

user feedback in software evolution

Andrew J. Ko with Parmit Chilana



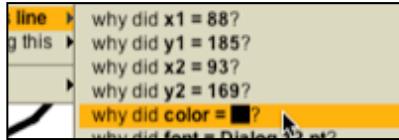
dub  **Information School**
UNIVERSITY *of* WASHINGTON

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).

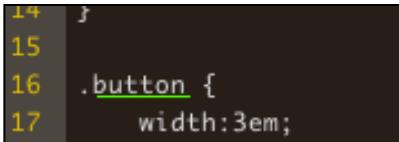
finding and fixing everyday software defects



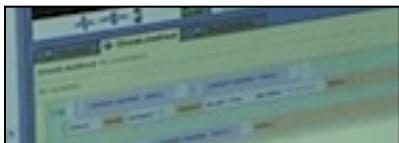
helping developers diagnose failures



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

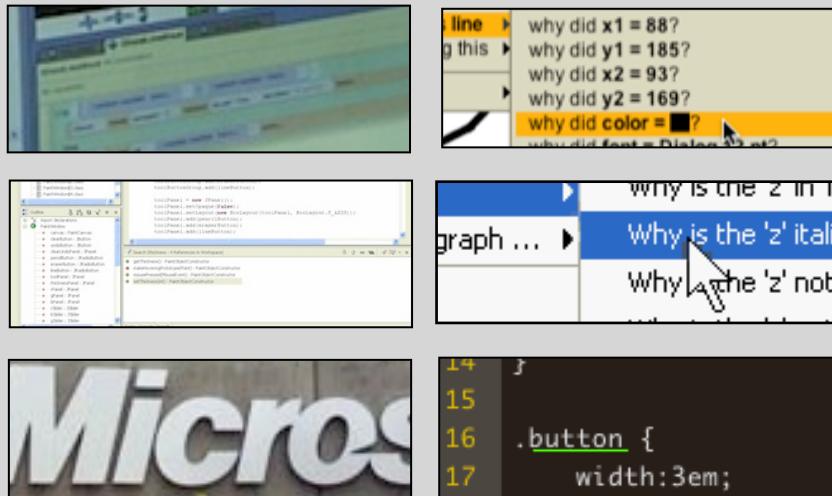
software team



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

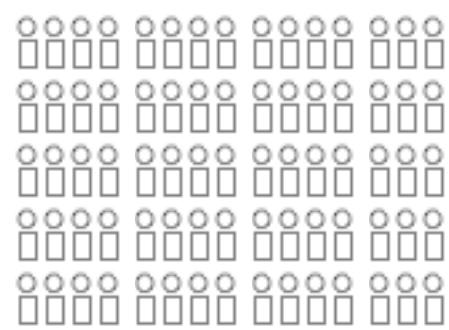
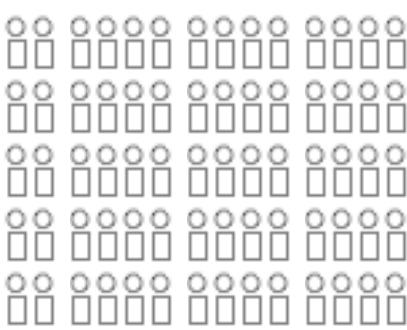
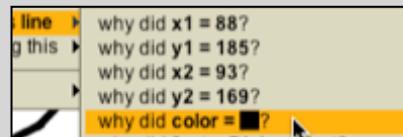
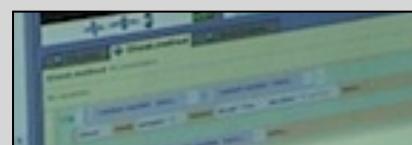
perpetual beta status

open bug reporting

web-based user feedback

crowdsourced help in support forums

software team



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?

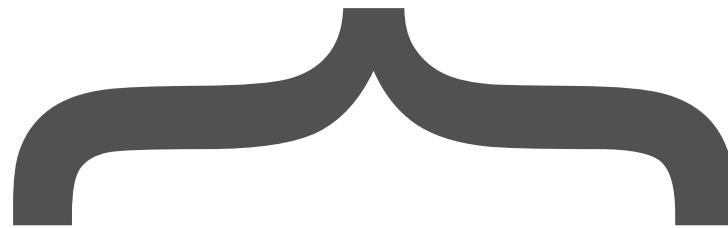
research from the past two years

- 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 for the CHI 2010 Housing and Accommodations page. The URL in the address bar is <http://chi2010.org/attending/index.html>. A context menu is open over the text "USA at the [Hyatt Regency Atlanta](#)". The menu options are: Open Link in New Window, Open Link in New Tab, Bookmark This Link, Save Link As..., Send Link..., Copy Link Location, and Inspect Element.

CHI 2010 Housing and Accommodations

http://chi2010.org/attending/index.html

leanroom Most Visited print in context JAIS call fb tw me blog news apps bus uw seattle blogs fashion pubs social shop ent

CHI 2010 Housing and Accommod... +

Housing information

- About Atlanta
- Venue information
- Child care options

Housing and Accommodations

CHI 2010 will take place 10 April 2010 through 15 April 2010 in Atlanta, Georgia, USA at the [Hyatt Regency Atlanta](#).

Housing for CHI 2010 has been arranged to provide reduced rates (ranging from \$100-\$187 per night) with a number of Atlanta hotels within walking distance of the Hyatt Regency hotel.

In order to obtain the special rates, attendees must make hotel reservations as instructed. The official conference hotels allows us to keep our conference costs low and continue to offer room blocks for our attendees.

The cutoff date for CHI 2010 housing is 1 March 2010. Because housing is limited, however, attendees are encouraged to make hotel reservations early in order to ensure receipt of the group rate. Please note that hotels will only honor the special conference rates for reservations secured by the methods noted below. Reservations made by other means will not be included in special conference promotions or activities.

Related links

- Hyatt Regency Atlanta
- Atlanta Convention & Visitor's Bureau Website
- Southern Hospitality Savings Card

user visits **bugzilla.mozilla.org**

bugzilla@Mozilla – Main Page

[Home](#) | [New](#) | [Search](#) | [Find](#) | [Reports](#) | [My Requests](#) | [My Votes](#) | [Preferences](#) | [Log out](#) andyjko@gmail.com

Welcome to mozilla.org's Bugzilla

Get Help **File a Bug** **Search** **User Preferences**

Enter a bug # or some search terms [Reset Password](#)

[Quick Search help](#)

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 corrupt 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+alt+del) 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 (reusing tabs)

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.

[Home](#) | [New](#) | [Search](#) | [Find](#)[Reports](#) | [My Requests](#) | [My Votes](#) | [Preferences](#) | [Help](#) | [Log out](#) andyjko@gmail.com**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)**

Status:	RESOLVED FIXED	Reported:	2002-10-06 15:23 PDT by Duey
Whiteboard:		Modified:	2009-11-24 21:21 PST (History)
Keywords:	conversion, fixed-aviary1.0	CC List:	<input checked="" type="checkbox"/> Add me to CC list 119 users (edit) <ul style="list-style-type: none"> 2005@bdam.de alex@spamcop.net ali@ebrahim.org ask@swva.net asqueella@gmail.com beltzner@mozilla.com benjamin@cmichurin.us
Product:	Firefox		
Component:	General		
Version:	unspecified		
Platform:	All All		
Importance:	P3 enhancement with 64 votes (vote)		
Target Milestone:	Firefox1.0		
Assigned To:	Dan M	Flags:	
QA Contact:			
URL:			
Depends on:	255123	bugs: blocking-aviary1.0PR <input type="button" value="+/-"/>	
Blocks:	128632 75138 99945 103843 121969 161466 257011 258076 263956 267249	jst: blocking-aviary1.0 <input type="button" value="+/-"/>	
		blocking1.9.0.19 <input type="button" value="+/-"/>	
		wanted1.9.0.x <input type="button" value="+/-"/>	
		blocking1.8.1.next <input type="button" value="+/-"/>	
		wanted1.8.1.x <input type="button" value="+/-"/>	
		blocking1.8.0.next <input type="button" value="+/-"/>	
		wanted1.8.0.x <input type="button" value="+/-"/>	
		in-testsuite <input type="button" value="+/-"/>	
		in-litmus <input type="button" value="+/-"/>	

[Commit](#)

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reporter

who created
the report

Status: RESOLVED FIXED

Whiteboard:

date

when the
report was
created

Importance: P3 enhancement with 64 votes (vote)

Target Milestone:

Assigned To: Dan M

QA Contact:

the developer
assigned to
resolve this
report

URL: [255123](#)

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

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

[Commit](#)

Reported: 2002-10-06 15:23 PDT by Duey

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

CC List: Add me to CC list

resolution **FIXED**
DUPLICATE
INCOMPLETE
WONTFIX
WORKSFORME
INVALID

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 [+](#) [-](#)

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 in-litmus test fails	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

Tbis 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 consitant. 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 independant of Mozilla. However, I'll understand it if you feel this isn't that important. At least you will have considered it.

Reproducible: Always

comments and commenters

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

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

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.



Andrew J. Ko – IBM Research Symposium, Sept. 30, 2010

17

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

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

a typical report lifespan

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





1 who contributes bug reports?



