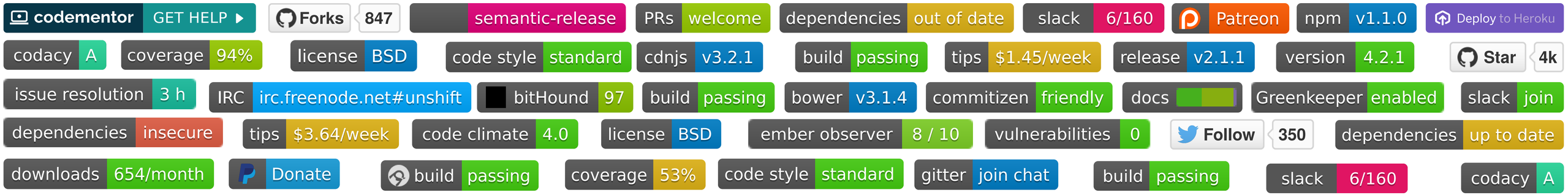

Adding Sparkle to Social Coding:

An Empirical Study of Repository Badges in the npm Ecosystem

Asher Trockman, Shurui Zhou, Christian Kästner, Bogdan Vasilescu

ICSE '18, May 27-June 3, 2018, Gothenburg, Sweden

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SOCIO-TECHNICAL RESEARCH USING DATA EXCAVATION LAB

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EST 1854
Civic Mission... Sacred Trust

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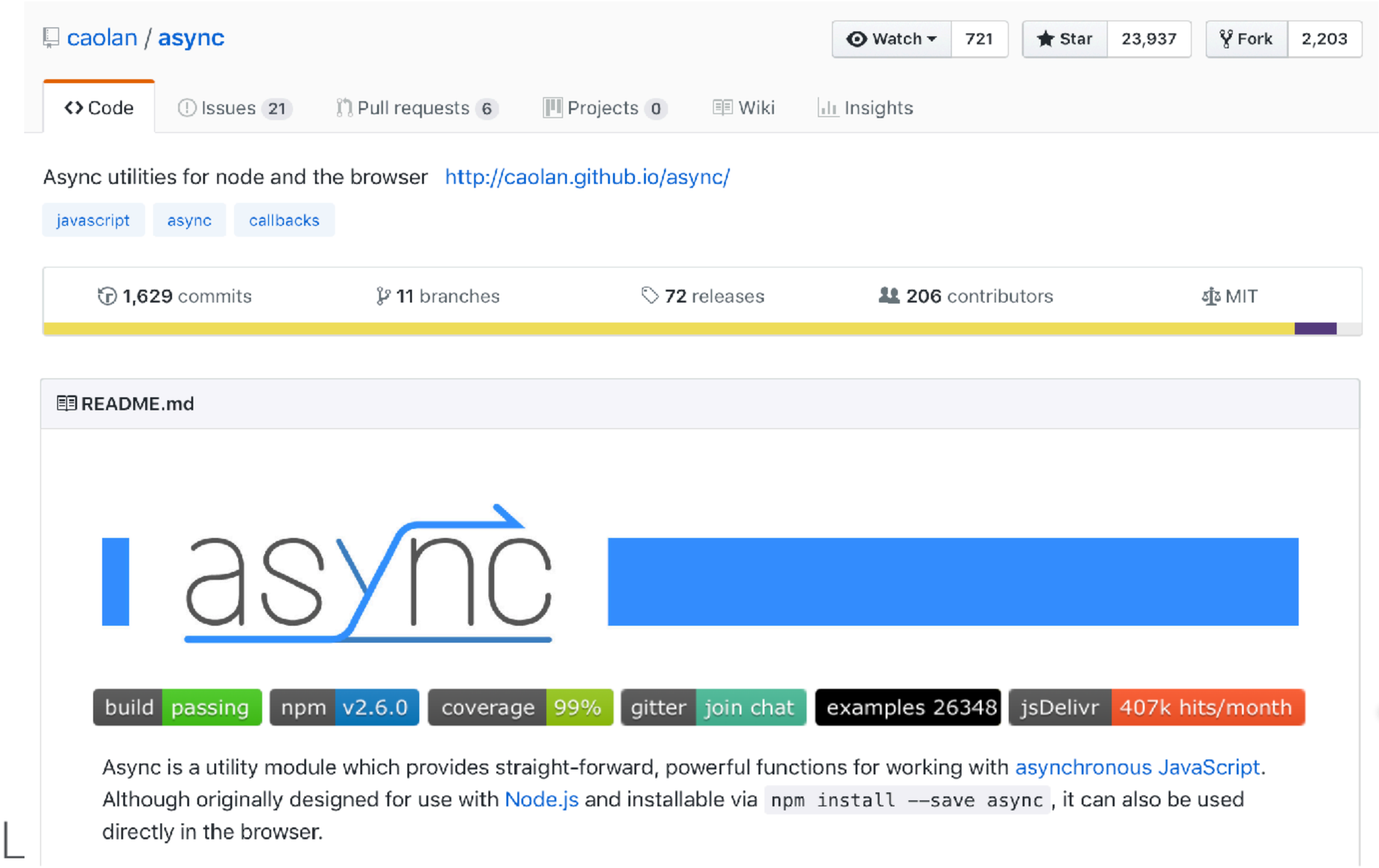
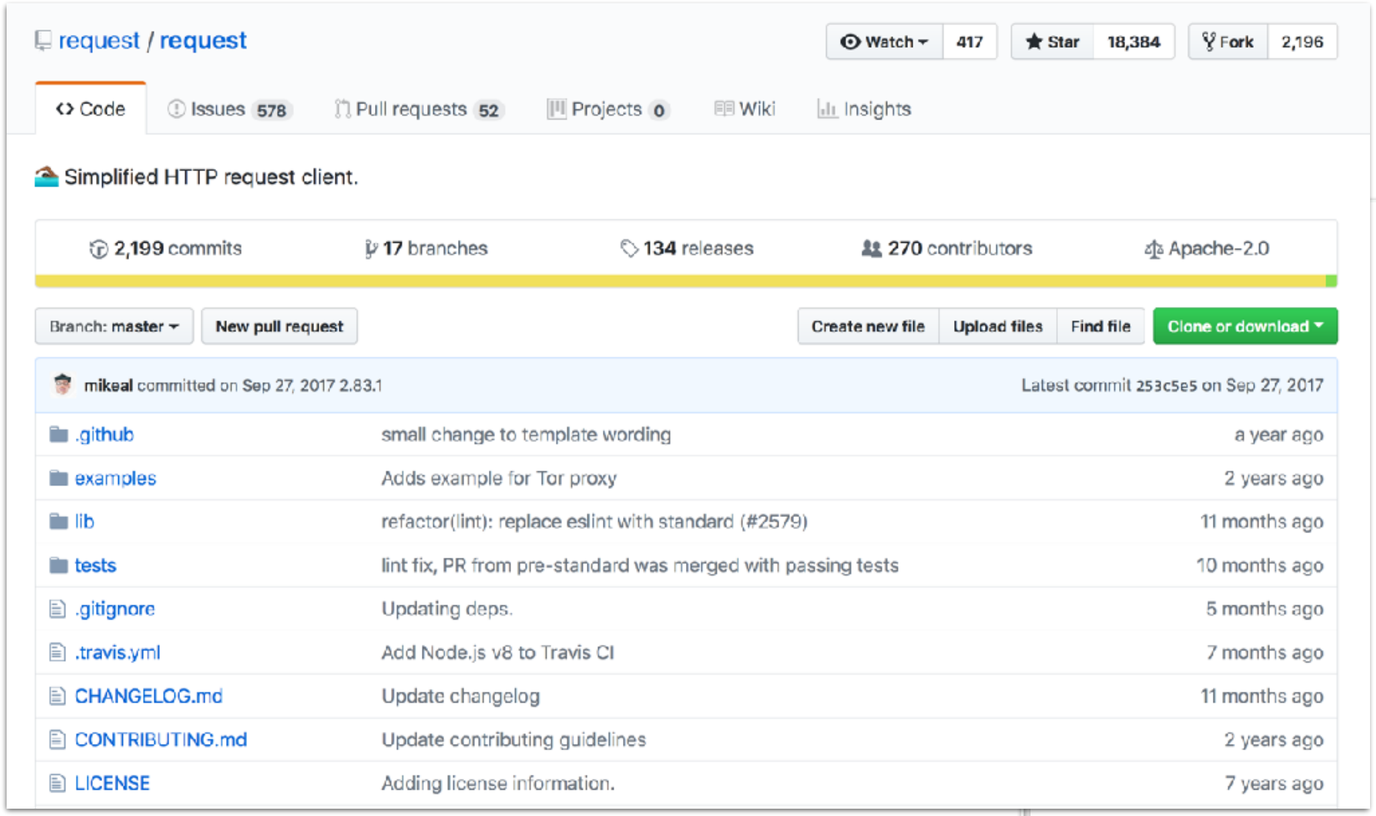
isr institute for SOFTWARE RESEARCH

GitHub Repository Badges



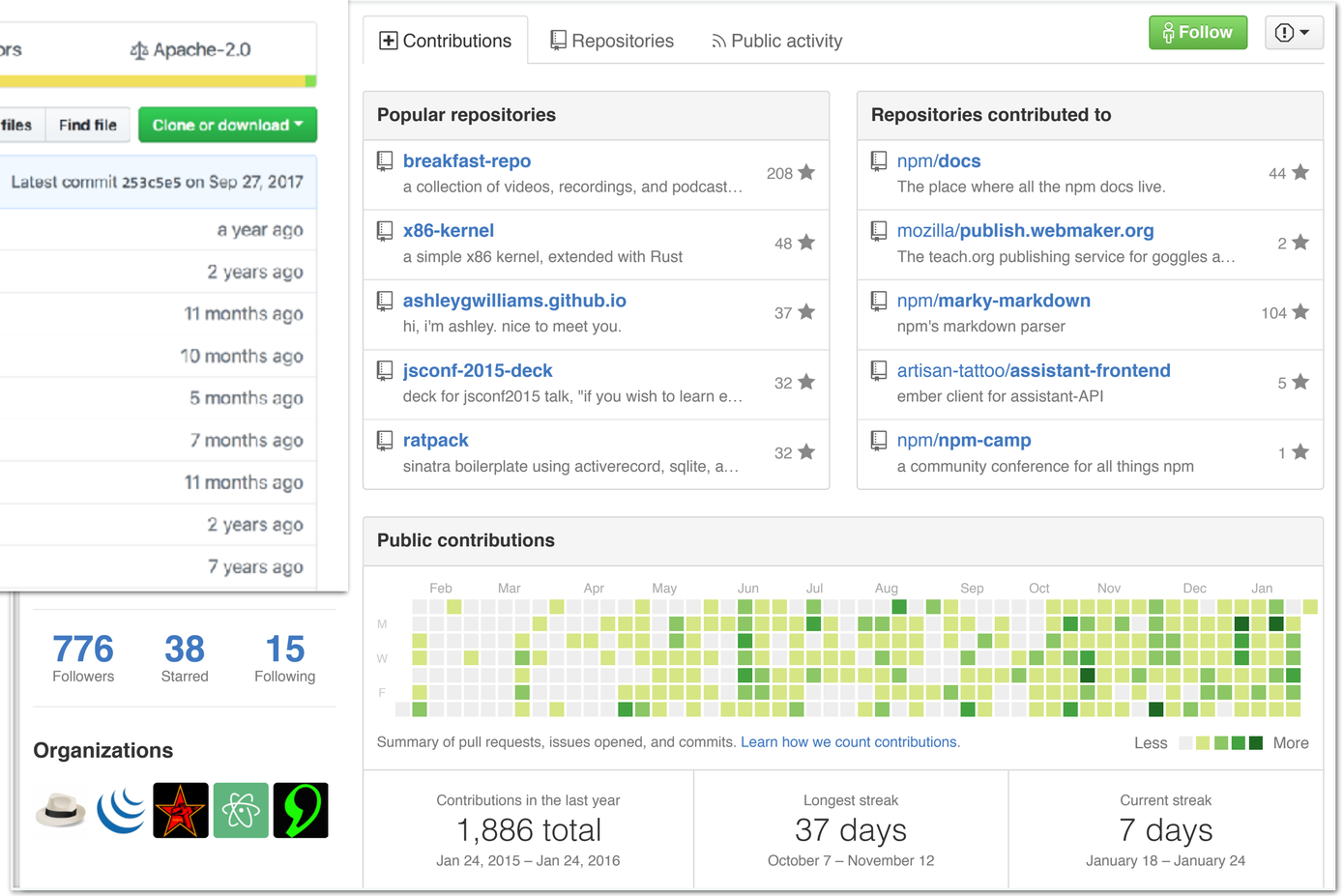
Enlarged to show detail.

