

user feedback in software evolution

Andrew J. Ko with Parmit Chilana

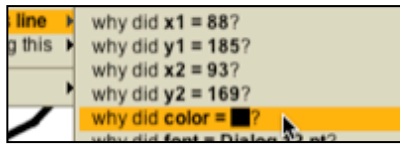


based on

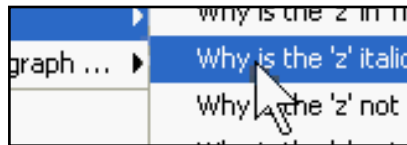
Ko, A.J. and Chilana, P. (2010). How power users help and hinder open bug reporting. ACM Conference on Human Factors in Computing (CHI).

Chilana, P., Ko, A.J., & Wobbrock, J.O. (2010). Understanding expressions of unwanted behaviors in open bug reporting. IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC).

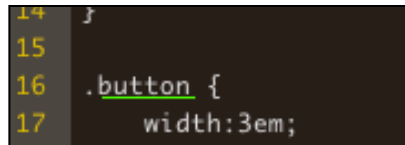
finding and fixing everyday software defects



helping developers diagnose failures



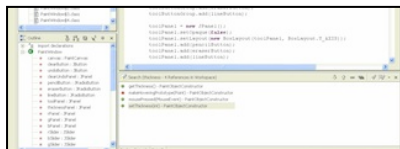
helping users diagnose failures



detecting usability defects automatically



where do defects come from?

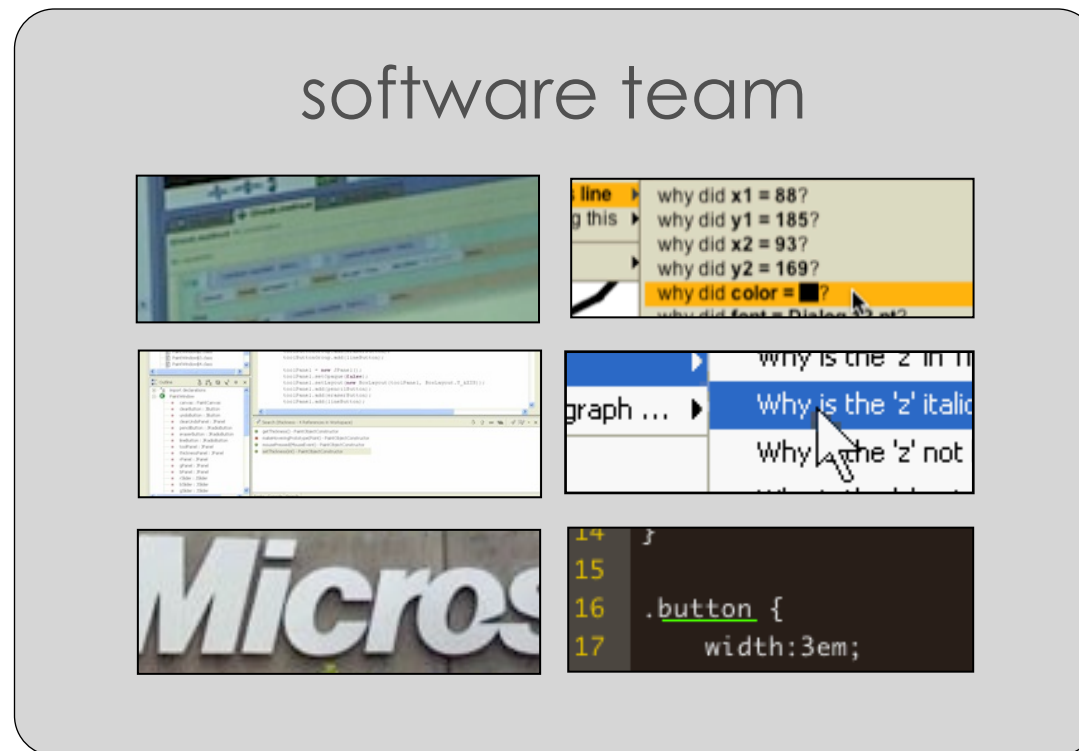


what makes debugging difficult?



what do software teams need to fix defects?

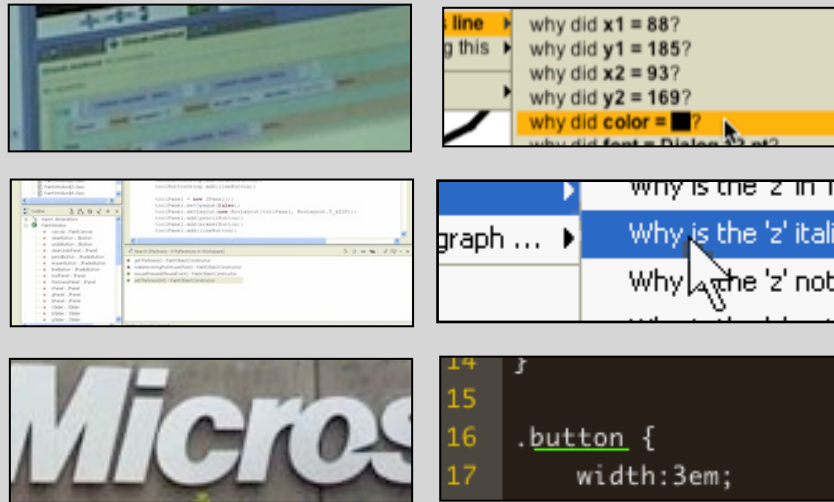
finding and fixing everyday software defects



user community

finding and fixing everyday software defects

software team



user community

finding and fixing everyday software defects

users have more opportunities than ever to influence what defects are found and fixed

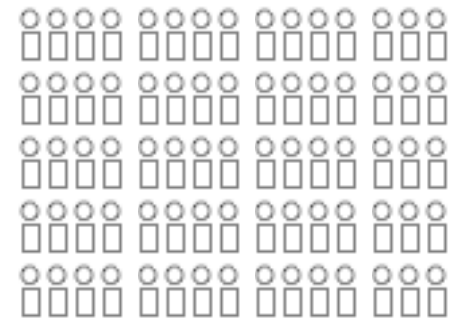
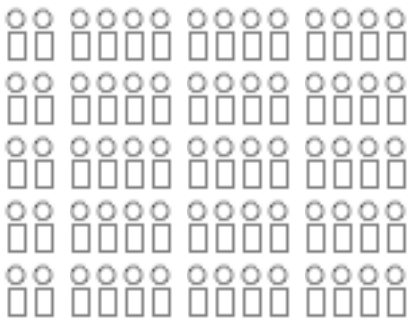
open development processes

perpetual beta status

open bug reporting

web-based user feedback

crowdsourced help in support forums



users have more opportunities than ever to influence what defects are found and fixed

who contributes such feedback?

what do they write about?

what feedback is addressed?

why is some feedback ignored?

how can teams get better feedback?

how can teams use feedback better?

research from the past two years

who contributes such feedback?

what do they write about?

what feedback is addressed?

why is some feedback ignored?

research in progress

how can teams get better feedback?

how can teams use feedback better?

open bug reporting in the Mozilla project



research from the past two years

who contributes such feedback?

what do they write about?

what feedback is addressed?

why is some feedback ignored?

outline

- ① a brief introduction to bug reporting
- ② who contributes such feedback?
- ③ what do they write about?
- ④ what feedback is addressed?
- ⑤ why is some feedback ignored?

a user's **expectations**
are violated

*"I wanted this to be a new
tab, not a new window!"*

The screenshot shows a web browser window titled "CHI 2010 Housing and Accommodations". The address bar contains the URL "http://chi2010.org/attending/index.html". The browser's navigation bar includes a search engine (Google) and a list of navigation links: "Home", "Most Visited", "print in context", "JAIS call", "fb", "tw", "me", "blog", "news", "apps", "bus", "uw", "seattle", "blogs", "fashion", "pubs", "social", "shop", "ent". The page content is titled "Housing and Accommodations" and includes a paragraph: "CHI 2010 will take place 10 April 2010 through 15 April 2010 in Atlanta, Georgia, USA at the [Hyatt Regency Atlanta](#)." A context menu is open over the link, showing options: "Open Link in New Window", "Open Link in New Tab", "Bookmark This Link", "Save Link As...", "Send Link...", "Copy Link Location", and "Inspect Element". The "Inspect Element" option is highlighted. On the right side of the page, there is a "Related links" section with three items: "Hyatt Regency Atlanta", "Atlanta Convention & Visitor's Bureau Website", and "Southern Hospitality Savings Card".

user visits **bugzilla.mozilla.org**

bugzilla@Mozilla – Main Page

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users are encouraged to look for an **existing bug report** that describes their issue

<u>Change in last day(s)</u>	<u>Component</u>	<u>Severity</u>	<u>Op Sys</u>	<u>Target Milestone</u>	<u>Summary</u>
0	Layout	normal	All	---	[INLINE] Too much space (for descenders) under image (e.g. in table cells
0	Startup and Profile System	critical	Windows XP	---	customized toolbar always reset to default on restart, bookmark engines lost, unable to add search engines (localstore.rdf corrupted on upgrade or crash). SEE URL FIELD FOR SUPPORT LINK
0	Widget: Win32	major	Windows 98	---	Mousewheel doesn't work with some driver/Win32 OS combination (scrolling)
0	Plug-ins	critical	All	---	Application shortcut keys (keyboard commands such as f11, ctrl+q) fail to operate when plug-in (flash, acrobat, quicktime) has focus
0	Layout	enhancement	All	---	(Warning 56k) Alt text is not displayed as a tooltip over
0	Plug-ins	major	Mac OS X	Future	[OSX] Java applets draw on wrong tabs
0	Layout	critical	All	mozilla1.9beta1	Splitting Absolutely positioned frames not implemented - Missing page of content when printing or print previewing this site
0	General	enhancement	All	Firefox1.0	Options for where to open URLs from other applications (reuse existing windows)

if they don't find one, they submit a
new bug report...

Summary

Options for where to open URLs from other applications (reuse tab, new window)

A sentence which summarises the problem. Please be descriptive and use lots of keywords.

Bad example: mail crashed

Good example: crash if I close the mail window while checking for new POP mail

Details


This is a dupe of http://bugzilla.mozilla.org/show_bug.cgi?id=75138 (for Mozilla). There's a great discussion of it over there. However, that RFE has been listed for over a year now and is still marked for "future".

Expand on the Summary. Please be as specific as possible about what is wrong.

Bad example: Mozilla crashed. You suck!

Good example: After a crash which happened when I was sorting in the Bookmark Manager, all of my top-level bookmark folders beginning with the letters Q to Z are no longer present

Reproducibility

Happens every time. 

Steps to Reproduce

- 1.
- 2.

