

Supplementary Bug Fixes vs. Re-opened Bugs

Le An, Foutse Khomh, Bram Adams

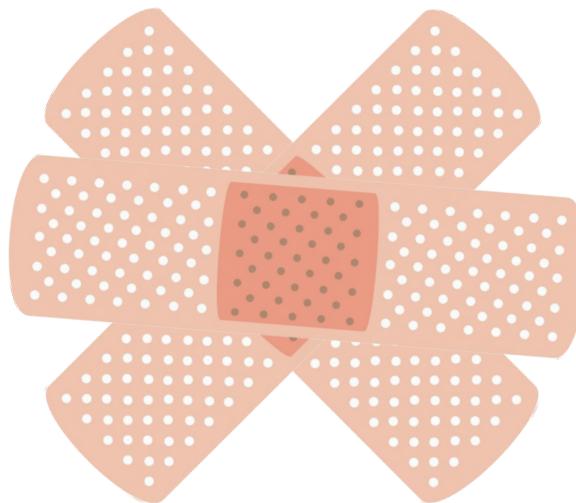
SCAM 2014, Victoria, Canada
29 september, 2014

POLYTECHNIQUE
MONTRÉAL

LE GÉNIE
EN PREMIÈRE CLASSE



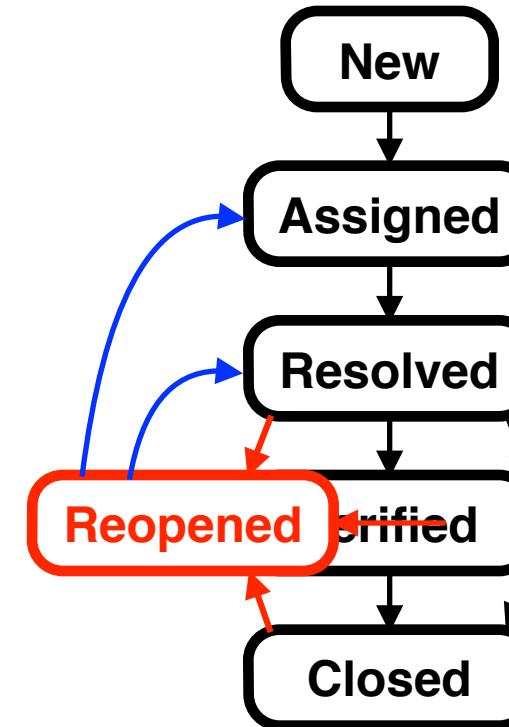
Motivation



supplementary bug fixes



- Agile development
- Initial fix could not address the problem



re-opened bugs

- ↗ overhead
- ↗ user's satisfaction



RQ1: what is the prevalence of supplementary fixes & re-opened bugs?



RQ2: what is the relation of supplementary fixes & re-opened bugs?



RQ3: can we predict the re-opening of supplementary bug fixes?

Study Design

subject systems



mozilla
FOUNDATION

03/2007 - 08/2010



NetBeans

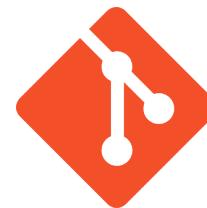
01/1999 - 06/2010



JDT Core

Platform SWT

10/2001 - 06/2010



WebKit

08/2001 - 06/2014

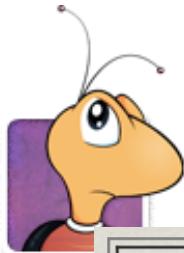
Study Design

identification approach - supplementary fixes

changeset	21149:7aeaf064ad9f
date	Fri Oct 31 09:07:15 2008 -0700
summary	Bug 462381 - Build layout directories in parallel r=ted sr=roc
churn	12 files changed, 16 insertions(+), 464 deletions(-)
... ...	
changeset	34890:fae81b8a5648
date	Fri Nov 13 14:40:00 2009 -0500
summary	bug 462381 - sprinkle magic PARALLEL_DIRS fairy dust about the build system r=ted.mielczarek
churn	12 files changed, 191 insertions(+), 173 deletions(-)
... ...	
changeset	34902:827d8651799e
date	Mon Nov 16 07:57:15 2009 -0500
summary	bustage fix from bug 462381
churn	1 files changed, 4 insertions(+), 2 deletions(-)

- **Type I bugs - bugs definitely fixed by one attempt**
- **Type II bugs - bugs definitely fixed by multiple attempts (bugs that need supplementary bug fixes)**

Study Design



identification approach - reopened bugs

Who	When	What	Removed	Added
john	2003-01-24 17:56:20 PST	Blocks		104449
john	2003-01-27 17:02:09 PST	Status	NEW	RESOLVED
		Resolution	---	WONTFIX
		Last Resolved		2003-01-27 17:02:09
tpowellmoz	2003-01-28 06:46:21 PST	Status	RESOLVED	REOPENED
		Resolution	WONTFIX	---
		CC		tpowell
timwi	2003-07-06 08:39:45 PDT	CC		timwi
philringnald	2009-08-23 19:41:40 PDT	QA Contact	tpreston	layout.form-controls
		Assignee	layout.form-controls	nobody



RQ1: what is the prevalence of supplementary fixes & re-opened bugs?



