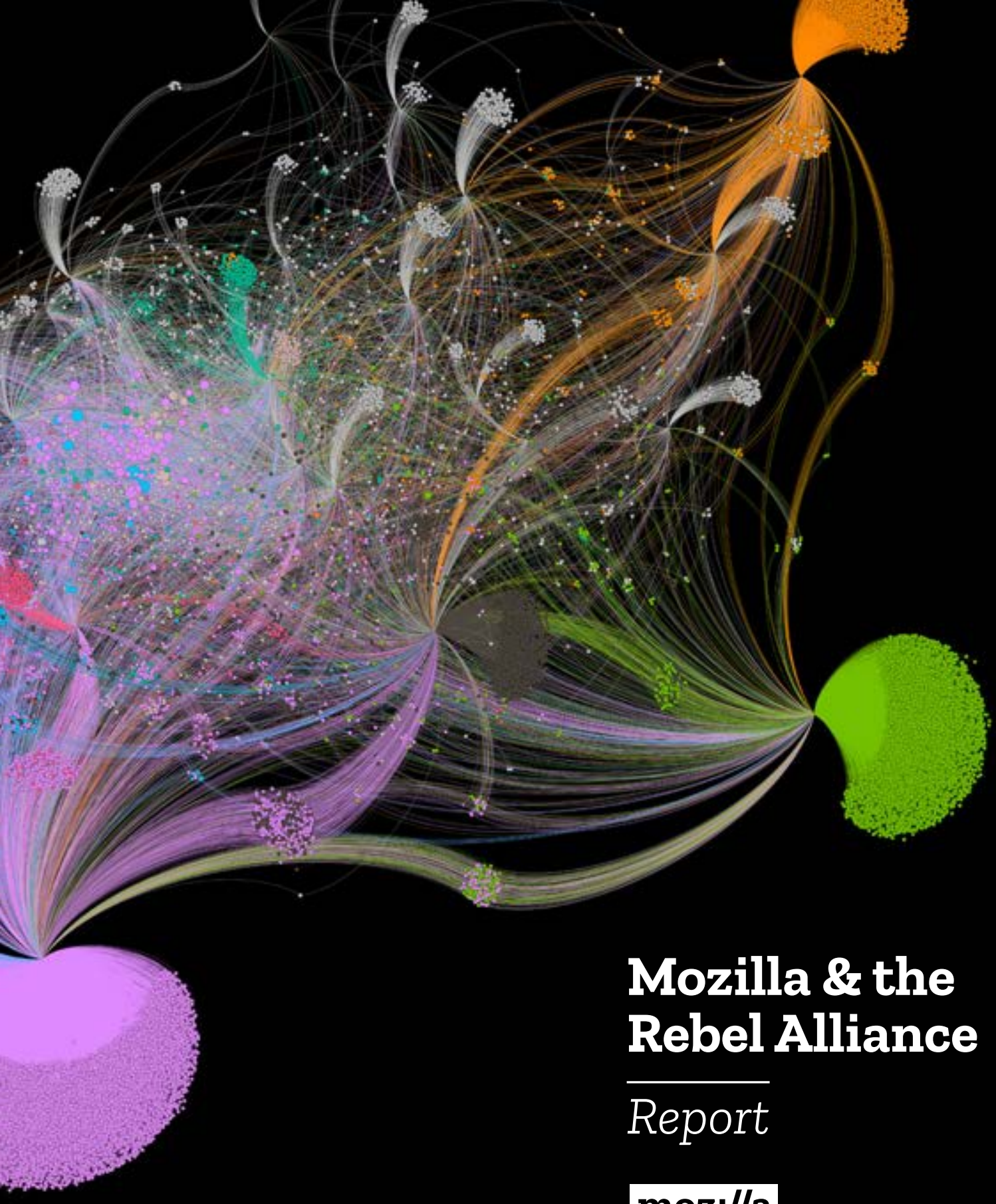
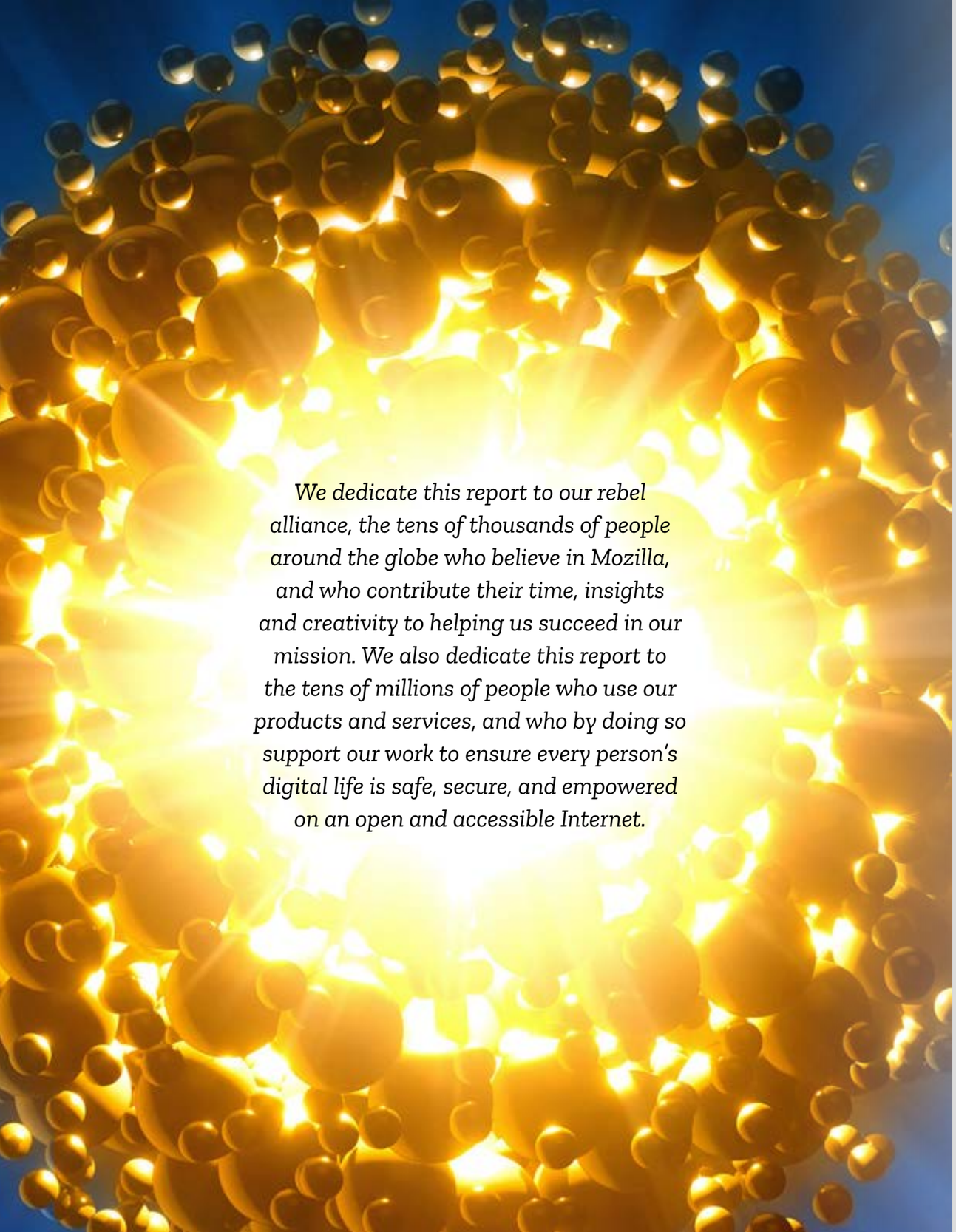


Mozilla & the Rebel Alliance

Report

moz://a

Open Innovation
January 2020



KATHARINA BORCHERT,
CHIEF OPEN INNOVATION
OFFICER AT MOZILLA

Understanding the Rebel Alliance

SUMMARY

As Mozilla sets out to address the big problems of the internet today and the deep challenges we all face in our digital lives, it is vitally important to recognize that we will not be successful on our own. And we don't have to be! We did not attempt to succeed on our own when we built the first version of what was to become Firefox and we do not need to attempt to do that now.

We have certainly changed as an organisation in the years since the first launch of Firefox and so have our communities and the many ways we work with them on different projects. Not all of the changes have been great admittedly but our mission and the day to day work that we do still compels a large group of people to join in the fight for the open internet. And the challenges ahead of us drive us to double down on working differently, double down on reaching out and building a stronger rebel alliance with individuals and organisations in our space and beyond.

As we think about revitalising the core of Mozilla and building much more porous boundaries between our organisation and our allies in the world it is helpful to understand who we are already working with. How we are working with them. And what we have learned about successfully collaborating across organisational borders. That's the impetus behind the work presented here.

This report covers the year 2018. It shows Mozilla has continued to nurture an ever-evolving rebel alliance of individual and commercial contributors that were there at our inception. We have relied upon open, collaborative practices — foremost open source co-development — to bring in external knowledge and contribution to many of our products, technologies, and operations. Through this, we've increased our reach, influence, capacity and creativity.

The stories and numbers in this report show how unique Mozilla is in the technology world, in our ability to generate the trust required to bring together such a strong alliance of supporters and contributors. We build technology products that are demonstrably for the people and by the people. What do we mean by this? In 2018, well over 14,000 individual and commercial volunteers worked with us to build, localize, test, de-bug, deploy, and support our products and services. They helped us advocate for better government regulation around the world that puts people's interests and the public benefit first. They helped us 'document the web' through the Mozilla Developer Network. They spoke on topics near and dear to Mozilla's people-first mission at conferences around the globe, and helped us host events around the globe too, like the 10th anniversary of MozFest.

This Mozilla and the Rebel Alliance report is the first to be broadly published to our employees, contributor communities, and general public. It builds upon foundational work done in 2017 to present a more detailed, nuanced analysis of contribution across Mozilla. The first section of the report is quantitative. It presents analyses based on data obtained through our main contribution platforms as well as a survey, and includes questions for further study. The second is more narrative and presents select contributor-focused stories that go beyond the numbers.

Mozilla's communities remain vibrant, generally attracting new participants and retaining existing ones at respectable rates. But the results per open source project vary widely. Together, Firefox and Gecko added almost 3,500 new non-employee contributors in 2018 – although these numbers represent a dip for each from the previous years, and Gecko has lost its ability to attract new contributors over its lifetime – while the Mozilla Developer Network added over 1,000. Contribution volume is growing across almost all contribution platforms, with Bugzilla as the exception. Perhaps the most remarkable finding is that in 2018, just over half of all traceable contributions came from our communities.

But 'looking in' numbers about participants and contribution volume tell only a partial story. How are our open source products embedded in the greater open source and commercial ecosystems? This report looks at contribution patterns across GitHub/Git repositories, such as for our work in virtual and augmented reality (WebMR), as well as at commercial contribution. Commercial contribution as measured through Mozilla's contribution systems is decreasing slightly, with Google representing almost double the combined volume from Microsoft, Oracle, Apple, and Facebook. However, commercial contribution to Firefox and Gecko is on the rise, with Google again in the lead. We are concerned about market consolidation around Blink, so this data might be a useful signal to watch.

New network graphs show the breadth, dynamism, and interconnectedness of Mozilla's communities. These kaleidoscopic visualizations of Mozilla's communities also show how they differ in focus, numbers and volume. gain, these don't include the thousands of participants whose support isn't registered in a contribution system! The report makes clear that non-employee contributors continue to help Mozilla across a wide range of our business and mission, from answering support questions on Twitter to documenting new web technologies, localizing web content, and identifying problems in our open source products.

This report brings a more sophisticated understanding of our communities that could drive new pragmatic investments in contribution programs. For example, knowing our community members identify over half of all regression bugs in Firefox, Gecko, and Developer Tools* (and at a high rate of quality), how might we better incentivize such contributions? As another example, a remarkably high number of people in our survey signed up to participate but didn't follow through. Most cited that they just got busy, but many also didn't know how to start or what to do. How might we improve the contribution experience to better lead potential contributors from interest to participation?

Open source development is just one of many ways volunteers contribute to Mozilla. Indeed, at least by our survey results, it's not the primary area of participation. That's reserved for events, such as workshops on IOT and localization meetups. Still, open source is enshrined in our mission, and it's at the heart of our rebel alliance. Despite being central to our culture, workflows, and relationships, Mozilla hasn't had a way of evaluating how well our co-development communities are functioning. We're not alone in this problem. The report relies on recent research to present a vision for how Mozilla could better conceptualize and track open source community 'health,' and applies some of these metrics to our main open source projects.

Lastly, it's important to note what isn't captured here: the value of social connections, the learning and the mutual support people find in our communities – staff and non-employees alike. These intangibles are hard to quantify, but they're the essence of Mozilla's communities of builders and makers and dreamers.

When we shipped Firefox 1.0, none could have guessed there would be such passion and generosity from so many contributors around the world. We are grateful. It motivates us to fight even harder for everyone to have the safe, secure, and empowering digital life they deserve. The challenges around the state of the internet are daunting: disinformation, algorithmic bias and discrimination, market consolidation and weak competition, and hate speech and online bullying. But with the creativity and strength we gain from our contributor communities, we're up for the fight.

See an interactive network view of Mozilla's contributor communities

https://report.mozilla.community

THE MOZILLA FOUNDATION AND CORPORATION

This report focuses largely on the contributor communities associated with the Mozilla Corporation, the maker of the Firefox family of products and a broad range of open source technologies that help keep the web open. However, much of Mozilla's community engagement is also led by the Mozilla Foundation, which is the sole shareholder in the Mozilla Corporation. The Foundation focuses on fueling a broad, global movement for a healthier internet by working with communities around the world — such as digital rights organizations in Europe and privacy activists in Latin America — that share Mozilla's principles and ambitions for a more human-centered internet.

With the infrastructure and capabilities we've set up through this research, we expect that future reports on Mozilla's rebel alliance will be better able to give a more holistic view of Mozilla's contributor communities, including the Foundation's community-focused efforts.

Still, this report does describe several of the Foundation's key expert networks and community building programs — the Mozilla Fellowship and Awards — as well as the annual Internet Health Report and Mozilla Festival. Please see the Rebel Alliance of Experts, Influencers, and Students section for more details.

NOTES ON THE DATA

These analyses are based on contribution data from five different contribution platforms: GitHub/Git, Bugzilla, Kitsune (Support), Pontoon (Localization), Kuma (Mozilla Developer Network), and the Add-ons database. Note that the Common Voice contribution data for all analyses are for only for code contribution to GitHub/Git and localization contributions, except where noted in the section specific to the Common Voice project. Also included are insights from a qualitative survey of contributors conducted between April and May 2019.

Contribution data from Firefox OS, a large, multi-year effort to build a mobile operating system based on web technologies that was cancelled in 2016, is not included in the quantitative results here. While Firefox OS proved effective at mobilizing contribution, as a special investment, that data represents an outlier when drawing historical trends from Mozilla's current portfolio of products and technologies. Accordingly, Firefox OS data is only included in the survey results in the context of past contributions.

Additionally, we know there are some inaccuracies in the data. For example, we are aware that we did not include the full set of repositories related to Firefox for Android. Please see the Appendix section on data reliability for more information.

This report takes a high-level view of contributor engagement, with a focus on describing the network and set of communities that function as an ecosystem around Mozilla. In some cases, Mozilla employee contributions are included in the analyses, such as to highlight contrasts. These instances are clearly marked. Otherwise, the analyses include only non-employee contributors.*

** Non-employee: a person not hired by Mozilla as staff or contractor at that time. Employee: a person hired by Mozilla as staff or contractor during that time.*

This report also tells an incomplete story about the value of Mozilla contributions. Moreover, as we openly call for and rely upon contributions of all kinds, we don't claim that one type of contribution is more valuable than another. In describing the contributor communities and segments and how they are networked, this report counts code commits the same as comments or issues.

Understanding the Rebel Alliance

Definitions

PLATFORMS	DATA SOURCE	WHAT COUNTS AS A CONTRIBUTION?	THE KEY NUMBERS NON-EMPLOYEES	THE KEY NUMBERS EMPLOYEES
GITHUB/GIT	**SOURCE:** 1,313 repositories, 48 projects **PERIOD:** CVS and Mercurial: 1998-2019 Git: 2005-2019 GitHub/Git: 2010-2019	*Commits (git)* *Issues (GitHub/Git)* *Pull requests (GitHub/Git)*	CONTRIBUTORS 39,129 CONTRIBUTIONS 1,088,739	CONTRIBUTORS 2,095 CONTRIBUTIONS 1,672,276
BUGZILLA	**SOURCE:** Bugzilla **PERIOD:** 1998-2019	*Creating a bug*	CONTRIBUTORS 158,596 CONTRIBUTIONS 514,511	CONTRIBUTORS 2,817 CONTRIBUTIONS 435,310
KITSUNE (SUMO, OR MOZILLA SUPPORT)*	**SOURCE:** Kitsune **PERIOD:** 2008-2019	*Revision, review or draft revision of KB articles* *Question or answers in question forum* *Twitter response through Army of Awesome* *Creation of thread or post in contributor forum* *Creation of thread or post in KB forum*	CONTRIBUTORS 429,226 CONTRIBUTIONS 1,809,455	CONTRIBUTORS 397 CONTRIBUTIONS 69,356
PONTOON (MOZILLA LOCALIZATION)	**SOURCE:** Pontoon **PERIOD:** June 2013-2019	*Translations* *Reviews* *Rejection, approval*	CONTRIBUTORS 1,884 CONTRIBUTIONS 2,043,268	CONTRIBUTORS 149 CONTRIBUTIONS 654,271
KUMA (MDN, OR MOZILLA DEVELOPER NETWORK)	**SOURCE:** Kuma **PERIOD:** 2005-2019	*KB article revisions*	CONTRIBUTORS 46,602 CONTRIBUTIONS 475,169	CONTRIBUTORS 993 CONTRIBUTIONS 359,330
AMO (FIREFOX ADD-ONS)	**SOURCE:** Add-ons, mozilla.org **PERIOD:** 2008-2019	*Creating add-on (extension and theme)* *Updating add-on*	CONTRIBUTORS 217,085 CONTRIBUTIONS 289,188	CONTRIBUTORS 186 CONTRIBUTIONS 875

** Note that SUMO analyses do not include Twitter data through the Reply by Buffer application. We were unable to include that new data source. SUMO stands for SUpport.MOzilla.org*

Several high level questions came to mind to the authors and editors of the report, including:

- *How should we quantify the value of a contribution?*
- *How should we quantify investment per contribution area?*
- *Are there differences in contribution and contributors to Mozilla infrastructure versus other areas of participation? (e.g. code contribution to the Kuma platform behind MDN, IT/Ops?)*
- *Can we recognize when a community member is running into problems that hinder further engagement?*
- *Are there effective, scalable interventions in these cases?*
- *Can we identify a new contributor who is likely to engage across multiple projects?*
- *How can we better support our community members in their personal goals?*

These are just some of the questions we pose throughout and hope to begin answering within this report.

Have questions or suggestions? Please connect with us at: rebelalliancereport@mozilla.com

More details on the report's methodology, definitions, and additional notes of caution are in the Appendix.

Visualising the Rebel Alliance

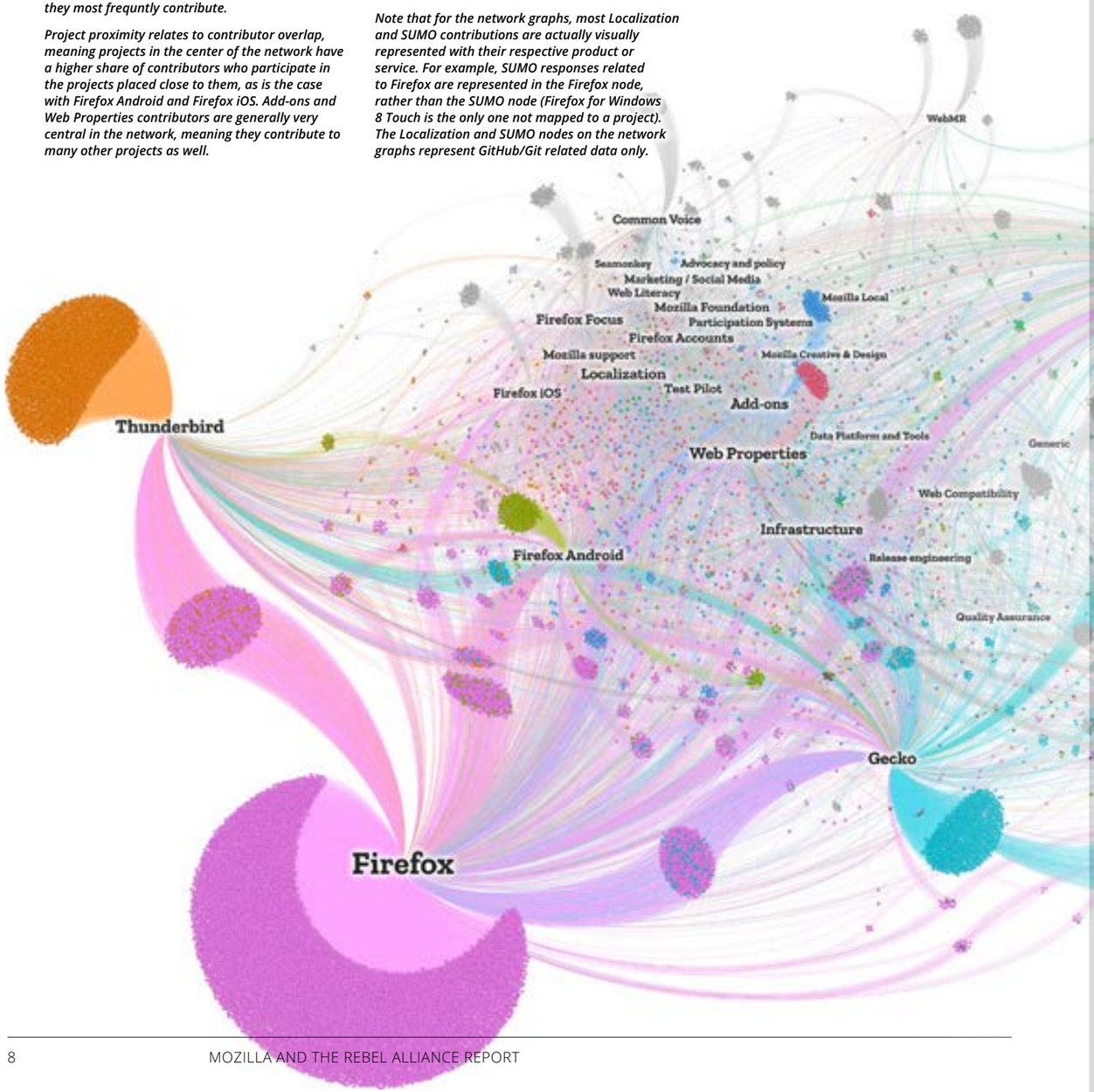
Network visualization of Mozilla and the Rebel Alliance by project activity (2017-2019)

Each node (circle) represents a single contributor, and the edges (lines) represent contributions from participants to different Mozilla projects. Each contributor is color-coded by the project to which they most frequntly contribute.

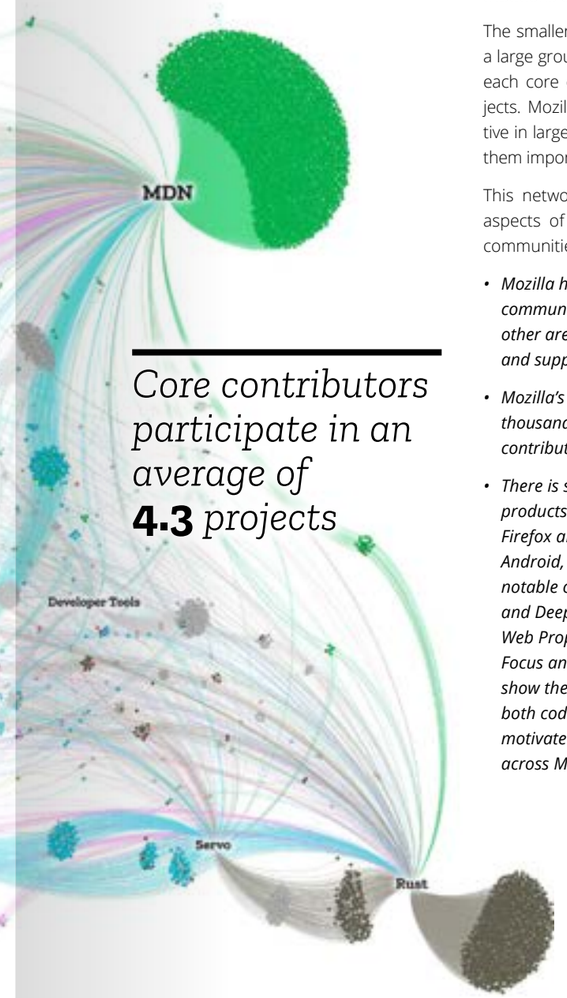
Project proximity relates to contributor overlap, meaning projects in the center of the network have a higher share of contributors who participate in the projects placed close to them, as is the case with Firefox Android and Firefox iOS. Add-ons and Web Properties contributors are generally very central in the network, meaning they contribute to many other projects as well.

Some of the big projects (larger labels) are at the periphery since they have a whole community of contributors who only participate in these specific projects (e.g. Firefox, Thunderbird, MDN, Rust).

Note that for the network graphs, most Localization and SUMO contributions are actually visually represented with their respective product or service. For example, SUMO responses related to Firefox are represented in the Firefox node, rather than the SUMO node (Firefox for Windows 8 Touch is the only one not mapped to a project). The Localization and SUMO nodes on the network graphs represent GitHub/Git related data only.



FIREFOX	46.73%
MDN	15.71%
THUNDERBIRD	11.85%
GECKO	6.68%
RUST	5.96%
FIREFOX ANDROID	1.47%
WEB PROPERTIES	1.29%
ADD-ONS	1.21%
SERVO	1.03%



Core contributors participate in an average of **4.3** *projects*

For the first time, we're able to visualize the network structure of Mozilla's rebel alliance of contributors by mapping individual contributors per project, based on data from our main contribution platforms. This network graph reflects non-employee contributor engagement between 2017 and 2019, but does not include any contributor that has made less than 5 contributions over their lifetime.*

The smaller communities in the center include a large group of core contributors. On average, each core contributor participates in 4.3 projects. Mozilla contributors also tend to be active in larger projects on the periphery, making them important bridges across communities.

This network lens demonstrates several key aspects of the state of Mozilla's contributor communities:

- *Mozilla has several well-defined contributor communities clustered around products and other areas of contribution, like localization and support.*
- *Mozilla's largest communities have thousands of participants who only contribute to that project.*
- *There is strong cross-contribution between products such as Firefox and Thunderbird, Firefox and Gecko, Firefox and Firefox Android, and Rust and Servo. There's also notable overlap between Common Voice and Deep Speech, Infrastructure and Gecko, Web Properties and Firefox, and Firefox Focus and Localization. These overlaps show there is a set of contributors—offering both code and non-code contributions—motivated to contribute to multiple projects across Mozilla.*
- *Contributor communities such as Add-ons and Web Properties** are central to the network. Their contributors are highly interconnected to many other Mozilla projects.*

This network view also makes clear that community participation in Firefox and Gecko appears strong. This view is corroborated by recent survey results in which 49% of respondents who contributed to Mozilla in the past year reported that their contributions were to Firefox specifically (in the context of this survey, Firefox represented contributions to Gecko as well). For a deeper dive into the specific categories of non-employee contribution to Gecko and Firefox (e.g. code versus other), see the section Open Source Projects: Towards an Understanding of Open Source Health.

FOR FURTHER RESEARCH

- *Which contributor communities act as the biggest 'onramps' to participation across multiple projects?*
- *What causes contributors to participate in multiple Mozilla projects?*
- *What do we know about the 'lifecycle' of non-staff contributors?*
- *What can we understand from looking at the social connectedness and links between projects?*

** We define this group as the 'visitor' segment.*

*** Please see the Appendix for definitions of Web Properties and Infrastructure.*

Overall View of Contribution

As the graphs here show, 2009 was an inflection point for Mozilla in engaging non-employee contributors. Overall contributor numbers rose rapidly after 2009, coinciding with the launch of new projects like Rust and WebMR. Excluding localization data from the Pontoon contribution platform, in which changes in 2014 significantly skewed results upward, contribution volume from non-employees and staff has risen at a similar pace since 2009. Notably, on average, employees contribute more than 12 times the volume of contributions as their non-staff counterparts.

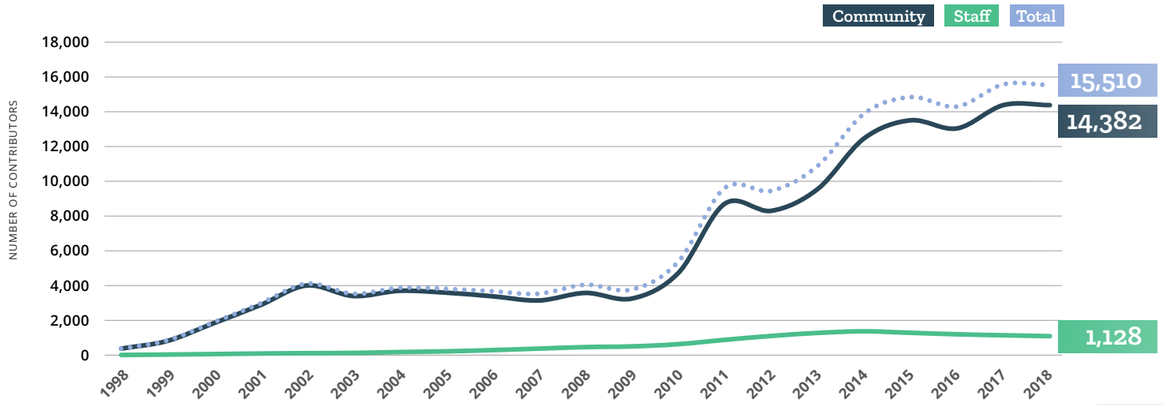
In 2018, 52% of all contributions to Mozilla were from community members (again excluding Pontoon). Contributions include everything from code commits and pull requests to revisions of MDN articles and answering support questions.

However, tracking and analyzing contribution volumes is only one step towards understanding the health, attractiveness, and impact of Mozilla's contributor communities. This generic view doesn't provide insight into community dynamics, motivations, productivity, quality or mutually shared values, and should not be taken to mean that only numbers of people and the volume of their contributions matter.

With that strong caveat, this data analysis does provide a useful overall picture. Non-employee engagement and contribution volumes are a proxy for public support of our mission, our message, and our product vision. Any decline in community engagement in the face of new projects and Mozilla investments would certainly indicate a problem. When we break these overall numbers down by contribution platform and project later in this report, there are no significant dips or big surprises from any of our main areas of participation.

Although we don't analyze measurable value and impact of these non-employee contributions, this quantitative analysis signals their significance to Mozilla's mission and market success.

Non-employee contributors continue to grow...



