# SBoM

## The Fad, The Future, and In-Between

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# Anant Shrivastava

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- Chief researcher @ Cyfinoid Research
- 15+ yrs of industry exposure
- **Speaker / Trainer:** BlackHat, c0c0n, nullcon, RootConf, RuxCon
- **Project Lead:**
  - Code Vigilant (Code Review Project)
  - Hacking Archives of India,
  - TamerPlatform (Android Security)

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# Software Bill of Material

- Itemized list of all the ***ingredients*** in the software
- Ingredients means mostly third-party components
  - Software name
  - Version
  - Checksum
  - License information
  - Dependencies list if possible

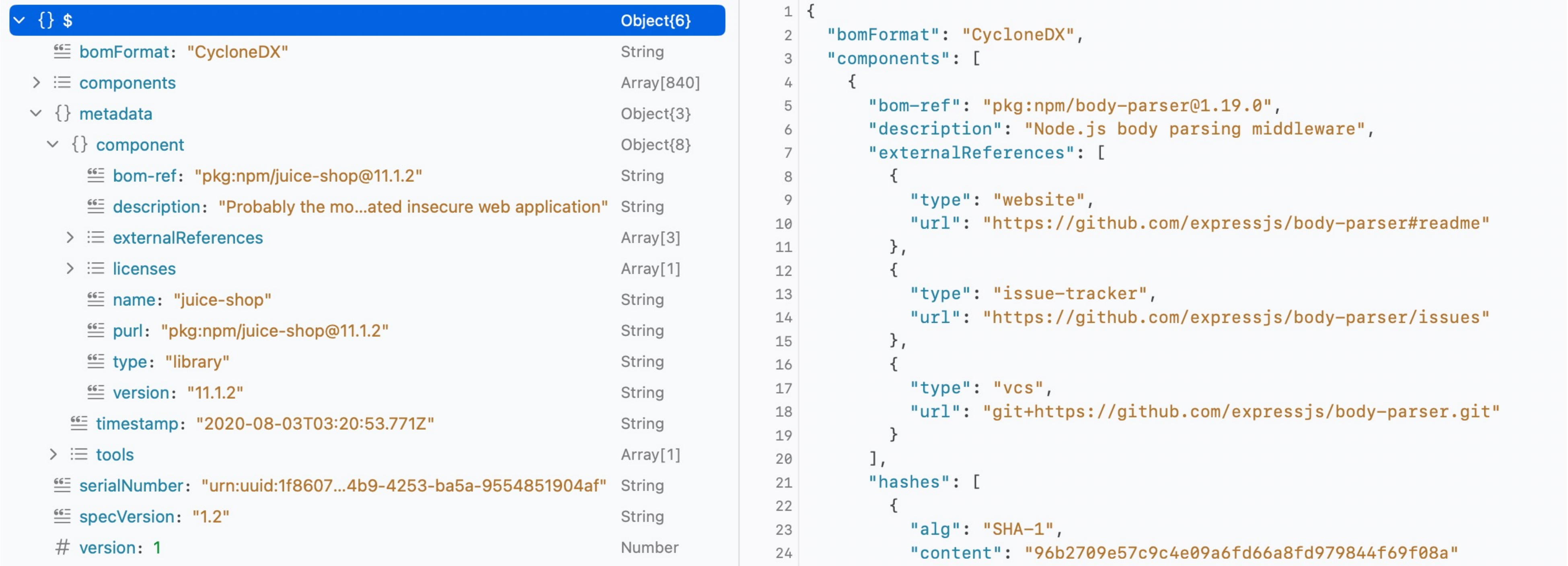
- SBoM's are mostly for one level depth only with other levels plugged in each other.