Bug List: (This bug is not in your last search results) [Show last search results](#)

Bug 172962 - Options for where to open URLs from other applications (reuse tab, new tab, new window)

[Last Comment](#)

Status: RESOLVED FIXED

Whiteboard:

Keywords: conversion, fixed-aviary1.0

Product: Firefox

Component: General

Version: unspecified

Platform: All All

Importance: P3 enhancement with [64 votes](#) ([vote](#))

Target Milestone: Firefox1.0

Assigned To: [Dan M](#)

QA Contact:

URL:

Depends on: [255123](#)

Blocks: [128632](#) [75138](#) [99945](#) [103843](#) [121969](#)
[161466](#) [257011](#) [258076](#) [263956](#) [267249](#)

Show dependency [tree](#) / [graph](#)

Reported: 2002-10-06 15:23 PDT by [Duey](#)

Modified: 2009-11-24 21:21 PST ([History](#))

CC List: Add me to CC list
119 users ([edit](#))

2005@bdam.de
alex@spamcop.net
ali@ebrahim.org
ask@swva.net
asqueella@gmail.com
beltzner@mozilla.com
benjamin@smedberg.us

Flags:

bugs: blocking-aviary1.0PR

jst: blocking-aviary1.0

blocking1.9.0.19

wanted1.9.0.x

blocking1.8.1.next

wanted1.8.1.x

blocking1.8.0.next

wanted1.8.0.x

in-testsuite

in-litmus

reporter

who created the report

date

when the report was created

assignee

the developer assigned to resolve this report

resolution FIXED

- the reason the report was closed
- DUPLICATE
- INCOMPLETE
- WONTFIX
- WORKSFORME
- INVALID

screenshots,
patches, test cases,
mockups, etc.

attachment attacher date

in-testsuite

in-litmus

See Also:

blocking1.9.3: ---

status1.9.3: ---

blocking1.9.2: ---

status1.9.2: ---

blocking1.9.1: ---

status1.9.1: ---



Attachments		
the strings (1.17 KB, patch) 2004-08-30 16:41 PDT, Mano	jst: review+ asa: approval-aviary+	Details Diff
base code to control where URLs are opened (19.04 KB, patch) 2004-09-19 16:54 PDT, Dan M	peterv: superreview+ jst: review+	Details Diff
optional addition to divert window.open to a new tab (5.36 KB, patch) 2004-09-19 16:58 PDT, Dan M	jst: review+ peterv: superreview+	Details Diff
pref UI (6.74 KB, patch) 2004-09-19 17:00 PDT, Dan M	bryner: review+ bugs: superreview+	Details Diff
windows-only native hookup of external URL control (5.03 KB, patch) 2004-09-19 17:03 PDT, Dan M	bryner: review+	Details Diff
mac-only native hookup of external URL control (Aviary branch) (7.35 KB, patch) 2004-09-30 13:13 PDT, Dan M	mikepinkerton: review+ neil: superreview+ neil: superreview+	Details Diff
linux-only native hookup of external URL control (Aviary branch) (6.97 KB, patch) 2004-09-30 17:18 PDT, Dan M	bryner: superreview+ blizzard: review+	Details Diff
don't divert window.open to a new tab if the named	jst: superreview+	Details Diff

User-Agent: Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.2b) Gecko/20021006 Phoenix/0.3
Build Identifier: Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.2b) Gecko/20021006 Phoenix/0.3

This is a dupe of http://bugzilla.mozilla.org/show_bug.cgi?id=75138 (for Mozilla). There's a great discussion of it over there. However, that RFE has been listed for over a year now and is still marked for "future".

I think this feature would be important. I, myself, prefer links to open new windows. Others would prefer them to use an existing window. Now that you can also browse with tabs, other people might like a combination of the two (open a new tab in an existing window).

Right now it's pretty much random for me. Some applications open links in a new window while others seem to always use the top most window. However, I think it's important that opening new links be consistent. I can't get all of my applications to do the same thing, so it's logical that I should be able to set my browser to act only one way.

I would like to open up this enhancement for Phoenix since (I think) the developers of Phoenix can add features independent of Mozilla. However, I'll understand it if you feel this isn't that important. At least you will have considered it.

Reproducible: Always

Steps to Reproduce:

comments and commenters

[David Tenser](#) 2002-10-06 15:23:28 PDT

[Comment 1](#) [reply] [-]

Changing summary:

anyone interested in this bug can add information to the report

[Asa Dotzler \[:asa\]](#) 2002-10-08 19:47:52 PDT

[Comment 2](#) [reply] [-]

Maybe later. Hyatt expressed interest. Confirming.



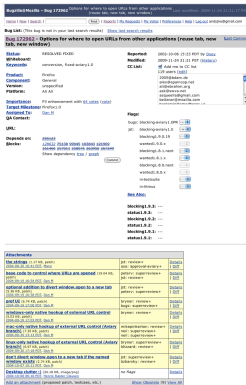
[Jesse Ruderman](#) 2002-10-20 16:17:20 PDT

[Comment 3](#) [reply] [-]

a typical report lifespan



original report
comment
comment
screenshot
comment
comment
comment
patch 1.0
comment
patch 2.0
code review
patch 3.0
closed



1 **who** contributes bug reports?

2 **what** do they write about?

3 **what** are the **outcomes** of their reports?

4 **why** do their reports have these outcomes?

1 who contributes bug reports?

obtained all **496,766** reports except for private security patches

15 years of reports, including Netscape years


152,877 unique e-mail addresses

64% addresses only authored, attached to, or commented on **1 report**

who's e-mail addresses were these?

who's e-mail addresses were these?

1% **CORE** developers, drivers, super reviewers,
module owners, peers



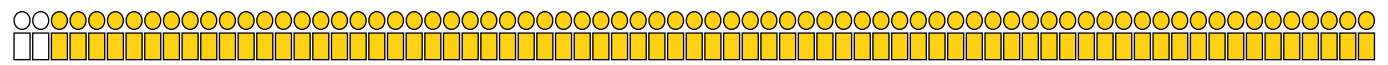
who was behind these 152,877 addresses?



who was behind these 152,877 addresses?