RQ2: what is the relation of supplementary fixes & re-opened bugs?

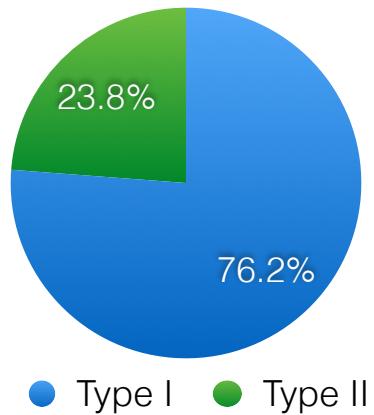


RQ3: can we predict the re-opening of supplementary bug fixes?

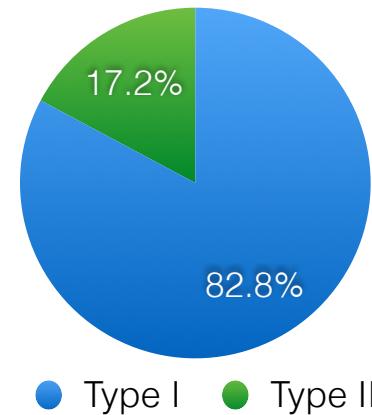


Type II bugs: 10.3% - 26.9%

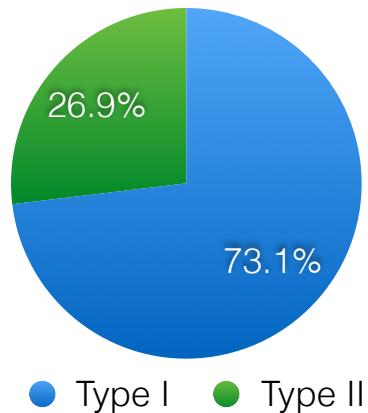
Mozilla



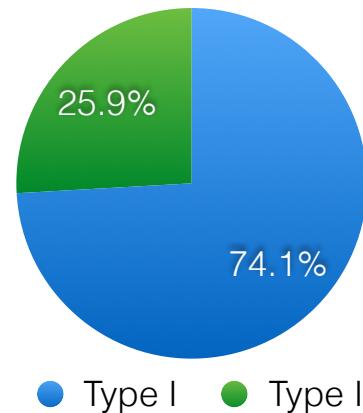
Netbeans



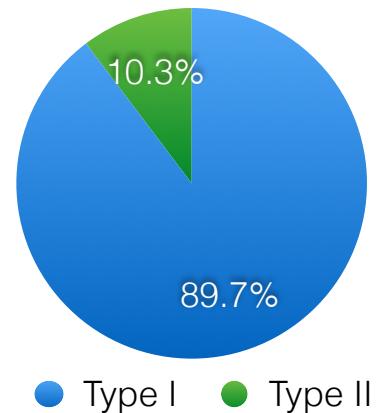
Eclipse JDT Core



Eclipse Plat. SWT



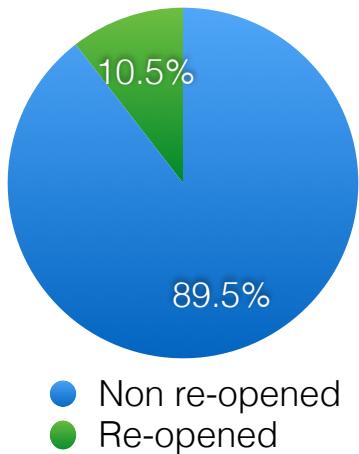
WebKit



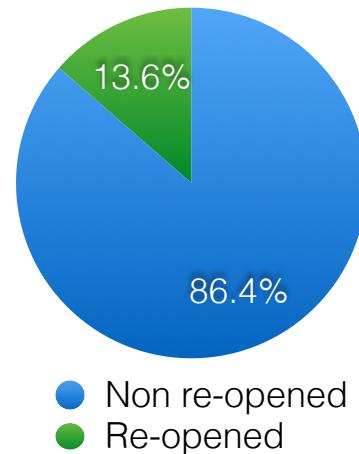