Yearly number of contributors by staff or community

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Excluded*
TIME *1998-2018*

Understanding the Rebel Alliance

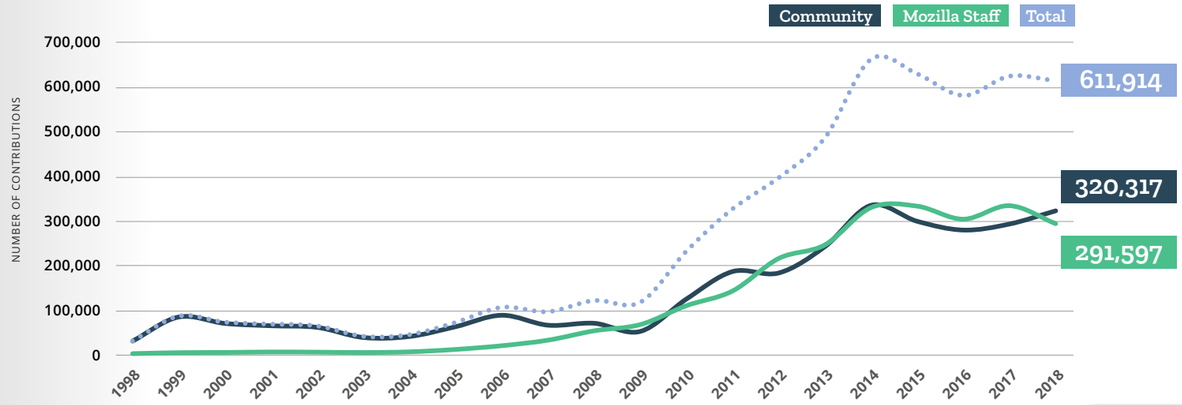
FOR FURTHER RESEARCH

- *What is a productive and sustainable ratio of non-employee to employee contributors?*
- *How can we make this type of determination?*

52%

of all contributions to Mozilla in 2018 were from community members

After peaking in 2014, contribution volume is now relatively stable. However, the average contribution volume per staff member was 12 times higher than that of non-staff contributors in 2018



Yearly number of contributions by staff or community contributors (excluding Pontoon)

DATA *All contributions from contributors with more than 5 contributions, excluding Pontoon*
STAFF *Excluded*
TIME *1998-2018*

Commercial Contribution

Mozilla has traditionally conceived of our contributor communities as being powered by individual volunteers who are largely motivated by Mozilla's mission. However, our products, technologies, and mission bring value to commercial organizations as well. Fostering co-development and collaboration with these commercially-vested contributors – even those with whom we have signficant differences of opinion or with whom we compete – can increase our market and mission impact.

Here, we evaluate commercial contribution to Mozilla across all platforms with a specific focus on contribution from the 28 commercial organizations identified in 2018 as having particular strategic value to Mozilla.

We've identified 1,268 contributors from these companies, with the top ten commercial contributor organizations being:

DOMAIN	NUMBER OF CONTRIBUTORS
google.com	530
microsoft.com	166
oracle.com	123
cisco.com	92
yandex.com	74
hp.com	59
apple.com	49
fb.com	45
amazon.com	27
dell.com	16

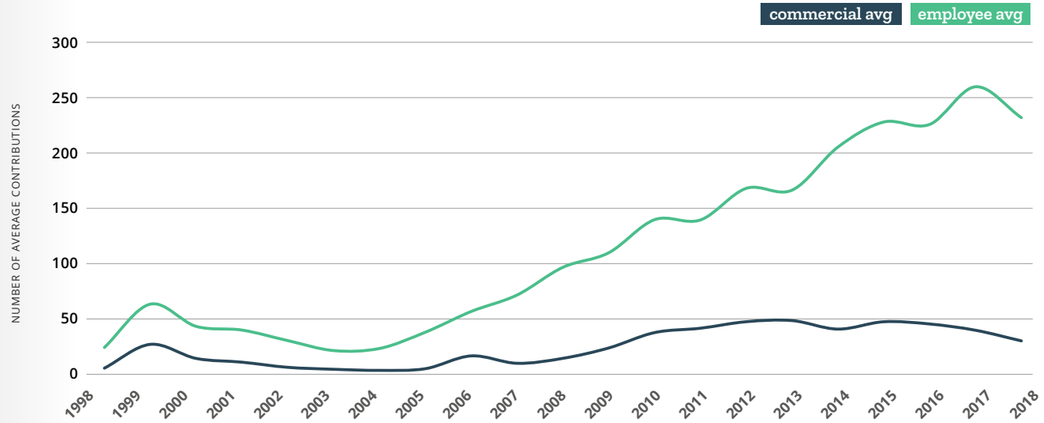
By contribution volume, the following five companies topped the pack. Note that Google contributors offered almost double the combined volume of contribution from Microsoft, Oracle, Apple, and Facebook. However, commercial contribution is decreasing.

DOMAIN	CONTRIBUTION VOLUME
google.com	52,672
microsoft.com	9,587
oracle.com	7,816
apple.com	7,433
facebook.com	2,449

Mozilla's GitHub/Git repositories were by far the biggest destination for these contributions, with 68% of all volume by these key commercial organizations. The top five projects for contribution were Gecko (26,576), Quality Assurance (20,230), Mozilla Developer Network (13,925), Rust (7,463) and Firefox (5,525).

Google leads commercial contribution, with almost double the combined volume of Microsoft, Oracle, Apple, and Facebook. However, commercial contribution has been declining since 2015

Average volume of employee contributions is increasingly outpacing average volume from our strategic commercial collaborators

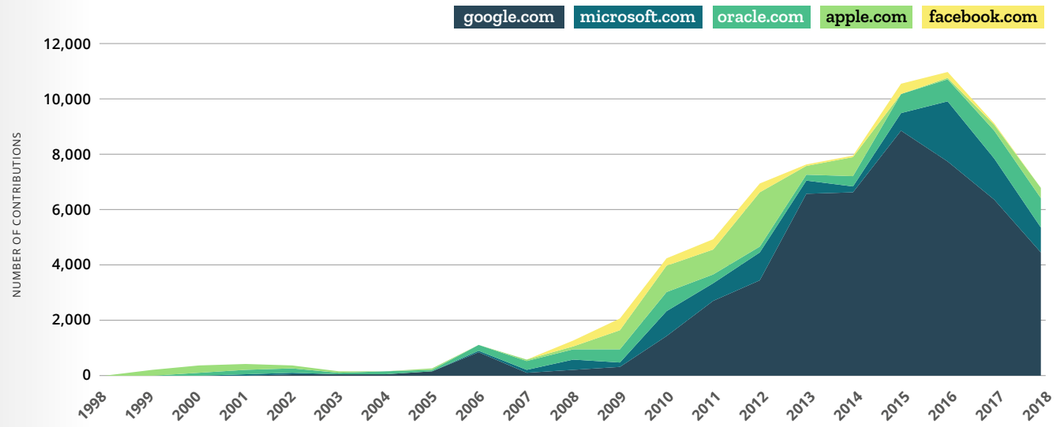


Yearly average contributions - commercial partners and employees

Note: This view excludes Pontoon

DATA *All platforms, excluding Pontoon*
STAFF *Excluded*
TIME *1998-2018*

Google has been the backbone of overall commercial contribution since 2010, but its volume has dropped dramatically since 2015. Apple's contribution peaked in 2012. Microsoft and Oracle mainly appeared on the scene in 2016 and 2017, respectively

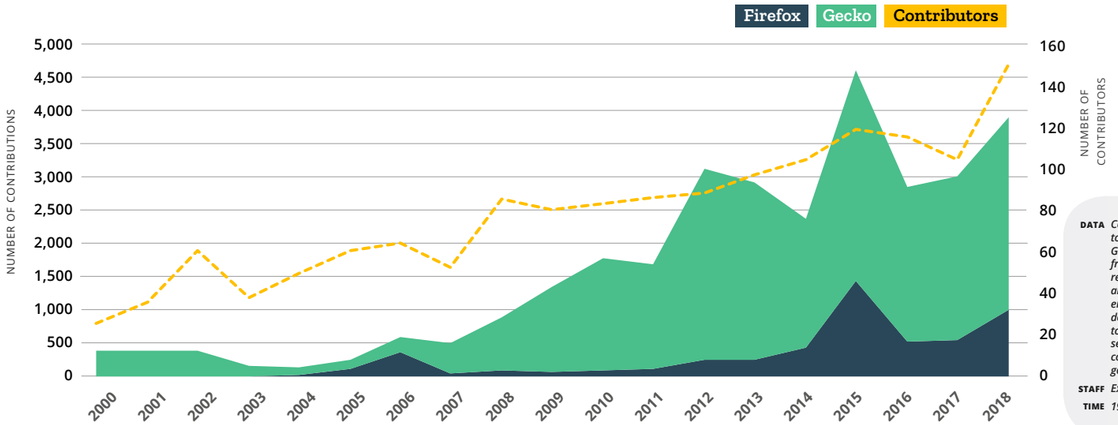


Yearly added contributions from top 5 commercial partners

DATA *All platforms*
STAFF *Excluded*
TIME *1998-2018*

Commercial Contribution to Firefox and Gecko

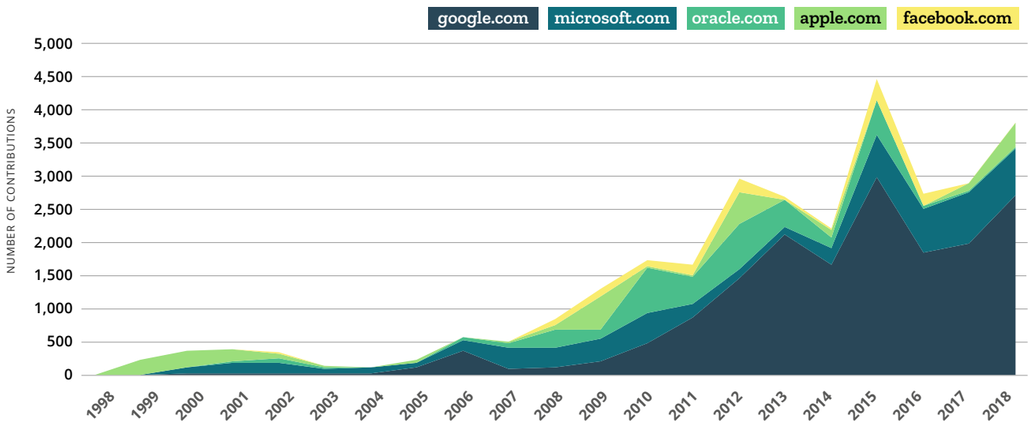
Contrary to the overall view, code-focused contribution to Gecko and Firefox from commercial partners has been rising, after a spike and fell around 2015. Contributor numbers have also grown, landing at 151 in 2018



External partners contributions to Firefox and Gecko

DATA *Contributions to Git/GitHub/ Git and Bugzilla from contributors registered with an email address ending with a domain belonging to one of 34 select commercial contributors (e.g. google.com)*
STAFF *Excluded*
TIME *1998-2018*

Google contributes dramatically more to Firefox and Gecko through GitHub/Git and Bugzilla than other commercial contributors and was largely responsible for the 2015 and 2018 spikes



Top 5 commercial contributors to Firefox and Gecko

DATA *Contributions to Git/GitHub/ Git and Bugzilla from contributors registered with an email address ending with a domain belonging to one of 34 select commercial contributors (e.g. google.com)*
STAFF *Excluded*
TIME *1998-2018*

Commercial Contribution to Rust

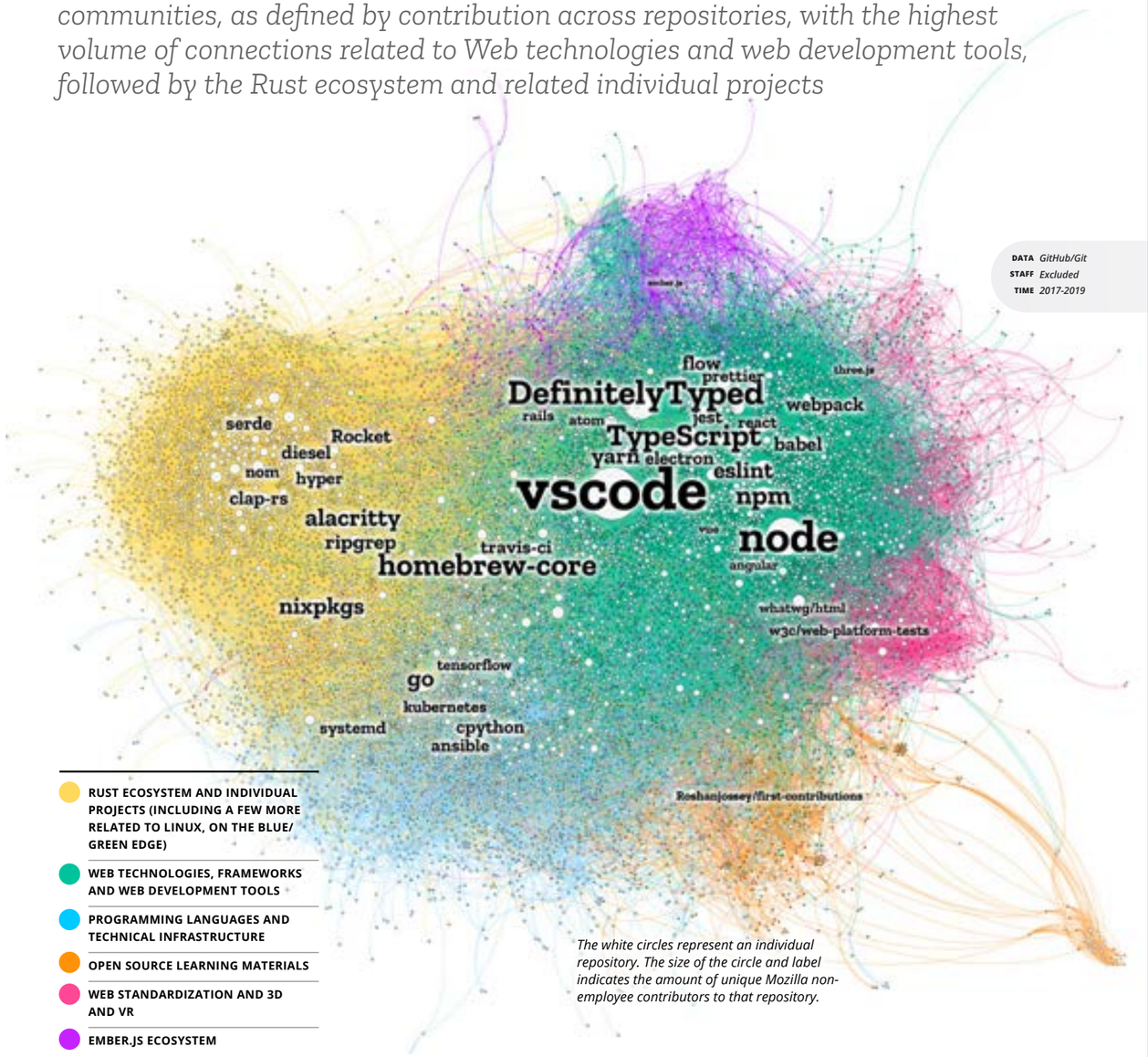
Commercial companies contribute to Rust in various ways, from sponsoring conferences to developing key parts of the ecosystem and supporting the core Rust project, either through co-development or in-kind donations. Mozilla is considering how we might create a governance structure to enable more direct support. For example, Microsoft's Azure team now provides Rust's CI support for free, while Amazon has offered credits to sponsor Rust's S3 costs. Several Google employees actively contribute to the compiler, and the company has been instrumental in shipping the async-await feature. More recently, Facebook has also begun to use Rust, although their co-development participation has so far been limited.

Mozilla's External Network Influence

The rebel alliance of Mozilla contributors helps us influence the industry, share our expertise and learn from more diverse views, and align upstream dependencies and encourage downstream adoption. Evaluating the full breadth and reach of all Mozilla's contributor communities is too challenging of an endeavor, but it would be useful to better understand the specific ecosystems in which our open source communities function. In our contributor survey, 56% of active participants said they participate in other free and open-source software (FOSS) projects – an increase from 43% in 2017. Our contributors' active participation in other FOSS initiatives suggests interconnectivity with peer projects and potential areas for greater collaboration and partnerships. Indeed, this interconnectedness can help us better understand technology embeddedness, fork and spin-off opportunities, and upstream dependencies, all of which are core to an ecosystems-focused understanding of Mozilla's open source health.

We've only just begun to scratch the surface of a network view of Mozilla and other projects as defined by GitHub/Git data. Combined with our standards activities and the expert advocacy networks built through the work of the Mozilla Foundation and the Mozilla Fellows program, research grants, and awards programs, we are just beginning to map the full influence and capacity of the rebel alliance.

The Rebel Alliance around Mozilla has strong connections to other open source communities, as defined by contribution across repositories, with the highest volume of connections related to Web technologies and web development tools, followed by the Rust ecosystem and related individual projects

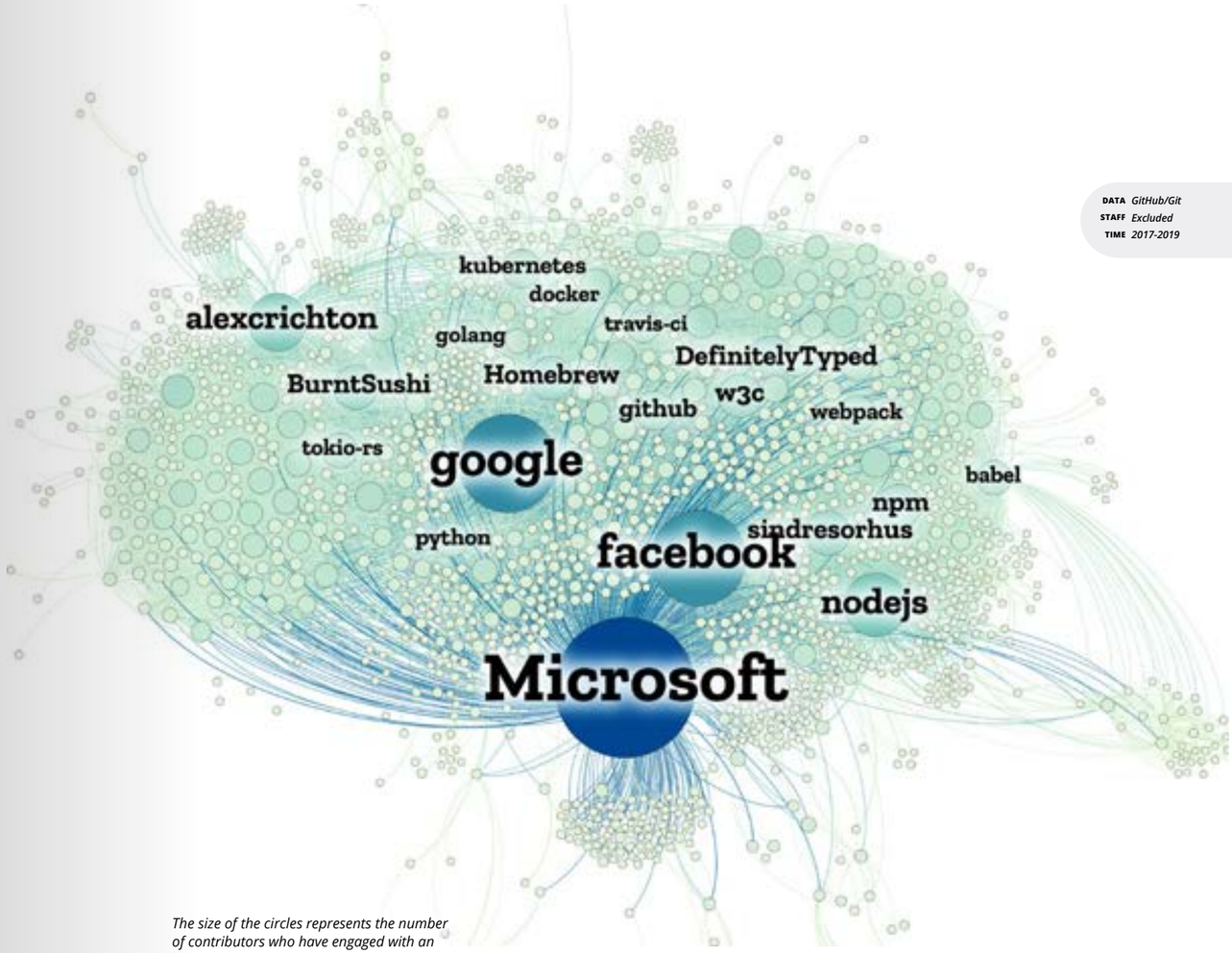


The white circles represent an individual repository. The size of the circle and label indicates the amount of unique Mozilla non-employee contributors to that repository.

This network graph shows to which other GitHub/Git projects Mozilla participants also contribute, giving us an indication of the ecosystem of open source projects around Mozilla and the relative strength of their connections (see the Appendix for details on methodology and see page 82 for a similar analysis for WebMR).

Unsurprisingly, most connections between Mozilla's open source work and the broader open source ecosystem are around web technologies, frameworks, and tools, such as node.js, react, and angular; Atom and Electron; and Visual Studio Code.

Microsoft, Google and Facebook manage the open source repositories with the highest numbers of Mozilla non-employee contributors



The size of the circles represents the number of contributors who have engaged with an organizations' repositories, as measured by commits, issues and pull requests.

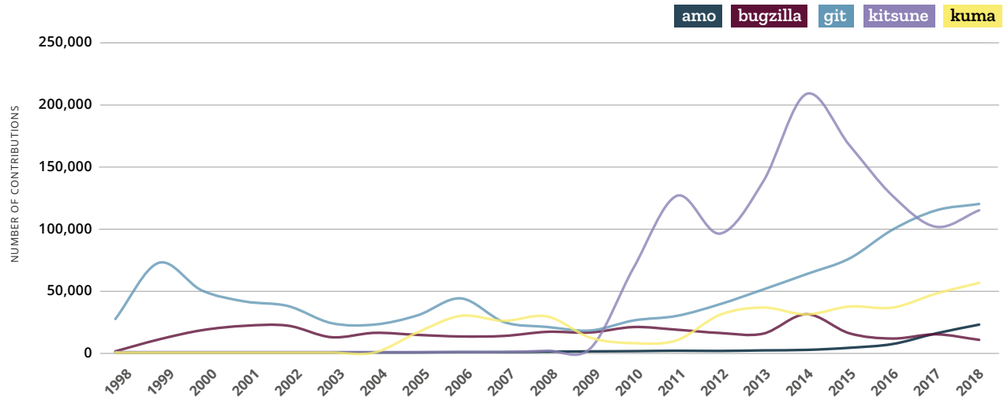
About 1,000 non-employee Mozilla contributors have also contributed to Microsoft-related open source projects, closely followed by Google and Facebook, with 685 and 662 respectively. Node, Homebrew, npm, W3C and GitHub/ Git also stand out, along with a few individual owners who maintain Rust related open source projects.

FOR FURTHER RESEARCH

- *Can we describe our rebel alliance in terms of adoption of Mozilla's technology into other projects, such as Rust and AV1?*
- *Can we describe our rebel alliance in terms of upstream dependencies on other open source projects?*

Platform Specific View of Contribution

All Mozilla contribution platforms and communities are experiencing growth, except Bugzilla (registered bugs), which is flattening out. The peak in Kitsune (Support) was driven by non-staff activity on Twitter



Yearly number of contributions by platform, excluding Pontoon (localization)

DATA *All contributions from contributors with more than 5 contributions, exclusing Pontoon*
STAFF *Excluded*
TIME *1998-2018*

Kitsune stands out as the most isolated platform, indicating a specialization in support, while non-employee contributors to Kuma (MDN) are the most likely to contribute through other platforms

	PONTOON	GIT	KITSUNE	KUMA	BUGZILLA	AMO
PONTOON	100%	10.1%	1.0%	2.8%	1.9%	1.9%
GIT	73.0%	100%	2.5%	15.3%	18.3%	9.4%
KITSUNE	19.1%	6.7%	100%	8.0%	17.8%	9.6%
KUMA	18.3%	14.0%	2.7%	100%	12.6%	9.7%
BUGZILLA	22.3%	29.1%	10.7%	22.0%	100%	14.1%
AMO	5.5%	3.8%	1.4%	4.3%	3.5%	100%

Shares can be understood by by following the columns. For example, by looking at the column for Kuma, we see 22% of Kuma contributors are also active on Bugzilla. If we follow the Bugzilla column, we see these 'bridgers' account for 13% of the Bugzilla contributors.

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Excluded*
TIME *1998-2018*

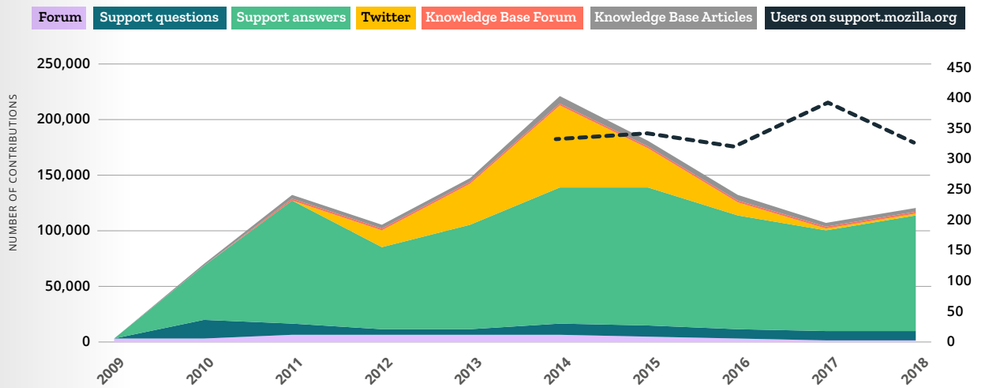
The table shows the share of contributors active on one platform who are also active on other platforms (column share).

The previous overlap matrix shows some interesting traits about Mozilla's various platforms and communities. For example, 73 percent of Pontoon (Localization) contributors are also active on Git/GitHub. Furthermore, 29% of Git/GitHub contributors are also present in Bugzilla. AMO and Kitsune contributors tend to contribute in a more isolated manner to their respective platforms. It's interesting to note that the Kitsune platform appears to have the smallest percentage of overlap with other contribution platforms.

Note that this report does not analyze non-employee code contribution to the open sourced contribution platforms we maintain, such as for Kuma (MDN), Kitsune (Support), and AMO (Add-ons). Code contribution to these platforms is included in our overall look at GitHub/Git contribution. Future reports should consider looking more specifically at these repositories and other areas that comprise Mozilla's technical infrastructure.

SUMO (MOZILLA SUPPORT)

SUMO attracts the highest traffic to Mozilla. Contribution volume – largely driven by answering support questions, with a spike from Twitter activity in 2014 – tracked visitor numbers between 2014-2016 but then went in opposite directions

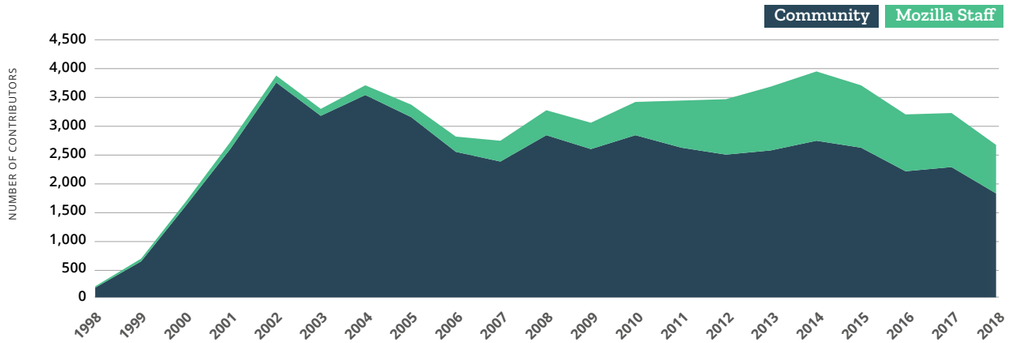


Support | Yearly development of contributions compared with visitors on the site

DATA *All contributions from contributors with more than 5 contributions.*
Number of users on support.mozilla.org is from Google Analytics
STAFF *Included*
TIME *2009-2018*

SUpport.MOzilla.org, or SUMO, is one of Mozilla's oldest contributor communities. As a contributor-led effort dating back to Mozilla's inception, many volunteers have as much insight into the product as any employee. It's also one of Mozilla's most active communities, comprising the largest chunk of contribution volume. The community provides support across many channels, but the primary focus is on Twitter and our support.mozilla.org forums. On these platforms, non-employee contributors are integral to our average 11.5h turnaround on initial response time on support forums, and 2d 13h on Twitter. On average, non-employees answer 382 questions in Twitter.

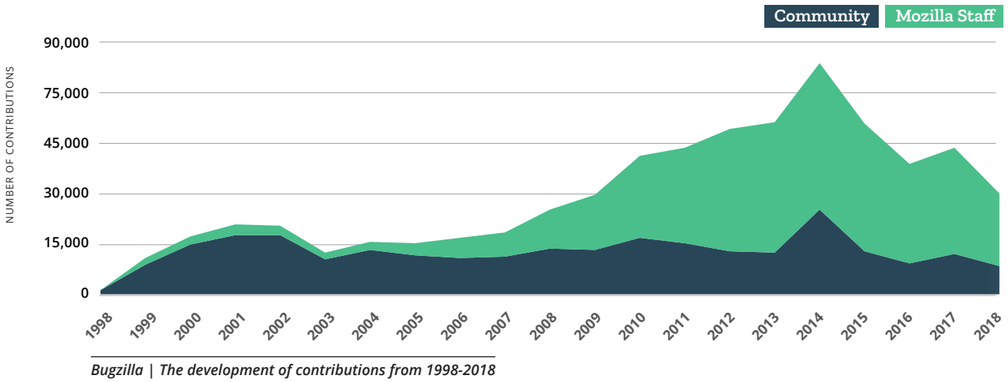
Bugzilla contributor numbers have declined gradually since 2014. The share of employees has remained steady at around 30% from 2013-2018



Bugzilla | The development of contributors from 1998-2018

Overall non-employee Bugzilla contributor numbers have been declining. New non-employee contributors to Bugzilla were at their highest in 2002 (1808), but only 413 new contributors joined last year. However, one-year contributor retention remains relatively steady across time, landing at 42% last year down from a high of 53% in 2008, suggesting that the problem lies more in attraction rather than retention.

Bug creation by staff has outpaced non-employee contributions since 2009, but overall bug contributions have declined sharply since 2014

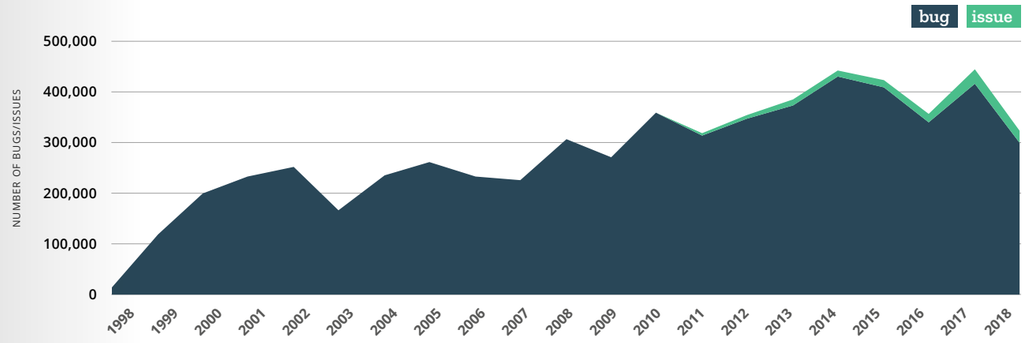


Bugzilla | The development of contributions from 1998-2018

Bugzilla contribution volume has had peaks and valleys, with those from Mozilla staff generally following the non-staff pattern until a significant upwards break by staff in 2009, with a peak variation in 2014. Since then, staff and non-staff contribution have both dropped, but that volume differentiation has remained stable. Bug contributions in Bugzilla are dropping.

This analysis of Bugzilla contributions only takes bug creation into account and does not reflect comments on bugs. These comments are a rich and complex source of data that could be incorporated in any future analyses.