1% **CORE** developers, drivers, super reviewers,
module owners, peers

1% **ACTIVE** developers assigned bug reports

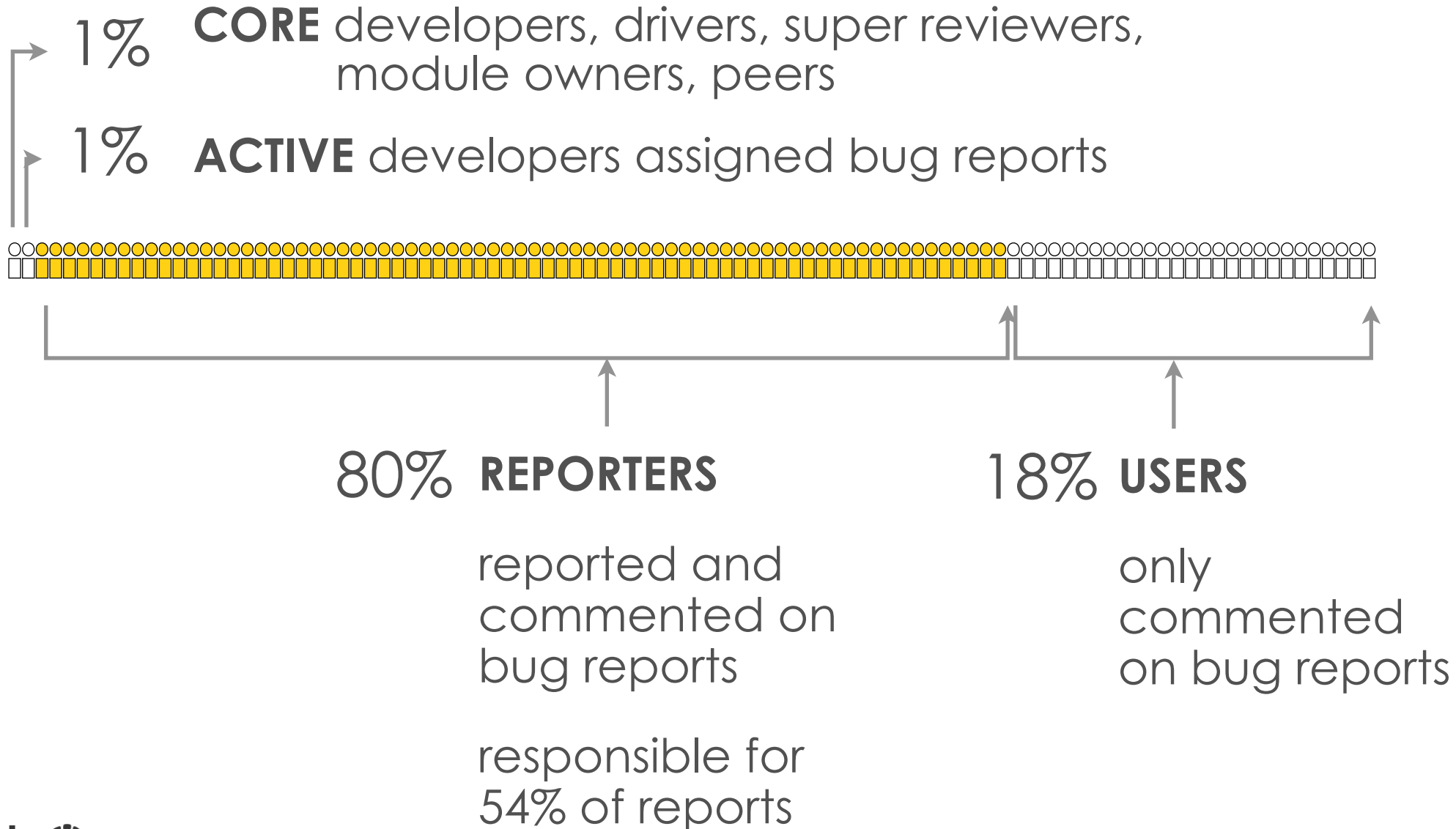


80% **REPORTERS**

reported and
commented on
bug reports

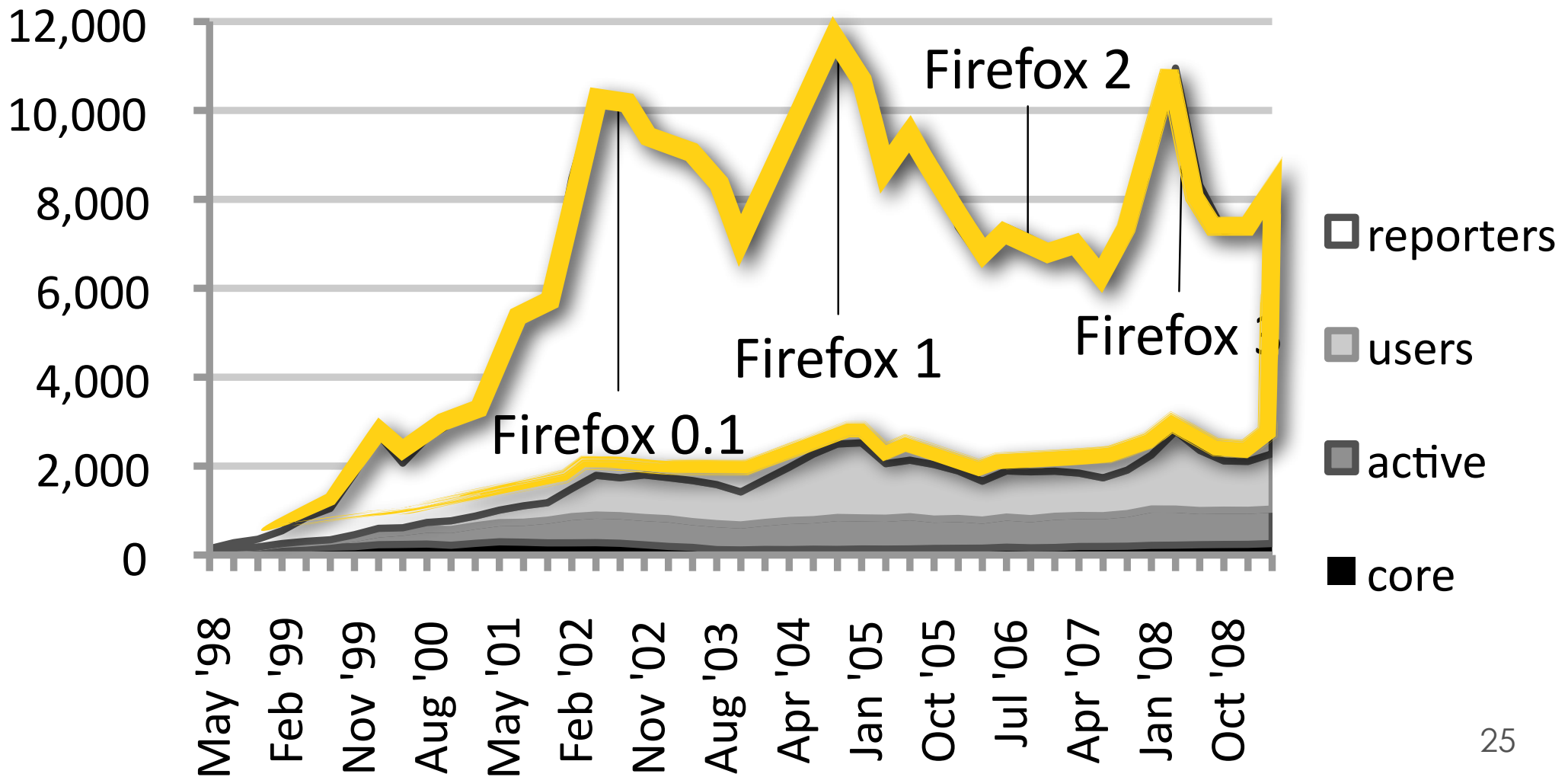
responsible for
54% of reports

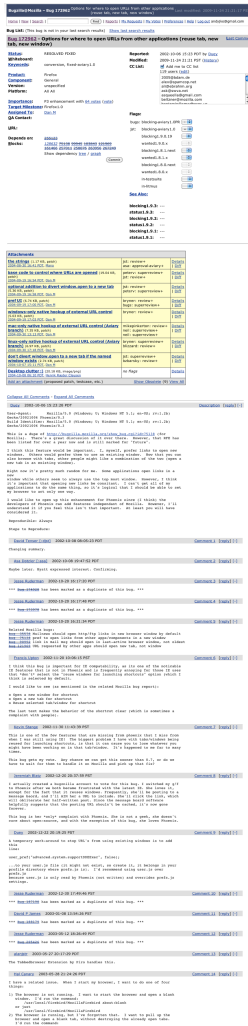
who was behind these 152,877 addresses?



of active contributors by type, per 6 month period

reporters and users fluctuate
spike before a release





1

who contributes bug reports?

mostly non-developer, one-time contributors who were active pre-release (**REPORTERS**)

2

what do they write about?

3

what are the **outcomes** of their reports?

4

why do their reports have these outcomes?



1 who contributes bug reports?

mostly non-developer, one-time contributors who were active pre-release (**REPORTERS**)

2 what do they write about?

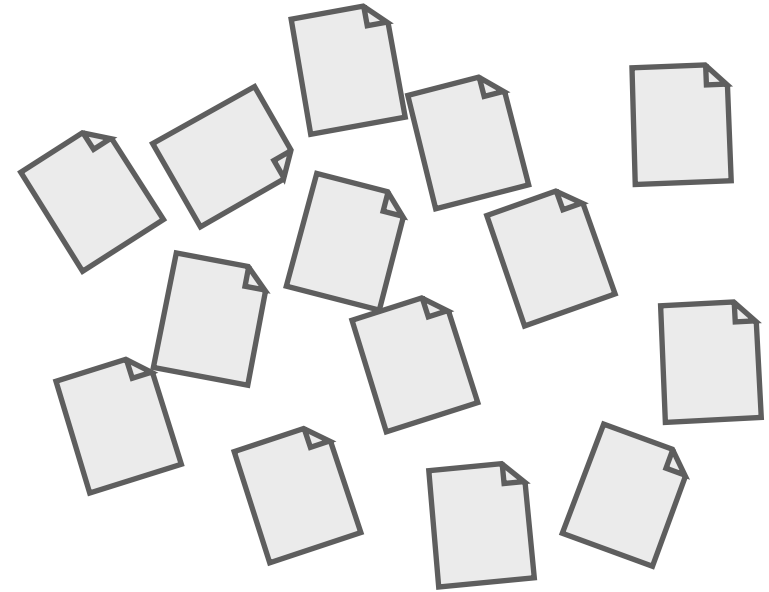
3 what are the **outcomes** of their reports?

4 why do their reports have these outcomes?

2 what do they write about?

selected a sample of 50 **REPORTER** reports

inductively analyzed **titles** and **descriptions**



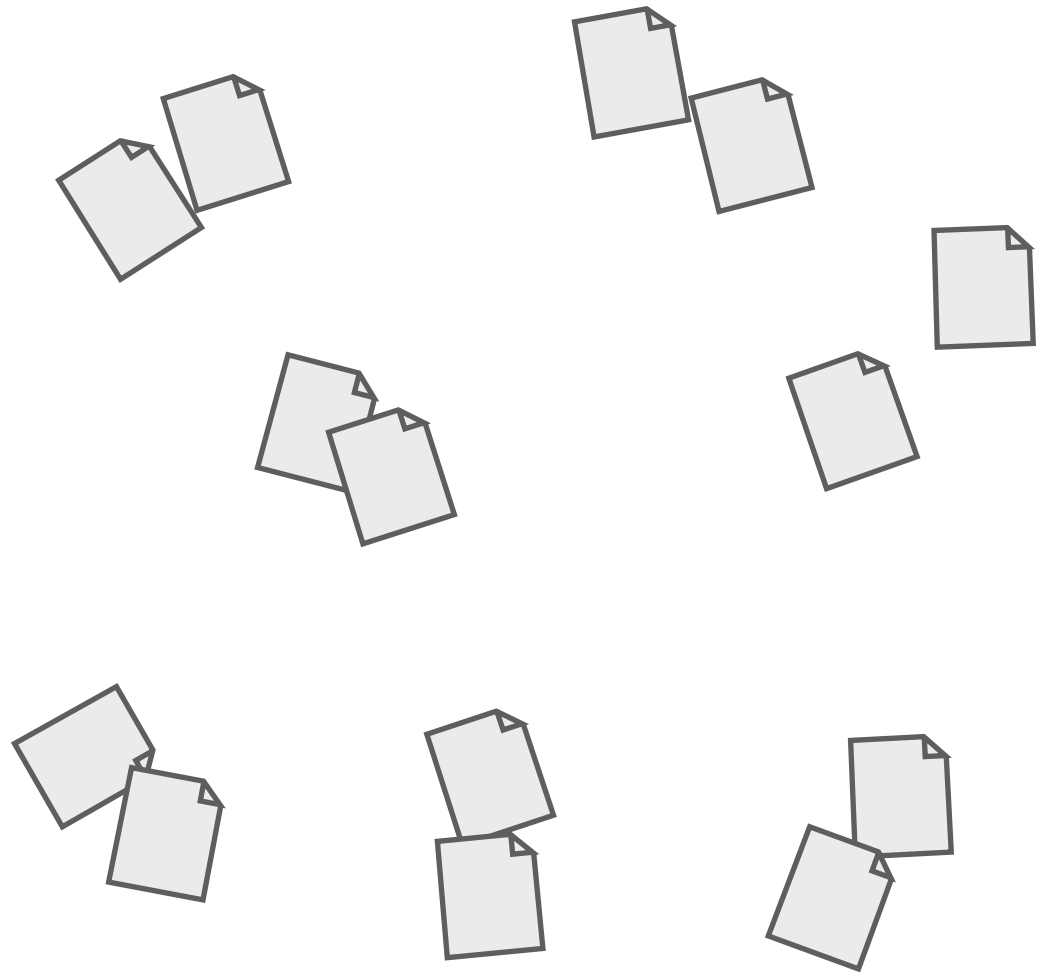
Bug List: (1 of 2) First Last Prev Next Show last search results			
Bug 578800 - Firefox Home should allow the title bar to be scrolled off the screen			
Status:	NEW	Reported:	2010-07-14 14:04
Whiteboard:		Modified:	2010-08-09 13:43

	Description
When viewing web pages in FFH, it would be nice if the title bar on the web viewing page could scroll offscreen.	

2 **what** do they write about?

the most salient feature was the **source of expectation**

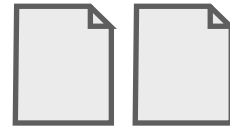
what group or person believed the behavior was defective?



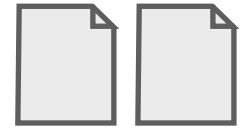
2 **what** do they write about?

iterated through 3 samples of 100 reports, converging towards a set of **7 sources**

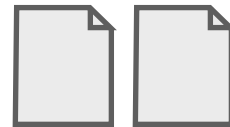
runtime logic



prior



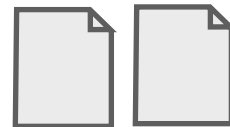
specifications



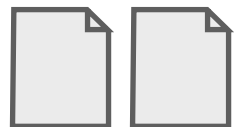
individual



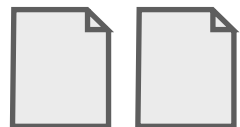
standards



community



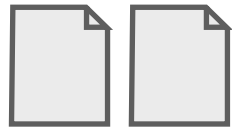
genre



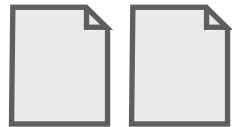
2 **what** do they write about?

