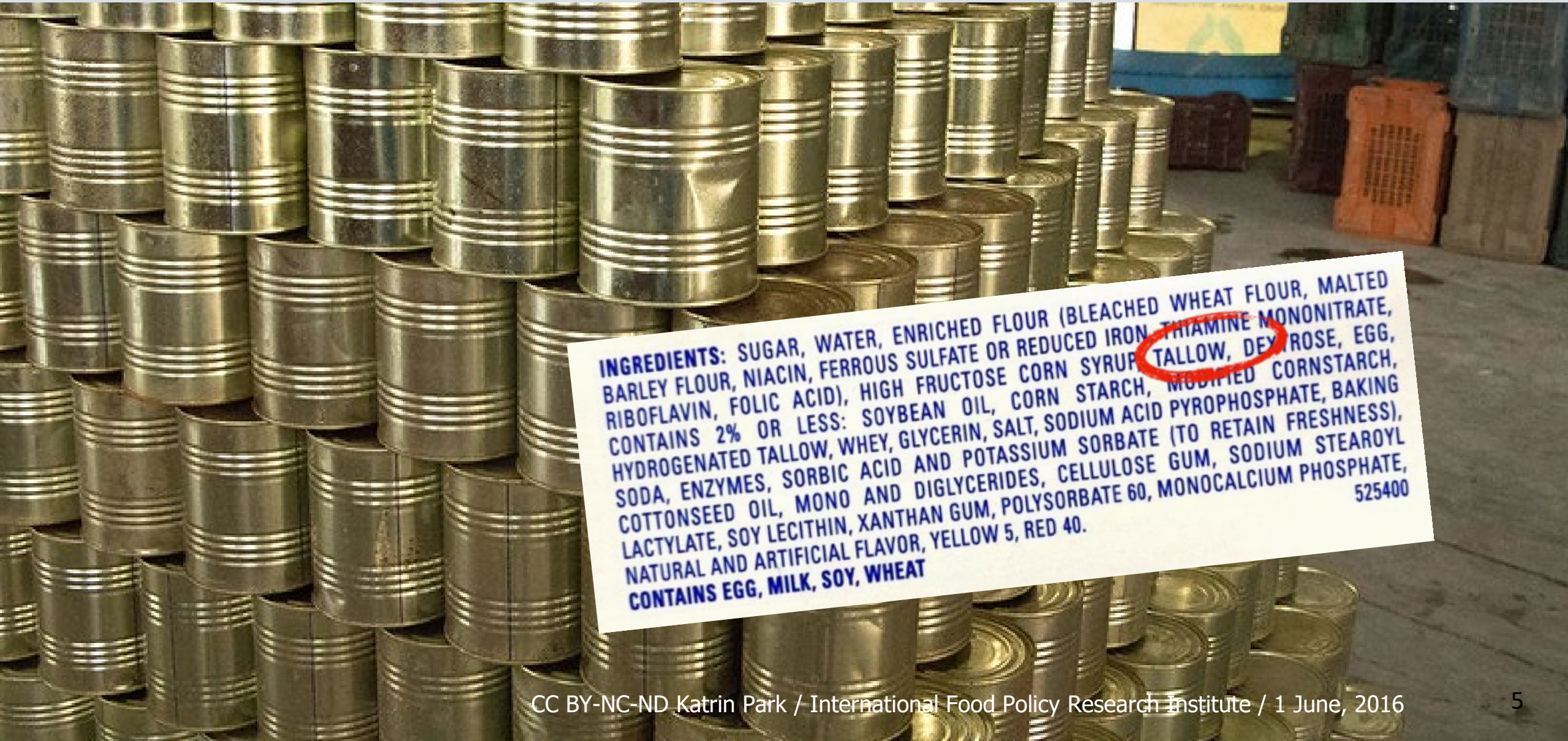
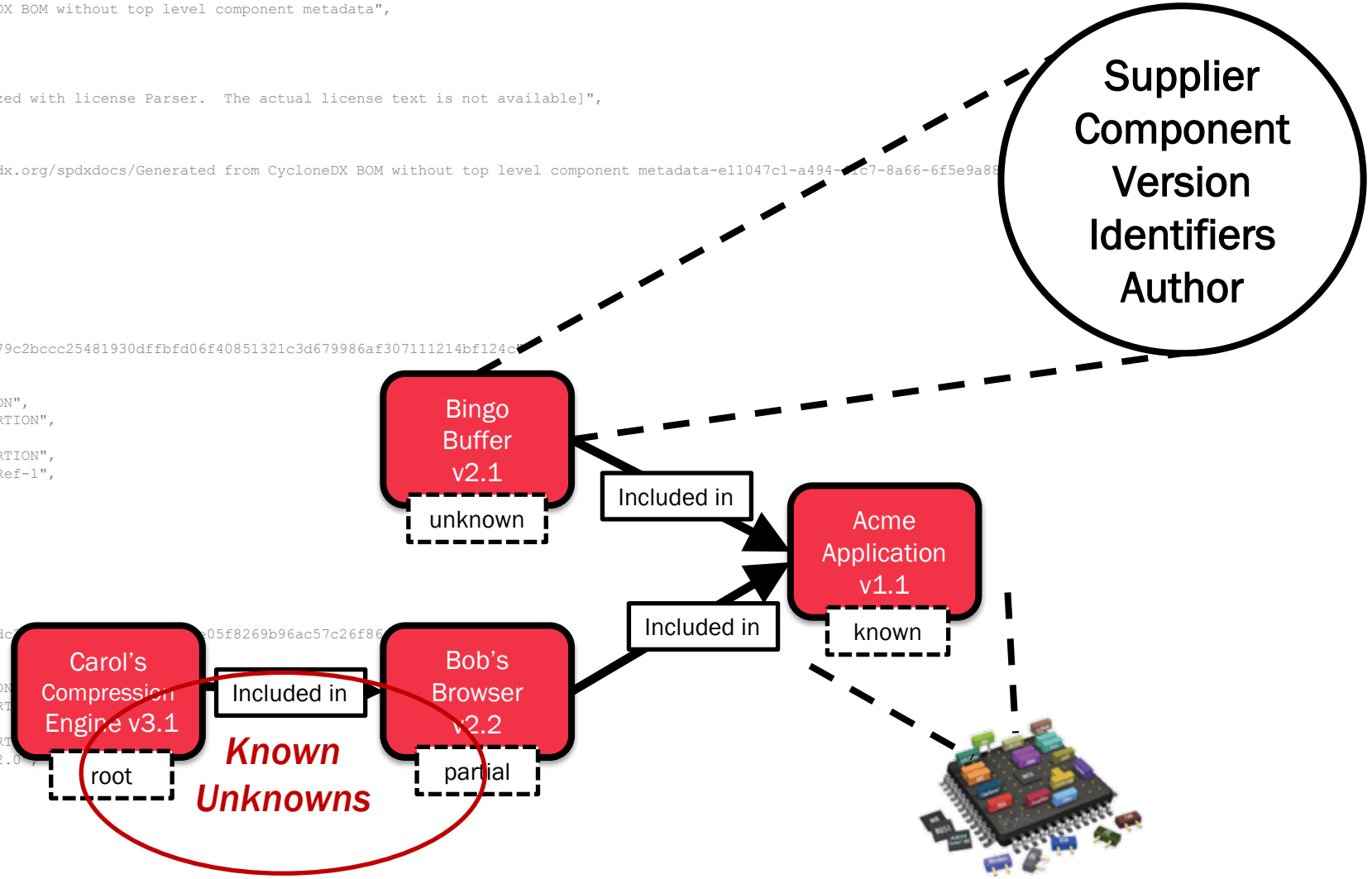