Key features: Transparency & signaling



Projects

Users



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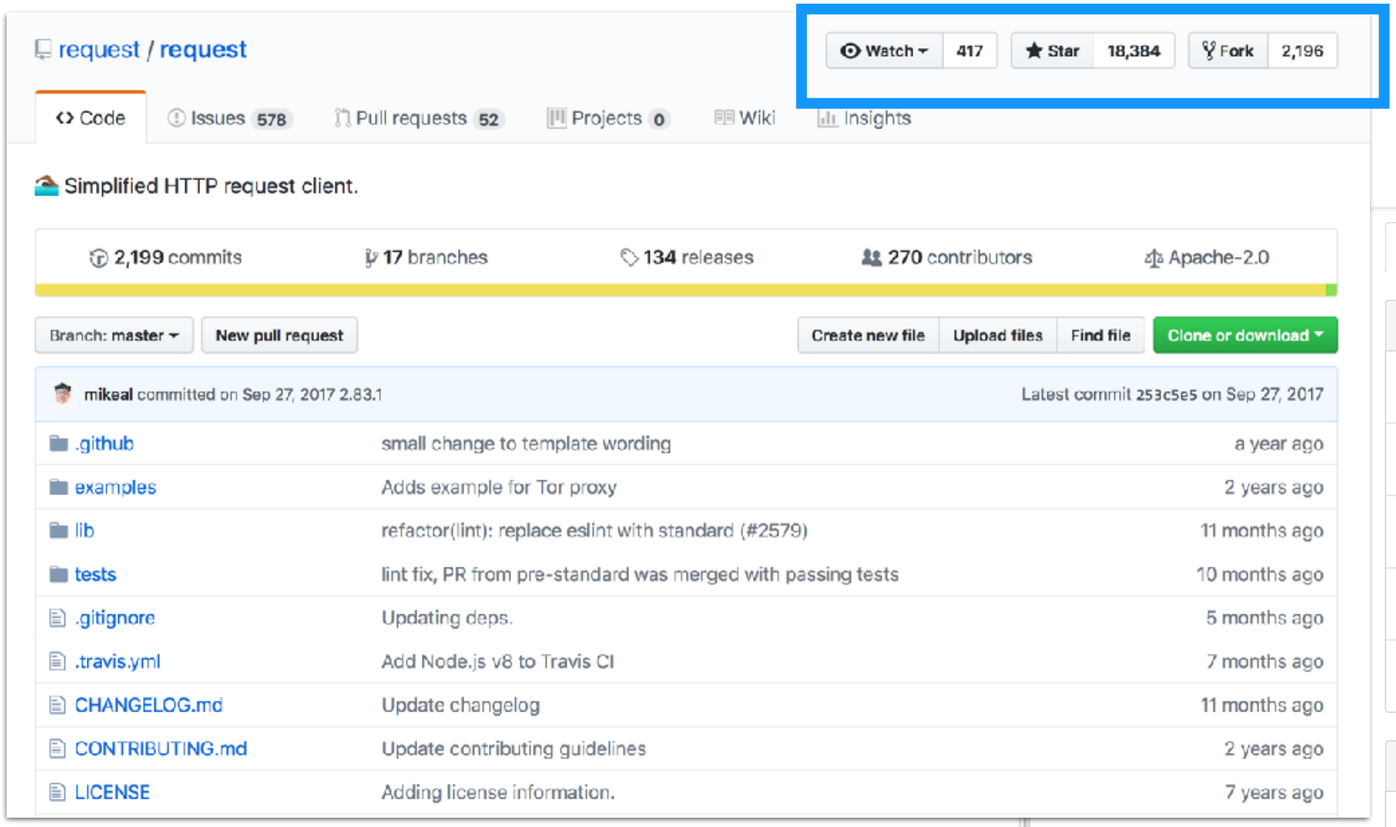
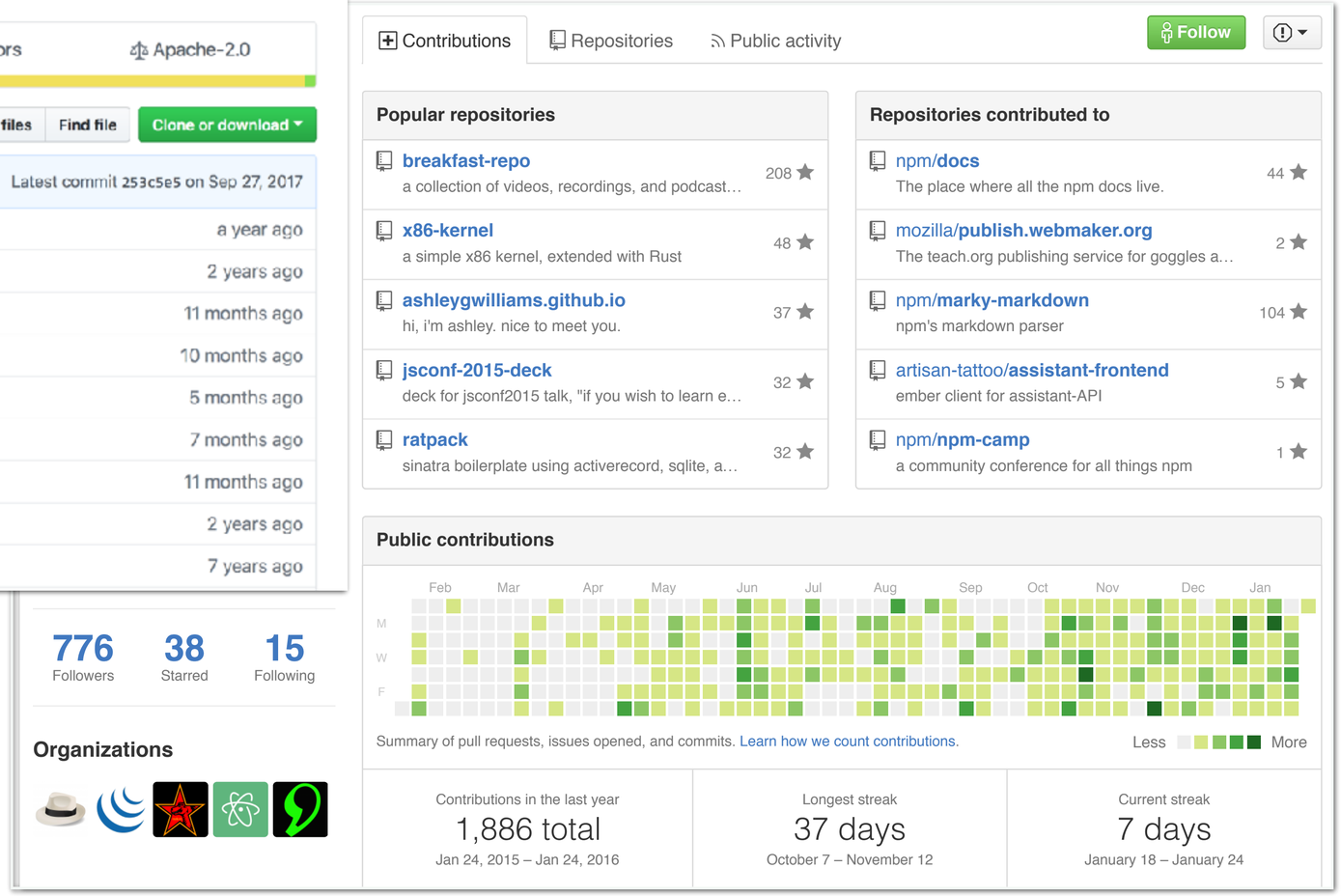
Key features: Transparency & signaling



Projects

Users



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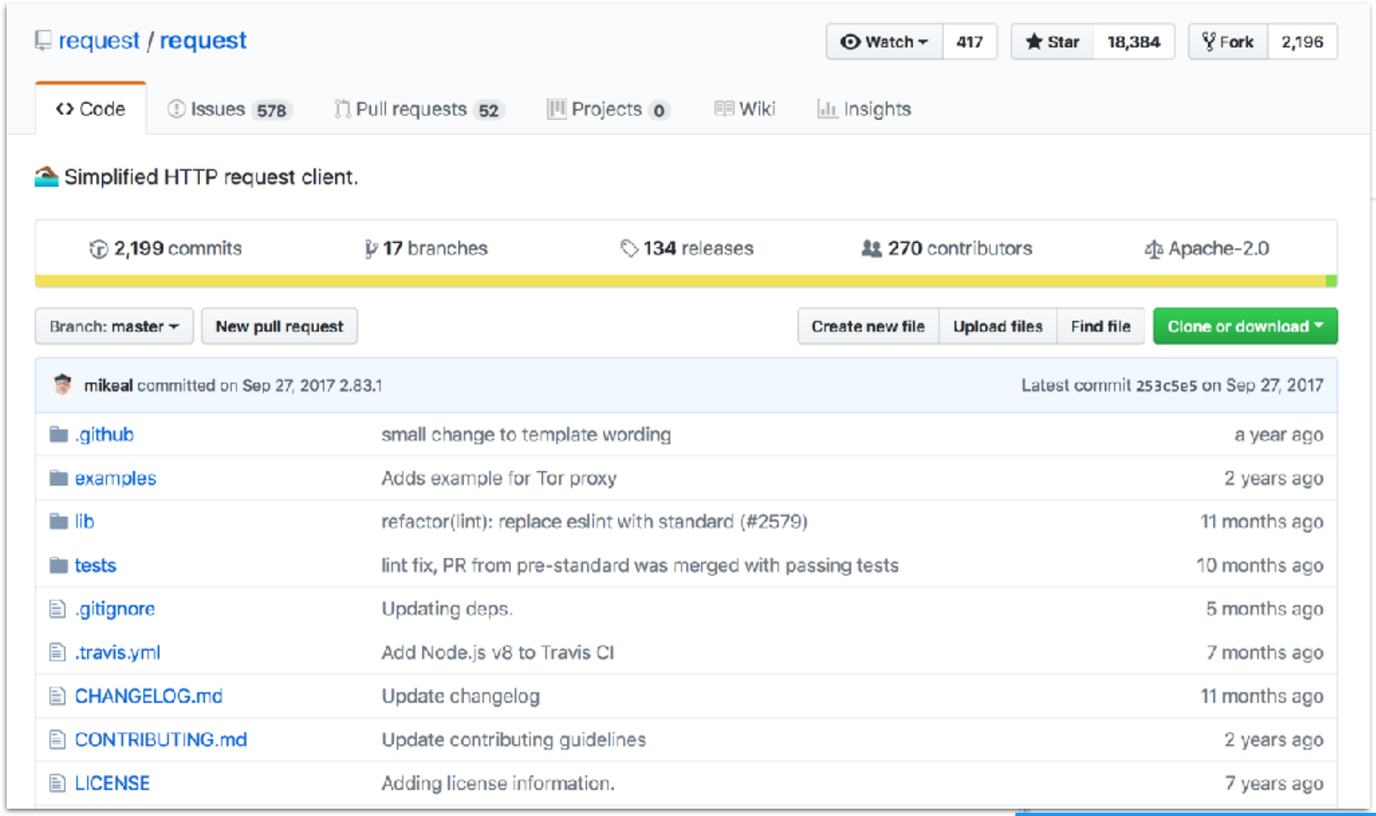
Key features: Transparency & signaling



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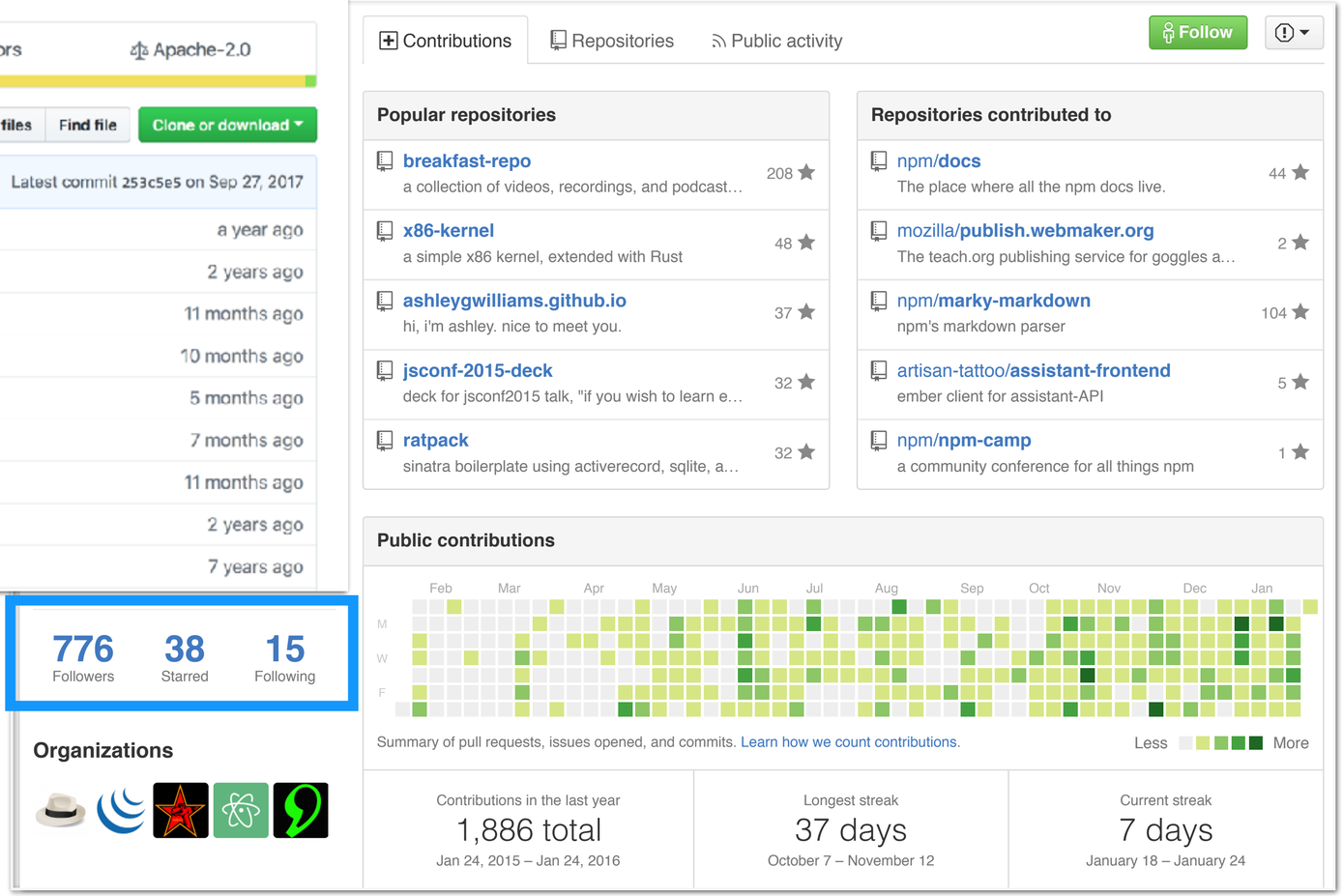

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Badges are Reliable Signals

Mostly

-

of the presence of **tests**
-

of **up-to-date** and secure **dependencies**
-

of the presence of **tests in pull requests**
-

of **popularity**

Mixed methods study

+

Survey

- 32 maintainers, 57 contributors
- Maintainers:
  - What do you intend to signal?
  - What effects do you expect?
- Contributors:
  - What do badges tell you?

Repository Mining

- 294,941 *npm* packages
- Mined badge adoptions/removals from README files
- Measured proxies for code quality, test suite quality, popularity, dependency freshness, …

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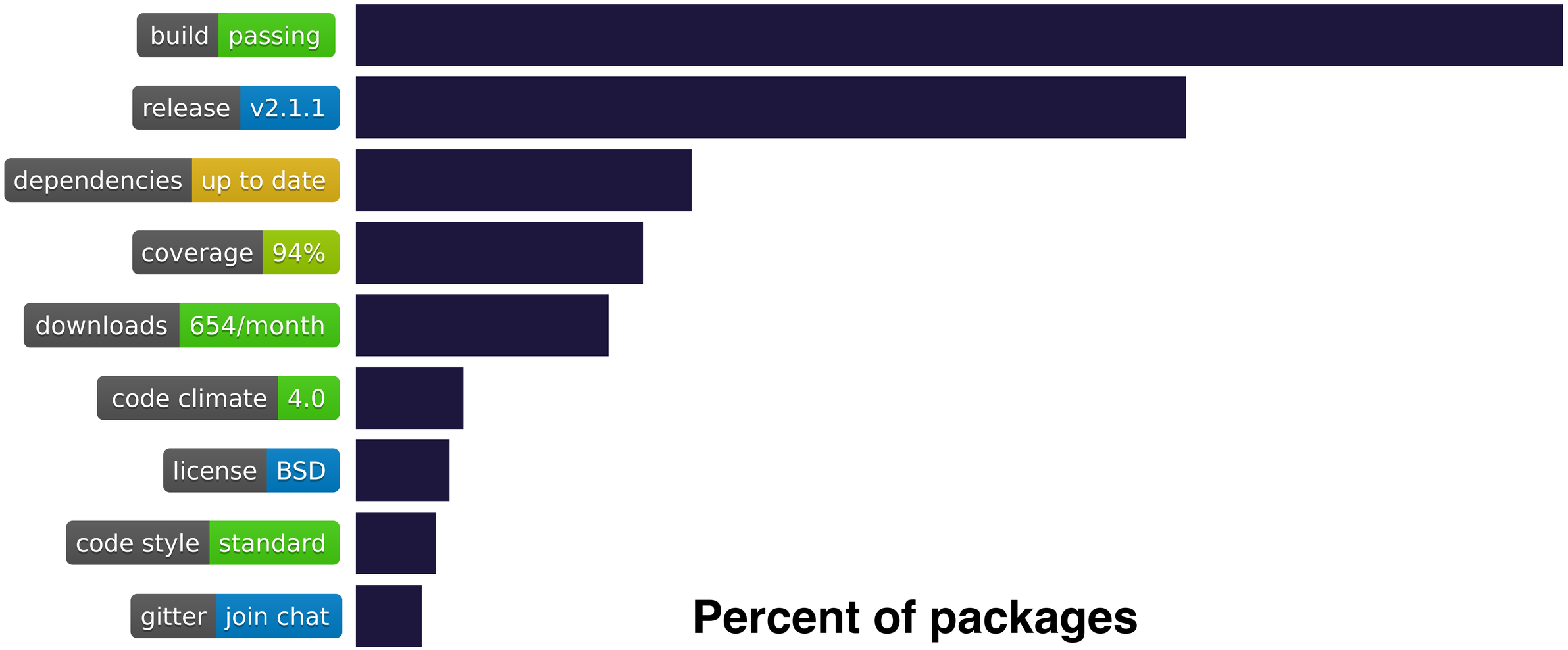
Popular Badges in npm