# Every standard starts with competition

- SPDX
  - ISO Standard
  - Github provides default export in this format
- CycloneDX
  - OWASP Supported
- SWID
  - Alternative ISO specification

https://www.ntia.gov/files/ntia/publications/sbom_formats_survey-version-2021.pdf

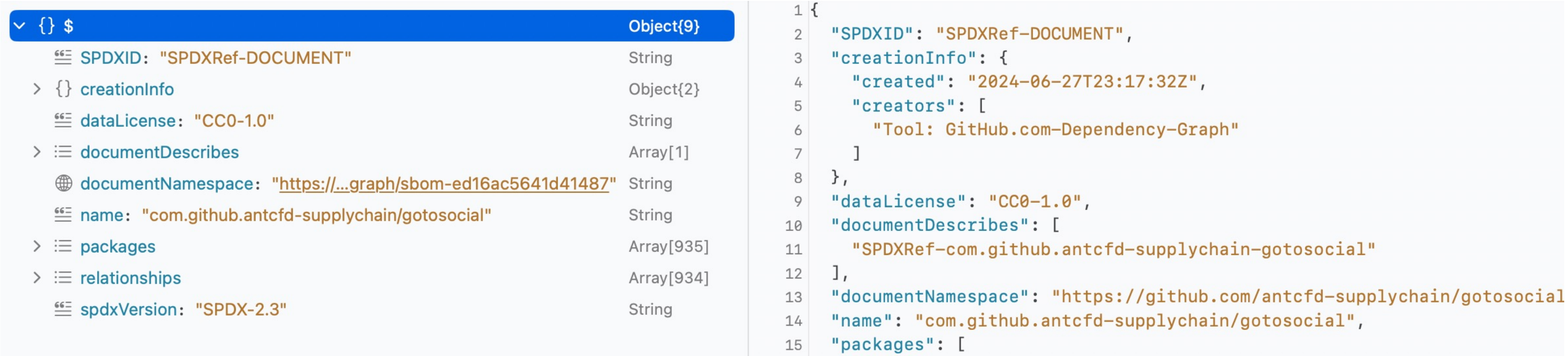
# Example CycloneDX SBoM



```
{} $                                                              Object{6}
    bomFormat: "CycloneDX"                                        String
  > components                                                    Array[840]
    {} metadata                                                   Object{3}
      {} component                                                Object{8}
          bom-ref: "pkg:npm/juice-shop@11.1.2"                    String
          description: "Probably the mo...ated insecure web application"  String
        > externalReferences                                      Array[3]
        > licenses                                                Array[1]
          name: "juice-shop"                                      String
          purl: "pkg:npm/juice-shop@11.1.2"                       String
          type: "library"                                         String
          version: "11.1.2"                                       String
        timestamp: "2020-08-03T03:20:53.771Z"                     String
      > tools                                                     Array[1]
    serialNumber: "urn:uuid:1f8607...4b9-4253-ba5a-9554851904af"  String
    specVersion: "1.2"                                            String
  # version: 1                                                    Number
```

```
{
  "bomFormat": "CycloneDX",
  "components": [
    {
      "bom-ref": "pkg:npm/body-parser@1.19.0",
      "description": "Node.js body parsing middleware",
      "externalReferences": [
        {
          "type": "website",
          "url": "https://github.com/expressjs/body-parser#readme"
        },
        {
          "type": "issue-tracker",
          "url": "https://github.com/expressjs/body-parser/issues"
        },
        {
          "type": "vcs",
          "url": "git+https://github.com/expressjs/body-parser.git"
        }
      ],
      "hashes": [
        {
          "alg": "SHA-1",
          "content": "96b2709e57c9c4e09a6fd66a8fd979844f69f08a"
```