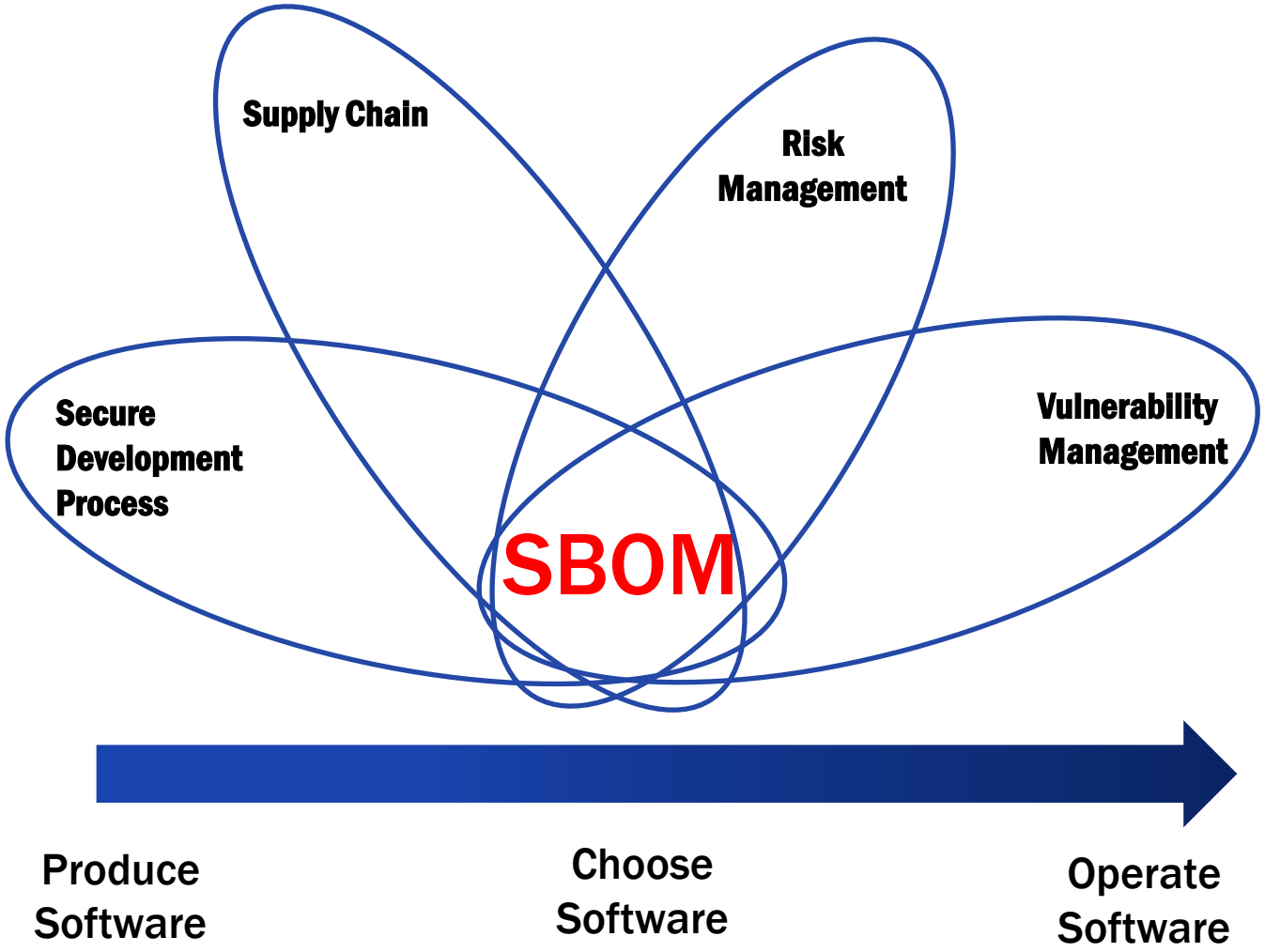