On average, > 1/10 bugs have been re-opened

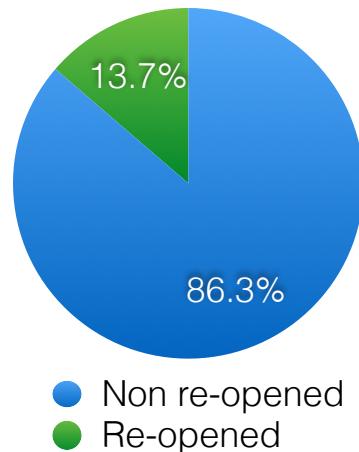
Mozilla



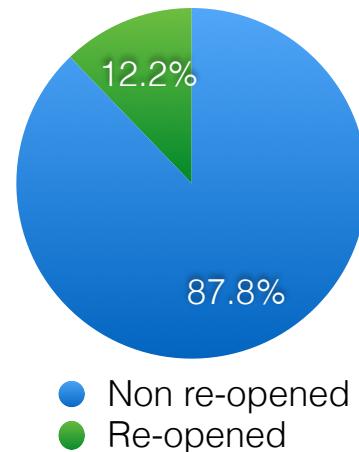
Netbeans



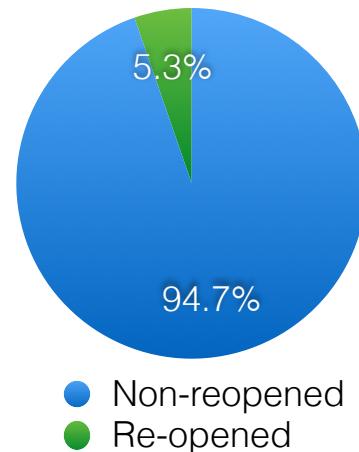
Eclipse JDT Core



Eclipse Plat. SWT



WebKit





RQ1: what is the prevalence of supplementary fixes & re-opened bugs?



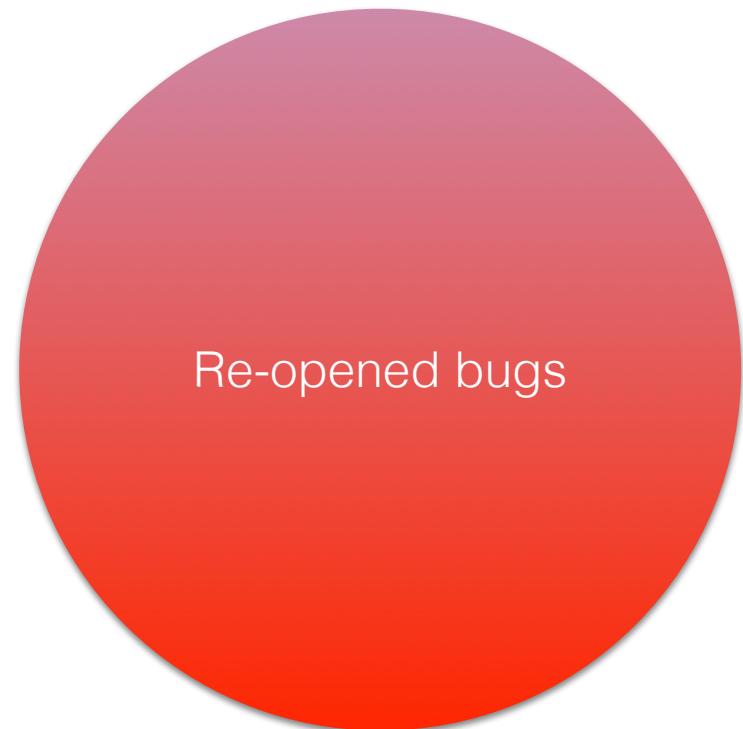
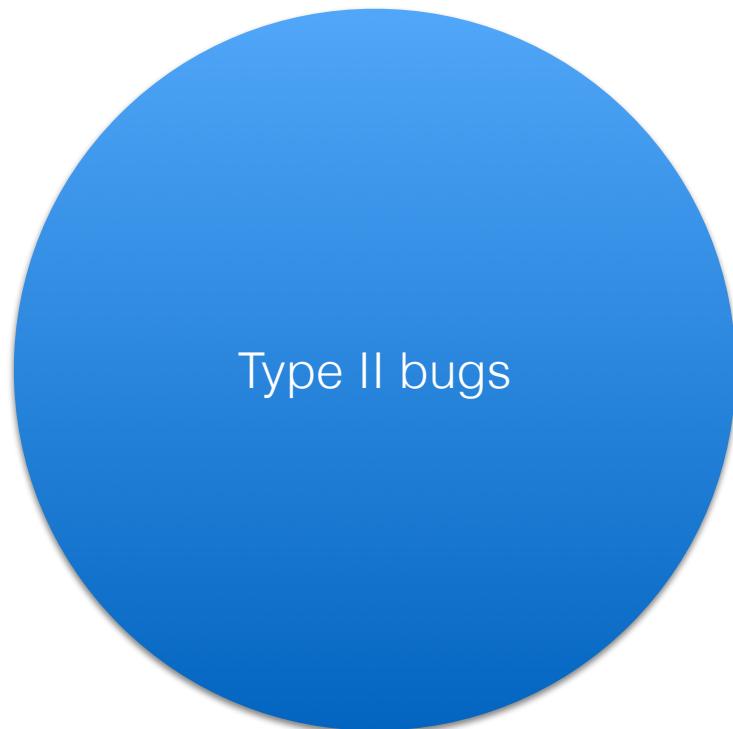
RQ2: what is the relation of supplementary fixes & re-opened bugs?



RQ3: can we predict the re-opening of supplementary bug fixes?

