

An Empirical Study of Delays In The Integration of Addressed Issues

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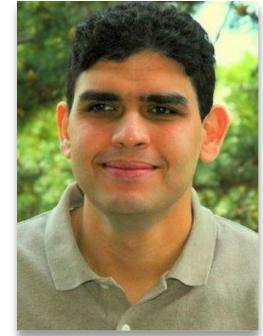
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The term *issue* can refer to a *bug fix*, a *new feature* or an *enhancement*



Bug fix

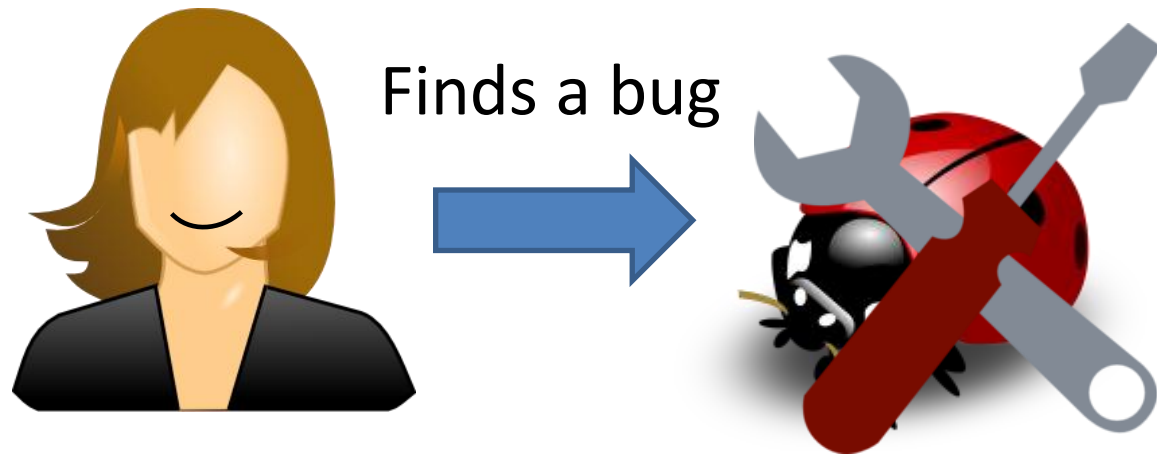


Enhancement



New feature

We may think that to address an issue is enough to satisfy an user



Previous research has focused on the time to fix a bug



Opened



Resolved-Fixed

How much time?

Techniques and approaches were invented



Prediction Models



Bug Repots Similarity

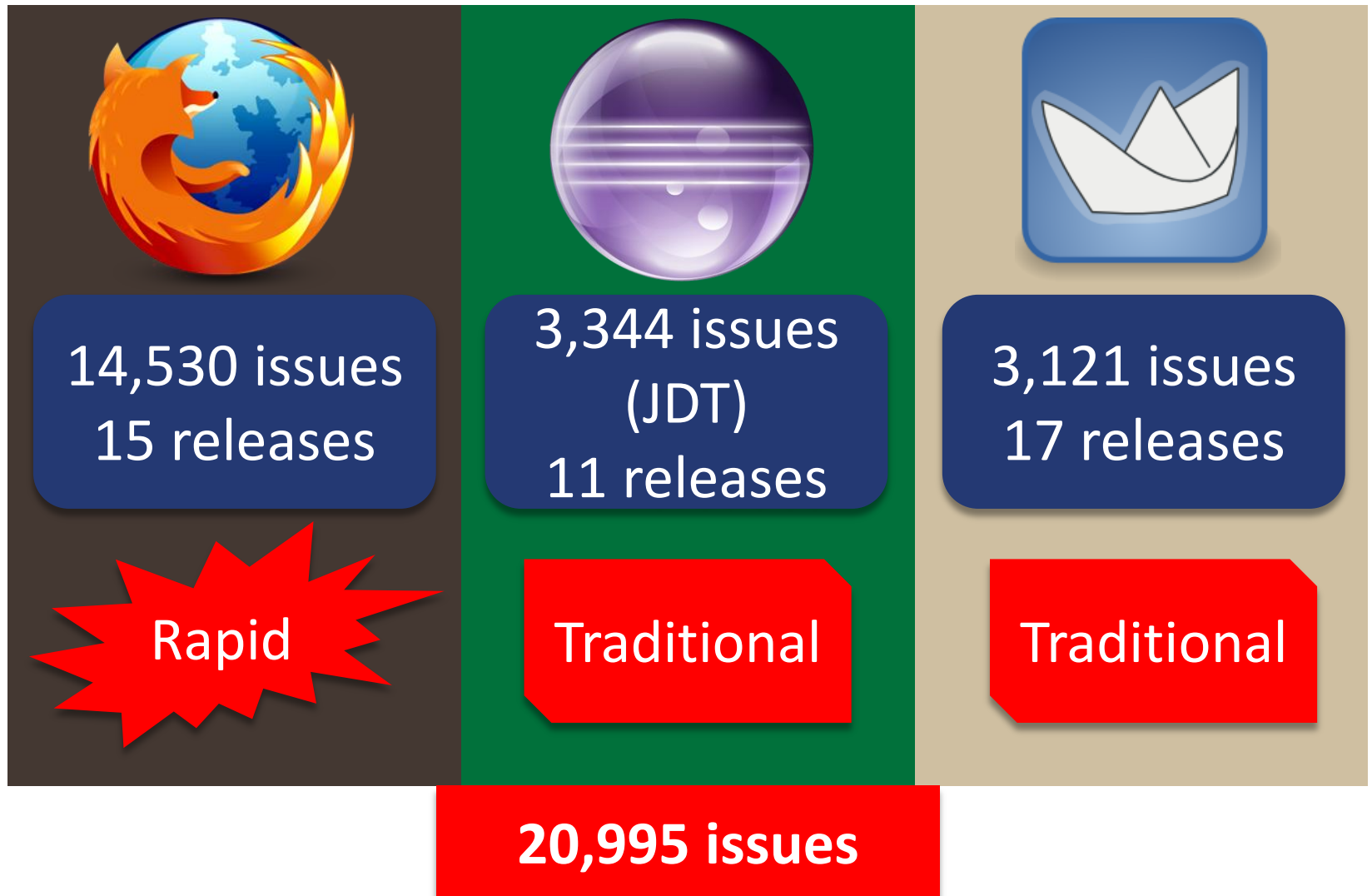
But an addressed issue may take some time to be integrated into a release



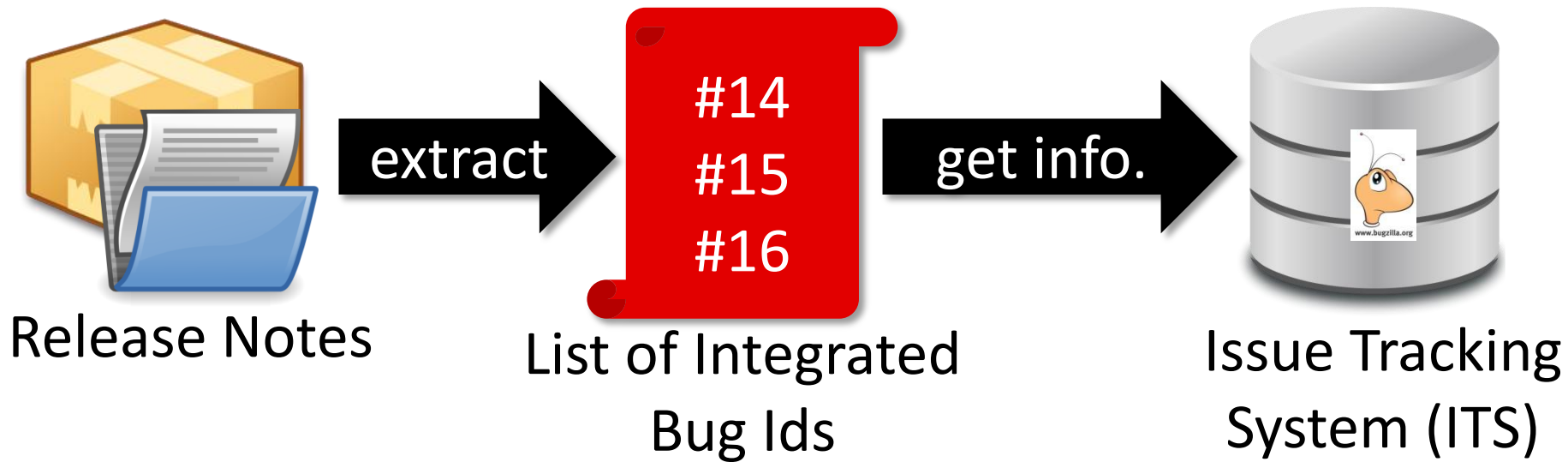
So when does this stuff get added? Will it be applied to the next FF23 beta? A 22.01 release? Otherwise?



