

UNDERSTANDING THE RESPONSE TO OPEN SOURCE DEPENDENCY ABANDONMENT IN THE NPM ECOSYSTEM

Friday, May 2nd, 2025



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open-source software is the infrastructure that our digital lives run on

open source software



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Code Issues Pull requests 17 Discussions Actions Security Insights

master 2 branches 36 files

- adril
- .github
- docs
- src/Spout
- tests
- .editorconfig
- .gitattributes Add docs to .gitattributes
- .gitignore Make build...
- .php-cs-fixer.dist.php Upgrade f...
- CONTRIBUTING.md Contribut...
- LICENSE First external release
- README.md Add "archived project" s...
- UPGRADE-3.0.md Add full support for PHP
- composer.json Upgrade PHP and dev dependencies last year
- composer.lock Make builds reproducible 9 months ago
- logo.png First external release 9 years ago
- phpstan.neon PHPStan Level 4 2 years ago
- phpunit.xml Upgrade PHPUnit config last year

README.md

Spout

stable v3-3.0 status inactive 17 Spout CI passing coverage 99% downloads 20.52 M

Archived project

This project has been archived and is no longer maintained. No bug fix and no additional features will be added. You won't be able to submit new issues or pull requests, and no additional features will be added.

You can still use Spout as is in your projects though :)

Thanks to everyone who contributed to this project, from a typo fix to the new cool feature. It was great to see the involvement of this community!

Used by 4.4k +4,370

Contributors 32 +21 contributors

Languages

- PHP 100.0%

but despite the widespread reliance on these projects, some are abandoned by maintainers



Our prev. study
about maintainer
disengagement



**Maintainers often leave projects for reasons we cannot prevent*:
(e.g., starting family, switching jobs, or losing interest)**

often nobody steps up when maintainers disengage**

*(Miller et al., 2019) **(Avelino et al., 2019)



**Abandonment can transform
open source dependency from
free resource
to
costly liability**

Developers often struggle when facing dependency abandonment

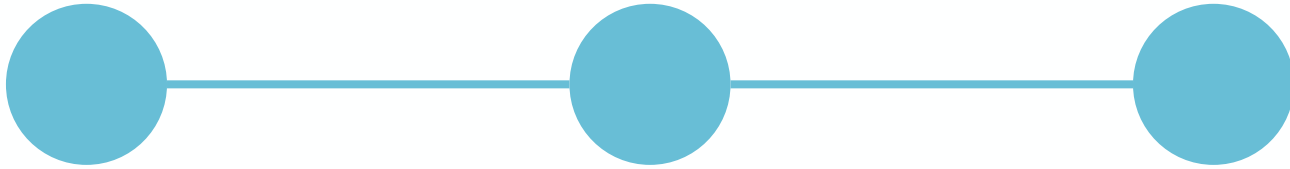
Our prev. interview study about dep abandonment





We know dependency abandonment is an inherent risk of relying on open source, but we lack an understanding of the scale of the issue

Study Objectives



PREVALENCE

How common is dependency abandonment?

REACTION

How do people react?

INFLUENCE

What factors influence how users respond?

Prevalence

RQ1

How prevalent is widely-used package abandonment?
How many downstream projects are subsequently exposed to abandonment?

Operationalizing Package Abandonment



1

EXPLICIT-NOTICE

☰ README.md

Spout

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This package has been deprecated

Author message:

This package is no longer maintained

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Operationalizing Package Abandonment

2

ACTIVITY-BASED



Methods



How prevalent is abandonment?
How many downstream projects
are subsequently exposed?

Identify
widely-used
packages

Scan for
signals of
abandonment

Identify
impacted
users

Calculate
exposure
estimates using
statistical
inference



of widely-used packages were abandoned

Downstream Exposure to Abandonment

~283,000+ GitHub projects directly exposed to abandonment

~78,000+ of whom were active post abandonment

Reaction

RQ2

How often & how fast do dependent projects remove abandoned dependencies?

Methods



How often & how fast do dependent projects remove abandoned dependencies?