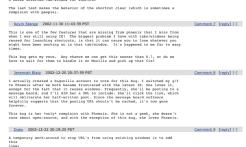
2 what do they write about?



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?

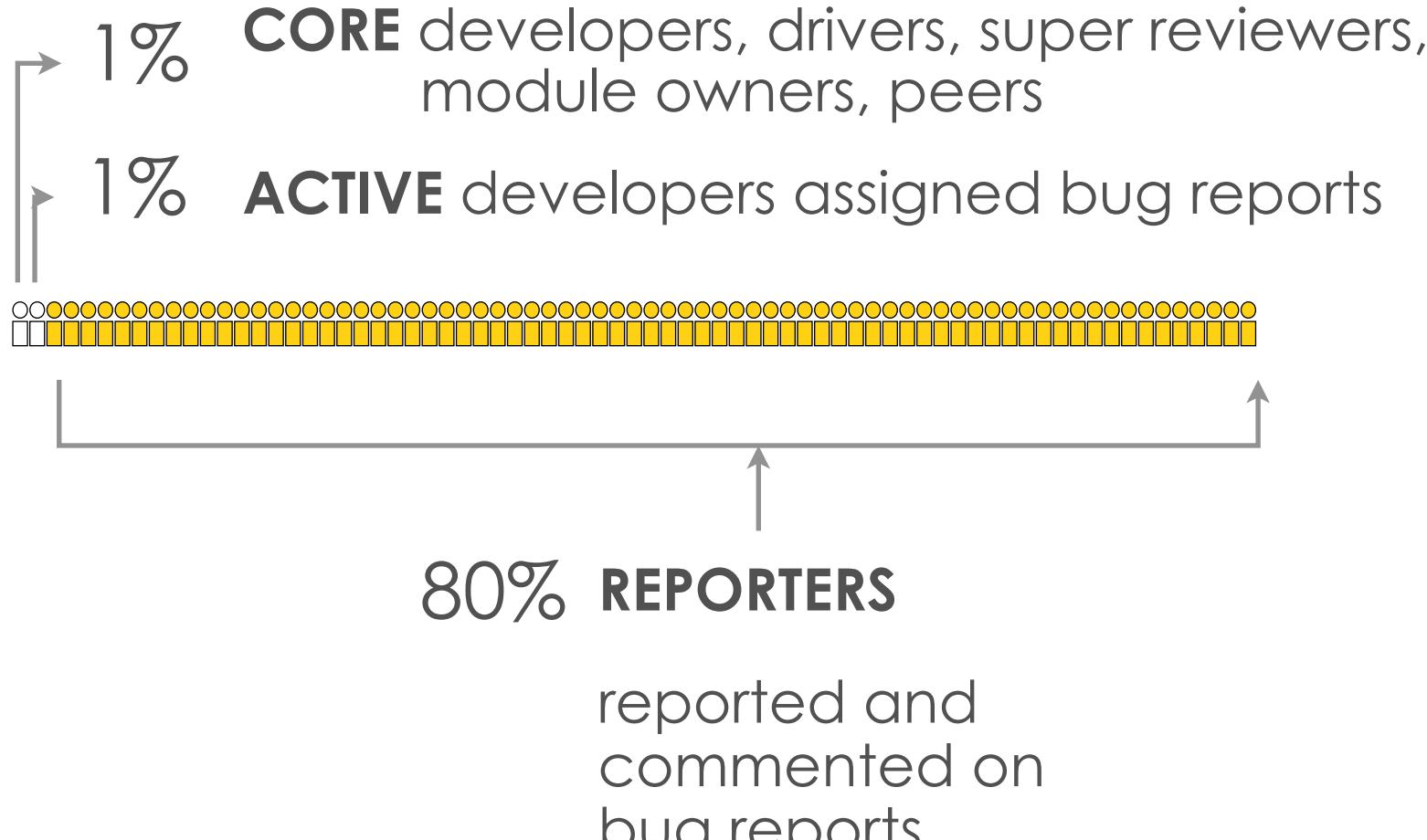
who's e-mail addresses were these?



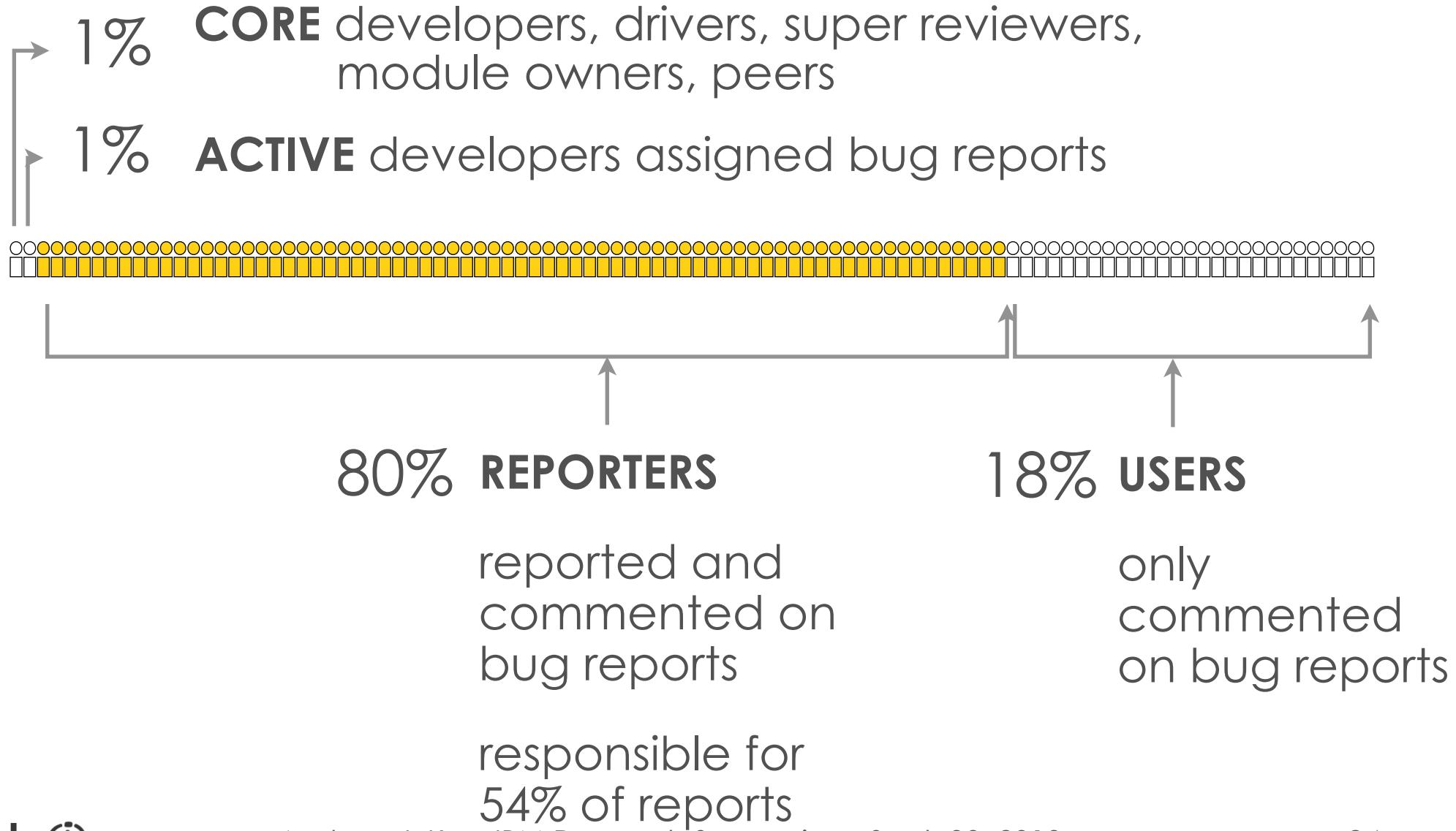
who was behind these 152,877 addresses?



who was behind these 152,877 addresses?