So what's an SBOM again?





A Software Bill of Materials (SBOM) is effectively a list of ingredients or a nested inventory.
It is “a formal record containing the details and supply chain relationships of various components used in building software"

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Motivation

- We’re ready for SBOM!
  - Many of you want this.
  - Some of you will *have* to do it…
  - See: Executive Order 14028*

- Doing this at scale requires tools

Photo by cottonbro: https://www.pexels.com/photo/a-person-holding-a-clay-pot-on-the-wooden-table-6692598/

*https://www.whitehouse.gov/briefing-room/presidential-actions/2021/05/12/executive-order-on-improving-the-nations-cybersecurity/

Based on organizations surveyed, it's forecasted

78% will use SBOMs in 2022.

SBOM 2021 SURVEY

Source: https://www.linuxfoundation.org/tools/the-state-of-software-bill-of-materials-sbom-and-cybersecurity-readiness/

Of organizations surveyed,

98% use open source software.

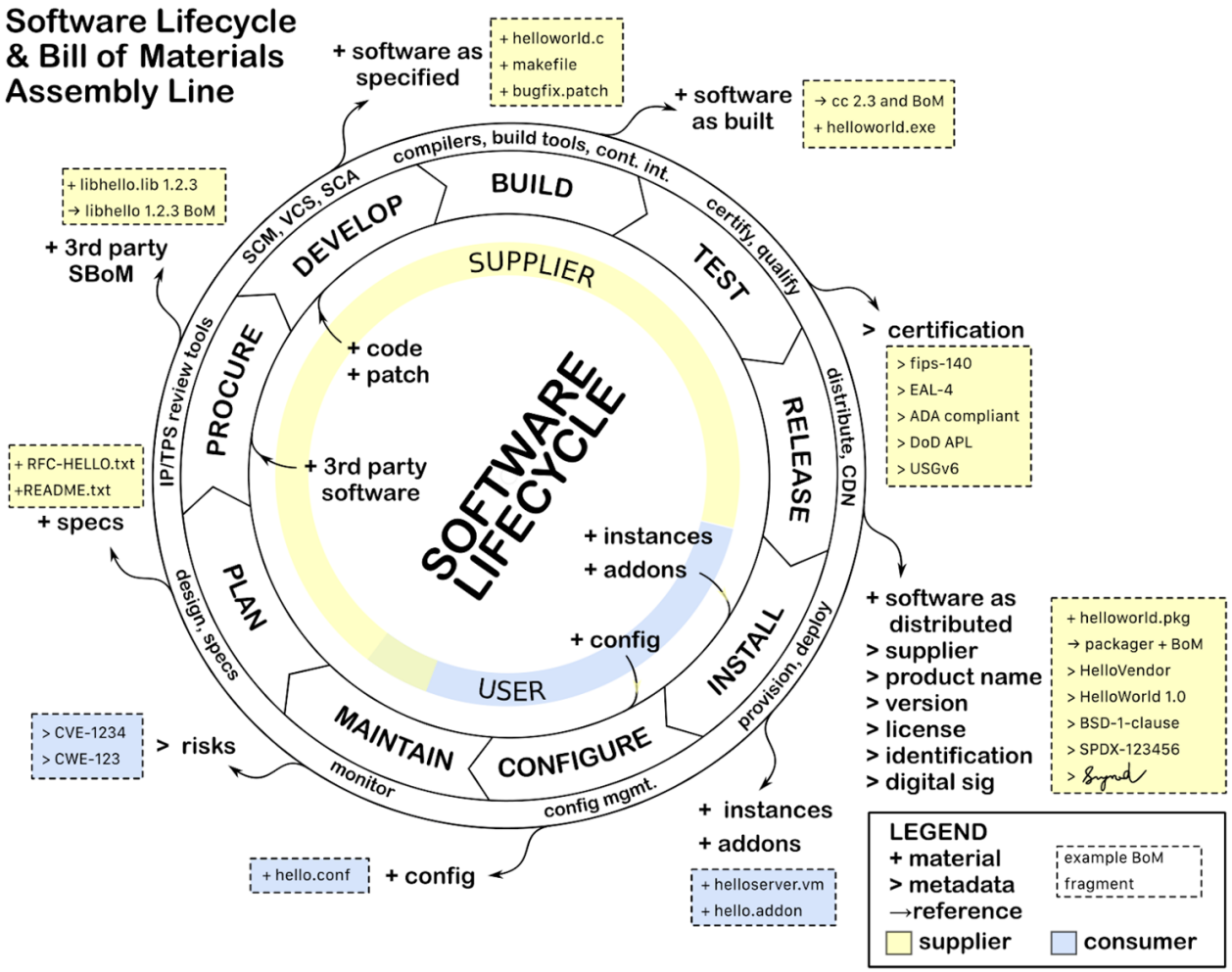
Source: https://www.linuxfoundation.org/tools/the-state-of-software-bill-of-materials-sbom-and-cybersecurity-readiness/