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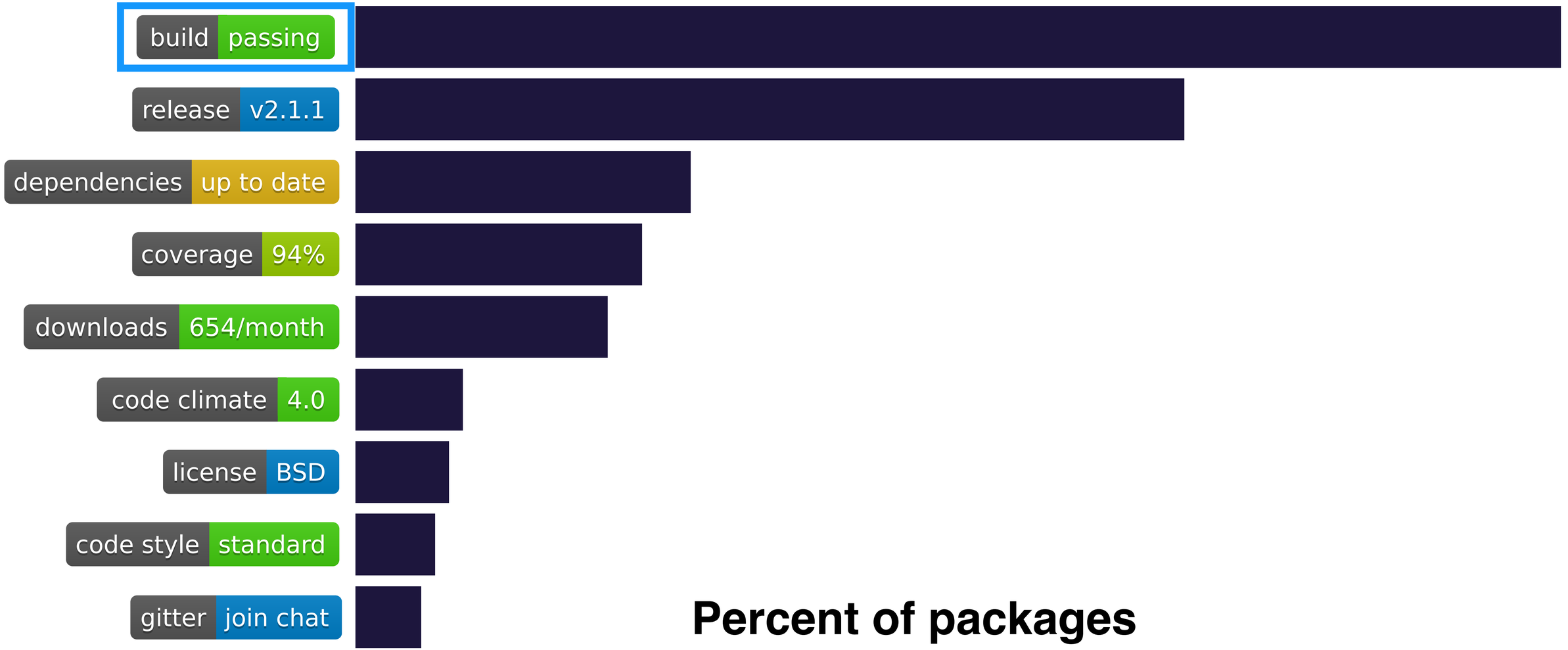
Popular Badges in npm



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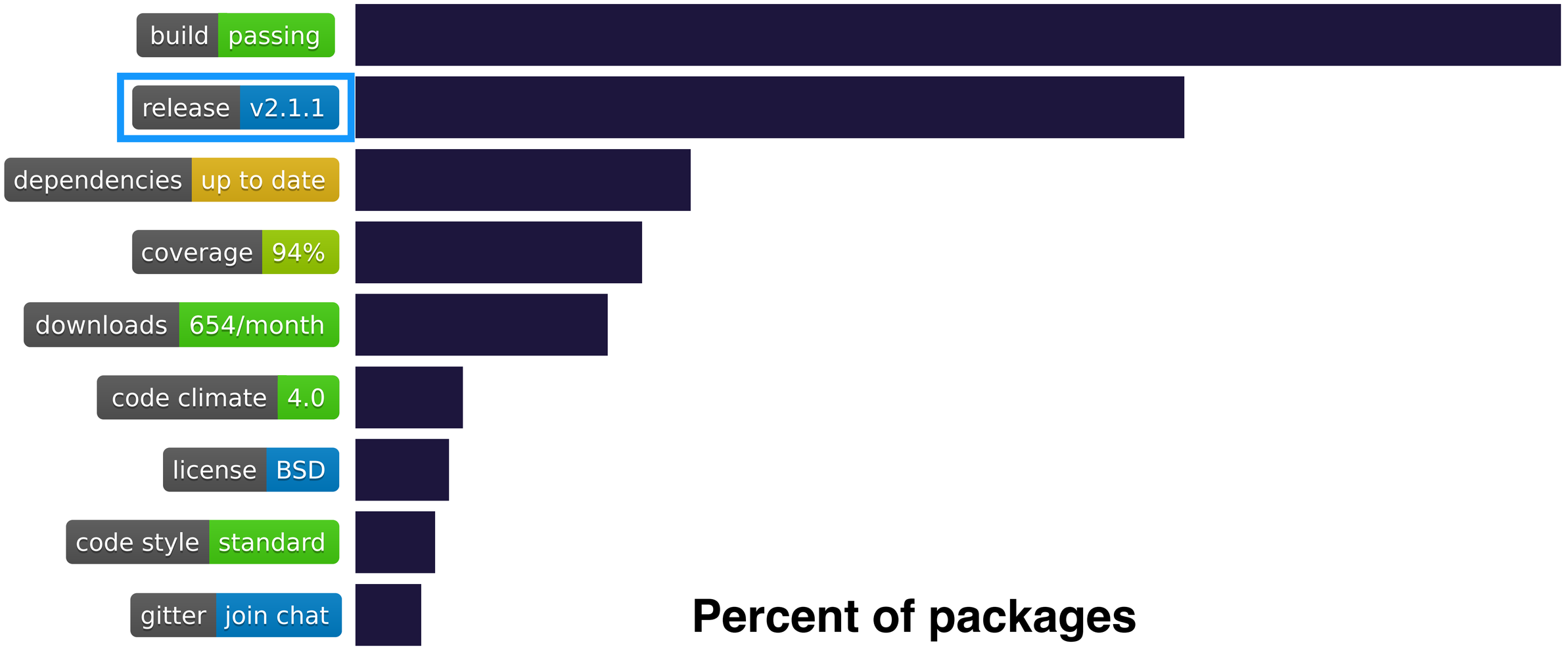
Popular Badges in npm



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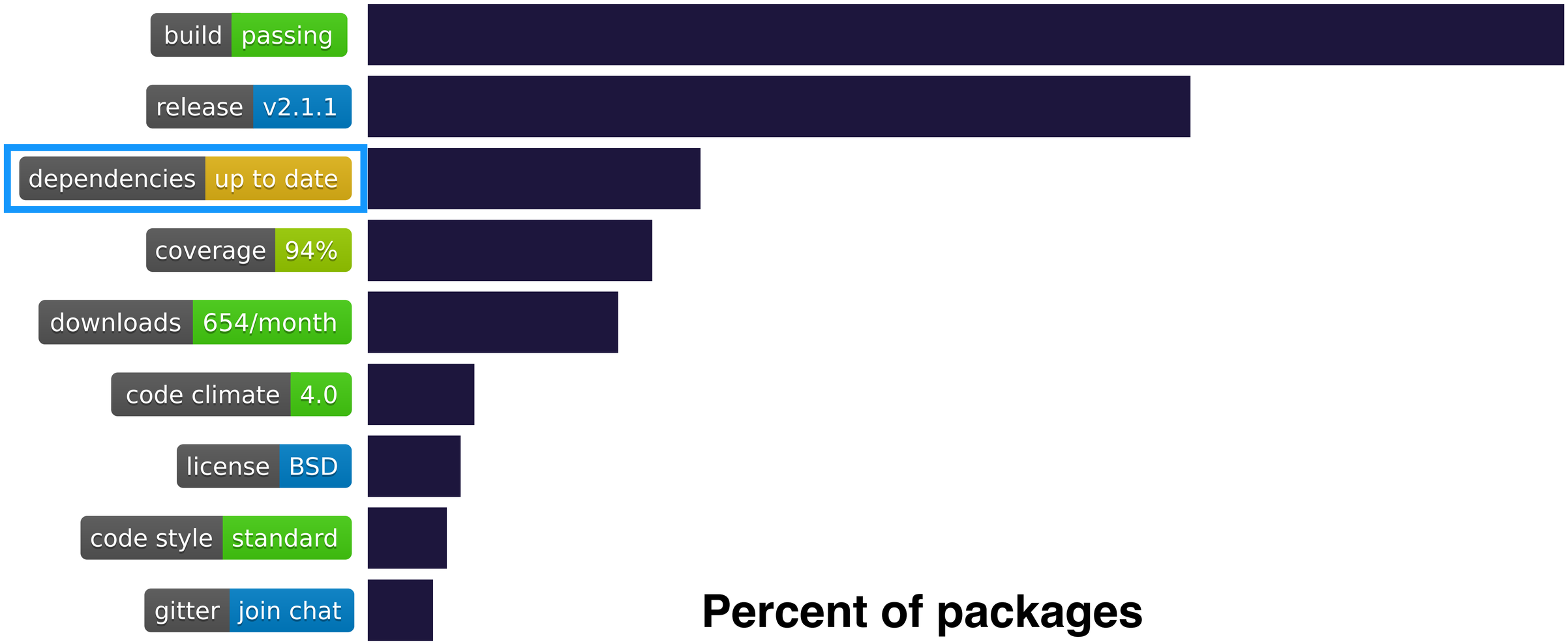
Popular Badges in npm



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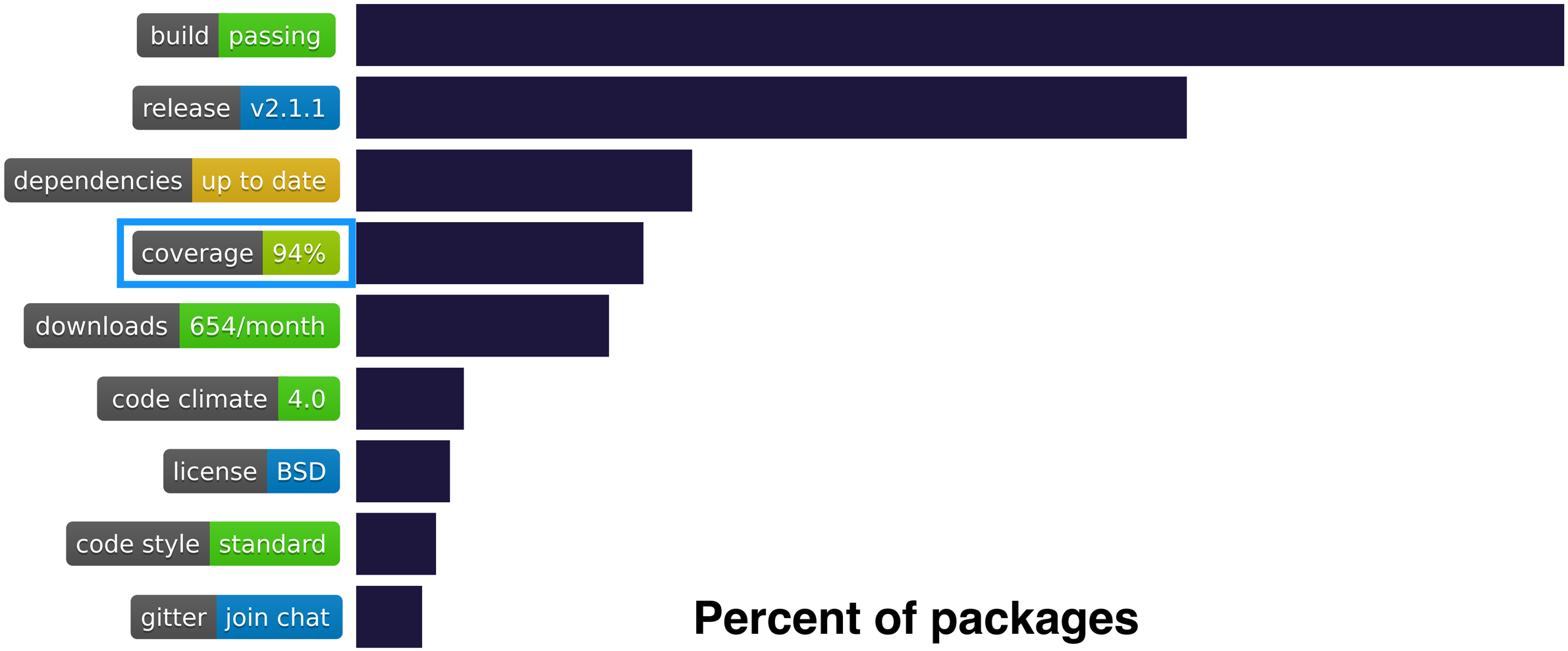
Popular Badges in npm



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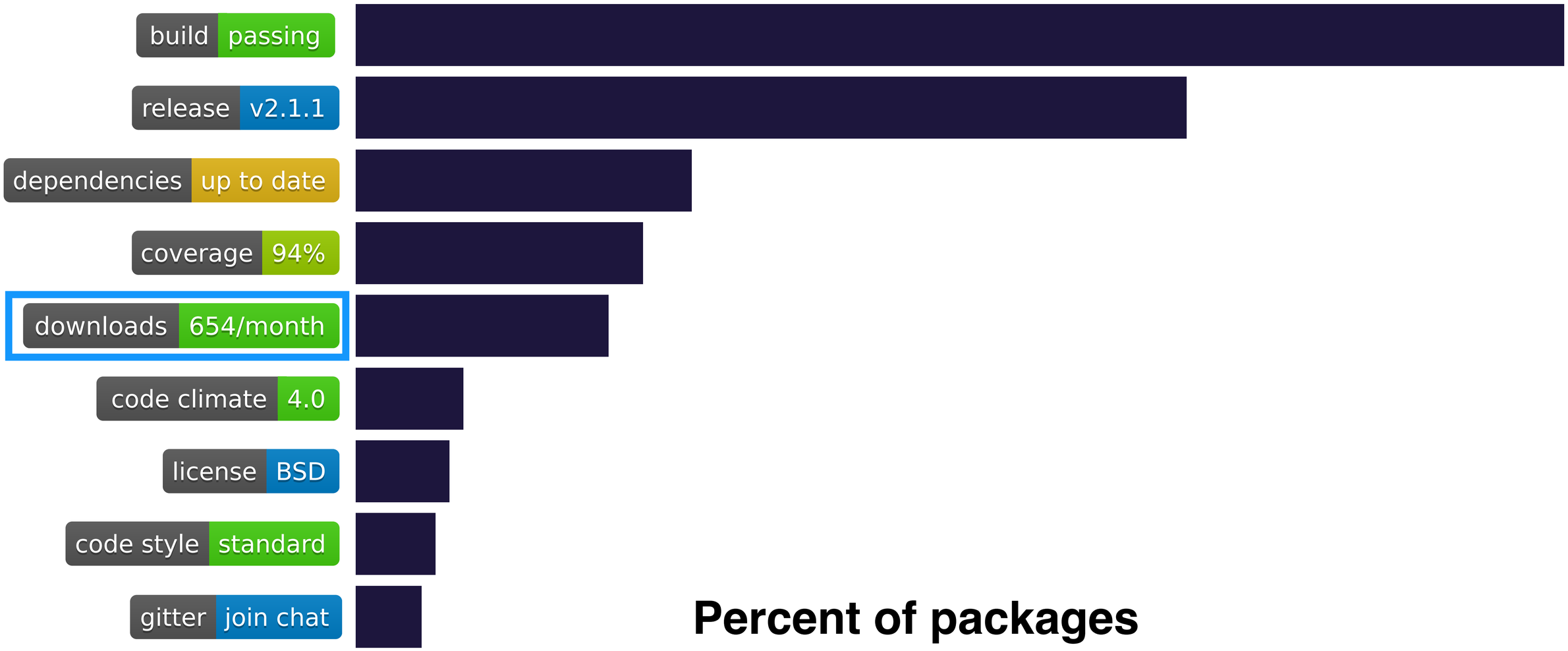
Popular Badges in npm



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What do developers expect from badges?

- *32* Maintainers
  - What do you intend to signal?
  - What effects do you expect?
- *57* Contributors
  - What do badges tell you?

"welcoming contributions"

"expectations of contribution quality"

"dedicated to offering support"

"reduced chances of conflicting versions of dependencies"

"indicator of product quality"

Analysis

Correlation

If all you saw was the badge, how much would that tell you?

Regression Analysis

How much more does the badge tell you, relative to existing signals?

Time Series Analysis

How do things change after adding the badge?

Analysis

Correlation

If all you saw was the badge, how much would that tell you?

Regression Analysis

How much more does the badge tell you, relative to existing signals?