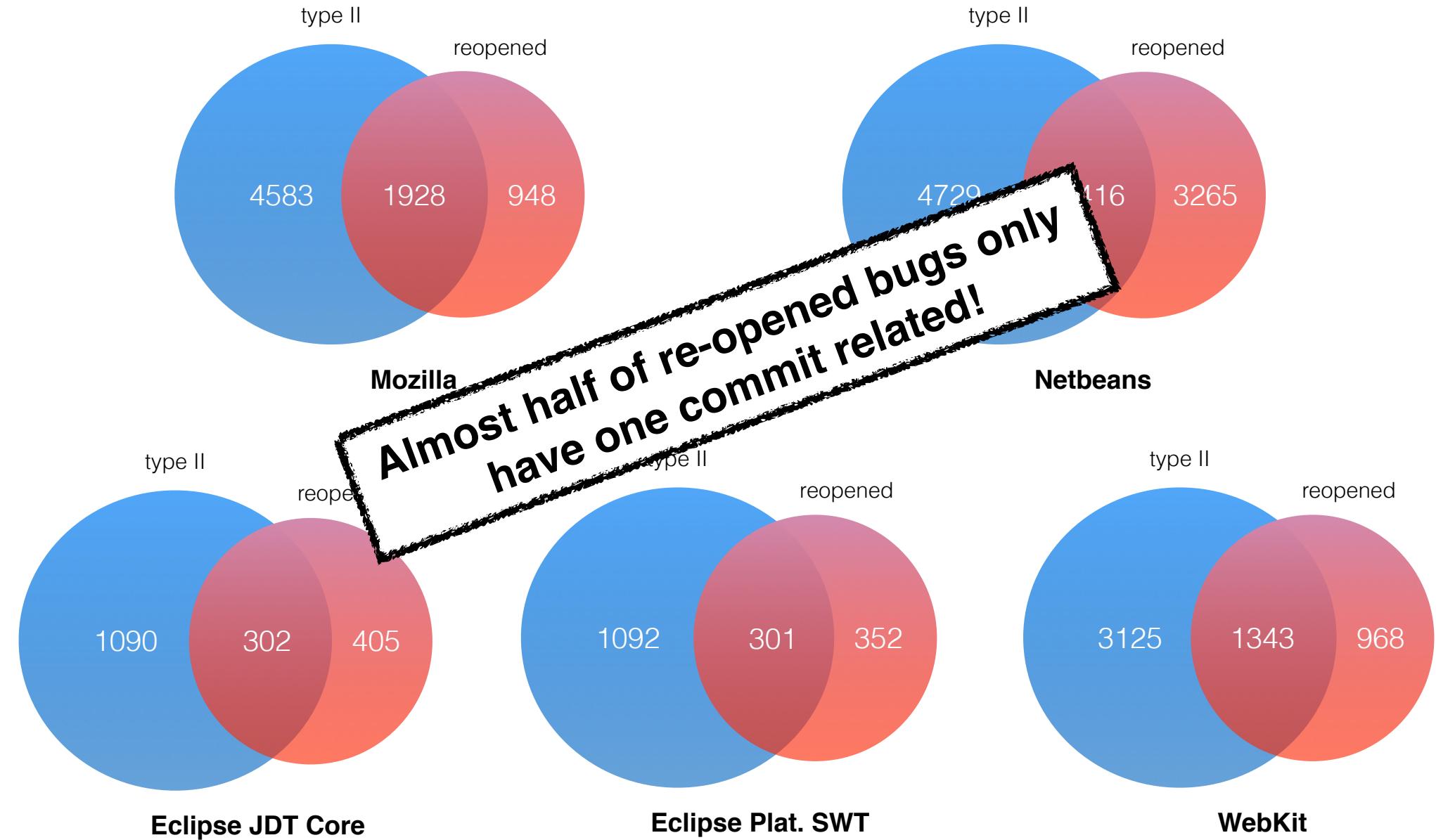


Expected relation of supplementary fixes & re-opened bugs



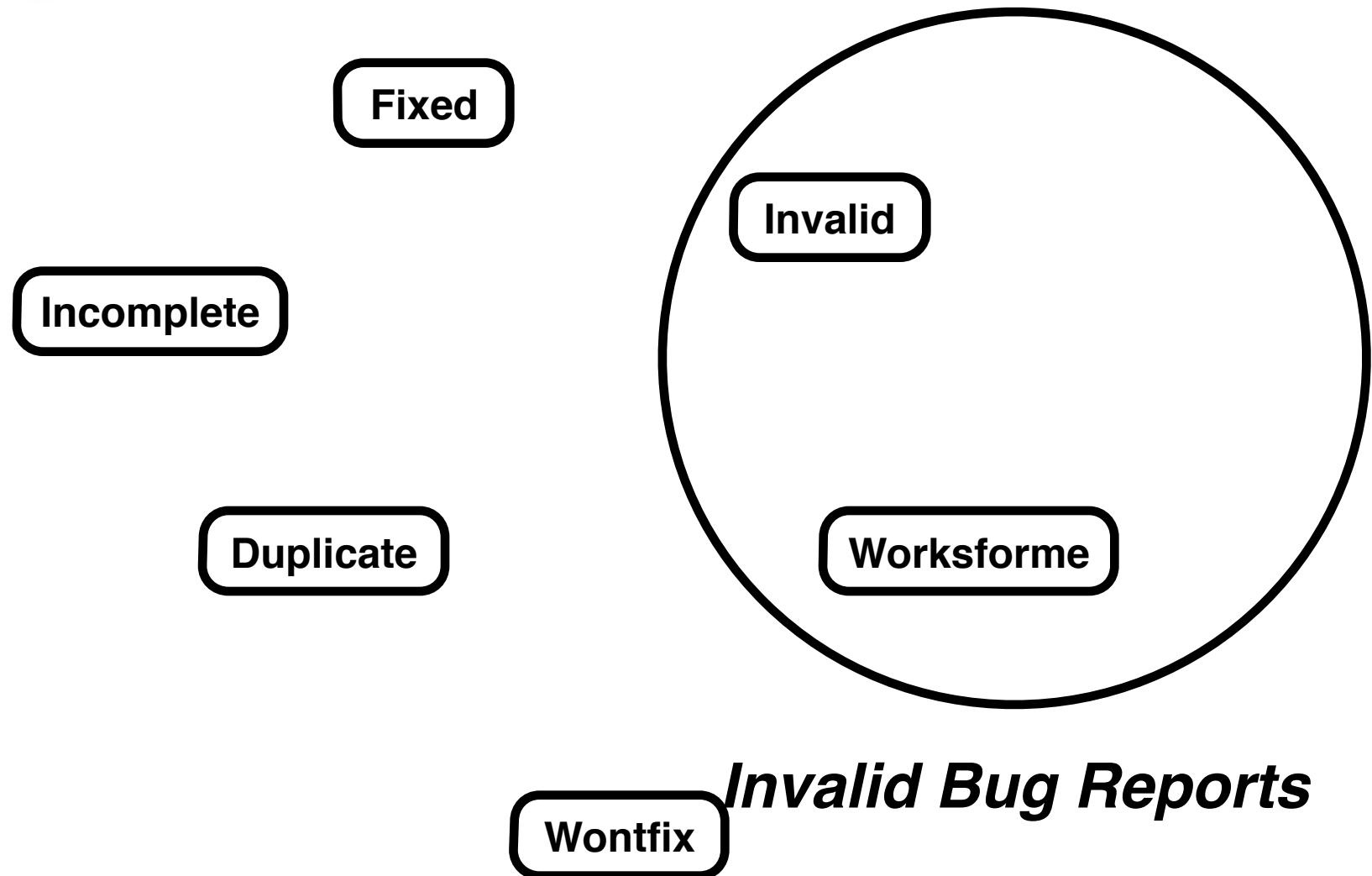