An empirical study to analyze the integration delay

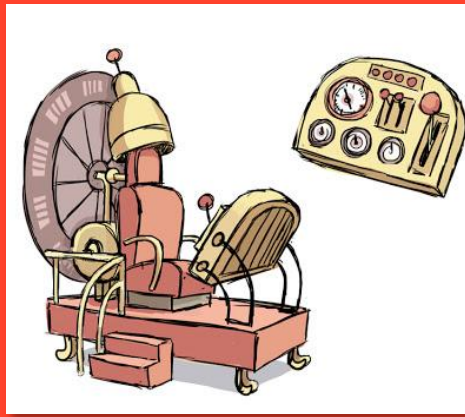


We collected data from release notes and issue tracking systems





Integration
delay

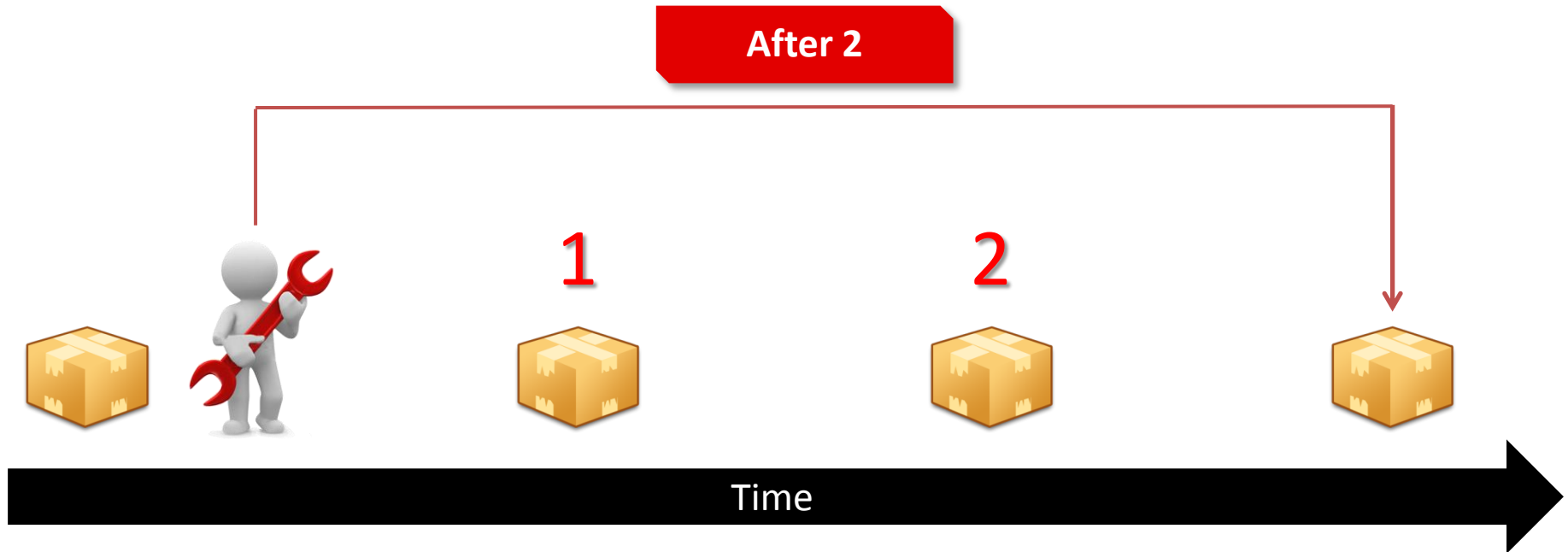


Prediction
models