Time Series Analysis

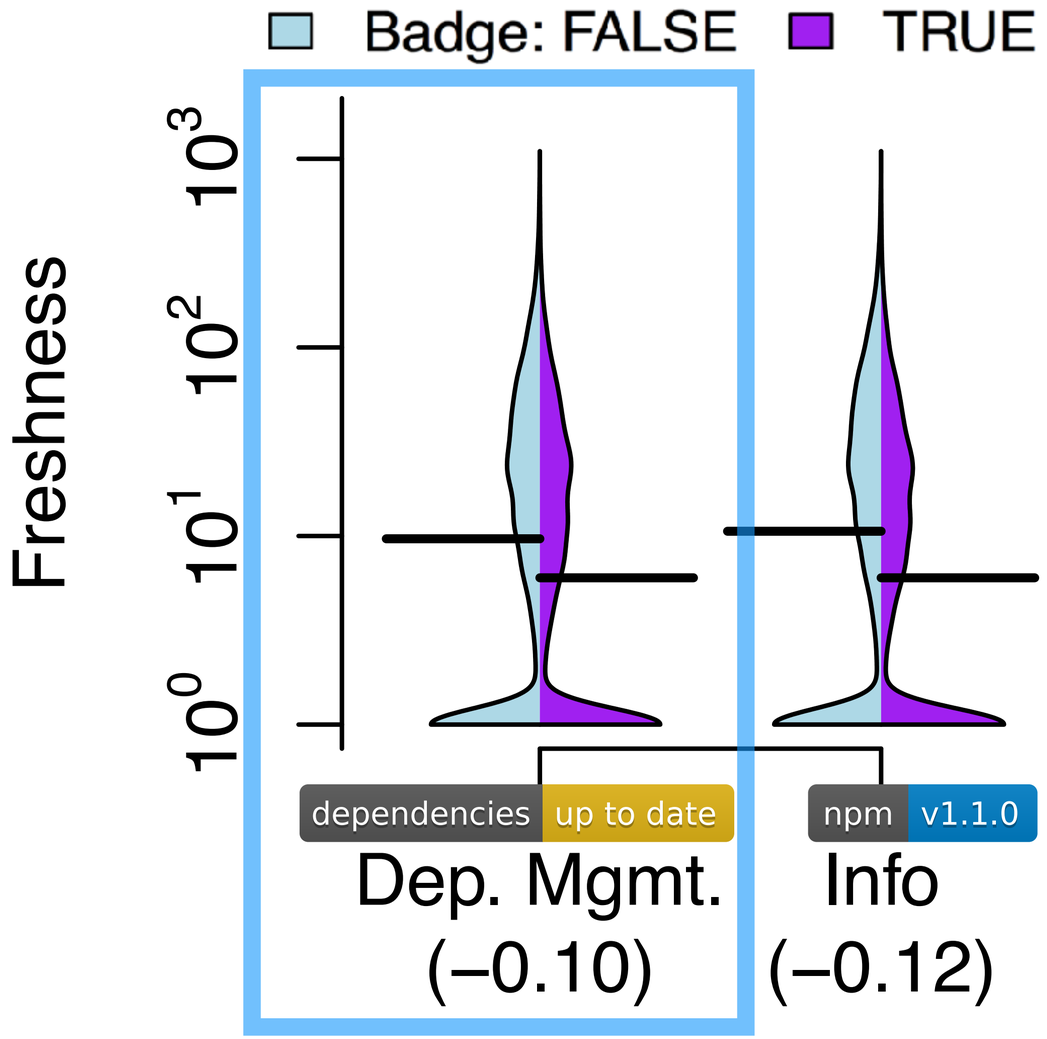
How do things change after adding the badge?

Step 1: Correlation

Signals of fresh dependencies

- **Based on survey:** The adoption of dependency management badges correlates with fresher dependencies
- **Freshness metric:** *lower* is better
  - (More up-to-date deps.)

Result: Dep. badges correlate with fresher dependencies



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Analysis

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Time Series Analysis

How do things change after adding the badge?

Step 2: Regression Analysis

Signals of fresh dependencies

- **Based on survey:** The adoption of dependency management badges correlates with fresher dependencies
- **Freshness metric:** *lower* is better
  - (More up-to-date deps.)

Result: Dep. badges are *the best* signals of fresh dependencies

	Basic Model response: *freshness = 0* 17.3% deviance explained		**Full Model** response: *freshness = 0* 17.4% deviance explained	
	Coeffs (Err.)	LR Chisq	Coeffs (Err.)	LR Chisq
(Interc.)	$3.54\ (0.03)^{***}$		$3.50\ (0.03)^{***}$	
Dep.	$-1.78\ (0.01)^{***}$	32077.8^{***}	$-1.79\ (0.01)^{***}$	32292.8^{***}
RDep.	$0.22\ (0.01)^{***}$	610.3^{***}	$0.21\ (0.01)^{***}$	560.6^{***}
Stars	$-0.08\ (0.00)^{***}$	301.4^{***}	$-0.09\ (0.00)^{***}$	311.2^{***}
Contr.	$-0.24\ (0.01)^{***}$	500.5^{***}	$-0.25\ (0.01)^{***}$	548.7^{***}
lastU	$-0.65\ (0.01)^{***}$	12080.9^{***}	$-0.64\ (0.01)^{***}$	11537.9^{***}
dependencies up to date			$0.24\ (0.03)^{***}$	116.1^{***}
npm v1.1.0			$0.11\ (0.02)^{***}$	48.3^{***}
dependencies up to date : npm v1.1.0			$-0.05\ (0.04)$	1.9
hasOther			$0.01\ (0.01)$	

$^{***}p < 0.001, {}^{**}p < 0.01, {}^{*}p < 0.05$

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Analysis

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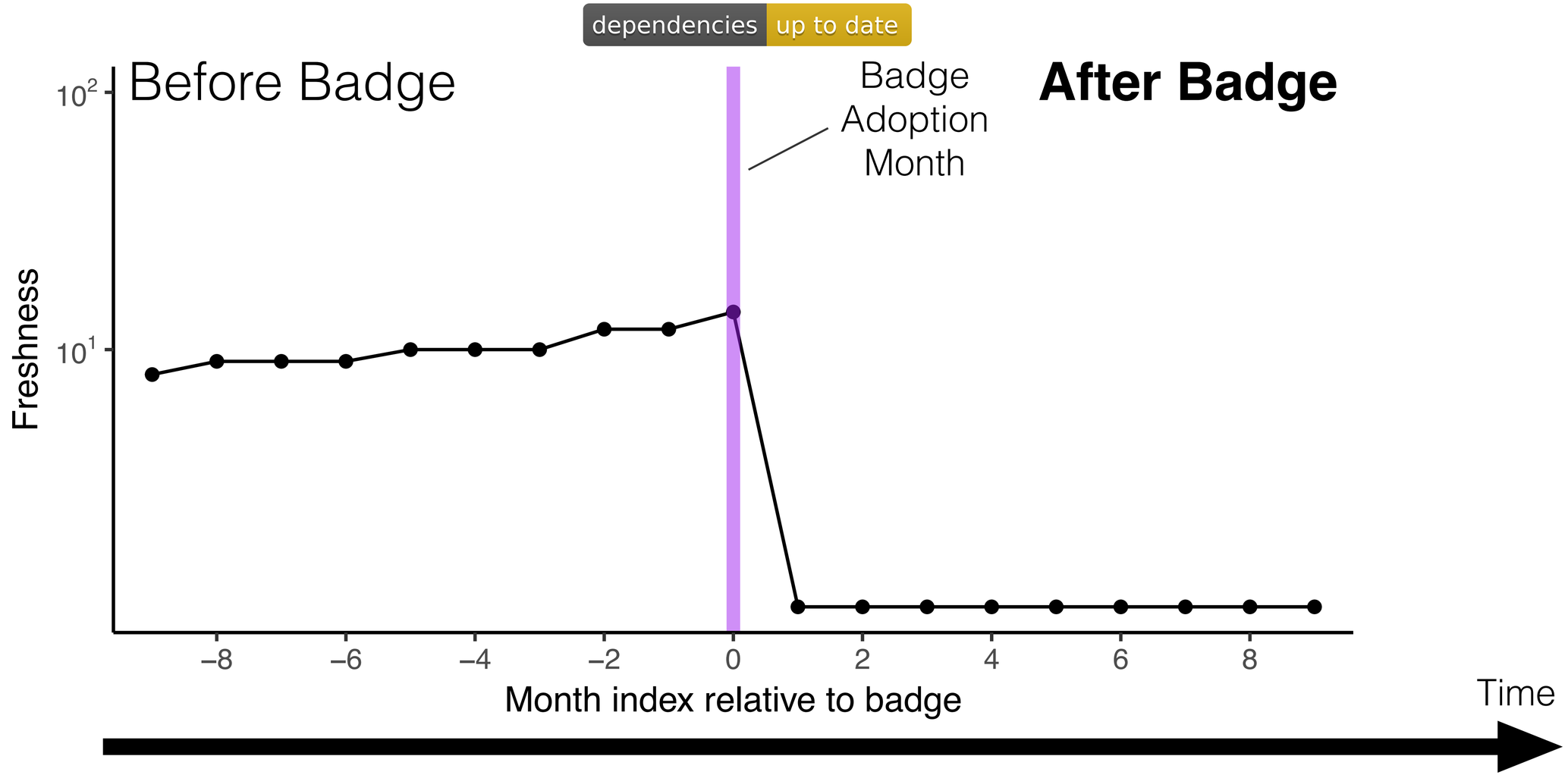
Time Series Analysis

How do things change after adding the badge?

Step 2: Time Series Analysis

Signals of fresh dependencies



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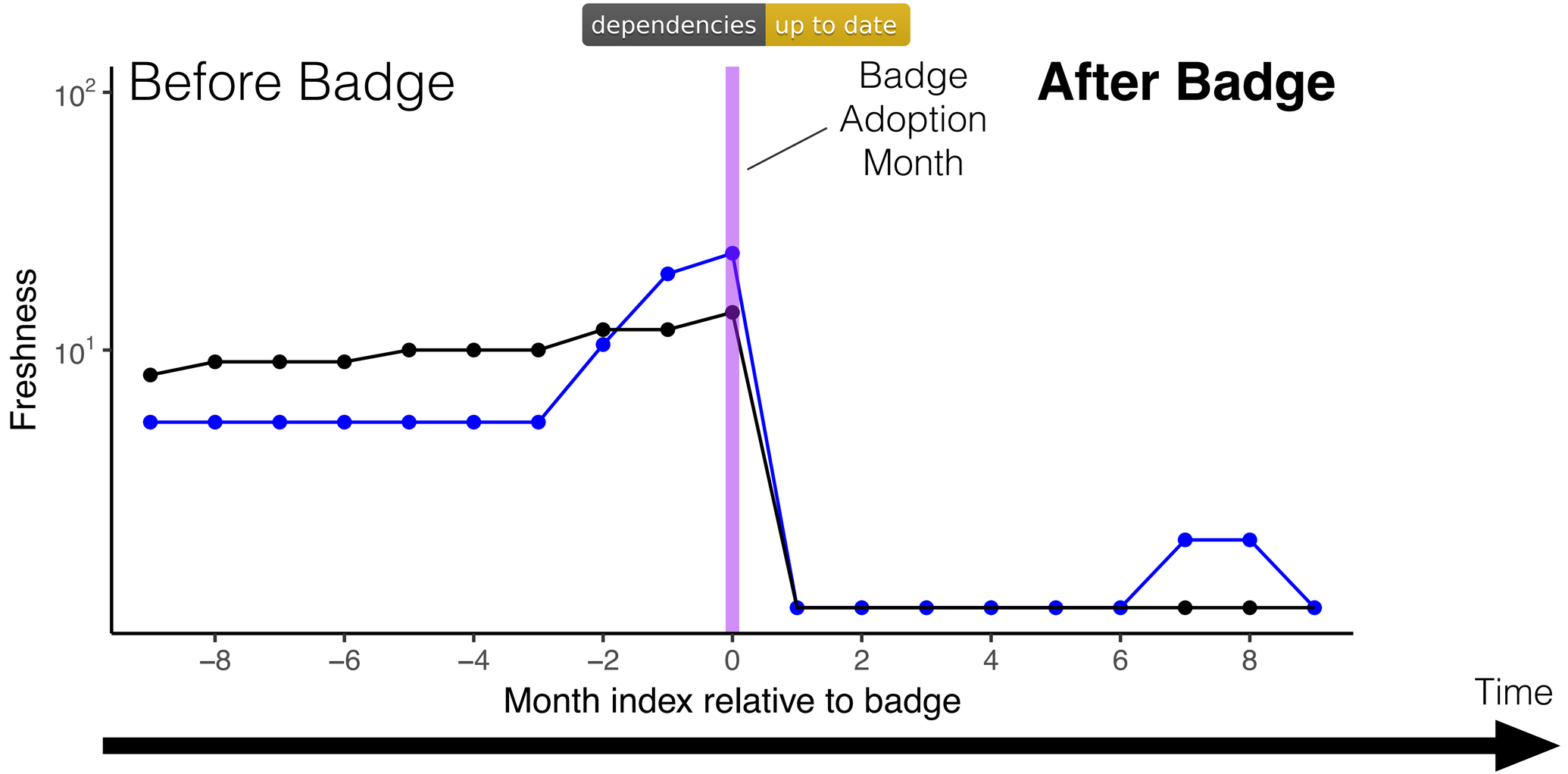
Step 2: Time Series Analysis

Signals of fresh dependencies



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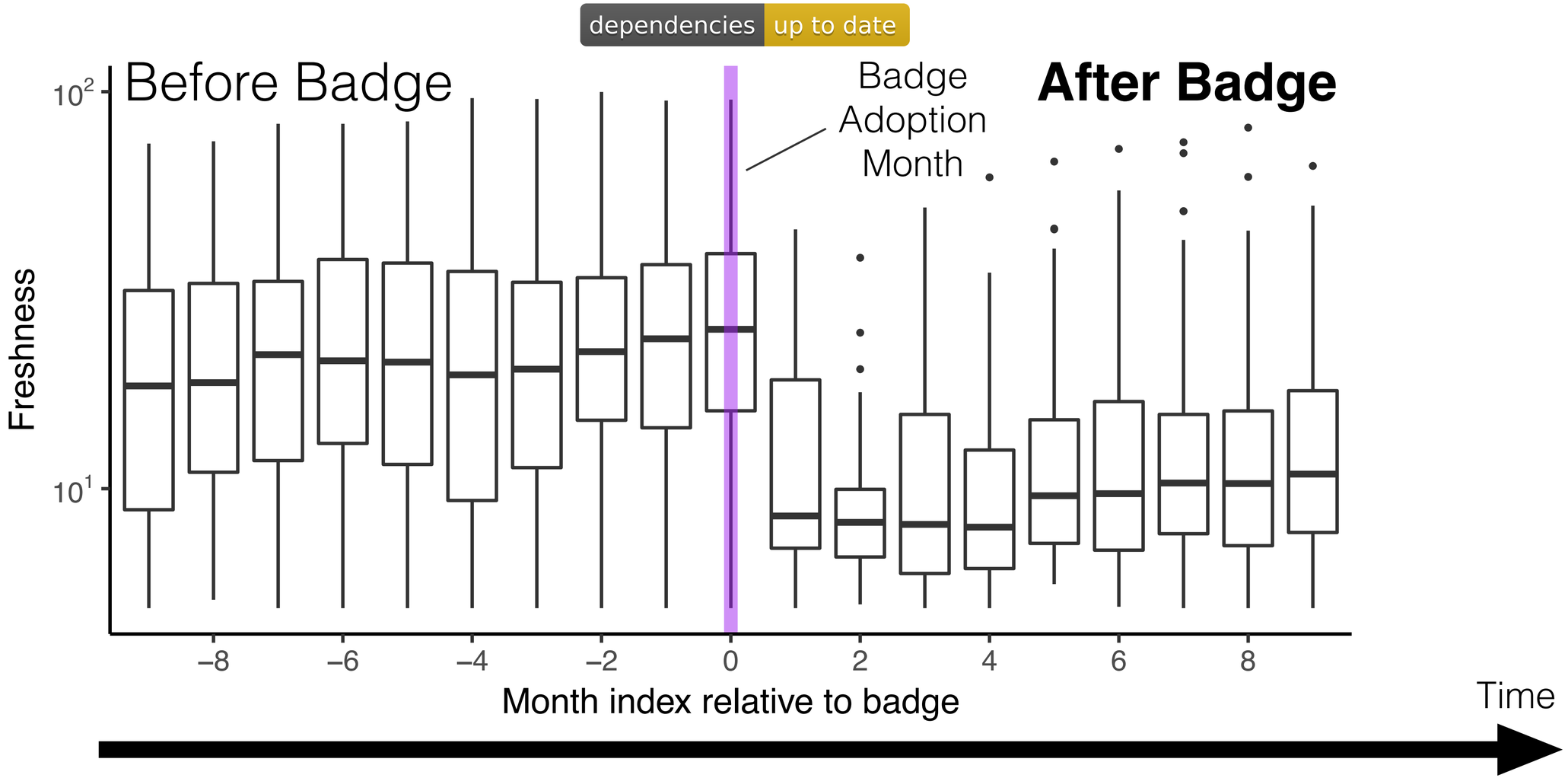
Step 2: Time Series Analysis