SBOM 2021 SURVEY

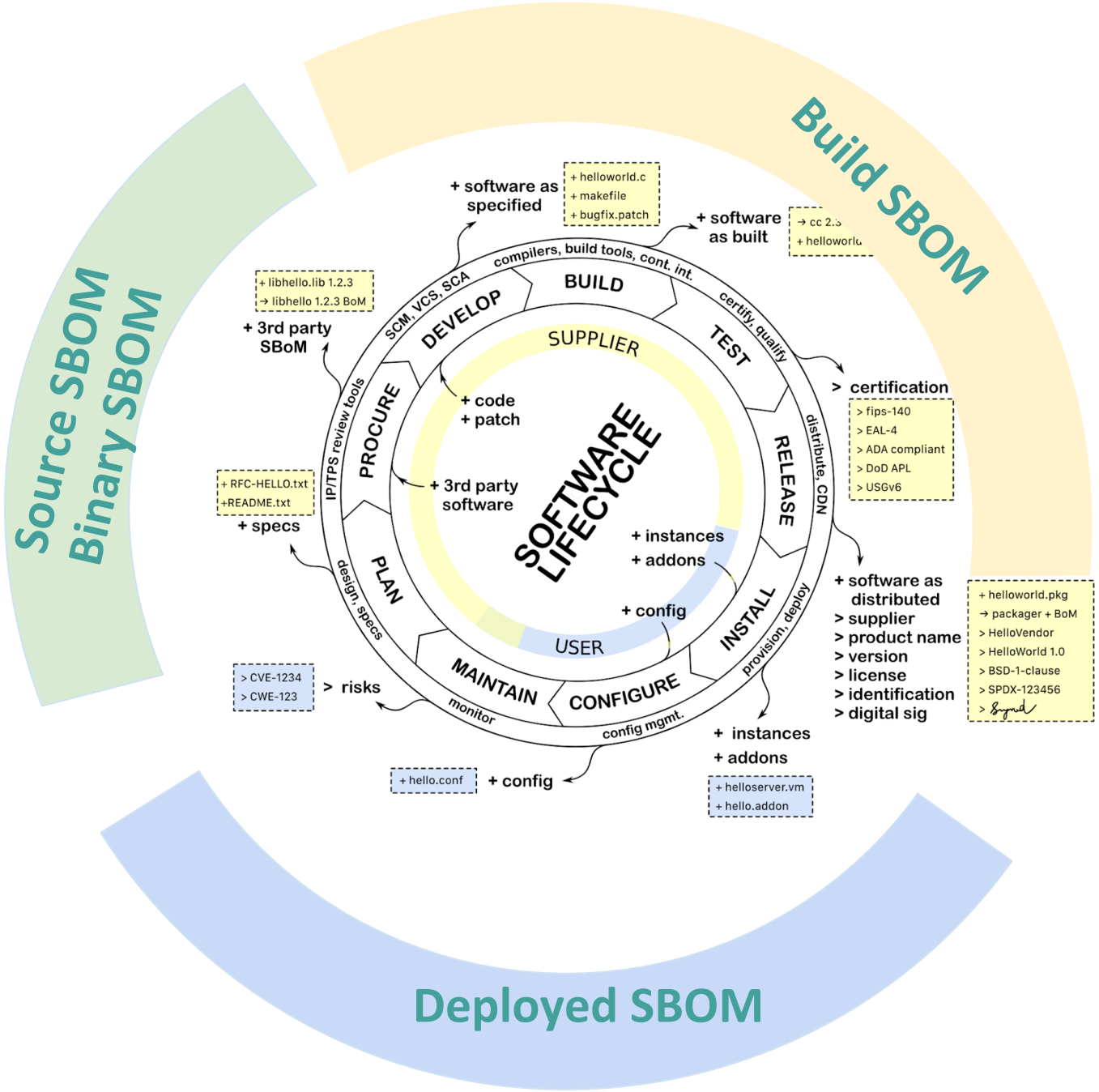
Goal:
Supporting an accessible, competitive marketplace

- A resource where tool providers can list themselves
- A resource where those looking for tools can find them
- A fair marketplace with transparent governance
- Standard/format neutral
- Includes open source and proprietary solutions
- Welcoming of novel solutions over time

SBOMs in the lifecycle of software



Source: NTIA's [Survey of Existing SBOM Formats and Standards]



Source SBOM - software sources imported used to build binary executable image.

Build SBOM - List of components and relationships between dependent components assembled to create a product released from Supplier.