# Example SPDX SBoM



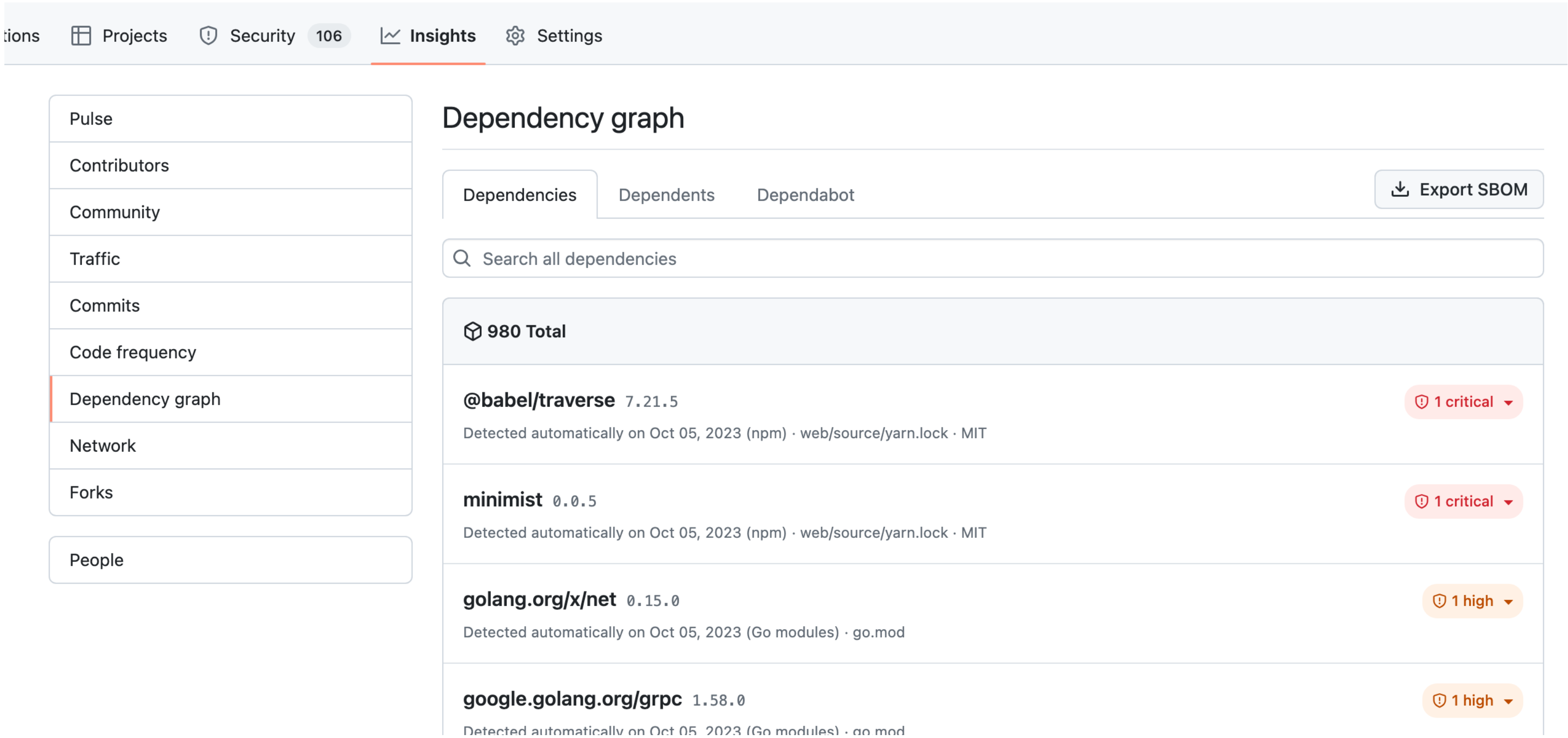
```
{} $                                                              Object{9}
    SPDXID: "SPDXRef-DOCUMENT"                                    String
  > {} creationInfo                                               Object{2}
    dataLicense: "CC0-1.0"                                        String
  > documentDescribes                                             Array[1]
    documentNamespace: "https://...graph/sbom-ed16ac5641d41487"   String
    name: "com.github.antcfd-supplychain/gotosocial"              String
  > packages                                                      Array[935]
  > relationships                                                 Array[934]
    spdxVersion: "SPDX-2.3"                                       String
```

```json
{
  "SPDXID": "SPDXRef-DOCUMENT",
  "creationInfo": {
    "created": "2024-06-27T23:17:32Z",
    "creators": [
      "Tool: GitHub.com-Dependency-Graph"
    ]
  },
  "dataLicense": "CC0-1.0",
  "documentDescribes": [
    "SPDXRef-com.github.antcfd-supplychain-gotosocial"
  ],
  "documentNamespace": "https://github.com/antcfd-supplychain/gotosocial
  "name": "com.github.antcfd-supplychain/gotosocial",
  "packages": [
```