**developer
intents**

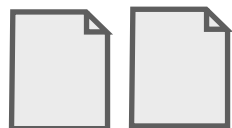
runtime logic



specifications

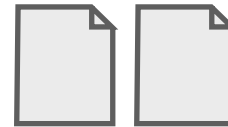


standards



**user
expectations**

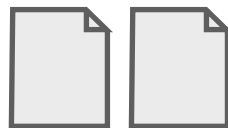
prior



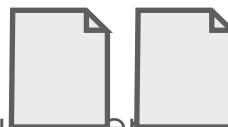
individual



community



genre



runtime violations

errors, warnings, assertion violations, crashes, hangs, and **language-defined invalid states**

```
"...scary deadlock assertions exiting  
mozilla after referencing  
nsInstallTrigger..."
```

● language

specification violations

an agreed upon **functional requirement**
among the application developers

```
"There's an incorrectly placed PR_MAX  
in the code for pref width  
distribution of colspanning cells."
```



standards violations

industry-wide functional specifications, reaching beyond the application's developer community

```
"'codebase' attribute of the HTML 4.0  
OBJECT element is not supported.."
```



violations of a reporter expectations

a reporter's **personal perspective** about what the system should do

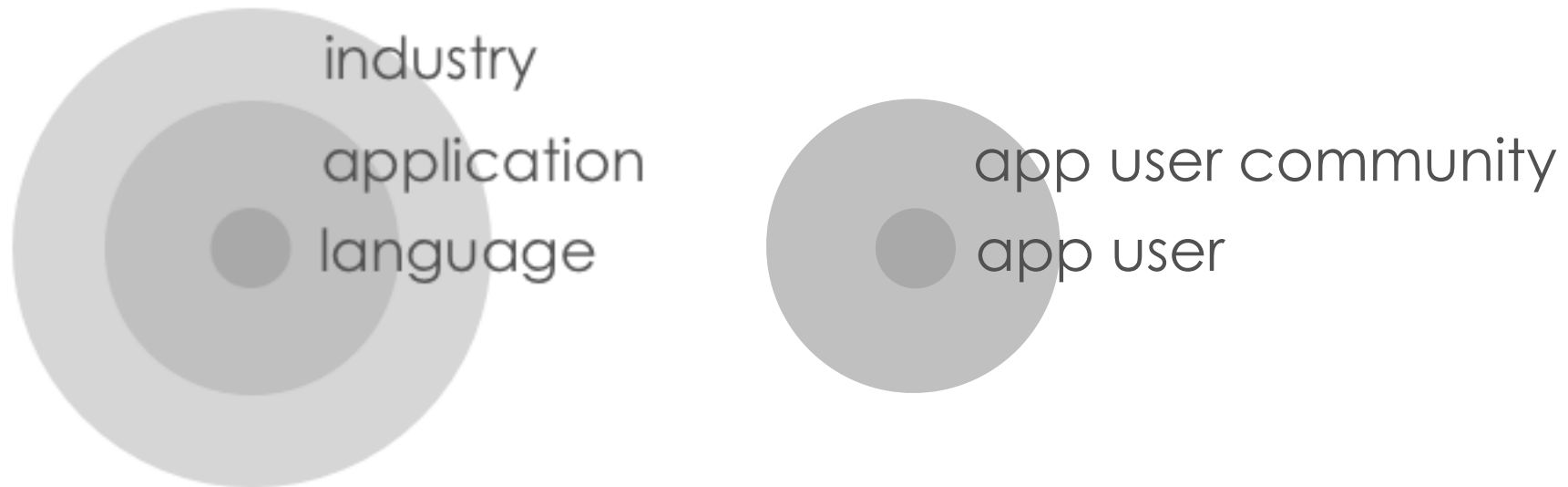
```
“Every time I Sort By Name by Bookmarks  
Firefox sorts and closes my Bookmark  
menu... Why does it do this??”
```



violation of a community's expectations

a reporter's belief about a "typical" user's expectations

"The preference to not show the tab bar when only one tab is open could be set to false by default. This would at least alert a new user to the possibility that tabs exist) The old tabbed browsing preferences could be returned."



violation of genre conventions

inconsistency with the behavior of a **similar application**

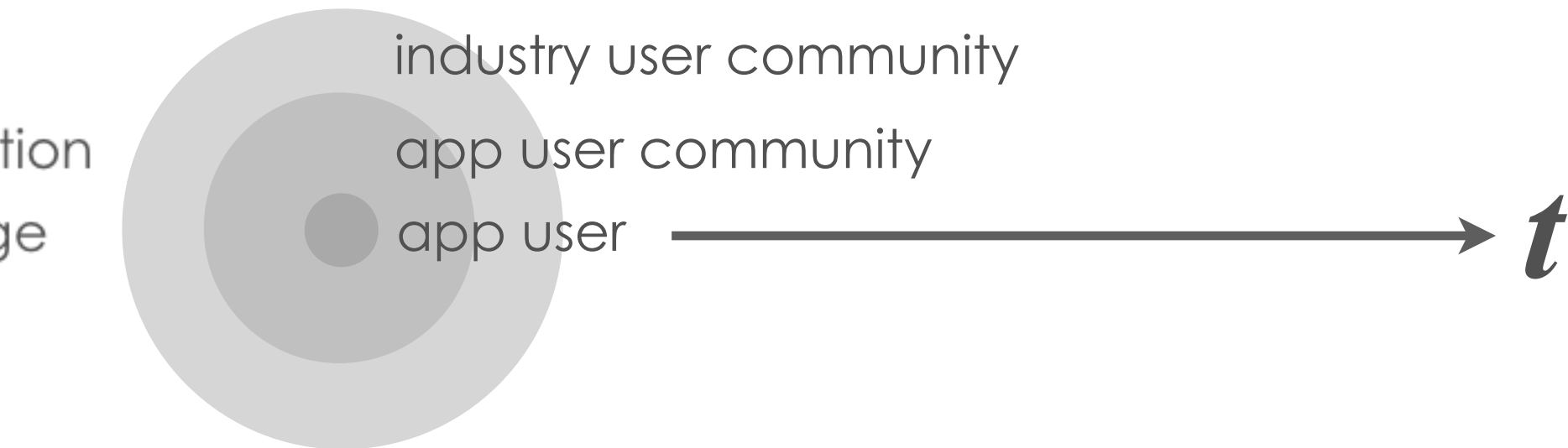
“Firefox does not limit the slideshow horizontal size to the window width. The same source works correctly in IE.”



inconsistency with prior behavior

community expectation that behavior of previous versions would be preserved

“The latest version of Firefox only imports one certificate from each file. I used to import all certificates previously.”



Issue 223232 - Eclipse for users to open URLs from other applications (Linux, Mac, Windows)

Product	Eclipse IDE	Version	2008-03-06 10:10:47 PM UTC
Reporter	andreas.klopp@ibm.com	Created	2008-03-06 10:10:47 PM UTC
Priority	Normal	Severity	Normal
Component	UI	Platform	GTK
Resolution	Fixed	Assignee	andreas.klopp@ibm.com
Status	Resolved	Resolution Date	2008-03-06 10:10:47 PM UTC

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1

who contributes bug reports?

mostly non-developer, one-time contributors who were active pre-release (**REPORTERS**)

2

what do they write about?

expectations from developer and user communities of varying population scope

3

what are the **outcomes** of their reports?

4

why do their reports have these outcomes?

Reporter	Count
IBM	1000
Microsoft	800
Oracle	600
Red Hat	400
SAP	300
Samsung	200
Sony	150
Toshiba	100
Verizon	80
Walmart	70
Yahoo	60
Zenith	50
Others	1000

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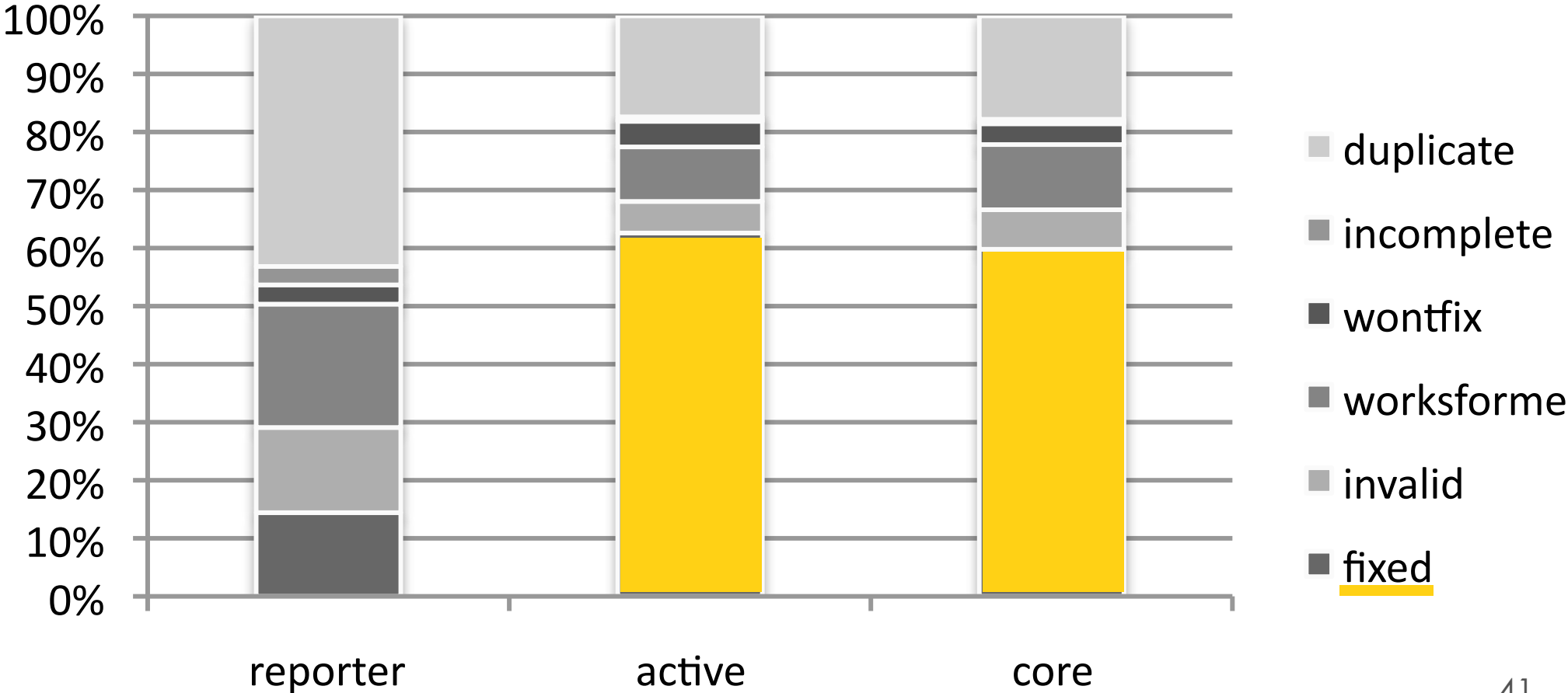
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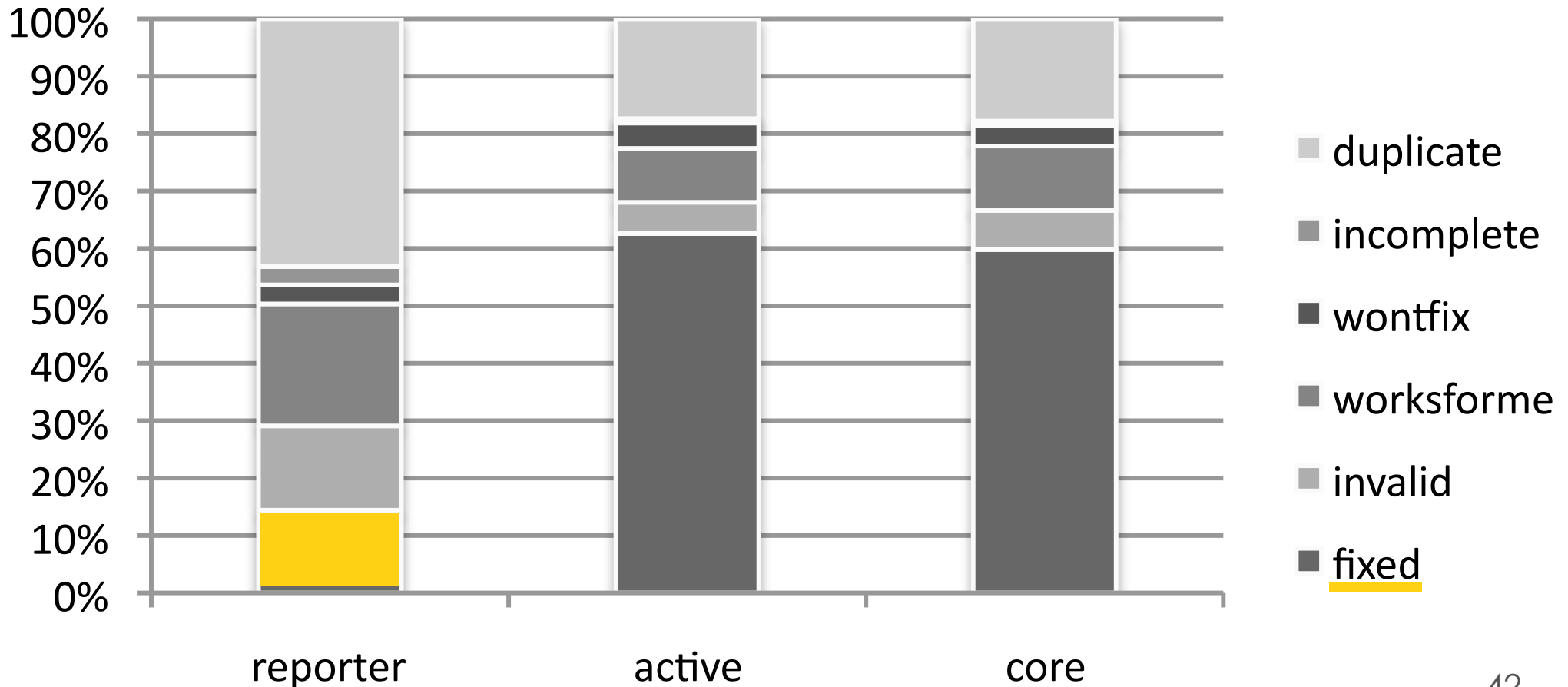
3 what are the **outcomes** of their reports?