Empirical relation of supplementary fixes & re-opened bugs



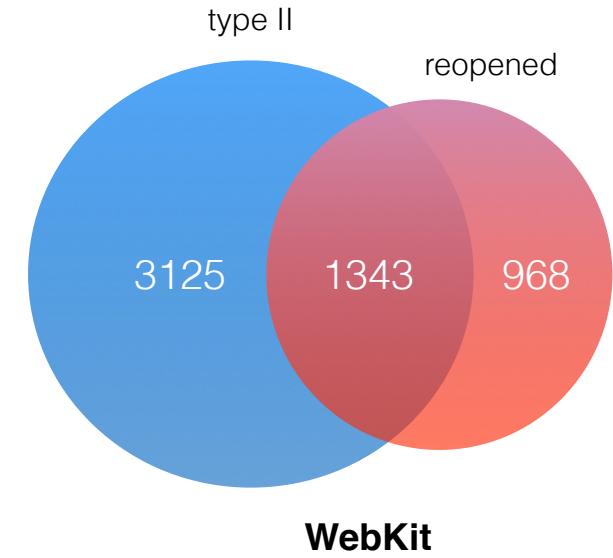
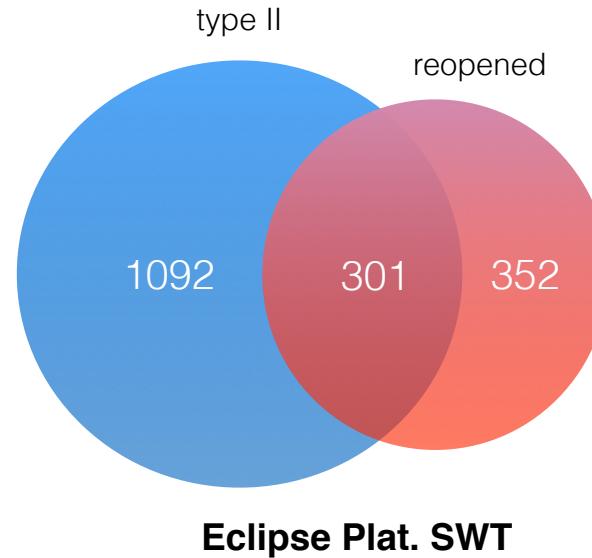