Signals of fresh dependencies



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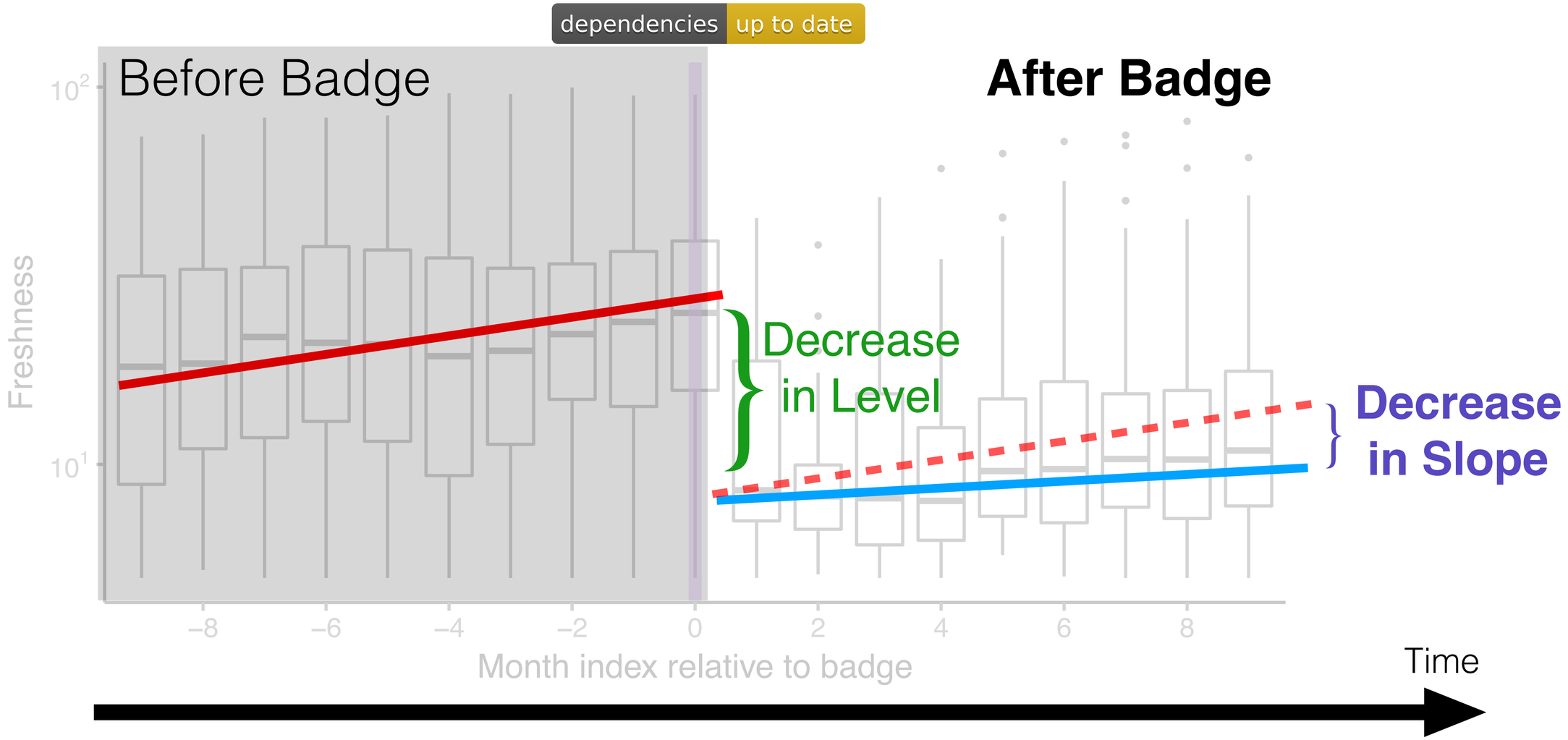
Step 2: Time Series Analysis

Signals of fresh dependencies



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Step 2: Time Series Analysis

Signals of fresh dependencies

- **Based on survey:** The adoption of dependency management badges correlates with fresher dependencies
- **Freshness metric:** *lower* is better
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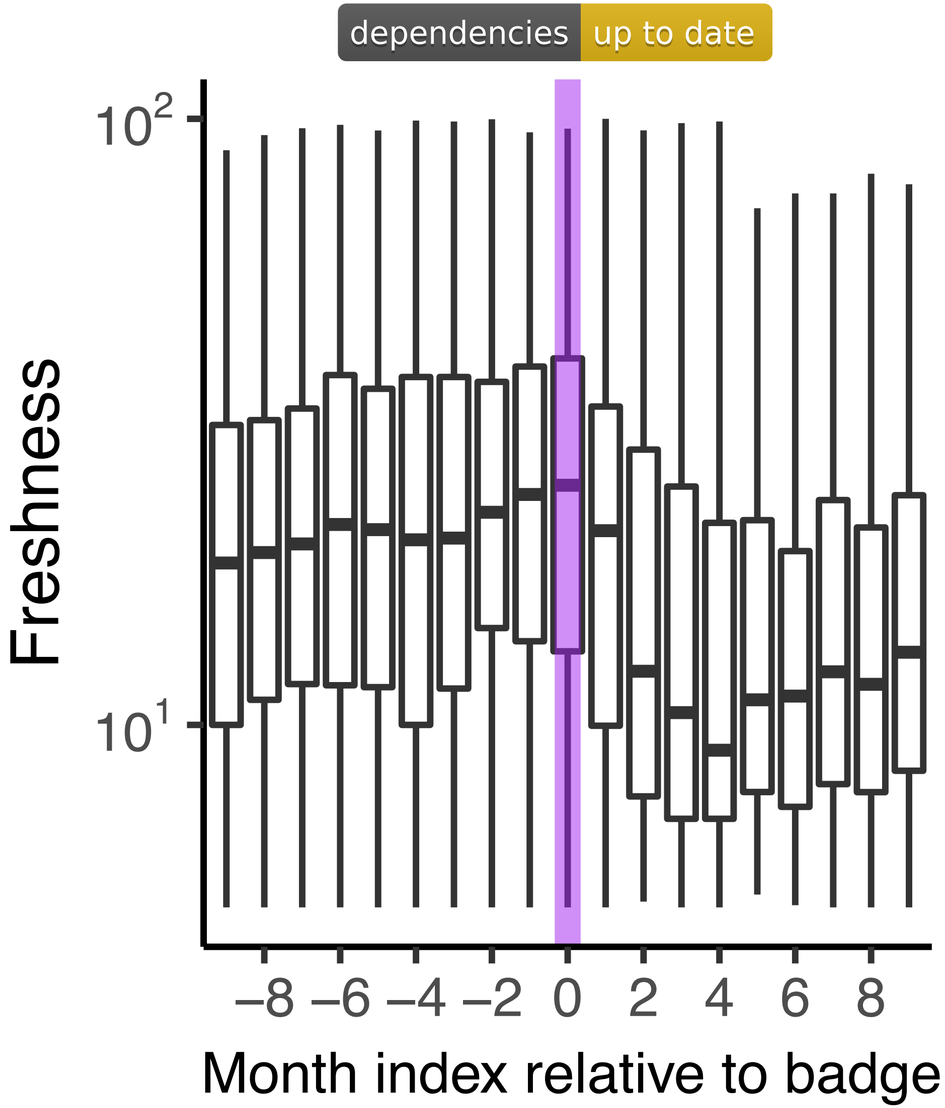
Result: Dep. badges indicate *improved dep. management practices*



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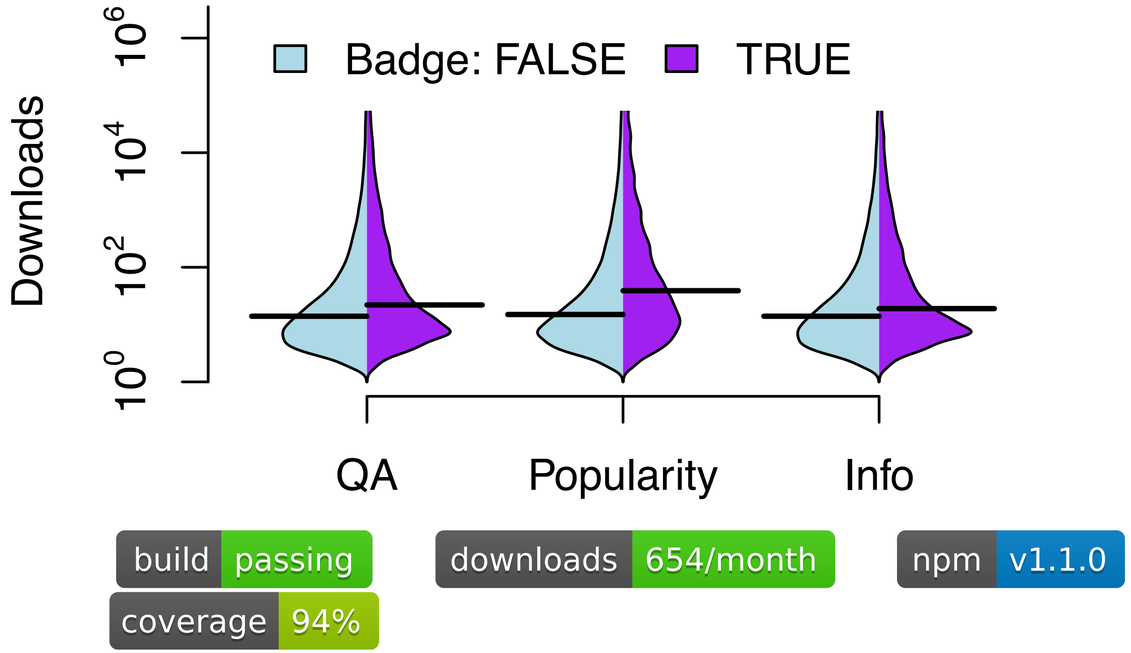
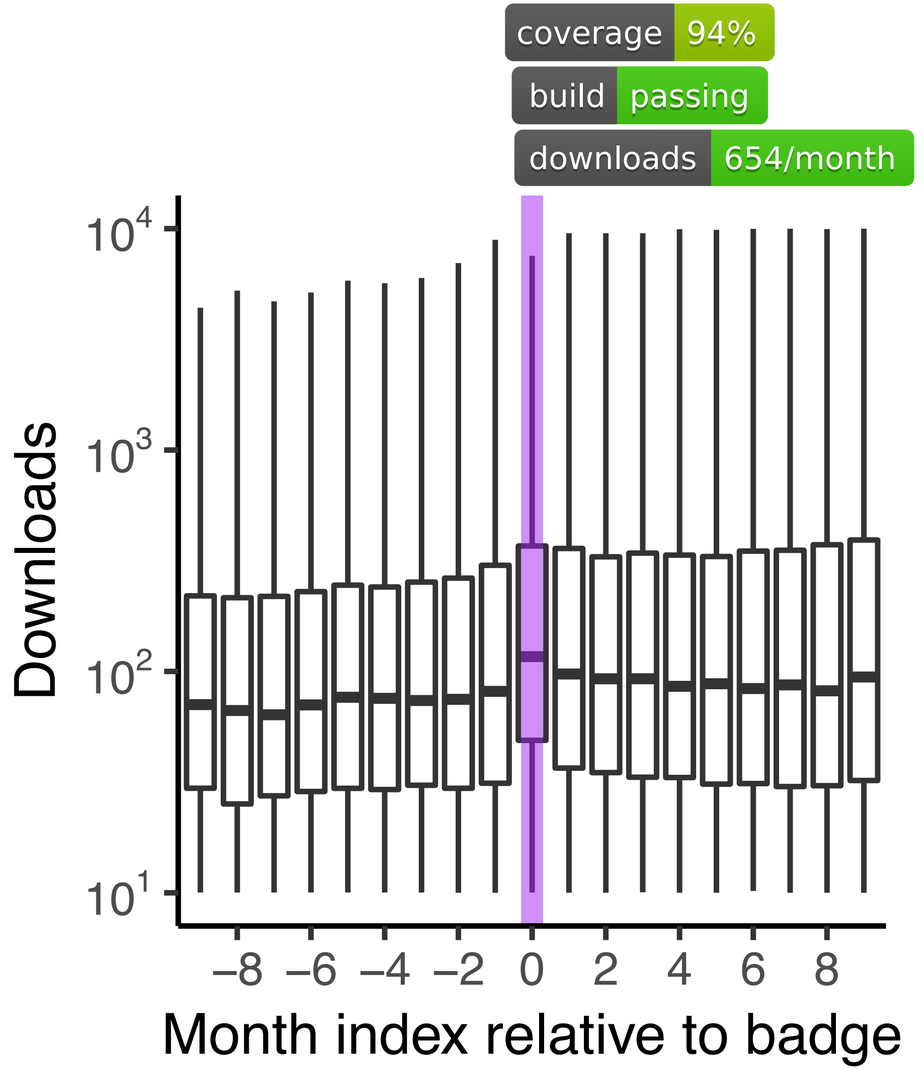
Signals of popularity





Result: Dep. badges are mostly reliable signals of popularity

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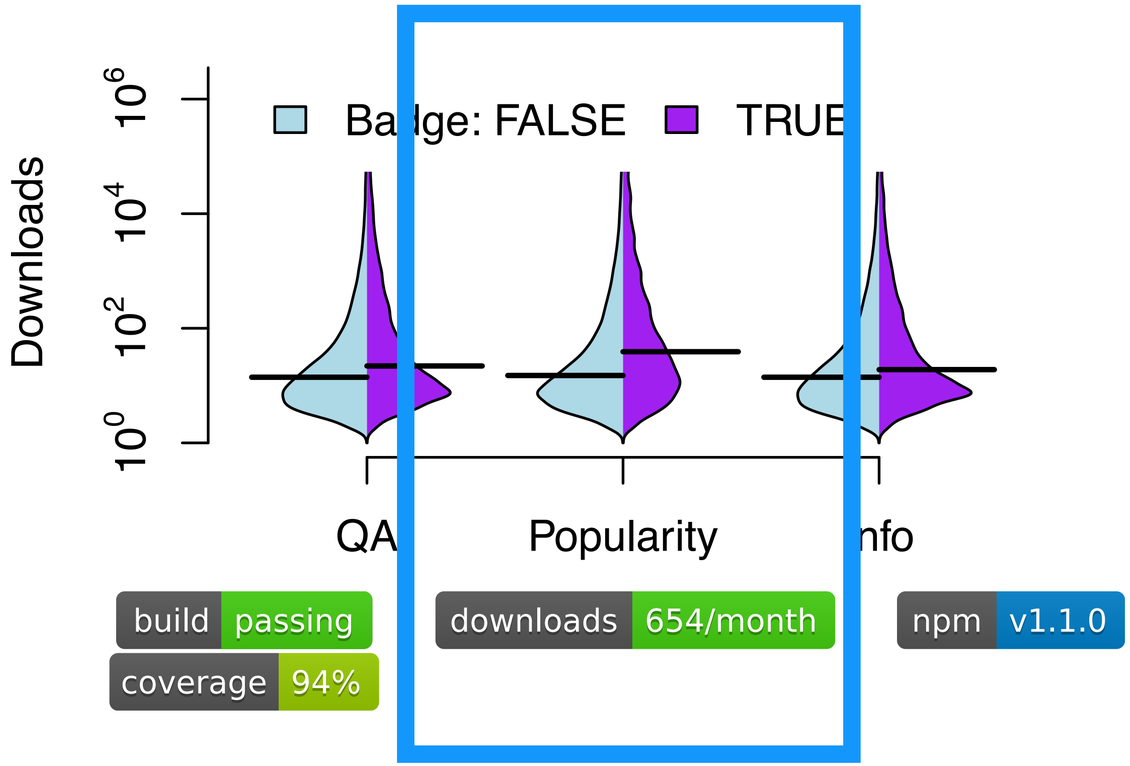
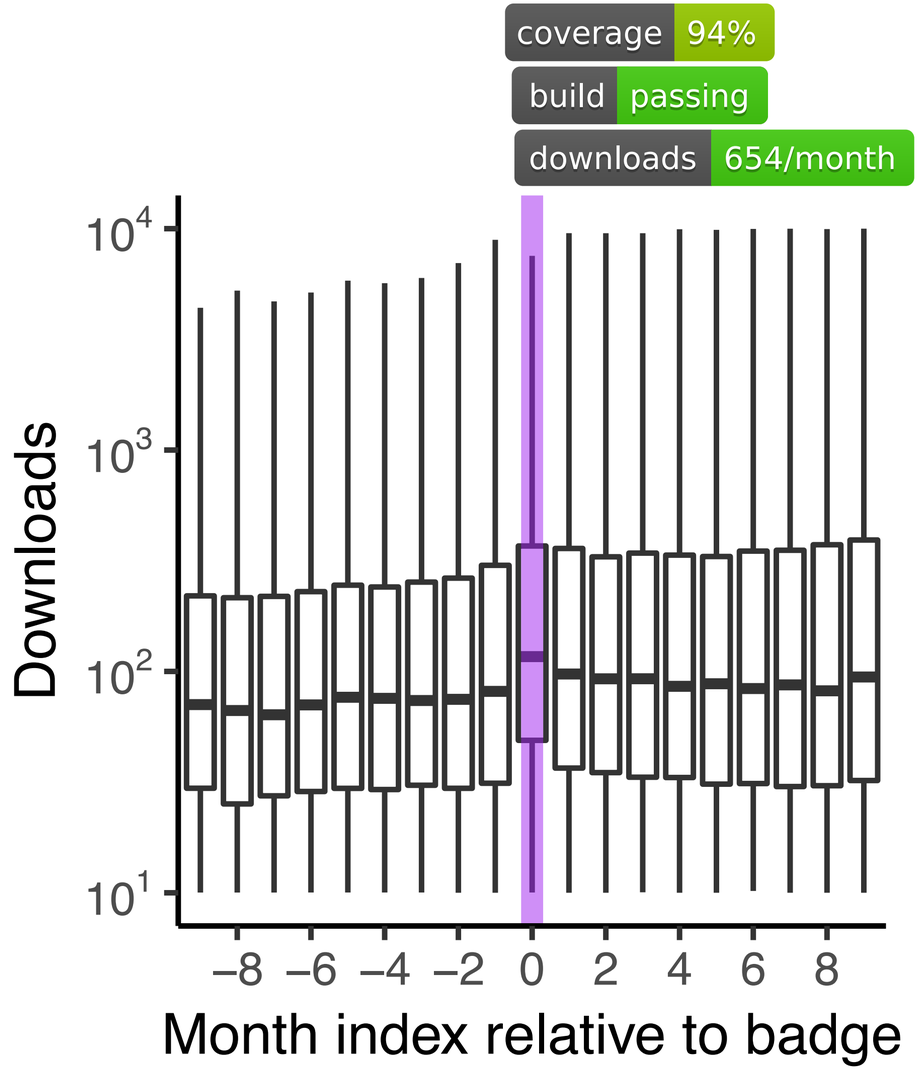
Signals of popularity