most **DEVELOPER** reports are **fixed**



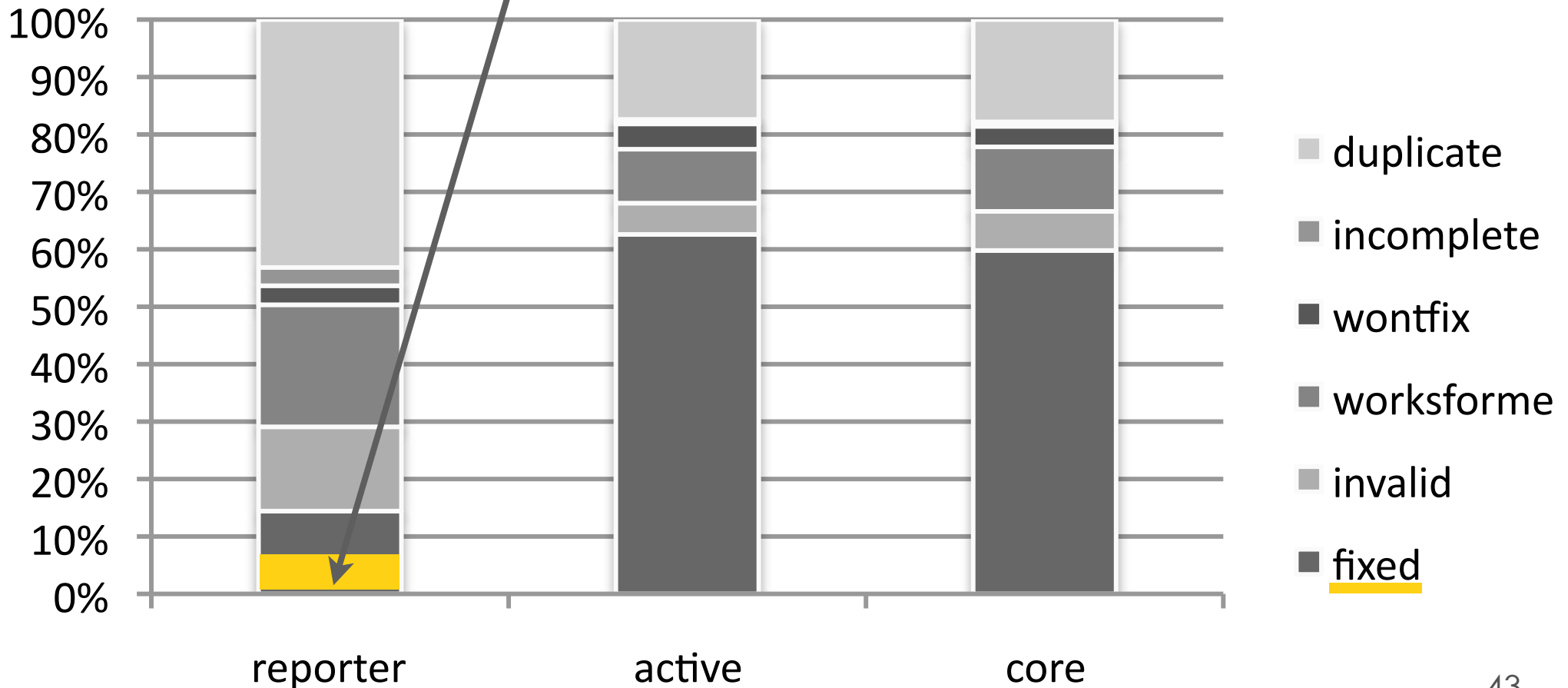
3 what are the **outcomes** of their reports?

only 13% of **REPORTER** reports were fixed



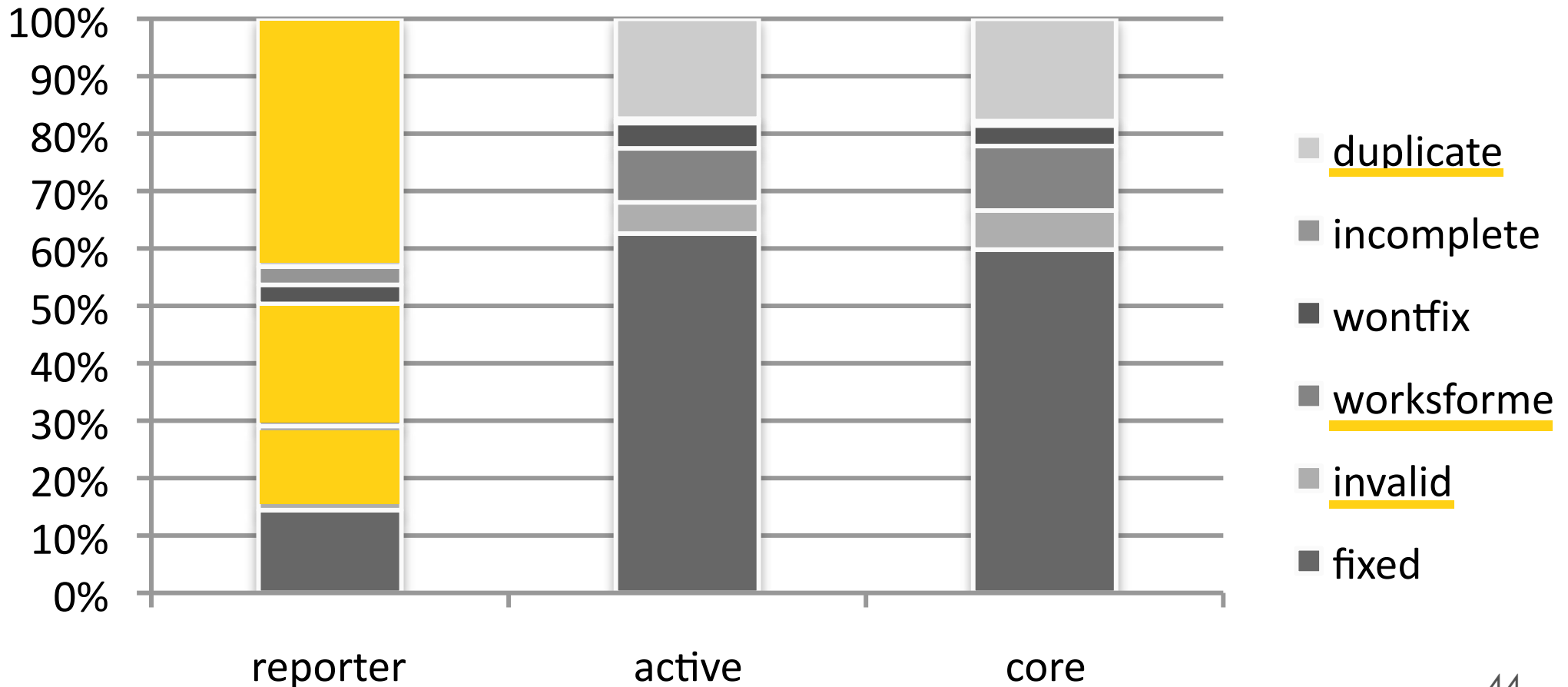
3 what are the **outcomes** of their reports?

half of fixed reports were reported by just ~8,000 (6% of) **REPORTERS**



3 what are the **outcomes** of their reports?

most **REPORTER** reports were duplicate, worksforme, or invalid



were the duplicates **useful**?