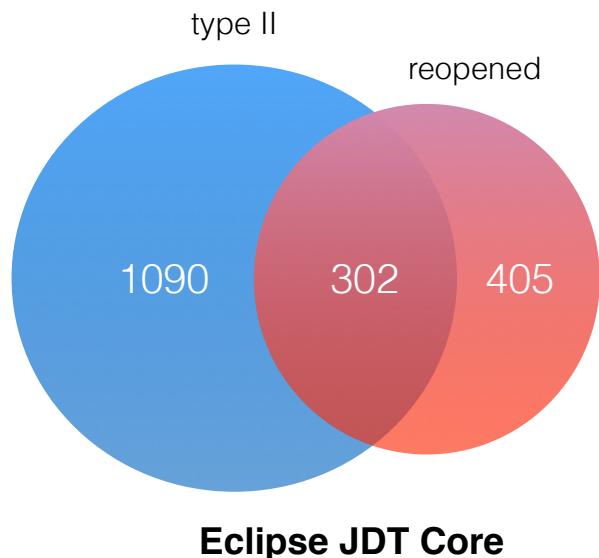
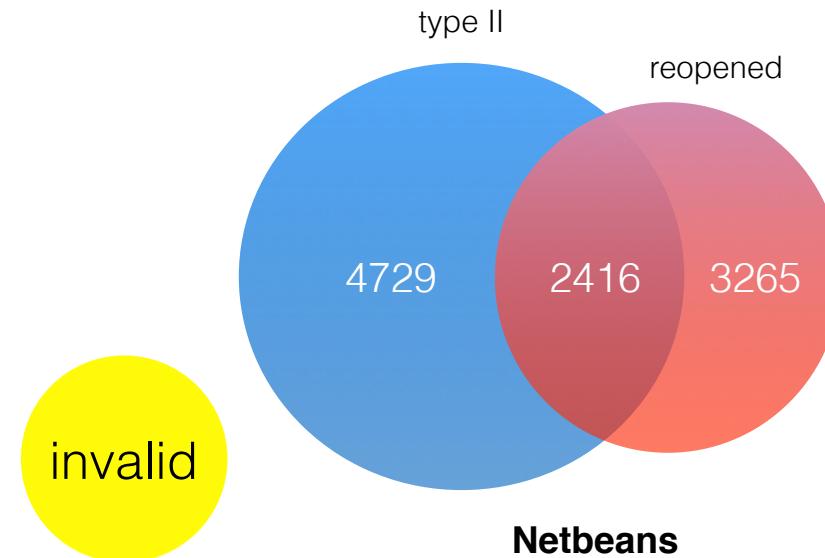
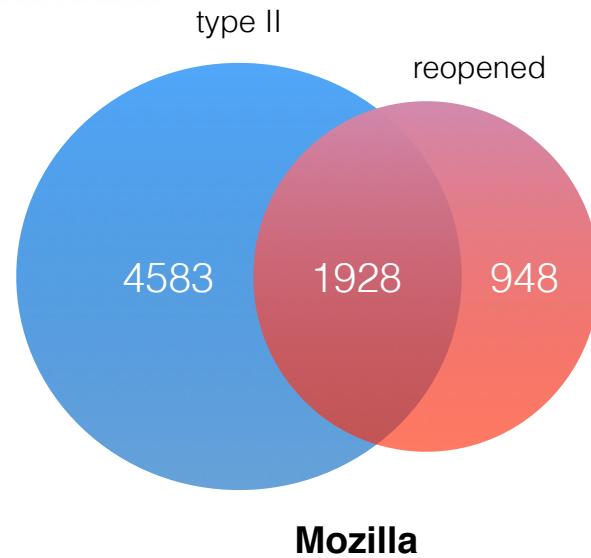