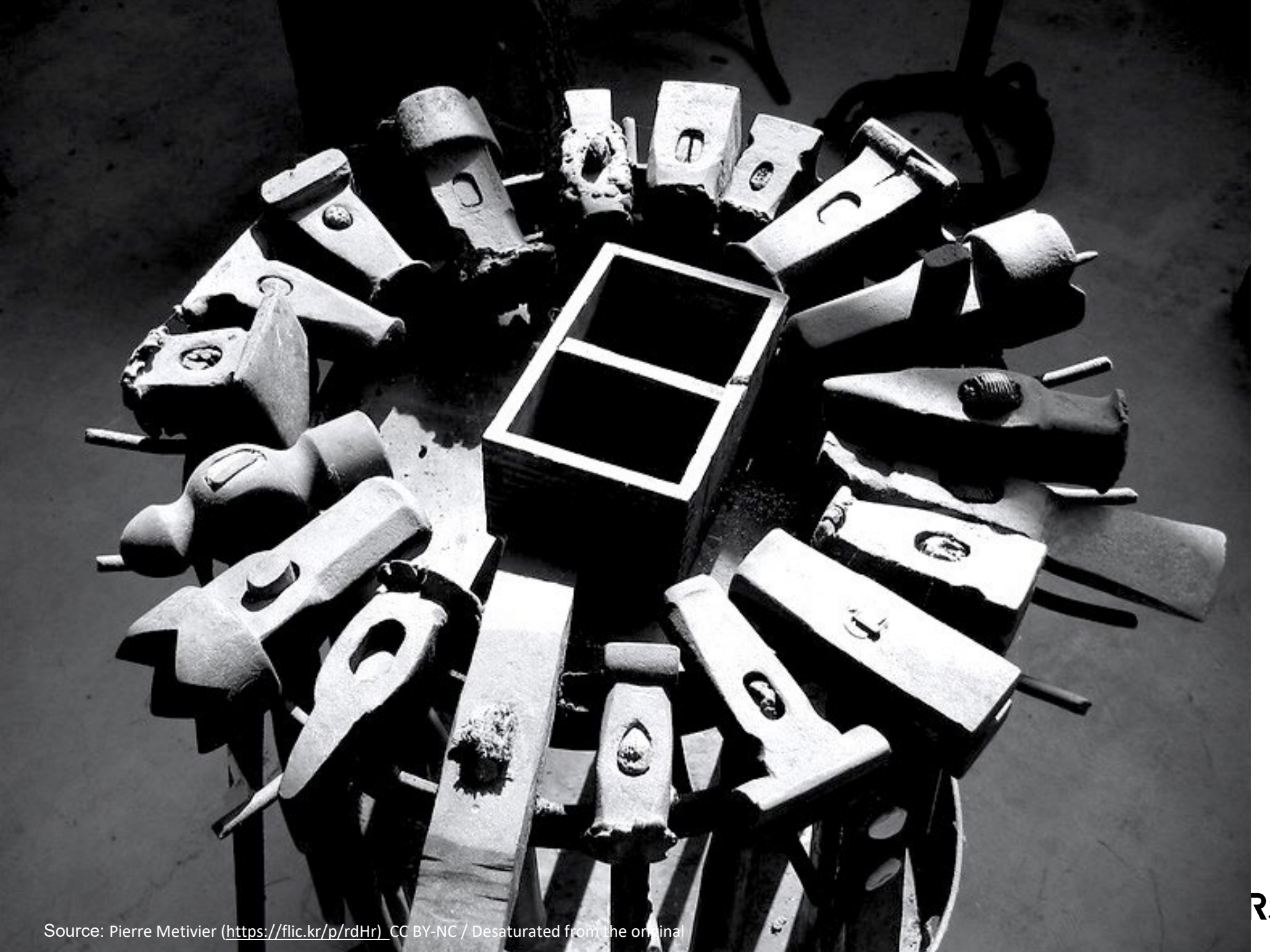
Binary Analysis SBOM - executable image to be integrated into deliverable. Created from 3rd party heuristics.

Deployed SBOM - Tracking configuration options on how a product has been deployed by User.

What is a Minimum SBOM?

Minimum Elements	
Data Fields	Document baseline information about each component that should be tracked: Supplier, Component Name, Version of the Component, Other Unique Identifiers, Dependency Relationship, Author of SBOM Data, and Timestamp.
Automation Support	Support automation, including via automatic generation and machine-readability to allow for scaling across the software ecosystem. Data formats used to generate and consume SBOMs include SPDX, CycloneDX, and SWID tags.
Practices and Processes	Define the operations of SBOM requests, generation and use including: Frequency, Depth, Known Unknowns, Distribution and Delivery, Access Control, and Accommodation of Mistakes.

Source:https://www.ntia.gov/files/ntia/publications/sbom_minimum_elements_report.pdf.



Source: Pierre Metivier (https://flic.kr/p/rdHr) CC BY-NC / Desaturated from the original

What about the Tools?