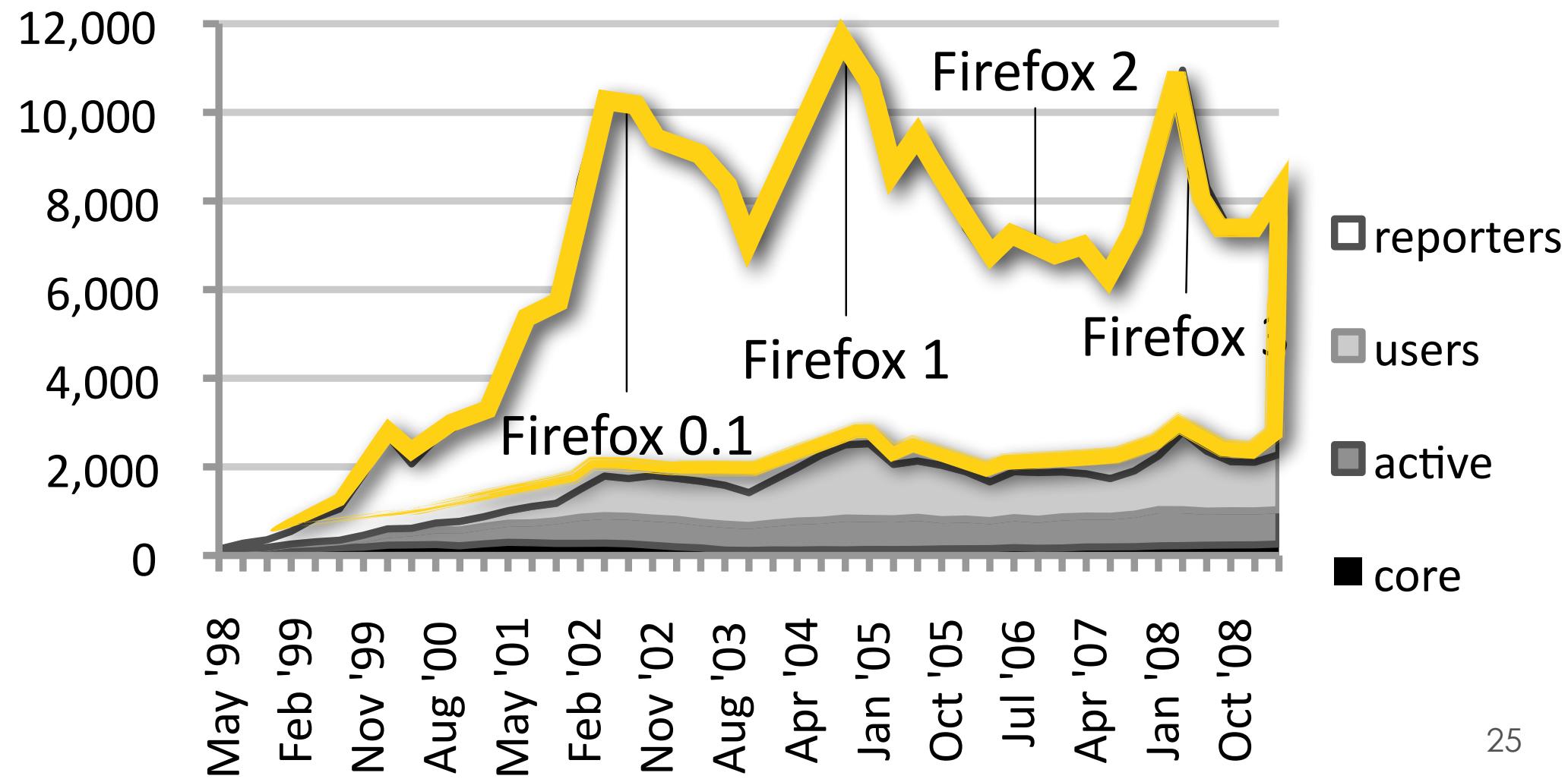


who was behind these 152,877 addresses?



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?

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what do they write about?

3

what are the outcomes of their reports?

4

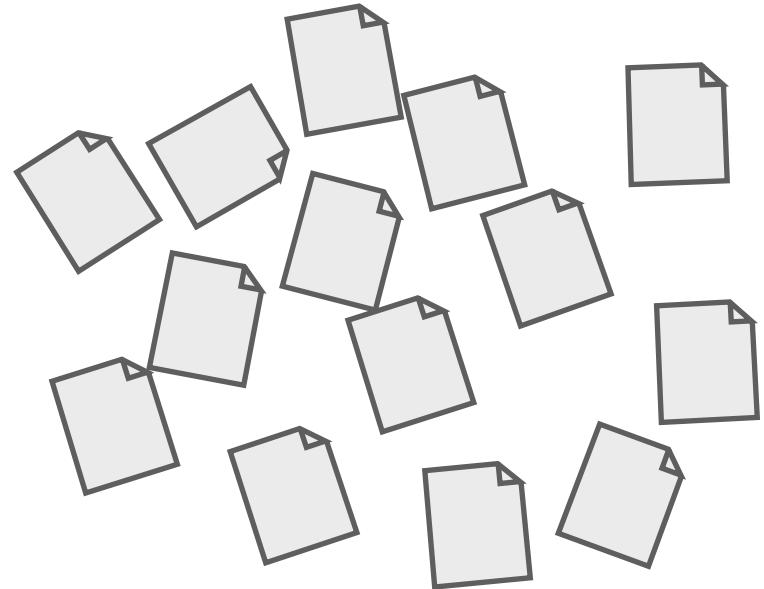
why do their reports have these outcomes?

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](#)

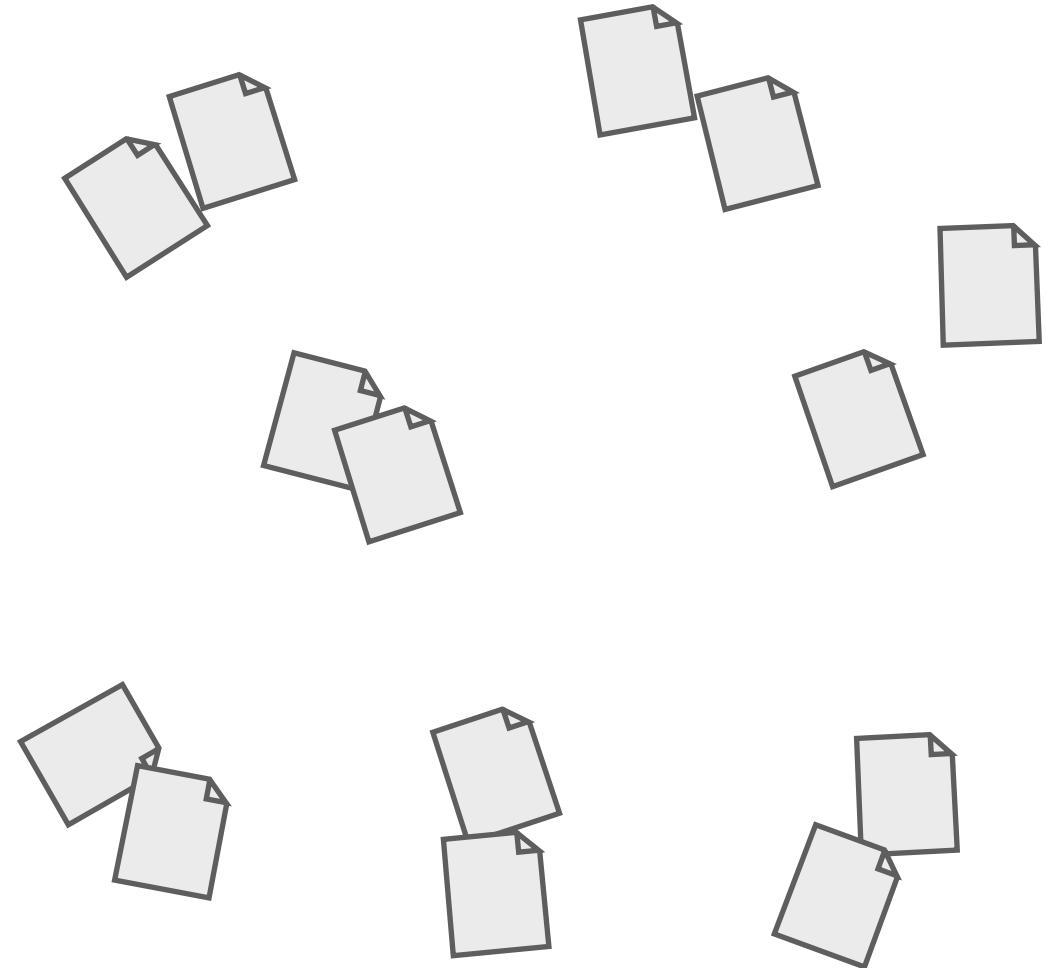
When viewing web pages in FFH, it would be nice if the title bar on the web viewing page could scroll offscreen.

2

what do they
write about?

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

what group or
person believed
the behavior
was defective?

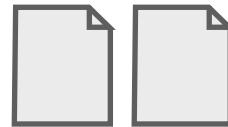


2

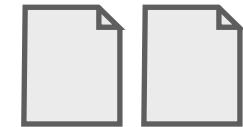
what do they write about?

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

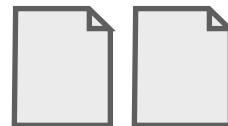
runtime logic



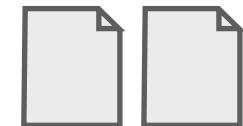
prior



specifications



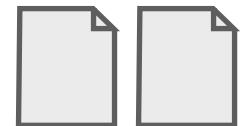
individual



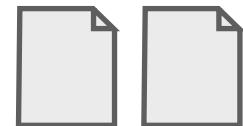
standards



community



genre

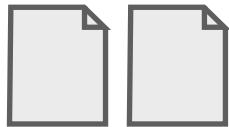


2

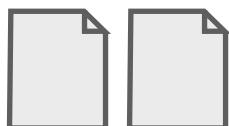
what do they
write about?

developer intents

runtime logic



specifications



standards



user expectations

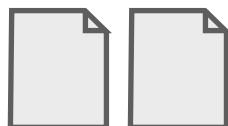
prior



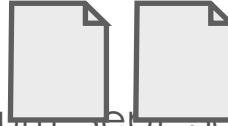
individual



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

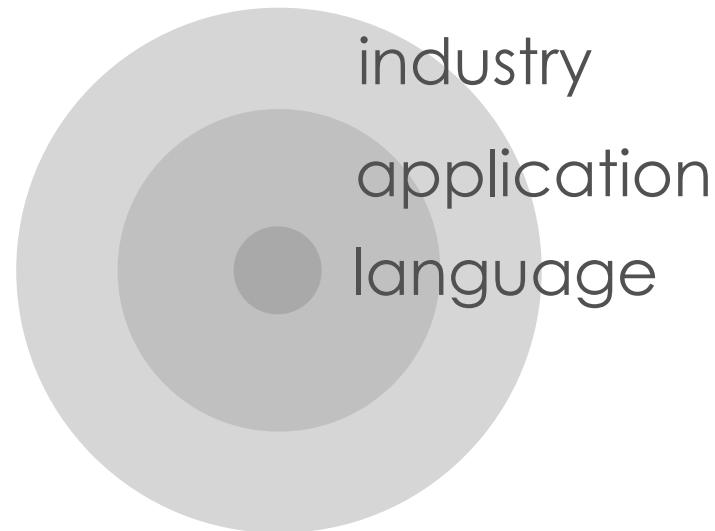
"There's an incorrectly placed PR_MAX
in the code for pref width
distribution of colspanning cells."