Possible resolutions in Bugzilla

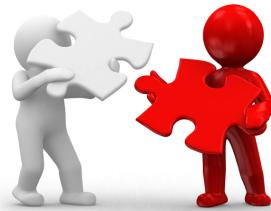




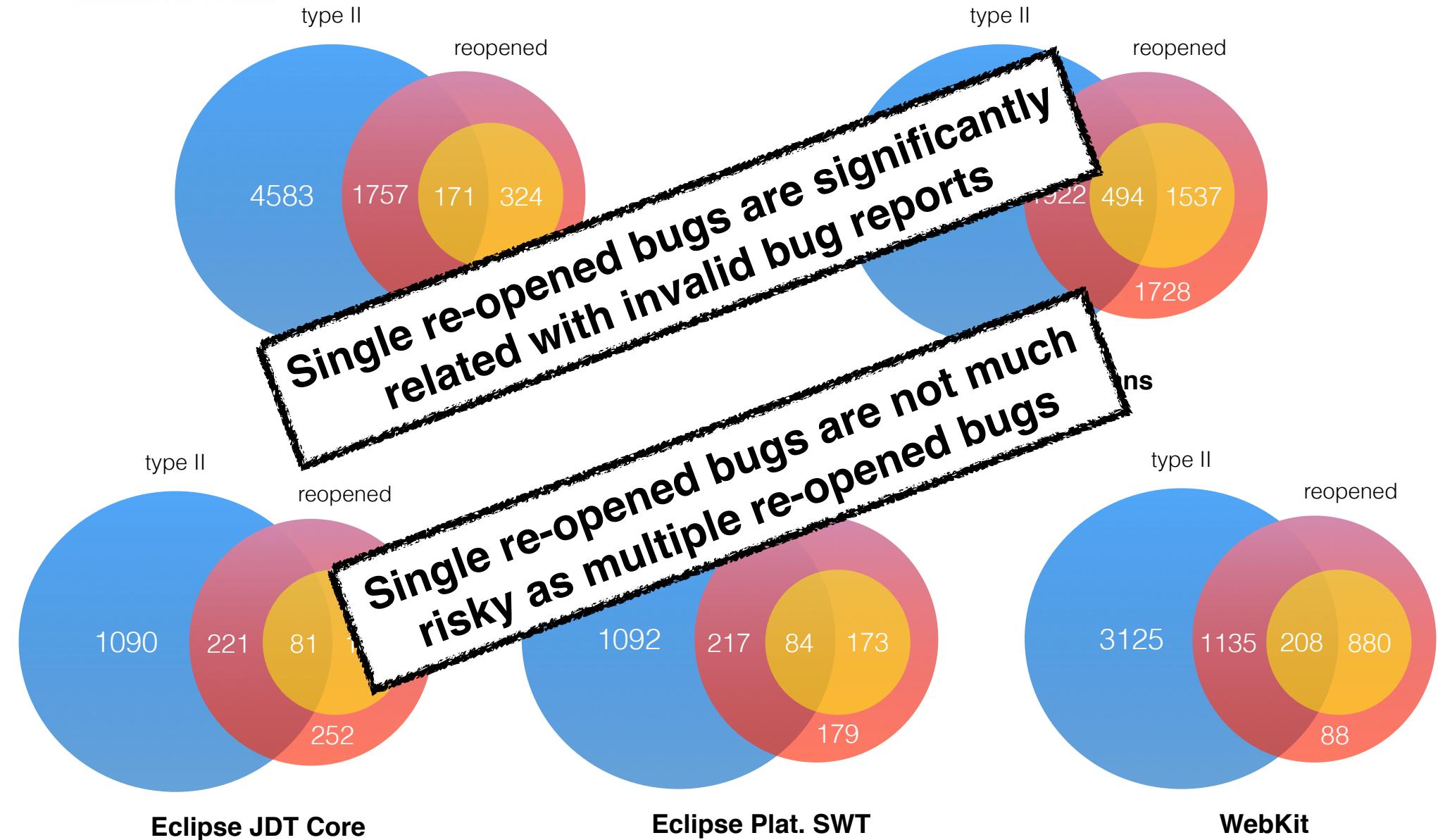
Empirical relation of supplementary fixes & re-opened bugs



invalid



Empirical relation of supplementary fixes & re-opened bugs





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RQ2: what is the relation of supplementary fixes & re-opened bugs?

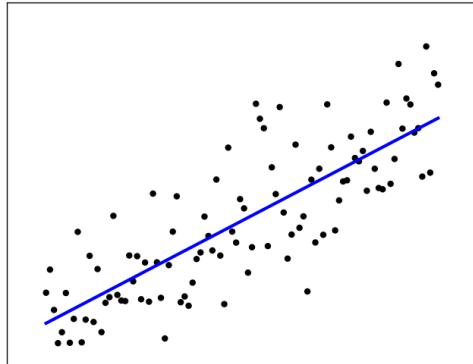


RQ3: can we predict the re-opening of supplementary bug fixes?



Prediction of bug-reopening of supplementary bugs

12/13

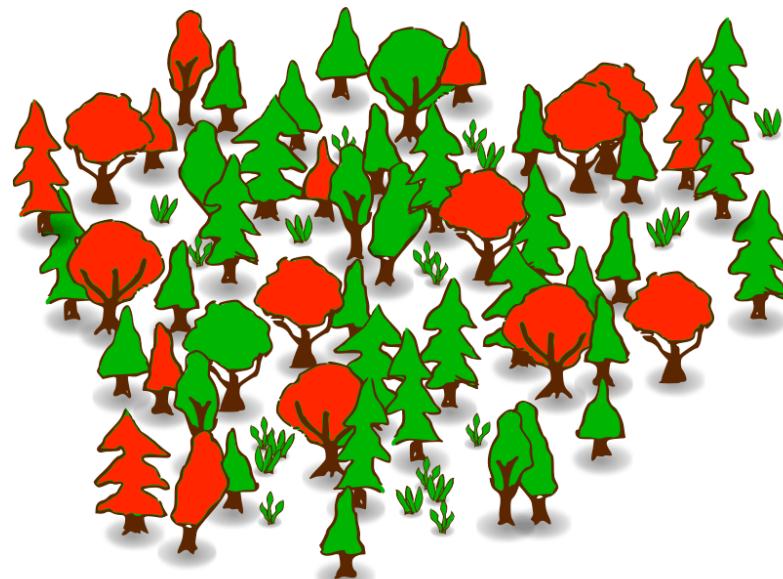


General Linear Model



C5.0

ctree (party)