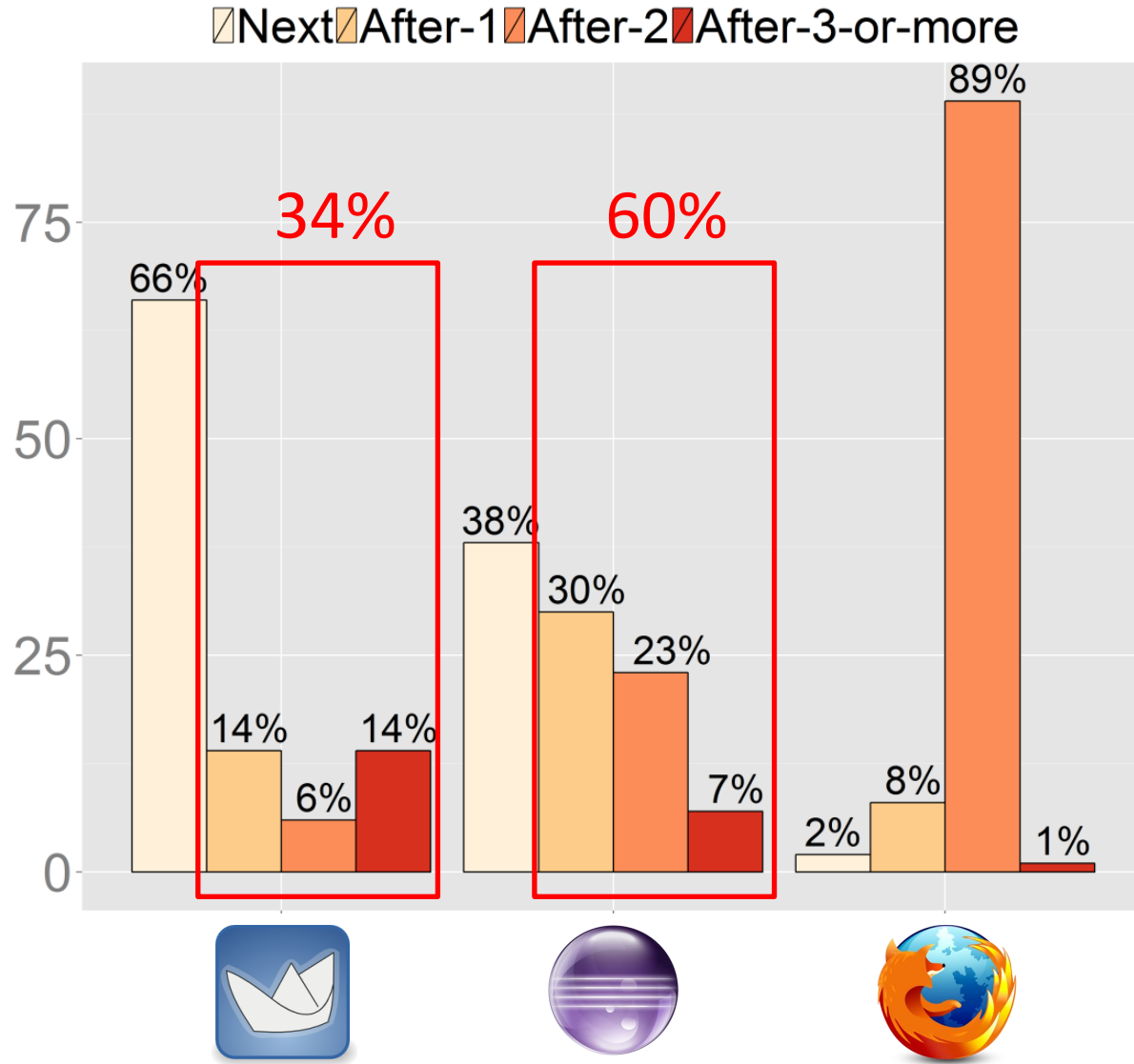


Influential
variables

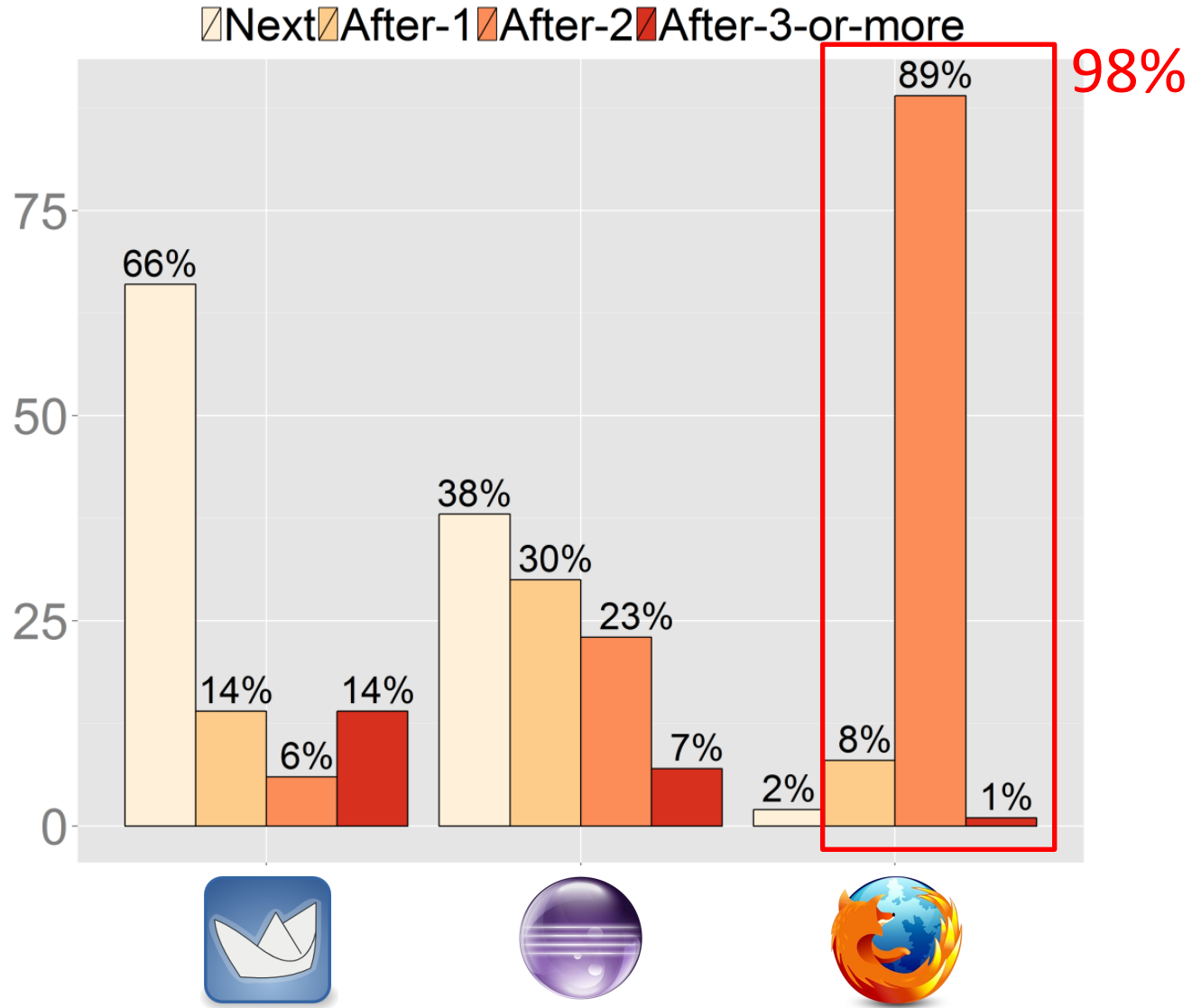
Measuring integration delay



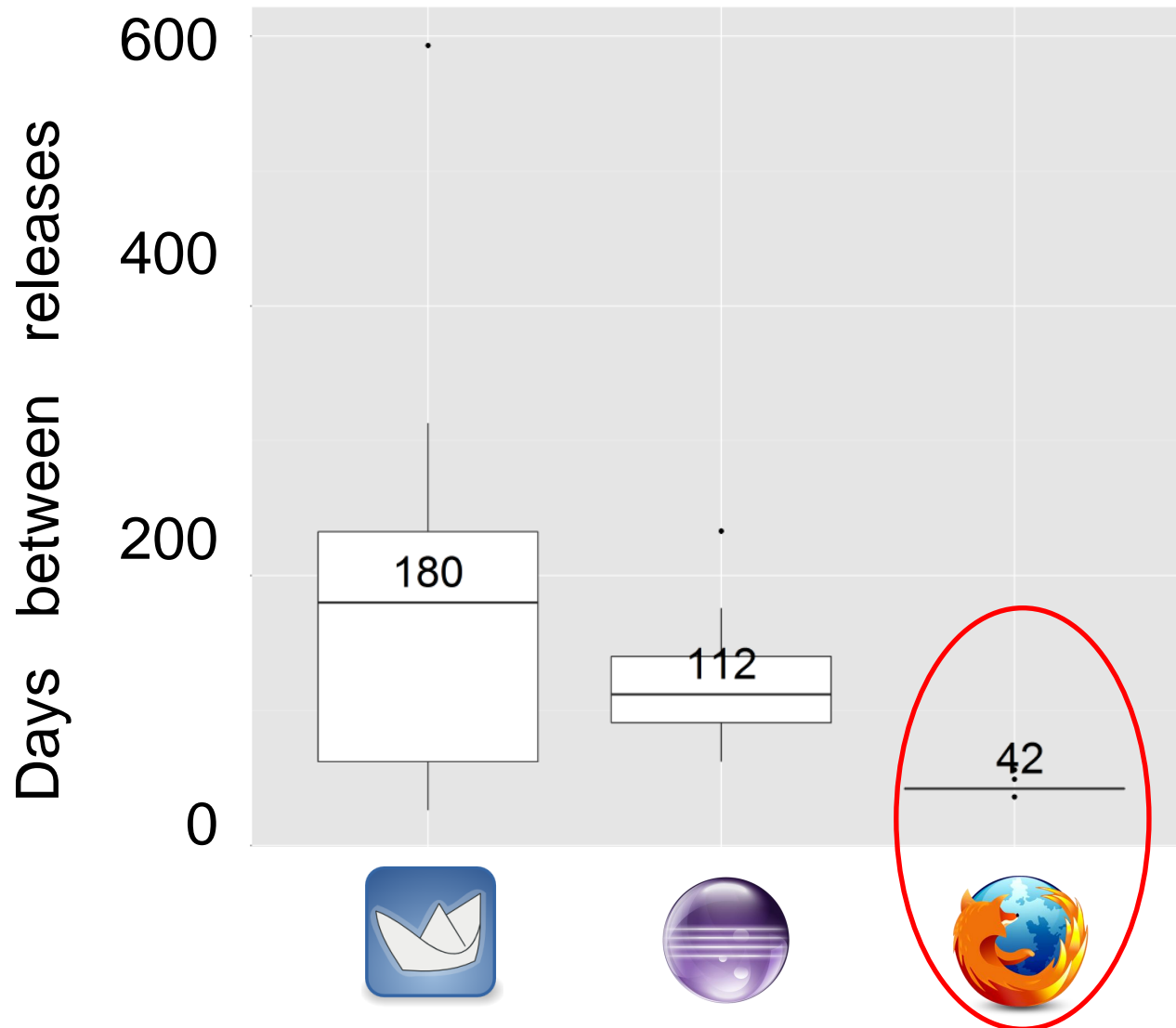
34% to 60% of addressed issues in traditional release cycle were delayed