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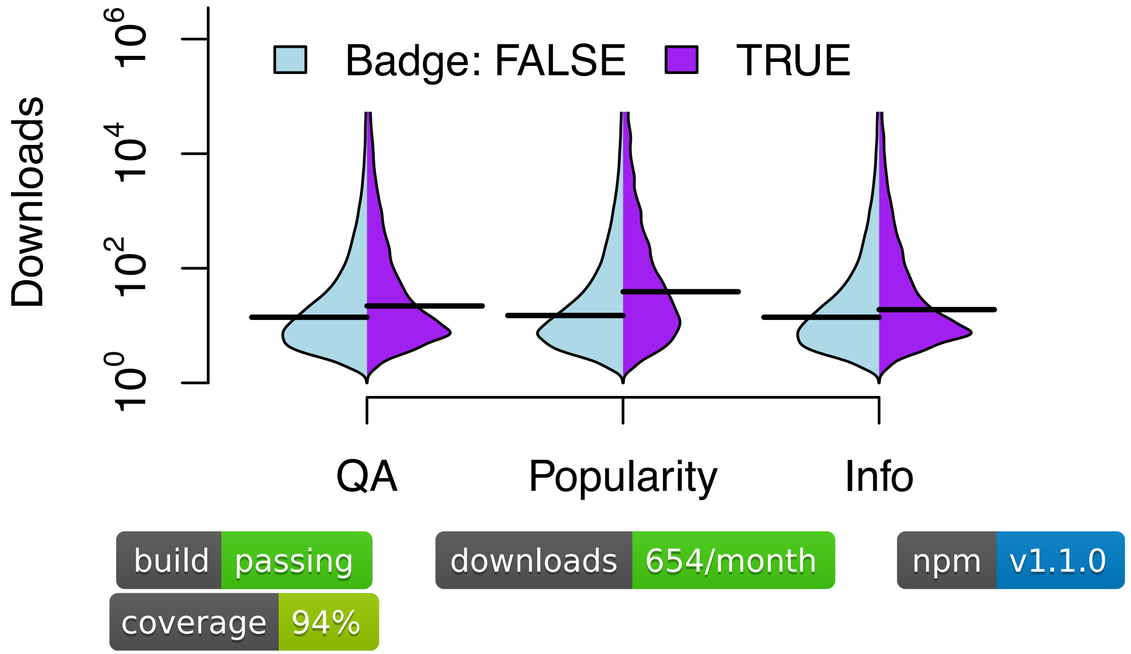

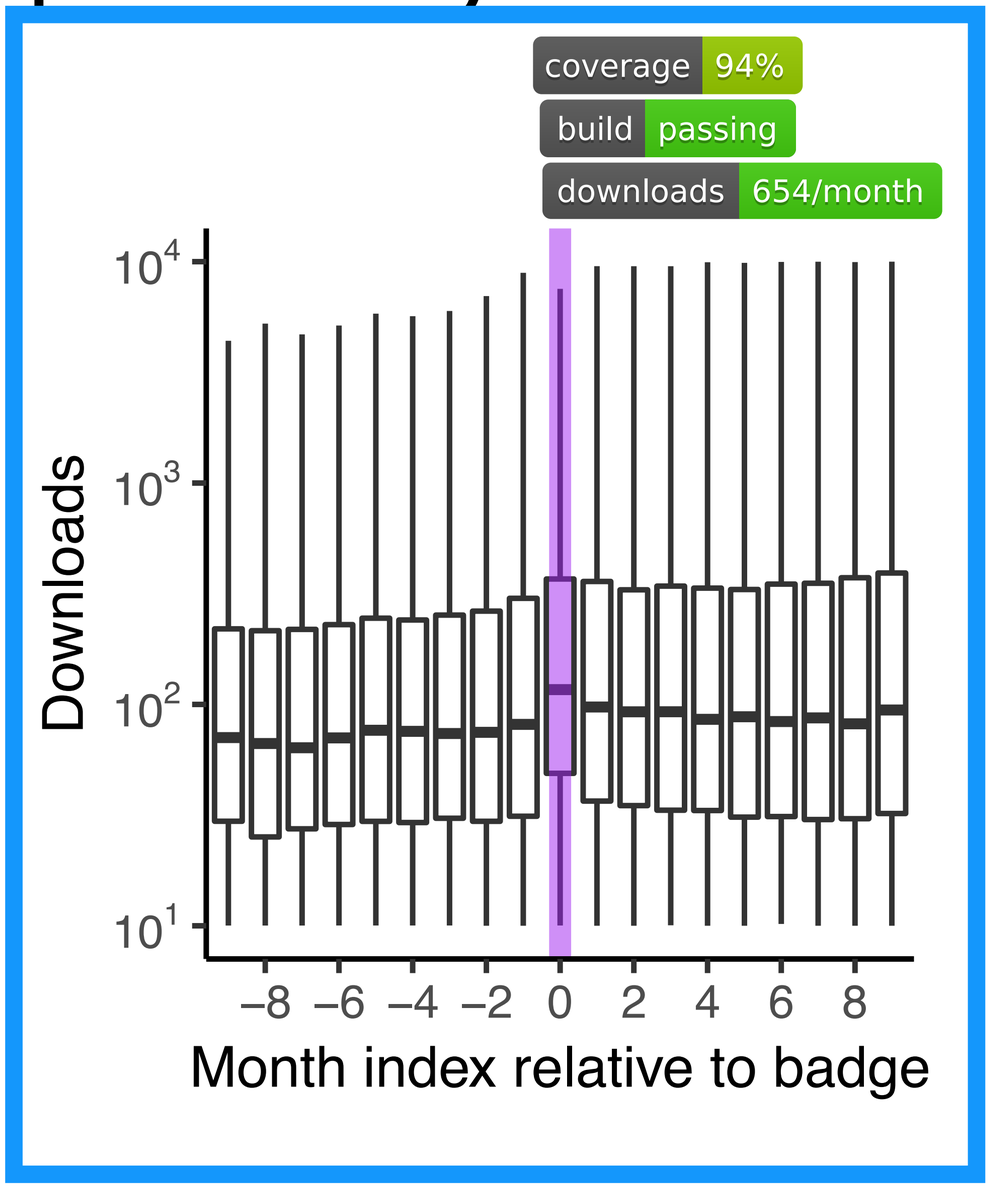

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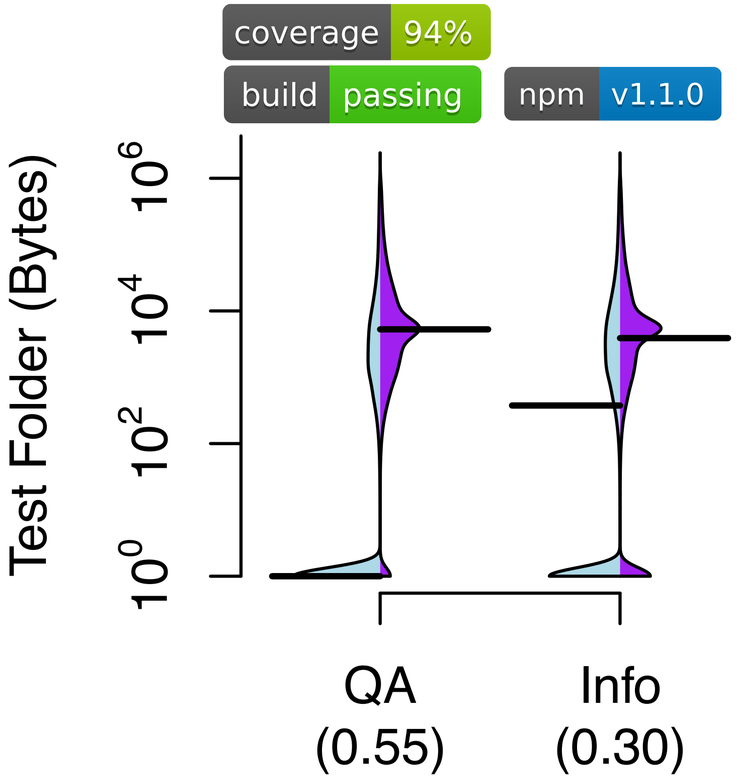
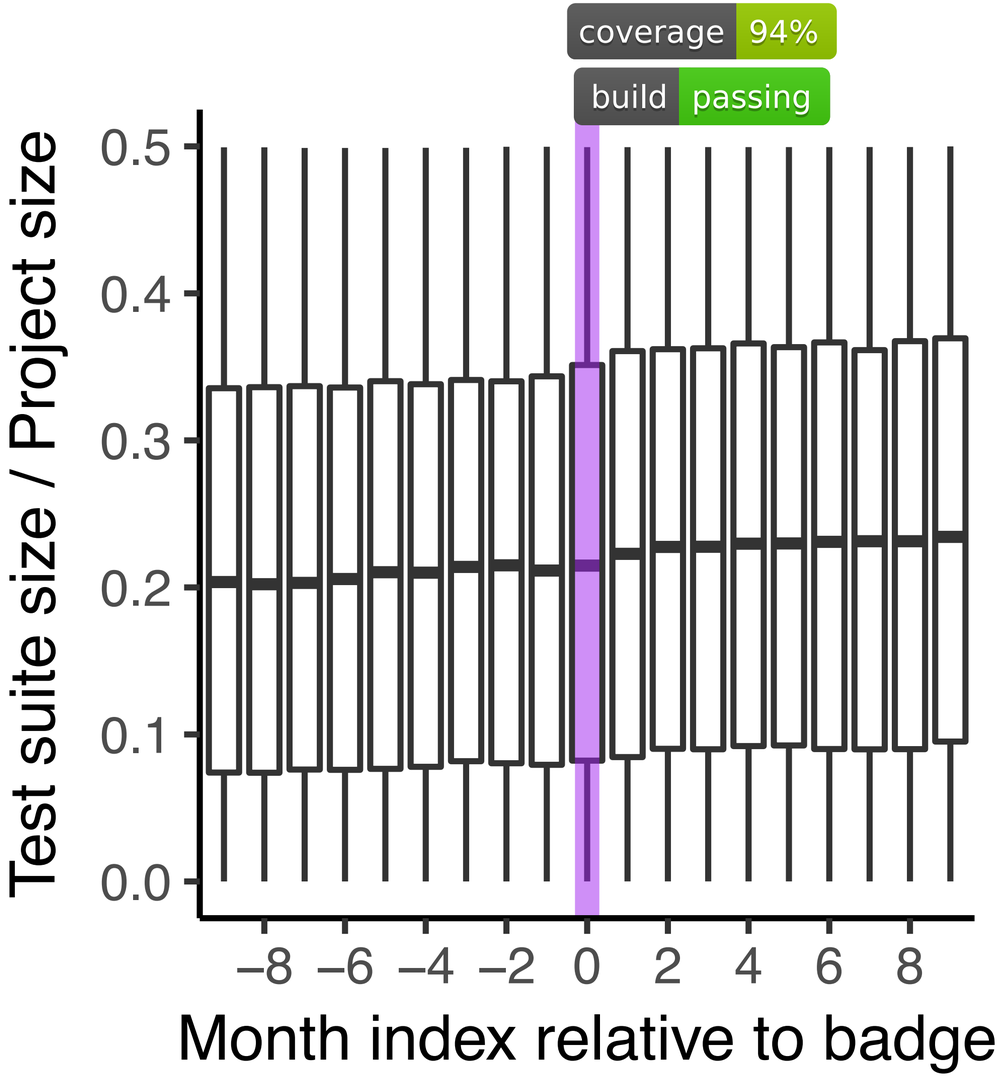
Signals of test suite quality





