Confusing Value with Enumeration: Studying the Use of CVEs in Academia

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Distinguished Paper

Do **you** know what a CVE is?

A **Common Vulnerabilities and Enumeration (CVE) ID** is a unique identifier assigned to a vulnerability

Two examples: **CVE-2014-0160** == Heartbleed

CVE-2017-5754 == Meltdown

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- abstract of some USENIX Security paper

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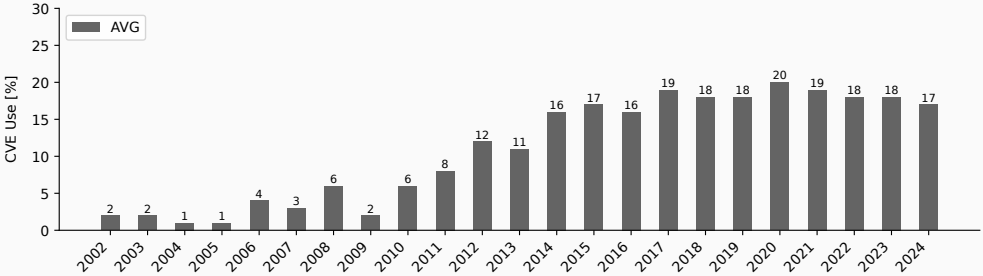
.. also used as a proxy for impact!

1. How widespread is the **use** of CVEs?
2. What happened to the underlying **bugs**?
3. What does the **community** think?

Have **you** used CVEs in a paper?

1 Quantitative Analysis – General Use of CVEs



Average percentage of papers that mention one or more CVE IDs across

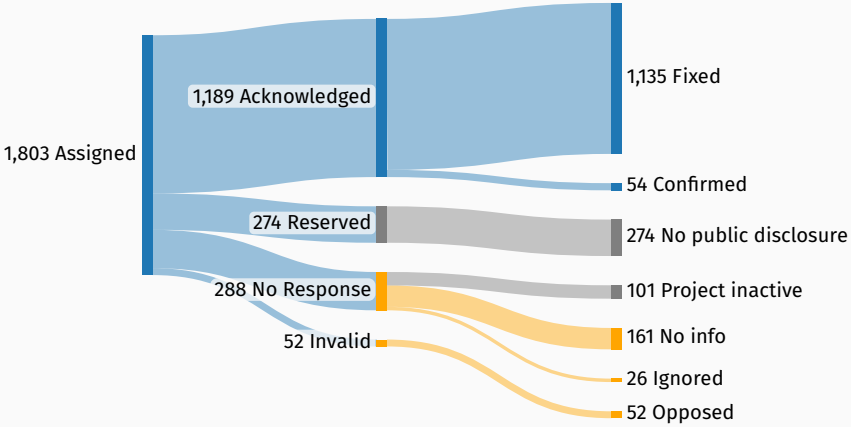
USENIX Security, IEEE S&P, ACM CCS, ISOC NDSS

Have **you** obtained CVEs for a paper?

2 Qualitative Analysis – Outcome Classification

- Identified papers from 2020–2024 that **claimed** CVEs
- Extracted **1,803** CVEs claimed across **304** papers
- Analyzed the **outcomes** of the underlying bugs

2 Qualitative Analysis – Outcome Classification



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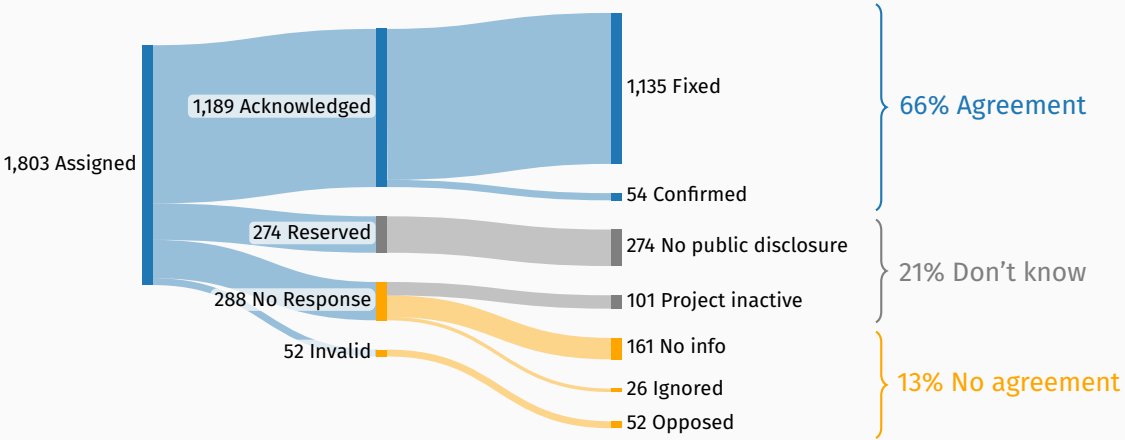

How?