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

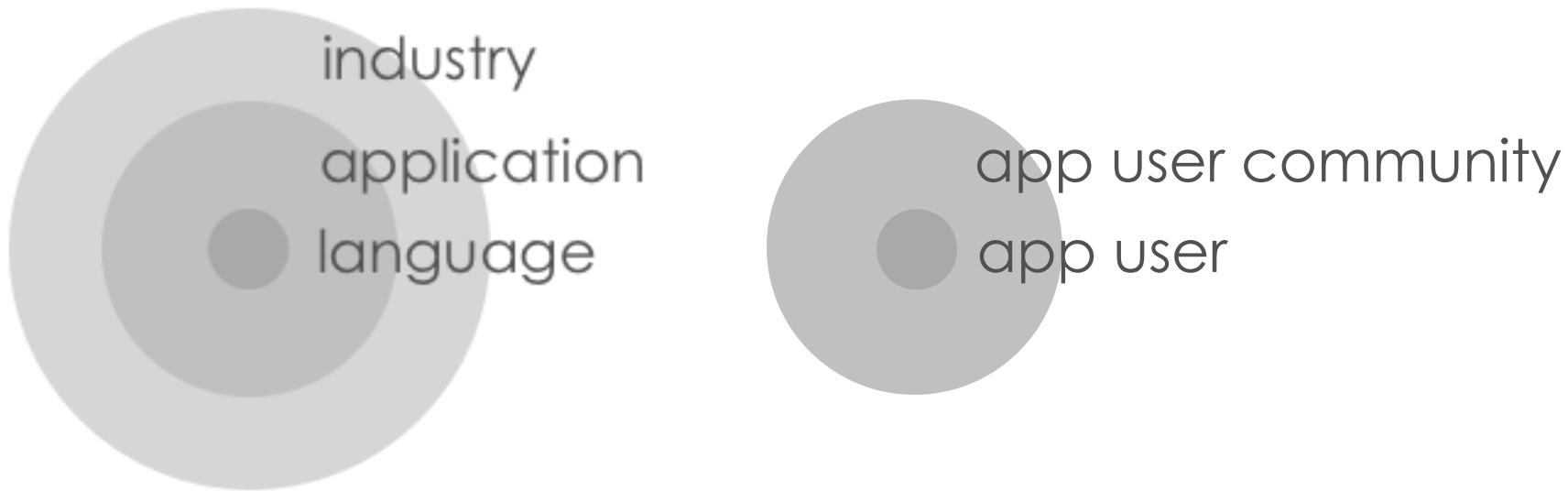
"Every time I Sort By Name by Bookmarks Firefox sorts and closes my Bookmark menu... Why does it do this??"



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**

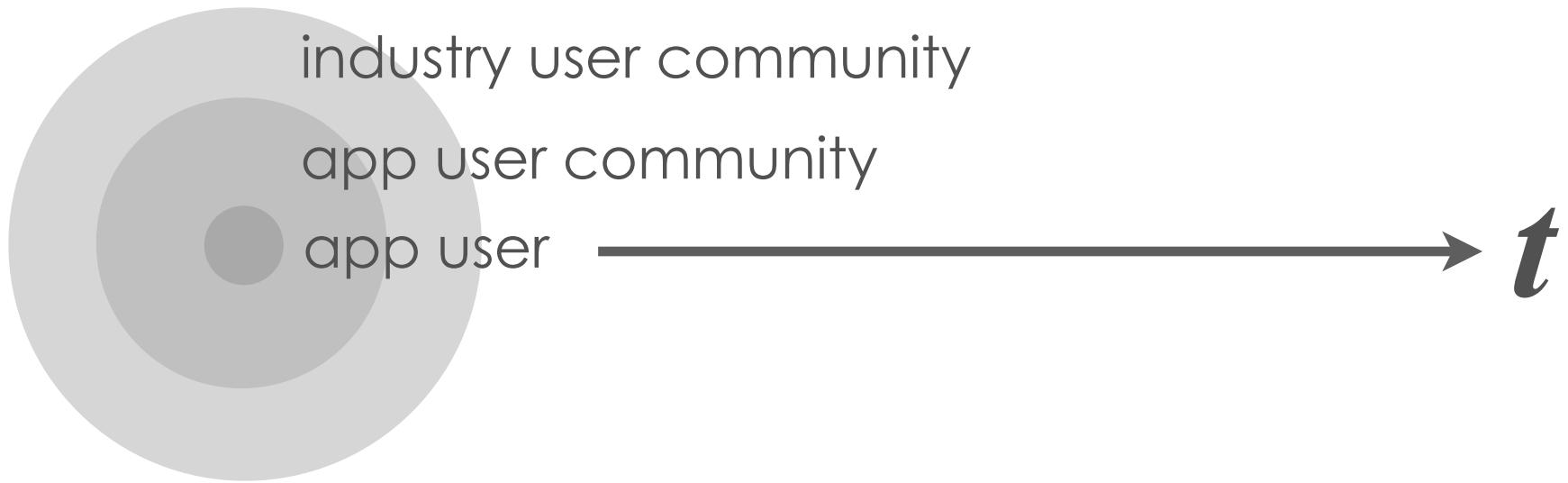
“Firefox does not limit the slideshow horizontal size to the window width. The same source works correctly in IE.”



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.”





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?



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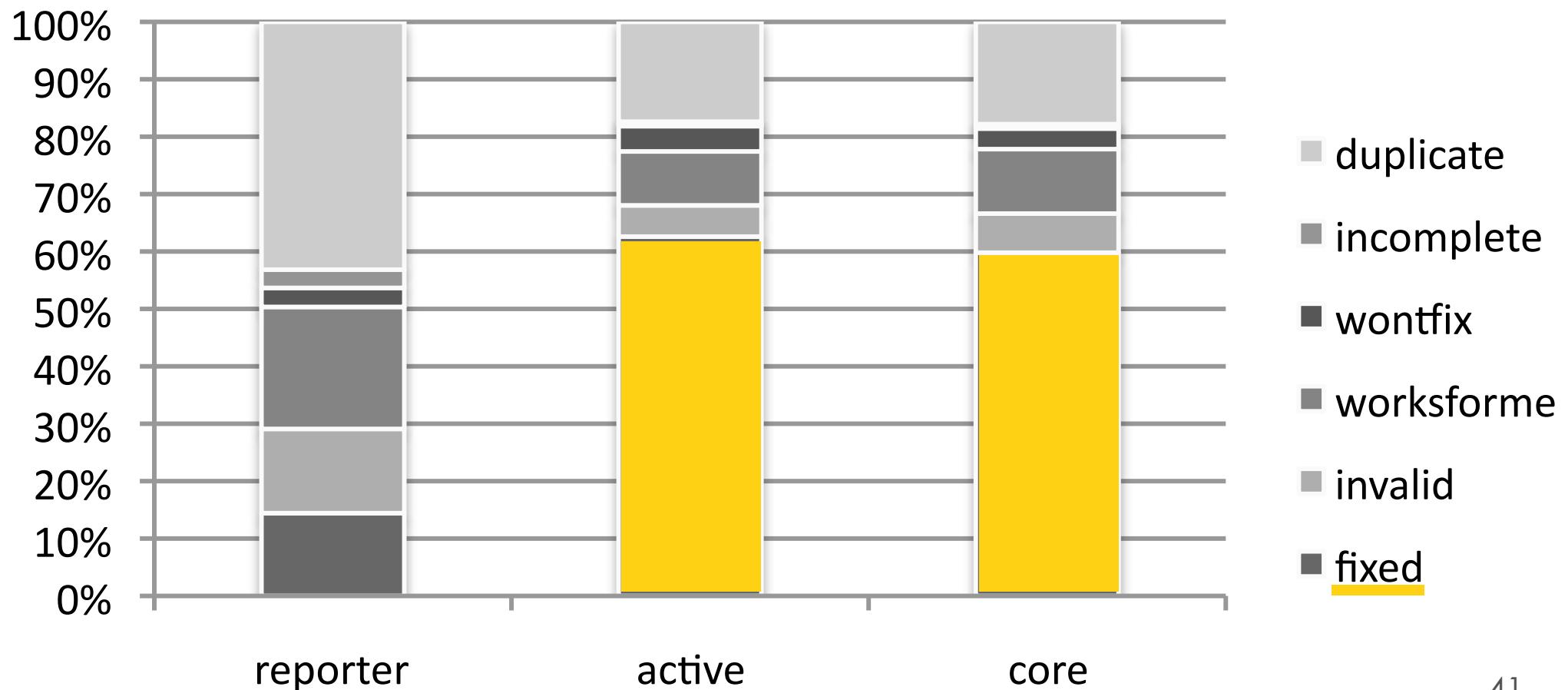
expectations from developer and user
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3 what are the **outcomes** of their reports?