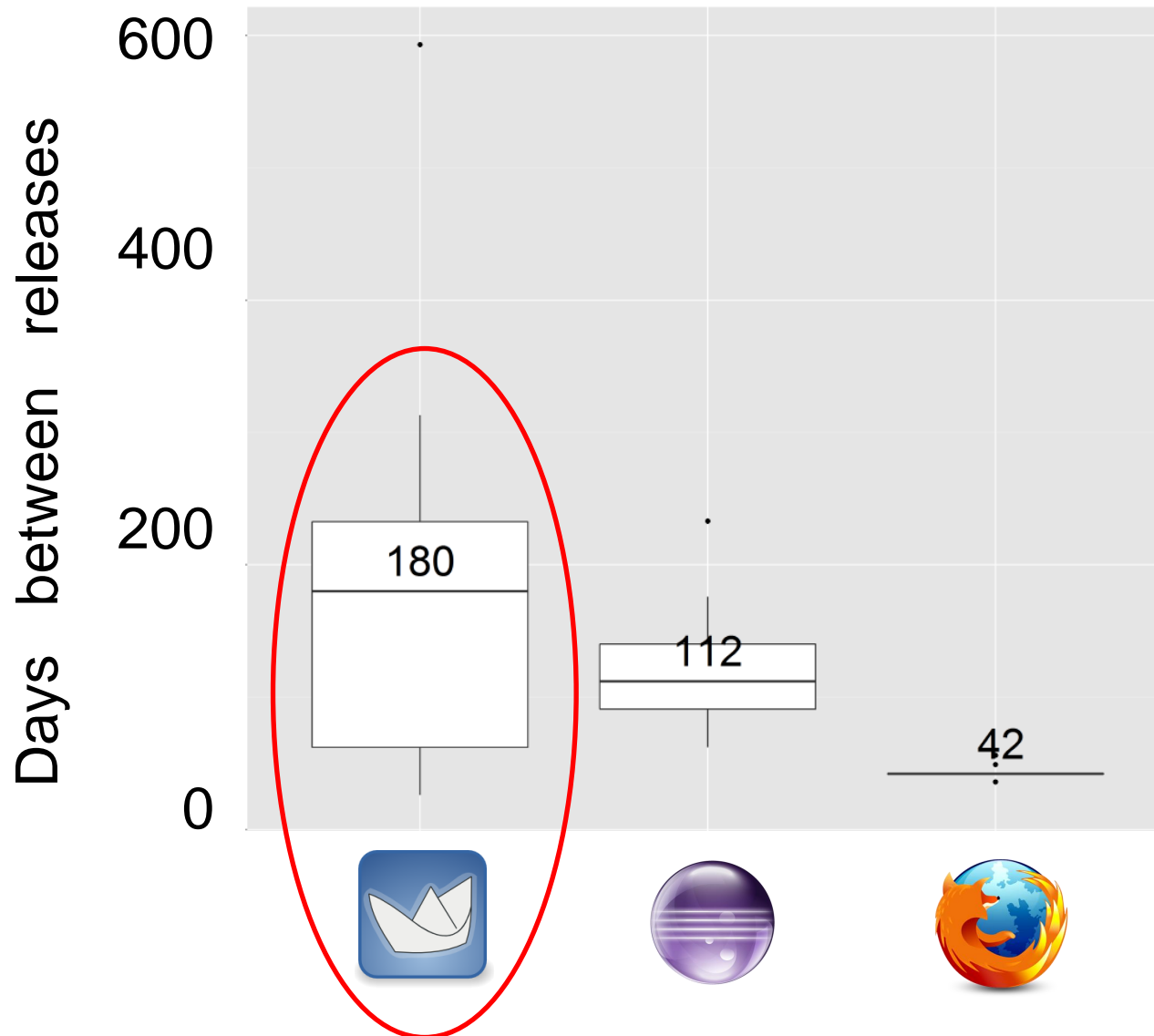
Addressed issues are usually delayed in rapid relasing cycle