Identify
comparison
samples

Identify
impacted
users

Measure
time to
response

Compare
response
rates

Removal is Uncommon

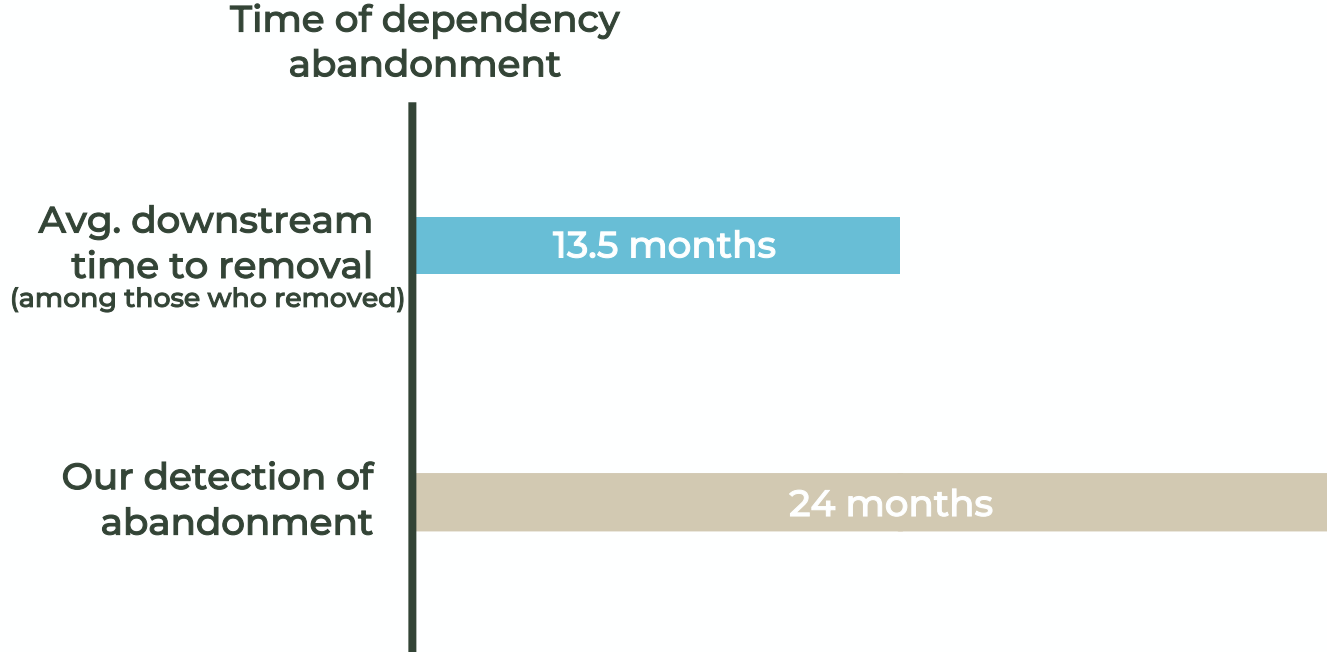
18% (419/2,288)