73% of **REPORTERS**' duplicates referred to *fixed* reports

70% of **REPORTERS**' duplicates referred to issues known for > **1 month**

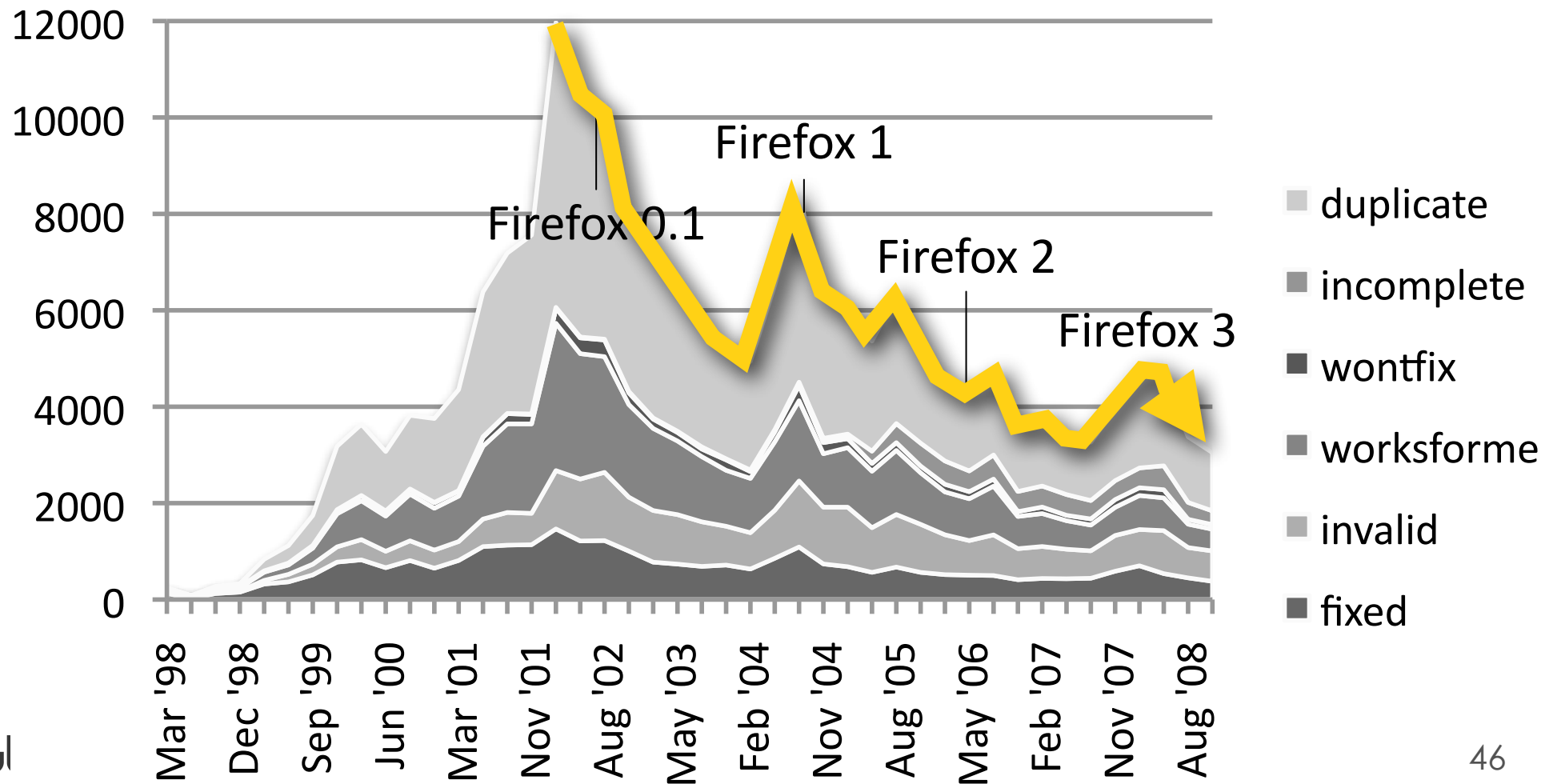
66% of **REPORTER** duplicates of *fixed* reports were created **after** a patch was attached



most **REPORTER** reports identified issues that were
already known
already patched

of **REPORTER** reports by resolution (per 3 months)

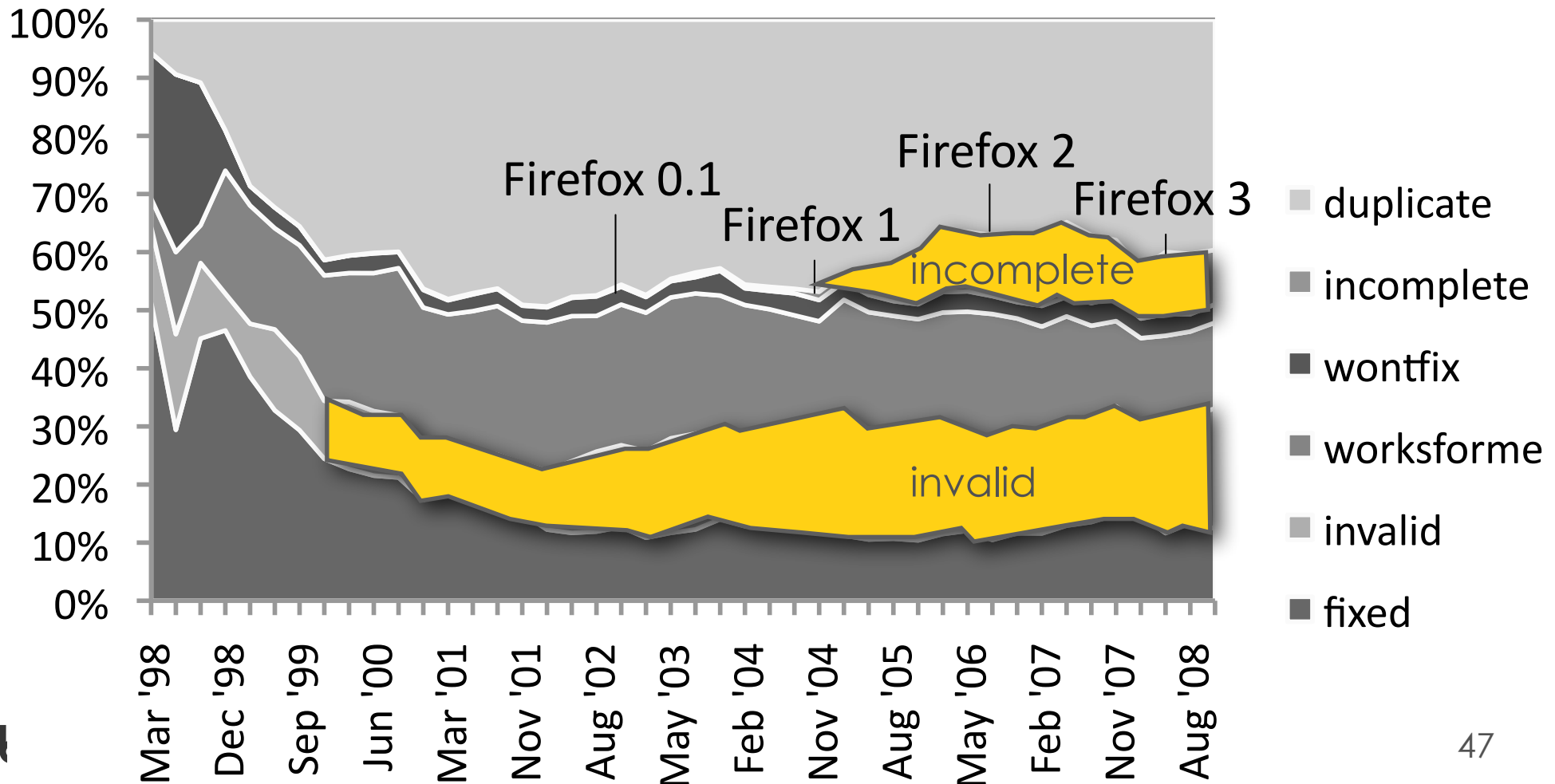
dropped since the alpha version...



% of REPORTER resolution types (per 3 months)

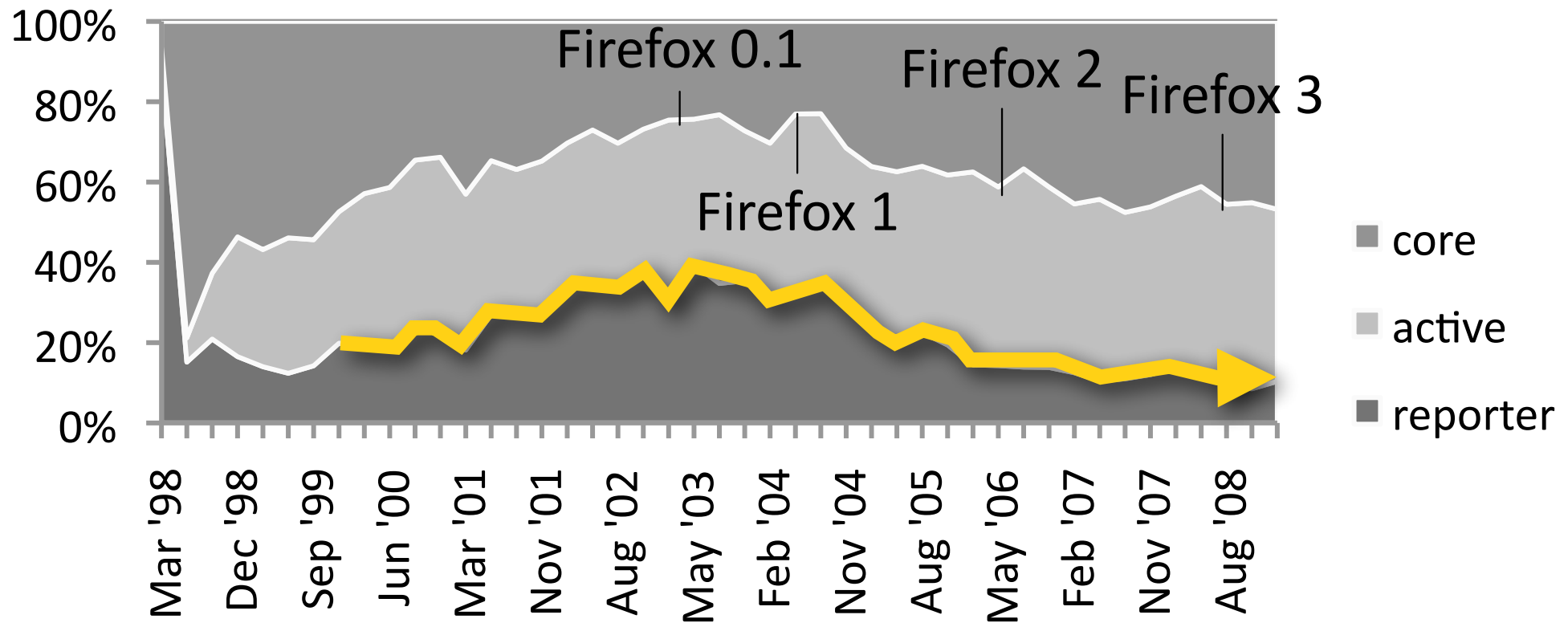
↑ likelihood of **invalid** or **incomplete**

↓ likelihood of **fixed**



% fixed reports by contributor type (per 3 months)

proportion by **REPORTERS**
has dropped since 1.0



what was the effect of the **expectation source** in report resolution?