Result: Build status/code coverage badges indicate a test suite

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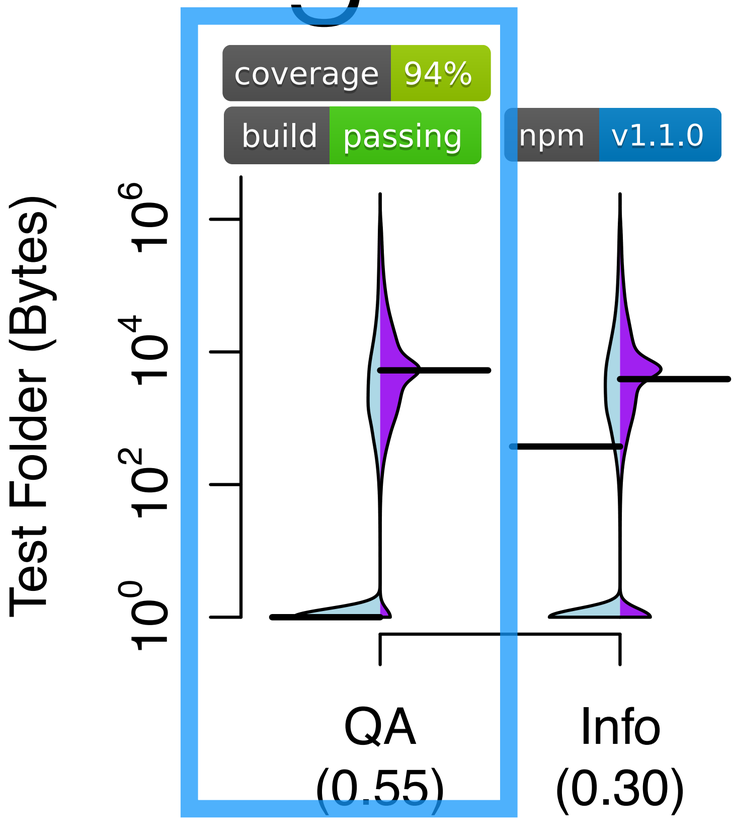
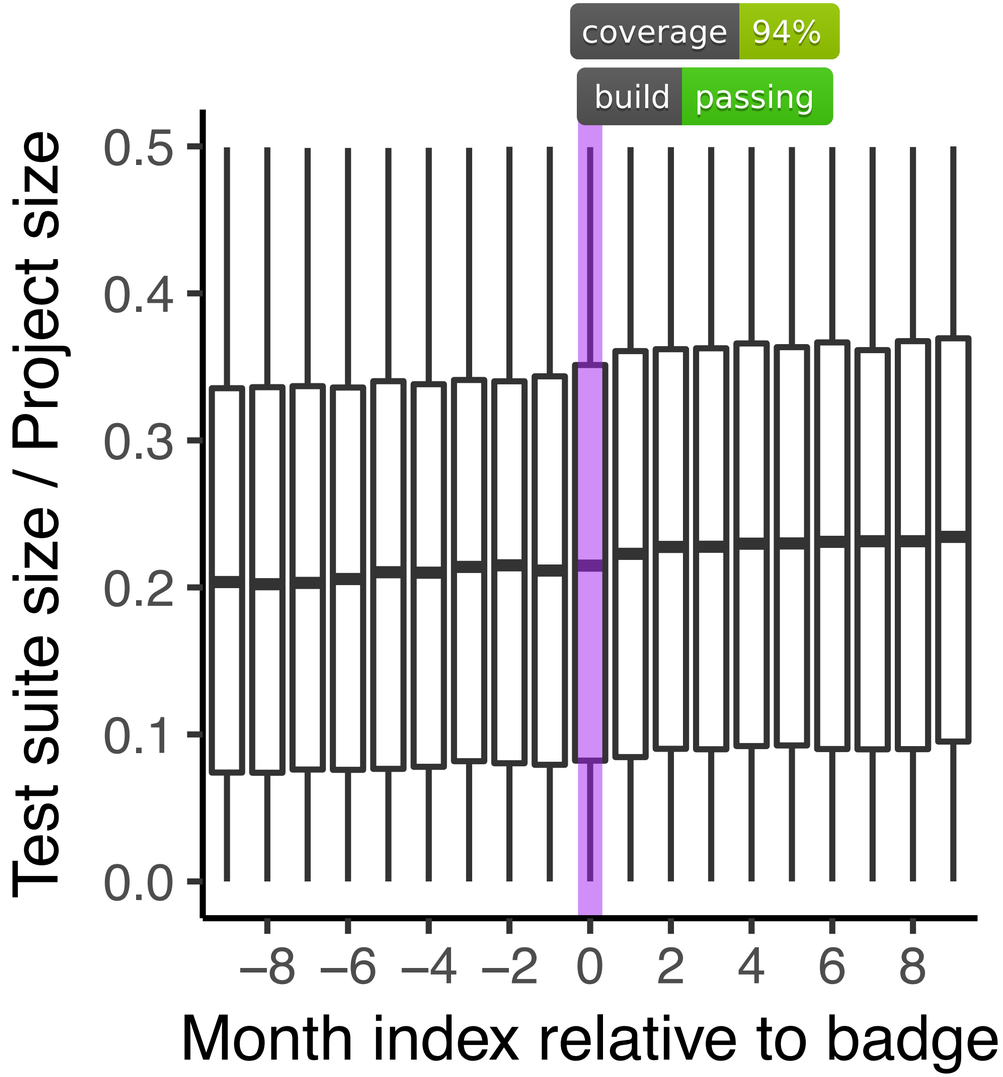
Signals of test suite quality





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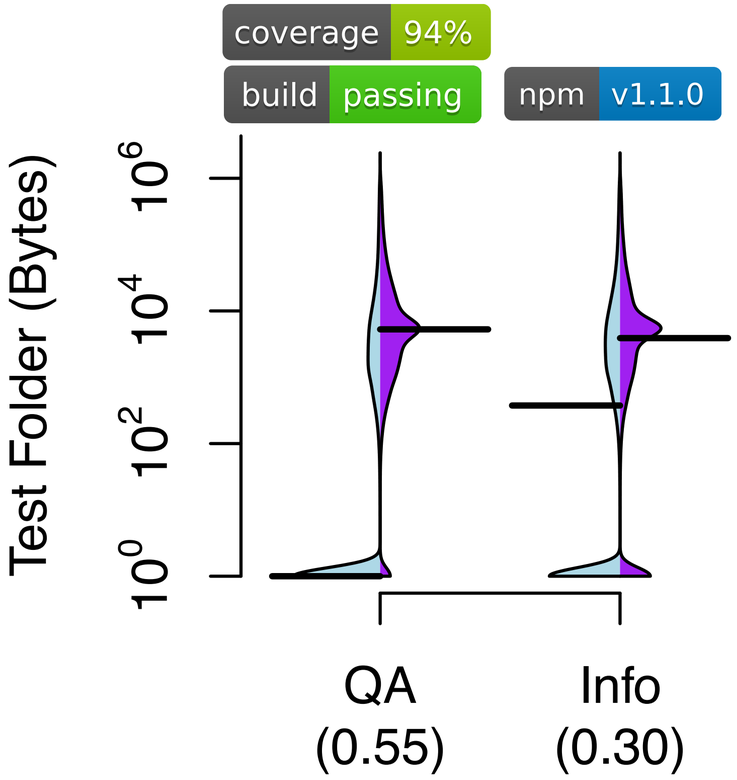

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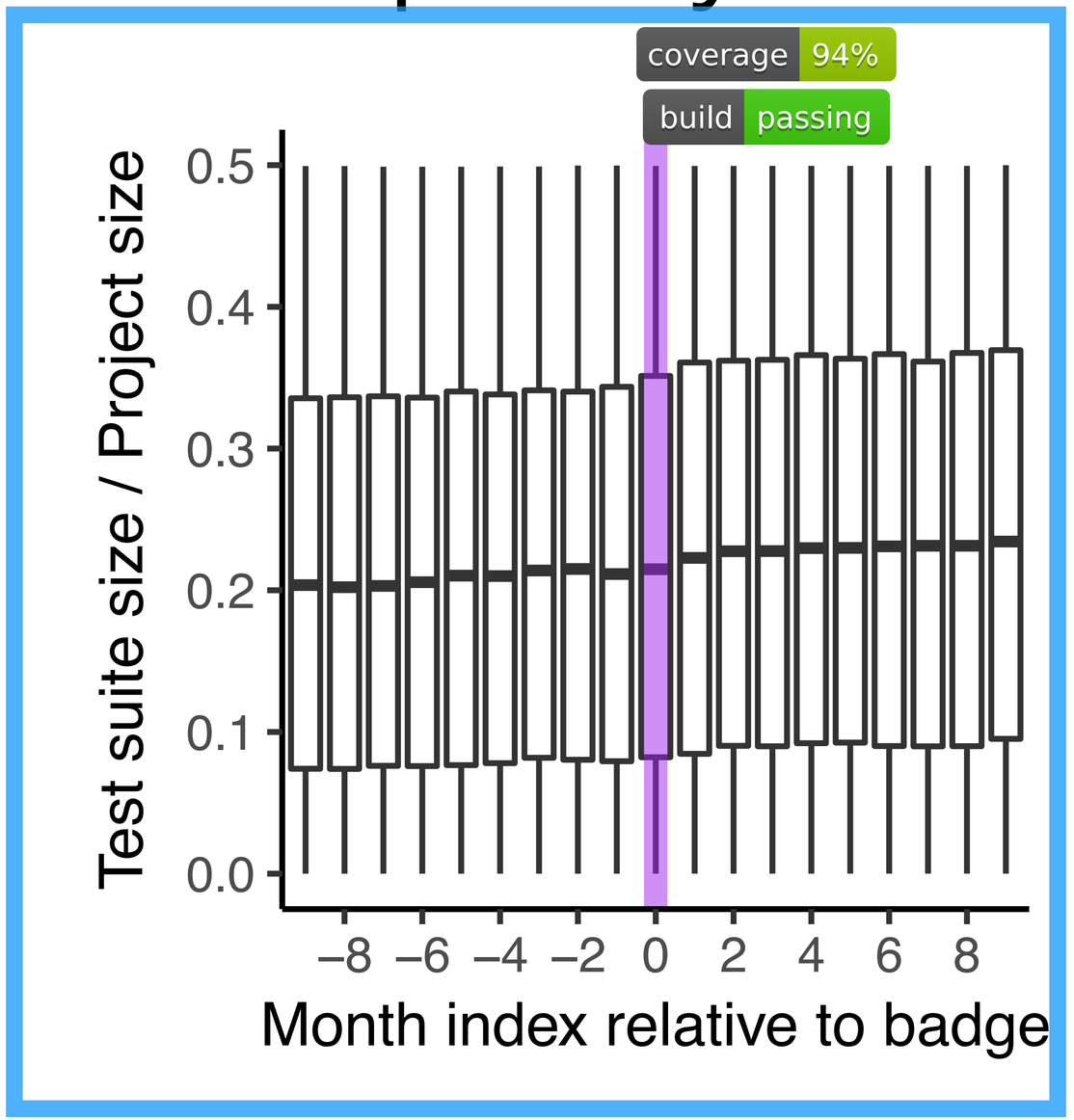

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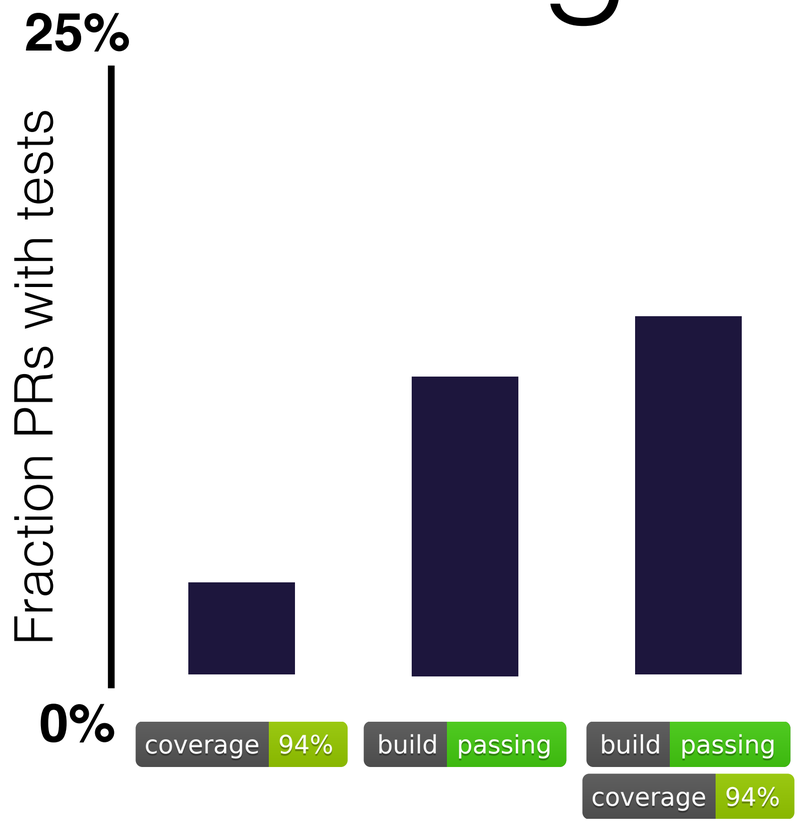
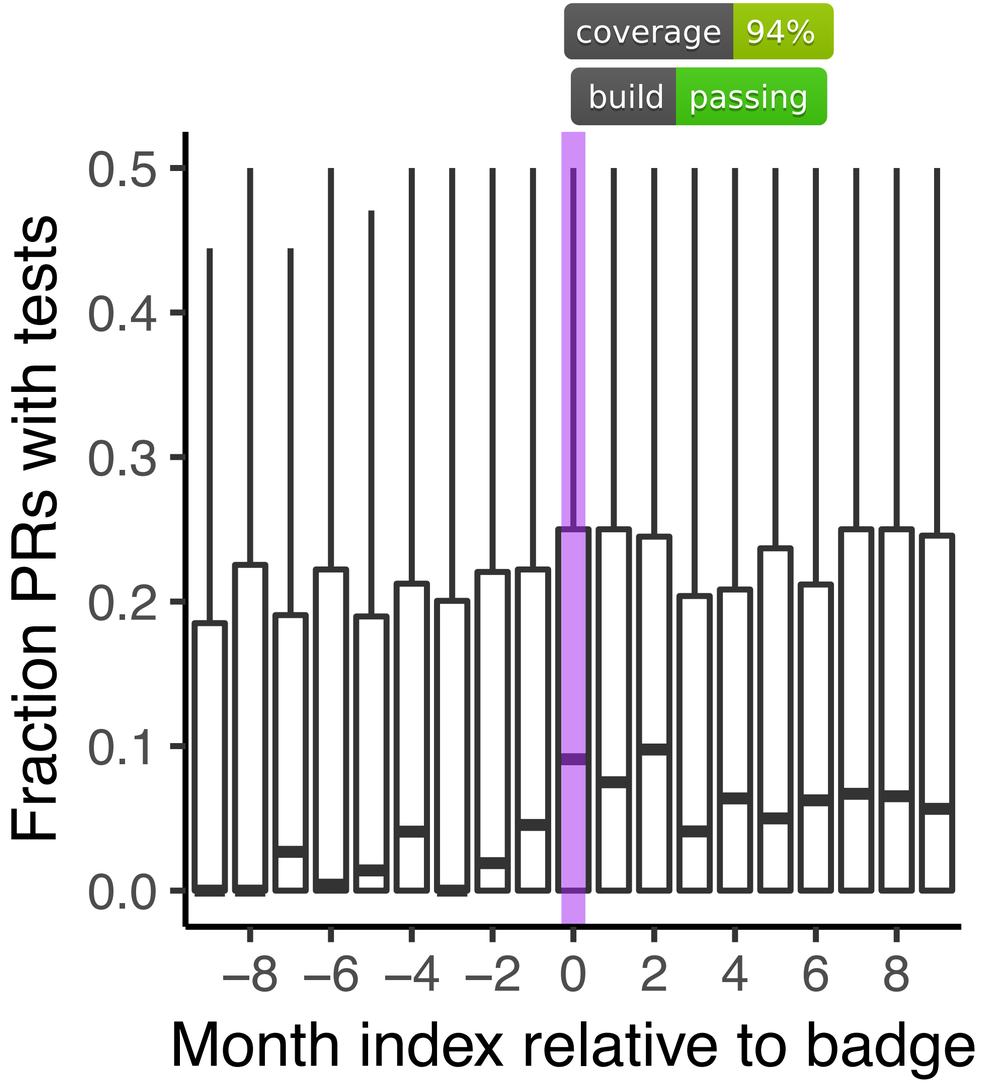
Signals of PR quality





Result: Build status+code coverage badges indicate *more tests in PRs*

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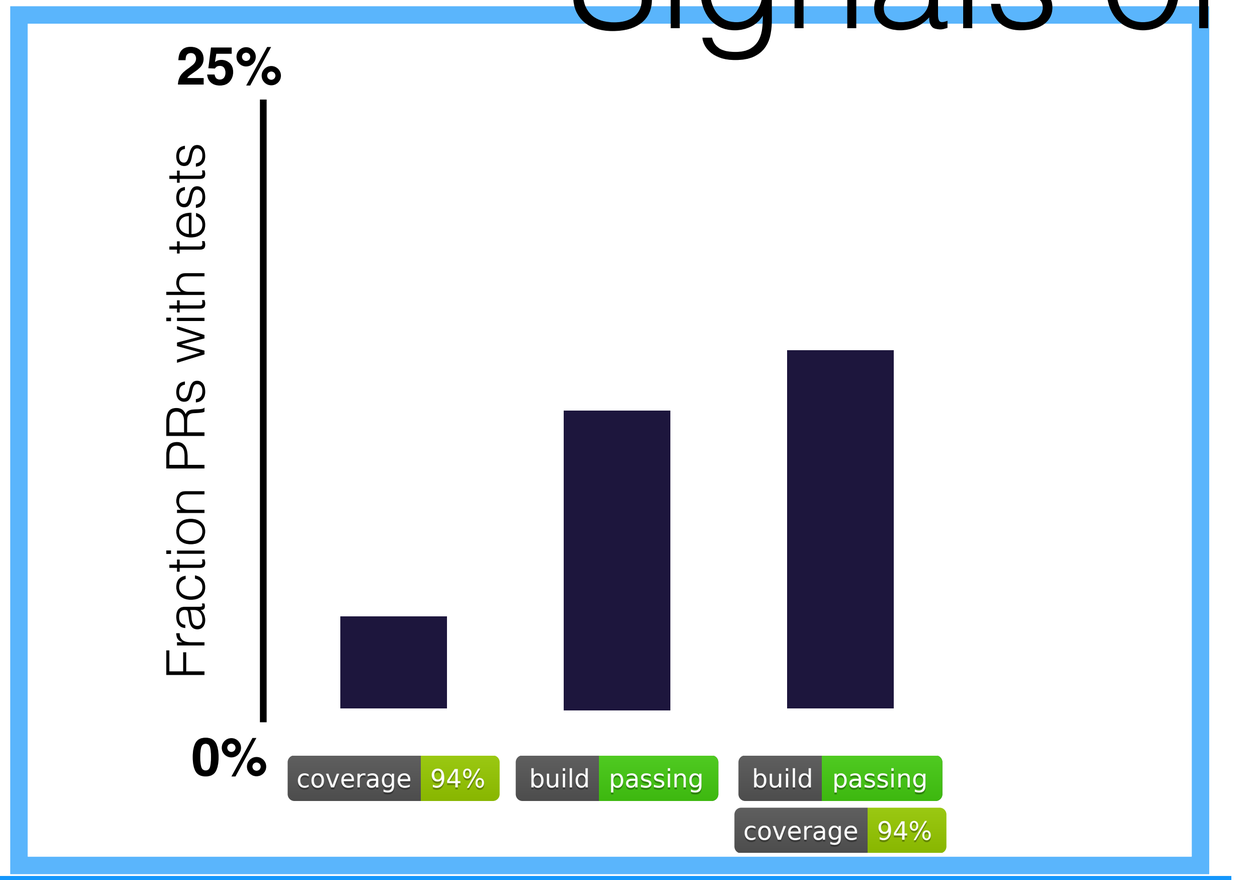
Signals of PR quality