**Of dependent projects
removed dependency**

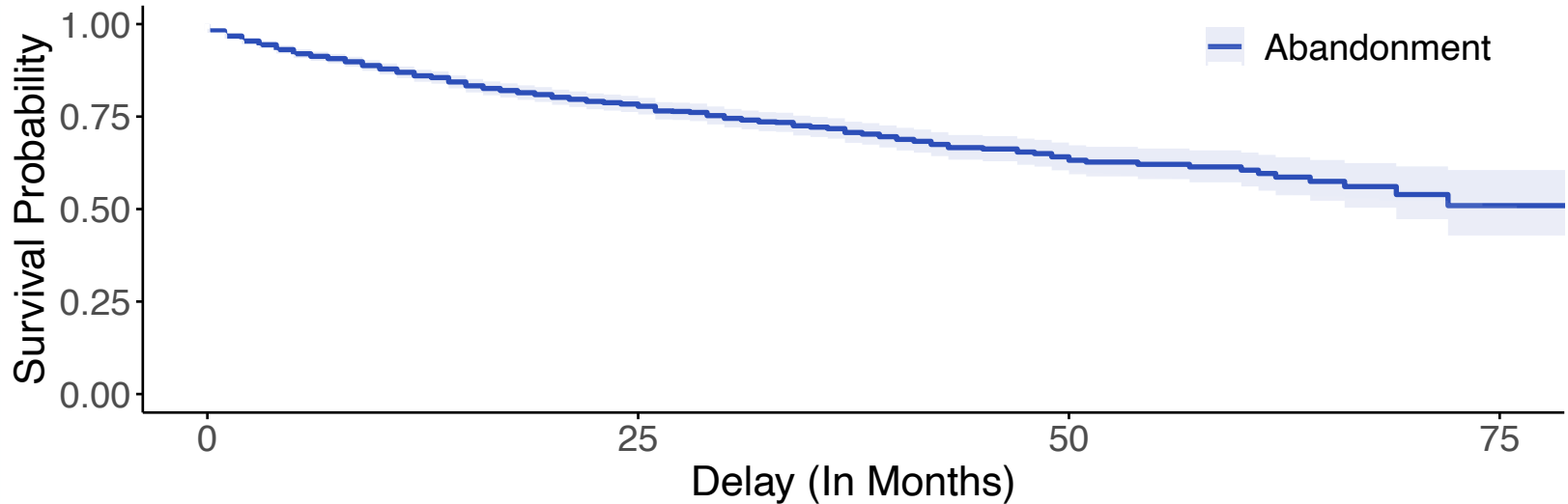
Avg. time from abandonment to removal:

13.5 months

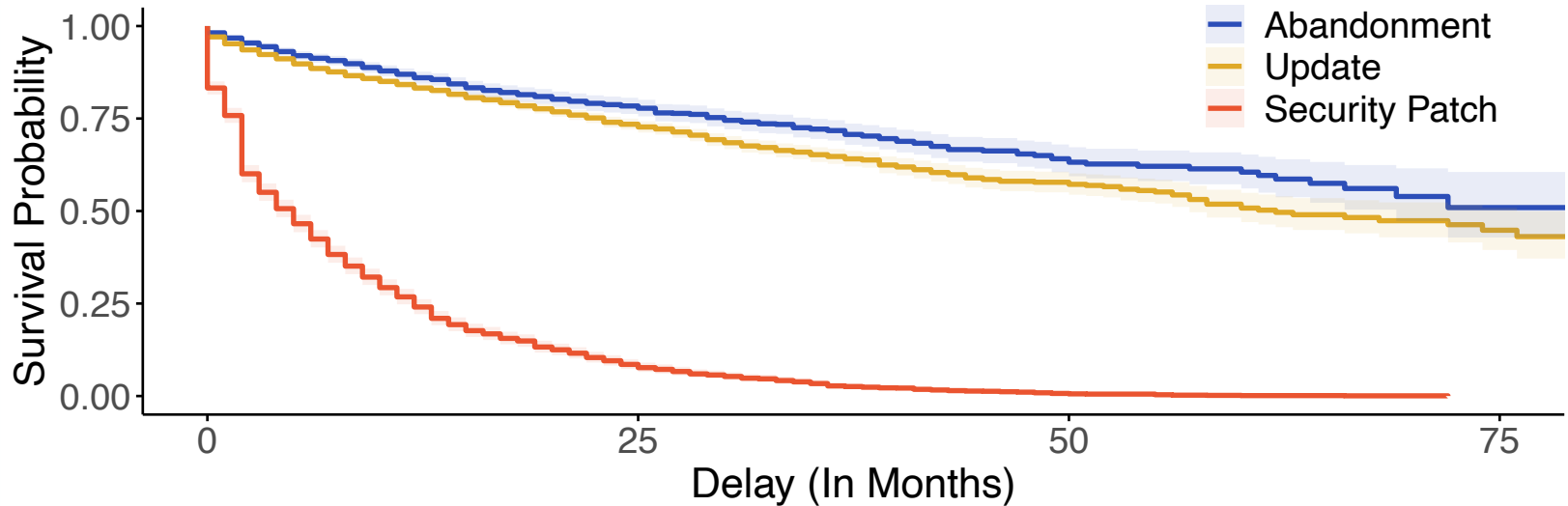
Removal is Uncommon



Kaplan-Meier Survival Curve



Kaplan-Meier Survival Curve w/ Baselines



Influence

RQ3

What dependent project characteristics are associated with removing abandoned dependencies?