sampled **1,000**
REPORTER reports

selected the most
salient expectation
cited in each report

classified each as
one of the 7 sources

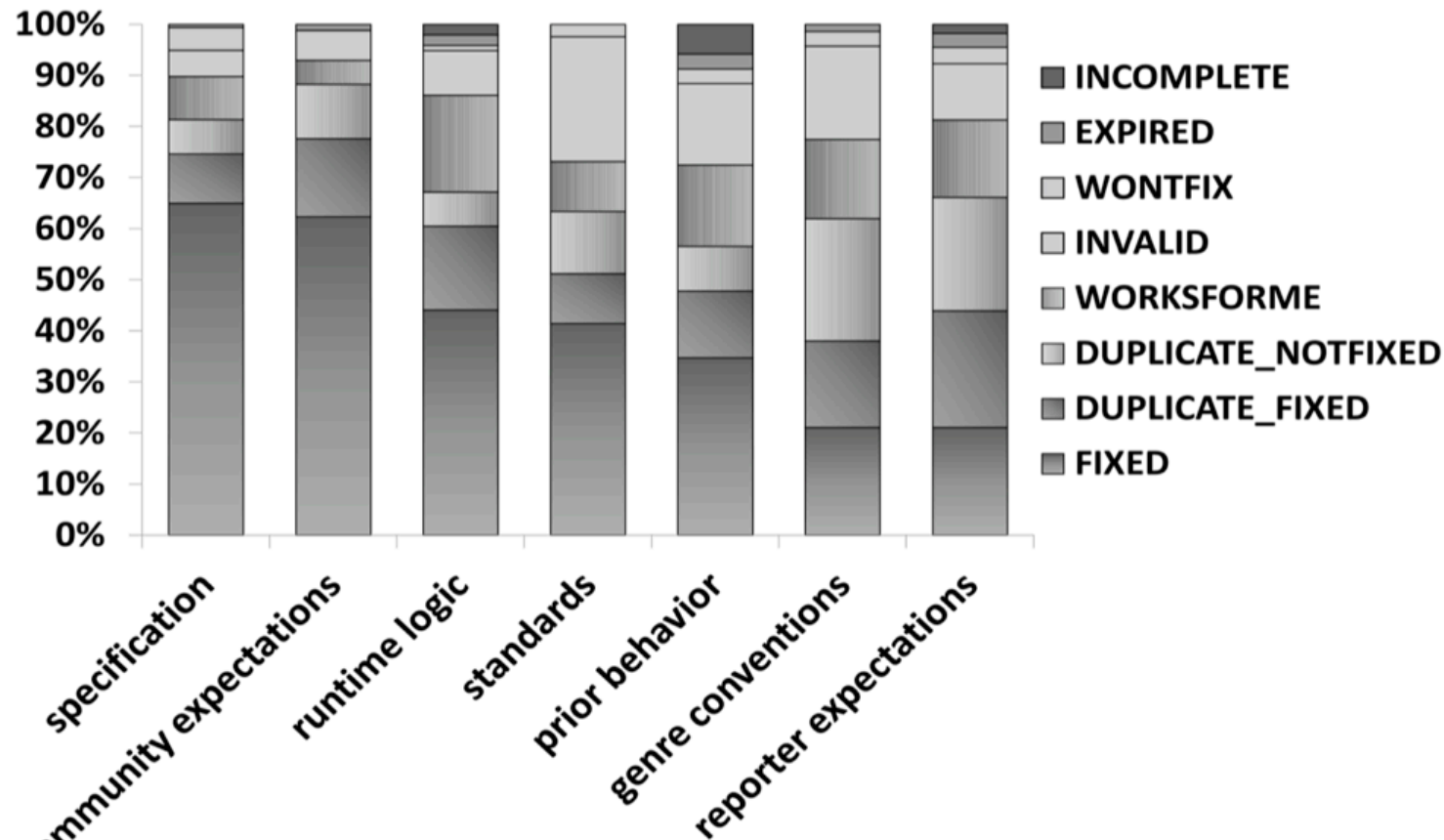
redundant coding
agreement was ~75%

sources of expectations

prior
runtime logic
individual
community
specifications
standards
genre

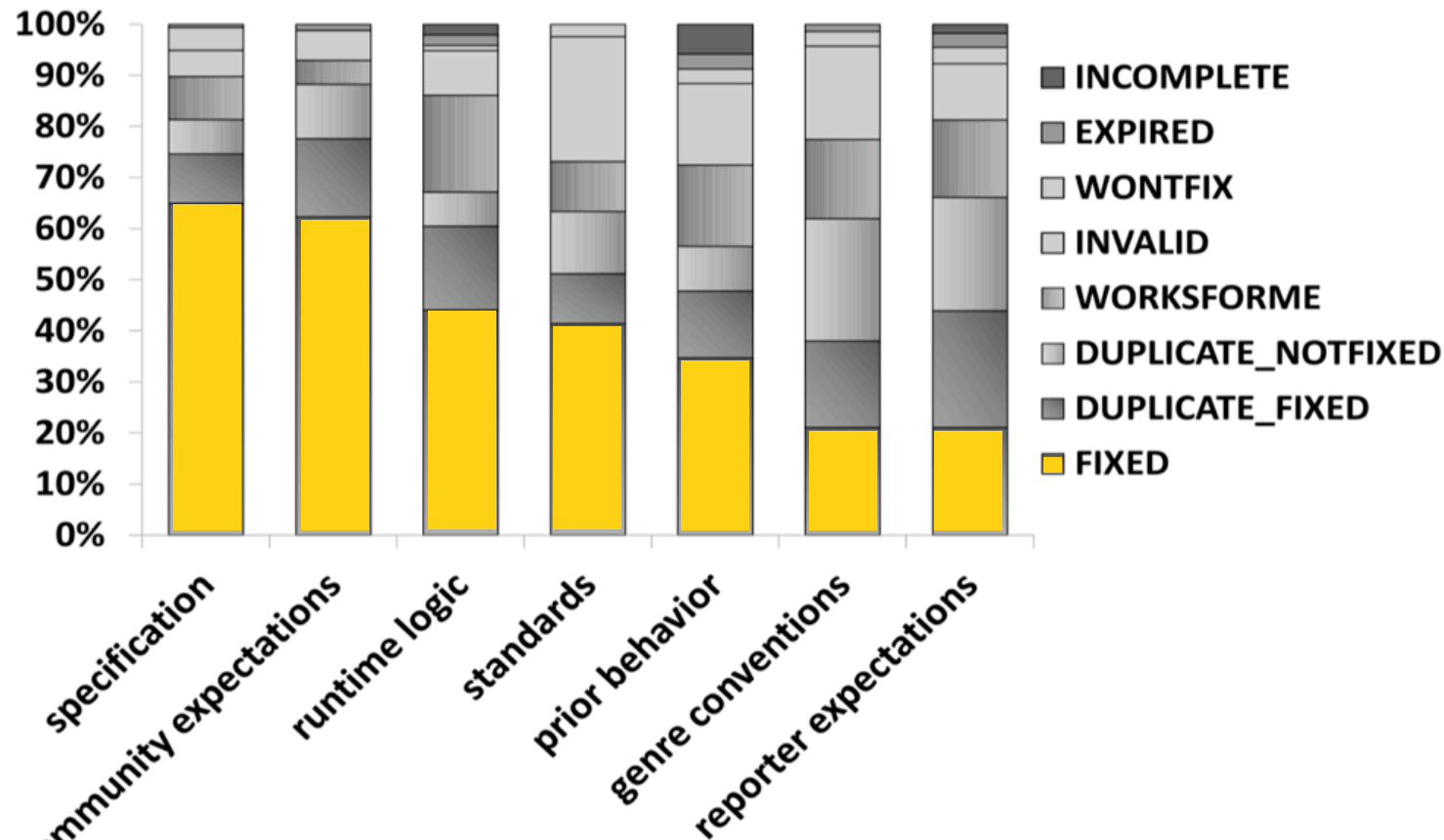
what was the effect of the **expectation source** on **REPORTER** report resolutions?

expectation source had a significant association with **resolution** $\chi^2(7, N=1000) = 35.8, p < .001$



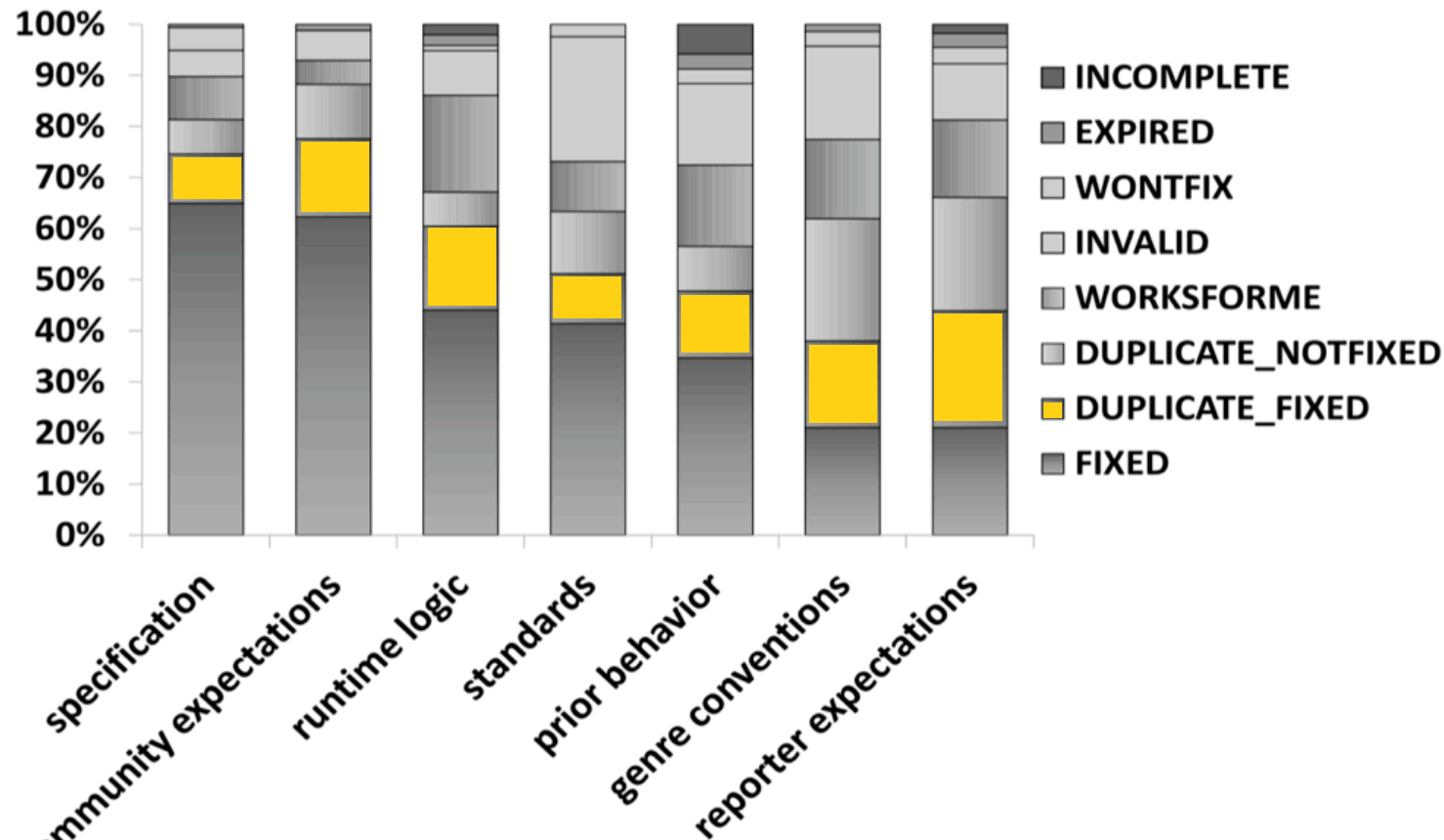
what was the effect of the **expectation source** on **REPORTER** report resolutions?

genre and **individual** expectations
least likely to be fixed



what was the effect of the **expectation source** on **REPORTER** report resolutions?

multiple reporters filing duplicates from any source of expectation sometimes led to fixes



Report ID	Reporter	Product	Version	Severity	Status	Created	Updated
100001	John Doe	Product X	1.0.0	High	Open	2010-09-29 10:00:00	2010-09-29 10:00:00
100002	Jane Smith	Product X	1.0.0	Medium	Open	2010-09-29 11:00:00	2010-09-29 11:00:00
100003	Bob Johnson	Product X	1.0.0	Low	Open	2010-09-29 12:00:00	2010-09-29 12:00:00

Report ID	Reporter	Product	Version	Severity	Status	Created	Updated
100004	Alice Brown	Product X	1.0.0	High	Open	2010-09-29 13:00:00	2010-09-29 13:00:00
100005	Charlie Davis	Product X	1.0.0	Medium	Open	2010-09-29 14:00:00	2010-09-29 14:00:00
100006	Diana Prince	Product X	1.0.0	Low	Open	2010-09-29 15:00:00	2010-09-29 15:00:00

100007: [Detailed description of a bug report, including steps to reproduce and expected vs actual behavior.]