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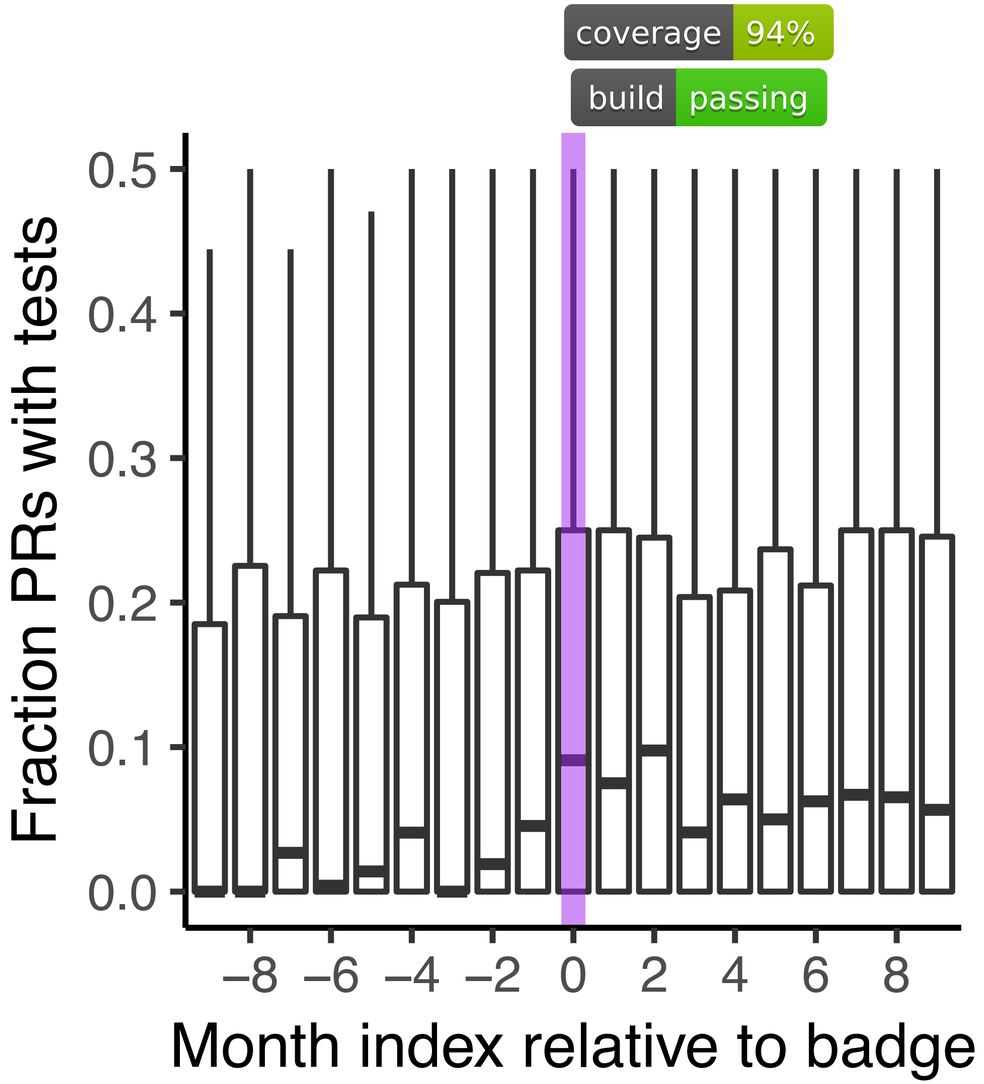

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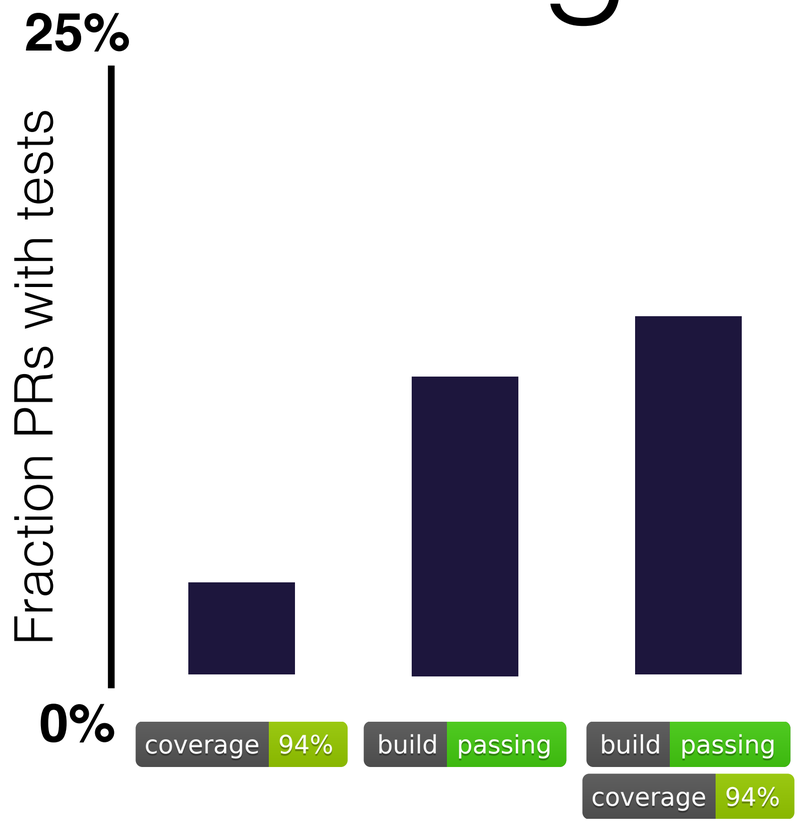

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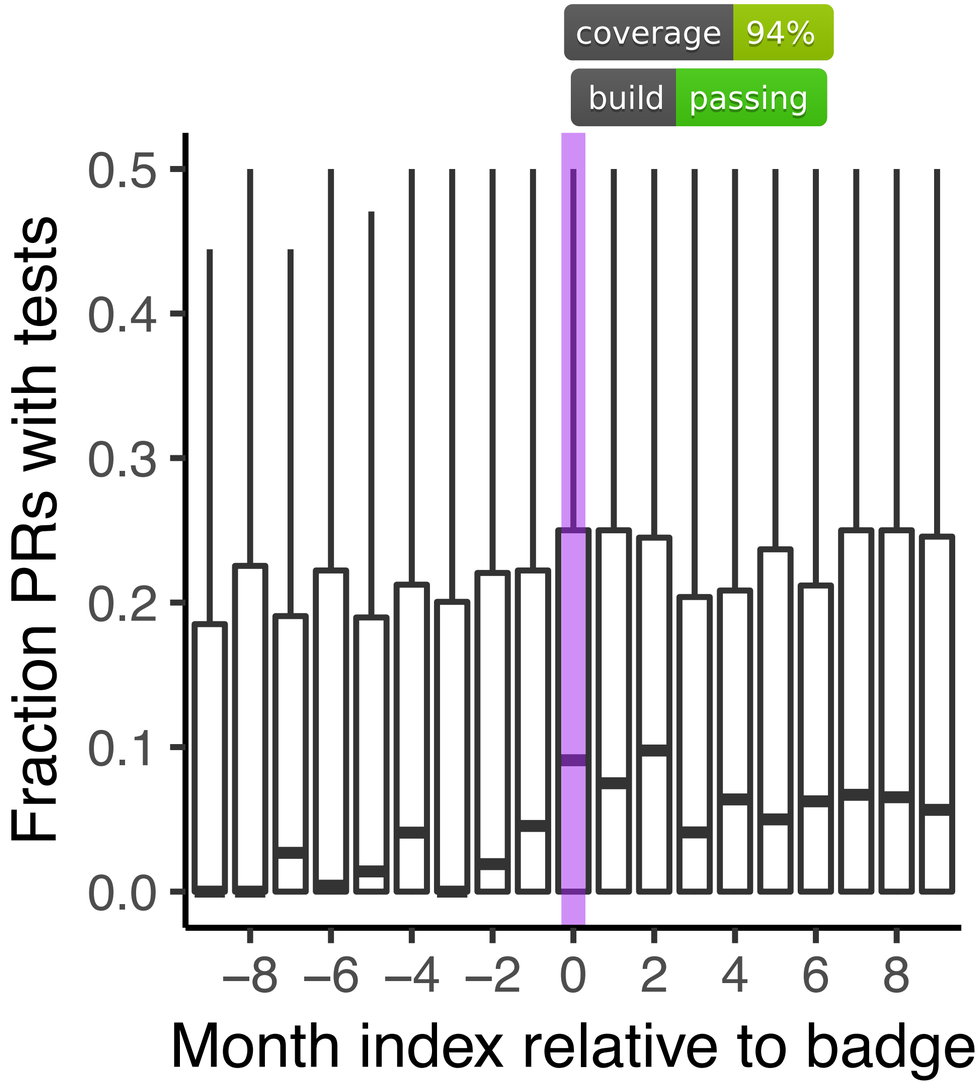

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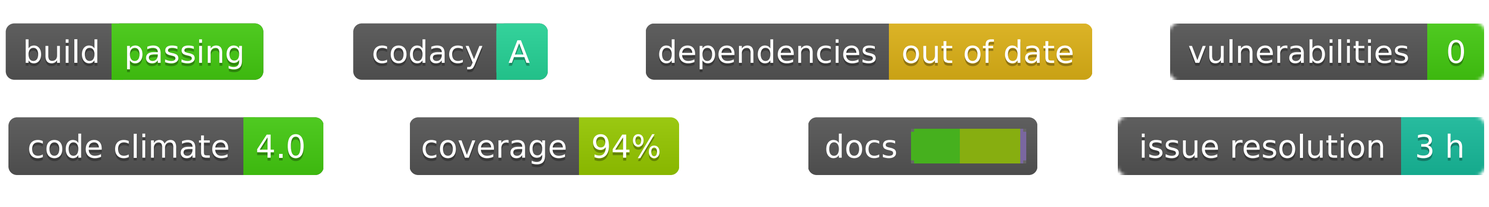
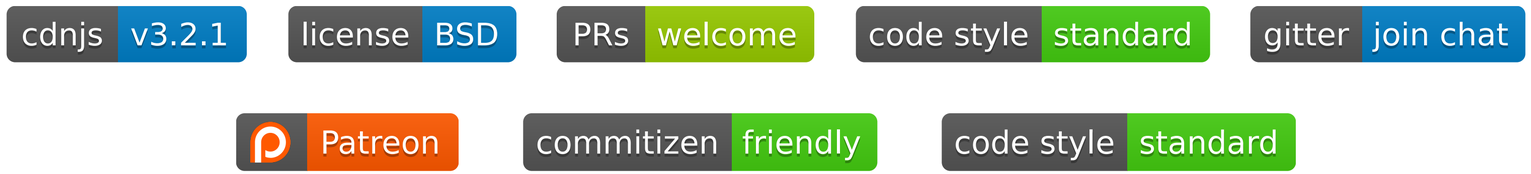
Take-aways

Badges with **underlying analyses:**



assessment signals

are **stronger predictors** than badges that merely state intentions or provide links:



conventional signals

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Take-aways

When possible,
design or choose the badge that takes the **most work:**

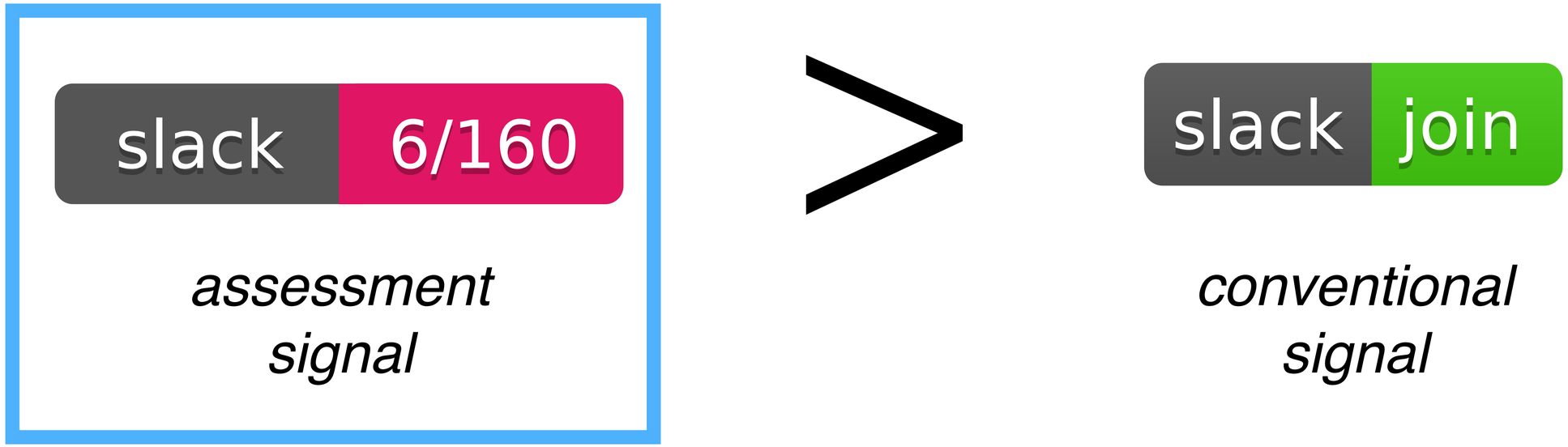
assessment signal

>

conventional signal

Take-aways

When possible,
design or choose the badge that takes the **most work:**



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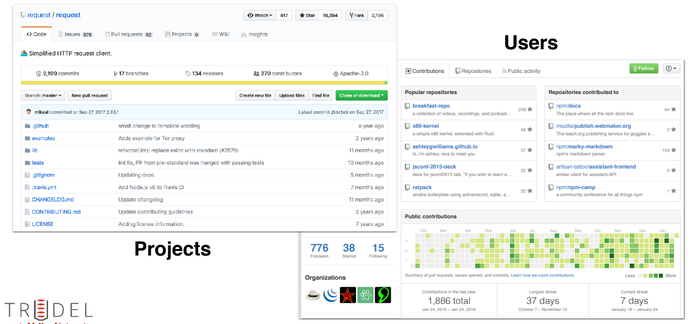

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Mixed methods study

Survey

- 32 maintainers, 57 contributors
- Maintainers:
  - What do you intend to signal?
  - What effects do you expect?
- Contributors:
  - What do badges tell you?

+

Repository Mining

- 294,941 *npm* packages
- Mined badge adoptions/removals from README files
- Measured proxies for code quality, test suite quality, popularity, dependency freshness, …

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Step 2: Time Series Analysis

Signals of fresh dependencies

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Take-aways

When possible,
design or choose the badge that takes the **most work:**

assessment signal

>

conventional signal

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Contact:

asher.trockman@gmail.com

https://cmustrudel.github.io

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