# How to create SBoM

- Github provides dependency Graph in “Insights”
- SBoM generation tools
  - Cdxgen
    - https://github.com/CycloneDX/cdxgen
  - SPDX Generator
    - https://github.com/spdx/tools
- /dev/hand if all else fails (Its XML)

# GitHub Export SBOM Option



tions | Projects | Security 106 | Insights | Settings

Pulse
Contributors
Community
Traffic
Commits
Code frequency
Dependency graph
Network
Forks

People

## Dependency graph

Dependencies | Dependents | Dependabot | Export SBOM

Search all dependencies

980 Total

**@babel/traverse** 7.21.5 — 1 critical
Detected automatically on Oct 05, 2023 (npm) · web/source/yarn.lock · MIT

**minimist** 0.0.5 — 1 critical
Detected automatically on Oct 05, 2023 (npm) · web/source/yarn.lock · MIT

**golang.org/x/net** 0.15.0 — 1 high
Detected automatically on Oct 05, 2023 (Go modules) · go.mod

**google.golang.org/grpc** 1.58.0 — 1 high
Detected automatically on Oct 05, 2023 (Go modules) · go.mod

DEMO GODS
PLEASE LET THIS DEMO WORK
memegenerator.net

# Is SBoM really useful

- SBoM rose to prominence coz of exec order by US President.
- Requirement is to create SBoM
- No directions around usage, consumption etc

- **SBoM Tells you software composition nothing else**

- Industry representatives have started asking Questions?
  - Should we focus on building SBOM or fix issues in that time?

# Thoughts from Industry around SBoM

- Why should I disclose my composition to the world
- I will only share the SBoM to NDA covered entities
- I don’t need SBoM coz I don’t sell to USA
- Better to spend time in fixing bugs then making SBoM

# Food for thought

software industry

is mostly

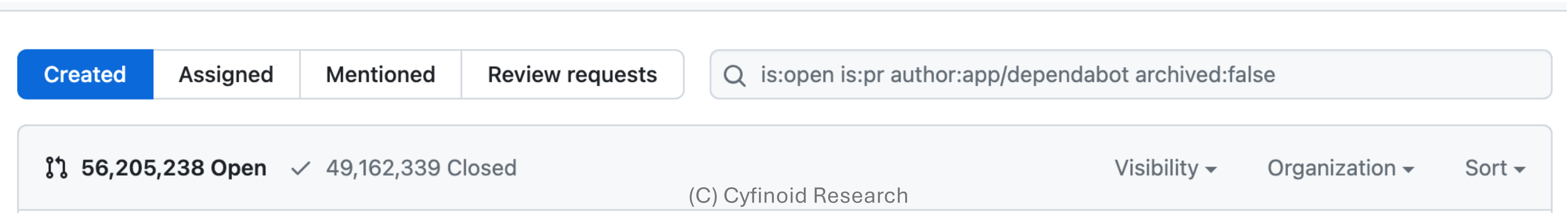
fixing problems

created by

software industry

# What problems have we created

- Software build automation == quicker release cycle
- Automated release cycle == less wait for features
- Faster feature release == less inclination to upgrade dependencies
- Too much focus on OSS Codebase without helping the maintainers
- Impossible segregation of features and bug fixes
- Automated notification of vulnerability (hedonic hamster wheel)