Some flattening of bugs and issues registered to Gecko and Firefox after years of steady increases



Filed bugs and issues to Gecko and Firefox

Looking exclusively at Bugzilla bug filing and GitHub/Git issue filing volume for Firefox and Gecko, we see that Bugzilla is still the main platform for filing bugs. After its deployment in 2010, GitHub/Git saw an increase of issues for Firefox and Gecko year over year, peaking in 2017 with 3,017 registered issues. Still, GitHub/Git does not seem to have taken over the main share of filed bugs. This historical view seems to indicate that registration of Firefox and Gecko bugs and issues on the respective platforms has been flattening out in the past few years. It's too early to tell if the year-over-year decline between 2017 and 2018 is the first sign of an ongoing trend or an isolated event.

Again, for a more complete view of contribution to Firefox and Gecko, please see the Open Source Health section.

FOR FURTHER RESEARCH

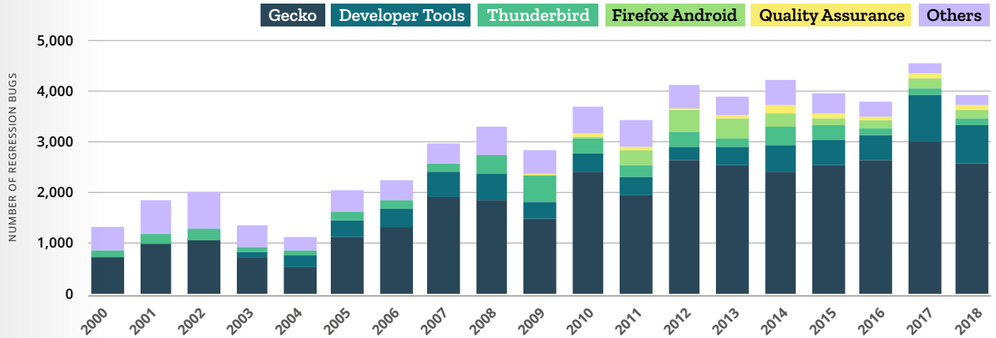
- *What can we learn from comments within Bugzilla? Might this inform our understanding of social connectedness?*
- *How might we analyze non-employee contribution to Bugzilla in terms of value? For example, how many of the bugs submitted by non-employees end up being triaged as 'need to fix'?*
- *What's behind the decrease in bug filing for Firefox and Gecko, and does this mean anything to product quality and user retention?*
- *Survey data seems to indicate that many people sign up to participate but don't actually make a contribution. Is this the case for Firefox/Gecko and bug identification in Bugzilla?*
- *How do we identify contributors that take on the most difficult bug fixes?*

For this report, the Firefox engineering team requested that we examine the role of non-employees in identifying regression bugs. A regression is a bug that makes a feature stop working after a recent patch or update, and they are defined in the bug's keyword.

Finding and filing regression bugs helps Mozilla continue delivering dependable, high-quality software. With Firefox release engineering moving from a six to four-week release cycle, identifying and resolving bugs is even more important. Rapid turnaround on regression bug fixes also impacts browser retention rates and usage.

Interestingly, when compared to filing of ***all*** bugs in Bugzilla, community filing of regression bugs outpaces employee contribution and has remained steady and significant over time.

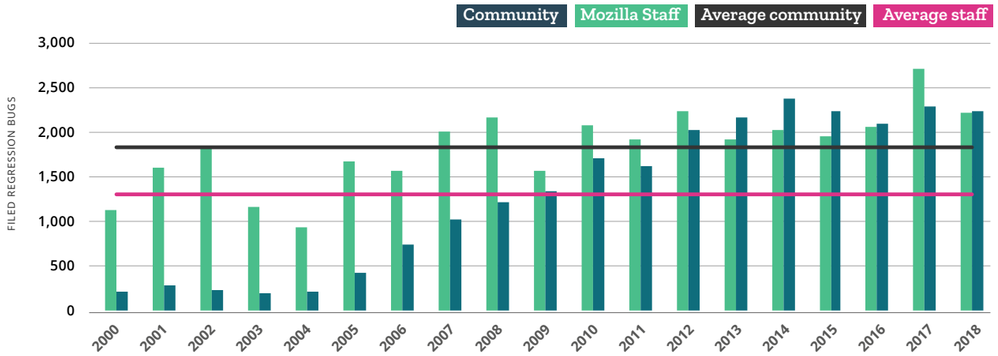
Gecko and Developer Tools have the most filed regression bugs



Regression bugs by project – yearly development

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *2000-2018*

Community contributions make up 58% of all filed regression bugs – at an average of 1,800 per year – and have been stable in volume as compared to staff contributions, which have almost always lagged community

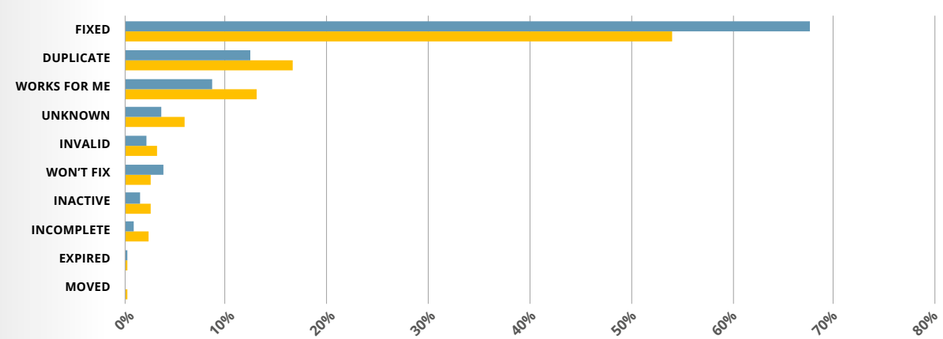


Development of filed regression bugs (yearly)

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *2000-2018*

Almost eleven thousand non-employee contributors filed regression bugs between 2000 and 2018. Though far more limited in numbers, staff members tend to be much more productive contributors, filing an average of six to seven bugs per individual compared to the 2.5 bugs per non-employee contributor. It's notable that there are relatively few non-employee contributors to MDN who also file regression bugs. One would expect more engagement from this web developer crowd.

Staff-filed regression bugs have a higher chance of being fixed, while community bugs are more often dismissed



Bug resolution

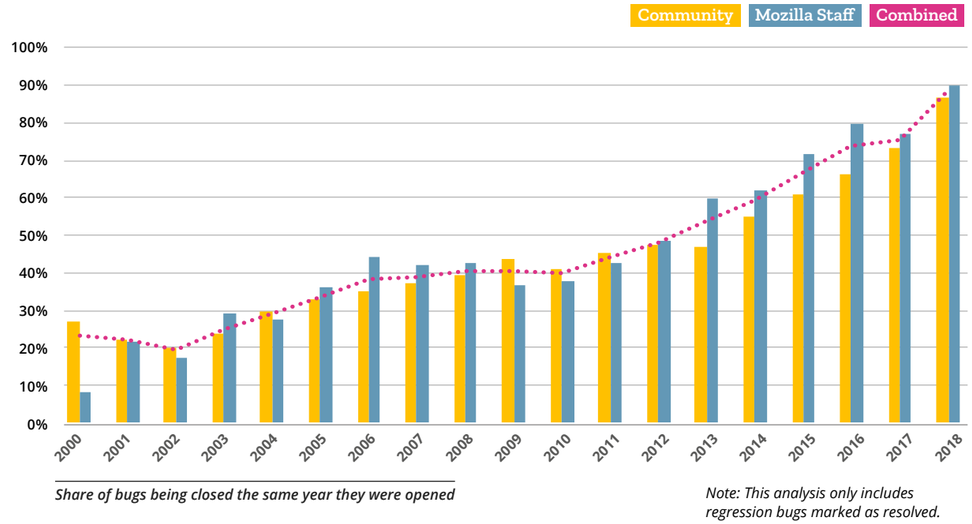
DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *2000-2018*

Promisingly, more than half of all non-employee regression bugs are validated and fixed. Still, bugs filed by community members have a higher chance of being dismissed. This could be due to problems in the contribution experience or even bias. For example, might bugs from non-native English speakers be treated differently?

There is a notably low percentage of WONTFIX bugs from non-employee contributors—less than from staff—suggesting that non-employee contributors aren't asking for features we've removed. This could be confirmed in the future by understanding how WONTFIX bugs break down into the categories of task, enhancement, and defect.

Looking at regression bugs opened and closed in the same year, those from non-employees closed on average 9% faster than those from non-employees (43.6 versus 39.5 days). The share of bugs closed in the same year they were opened has steadily risen since 2010, with a negligible difference between staff and community recently, suggesting a well functioning workflow.

The overall efficiency of regression bug closures is improving for both community and staff



DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *2000-2018*

Share of bugs being closed the same year they were opened

Note: This analysis only includes regression bugs marked as resolved.

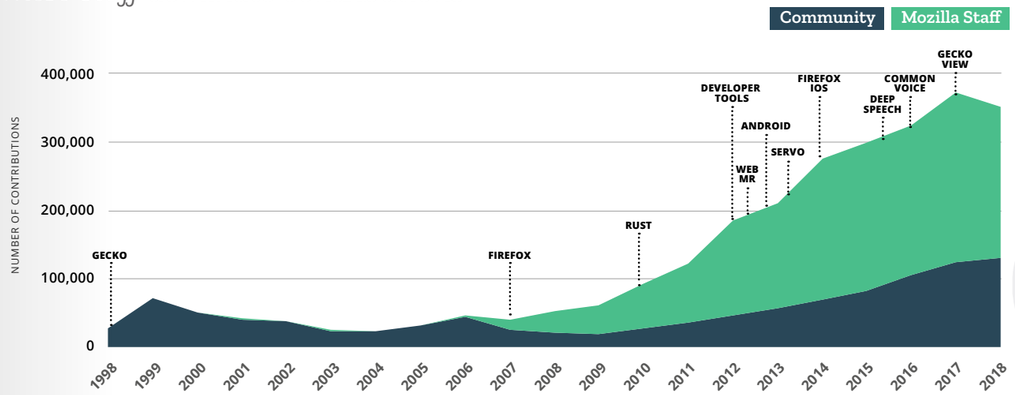
FOR FURTHER RESEARCH

- *What is the distribution of resolutions of non-employee filed regressions?*
- *How might we better engage non-employee contributors around regression bugs?*
- *How might we better activate our MDN developer community around filing regression bugs?*
- *How does bias impact the bug fix process, and how might this impact any automated triage work?*

In contrast to Bugzilla, the number of both employee and non-employee contributors to GitHub/Git has steadily increased since 2011, with the number of staff contributors remaining stable at around 900 contributors between 2013 and 2018.

GitHub/Git is one of the rare platforms for which cumulative employee contributions far outweighs contributions from the broader community, with 62 percent of all contributions attributable to employees.

Mozilla's open source projects are now mainly co-developed through GitHub/Git, where staff dominate contributions

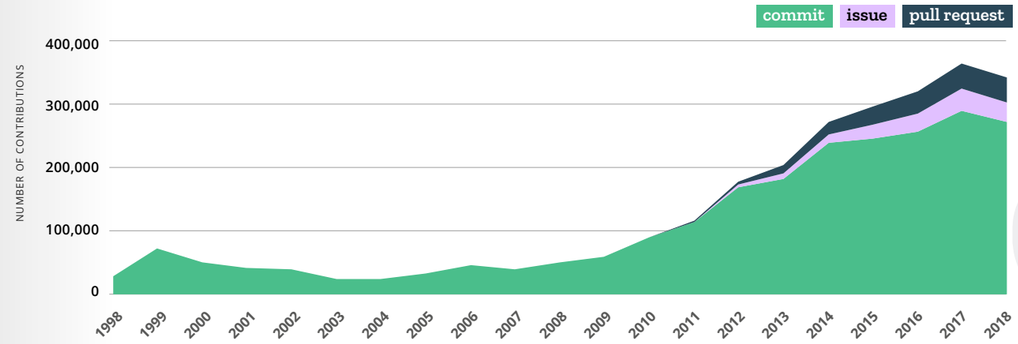


DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *2000-2018*

GitHub/Git | Yearly development of contributions from 1998-2018

Note that the Gecko data that starts in 1998 is the mirroring of gecko-dev.

Growth in GitHub/Git contribution comes from commits. Gecko and Firefox brought in 60%, followed by Infrastructure, Rust, and Web Properties



DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *1998-2018*

GitHub/Git | Yearly development of contribution types from 1998-2018

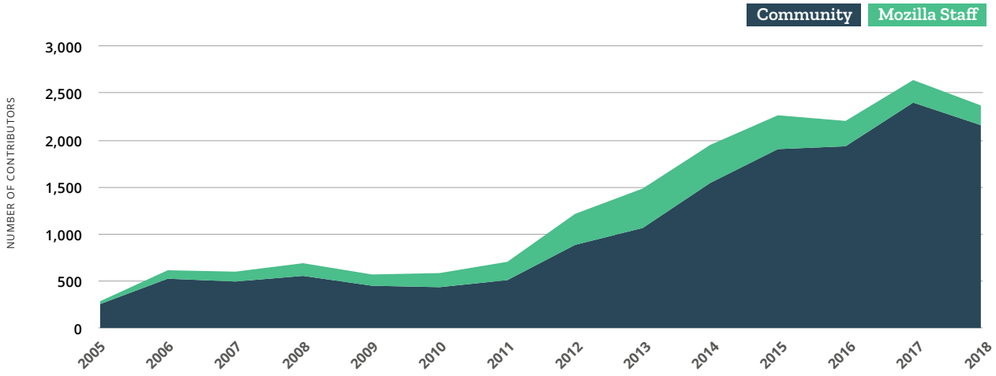
The growth in commits across our projects far outweighs the growth of issues and pull requests.

Despite the rise in contributor numbers, there was a 6% dip in ***overall*** contributions to GitHub/Git between 2017 and 2018. This reduction is attributable solely to employees, as community contributions actually rose over the same time period. This is a small reduction, and it's too early to say if projects are stabilizing in terms of contribution volumes. Projects that experienced a fall in contributions include: Servo (40%), Localization (28%), Firefox (27%), Web Properties (14%) and Gecko (13%).

Our analyses show that contribution volume to Bugzilla is decreasing while contribution volume to Gecko and Firefox is increasing. This could be due to the structure of GitHub/Git, in which contributors work on different branches and forks where issues can be filed, and commits are counted when they are merged into the main branch.

THE MOZILLA DEVELOPER NETWORK (KUMA)

Strong growth for the community that revises articles for MDN, the premier digital resource on open web technologies



DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *2005-2018*

Kuma | Yearly development of contributors from 2005-2018

Non-employee MDN contributors have grown, with a leap in 2011 that peaked in 2017. Contribution numbers likely track to web site traffic, which doubled between 2016 and 2019. The dip and plateau around 2016 is attributed to a spam problem, which meant we couldn't accept new contributors. However, the more recent dip should be monitored, although some is likely contributable to browser compatibility data editing moving to GitHub/Git between 2017 and 2018. Staff contribution volume has been generally stable, with a peak of 400 in 2017.

Non-employee growth has been driven by a combination of new non-staff contributors and solid retention rates that have generally been in the mid-30% range. MDN attracted 1,073 new non-employee contributors last year, coming not far behind Kistune/SUMO (1,971) and Firefox (2,923) in terms of new non-employee attraction.

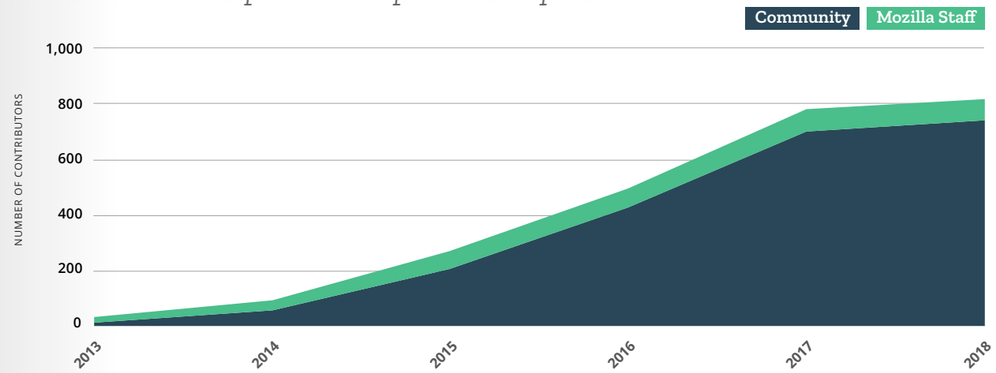
Contribution volume from staff and non-staff has grown consistently since 2011. Unfortunately, due to some inconsistencies with Kuma that means staff contributions are likely exaggerated, we're unable to get a reliably accurate breakdown of staff versus non-staff contributions, but we are confident stating that non-staff contribution volume has been growing steadily since 2011.

Perhaps more interesting is to assess if our October 2017 announcement of a Product Advisory Board for MDN and shared leadership with Microsoft, Google, Samsung, and the W3C had any impact on contribution. Between 1998-2018, we find that Google registered users had 9,226 contributions (article revisions) to Kuma and Microsoft had 3,452. However, the announcement of the Product Advisory Board didn't have an immediate positive impact on contribution from these companies, although there was a small uptick starting in January 2018. When we look more broadly across contribution to MDN from all 34 strategic commercial contributors, MDN article revisions increased in 2015 and plateaued through 2017, but has since dropped. Again, this analysis is likely affected by the move of browser compatibility data editing to GitHub/Git.

LOCALIZATION (PONTOON)

Pontoon is a Mozilla-specific localization tool through which contributors can help localize all Mozilla products and website content, ranging from the Firefox product to the Mozilla.org web site. Pontoon contributor numbers and contribution volume have grown steadily since our last report in 2017, with a remarkably high first year retention rate of 48% in 2018.

Non-employee contributors to product and web site localization has tripled in the past three years



DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *2013-2018*

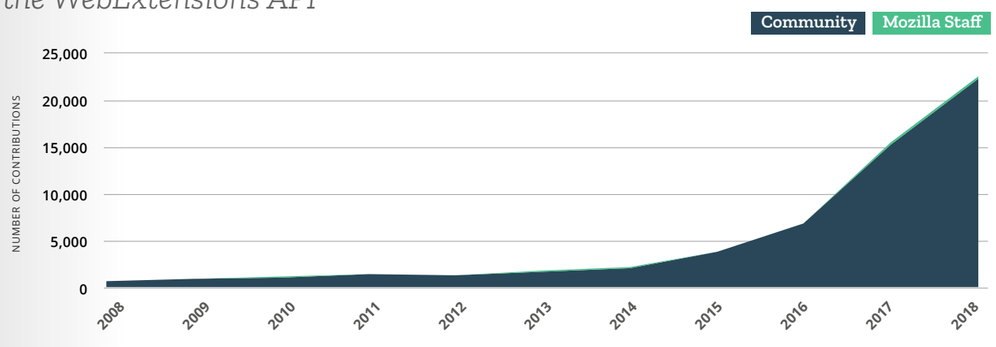
PONTOON | Yearly development of contributors from 2013-2018

Because contributions to Pontoon are based on translations, potentially counting translations of just a few words as one contribution, this platform follows a very different pattern than Mozilla's other contribution platforms. We also changed how we counted translations and approvals in Pontoon in 2015, making a comparative view of contribution over time difficult.

ADD-ONS (AMO)

Mozilla's encouragement of browser customization through Add-ons was central to our product's early success. The underlying technologies as well as how developers could create and promote extensions have changed over time, but the centrality of community-driven customization hasn't. Add-ons are popular! 40% of Firefox users have self-installed at least one extension, and these users stay with Firefox longer. Mozilla research indicates that Firefox users who use Add-ons also show a ~10% increase.

The volume of Add-ons creation and updates has grown dramatically since 2016 – 48% between 2016 and 2018 – most likely driven by the adoption of the WebExtensions API



DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *2008-2018*

AMO | Yearly development of contributions from 2008-2018

As seen in the graph, creating and updating Add-ons has exploded in the past two years, with 46% growth between 2017 and 2018. 1,095 new non-employee contributors created an extension in 2018. AMO also has the highest first year retention rates across all Mozilla contributor platforms, with 71% in 2018, from a peak of 96% in 2008 and a low of 69% in 2012. Because the Add-ons community is a key hub of interconnectivity, Mozilla should monitor it closely

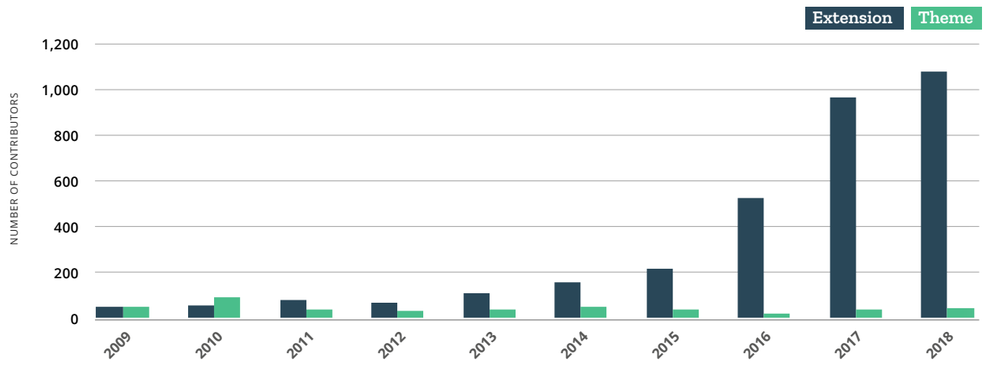
With the adoption of the WebExtensions API in 2017, extension developers could create and maintain one codebase that works on Firefox, Chrome, and other Chromium-based browsers with only minor modifications. This enabled many Chrome extension developers to port their extensions to Firefox. Unfortunately, some of these developers also produced spam and malicious extensions. We don't believe this problem significantly impacts the numbers. Still, the Firefox Add-ons team is prioritizing initiatives to keep the Add-ons ecosystem safe for users, including: launching a new Recommended Extensions program to promote extensions that meet Mozilla's highest standards of security and trust; educating users about the risks associated with installing non-recommended extensions; and developing new ways to identify and prevent malicious extensions from working in Firefox.

AMO's remarkably high average first year retention rate of

71%

suggests that Add-on contributors maintain their extensions and themes

Add-on extensions contributor numbers have grown rapidly since 2015. Note this graph does not include contrinutors who have made less than five contributions, which explains the low numbers of theme creators



AMO | Type of add-on by creation date (excluding visitors)

FOR FURTHER RESEARCH

- *Where do Add-ons creators start in the Mozilla ecosystem and what is their contributor path?*
- *What are the particular motivations of Add-on extension creators to participate in so many other areas?*

Contributor Segmentation & "Bridgers"

Understanding key contributor segments – what they are, how they relate to each other, how they change, and their motivations – can help define contributor types we can engage and evaluate with more specificity. Segmentation can also help us pinpoint where there are areas of concern, such as a ratio amongst the contributor segments that's potentially worrisome over time. For example, a community with a large number of casual contributors, low retention, and a very small number of regular and core contributors might indicate a possible systemic issue: what's stopping casual contributors from becoming regular and core contributors?

In 2017, we used a simplified adaptation of Kevin Crowston and James Howison's "onion model"* and an adjusted Pareto principle to segment users, defining core as those who generate 80% of contributions, regular as those who generate the next 15%, and casual as those who generate the last 5%. Although commonly used in the industry, this approach does not support an understanding based on the unique nature of a project and its community.

For this report, we developed platform specific definitions based on lifetime contribution activity. This method enables us to create more granular and meaningful segments that take into account the different natures of each platform and contribution types (e.g. code, translations, questions, and articles). Future analyses could make these definitions even more granular, such as on a year-by-year or quarter-by-quarter basis, which would give a more fine-grained view of a community. Please see the Appendix for details on these definitions.

Our network analysis also permitted us to better understand where contributors have participated in other areas, giving us a historical look at project communities that are highly interconnected by participants. These 'bridger' contributors are worth looking at more closely. It's notable that our Mission Driven Mozillian community, described later in the report, has a high number of bridgers as compared to other contributor communities, suggesting that these participants are uniquely motivated to work across projects.

Definitions: Casual, regular and core contributors

GITHUB/GIT

MDN

BUGZILLA

The contribution platforms GitHub/Git, Bugzilla and Kuma (MDN) are similar in number of contributors and contribution levels across their population, and so have one set of segment definitions:

CORE *contributor*
- *More than 1,000 contributions*

REGULAR *contributor*
- *100-1,000 contributions*

CASUAL *contributor*
- *6-99 contributions*

MOZILLA SUPPORT

This area has by far the highest number of contributors. However, the number of contributions per person is quite low. Therefore, segment definitions are:

CORE *contributor*
- *More than 250 contributions*

REGULAR *contributor*
- *21-250 contributions*

CASUAL *contributor*
- *6-20 contributions*

MOZILLA LOCALIZATION (PONTOON)

This area has the least number of contributors. However, localization contributors make a high number of contributions. Therefore, the segment definitions are:

CORE *contributor*
- *More than 1,500 contributions*

REGULAR *contributor*
- *200-1,500 contributions*

CASUAL *contributor*
- *6-199 contributions*

FIREFOX ADD-ON

This area has a high number of contributors. But like Support, the number of contributions per person is very low. Therefore, the segment definitions are:

CORE *contributor*
- *More than 50 contributions*

REGULAR *contributor*
- *21-50 contributions*

CASUAL *contributor*
- *6-20 contributions*

Definitions: Casual, regular and core contributors

SEGMENTS	DEFINITION	GIT/GITHUB/GIT CONTRIBUTORS #	GIT/GITHUB/GIT CONTRIBUTORS %	BUGZILLA CONTRIBUTORS #	BUGZILLA CONTRIBUTORS %	MDN (KUMA) CONTRIBUTORS #	MDN (KUMA) CONTRIBUTORS %
CORE	> 1,000	673	2%	153	0.1%	71	0.1%
REGULAR	100-1,000	1,783	4%	1,230	1%	510	1%
CASUAL	6-99	7,867	19%	12,788	8%	7,785	16%
VISITORS	1-5	30,901	75%	147,242	91%	39,229	82%
TOTAL		**41,224**	**1**	**161,413**	**1**	**475.95**	**100%**

22,821
CONTRIBUTORS

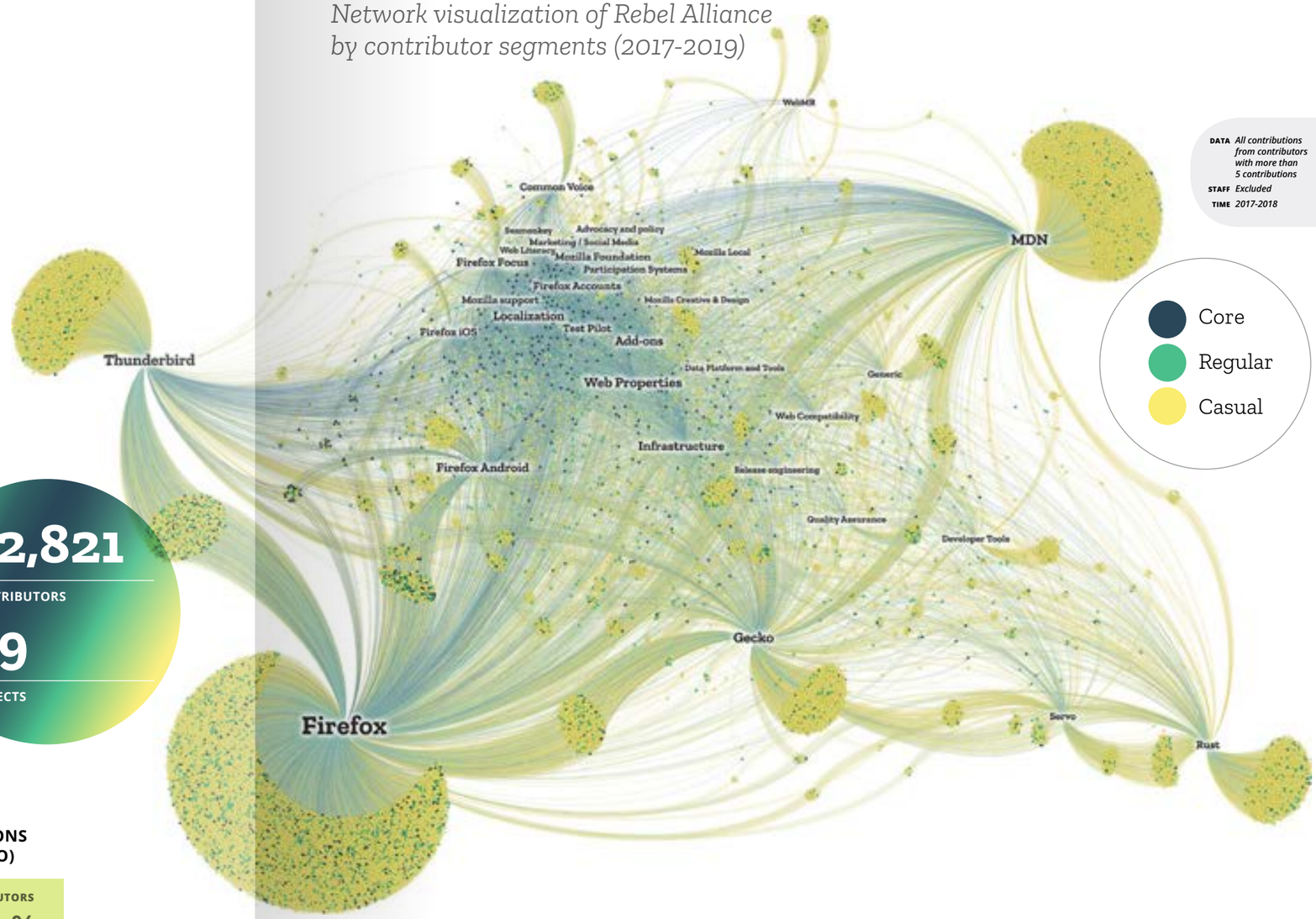
49
PROJECTS

SEGMENTS	DEFINITION	MOZILLA SUPPORT (KITSUNE) CONTRIBUTORS #	MOZILLA SUPPORT (KITSUNE) CONTRIBUTORS %
CORE	> 250	1,172	0.3%
REGULAR	21-250	2,071	0.5%
CASUAL	6-20	22,312	5%
VISITORS	1-5	406,067	94%
TOTAL		**429,623**	**100%**

SEGMENTS	DEFINITION	LOCALIZATION (PONTOON) CONTRIBUTORS #	LOCALIZATION (PONTOON) CONTRIBUTORS %
CORE	> 1,500	238	12%
REGULAR	200-1,500	273	13%
CASUAL	6-200	926	46%
VISITORS	1-5	598	29%
TOTAL		**2,033**	**100%**

SEGMENTS	DEFINITION	ADD-ONS (AMO) CONTRIBUTORS #	ADD-ONS (AMO) CONTRIBUTORS %
CORE	> 51	197	0.1%
REGULAR	21-50	626	0.3%
CASUAL	6-20	2,561	1%
VISITORS	1-5	213,887	98%
TOTAL		**217,271**	**100%**

Network visualization of Rebel Alliance by contributor segments (2017-2019)



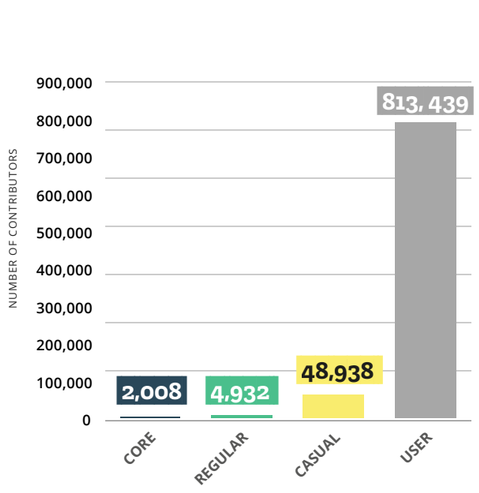
As opposed to the earlier network graph, which looked at individual contributors defined by the project to which they contributed the most, this network view shows contributors as defined by their segment, or their total lifetime amount of contributions (casual, regular, core). This network graph looks at the recent years of 2017-2019 and includes non-employee contributors who made more than 5 contributions during this time period (in other words, no 'visitors'). The nodes (circles) represent contributors, and the edges (lines) represent contributions from contributors to different Mozilla projects.