4 why do their reports have these outcomes?

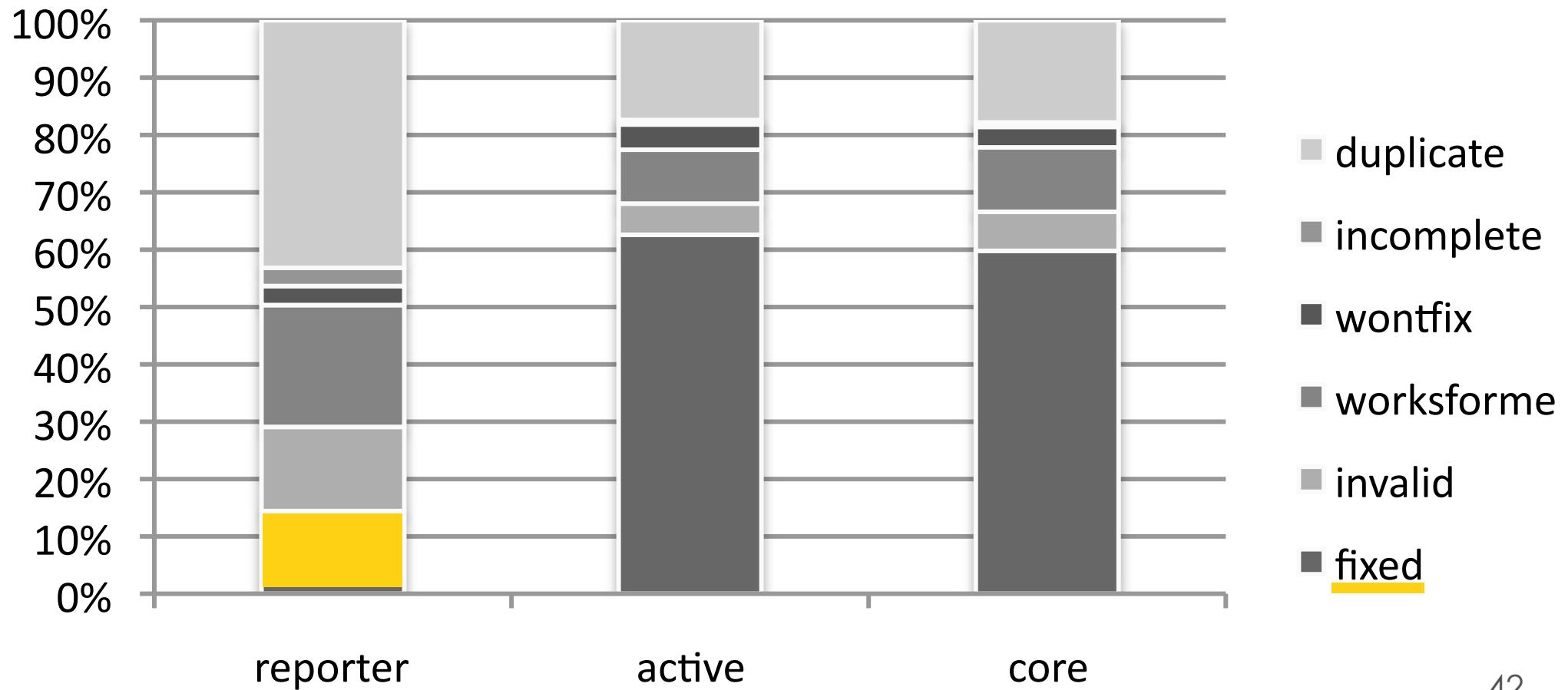
3 what are the **outcomes** of their reports?

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



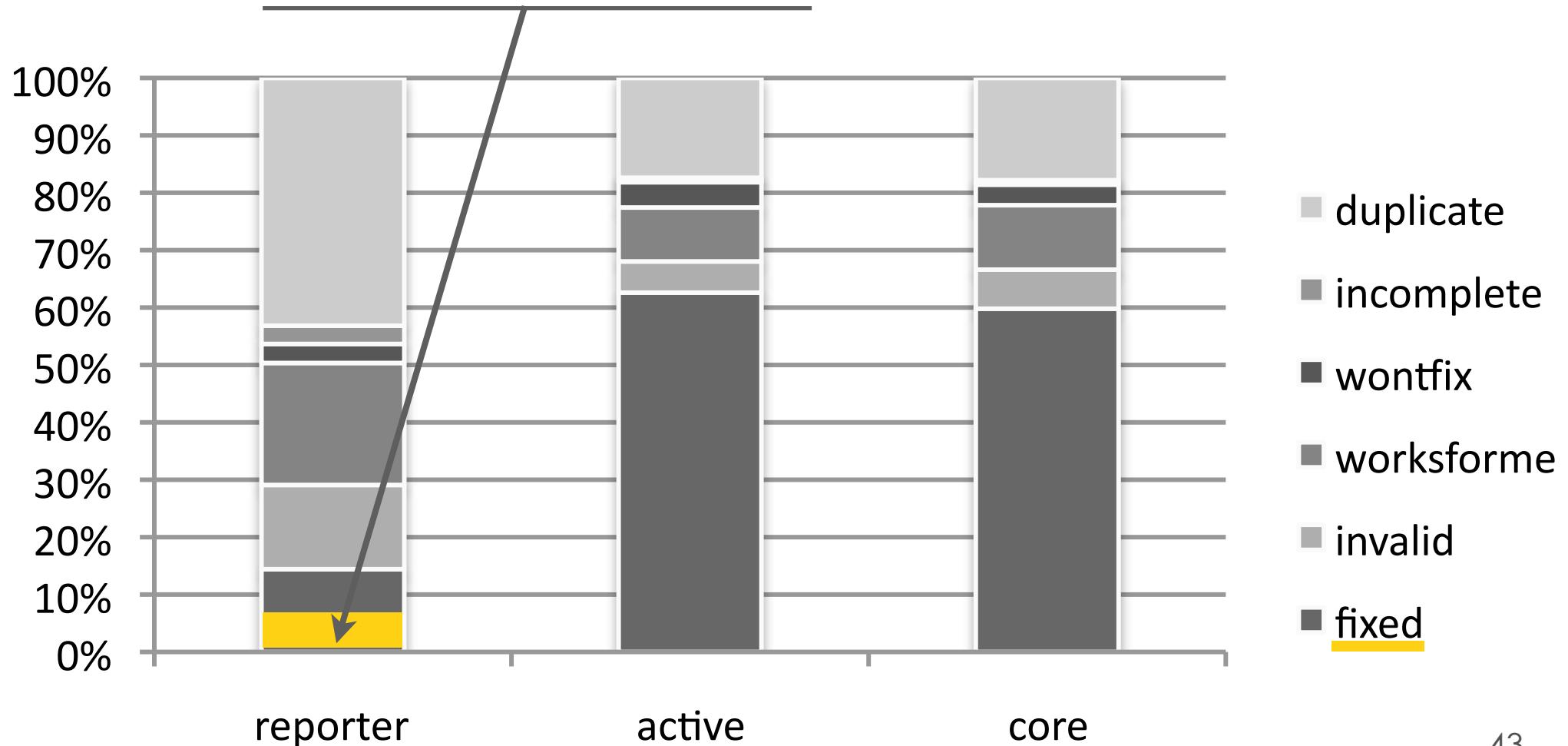
3 what are the **outcomes** of their reports?