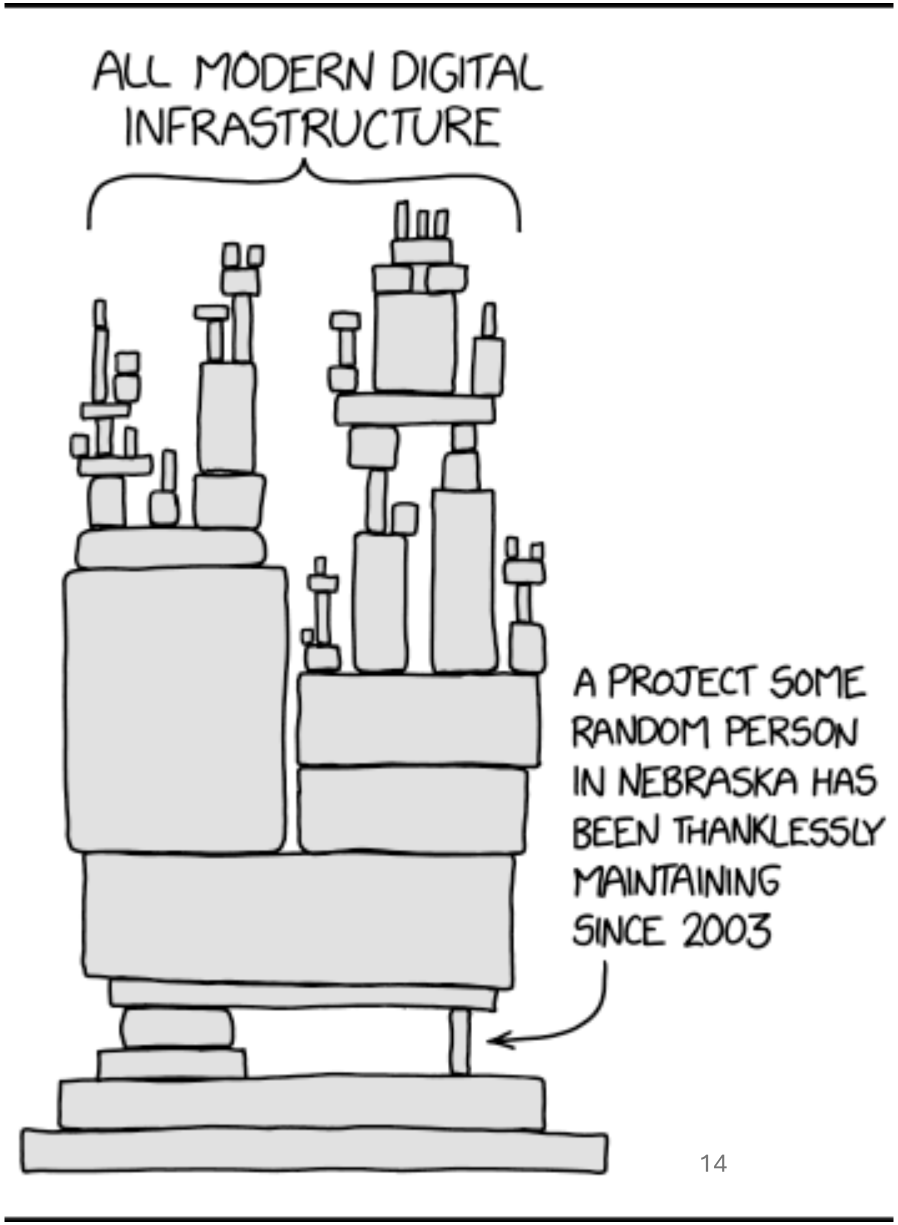
is:open is:pr author:app/dependabot archived:false

56,205,238 Open ✓ 49,162,339 Closed

# SBoM can help

- Identifying incorrect use of software
- Identify what to fix in scenarios like log4shell
- Identify impact in sec bug release in a core component