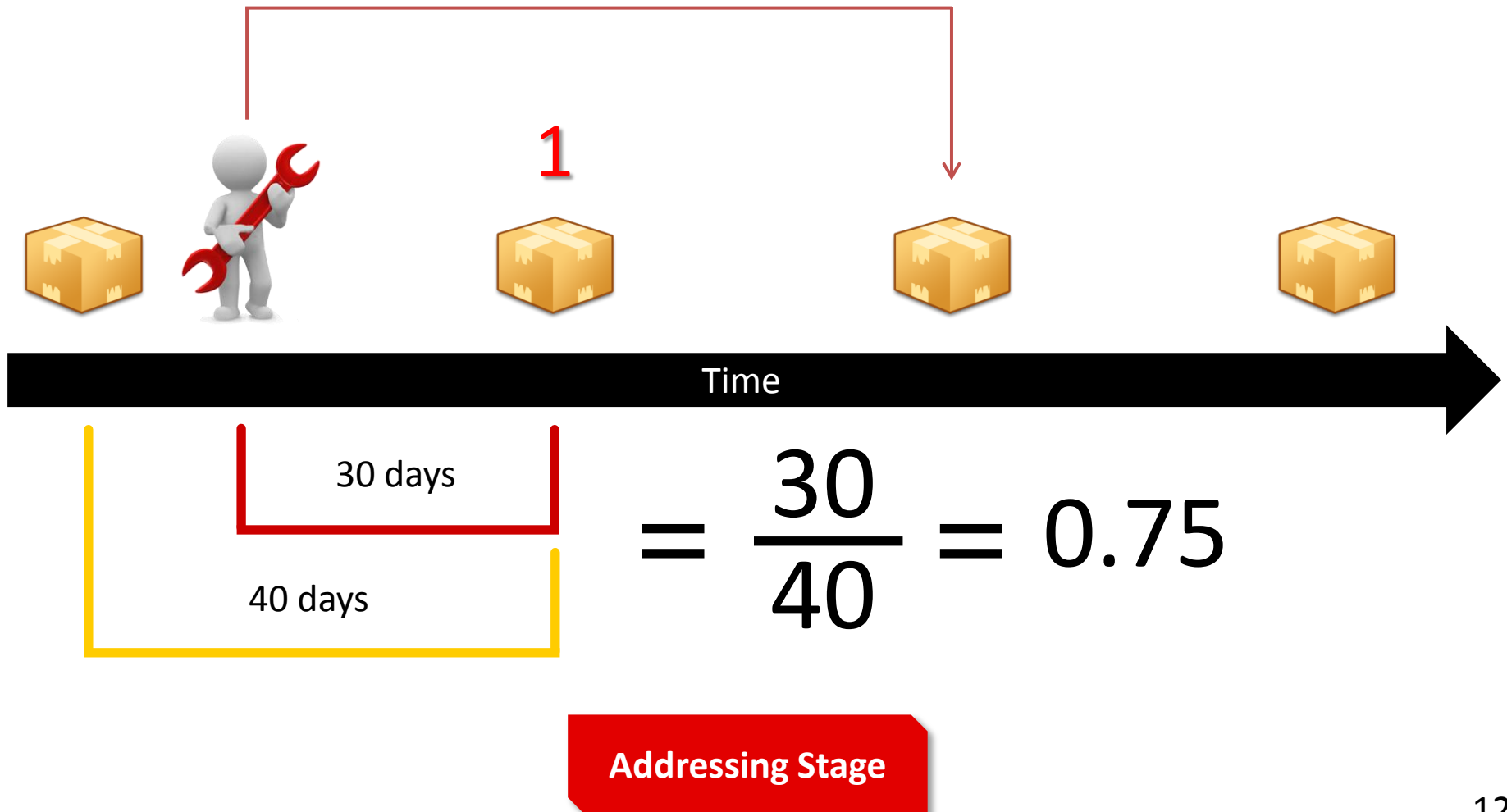
Measuring the release frequency



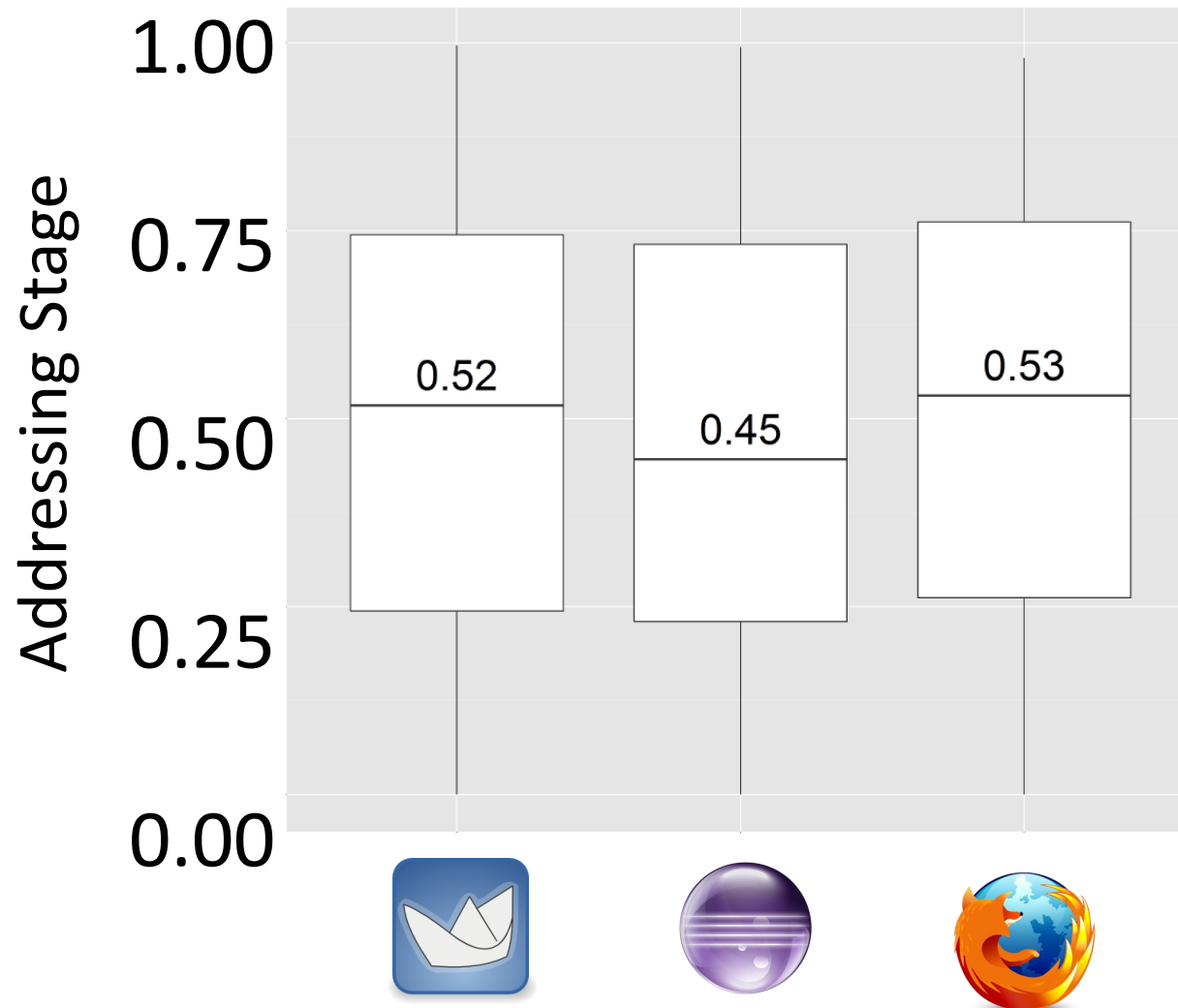
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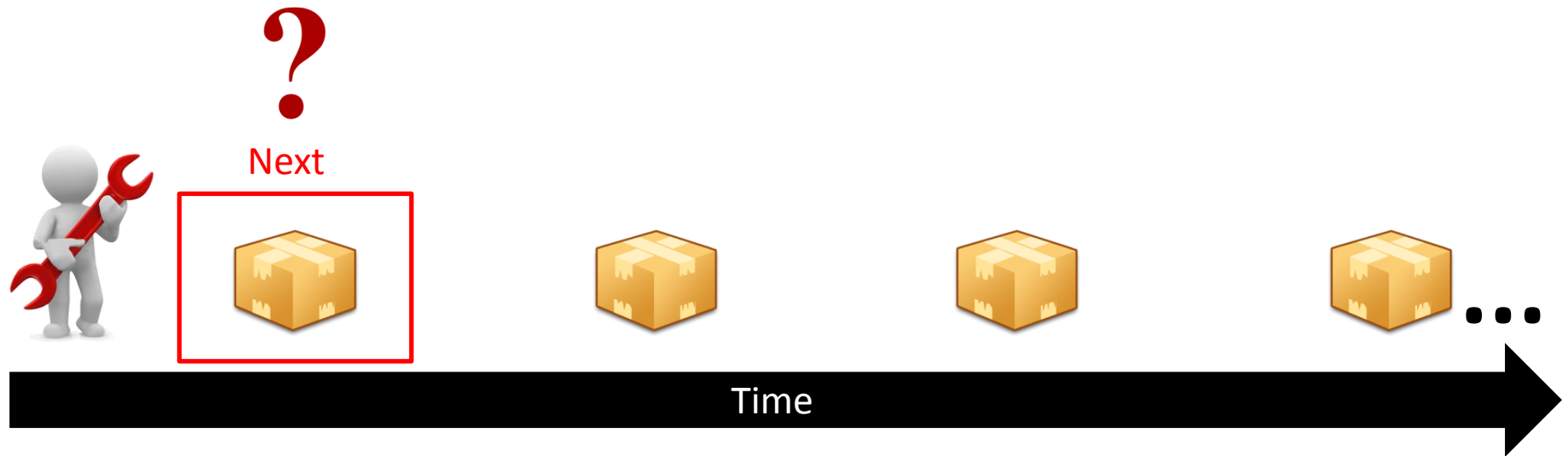
How long an issue was addressed before a release?



Delayed issues were addressed well before the next release



When will an addressed issue be integrated?



Studied metrics

Reporter metrics

Reporter
Experience

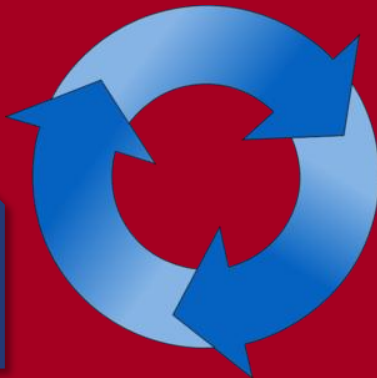


Issue metrics



Issue
priority

Number of
comments



Process metrics



Project metrics

Integration
workload



Measuring the integration workload of a given addressed issue



Time



= 500 ?

We are still waiting as well!