Taxonomy for Classifying SBOM Tools

Category	Type	Description
Produce	Build	SBOM is automatically created as part of building a software artifact and contains information about the build
	Analyze	Analysis of source or binary files will generate the SBOM by inspection of the artifacts and any associated sources
	Edit	A tool to assist a person manually entering or editing SBOM data
Consume	View	Be able to understand the contents in human readable form (e.g. picture, figures, tables, text.). Use to support decision making & business processes
	Diff	Be able to compare multiple SBOMs and clearly see the differences (e.g. comparing two versions of a piece of software)
	Import	Be able to discover, retrieve, and import an SBOM into your system for further processing and analysis
Transform	Translate	Change from one file type to another file type while preserving the same information
	Merge	Multiple sources of SBOM and other data can be combined together for analysis and audit purposes
	Tool support	Support use in other tools by APIs, object models, libraries, transport, or other reference sources

More details in: https://www.ntia.gov/files/ntia/publications/ntia_sbom_tooling_taxonomy-2021mar30.pdf

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Other ways of classifying SBOM tools

Other ways of classifying tools

- Generation vs. Consumption
- By the Lifecycle of software

- Technical ecosystem
- Sector-specific tools
- Open source vs proprietary
- First party / third party
- Data management and configuration management
  - Tracking what has been updated
  - Also an asset management story

Generation made easy – single line cmds

- Docker

Generation made easy – single line cmds

- Docker

```
$ docker sbom neo4j:4.4.5
Syft v0.43.0
 ✔ Loaded image
 ✔ Parsed image
 ✔ Cataloged packages      [385 packages]

NAME                    VERSION                 TYPE
...
bsdutils                1:2.36.1-8+deb11u1      deb
ca-certificates         20210119                deb
...
log4j-api               2.17.1                  java-archive
log4j-core              2.17.1                  java-archive
...
```

Generation made easy – single line cmds

- Docker
- Yocto
- Zephyr
- … more coming

New **production tools** are emerging daily, but challenge is organizations need a place to find them, and **find the right type of tool for the task**!

Consumption tools

Consumption tools

- Simple use case: detecting vulnerabilities
  - Grep NVD
  - Map to other sources of data
  - Entity disambiguation
- Integration into existing security tools
  - Asset management
  - Vulnerability management
  - CMDB
  - Data Lake

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Tools starting to do this:

SW360
OWASP DependencyCheck
Daggerboard (coming soon!)

… and of course, commercial offerings!

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Challenges & Open Questions for Automation

Delivering SBOMs: discovery and access

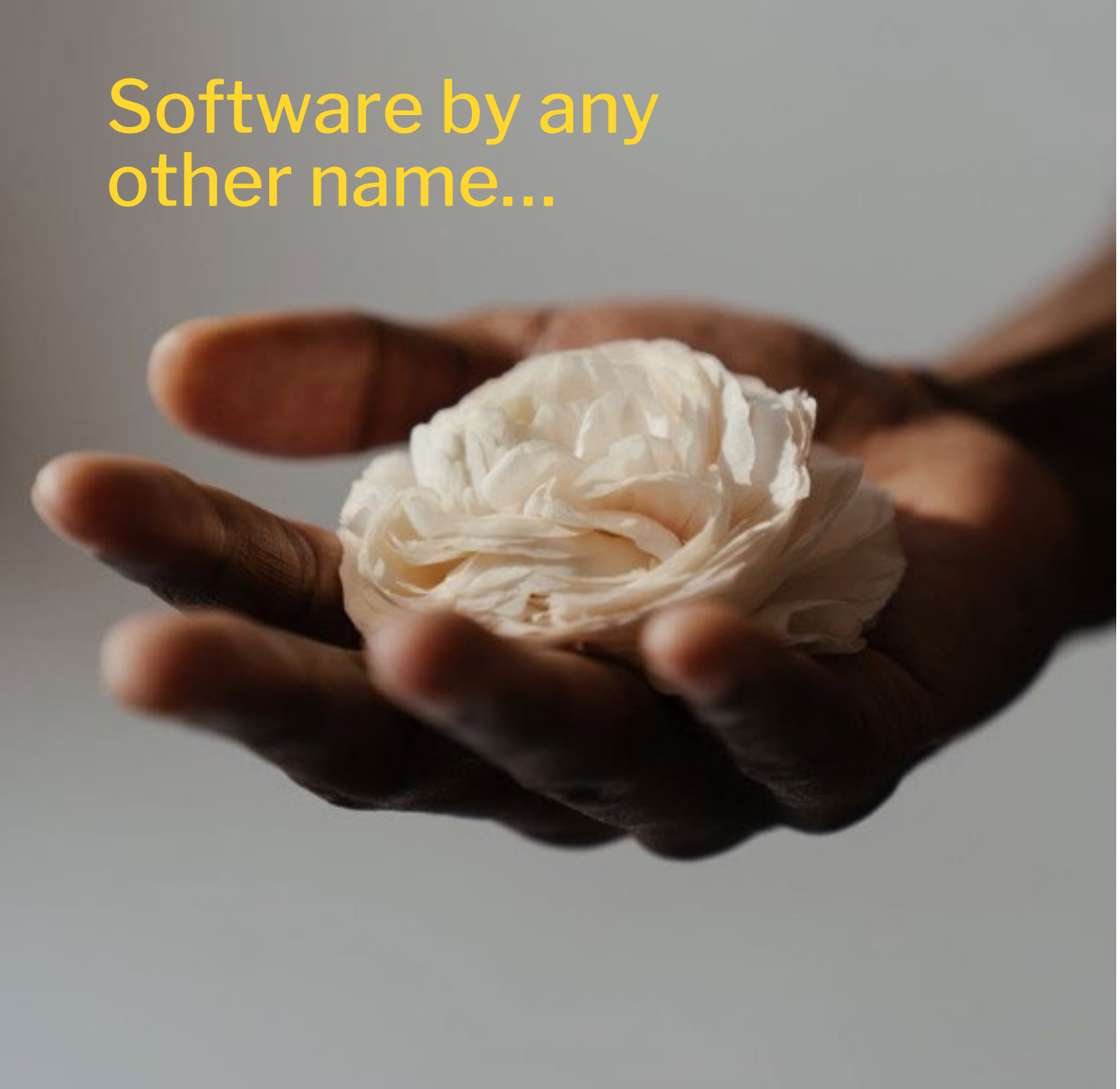
Photo by **Artem Podrez** from **Pexels**