100008: [Detailed description of a bug report, including steps to reproduce and expected vs actual behavior.]

100009: [Detailed description of a bug report, including steps to reproduce and expected vs actual behavior.]

100010: [Detailed description of a bug report, including steps to reproduce and expected vs actual behavior.]

1

who contributes bug reports?

mostly non-developer, one-time contributors who were active pre-release (**REPORTERS**)

2

what do they write about?

expectations from developer and user communities of varying population scope

3

what are the **outcomes** of their reports?

mostly not fixed, unless grounded in community expectations or in large numbers

4

why do their reports have these outcomes?



1 who contributes bug reports?

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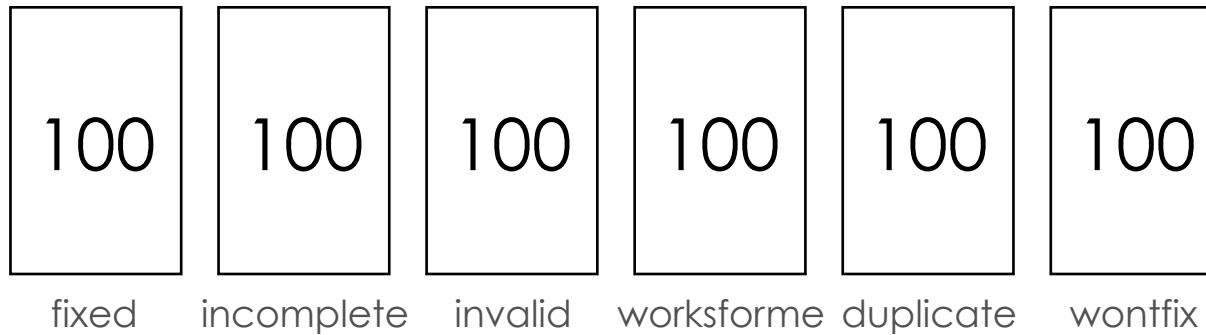
3 what are the **outcomes** of their reports?

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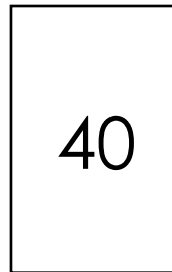
4 why do their reports have these outcomes?

4 why do their reports have these outcomes?

a qualitative analysis of reports with **REPORTER** and **USER** comments



+



reports with **USER** comments
(5% of all reports)

fixed reports

13% of REPORTER reports

terse, productive

an obvious shared understanding of process

usually a single **REPORTER** followed by a patch

some involved diagnosis by the **REPORTER**
before a patch could be written

incomplete, invalid, workforme reports

38% of REPORTER reports

problems were **ambiguous** and **ego-centric**

1/3 identified issues **already resolved** in a recent build

“have you tried the latest nightly build?”

2/3 two thirds identified problems caused by **exotic configurations**:

“so i trashed the preferences and all was fine again. thank you all for your time. everyday mozilla is getting better, thank to people like you!” (104347:7)

duplicate reports

42% of REPORTER reports

most were about widely experienced problems with **nightly builds**

88/100 were marked duplicate on the **same day**

most had only **1 comment**, reminding reporters to check for duplicates

only 12/100 had **attachments**, such as logs and screenshots

wontfix reports

3% of REPORTER reports

narrow expert **feature requests**

“it would be nice if I could...”

half explained the resolution, saying the feature was **not broadly useful** to “regular” users

the rest were denied because the request was supported through other means (e.g., plug-ins)

some **REPORTERs** expressed frustration

“If you don't change Thunderbird, then Firefox on Mac must be changed, it must be done the same way. (383036:3)”

reports with **USER** comments

5% of all reports

regarded **contentious** Firefox design choices

bookmarks, location bar, file handling, keyboard shortcuts, tabs, security, history

most **REPORTER** and **USER** contributions expressed

agreement (“me too!”)

frustration (“this is ridiculous!”)

confusion about the process (“why was it closed?”)

contentious reports with **USERS**

5% of all reports, 40 sampled

REPORTERS trivialized engineering work

Forcing my users to retype the filename (presuming they even know what it should be) is just plain oppressive, IMHO... The organizations (large choral groups) for which I'm creating sites use the right-click save extensively to download (instead of play in their browsers) audio files for rehearsing music. ... **It's just *code*, guys. Figure it out.**
(299372:49:reporter)

contentious reports with **USERS**

5% of all reports, 40 sampled

REPORTERS viewed it as a service

Over two months ago I gave complete information on when and how I got the error AND spent a great deal of time isolating the messages that caused it ... Which part of that is just saying "me too"? **For crying out loud, I'm a nursing student, not a programmer.** Do you do your own x-rays before going to the doctor? (252697:10:user)

contentious reports with **USERS**

5% of all reports, 40 sampled

REPORTERS expected service for payment

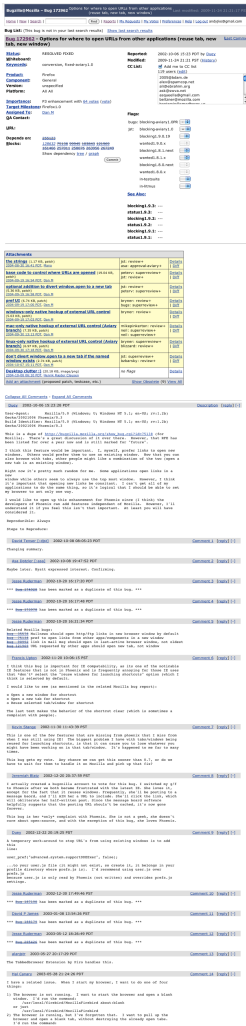
Mozilla "Foundation", you have cash,
you have the resources. FIX IT.
**PEOPLE DONATED MONEY TO HAVE YOU *FIX
THIS KIND-OF SHIT*...This is the
EXACT sort-of situation that shows
why open-source *FAILS*.**

contentious reports with **USERS**

5% of all reports, 40 sampled

developers tried to explain the process

OK, calm down everyone. How many times do I have to say it? It's what we want to try out to start with. That is not code for "we've made a decision" or "your arguments all suck and we're going to ignore them"... **That's what the trunk is for. Experimentation. We want to do a UI experiment.**



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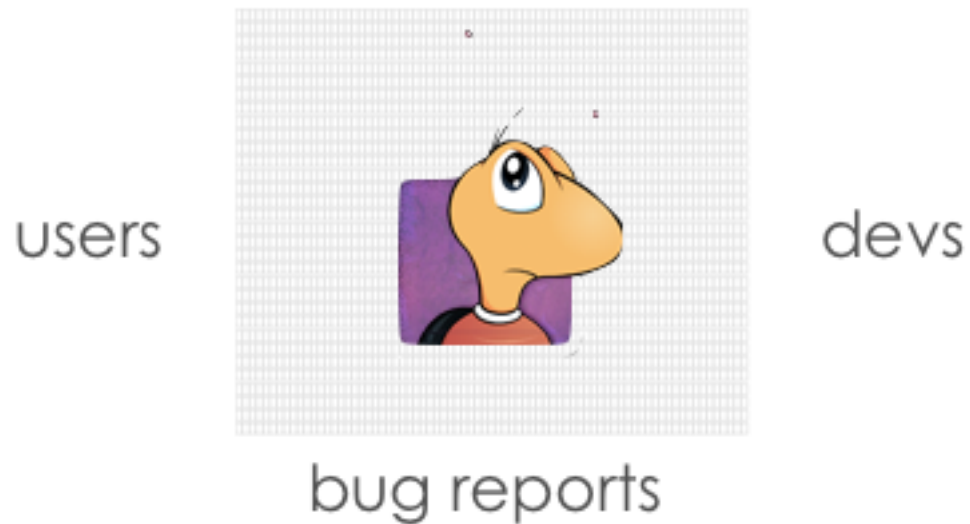
mostly not fixed, unless grounded in community expectations or in large numbers

4

why do their reports have these outcomes?

REPORTERS understood little about the context of resolution decisions, leading to missing information and egocentric requests

how well did this dialog
between users and
developers work?





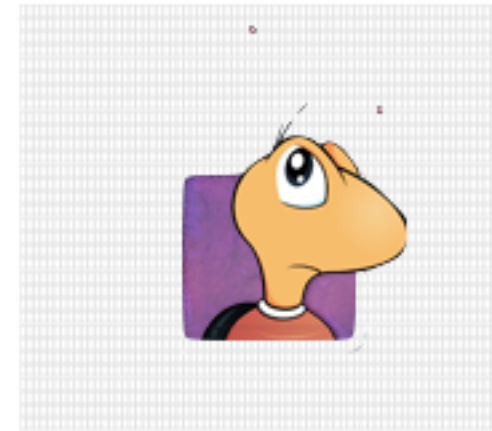
the ~8,000 successful REPORTERs
act like **closed source beta testers**

most active before a release

effective at writing good reports

trained over several years

users



bug reports

✓ the ~8,000 successful REPORTERs
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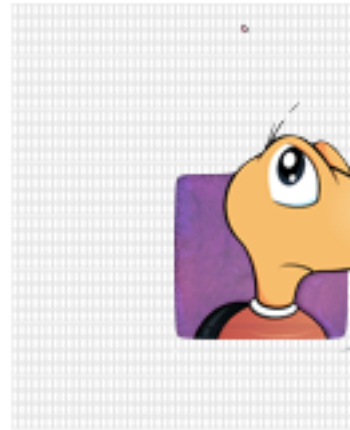
trained over several years

✗ all other REPORTERs were far less
effective

most of their issues should have
been triaged by a **tech support**

misunderstandings about process
sometimes led to friction

users



bug reports

REPORTERS
beta testers

release


good reports


years


ere far less

ould have
ch support

about process
tion

bug reporting is a **skill**
 open bug reporting
communities appear to
cultivate this skill

 **few** contributors acquire
these skills, perhaps because
are early negative
experiences

 bug reporting is an
ineffective place to gather
user feedback

future work

do these trends occur in **non-FLOSS** projects via user feedback?

do **explicitly user-centered** software teams treat user feedback differently?

are there better ways of gathering and **aggregating user feedback** from help forums, new help tools?

what kind of data would help teams **interpret** user feedback when triaging bugs?



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Paul Li