Our models perform better than random guessing



Precision
0.59 to 0.88



Recall
0.62 to 0.88



ROC Areas
All above 0.74

We computed the variable importance of our methods



Experience	Workload	#Comments
55	340	30
66	100	70
78	540	22



Accuracy: 0.8

Experience	Workload	#Comments
66	340	30
78	100	70
55	540	22

Accuracy: 0.79

We computed the variable importance of our methods



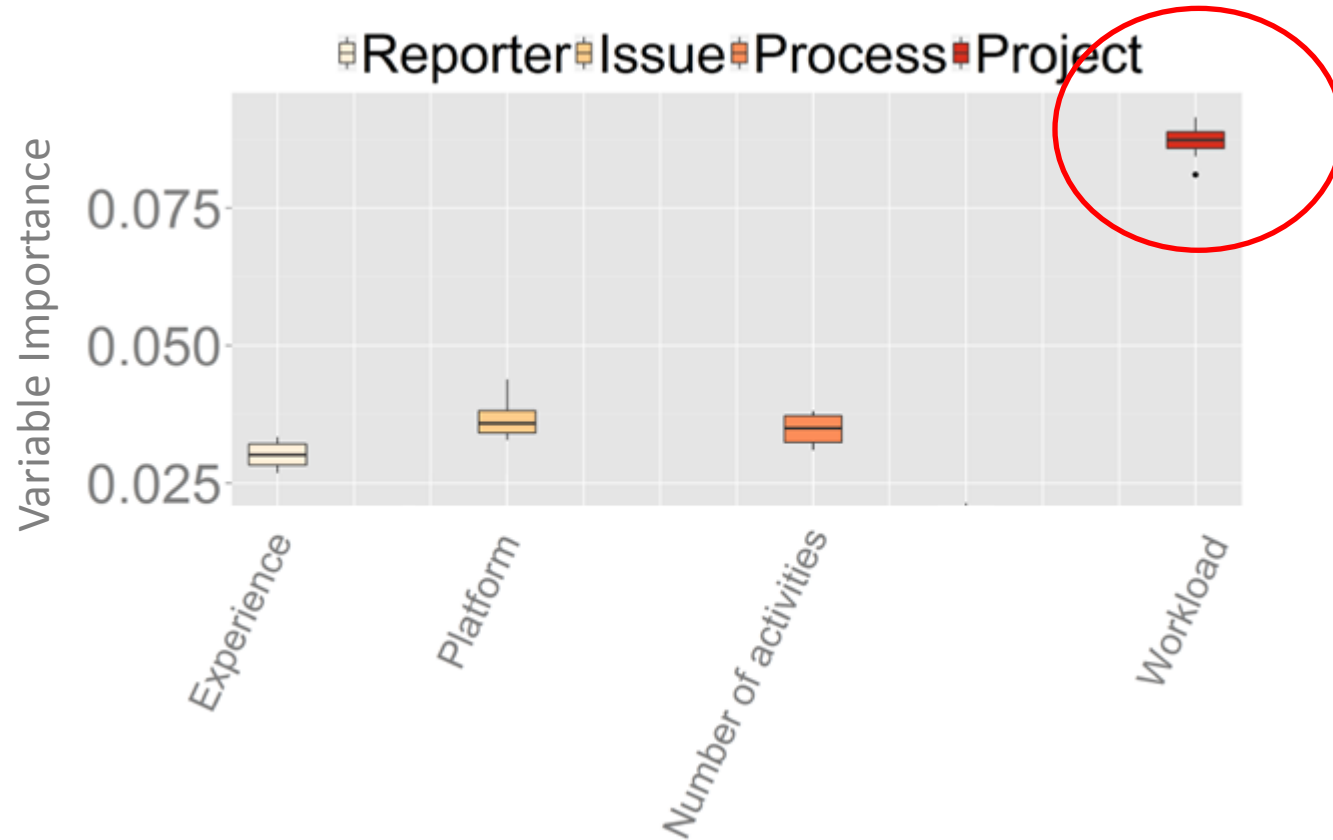
Experience	Workload	#Comments
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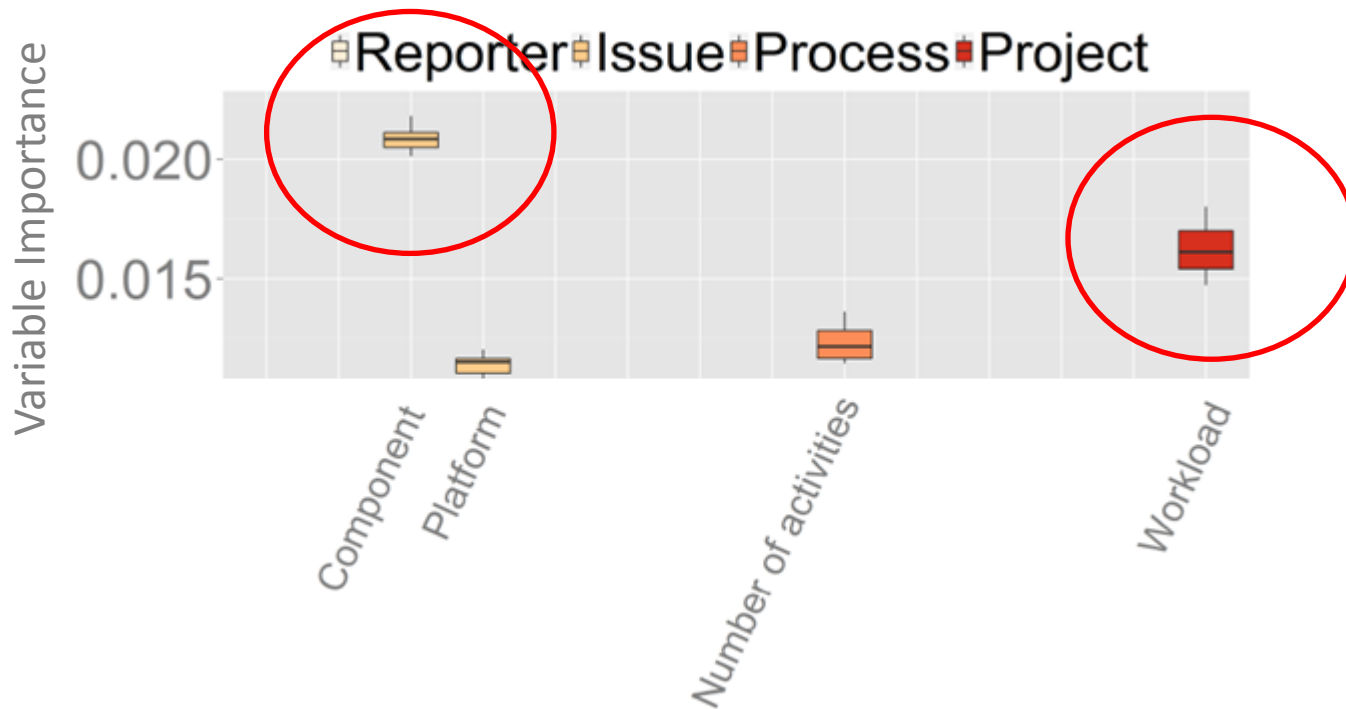
Experience	Workload	#Comments
55	100	30
66	340	70
78	540	22

Accuracy: 0.3

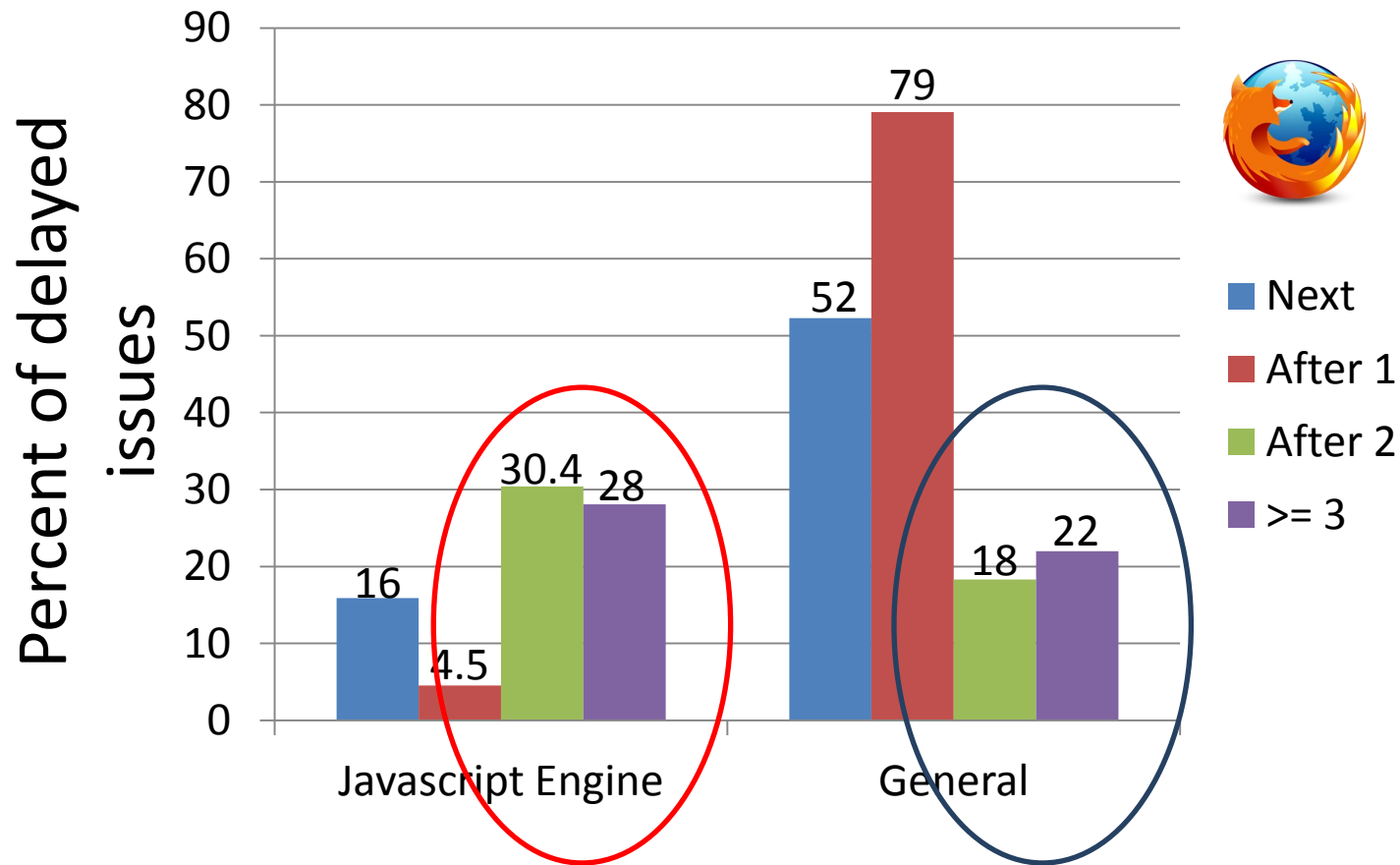
The integration workload has a bigger influence in our models