Plumbing

- *All infosec problems eventually become data management problems*
- How will I get my SBOMs
- How to store our piles of SBOMs?
- How do we find the relevant info in our SBOMs?
- Integration into existing data flows

Photo by jiawei cui: https://www.pexels.com/photo/chrome-pipe-lines-2310904/

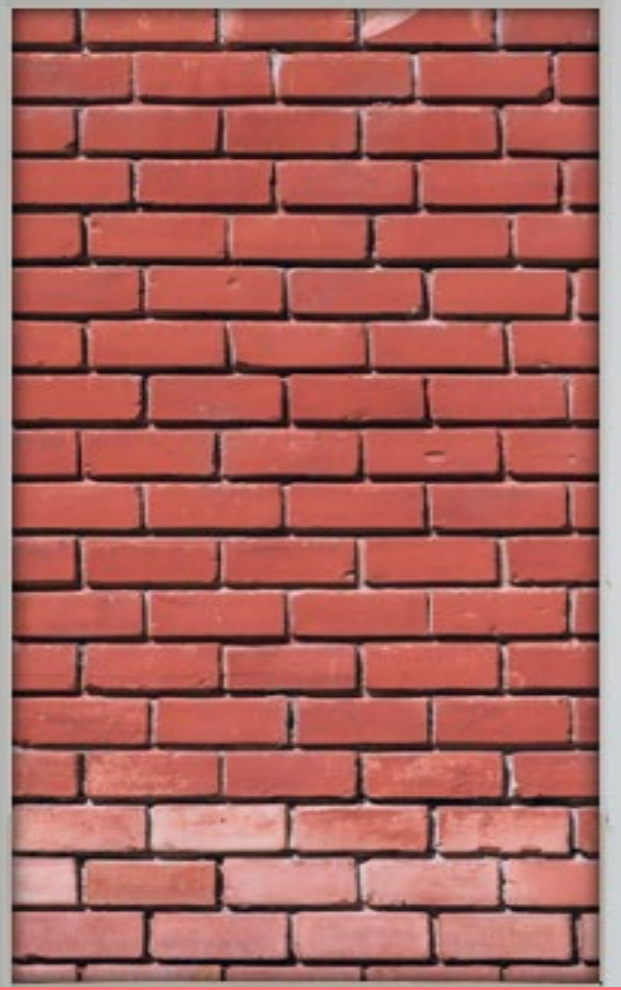
Software by any other name…



"There are only two hard things in Computer Science: cache invalidation and naming things."

- attributed to Phil Karlton

Challenge: Vulnerability vs Exploitability



Solution: “Vulnerability Exploitability eXchange” (VEX)

SBOM – to include vulnerabilities or not?

- Tooling across organizations: how to keep data current?
- Mapping VEX documents to SBOMs and other data
- Tools for VEX creation and consumption
  - Early days: https://secvisogram.github.io/
- Work flows for lifecycle
  - E.g. – VEX documents replace other VEXes.
  - E.g. - Do earlier VEX docs apply to later products?

Photo by Caroline Selfors on Unsplash

Where to find more info on tools?

CycloneDX: cyclonedx.org/tool-center/
or tiny.cc/CycloneDX

SPDX: spdx.dev/resources/tools/
or tiny.cc/SPDX

SWID: tiny.cc/SWID

Need to see a summary in a **neutral location** that is Standard/Format Neutral to allow a more open process and wider set of visible reviews.