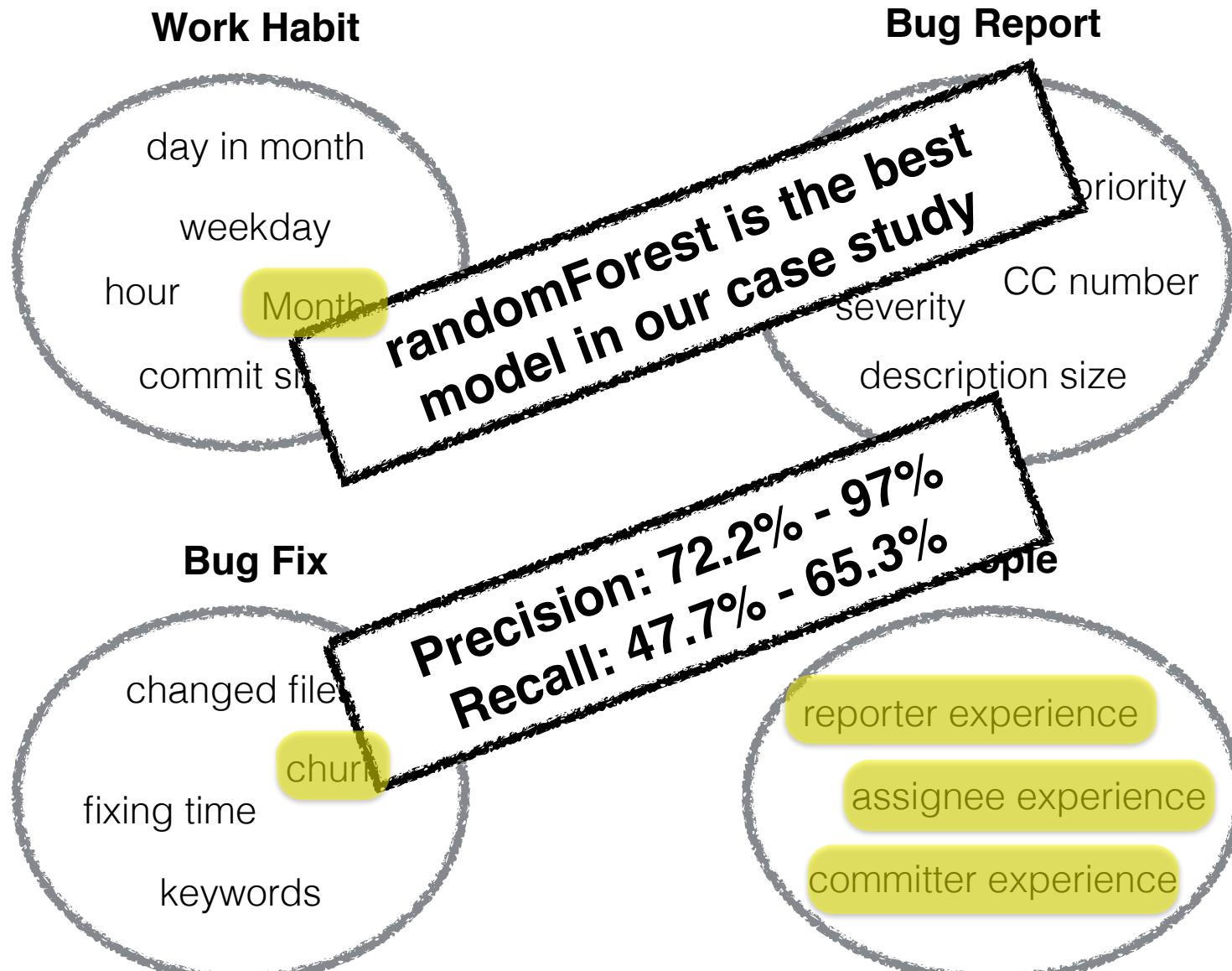
randomForest

cforest (party)



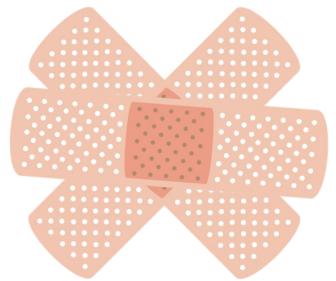


Prediction of bug-reopening of supplementary bugs



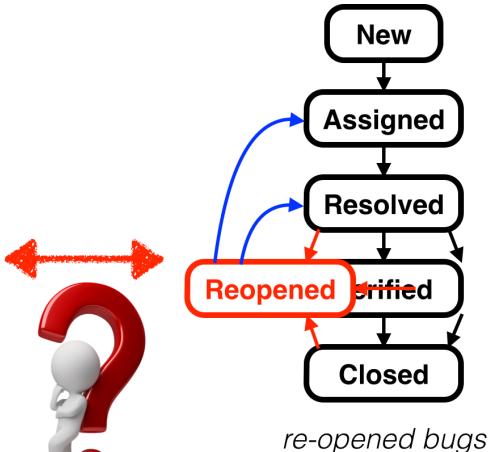
**Thanks for
Grammatech, Inc. &
Semantic Designs, Inc.**





supplementary bug fixes

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↗ overhead
↘ user's satisfaction