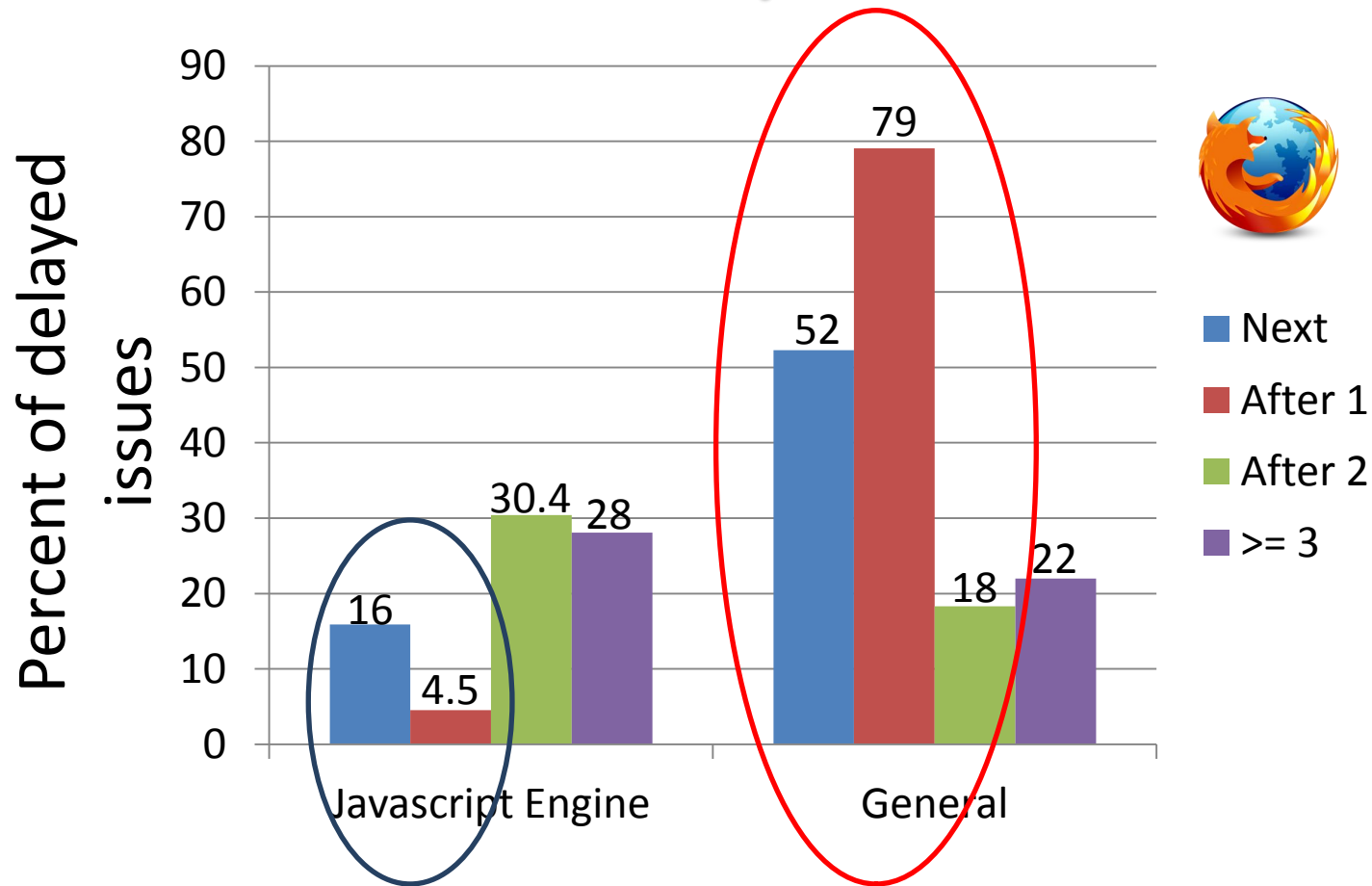
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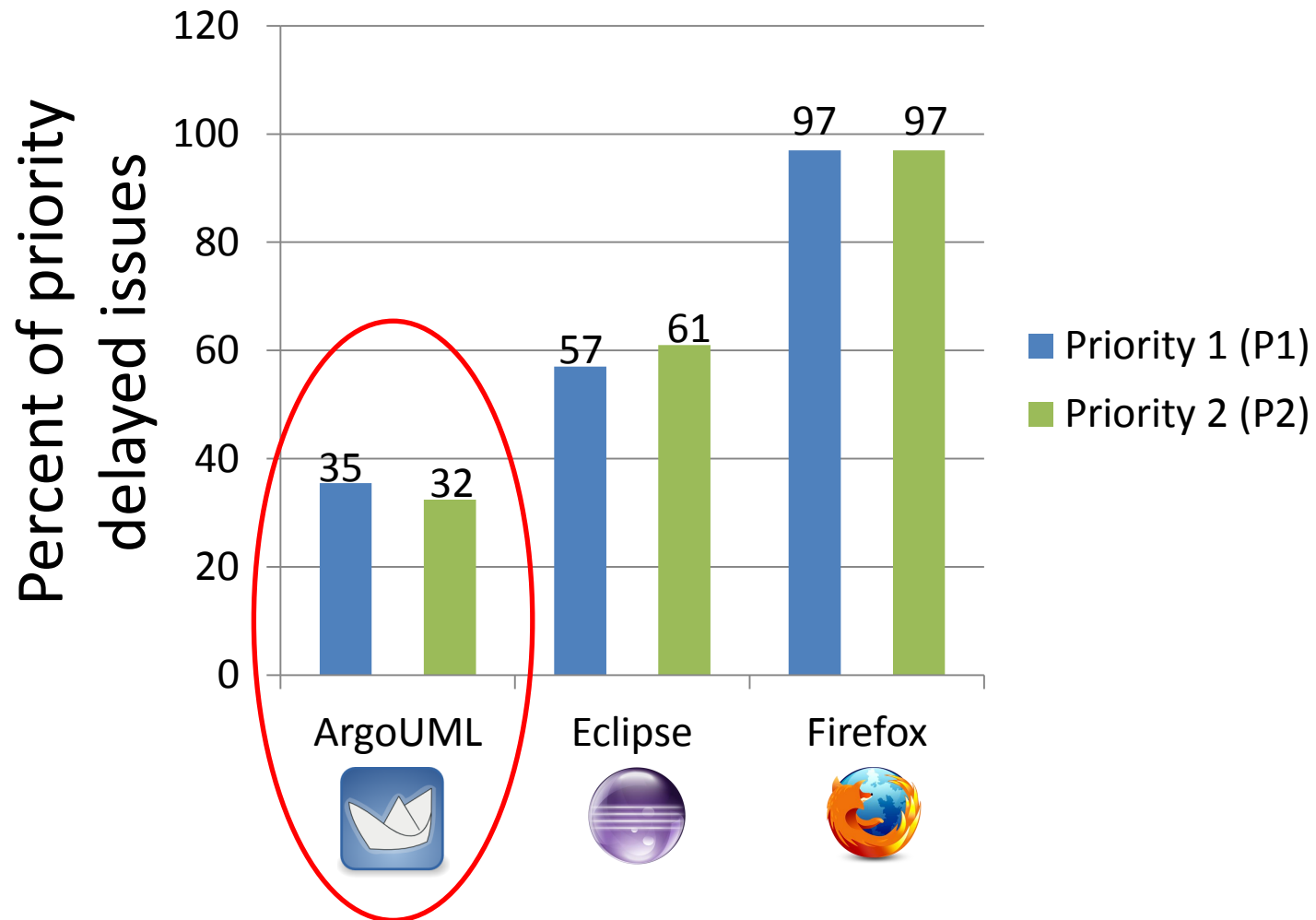
Javascript Engine is the component with the most delayed issues in firefox