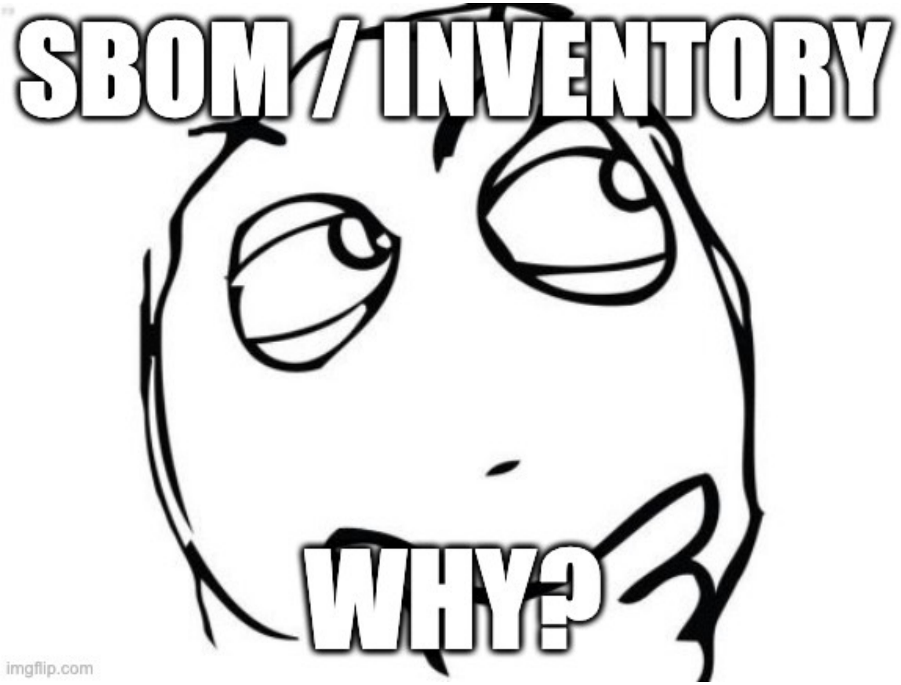
- Basically, Inventory problems


ALL MODERN DIGITAL INFRASTRUCTURE
A PROJECT SOME RANDOM PERSON IN NEBRASKA HAS BEEN THANKLESSLY MAINTAINING SINCE 2003

Ref: XKCD.com/2347

# Another thought

- Infosec has never had the luxury of well-maintained inventory
- SBoM can help with it
- we never had inventory; we don't even know what to do with it when its created