Some of the big projects (larger labels) are placed at the periphery because they have a high number of contributors who only participate in those specific projects (e.g. Firefox, Thunderbird, MDN). As in the previous network graph, projects that are placed closer together share many contributors.

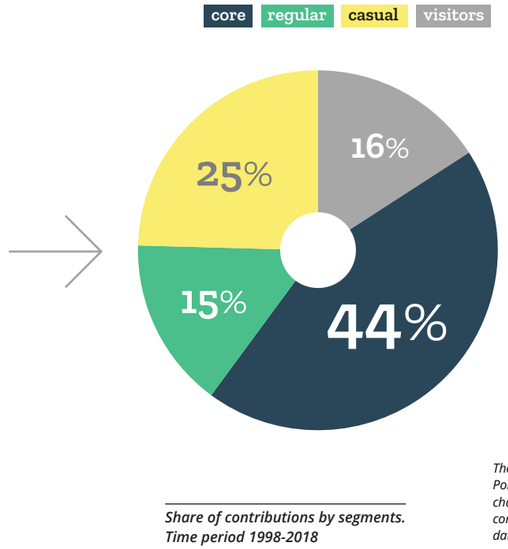
In the center of the network, we find an extremely engaged group of core and regular contributors who are active on multiple projects. As noted in the earlier network graph, non-employee core participants contribute to an average of 4.3 projects, and non-employee regular participants contribute to an average of 2.5 projects.

In general, the more connections in a network, the stronger it is. By this view, contributor communities in Mozilla's rebel alliance are generally well connected and robust.

Core contributors – 0.2% of all non-employee contributors – account for 58% of contributions...



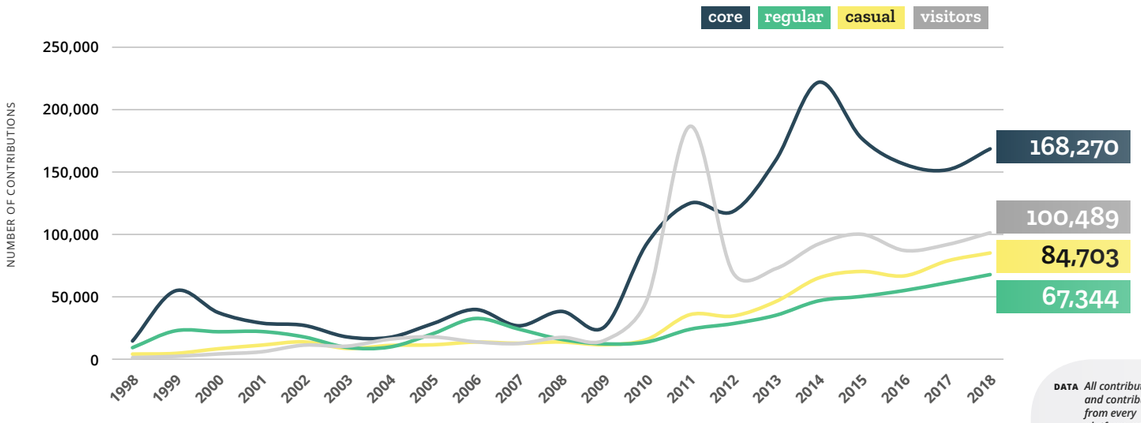
Number of contributors by segment. Time period 1998-2018



Share of contributions by segments. Time period 1998-2018

These graphs excludes Pontoon data, as recent changes in how we count contributions skews the data significantly upwards.

...and contribution growth from this segment has risen dramatically since 2009. But we can't forget the 'visitor' segment, which contributes more than either the casual or regular segments



Yearly number of contributions by segments

DATA *All contributors and contributions from every platform except Pontoon*
STAFF *Included*
TIME *2005-2018*

Average contributions per year for core contributors has remained stable over the years at around 200, so growth in core contribution is due to an increase in their numbers.

This graph excludes Pontoon data, as recent changes in how we count contributions skews the data significantly upwards.

In 2018, core community members made 40% of all contributions, regular made 16% and casual and visitors combined made 44%

In each segment, most contributors work on only one project. However, there is a group of 135 regular and 256 core contributors who are active on 10 or more projects!

There is a group of

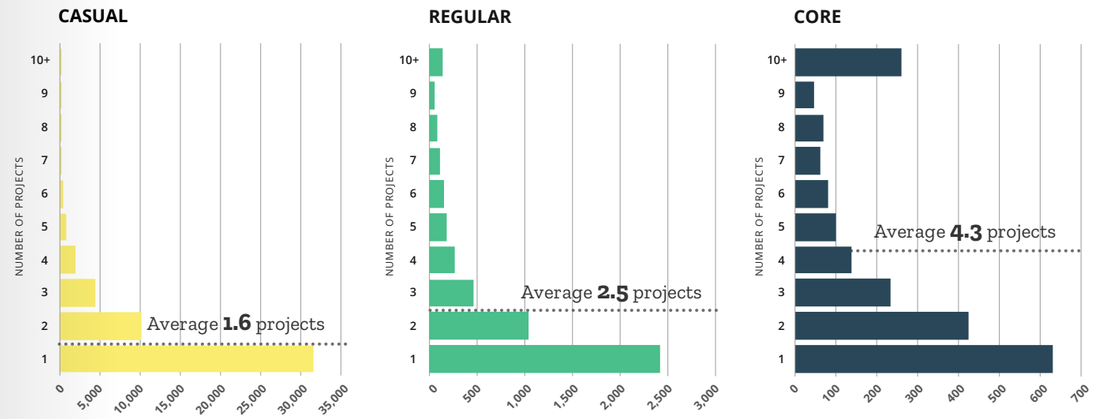
135 & 256

regular and core contributors active on

10+

projects!

Core non-employees are pretty hard core, averaging participation across 4.3 projects!



The number of projects which casual, regular and core contributors are/have been engaged in

The recent drop in attraction in the core segment should be monitored, but retention patterns are generally solid. A notably high percentage of casual contributors return

	CASUAL	REGULAR	CORE
1999	529	203	82
2000	1078	122	29
2001	1492	108	24
2002	1750	81	22
2003	976	60	36
2004	1069	64	35
2005	879	105	44
2006	792	114	39
2007	779	125	32
2008	893	81	60
2009	707	92	70
2010	1677	269	121
2011	4531	490	184
2012	3074	348	171
2013	3962	462	256
2014	5230	549	317
2015	5134	532	215
2016	4520	375	113
2017	4943	414	109
2018	4494	302	55

Attraction | Number of new contributors per year across segments

	CASUAL	REGULAR	CORE
2000	66%	91%	91%
2001	60%	87%	88%
2002	65%	84%	90%
2003	49%	75%	75%
2004	54%	64%	65%
2005	49%	77%	81%
2006	43%	76%	77%
2007	40%	59%	67%
2008	48%	63%	65%
2009	43%	62%	78%
2010	48%	77%	83%
2011	50%	76%	83%
2012	36%	65%	77%
2013	34%	65%	78%
2014	39%	70%	75%
2015	37%	67%	74%
2016	36%	65%	75%
2017	40%	69%	78%
2018	42%	71%	81%

1-year retention | Share of contributors who were also active the previous year across platforms

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *2005-2018*

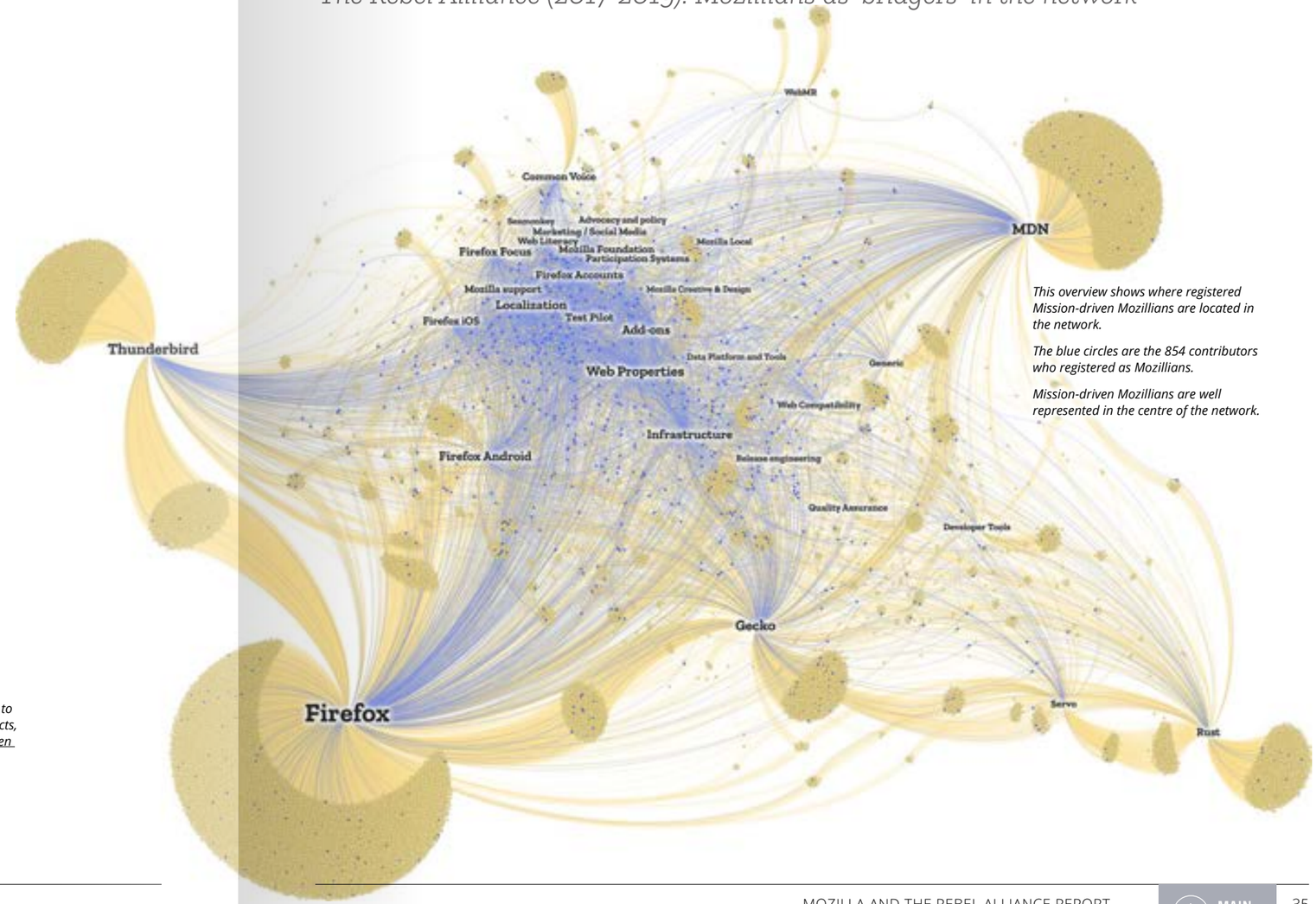
When we look at the data from a contributor segment perspective, we see steady numbers and few surprises. Attraction is highest for casual contributors, then regular and core. However, there was quite a drop in new core contributors in 2018. First year retention rates are strong across all segments as well.

To see segmentation specific to individual open source projects, please see the section on Open Source Health.

Mission-Driven Mozillians: Aligning 'Bridge' Contributors for Greatest Impact

The 2017 report confirmed that there is not one singular Mozilla community, but rather many, with differences in project focus, personal interest, operational norms and more. 2017 survey data confirmed that one of these communities is a large, global group of enthusiastic contributors who are very motivated by "advancing Mozilla's mission" and eager to make impactful contributions in multiple areas. Almost 3,000 of these contributors have signed up to be part of the global Mozillians network. The quantitative network graph of these contributors confirms they do work on multiple projects and thus are generally placed within the center of Mozilla's rebel alliance.

The Rebel Allliance (2017-2019): Mozillians as 'bridgers' in the network



This overview shows where registered Mission-driven Mozillians are located in the network.

The blue circles are the 854 contributors who registered as Mozillians.

Mission-driven Mozillians are well represented in the centre of the network.

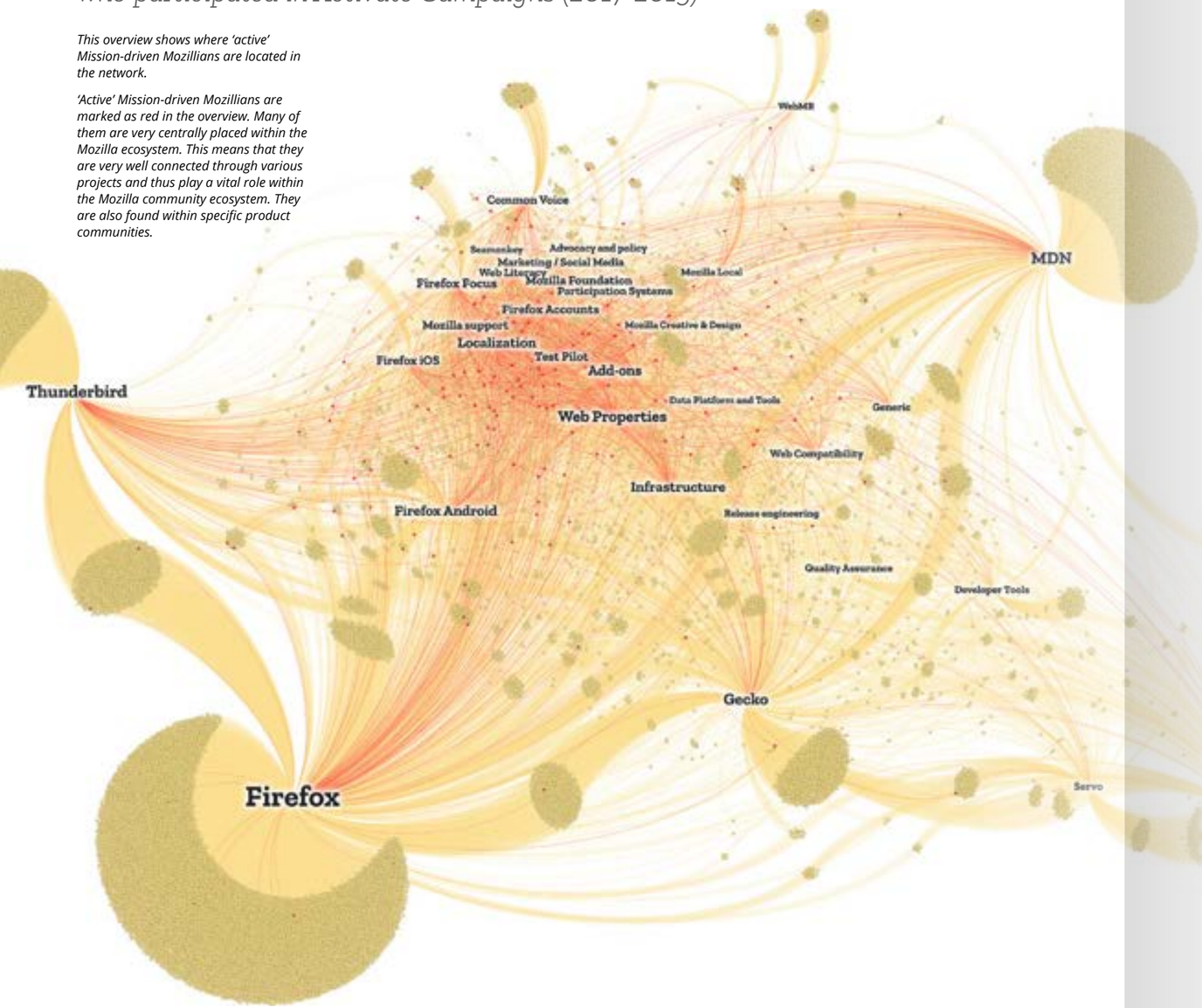
In order to more effectively engage this globally distributed, mission-driven Mozillian contributor base, the Open Innovation team introduced a new way for volunteers to participate in 2017 through an ever-changing set of Activate Campaigns. These campaigns are curated to be accessible, scaleable and particularly mission aligned.

This year, our network analysis of these contributors confirms that these 'active' Mission-driven Mozillians – meaning they particpated in at least one Activate campaign – also show up as "bridgers" who work on multiple projects.

Network view of contributions from Mission-driven Mozillians who participated in Activate Campaigns (2017-2019)

This overview shows where 'active' Mission-driven Mozillians are located in the network.

'Active' Mission-driven Mozillians are marked as red in the overview. Many of them are very centrally placed within the Mozilla ecosystem. This means that they are very well connected through various projects and thus play a vital role within the Mozilla community ecosystem. They are also found within specific product communities.



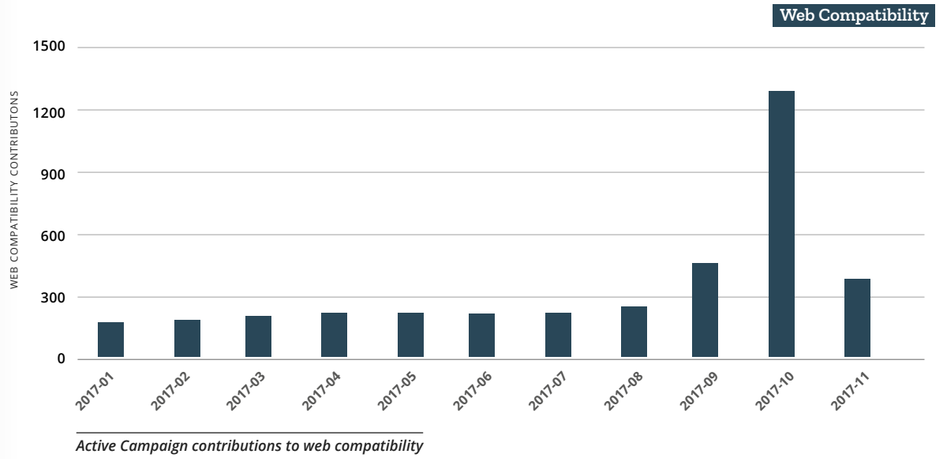
The Open Innovation team has worked to create Activate campaigns that bring external help to Mozilla projects at moments of particular need, such as for more global perspective and ideas, deeper reach into a valuable regional network, or to extend capacity. Recent Activate campaigns include:

- *Volunteers ran web compatibility testing immediately prior to the launch of Firefox Quantum. Community members tested 6,250 websites and filed 1,300 bugs within seven days.*
- *The Open Innovation team worked with the Mozilla Foundation Advocacy Team to mobilize Mozilla's India community around an Open Letter on Data Privacy and Aadhaar, authored by Mitchell Baker and addressed to Justice Srikrishna. Within a month, the open letter was co-signed by 1,300 Mozilla India community members. The letter was also published as a full-page advertisement in the February 9, 2019 edition of The Hindustan Times.*
- *Volunteers submitted more than 2,600 new sentences in more than 30 languages to Common Voice in just one week, helping the project expand into new locales.*
- *In a Firefox Support Sprint, 431 volunteers replied to 2,200 1-and 2-star Firefox reviews on the Google Playstore in 9 different languages, increasing Firefox's star rating.*
- *Over 5,000 volunteers downloaded and tested the beta version of the new Firefox for Android in the Fenix BugHunter Campaign. Volunteers filed more than 300 bugs.*

In each of these campaigns, the Open Innovation team paid close attention to designing a campaign that directly appealed to those motivated by Mozilla's mission and improved the process based upon participant feedback. The campaigns were successful enough that we recently began encouraging visitors to the Contribute page to join and have also folded in subscribers to the historical 'community campaigns' mailing list.

One question we asked in this year's report was whether these Activate campaigns spurred sustained engagement in the target project.

Sustained engagement around web compatibility Activate Campaign



Active Campaign contributions to web compatibility

In October 2017, Mozilla ran an Activate campaign on Web Compatibility (aka Firefox Quantum sprint). While the campaign was successful, it didn't generate sustained participation. It would be interesting to see how these numbers break down between new-to-the-project participants and veterans and to follow up with participants to understand why they didn't continue to participate. It may very well be that participants are more interested in discrete, time bound campaigns rather than deeper, longer-term engagements.

FOR FURTHER RESEARCH

- *What can we understand about the flow between the segments, that is, the percentage of contributors who move to the next category and the time it takes to do so?*
- *What motivates contributors to participate in multiple Mozilla projects? Is there anything common in their contribution patterns?*
- *Does our analysis of social connectedness relate in any way to the contribution patterns of these 'bridger' core contributors?*

Attraction and Retention

Attraction and retention numbers are obviously important indicators of community health, as well as proxies for things like discoverability. This analysis looks at contribution combined across all areas of participation.

When looking at all areas and types of contribution, attraction is steady and retention rates are strong

	ATTRACTION	1 YR RETENTION	2 YR RETENTION
1999	814		
2000	1229	75%	
2001	1624	66%	55%
2002	1853	68%	52%
2003	1072	53%	42%
2004	1168	55%	40%
2005	1028	52%	41%
2006	945	48%	37%
2007	936	45%	35%
2008	1034	51%	37%
2009	869	47%	37%
2010	2067	54%	40%
2011	5205	56%	45%
2012	3593	42%	40%
2013	4680	42%	31%
2014	6096	46%	34%
2015	5881	44%	34%
2016	5008	43%	31%
2017	5466	47%	34%
2018	4851	48%	35%

ATTRACTION: The number of people who made their first contribution within a given year.

1-YEAR RETENTION: Share of contributors who were also active the previous year

2-YEAR RETENTION: Share of contributors who were active two years ago

As one would guess from the earlier view of overall non-employee contributor numbers, we see that new participants continue to join in numbers that have generally been increasing. 2014 and 2015 were the most 'attractive' years, with approximately 6,000 new contributors in those years. SUMO (support) is responsible for a large portion of that growth.

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Excluded*
TIME *1999-2018*

Firefox brings in the most new contributors, followed by MDN. Over its lifetime, Gecko has lost its ability to attract new non-employee contributors

	ADD-ONS	DEVELOPER TOOLS	FIREFOX	FIREFOX ANDROID	FIREFOX IOS	GECKO	LOCALIZATION	MOZILLA DEVELOPER NETWORK (MDN)	MOZILLA SUPPORT	RUST	SERVO	THUNDERBIRD
2001			46			1489	20	23				617
2002			286			1583	51	33				830
2003			594			833	22	10				615
2004	144		1235			771	50	22				729
2005	75		1032	1		646	39	258				402
2006	57		586	0		452	41	424				313
2007	60		500	0		414	32	309				260
2008	71		815	25		497	51	332	2			227
2009	74		539	53		407	43	236	7			312
2010	103		1678	95		506	46	226	21			261
2011	107		4864	224		493	47	292	41	28		182
2012	72		2846	310		482	40	478	12	89		170
2013	91		3292	461	4	587	85	757	36	243	91	106
2014	92	27	3324	486	11	644	97	1100	38	489	162	1578
2015	146	13	2943	428	142	671	113	1304	68	502	274	1599
2016	205	45	2477	417	151	657	172	1163	123	446	326	1299
2017	281	113	3166	346	157	614	260	1495	75	408	281	940
2018	247	81	2923	408	141	494	198	1176	66	272	133	958

Note: In this view, MDN includes contributions to the technical infrastructure for MDN (GitHub/Git) as well as Kuma.

Attraction | Number of new contributors per year across projects

When we include Localization, Support and document revisions as part of contribution, we see that Firefox, MDN and Thunderbird are consistently the main 'onramps' for new contributors. However, note that this analysis does not include sentence validation and voice recordings from Common Voice. Per our survey, new contributors were attracted most to Firefox, Common Voice, and Add-ons, respectively.

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Excluded*
TIME *2001-2018*

First year retention across projects

	ADD-ONS	DEVELOPER TOOLS	FIREFOX	FIREFOX ANDROID	FIREFOX IOS	GECKO	LOCALIZATION	MOZILLA DEVELOPER NETWORK (MDN)	MOZILLA SUPPORT	RUST	SERVO	THUNDERBIRD
2002			13%			62%	55%	19%				45%
2003			36%			42%	21%	10%				35%
2004			50%			41%	26%	14%				38%
2005	24%		39%			39%	21%	15%				32%
2006	16%		33%	0%		41%	34%	42%				32%
2007	24%		35%			38%	23%	35%				33%
2008	33%		46%			39%	39%	40%				31%
2009	29%		35%	28%		37%	20%	33%	50%			41%
2010	41%		46%	38%		42%	22%	38%	38%			39%
2011	35%		51%	38%		43%	25%	42%	42%			29%
2012	29%		35%	35%		40%	38%	47%	21%	75%		35%
2013	30%		35%	29%		40%	46%	32%	50%	62%		32%
2014	31%		36%	27%	0%	45%	44%	37%	57%	63%	36%	35%
2015	38%	4%	34%	28%	36%	44%	35%	35%	51%	61%	34%	36%
2016	40%	21%	33%	26%	42%	39%	47%	37%	65%	52%	33%	31%
2017	45%	54%	42%	29%	38%	41%	57%	40%	35%	59%	29%	27%
2018	46%	33%	45%	30%	55%	38%	52%	36%	49%	58%	23%	36%

Note: In addition to Kuma, MDN also includes contributions to the technical infrastructure for MDN (GitHub/Git).

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Excluded*
TIME *2002-2018*

1-year retention | Share of contributors who were also active on the project the previous year

Second year retention across projects

	ADD-ON	DEVELOPER TOOLS	FIREFOX	FIREFOX ANDROID	FIREFOX IOS	GECKO	LOCALIZATION	MOZILLA DEVELOPER NETWORK (MDN)	MOZILLA SUPPORT	RUST	SERVO	THUNDERBIRD
2003			17%			33%	25%	11%				25%
2004			38%			26%	10%	5%				26%
2005			31%			28%	14%	21%				22%
2006	13%		23%			26%	13%	0%				20%
2007	12%		22%	0%		27%	16%	26%				25%
2008	19%		36%			25%	24%	24%				22%
2009	26%		30%			27%	24%	22%				28%
2010	19%		31%	20%		29%	15%	23%	50%			33%
2011	29%		40%	23%		33%	13%	30%	38%			24%
2012	16%		34%	23%		30%	23%	34%	17%			21%
2013	19%		25%	21%		29%	32%	26%	15%	46%		22%
2014	20%		27%	17%		34%	36%	21%	29%	50%		26%
2015	28%		25%	16%	75%	36%	23%	25%	37%	44%	15%	30%
2016	22%	4%	23%	18%	18%	30%	23%	22%	46%	40%	21%	26%
2017	32%	29%	28%	16%	27%	30%	44%	26%	53%	42%	16%	20%
2018	39%	27%	31%	14%	33%	27%	46%	26%	27%	46%	13%	24%

Note: In addition to Kuma, MDN also includes contributions to the technical infrastructure for MDN (GitHub/Git).

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Excluded*
TIME *2003-2018*

2-year retention: Share of contributors who were also active on the same project two years ago

First and second year retention rates are generally laudable and steady. Although second year retention is steady for DevTools, a recent drop in the first year retention rate might merit observation. Conversely, last year saw a notable increase for first and second year retention in FIrefox iOS, and it'd be interesting to know why. Gecko seems to be keeping contributors but not attracting new ones at the same pace.

Social Connectedness

We often hear that the fun and camaraderie of participating in Mozilla's communities is a big draw. Survey responses bear this out, even though networking goals were the lowest motivator, behind self-improvement and social impact, with about 30% of respondents calling it a key motivator.

Moreover, while the primary reason contributors dropped out was a busy schedule, lack of community was the second most cited reason.

Humans are social creatures.

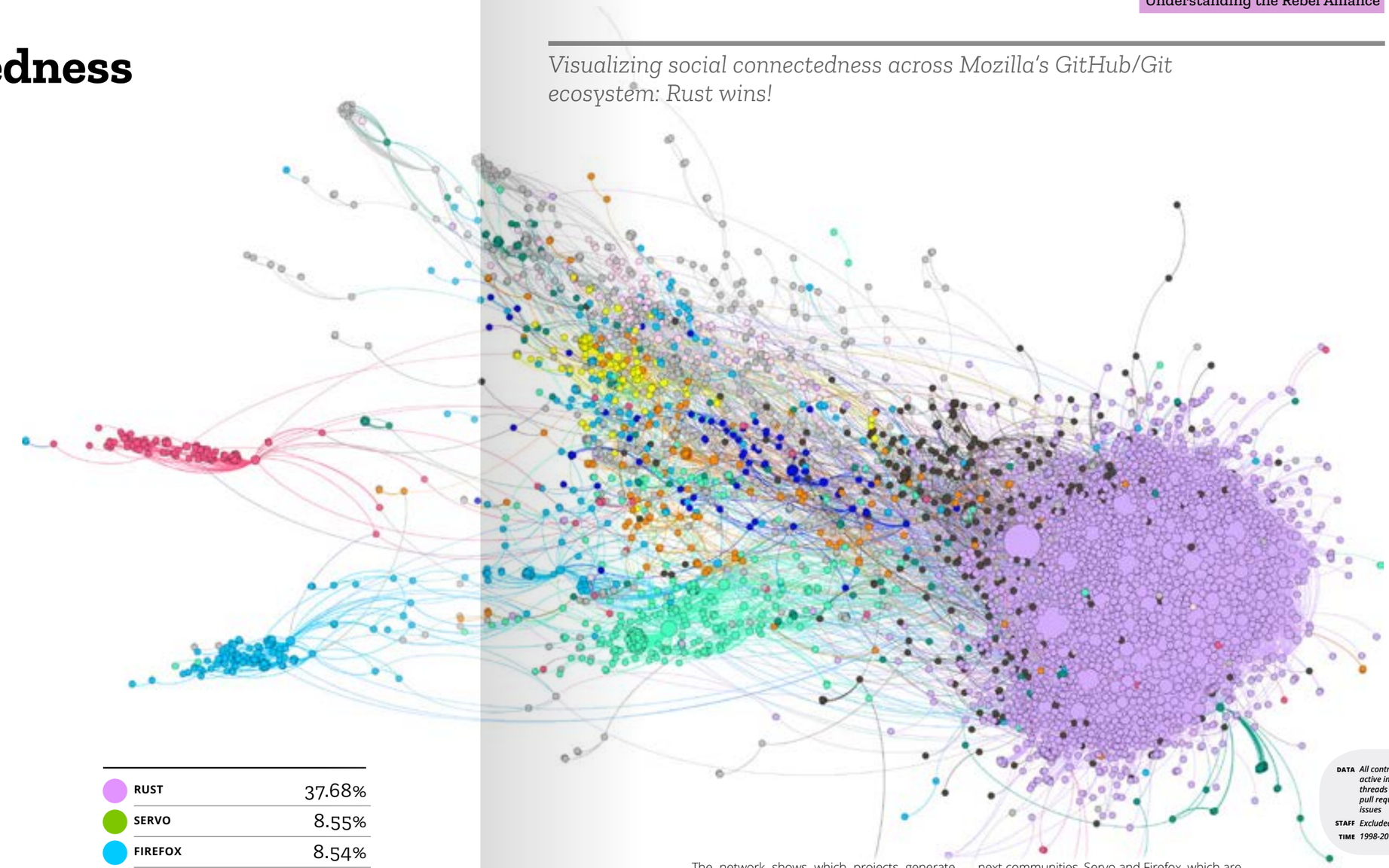
We hypothesize that social connectedness could be a health indicator—either through correlation or causation—of a community with high social capital and internal cohesion, and thus higher retention and efficiency in working together.