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



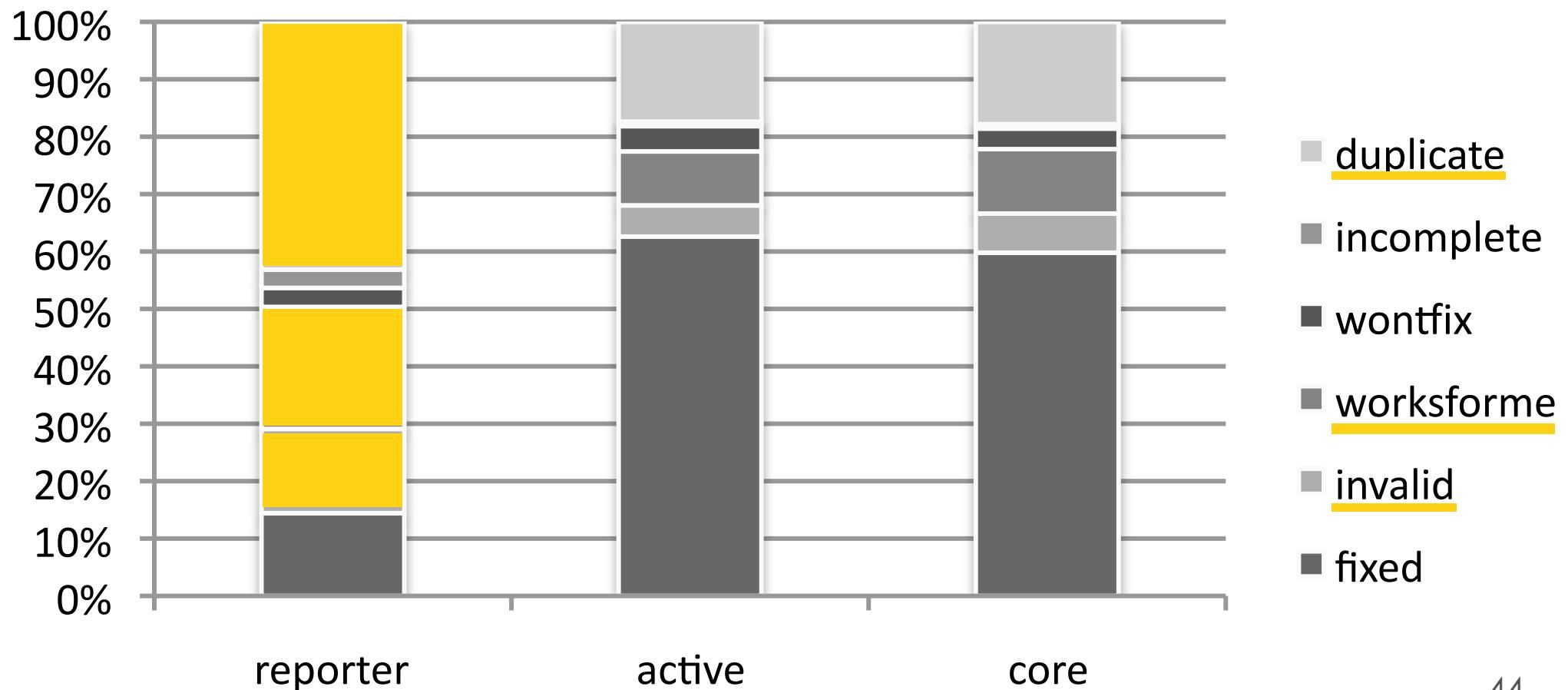
3 what are the **outcomes** of their reports?

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**

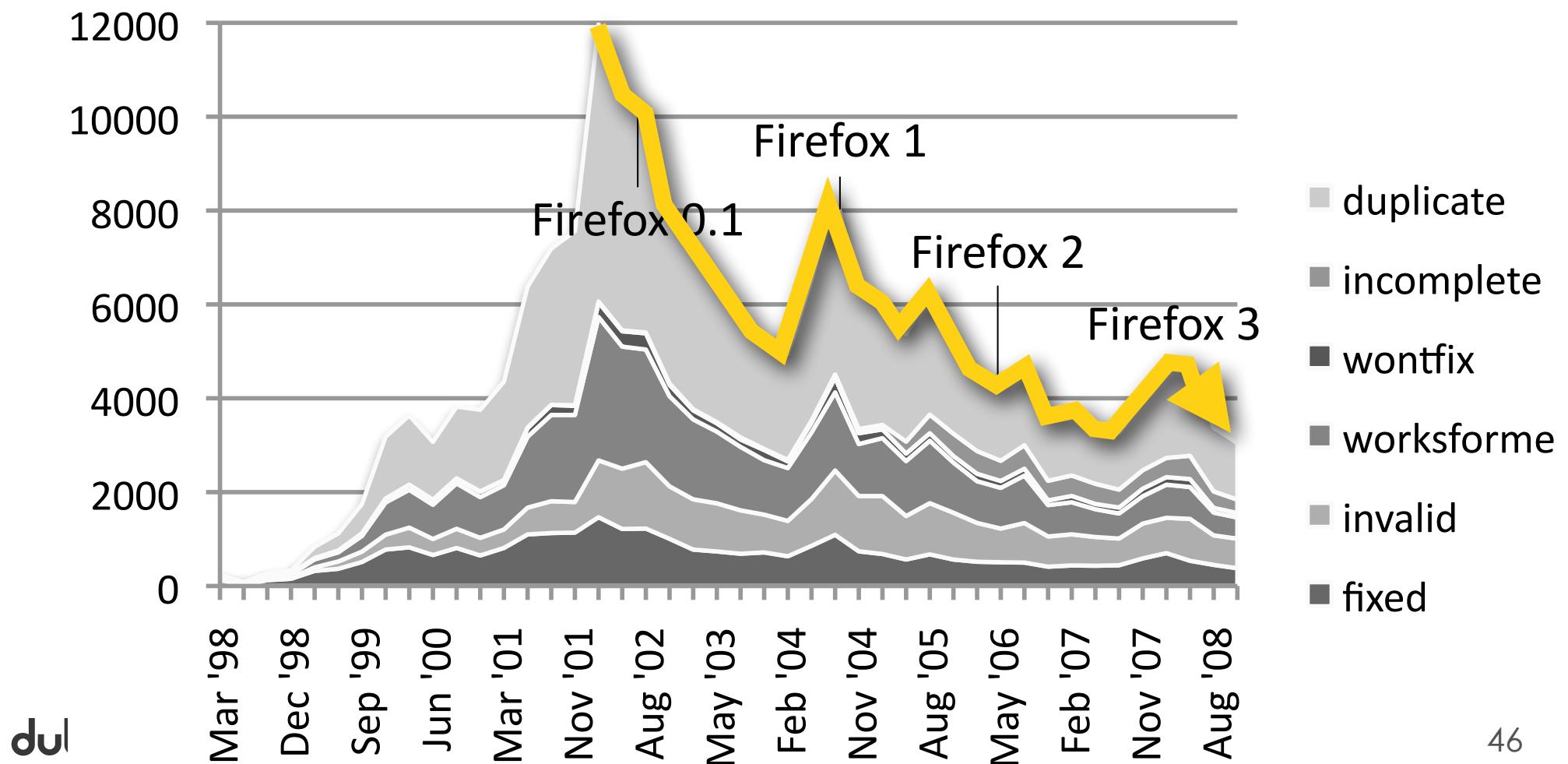
66% of **REPORTER** duplicates of fixed reports were created **after** a patch was attached



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

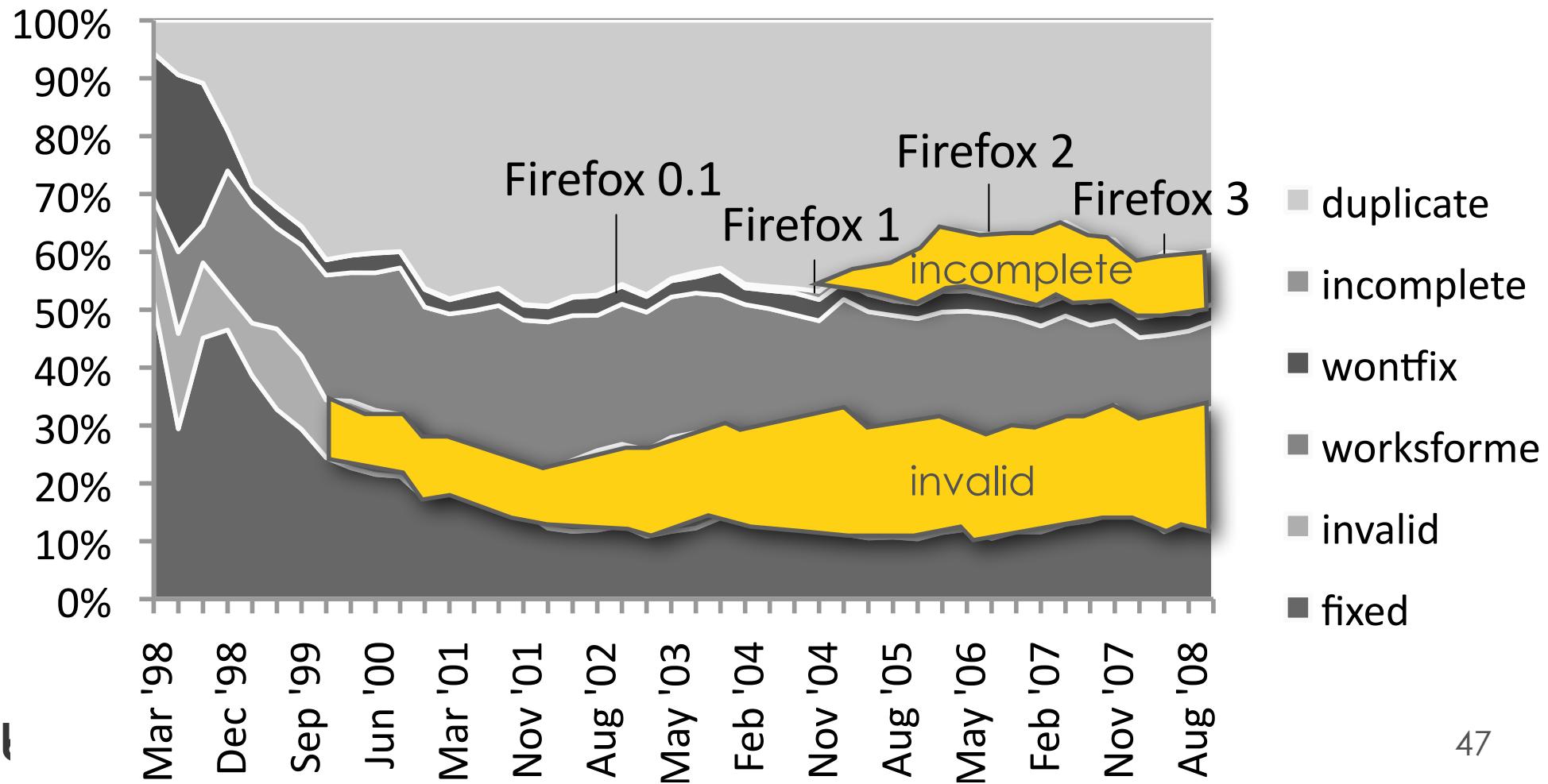
of **REPORTER** reports by resolution (per 3 months)

dropped since the alpha version...