CVE Numbering Authorities (CNAs)

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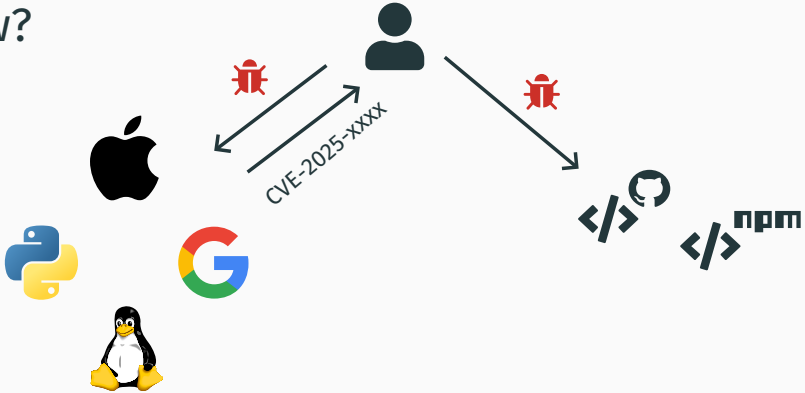

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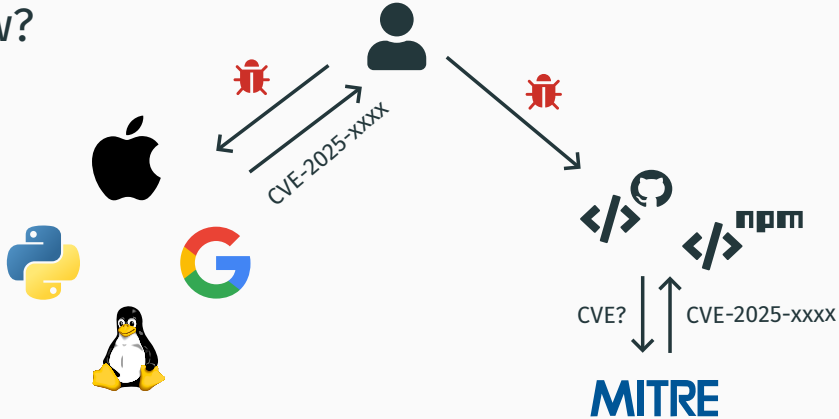

CVE Numbering Authorities (CNAs)

CNAs of **Last Resort** (CNA-LRs)

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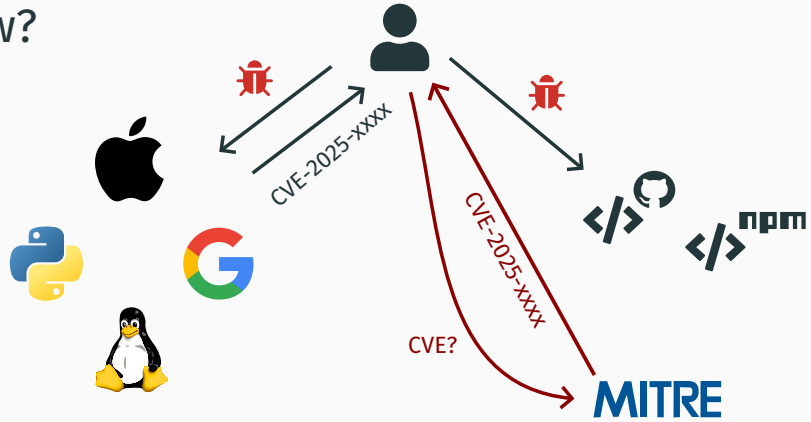

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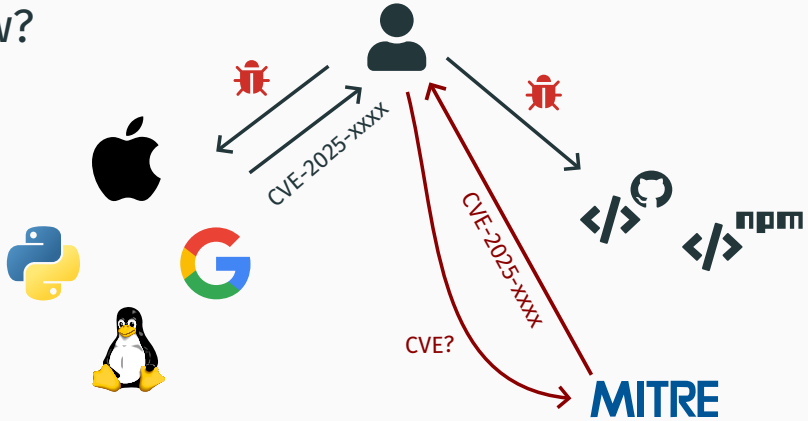

CVE Numbering Authorities (CNAs)

CNAs of **Last Resort** (CNA-LRs)

=> Lack of Verification!

2 Qualtitative Analysis – By CNA Type

	Agreement	*Don't know*	*No-Info*	*Ignored*	*Opposed*	Sum
CNA-LRs	690	101	158	26	49	1,024
Regular CNAs	499	0	3	0	3	505

2 This has an impact beyond academia

*"But they seem like a known **bad actor**, lots of **bogus CVEs** and no response after that anymore. This is the problem with the whole **security circus**"*

– a project maintainer on GitHub

Let’s compare this data to the opinion of

102 academics

Do you try to obtain CVEs?

Do you try to obtain CVEs? **71%** agree

3 Survey – Authors' Perspective

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Do CVEs help getting a paper accepted? **76%** agree

$\Rightarrow$ CVEs are seen as **desirable**

Do you check submissions for CVEs?

3 Survey – Reviewers' Perspective

Do you check submissions for CVEs? **38%** agree

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Do CVEs improve your perception of a paper?

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Do you check submissions for CVEs? **38%** agree

Do CVEs improve your perception of a paper? **68%** agree

$\Rightarrow$ **99%** chance that the perception of one of your reviewers is positively affected (assuming four reviewers)

Is verification part of the CVE assignment process?

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$\Rightarrow$ This may create a false sense of credibility

Takeaways

- **Misaligned incentives** incite a hunt for CVEs
- **Lack of verification** creates opportunity for misuse
- **Misconceptions** lull us into a false sense of security

CVEs are not a good impact metric