By looking at participation in comment threads to pull requests on GitHub/Git,* we've developed a social network measure that describes how connected contributors are to one another. As a proxy measure for social connectedness, this can be combined with other measures in future reports to gain insights about the impact of being more or less socially connected. Ultimately, this might inform Mozilla about how to best nurture thriving contributor communities.

RUST	37.68%
SERVO	8.55%
FIREFOX	8.54%
WEB PROPERTIES	7.51%
IT/OPS	4.26%
ADD-ONS	3.55%
GENERIC	3.26%
WEB COMPATIBILITY	2.75%
DEVELOPER TOOLS	2.72%
GECKO	2.17%

Understanding the Rebel Alliance

Visualizing social connectedness across Mozilla's GitHub/Git ecosystem: Rust wins!



DATA *All contributors active in comment threads related to pull requests or issues*
STAFF *Excluded*
TIME *1998-2018*

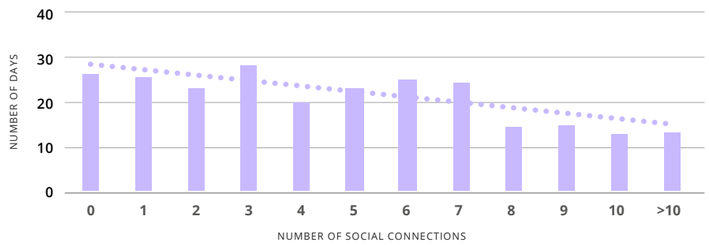
The network shows which projects generate social ties between contributors through the comment threads related to any pull request or issue. Every node is a contributor. The colors represent the project that the person has contributed to the most. Size indicates how many different people the contributor has interacted with through the comments (i.e. level of interconnectivity of a particular contributor).

By this measure, Rust displays significantly more social connectedness than any other Mozilla community: about 37.7% as compared to the next communities, Servo and Firefox, which are both about 8.5%. However, when we look at retention rates, we don't see that same discrepancy, with Rust's average two year retention rate at 47% compared to Servo's and Firefox's 42% and 32%, suggesting that social connectivity doesn't have a large impact on retention.

Still, this is a rich area for further investigation. There is a good amount of existing research on social network analysis of open source communities in particular that may act as a starting point.

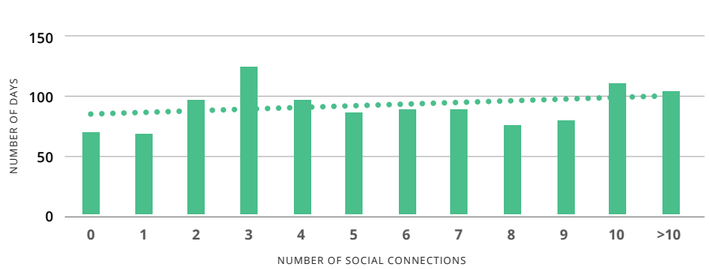
Measuring 'efficiency' impacts of social connectedness: pull request reviews and issue resolution

NO. OF SOCIAL CONNECTIONS	NO. OF CONTRIBUTORS
0	20,744
1	1,414
2	785
3	434
4	309
5	204
6	154
7	155
8	106
9	91
10	95
>10	1,124



Average number of days for a pull request to be solved when made by socially connected contributors

There is a correlation between how well connected a contributor is and how fast a pull request from this person is being solved. If a contributor is connected to 8 or more people, the leadtime is around 2 weeks or less.



Average number of days for an issue to be solved when made by socially connected contributors

On the contrary, we find no correlation between how well connected a contributor is and how fast an issue from this person gets resolved.

Issues generally have a longer leadtime than pull requests.

DATA *All contributors active in comment threads related to pull requests or issues*
STAFF *Included*
TIME *1998-2018*

There is also a correlation between how interconnected a contributor is and how quickly their pull requests are solved. If a contributor is connected to eight or more people, the lead time is usually around two weeks or less.

On the contrary, we find no correlation between how well connected a contributor is and how fast their issues are resolved. Issues generally have a longer lead time than pull requests.

FOR FURTHER RESEARCH

- *Is there any relationship social connectedness and demographic information, such as gender or language(s) spoken?*
- *Is there any relationship between social connectedness and participation in other non-Mozilla projects?*
- *How does this relate with our understanding of 'bridgers'? Would a combination of these views show non-employee contributors who are 'super networkers' and perhaps of particular influence?*

Software Quality Metrics in Bugzilla and GitHub/Git

This section looks at select productivity metrics from the platform perspectives of Bugzilla and GitHub/Git. This broad look across all Mozilla projects gives us an internal benchmark for individual projects.

Understanding Mozilla's contributor communities requires better open source metrics. These should incorporate conventional software engineering metrics where merited as well measurements of contributor reward and satisfaction and community inclusiveness. The Open Innovation team has researched what would be fitting for next-generation open source metrics.* We outline a vision for what should be defined, per specific project goals, in the section Open Source Projects: Towards an Understanding of Open Source Health. That section also details limited software metrics specific to key open source projects.

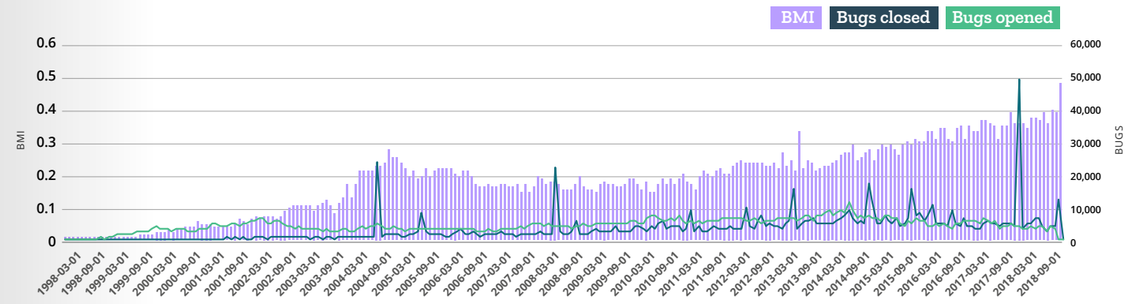
Understanding the backlog management index (BMI) helps to manage the backlog of open, unresolved problems (bug or issues). BMI is calculated by the number of problems closed divided by the number of problems open in a time period. A BMI below 1 means there are more new, backlogged problems than solved problems. The average lead time is the number of days to close a new bug or issue.

Similarly, understanding the pull request review efficiency index (REI) helps to manage the backlog of pull requests. REI is calculated by the number of closed pull requests divided by the number of open pull requests in a given period of time. Average pull request lead time is the number of days for a pull request to be closed.

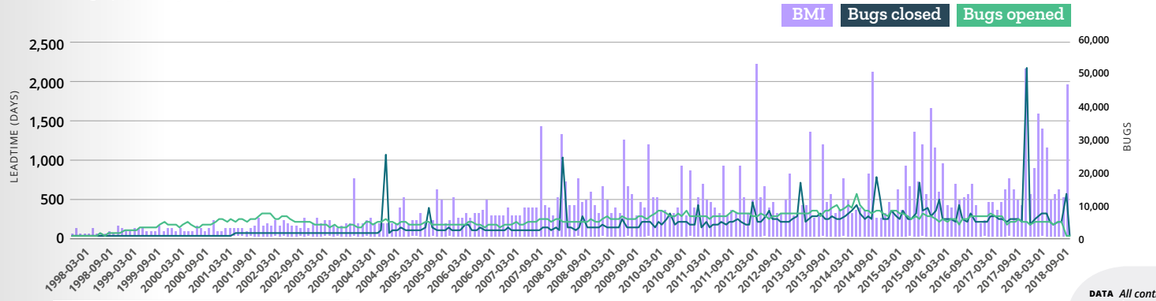
All are measured by quarters in the below graphs. Note these do not control for bug type, which is a limitation that should be addressed in future reports.

**See Ahuja, Vinod. "How to measure the impact of your open source project," Opensource.com, May 23, 2018 https://opensource.com/article/18/5/metrics-project-success*

Bugzilla's backlog management index (BMI) has increased steadily, with spikes in Q1 2018 and 2019, while lead times for closing bugs is quite variable



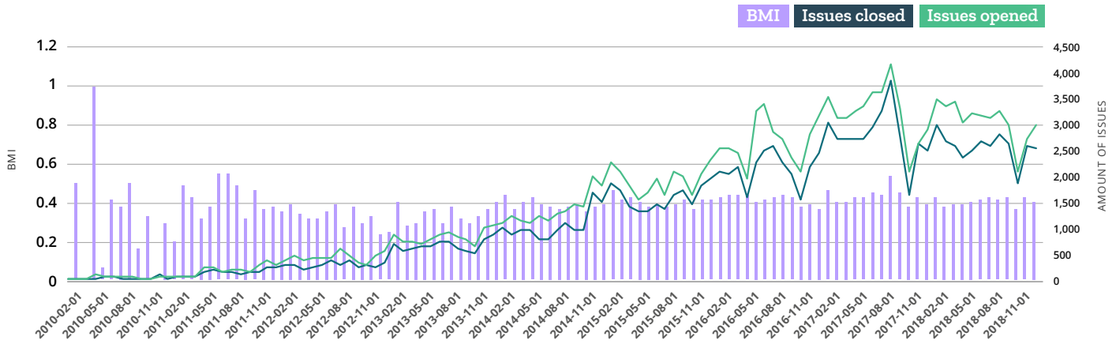
All bugs | Quarterly average BMI



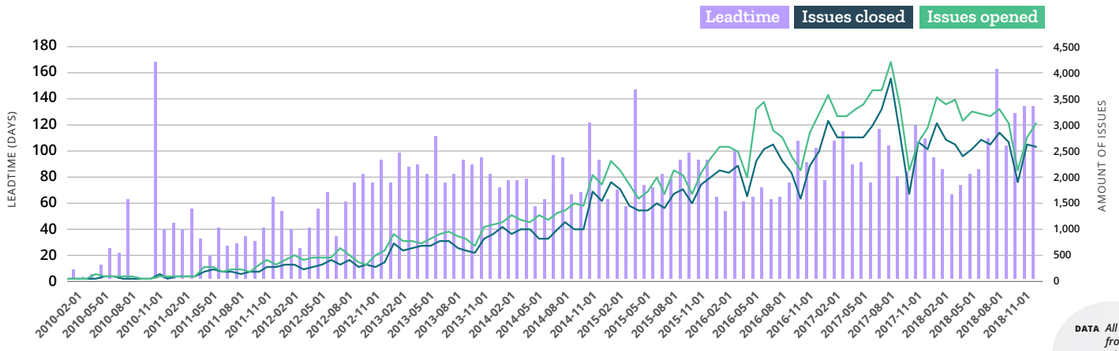
All bugs | Quarterly average leadtime (days)

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *1998-2019*

Across all GitHub/Git projects, BMI has been remarkably stable since 2014 at around 0.4, with lead times for closing issues also fluctuating but significantly less bugs – and thus less lead times – than Bugzilla



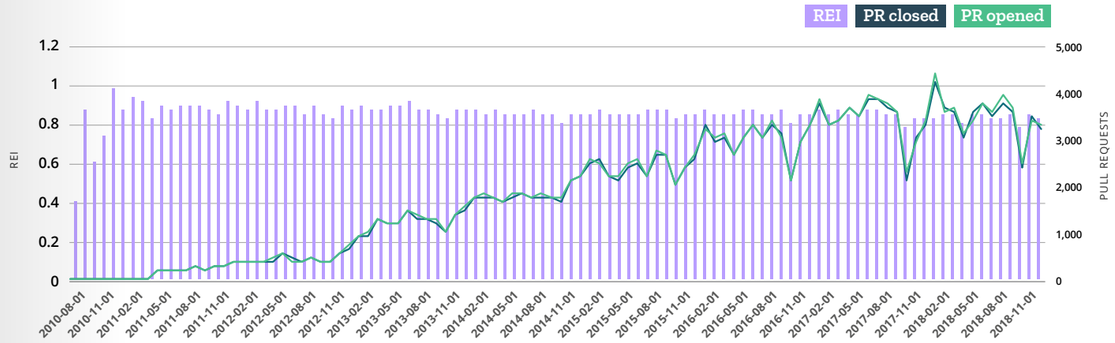
Issues | Quarterly average BMI



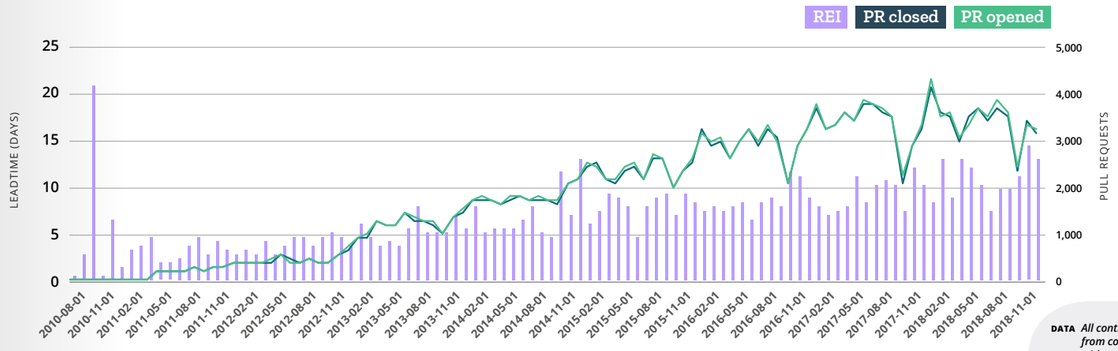
Issues | Quarterly average leadtime (days)

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *2010-2018*

Across all GitHub/Git projects, efficiency around the ratio of open to closed pull requests (REI) has been stable around 1. Average lead times have had more fluctuation but is pretty steady, landing at between 7-14 days in 2018



Pull requests | Quarterly average REI



Pull requests | Quarterly average leadtime (days)

DATA *All contributions from contributors with more than 5 contributions*
STAFF *Included*
TIME *2010-2018*

Diversity and Inclusion

Like many other organizations in the open source space, Mozilla has only recently begun to emphasize and prioritize diversity and inclusion efforts. Since the inception of open source as a co-development model, the unfortunate norm has been inaction: too often, open source initiatives have rested on the comfortable but false assumption that open co-development is inherently inclusive. In reality, open source communities tend to be less diverse than the overall tech industry.

Open source practitioners have begun to realize the complexity of influencing change in their communities—a particularly frustrating problem as many communities believe they are genuinely meritocratic. There is a clear need for quality tools and data to help open source communities promote diversity and inclusion, as well as to measure the impact of such interventions. For example, Mozilla worked closely with the Linux Foundation's CHAOSS project to establish the first-ever set of inclusivity measurements in open source metrics. As these efforts continue to ramp up, we believe that measuring and monitoring indicators of inclusivity will be integral to our goals.

In our 2017 report on contributor communities, Mozilla leveraged the genderize.io service to attempt a rough understanding of binary gender in our open source communities as determined through data on Git commits. This approach was clearly imperfect and not inclusive, in that it failed to reflect the breadth of gender identities or allow self-identification. The methodology itself failed to incorporate the very type of inclusivity measures we would hope to integrate into our core practices.

Still, it gave us some insight and a way to benchmark ourselves against other open source projects using the same methodology, and we did conduct another genderize.io analysis this year. However, moving forward, Mozilla will no longer use this methodology and will instead rely on surveys and contributor interviews to better measure how inclusive our contributor communities are as well as areas for improvement.

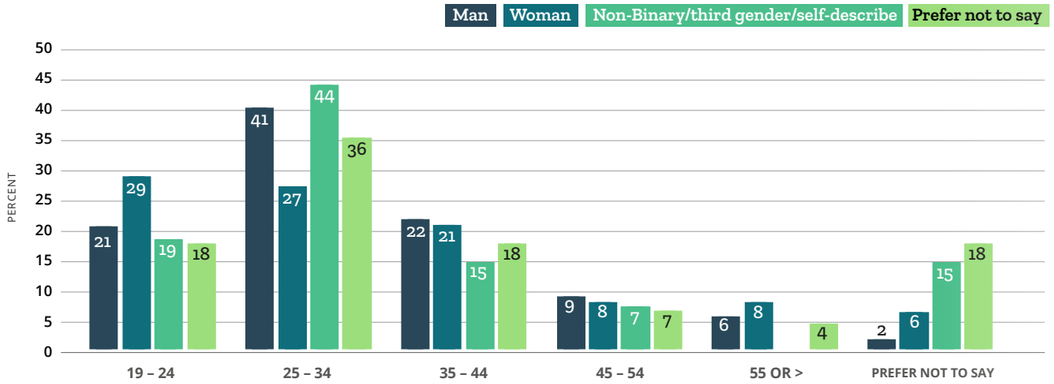
Since 2016, per the genderize.io measurements, gender diversity in Mozilla's communities has grown from 6.5% of contributors identifying as women to 8% in 2018. Survey respondents* who identified as female remained the same between 2016 and 2018, at around 10%. (Note: survey respondents included contributors to non-code and code areas of participation.) While these kind of gender diversity metrics are within the average range for open source communities, they are far from enough. Mozilla and others in the industry have a long way to go towards promoting and ensuring diversity within our open source communities.

When we look at a gender representation across age groups, it's notable that there are about 40% more women than men between the ages of 19-24, but this relationship inverts dramatically in the next age group. There's also a dramatic difference between non-binary/third gender/self-describe in these age groups.

The higher number of women in the younger cohort could reflect a spike due to programs like the Open Source Student Network, which strives to engage college and university students in an array of open source projects, including those sponsored by Mozilla. It could also reflect that the contribution experience, motivations, or general situation of the older cohort is quite different. However, the motivations of these two age groups doesn't differ much, so it seems unlikely that motivations cause such a large shift. We do know that the largest reason for stopping participation is burnout and getting busy in work or personal life (65%). The drop might also signal that something happens early in the experience of contributing or in the lives of women that makes continued participation less valuable or engaging.

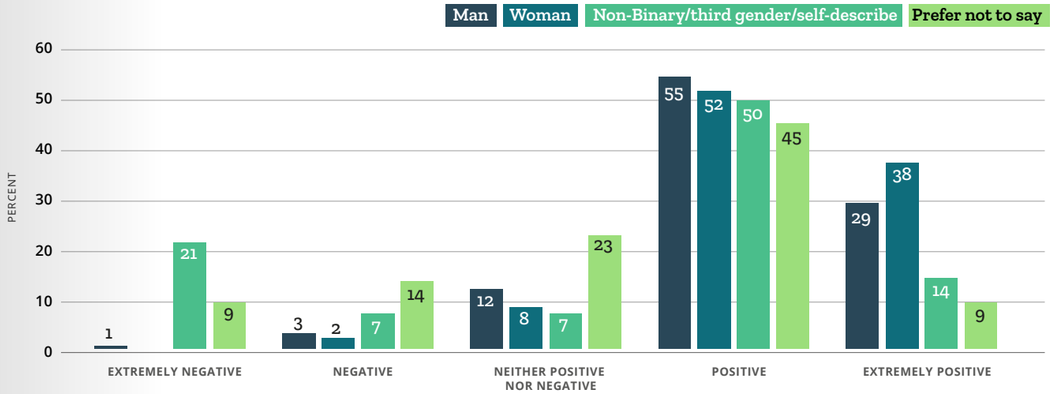
**A note on the survey data: We had 1,144 complete responses, slightly higher than our 2017 survey. However, due to very small numbers of people identifying as either non-binary/third gender or choosing to self-describe, we often had to combine the categories in order to say something meaningful about gender differences. When possible, we kept the categories separate. Still, our survey enabled us to generate a more nuanced understanding of diversity as well as gather data from non-coding contributor communities.*

Women are most represented in the youngest age group, while non-binary/third gender/self-describe are most represented in second youngest group



Gender across age groups

Gender across rating of overall experience



Gender across "How would you rate your overall experience?"

We need more qualitative, project-level research to inform how we can improve diversity in our communities through more inclusive practices

We did see troubling data around the experiences of non-binary/third gender/self describe, with 35% describing their experiences as negative or extremely negative. This points to a need for more qualitative research to understand exactly what is being reported as negative. We do know from past D&I research that efforts to 'lump' everyone who is not-male into the category of women is far from ideal.

In 2018 and 2019, we also established better enforcement of our Community Participation Guidelines, which we expect to help increase participation from those not well represented in open source.

In general, we need more qualitative, project-level research to inform how we can improve diversity in our communities through more inclusive practices. We found this most recently in our hands-on diversity research with the Developer Tools/Debugger community. Asking five non-male contributors simple questions about their experiences around community leadership, governance and communication revealed small areas of improvement that could positively influence their experiences.

We were able to ask a broader set of questions around diversity and inclusion in this year's survey. For example, we asked questions about disability for the first time. The results aren't compelling, as we weren't able to get enough data on how disability affects experience, but this is something on which to follow up. The survey results do suggest that people identifying as having a disability found it challenging to contribute: 12% of those who responded that they never contributed also have a disability, as opposed to 5% of active participants.

Nearly as many women as men contribute to coding, while non-technical contributions like localization and voice recording are more predominantly male. This is contrary to the bias that women prefer non-technical contribution.

IS DIVERSITY AND INCLUSION EVERYONE'S JOB? OR A JOB EVERYONE SHOULD KNOW HOW TO DO?

Despite slogans like "inclusion is everyone's job," most people working to improve diversity and inclusion in open source are also those most impacted when it fails. They are the most likely to take on emotional labour, the most likely to burn out, and sadly, the most likely to face backlash and trolling.

Yet might we be at a turning point? The #metoo movement has created a surge of companies and organizations that are prioritizing inclusive workplaces – and employees are increasingly holding them accountable. A similar type of activism is emerging within open source.

Still, the Open Innovation team's 2017 research into diversity and inclusion found that while the open source ecosystem was beginning to prioritize efforts to be more inclusive, these efforts were taking place in information silos with little consistent application of useful metrics and best practices.

To address these problems, we created a network dedicated to connecting researchers, academics, projects, government and others invested in diversity and inclusion in open source to accelerate needed change. We also worked with the Linux Foundation's CHAOSS project to create a set of peer-validated metrics to help project owners understand, evaluate and ultimately improve how their projects include and empower everyone. A selection of those metrics can be found in a basic checklist for evaluating and improving governance, leadership, communication and documentation. These metrics have been applied with Mozilla's Open Source Support Program (MOSS) and Firefox Developer Tools. The Linux Foundation's Hyperledger project also plans to implement them. Mozilla should also implement and measure them as part of our open source health metrics.

Perhaps the tool for change that's most exciting because of its immediate applicability is the lowly bug. Because software engineers and community managers already expect to see reports of "bugs" in their software, adding a new category of bugs for reporting problems or opportunities around inclusion is low effort. For example, if a contributor is evaluating an open source project and sees that the code of conduct does not include information about to whom a code of conduct report goes, he can open a bug report to start a process of discussion and change.

This simple approach fosters a process in which anyone can report or fix issues of inclusion. Moreover, it moves us from a broken system dependent on the remedial efforts of underrepresented and marginalized people to one in which a broader 'rebel alliance' of problem solvers can work on needed changes and in which communities hold projects accountable for implementation of those changes.

NEARLY AS MANY WOMEN AS MEN CONTRIBUTE TO CODING, WHILE NON-TECHNICAL CONTRIBUTIONS LIKE LOCALIZATION AND VOICE RECORDING ARE MORE PREDOMINANTLY MALE. THIS IS CONTRARY TO THE BIAS THAT WOMEN PREFER NON-TECHNICAL CONTRIBUTION.

Open Source Projects: Towards an understanding of open source health

A key aim of this report was to begin creating an evidence-based framework for understanding the 'health' of Mozilla's open source projects. While we are still some ways from this goal, we present a beta version that is generalized in its application to our main open source products and communities. We also sketch a future vision.

For this beta version, we've conceptually followed the Open Source Ecosystem Health Operationalization (OSEHO) framework proposed by Slinger Jansen (2014)*, which builds on three recognised pillars for business ecosystem health research: productivity, robustness and niche creation (Fig. 1, below).

We haven't published all data outlined in this framework, as our time was limited and we didn't have access to or an understanding of some data (e.g. data around niche creation or contribution quality). We still believe this framework is useful despite being generalized and missing important aspects of health, like metrics related to contributor reward, community inclusiveness, social connectedness, and better integration of traditional software metrics. It should spur discussion of what Mozilla's approach to open source metrics should be. It also encourages us to assess our projects as part of well functioning ecosystem(s), and gives us a very general benchmark we can use in the future.

Jansen, Slinger. "Measuring the Health of Open Source Software Ecosystems: Beyond the Scope of Project Health." Information and Software Technology. 56.11 (2014)

	PRODUCTIVITY	ROBUSTNESS	NICHE CREATION
THEORY	Total factor productivity Productivity improvement Delivery of innovations	Survival rates Persistence of structure Predictability Limited obsolescence Continuity	Value creation Variety
NETWORK LEVEL	New related projects ● ● ● Downloads of new projects Added knowledge about ecosystem Events	Total number of active projects ● ● ● ● Project connectedness/Cohesion ● Core network consistency ● Outbound links to other SECOs Switching costs to other SECOs	Variety in projects ●
PROJECT LEVEL	KLOC/time period added ● ● New tickets New downloads ● Knowledge and artifact creation ● ● Mailing list responsiveness ● Bug fix time Spin-offs and forks ● New partnerships New patents Usage	Partnerships and embeddedness Organizational maturity Commercial patronage Capital contributions and donations Contributor satisfaction Active contributors ● ● ● ● Contributor ratings and reputation Multi-homers Contributor connectedness Interest: Page views, search statistics ● ● Market share ● Switching costs to alternatives User loyalty and usage User satisfaction or ratings Artifact quality	Variation in contributor type ● Variation in project applications Supported natural languages ● Variety in supported technologies ● Variety in development technologies ● Multiple markets

● *Lucassen et al., 2013* ● *Hoving, Slot, and Jansen, 2013* ● *Goeminne & Mens, 2013* ● *van Lingen, Palomba, and Lucassen, 2013*

Referencing back to the centrality of open source co-development to Mozilla's rebel alliance and our open by design strategy – in particular building community for impact – the Open Innovation team hopes to work with Mozilla product teams to create more tailored analyses for their open source projects.

VISION FOR OPEN SOURCE HEALTH METRICS

In a world where open source effort is spread across the entire open source ecosystem, and where lasting success comes through building communities shaped to specific projects, Mozilla needs health metrics that reveal how it is working with those communities to fulfill the goals for each open source effort. The most valuable questions about health should be derived from these unique goals, perhaps guided by the open source archetypes Mozilla created in collaboration with Open Tech Strategies . Appropriate metrics that answer those questions can then be chosen. For example, if an open source goal is to provide infrastructure defined and used by multiple vendors, then a key success metric would be attracting co-investment from partners. In this example, general pull request efficiency might not be as important as the rate at which partner contributors pick up high-priority issues.

A revised approach to open source health metrics would enable Mozilla to move from simply measuring project activity to measuring what actually matters: fulfillment of our strategic, mission-driven goals, including providing an inclusive, rewarding experience for contributors. These metrics should illuminate how our goals are being met through the give-and-take of collaborative development involving individuals, organizations, and the greater open source ecosystem. They are fundamentally about relationships that produce better products and more mutual value.

The Open Innovation and IT teams are creating a unified identity and access management system for employees and non-employee contributors. The Mozilla People Directory is the first step in this project to better integrate non-employee contributors and provide secure, appropriate access to Mozilla services and workflows. A longer term vision might be to use this project as a foundation for a more people-and-organization-first view of collaboration metrics.

HOW TO READ THIS SECTION

This report does not provide an analysis of all types of contribution for the core open source projects Mozilla supports. We are missing many aspects of contribution, such as documentation, code reviews, QA where applicable, and other areas of participation that matter to our open source projects. It also provides a limited look at software efficiency metrics, specifically just lead time for GitHub/Git pull requests and issues. Our goal for a revision would be to work with each product area to ensure we have a comprehensive view of community contribution.

As noted earlier, this report also does not comprehensively answer the questions of contribution quality, or impact or return on investment – for Mozilla or for our contributors. These are complex questions that the Open Innovation team would have to work very closely with product teams to answer even in a proximate manner. Although many data points presented here are, in combination, relevant to understanding return and impact, they must be understood on a per project basis.

Taking a cue from the OSEHO framework described above, we have collated data for ten projects as follows:

PRODUCTIVITY	DATA?	ROBUSTNESS	DATA?
Contribution activity/time and users	*Yes*	User acquisition/ attraction	*Yes*
Bug resolution time	*Yes, where available*	User retention	*Yes*
Pull request resolution time	*Yes*	User diversity (segments, roles)	*Yes, but future analyses should include inclusivity measurements as well as a proxy for the diversity for which we strive in our communities*
Issue resolution time	*Yes*	Project connectedness (networkers)	*Yes*
New issues/tickets	*Yes*	Contributor satisfaction (survey)	*Not enough data at a project level for this report*
Knowledge creation (wiki articles, QA forums)	*Yes, where available*	Contribution quality	*No. Would need to be defined on a per project basis*
Usage (end users)	*No*	User collaboration (work teams)	*No. Would need to develop*
Project cohesiveness – social cohesion within project	*Not detailed by project here but described at a broad level in separate section*	Project cohesiveness – external/ embeddedness	*Some description specific to WebMR here; broad look included earlier in report*

Community health

Firefox

Summary

ROBUSTNESS

By Mozilla network engagement: A great share of Firefox contributors do not contribute to any other projects. Cross-contribution happens mainly with Gecko and Thunderbird, followed by Web Properties, Add-ons/Web Extensions and MDN. Its notable that the core segment is also very active on other projects.

By attraction and retention: When taking all forms of contribution into consideration, Firefox has the highest number of contributors, including non-staff contributors. Its 1st and 2nd year retention rates are average, compared to other Mozilla projects, but have increased over the past two years.

By user diversity: Contributions are mainly from the core segment, implying a lower degree of diversity compared to other projects

What counts as a contribution? Contributions from: Bugzilla, GitHub/Git, AMO, Kitsune and Pontoon.

KEY FIGURES*

**Note that the overall numbers referenced below are across the history of the project, while the network graphs are just 2017-2019*

12,334

CONTRIBUTORS

747,524

CONTRIBUTIONS TO FIREFOX (INCLUDING BUGZILLA, GIT/GITHUB/GIT, ADD ONS, KISTUNE AND PONTOON)

65,371

CODE SPECIFIC CONTRIBUTIONS (GIT/GITHUB/GIT, BUGZILLA AND ADD-ONS)

1,870,928

CONTRIBUTIONS ACROSS THE MOZILLA PROJECT

NOTES TO THE NETWORK

The network includes all contributors who have more than 5 contributions to Firefox (only non-staff).