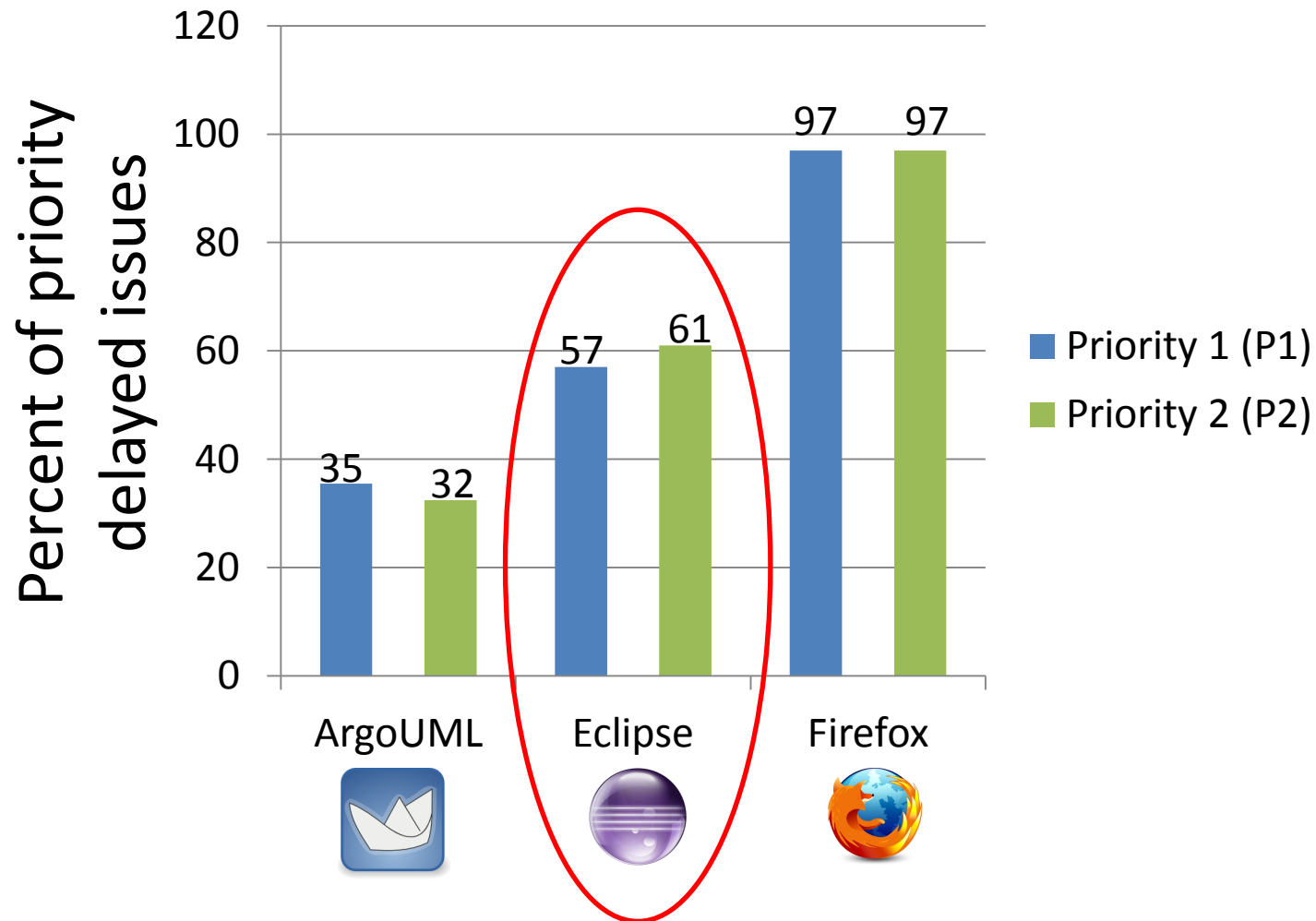
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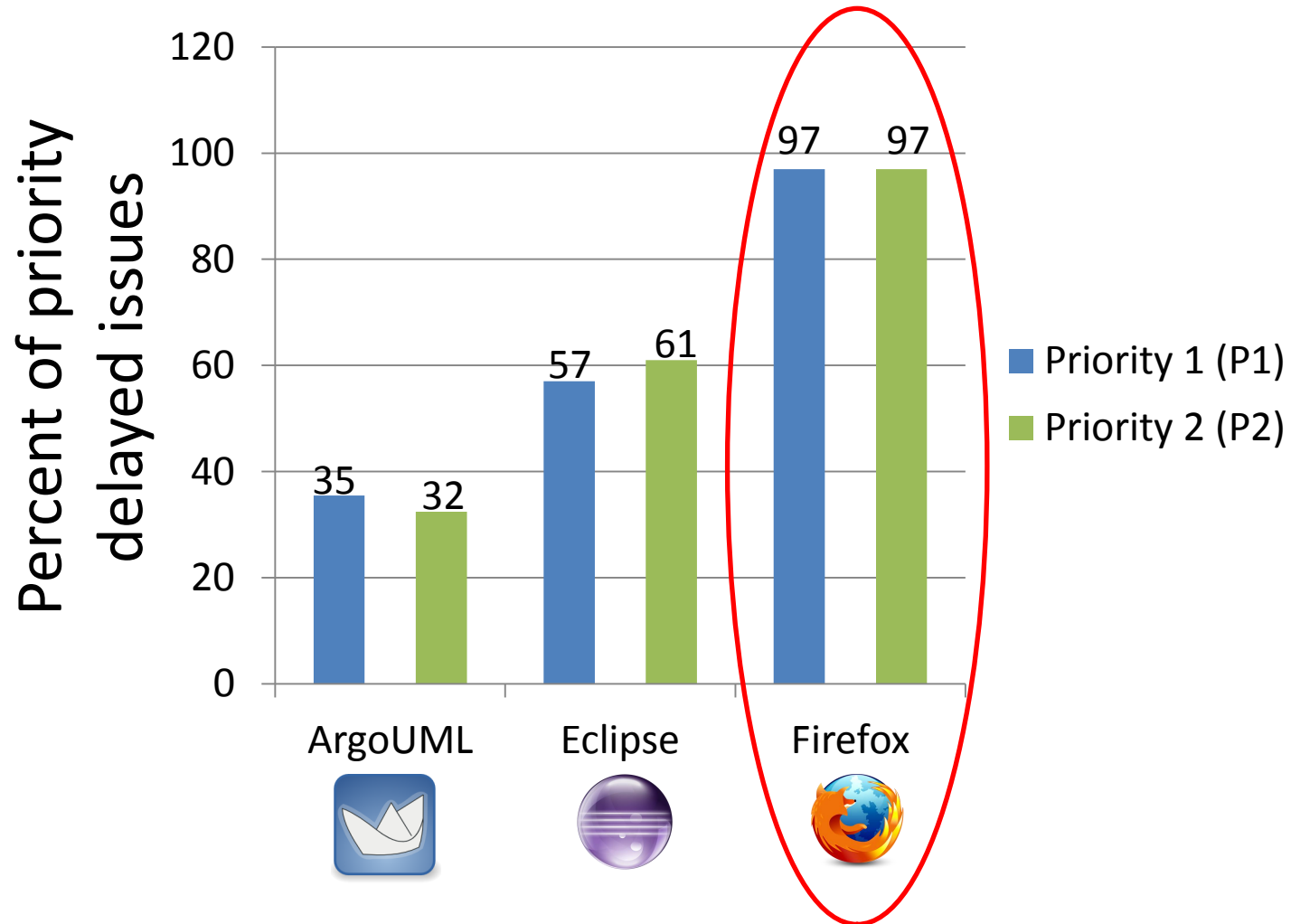
Surprisingly, priority and severity have little influence on our models



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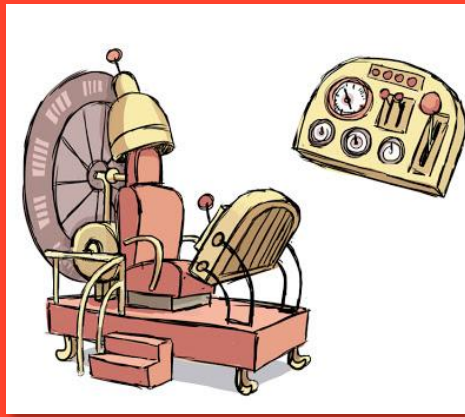




Integration delay

Issues are
usually delayed
in rapid
releasing cycle

Issues are
adressed well
before a release



Prediction models

Our models
perform better
than random
prediction



Influential variables

Integration
Workload is the
most influential
variable in our
models

But an addressed issue may take some time to be integrated into a release



So when does this stuff get added? Will it be applied to the next FF23 beta? A 22.01 release? Otherwise?



An empirical study to analyze the integration delay



34% to 60% of addressed issues in traditional release cycle were delayed