# Consequences for Infosec

For Practitioners both infosec and Devops

- We have been asking for better visibility, this is it

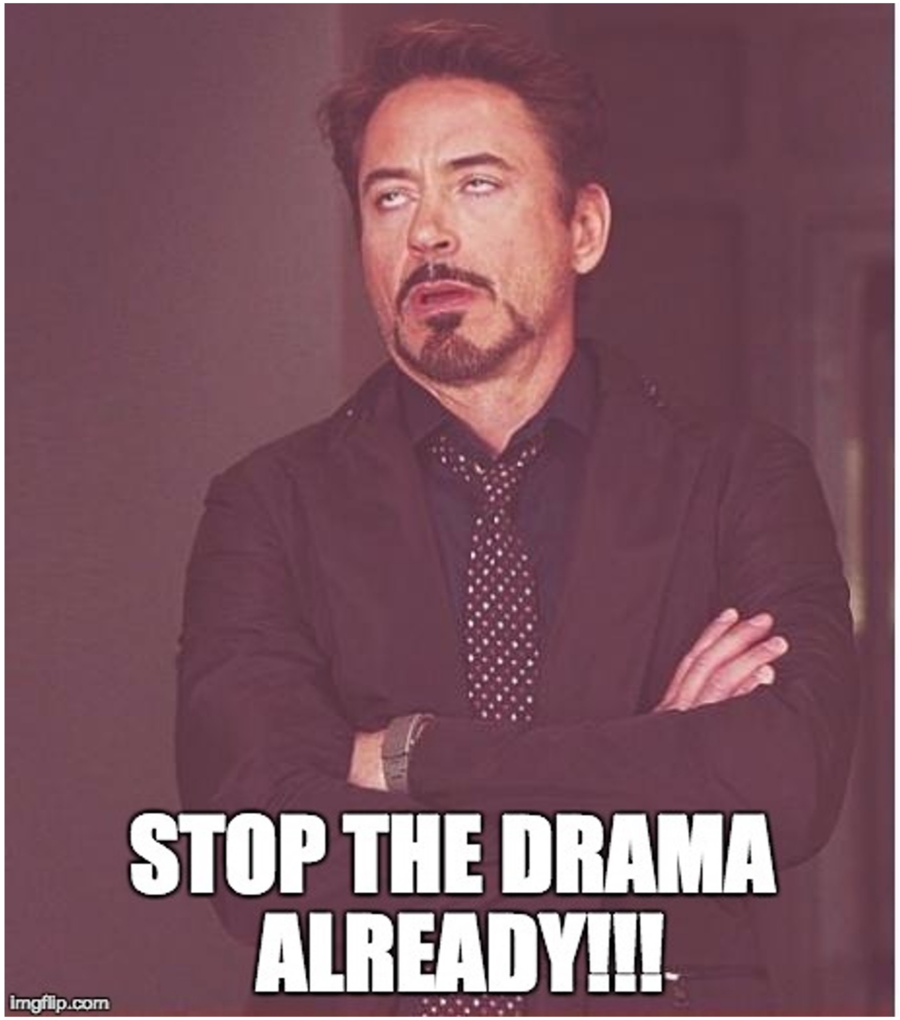
For Industry entities

- This is like “opening the kimono” moment

(C) Cyfinoid Research

# If security practitioners want to preserve this facility they need to act now

imgflip.com


STOP THE DRAMA
ALREADY!!!
imgflip.com

# Existing tooling

- OWASP Cyclone DX : https://cyclonedx.org/
- Google SLSA dev : https://slsa.dev/
- SPDX : https://spdx.dev/
- SafeDep : https://safedep.io/
- Dependency Tracker: https://dependencytrack.org/
- SYFT : https://github.com/anchore/syft

# Security efforts already in progress

- VDR : Vulnerability Disclosure Report
- VEX : Vulnerability Exploitability eXchange
- xBoM’s
  - Software-as-a-Service Bill of Materials (SaaSBOM)
  - Hardware Bill of Materials (HBOM)
  - Machine Learning Bill of Materials (ML-BOM)
  - Cryptography Bill of Materials (CBOM)
  - Manufacturing Bill of Materials (MBOM)
  - Operations Bill of Materials (OBOM)
- Attestations

# What can we do

- Security is largely considered a cost center and any incentive that is solely useful for security is a cost.
- Inventory allows organization to make data driven decisions
- Make SBoM’s usefulness visible for other departments
- If more people especially profit centers and business requirements (HR, Finance) need it, its hard to kill

# SBoM Usage beyond security teams

Use each SBoM as part of inventory,

Consolidate then and then draw inferences from it

- Development
- Acquisitions and mergers
- Compliance (adjunct security)
- Risk Management

# SBoM usage for Developers

- Manage technical Debt
- Reduce dependency scatter
- Consolidate efforts for usage
- Simplified package selection in case of newer project

# SBoM usage for Acquisitions & Mergers

Use SBoM as an indicator for future cost and decision

- Too many outdated / EOL / unmaintained software in use leads to high cost of ownership after acquisitions
- If the toolset / techstack is vastly different than existing, then extra talent cost
- If too many techstacks in picture, shows non cohesive teams

# SBoM usage for Compliance

- Licensing policy spread not just at product but at input component level
- Possible cost of rework due to non-compliance with company policy
- Possible repercussions if my code touches this code (GPL restrictions to name as one)

# SBoM usage for Risk Management

Interesting questions that can be answered

- Do I want to include X amount of risk by purchasing this vendor’s software?
- If risk is low but product will be highly visible, can I still afford it.
- Even with high risk, in a self-contained environment is it okey
- Do I really want my SSO auth token going into this software

# What is needed

- Better tooling (tech and UX)
  - Current tools are not easy to use even for practitioners
- Collaboration and seeking feedback from other parties
  - Don’t make tooling for yourself make it for others
- Focus on usage not on glamorizing tech
  - We technologists focus too much of technical side.

# To Conclude

- I believe SBoM is a Boon for overall IT Industry to move in better directions.
- Newton’s first law of motion stands : Inertia can only be countered by greater force
- There is a bright future ahead if we can muster the courage for it

# Thanks for listening & open to Questions?

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