TIME PERIOD

2017-2019

COLORED NODES

Contributors with more than 5 contributions to Firefox, colored by segment

NODES WITH LABELS

Projects with more than 5 Firefox-contributors

Understanding the Rebel Alliance

Community health

Firefox

DATA

Includes only non-staff contributors with more than 5 contributions (staff excluded)

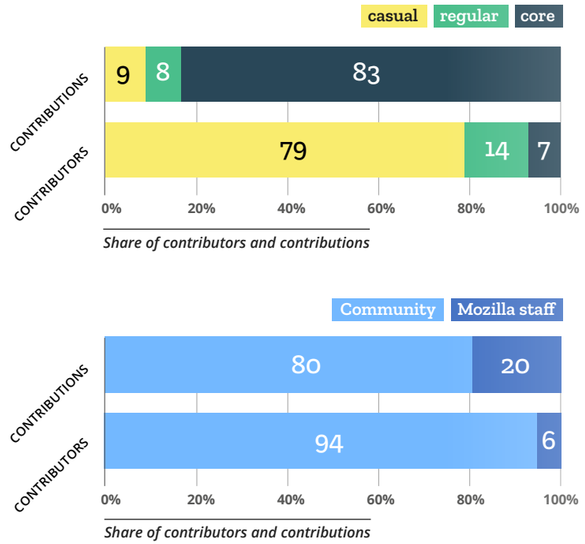
TIME PERIOD

2017-2019

ROBUSTNESS • Attraction and retention of contributors

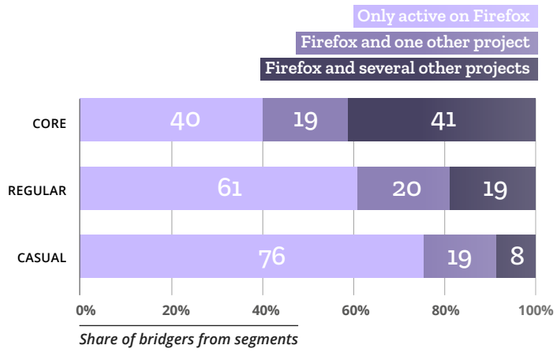
	NO. OF ACTIVE CONTRIBUTORS	ATTRACTION	TURNOVER	1 YEAR RETENTION	2 YEAR RETENTION
2001	47	47	0		
2002	295	289	41	13%	
2003	709	596	182	36%	17%
2004	1651	1236	294	50%	38%
2005	1750	1033	934	39%	31%
2006	1320	586	1016	33%	23%
2007	1193	500	627	35%	22%
2008	1844	815	164	46%	36%
2009	1438	539	945	35%	30%
2010	2792	1678	324	46%	31%
2011	6775	4865	882	51%	40%
2012	5699	2846	3922	35%	34%
2013	6254	3292	2737	35%	25%
2014	6915	3324	2663	36%	27%
2015	6577	2944	3282	34%	25%
2016	5927	2477	3127	33%	23%
2017	7351	3166	1742	42%	28%
2018	7626	2923	2648	45%	31%

ROBUSTNESS • Diversity of contributors (segments and roles)



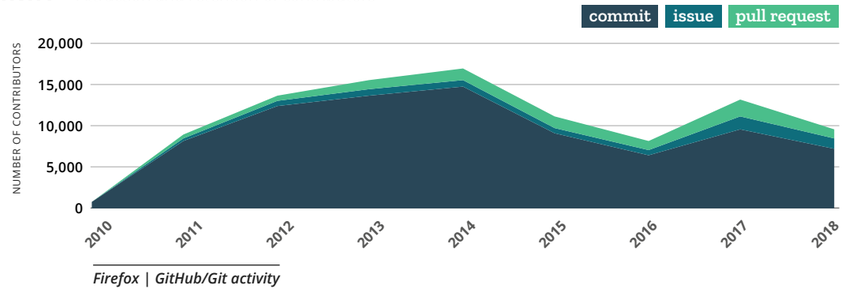
Share of contributors and contributions

ROBUSTNESS • Networkers between projects



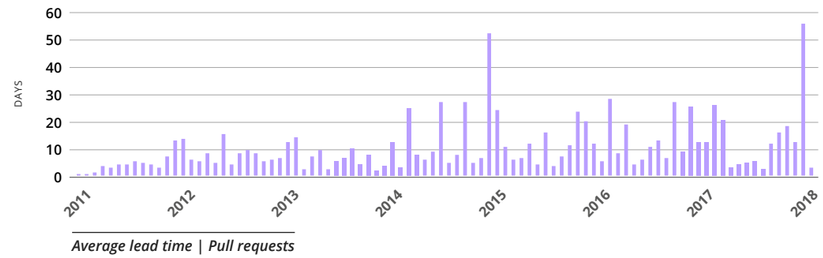
Share of bridgers from segments

PRODUCTIVITY • Attraction and retention of contributors

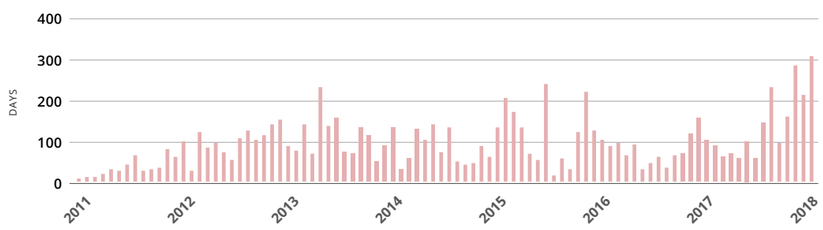


Firefox | GitHub/Git activity

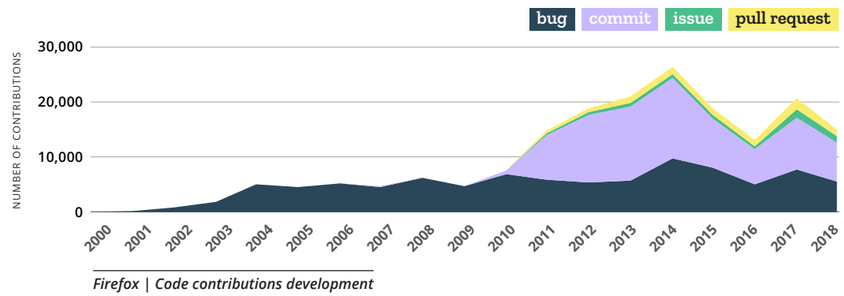
PRODUCTIVITY • Lead time for pull requests and issues (GitHub/Git)



Average lead time | Pull requests



Average lead time | Issues



Firefox | Code contributions development

Community health

Gecko

Summary

ROBUSTNESS

By Mozilla network engagement: Most cross-contribution occurs with Firefox, followed by MDN, Infrastructure, and Add-ons.

By attraction and retention: 76% of Gecko contributors are non-staff. However, most contribution (85%) comes from staff. Gecko's 1st and 2nd year retention rates are high and have been on the rise.

By user diversity: Contributions come equally from casual, regular and core segments, implying a high degree of diversity. As the network shows, Gecko contributors are often quite active on several other projects – and this is true for all three segments.

What counts as a contribution? Contributions from: Bugzilla and GitHub/Git.

KEY FIGURES*

2,680
CONTRIBUTORS

51,373
CONTRIBUTIONS TO GECKO

362,953
CONTRIBUTIONS ACROSS THE MOZILLA PROJECT

**Note that the overall numbers referenced below are across the history of the project, while the network graphs are just 2017-2019*

NOTES TO THE NETWORK

The network includes all contributors who have more than 5 contributions to Gecko (only non-staff).

TIME PERIOD

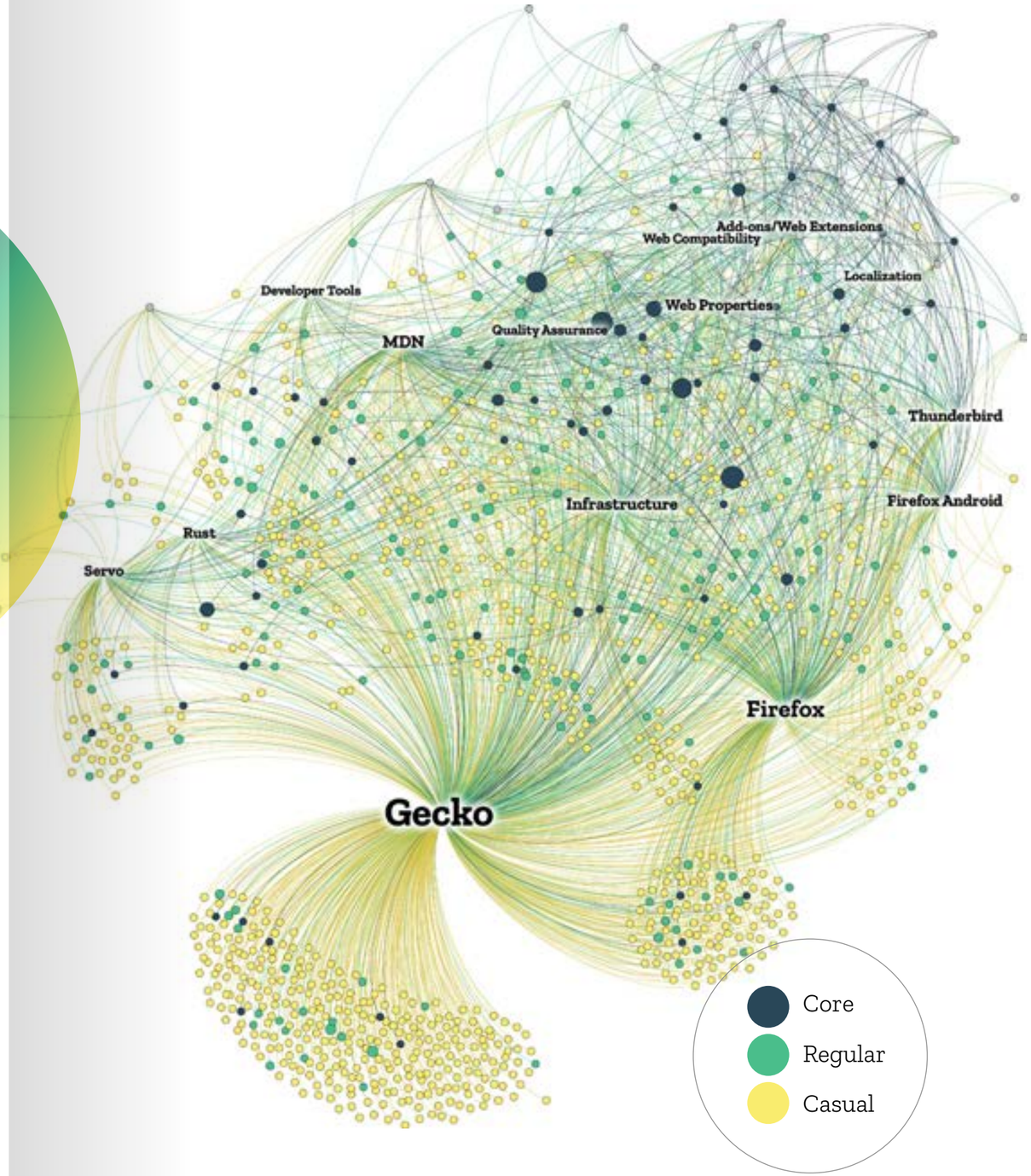
2017-2019

COLORED NODES

Contributors with more than 5 contributions to Gecko, colored by segment

NODES WITH LABELS

Projects with more than 5 Gecko-contributors



Understanding the Rebel Alliance

Community health

Gecko

DATA

Includes only non-staff contributors with more than 5 contributions (staff excluded)

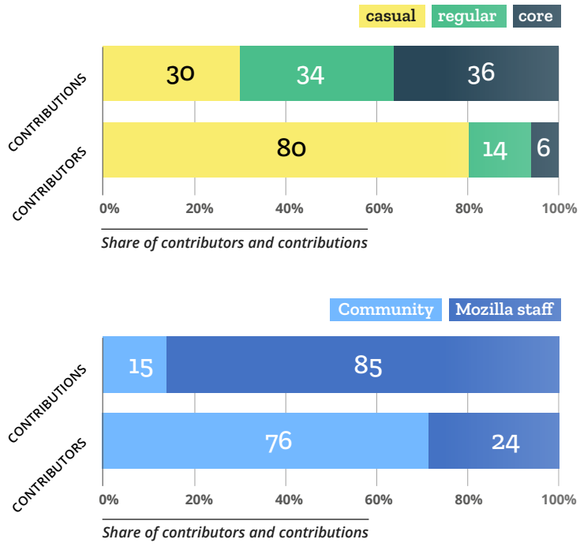
TIME PERIOD

2017-2019

ROBUSTNESS • Attraction and retention of contributors

	NO. OF ACTIVE CONTRIBUTORS	ATTRACTION	TURNOVER	1 YEAR RETENTION	2 YEAR RETENTION
2000	1813	1813	0		
2001	2711	1565	667	63%	
2002	3491	1628	848	63%	49%
2003	2534	867	1824	43%	34%
2004	2278	810	1066	42%	27%
2005	2030	686	934	41%	30%
2006	1855	492	667	44%	29%
2007	1605	479	729	42%	31%
2008	1771	576	410	46%	31%
2009	1541	464	694	44%	34%
2010	1804	582	319	51%	38%
2011	1961	611	454	53%	45%
2012	2030	663	594	53%	42%
2013	2233	742	539	54%	43%
2014	2480	780	533	58%	48%
2015	2581	758	657	55%	48%
2016	2457	705	829	51%	43%
2017	2408	664	713	53%	41%
2018	2067	549	890	48%	39%

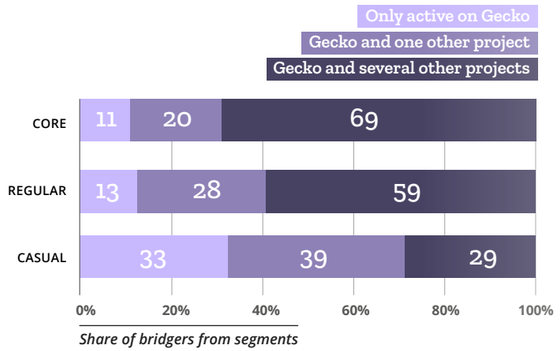
ROBUSTNESS • Diversity of contributors (segments and roles)



Share of contributors and contributions

Share of contributors and contributions

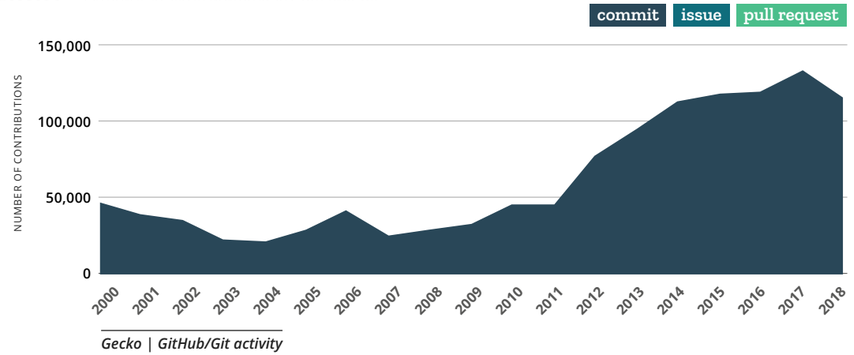
ROBUSTNESS • Networkers between projects



Share of bridgers from segments

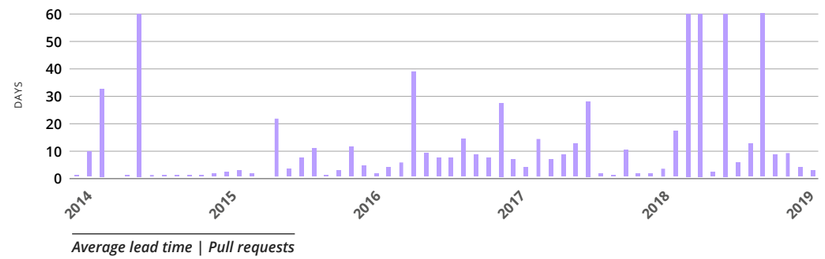
Understanding the Rebel Alliance

PRODUCTIVITY • Amount of contributions on GitHub/Git

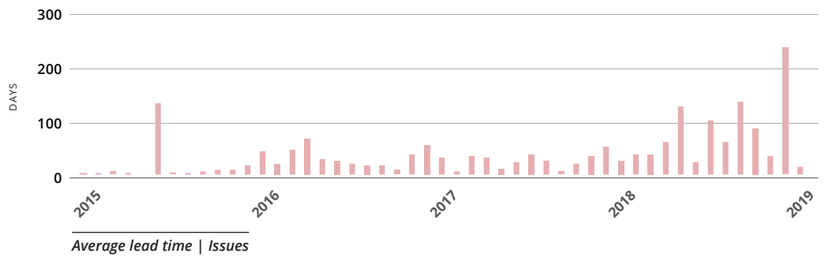


Gecko | GitHub/Git activity

PRODUCTIVITY • Lead time for pull requests and issues (GitHub/Git)



Average lead time | Pull requests



Average lead time | Issues

Community health

Developer Tools

Summary

ROBUSTNESS

By Mozilla network engagement: DevTools contributors overlap most with Gecko, followed by Firefox, Infrastructure, and MDN. All core and most regular contributors work on multiple Mozilla projects. With a small number of contributors overall, these individuals should be known and well supported!

By attraction and retention: 66% of DevTools contributors are non-staff, but most contributions come from staff (75%).

By user diversity: However, quite unusually we find that this project has the majority of contributions from casual and regular contributors. The number of new contributors (attraction) has been steady after a jump in 2015, with first and second year retention rates also steadily increasing.

What counts as a contribution? Contributions from: Bugzilla and GitHub/Git

KEY FIGURES*

243
CONTRIBUTORS

4,343
CONTRIBUTIONS TO GECKO

24,212
CONTRIBUTIONS ACROSS THE MOZILLA PROJECT

*Note that the overall numbers referenced below are across the history of the project, while the network graphs are just 2017-2019

NOTES TO THE NETWORK

The network includes all contributors who have more than 5 contributions to DevTools (only non-staff).

TIME PERIOD

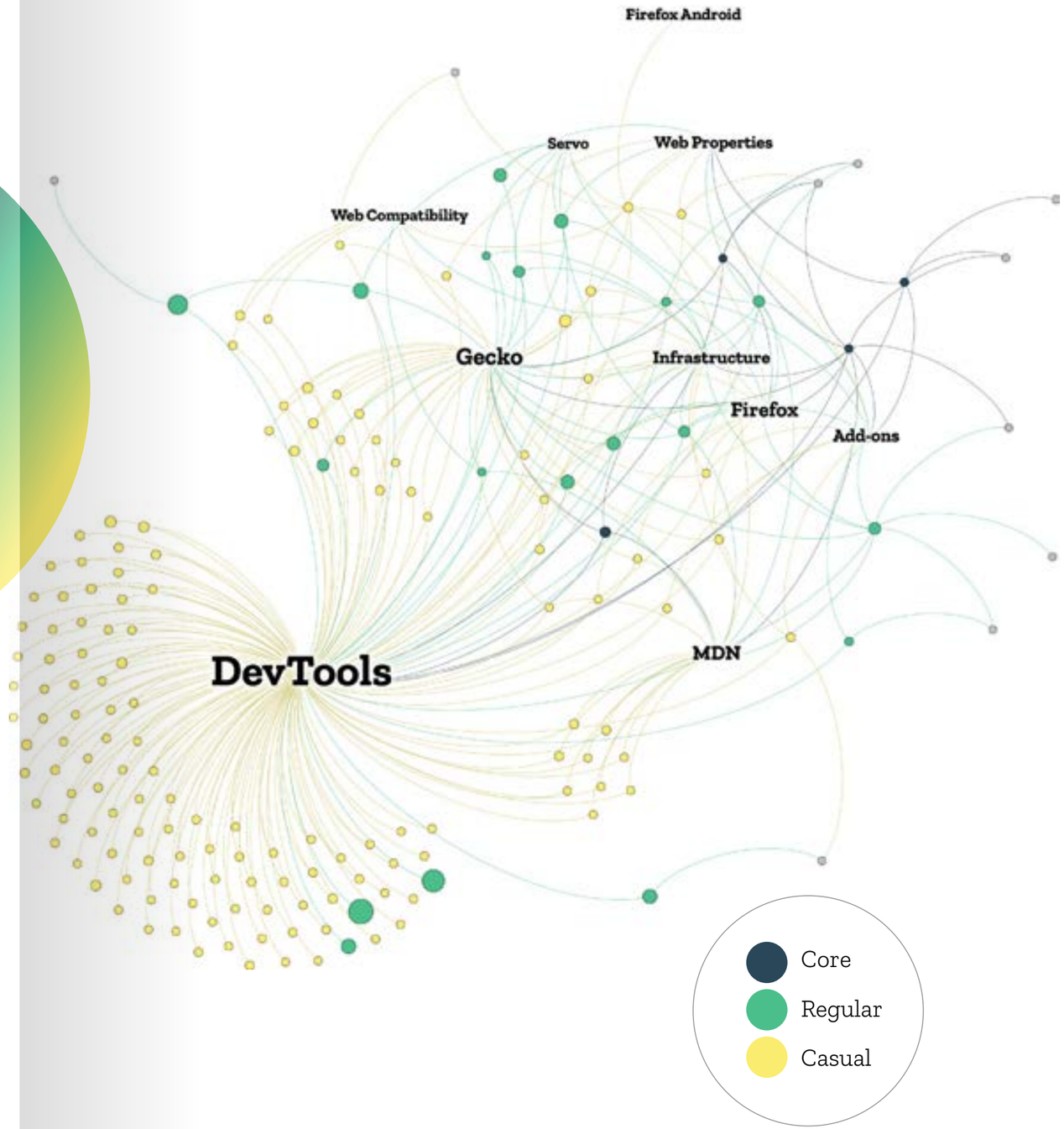
2017-2019

COLORED NODES

Contributors with more than 5 contributions to DevTools, colored by segment

NODES WITH LABELS

Projects with more than 5 DevTools-contributors



Understanding the Rebel Alliance

Community health

Developer Tools

DATA

Includes only non-staff contributors with more than 5 contributions (staff excluded)

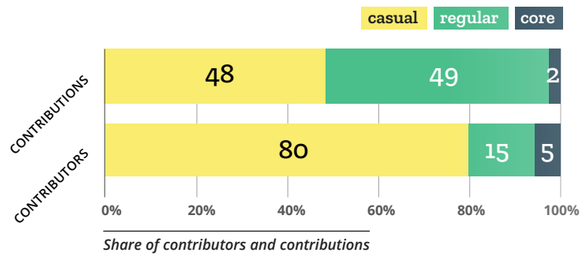
TIME PERIOD

2017-2019

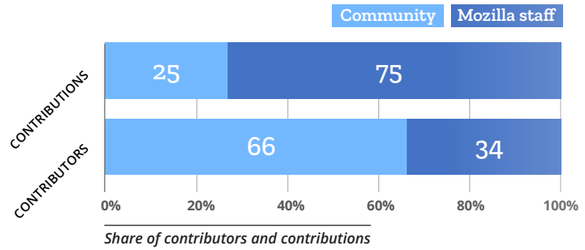
ROBUSTNESS • Attraction and retention of contributors

	NO. OF ACTIVE CONTRIBUTORS	ATTRACTION	TURNOVER	1 YEAR RETENTION	2 YEAR RETENTION
2013	4	4	0		
2014	11	11	4	0%	
2015	149	142	4	36%	75%
2016	214	151	86	42%	18%
2017	245	157	126	38%	27%
2018	287	141	99	55%	33%

ROBUSTNESS • Diversity of contributors (segments and roles)

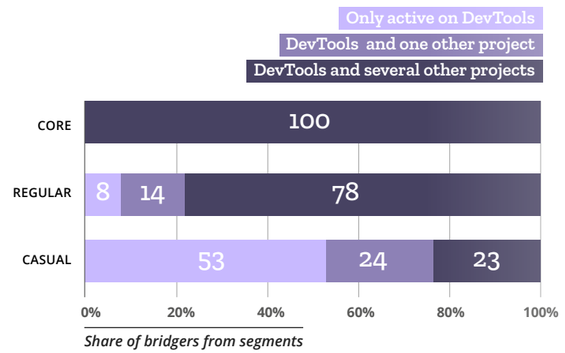


Share of contributors and contributions



Share of contributors and contributions

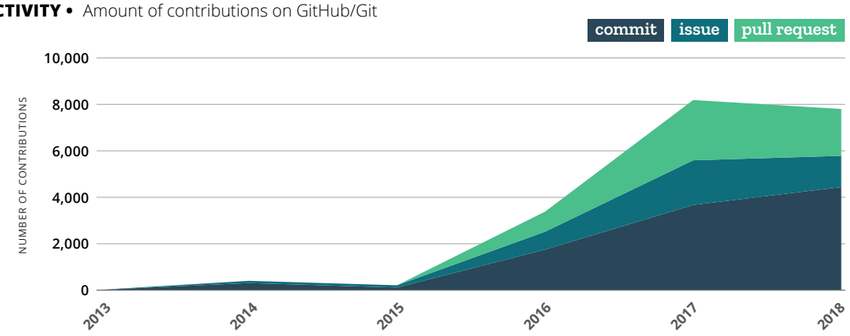
ROBUSTNESS • Networkers between projects



Share of bridgers from segments

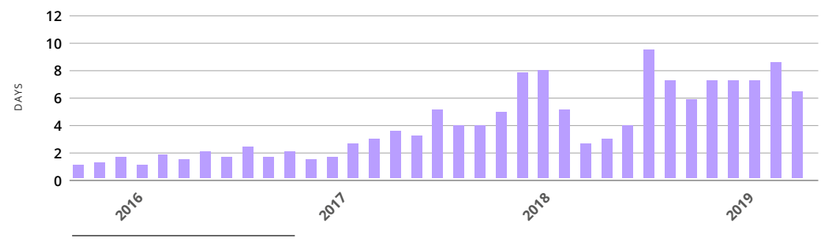
Understanding the Rebel Alliance

PRODUCTIVITY • Amount of contributions on GitHub/Git

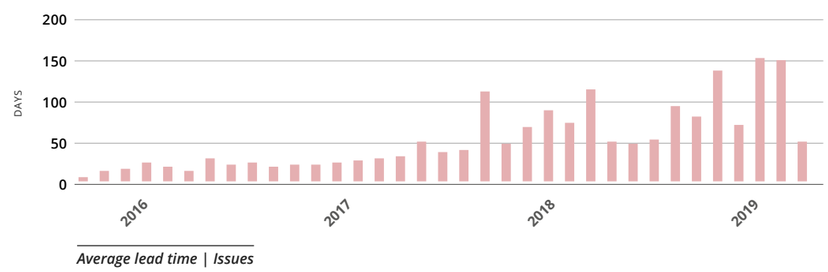


Debugger | GitHub/Git activity

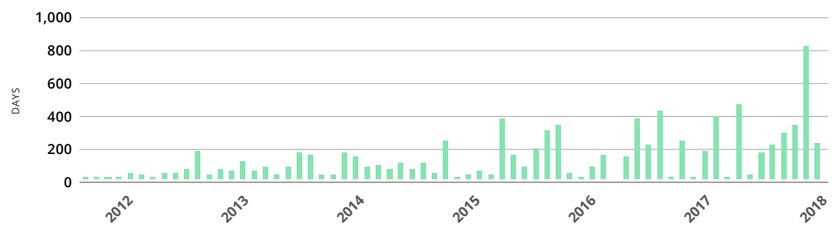
PRODUCTIVITY • Lead time for pull requests and issues (GitHub/Git) and bugs (Bugzilla)



Average lead time | Pull requests



Average lead time | Issues



Average lead time | Bugs

Community health

Firefox for Android

Summary

ROBUSTNESS

By Mozilla network engagement: Firefox Android developers mainly overlap with Firefox, followed by Gecko, Web Properties and Thunderbird. A notably high percentage of core contributors (85%), regular (58%) and casual participants (36%) contribute to multiple Mozilla projects, as evidenced in the graph.

By attraction and retention: Firefox Android is remarkably community-driven: 81% of the contributors are non-staff, and they account for 80% of contributions. However, compared to other projects, the community has very low 1st and 2nd year retention rates.

By user diversity: Most contributions come from the core segment.

What counts as a contribution? Contributions from: Bugzilla, GitHub/Git, Kitsune, Pontoon and AMO

KEY FIGURES*

**Note that the overall numbers referenced below are across the history of the project, while the network graphs are just 2017-2019*

1,111
CONTRIBUTORS

26,519
CONTRIBUTIONS TO FIREFOX ANDROID

2,468
CODE SPECIFIC CONTRIBUTIONS (GIT/GITHUB/GIT, BUGZILLA)

1,525,219
CONTRIBUTIONS ACROSS THE MOZILLA PROJECT

NOTES TO THE NETWORK

The network includes all contributors who have more than 5 contributions to Firefox Android (only non-staff).

TIME PERIOD

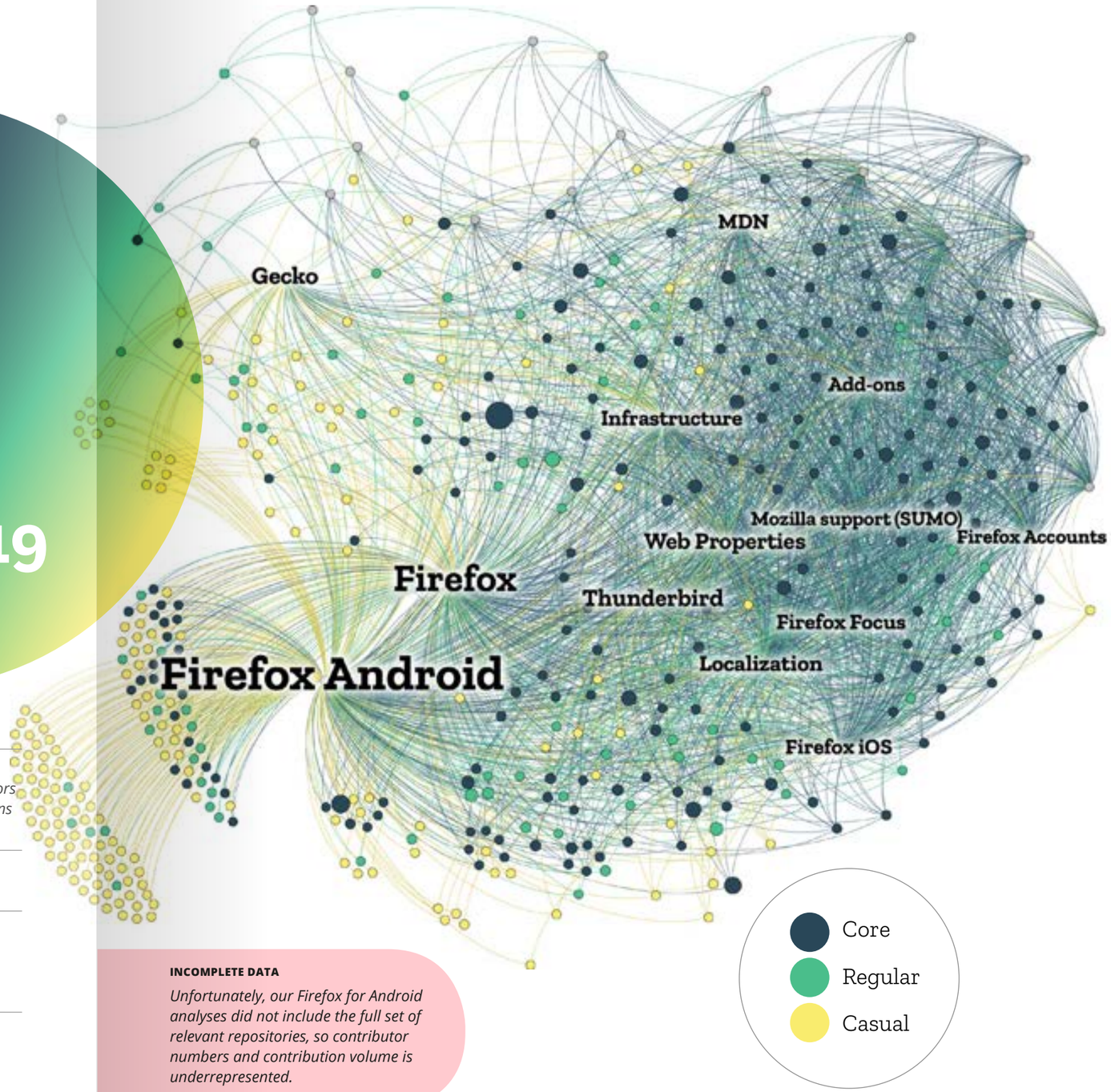
2017-2019

COLORED NODES

Contributors with more than 5 contributions to Firefox Android, colored by segment

NODES WITH LABELS

Projects with more than 5 Firefox Android-contributors



INCOMPLETE DATA

Unfortunately, our Firefox for Android analyses did not include the full set of relevant repositories, so contributor numbers and contribution volume is underrepresented.