RQ4

How does announcing the abandonment status of a package impact how fast dependent projects remove the abandoned dependency?

Methods

Take snapshot of
exposed projects
at time of exposure

Operationalize &
measure project
characteristics

Perform
regression &
survival analysis

RQ3

What project characteristics are associated with removing abandoned dependencies?

RQ4

How does announcing abandonment impact downstream removal speed?

Abandonment Response is Associated with Other Dependency Management Practices



**More mature
governance
practices**

OR = 1.43***



**More active
dependency
management**

OR = 1.15*



**Fewer
outdated
dependencies**

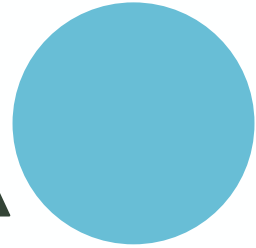
OR = 0.84***

OR = Odds Ratio

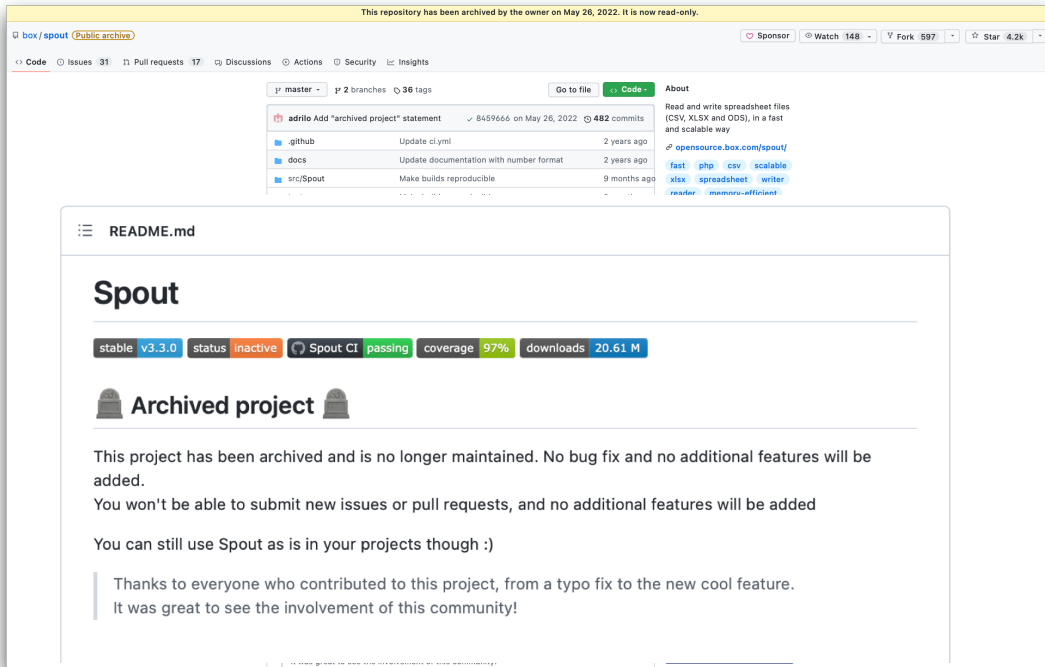
Explicit Notice of Abandonment Supports Downstream Response!!

Publicly announcing abandonment
increases the likelihood of
downstream project removal by

58%↑



Explicit Notice of Abandonment Supports Downstream Response!!



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Go to file Code

About

Read and write spreadsheet files (CSV, XLSX and ODS), in a fast and scalable way

opensource.box.com/spout/

fast php csv scalable

six spreadsheet writer

reader mempro-efficient

README.md

Spout

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Understanding the Response to Dependency Abandonment in the npm Ecosystem

Paper here!



- Dependency abandonment is prevalent issue
- Developers may care about identifying abandonment, but may lack awareness or require extended observation periods to make determinations
- Most exposed projects do not respond, but responses are significantly faster when explicit notice is provided
- Increasing information transparency surrounding abandonment supports downstream responses