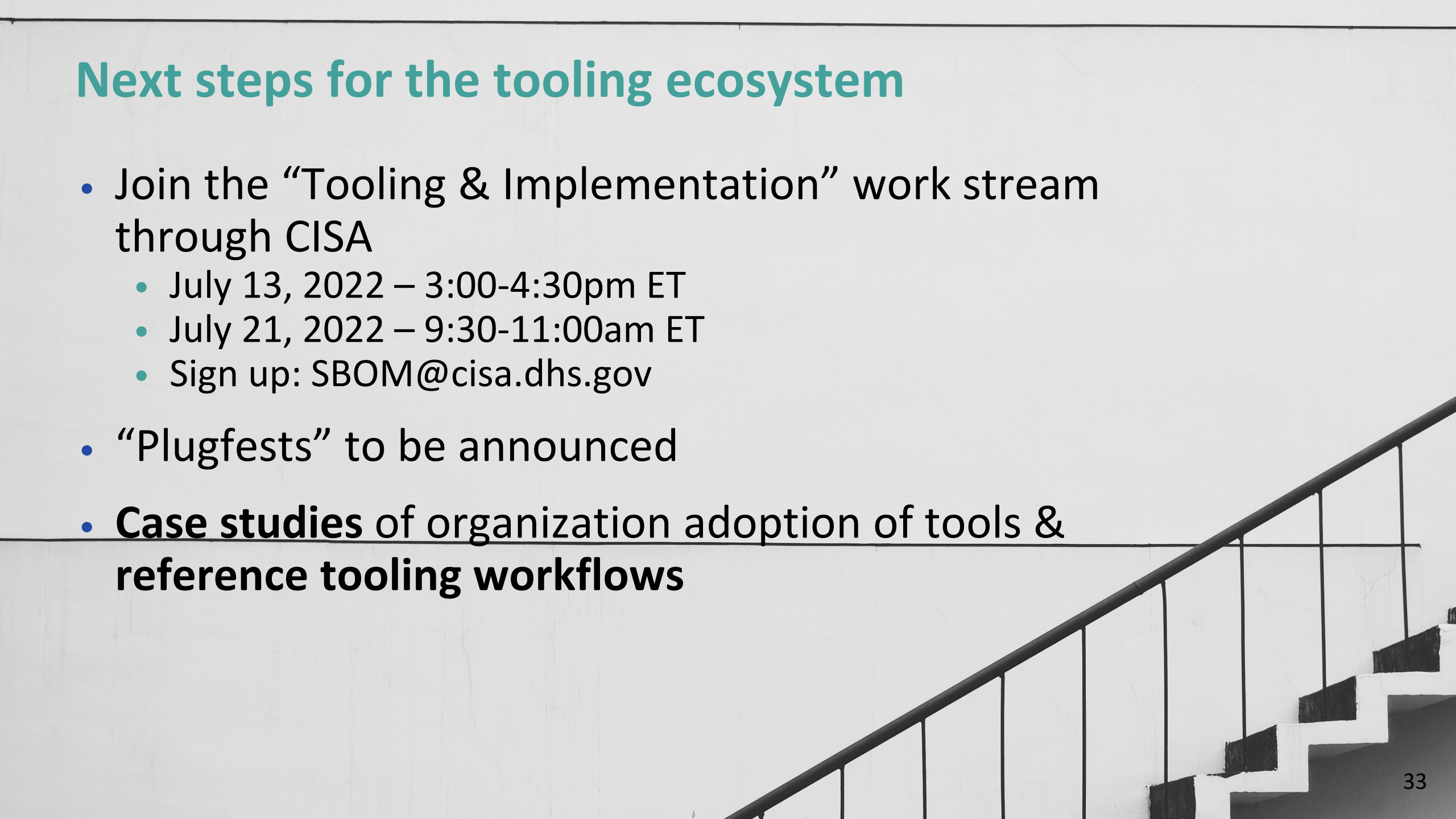
- Anyone can nominate tool to be added to a list
- Point to evidence of producing, consuming or transforming of SBOM documents to get tool on the list (this includes participating in Plugfest)

Translating Between SBOM Formats and Filetypes

- SwiftBOM: (SPDX(.spdx), SWID(.xml), CycloneDX(.xml,.json))
  - Demo at: https://democert.org/sbom/
  - Source code at: https://github.com/CERTCC/SBOM/tree/master/sbom-demo
- SPDX online tools: (SPDX (.spdx, .json, .yaml, .rdf, .xml, .xls))
  - Demo at: https://tools.spdx.org/app/
  - Source code at: https://github.com/spdx/spdx-online-tools
- CycloneDX CLI: (CycloneDX (.xml, .json), SPDX(.spdx))
  - Source code at: https://github.com/CycloneDX/cyclonedx-cli

Next steps for the tooling ecosystem

- Join the “Tooling & Implementation” work stream through CISA
  - July 13, 2022 – 3:00-4:30pm ET
  - July 21, 2022 – 9:30-11:00am ET
  - Sign up: SBOM@cisa.dhs.gov
- “Plugfests” to be announced
- **Case studies** of organization adoption of tools & **reference tooling workflows**



What can *your organization* do?

- Next week: Understand origins of software your organization is using
  - Commercial - can you ask for an SBOM?
  - Open Source - do you have an SBOM for the binary or sources you're importing?
- Three months: Understand what SBOMs your customers will require
  - Expectations - which Standards, dependency depth, licensing info?
- Six months: Prototype and Deploy
  - Implement SBOM through using an OSS tool and/or starting conversation with vendor

If your organization think this is important enough to help:

- Participate in ongoing discussions to determine best practices for ecosystem
- Contribute to open source project any code developed to support

What can *you* do?

- Next week: start playing with an Open Source SBOM tool and apply it to a repo
- Three months: Have an SBOM strategy that explicitly identifies tooling needs
- Six months:
  - begin SBOM implememention through using an OSS tool or starting conversation with vendor
  - Participate in a Plugfest, and try to consume another's SBOM

If you think this is important enough to help:

- Tools exist, both open source and commercial. Make sure the ones you find most useful are listed.
- Work with the tools to help harden them, test and report bugs, push them to scale