Understanding the Rebel Alliance

Community health

Firefox for Android

DATA

Includes only non-staff contributors with more than 5 contributions (staff excluded)

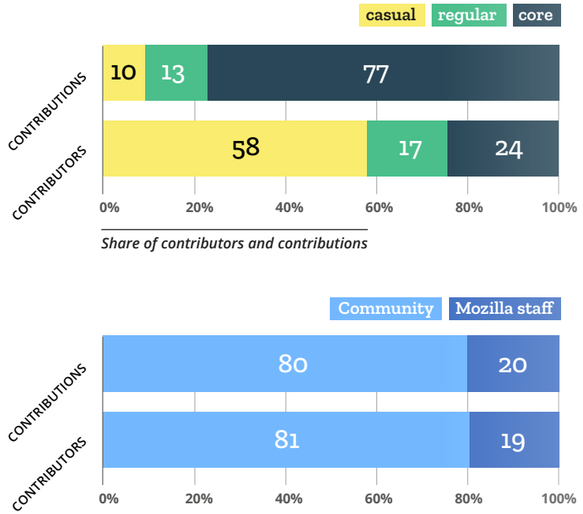
TIME PERIOD

2017-2019

ROBUSTNESS • Attraction and retention of contributors

	NO. OF ACTIVE CONTRIBUTORS	ATTRACTION	TURNOVER	1 YEAR RETENTION	2 YEAR RETENTION
2008	25	25	0		
2009	60	53	18	28%	
2010	119	95	36	38%	20%
2011	273	224	70	38%	23%
2012	413	310	170	35%	23%
2013	599	461	275	29%	21%
2014	673	486	412	27%	17%
2015	660	428	441	28%	16%
2016	633	417	444	26%	18%
2017	597	346	382	29%	16%
2018	654	408	351	30%	14%

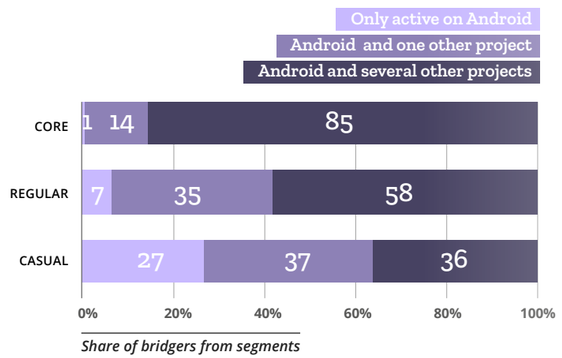
ROBUSTNESS • Diversity of contributors (segments and roles)



Share of contributors and contributions

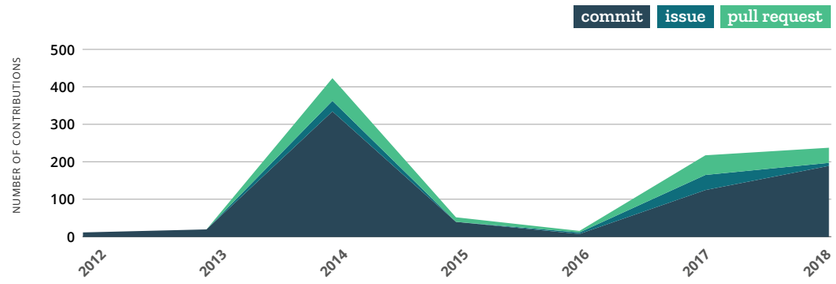
Share of contributors and contributions

ROBUSTNESS • Networkers between projects



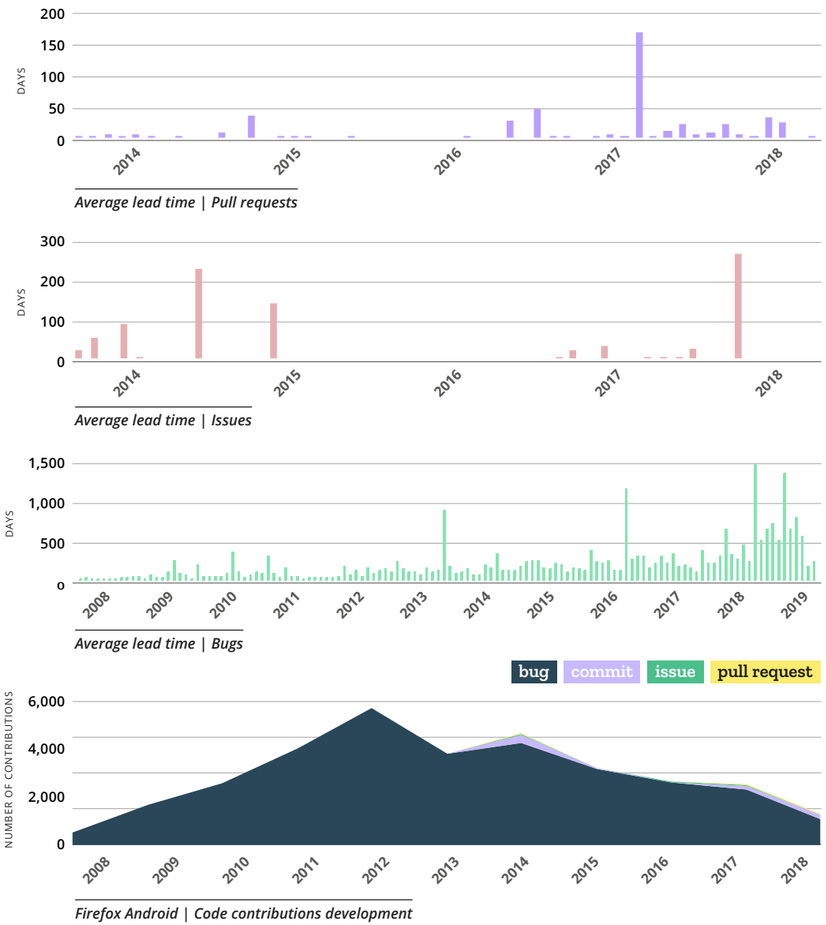
Share of bridgers from segments

PRODUCTIVITY • Amount of contributions on GitHub/Git



Firefox Android | GitHub/Git activity

PRODUCTIVITY • Lead time for pull requests and issues (GitHub/Git) and bugs (Bugzilla)



Average lead time | Pull requests

Average lead time | Issues

Average lead time | Bugs

Firefox Android | Code contributions development

Community health

Firefox iOS

Summary

ROBUSTNESS

By Mozilla network engagement: Firefox iOS non-staff contributors mainly overlap with Firefox, but they are very engaged across other Mozilla projects. This is true of all contributor segments.

By attraction and retention: As with Firefox Android, Firefox iOS is very community-driven: most contributors are non-staff (77%), and they account for most contributions (71%). Unlike Firefox Android, the Firefox iOS community has high 1st and 2nd year retention rates.

By user diversity: 90% of contributions come from the core segment, a low degree of diversity that might be problematic.

What counts as a contribution? Contributions from: Bugzilla, GitHub/Git, Kitsune and Pontoon.

KEY FIGURES*

418
CONTRIBUTORS

52,196
CONTRIBUTIONS TO FIREFOX IOS

1,815
CODE SPECIFIC CONTRIBUTIONS (GIT/GITHUB/GIT, BUGZILLA)

1,344,975
CONTRIBUTIONS ACROSS THE MOZILLA PROJECT

*Note that the overall numbers referenced below are across the history of the project, while the network graphs are just 2017-2019

NOTES TO THE NETWORK

The network includes all contributors who have more than 5 contributions to Firefox iOS (only non-staff).

TIME PERIOD

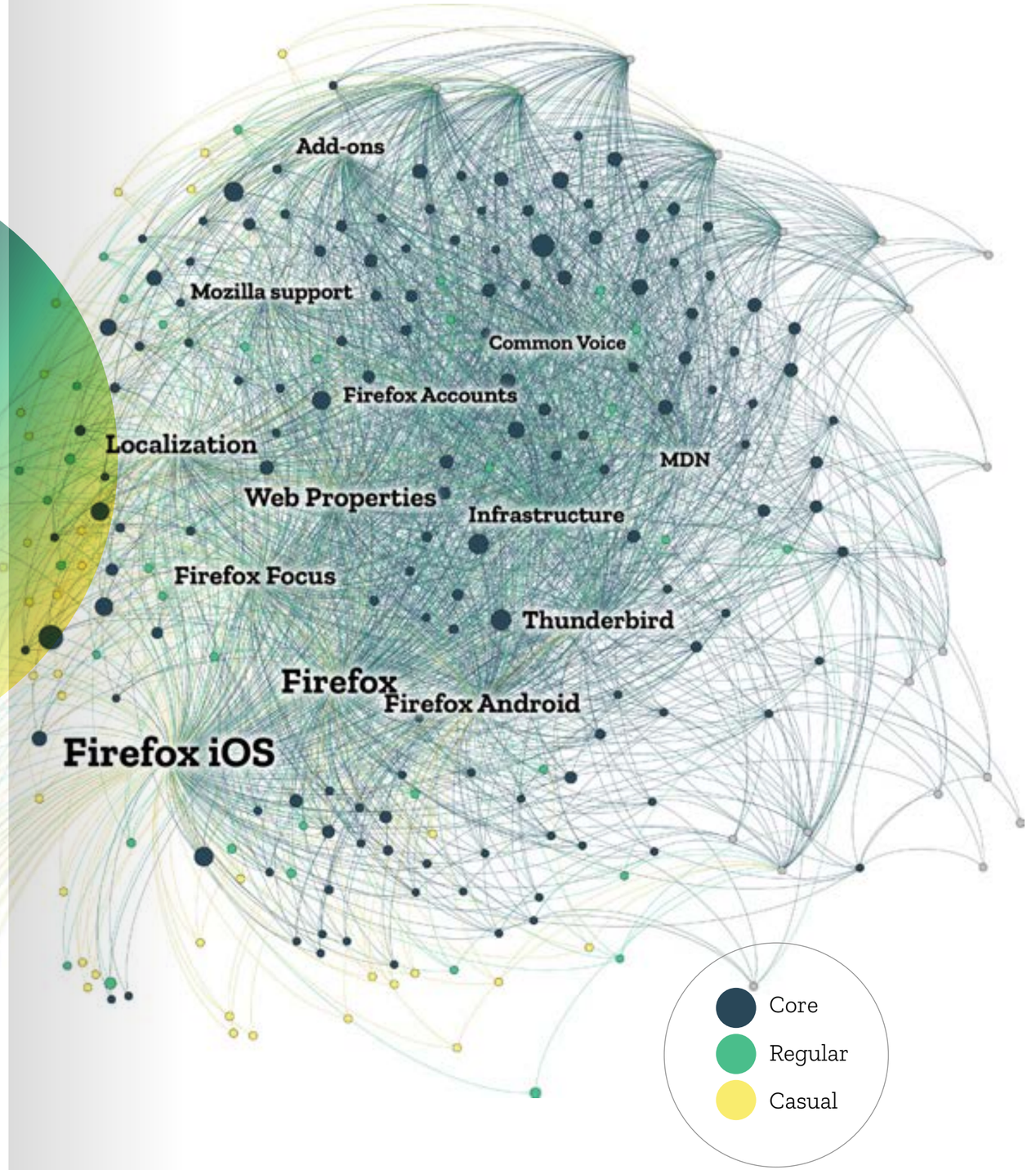
2017-2019

COLORED NODES

Contributors with more than 5 contributions to Firefox iOS, colored by segment

NODES WITH LABELS

Projects with more than 5 Firefox iOS-contributors



Community health

Firefox iOS

DATA

Includes only non-staff contributors with more than 5 contributions (staff excluded)

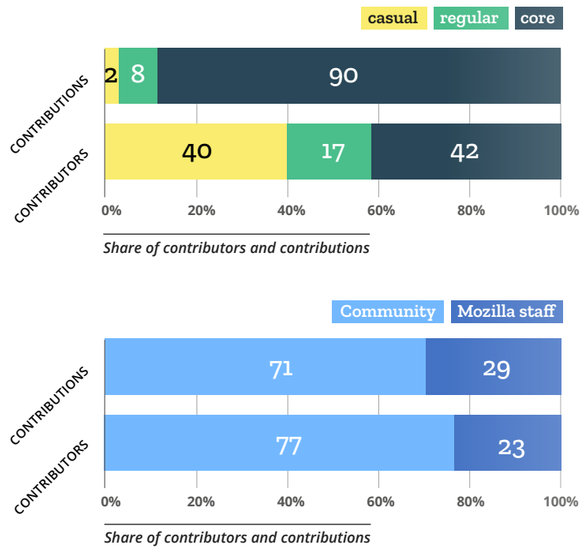
TIME PERIOD

2017-2019

ROBUSTNESS • Attraction and retention of contributors

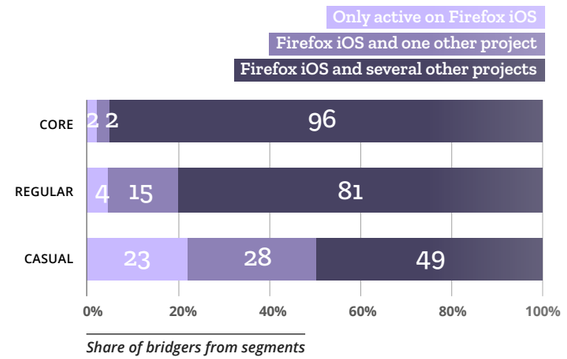
NO. OF ACTIVE CONTRIBUTORS	ATTRACTION	TURNOVER	1 YEAR RETENTION	2 YEAR RETENTION
11	11	0		
149	142	4	100%	
214	151	86	44%	18%
245	157	126	54%	27%
287	141	99	58%	33%

ROBUSTNESS • Diversity of contributors (segments and roles)



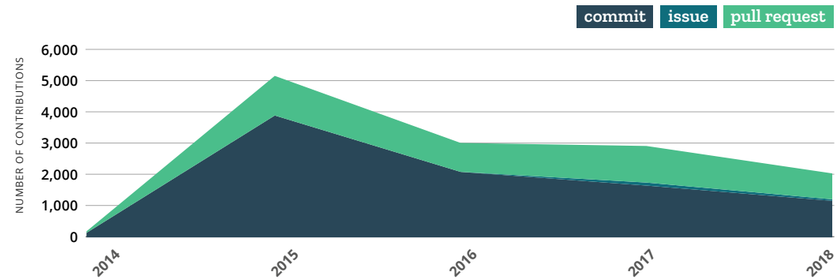
Share of contributors and contributions

ROBUSTNESS • Networkers between projects



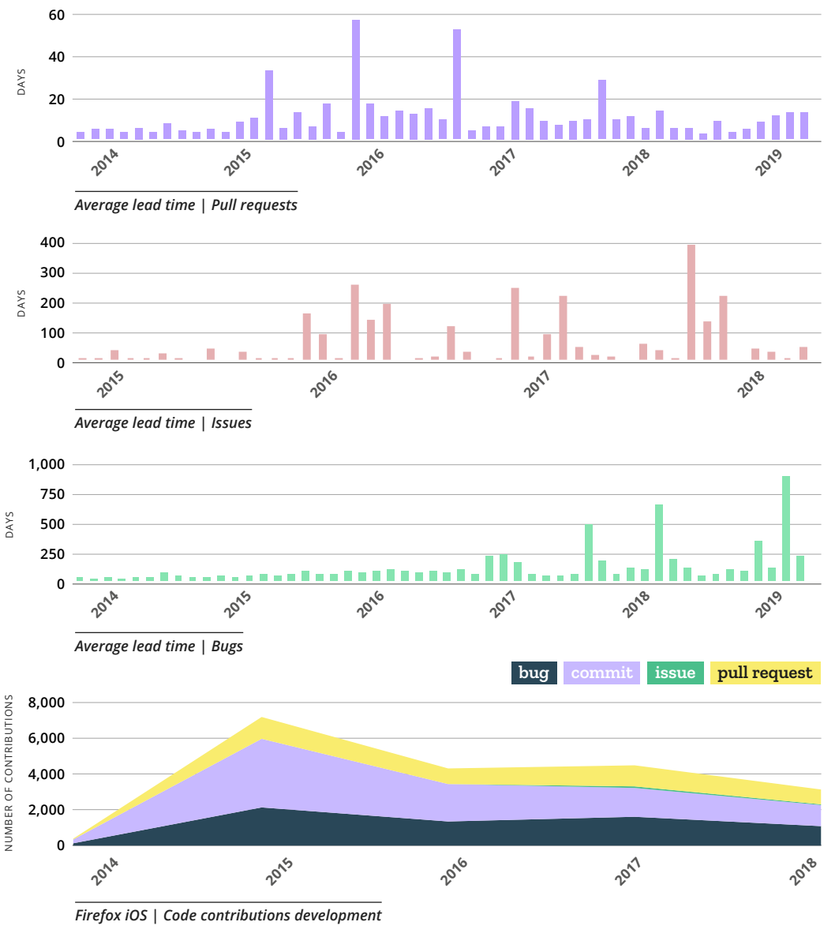
Share of bridgers from segments

PRODUCTIVITY • Amount of contributions on GitHub/Git



Firefox iOS | GitHub/Git activity

PRODUCTIVITY • Lead time for pull requests and issues (GitHub/Git) and bugs (Bugzilla)



Average lead time | Pull requests

Average lead time | Issues

Average lead time | Bugs

Firefox iOS | Code contributions development

Community health

Servo

Summary

ROBUSTNESS

By Mozilla network engagement: Servo contributor mainly overlap with Gecko, followed closely by Rust.

By attraction and retention: Most contributors are non-staff, but their contributions comprise the 29% of the overall volume. 1st and 2nd year retention rates have dropped since 2016, with the 1st year retention rate still very acceptable but the 2nd rate perhaps of concern.

By user diversity: By contributor segments, the Servo community seems robust and diverse, with contributions well distributed across the segments.

What counts as a contribution? Contributions from: GitHub/Git

KEY FIGURES*

622
CONTRIBUTORS

8,747
CONTRIBUTIONS TO SERVO

92,946
CONTRIBUTIONS ACROSS THE MOZILLA PROJECT

*Note that the overall numbers referenced below are across the history of the project, while the network graphs are just 2017-2019

NOTES TO THE NETWORK

The network includes all contributors who have more than 5 contributions to Servo (only non-staff).

TIME PERIOD

2017-2019

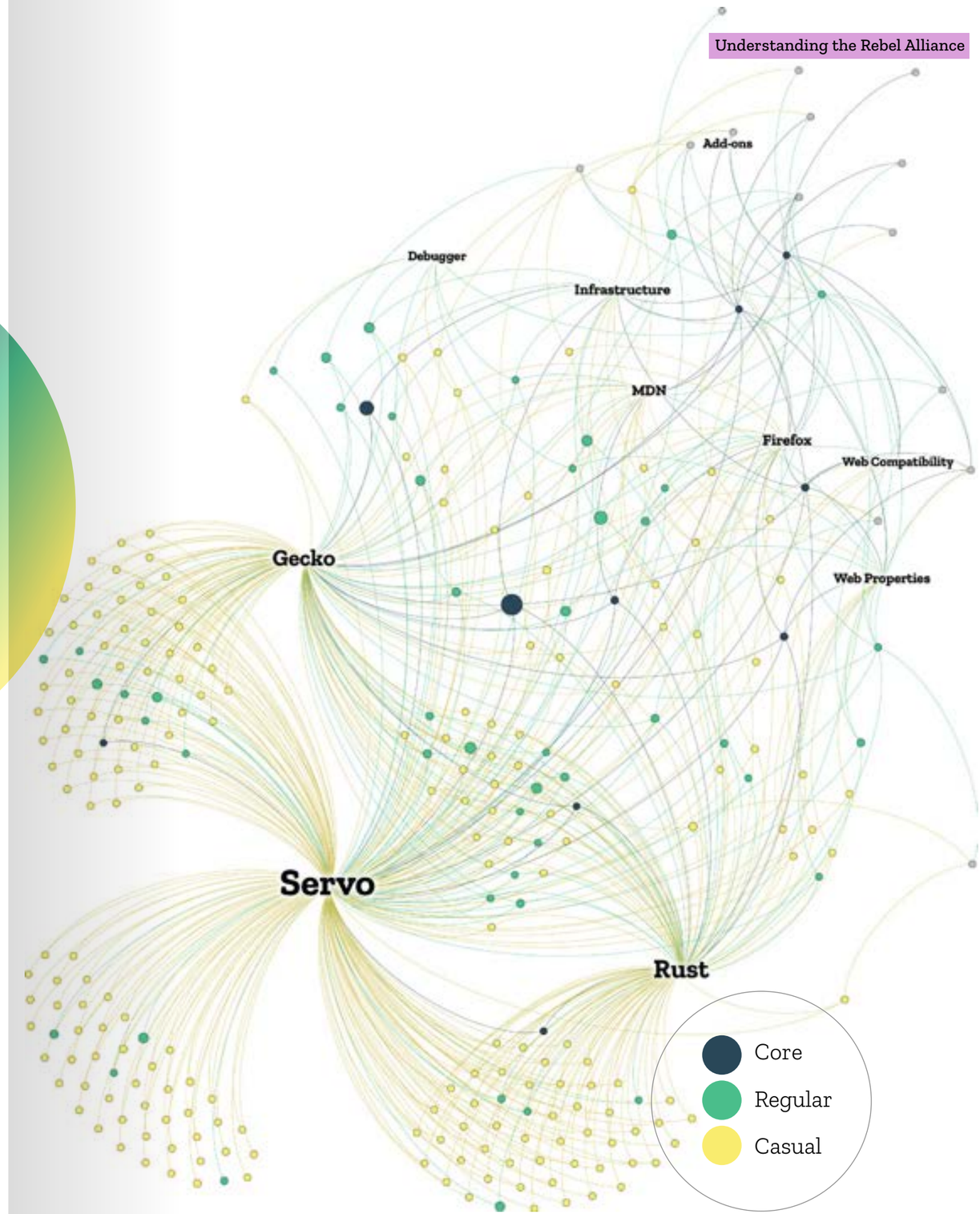
COLORED NODES

Contributors with more than 5 contributions to Servo, colored by segment

NODES WITH LABELS

Projects with more than 5 Servo-contributors

Understanding the Rebel Alliance



Community health

Servo

DATA

Includes only non-staff contributors with more than 5 contributions (staff excluded)

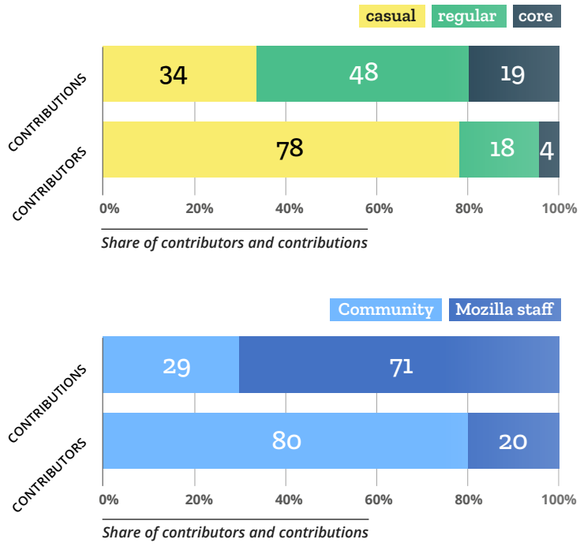
TIME PERIOD

2017-2019

ROBUSTNESS • Attraction and retention of contributors

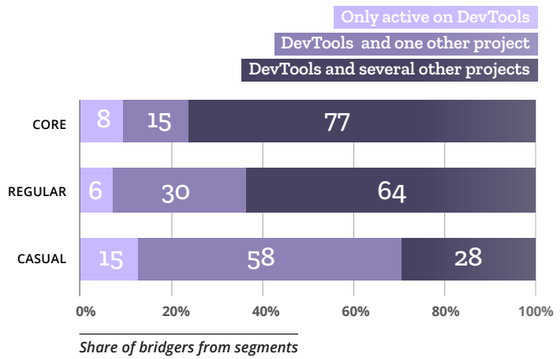
	NO. OF ACTIVE CONTRIBUTORS	ATTRACTION	TURNOVER	1 YEAR RETENTION	2 YEAR RETENTION
2012	21				
2013	91	91	21		
2014	195	162	58	50%	
2015	344	274	125	55%	15%
2016	454	326	216	60%	21%
2017	443	281	292	47%	16%
2018	263	133	313	47%	13%

ROBUSTNESS • Diversity of contributors (segments and roles)



Share of contributors and contributions

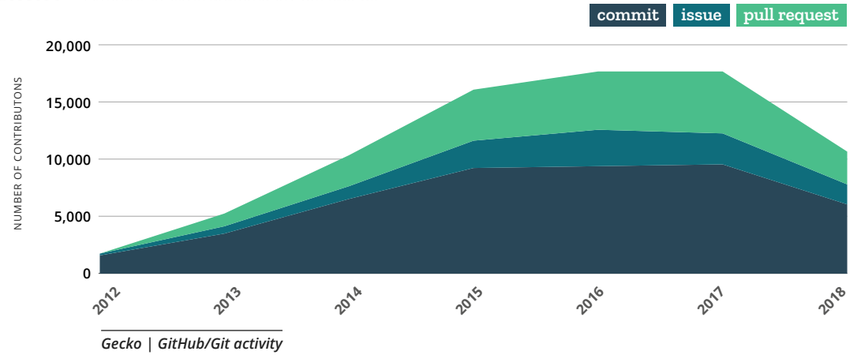
ROBUSTNESS • Networkers between projects



Share of bridgers from segments

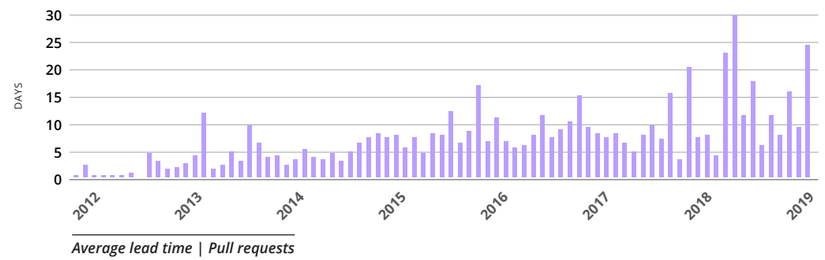
Understanding the Rebel Alliance

PRODUCTIVITY • Amount of contributions on GitHub/Git

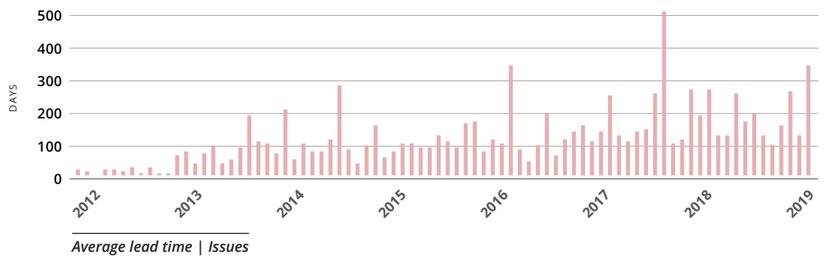


Gecko | GitHub/Git activity

PRODUCTIVITY • Lead time for pull requests and issues (GitHub/Git)



Average lead time | Pull requests



Average lead time | Issues

Community health

Rust

Summary

ROBUSTNESS

By Mozilla network engagement: Rust contributors participate elsewhere across Mozilla. Gecko and Servo are the primary 'partner' projects, but we also find cross-participation in Firefox, Web Properties, MDN , Thunderbird and Infrastructure.

By attraction and retention: Rust is mainly driven by non-staff contributors and has very high 1st and 2nd year retention rates compared to other projects at Mozilla.

By user diversity: contributions come relatively equally from casual, regular and core segments, implying a high degree of segment diversity.

What counts as a contribution? Contributions from: Bugzilla (only 2010) and GitHub/Git

KEY FIGURES*

**Note that the overall numbers referenced below are across the history of the project, while the network graphs are just 2017-2019*

1,711
CONTRIBUTORS

49,923
CONTRIBUTIONS TO RUST

123,280
CONTRIBUTIONS ACROSS THE MOZILLA PROJECT

NOTES TO THE NETWORK

The network includes all contributors who have more than 5 contributions to Rust (only non-staff).