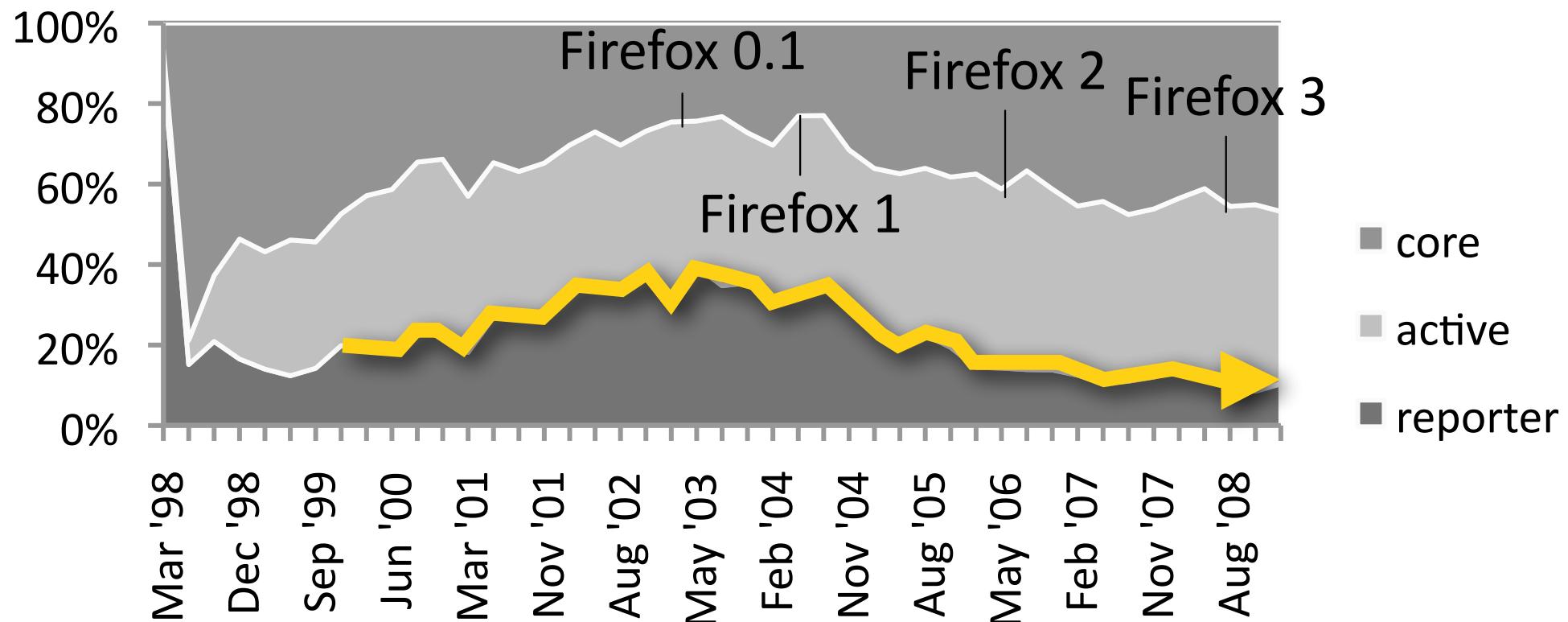
% of REPORTER resolution types (per 3 months)

↑ likelihood of **invalid** or **incomplete**
↓ likelihood of **fixed**



% fixed reports by contributor type (per 3 months)

proportion by **REPORTER**s
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

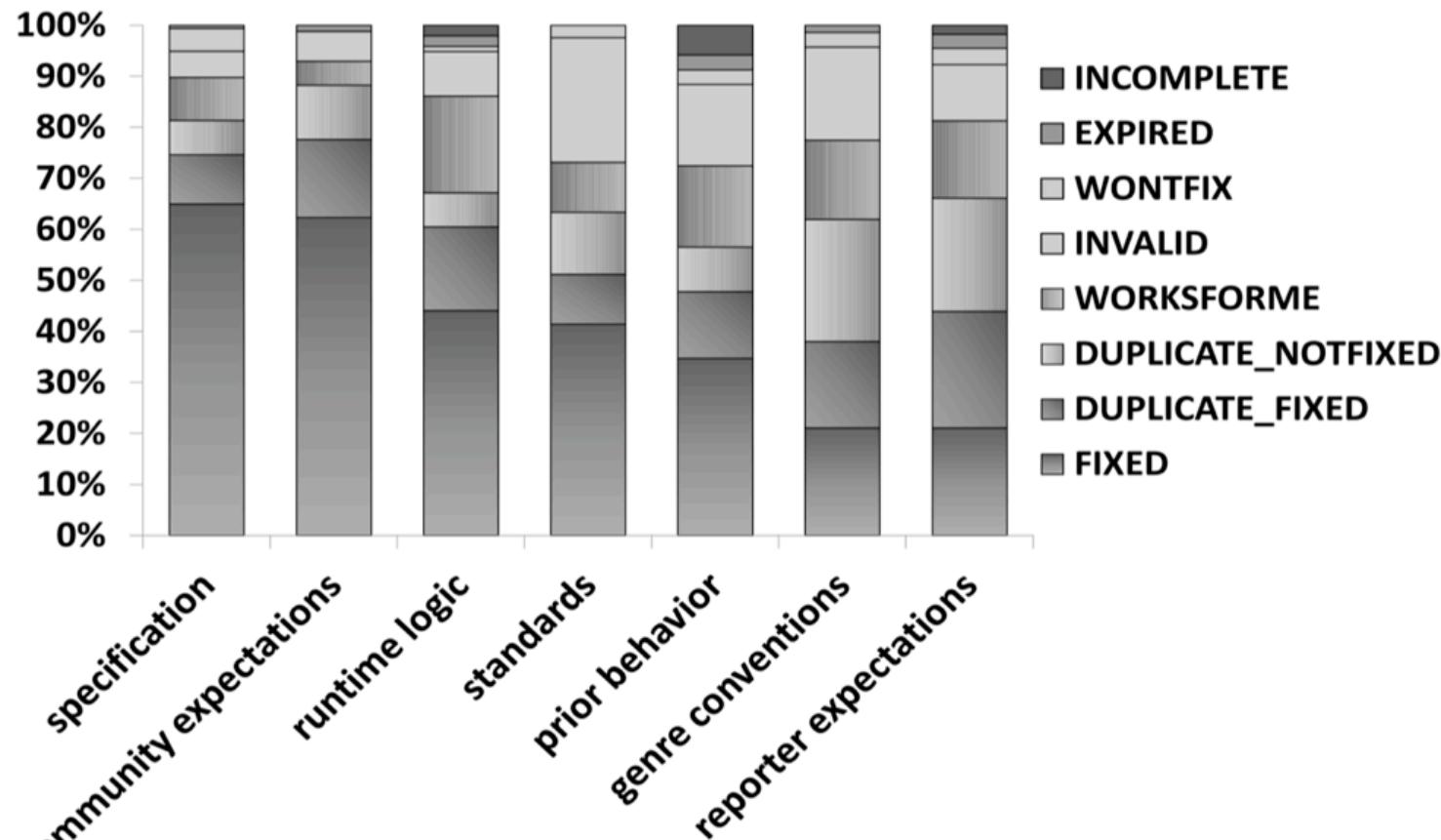
redundant coding
agreement was ~75%

sources of expectations

prior
runtime logic
individual
community
specifications
standards
genre

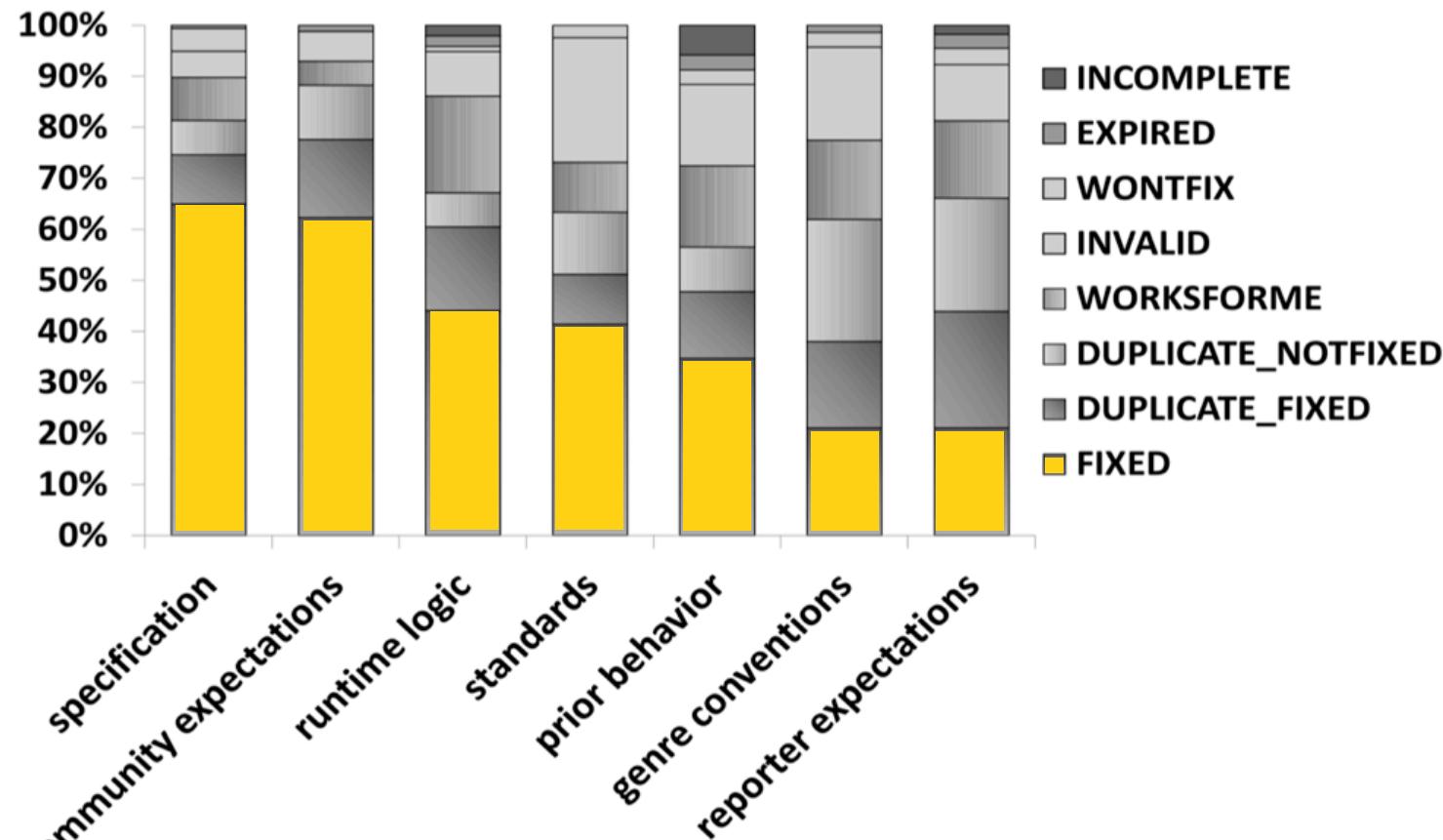
what was the effect of the **expectation source** on **REPORTER** report resolutions?

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



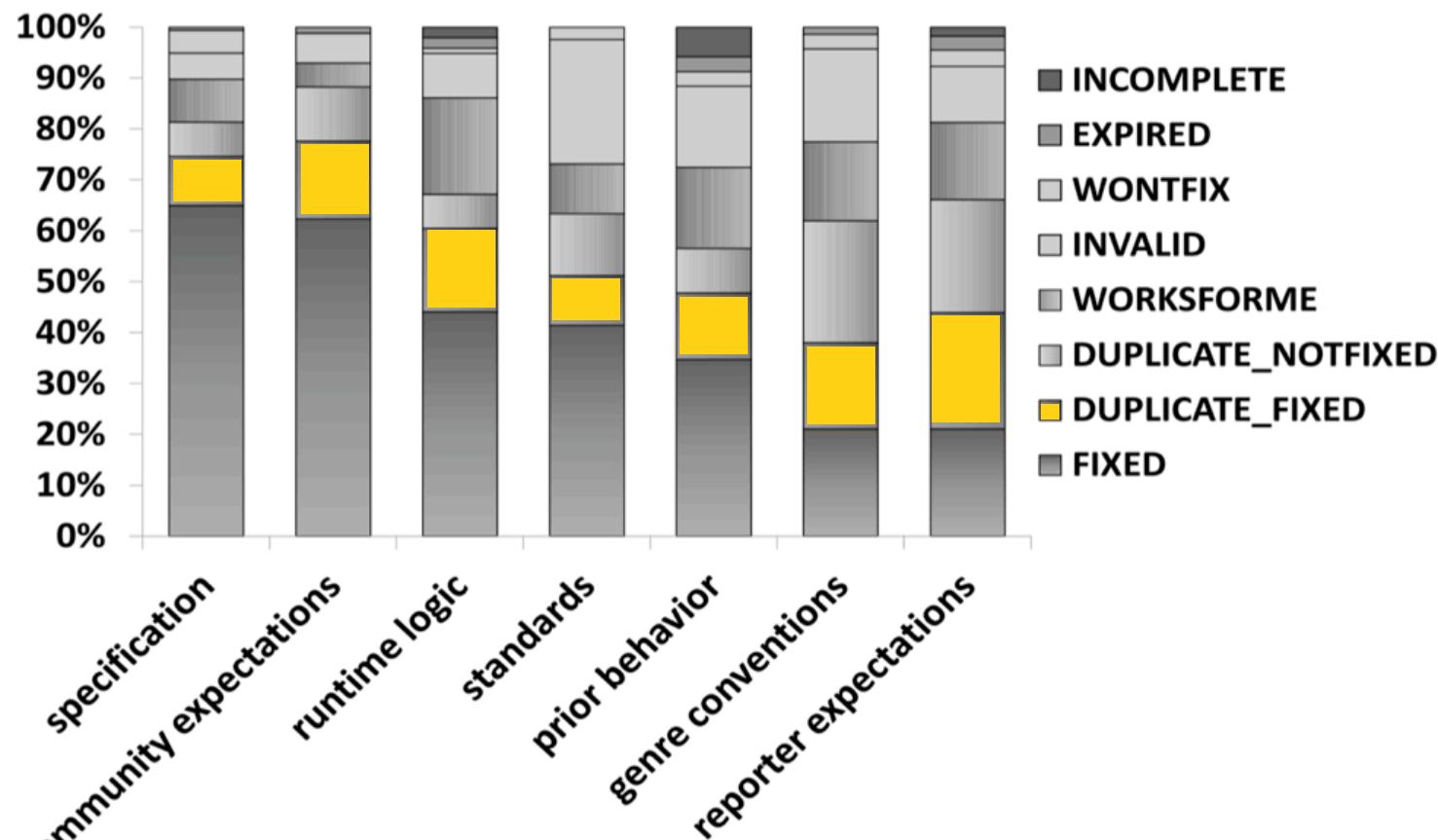
what was the effect of the **expectation source** on **REPORTER** report resolutions?

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





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?



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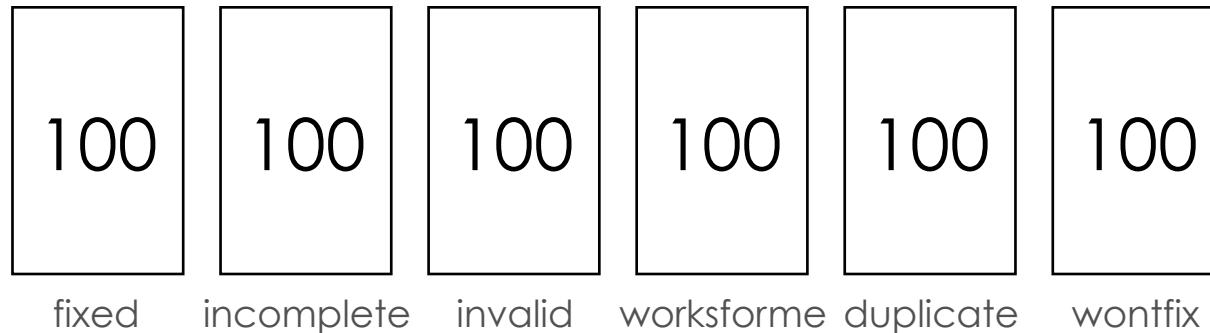
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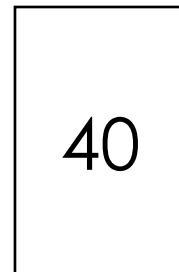
4

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, worksforme 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.**



1

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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**

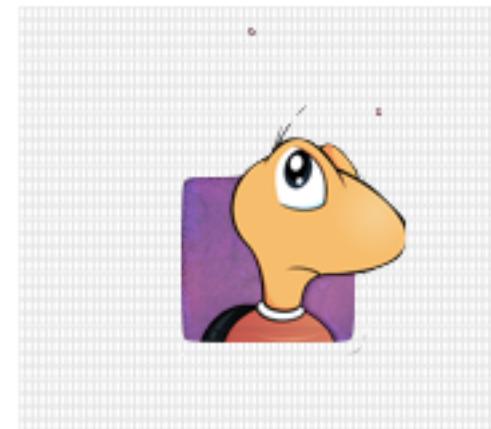
most active before a release

effective at writing good reports

trained over several years



users



bug reports



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

most active before a release

effective at writing good reports

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 repo

REPORTERS
beta testers
release
good reports
years

were far less
should 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