TIME PERIOD

2017-2019

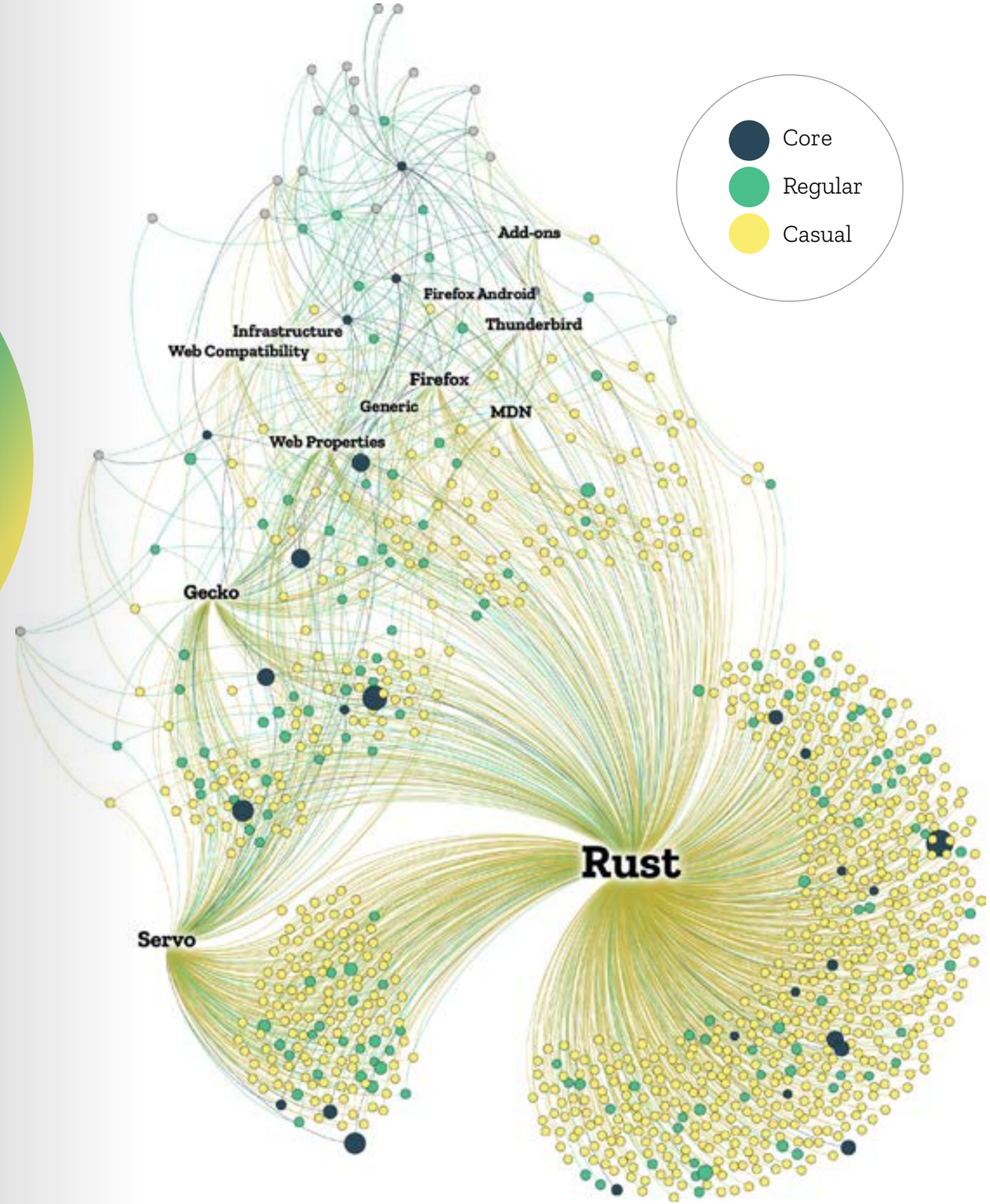
COLORED NODES

Contributors with more than 5 contributions to Rust, colored by segment

NODES WITH LABELS

Projects with more than 5 Rust-contributors

Understanding the Rebel Alliance



Community health

Rust

DATA

Includes only non-staff contributors with more than 5 contributions (staff excluded)

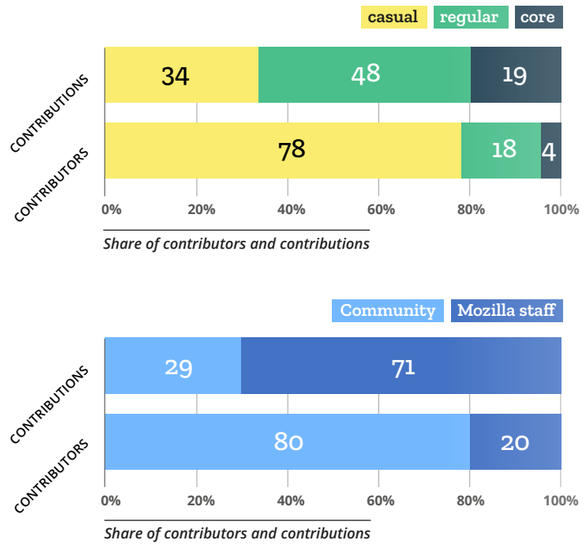
TIME PERIOD

2017-2019

ROBUSTNESS • Attraction and retention of contributors

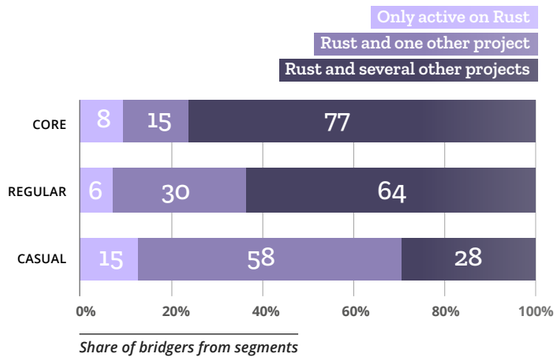
	NO. OF ACTIVE CONTRIBUTORS	ATTRACTION	TURNOVER	1 YEAR RETENTION	2 YEAR RETENTION
2012	28	28	0		
2011	110	89	7	75%	
2013	312	243	41	62%	46%
2014	693	489	108	63%	50%
2015	954	502	241	61%	44%
2016	1001	446	399	52%	40%
2017	1118	408	291	59%	42%
2018	1080	272	310	58%	46%

ROBUSTNESS • Diversity of contributors (segments and roles)



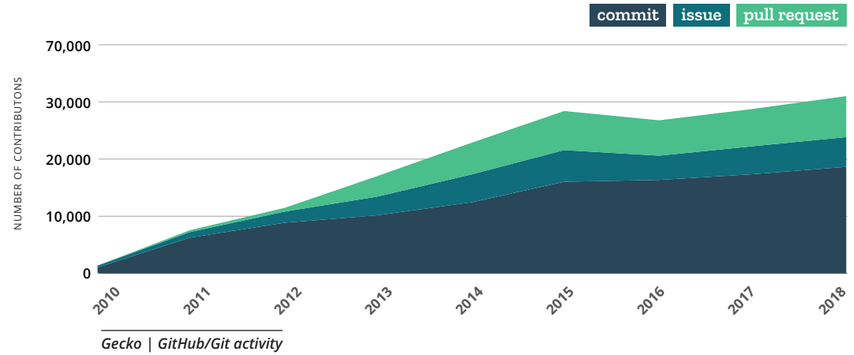
Share of contributors and contributions

ROBUSTNESS • Networkers between projects



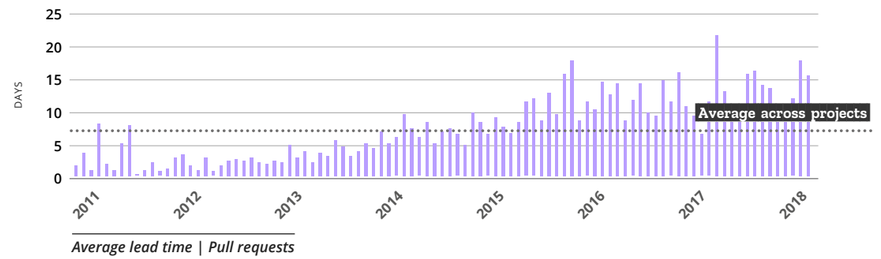
Share of bridgers from segments

PRODUCTIVITY • Amount of contributions on GitHub/Git

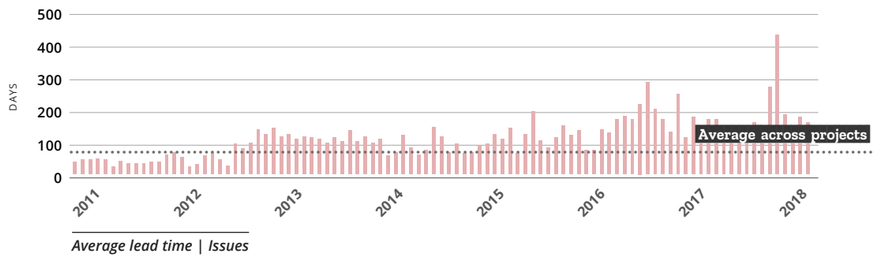


Gecko | GitHub/Git activity

PRODUCTIVITY • Lead time for pull requests and issues (GitHub/Git)



Average lead time | Pull requests



Average lead time | Issues

Community health

WebMR

Summary

ROBUSTNESS

By Mozilla network engagement: There is no particular cohesion between WebMR contributors and other Mozilla projects. The contributions are coming from both staff and non-staff.

By external network engagement: The WebMR work seems well embedded in an ecosystem of other open source frameworks and tools

By attraction and retention: WebMR is a relatively community-driven project, with almost half of contributions coming from non-staff. The community continues to grow, although slowly. Retention is difficult to assess in such a small community is this small, however, the early years were highly successful in keeping the contributors engaged, and retention has since dropped off – but is still respectable as compared to other projects.

By user diversity: contributions are equally coming from casual, regular and core segments.

What counts as a contribution? Contributions from GitHub/ Git and Kitsune

KEY FIGURES*

125
CONTRIBUTORS

7,247
CONTRIBUTIONS TO WEBMR

21,232
CONTRIBUTIONS ACROSS THE MOZILLA PROJECT

**Note that the overall numbers referenced below are across the history of the project, while the network graphs are just 2017-2019*

NOTES TO THE NETWORK

The network includes all contributors who have more than 5 contributions to WebMR (only non-staff).

TIME PERIOD

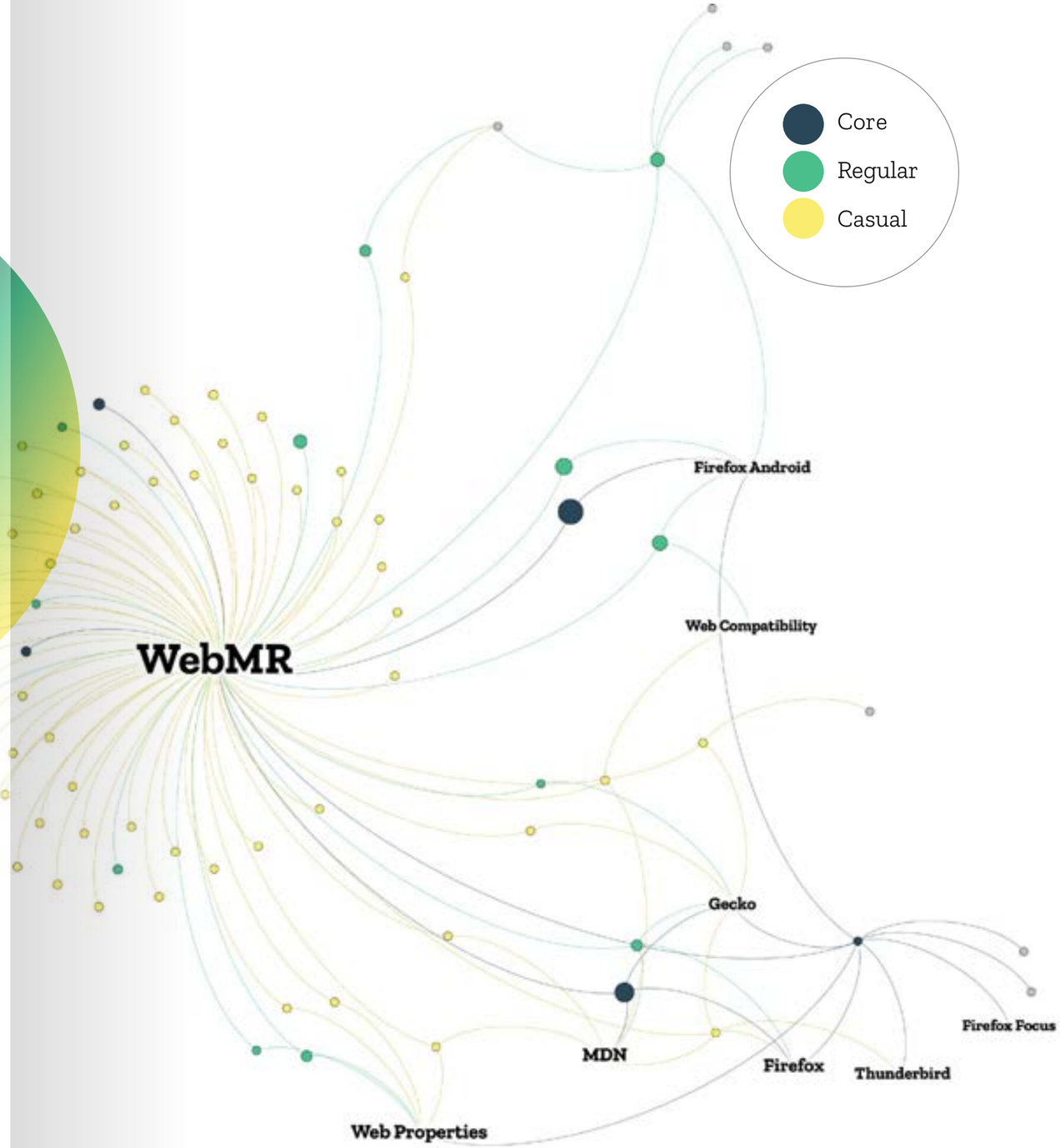
2017-2019

COLORED NODES

Contributors with more than 5 contributions to WebMR, colored by segment

NODES WITH LABELS

Projects with more than 5 WebMR-contributors



Understanding the Rebel Alliance

Community health

WebMR

DATA

Includes only non-staff contributors with more than 5 contributions (staff excluded)

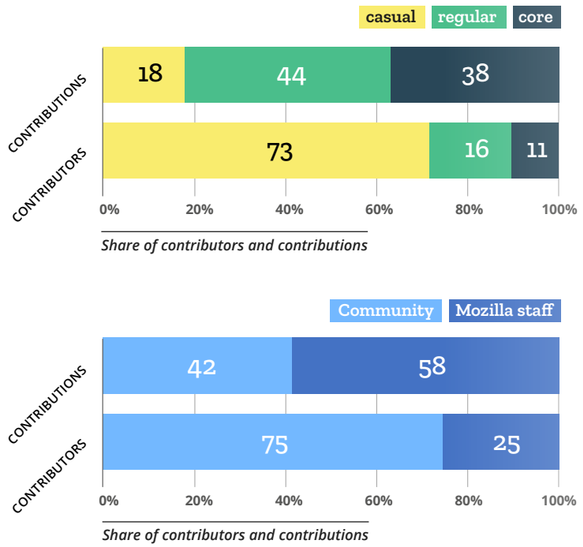
TIME PERIOD

2017-2019

ROBUSTNESS • Attraction and retention of contributors

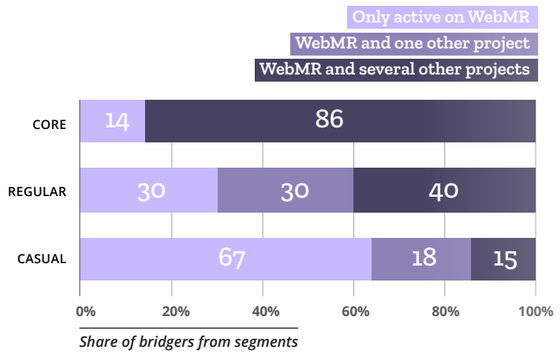
	NO. OF ACTIVE CONTRIBUTORS	ATTRACTION	TURNOVER	1 YEAR RETENTION	2 YEAR RETENTION
2013	5	5	0		
2014	5	1	1	80%	
2015	15	10	0	80%	100%
2016	55	47	7	53%	60%
2017	82	53	26	51%	40%
2018	72	38	48	40%	25%

ROBUSTNESS • Diversity of contributors (segments and roles)



Share of contributors and contributions

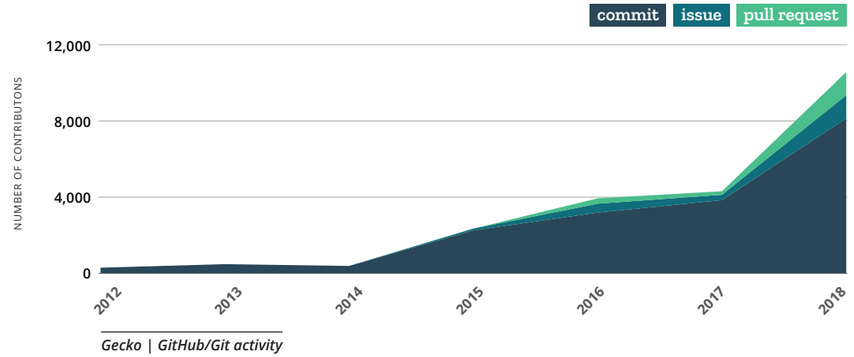
ROBUSTNESS • Networkers between projects



Share of bridgers from segments

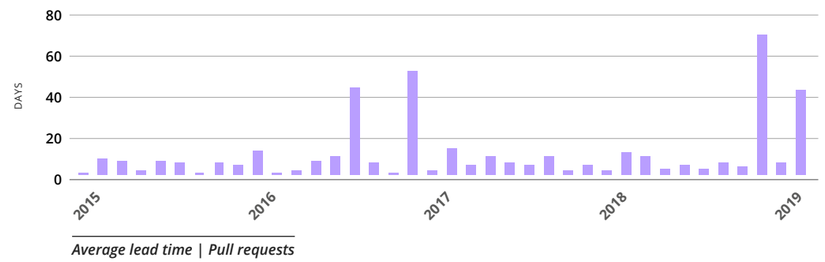
Understanding the Rebel Alliance

PRODUCTIVITY • Amount of contributions on GitHub/Git

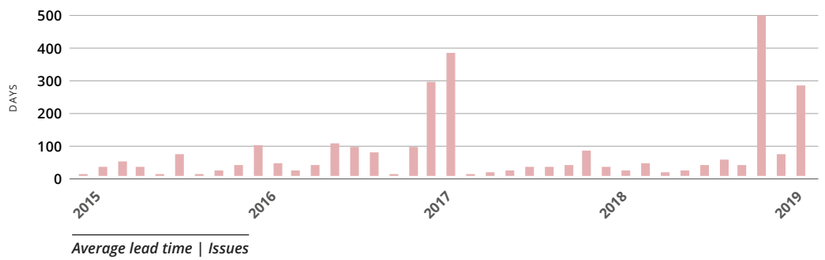


Gecko | GitHub/Git activity

PRODUCTIVITY • Lead time for pull requests and issues (GitHub/Git)



Average lead time | Pull requests



Average lead time | Issues

Community health

DeepSpeech

Summary

ROBUSTNESS

By Mozilla network engagement: There is no particular cohesion between WebMR contributors and other Mozilla projects.

The contributions are coming from both staff and non-staff.

By external network engagement: The network shows which other projects contributors to DeepSpeech also engage in. Here especially Common Voice is the main project, in fact, the people contributing to Deep Speech make more contributions to Common Voice (seen on the size of the label).

The Deep Speech project is like DevTools, made up by both staff and non-staff, but with staff making the most contributions.

Most of the contributions are made by either core or casual.

All regular and core contributors active on Deep Speech are also active on other projects.

What counts as a contribution? Contributions from: GitHub/Git

KEY FIGURES*

44
CONTRIBUTORS

701
CONTRIBUTIONS TO DEEPSPEECH

7,536
CONTRIBUTIONS ACROSS THE MOZILLA PROJECT

**Note that the overall numbers referenced below are across the history of the project, while the network graphs are just 2017-2019*

NOTES TO THE NETWORK

The network includes all contributors who have more than 5 contributions to Deep Speech (only non-staff).

TIME PERIOD

2017-2019

COLORED NODES

Contributors with more than 5 contributions to Deep Speech, colored by segment

NODES WITH LABELS

Projects with more than 5 Deep Speech-contributors

Understanding the Rebel Alliance

Community health

DeepSpeech

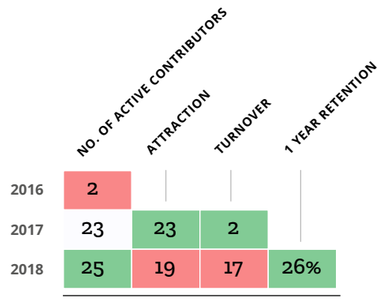
DATA

Includes only non-staff contributors with more than 5 contributions (staff excluded)

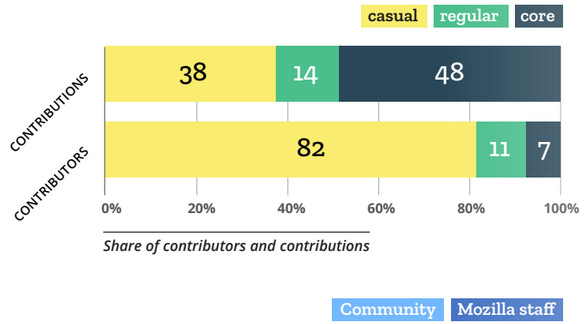
TIME PERIOD

2017-2019

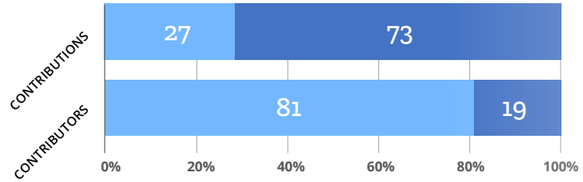
ROBUSTNESS • Attraction and retention of contributors



ROBUSTNESS • Diversity of contributors (segments and roles)

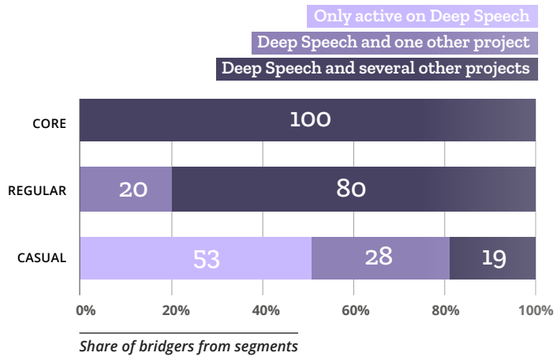


Share of contributors and contributions



Share of contributors and contributions

ROBUSTNESS • Networkers between projects

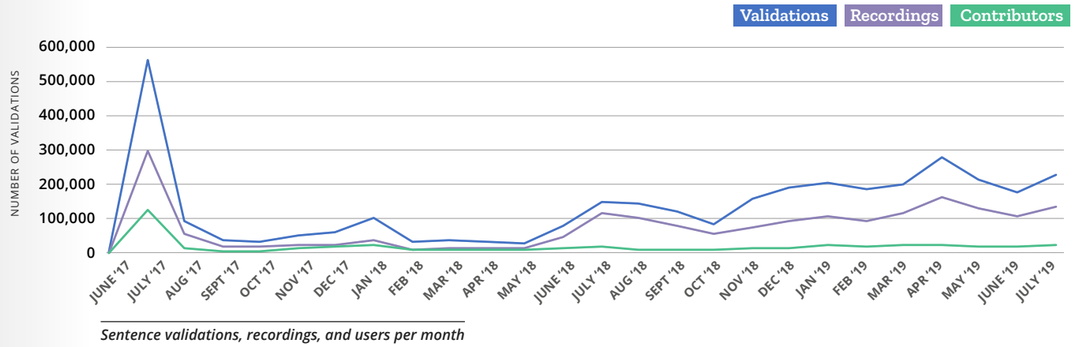


Share of bridgers from segments

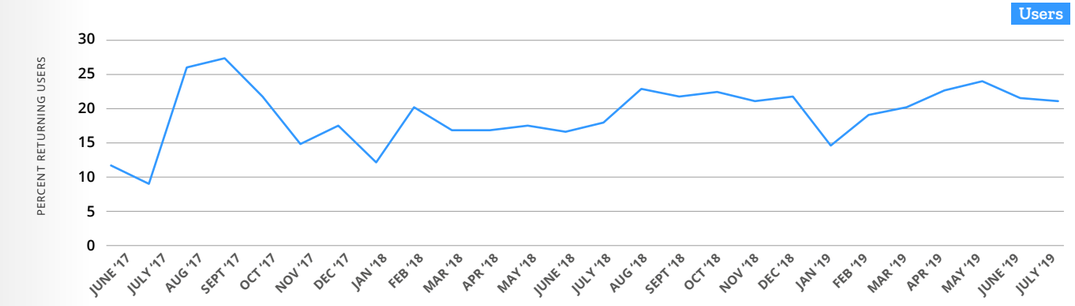
Community health

Common Voice

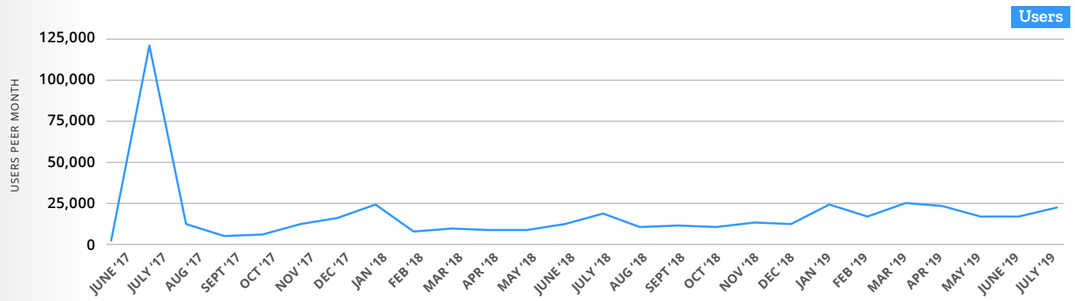
Contribution of sentence validation and voice recordings (open source code contributions follow)



Sentence validations, recordings, and users per month



Percentage of users returning each month



Total number of users per month

Community health

Common Voice

Summary

ROBUSTNESS

By Mozilla network engagement: The network shows which other projects contributors to Common Voice also engage in. Here both Firefox, Web Properties and Add-ons/ Web Extensions are the main projects.

The Common Voice project is very new and is mainly made up by non-staff contributors

The majority of contributions are from the core, but also regular contributors make a relatively high share of the contributions.

We also find that many of its contributors are active on other projects as well, not only focused on Common Voice – especially the core contributors.

What counts as a contribution? Contributions from: GitHub/Git and Pontoon

KEY FIGURES*

396

CONTRIBUTORS

66,450

CONTRIBUTIONS TO COMMON VOICE (INFRASTRUCTURE AND LOCALIZATION - THIS DOES NOT INCLUDE VOICE CONTRIBUTION AND SENTENCE VALIDATION)

1,083,885

CONTRIBUTIONS ACROSS THE MOZILLA PROJECT

*Note that the overall numbers referenced below are across the history of the project, while the network graphs are just 2017-2019

NOTES TO THE NETWORK

The network includes all contributors who have more than 5 contributions to Common Voice (only non-staff).

TIME PERIOD

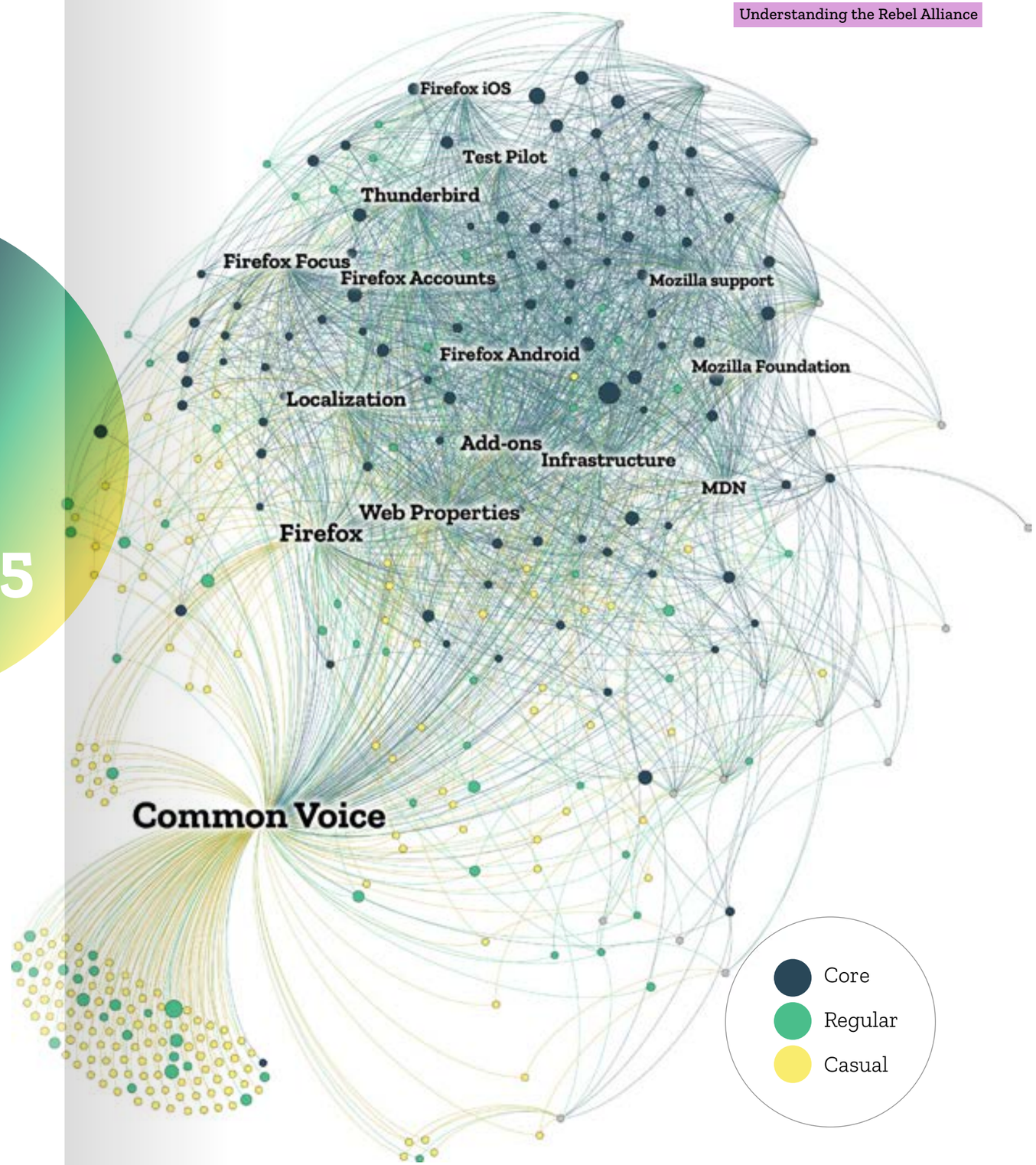
2017-2019

COLORED NODES

Contributors with more than 5 contributions to Common Voice, colored by segment

NODES WITH LABELS

Projects with more than 5 Common Voice-contributors



Understanding the Rebel Alliance

Community health

Common Voice

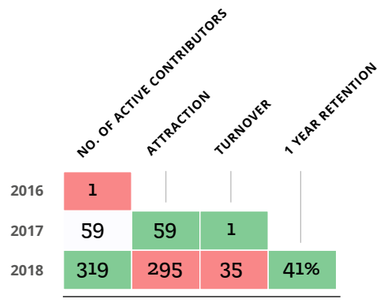
DATA

Includes only non-staff contributors with more than 5 contributions (staff excluded)

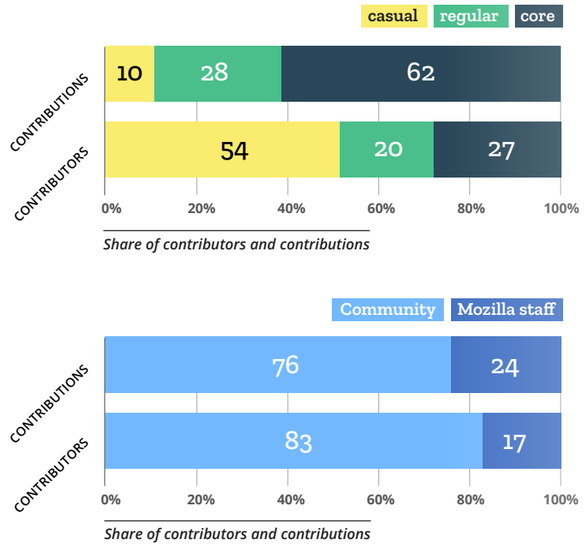
TIME PERIOD

2017-2019

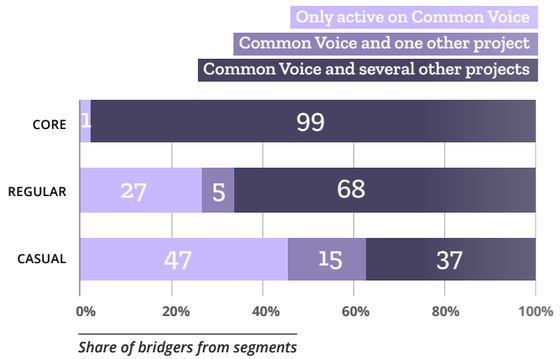
ROBUSTNESS • Attraction and retention of contributors



ROBUSTNESS • Diversity of contributors (segments and roles)

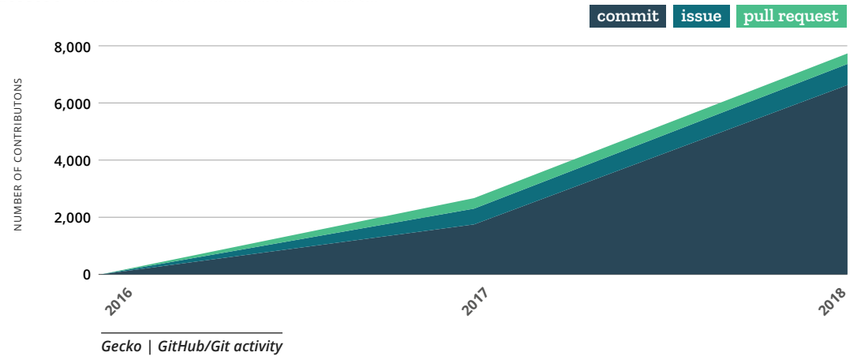


ROBUSTNESS • Networkers between projects

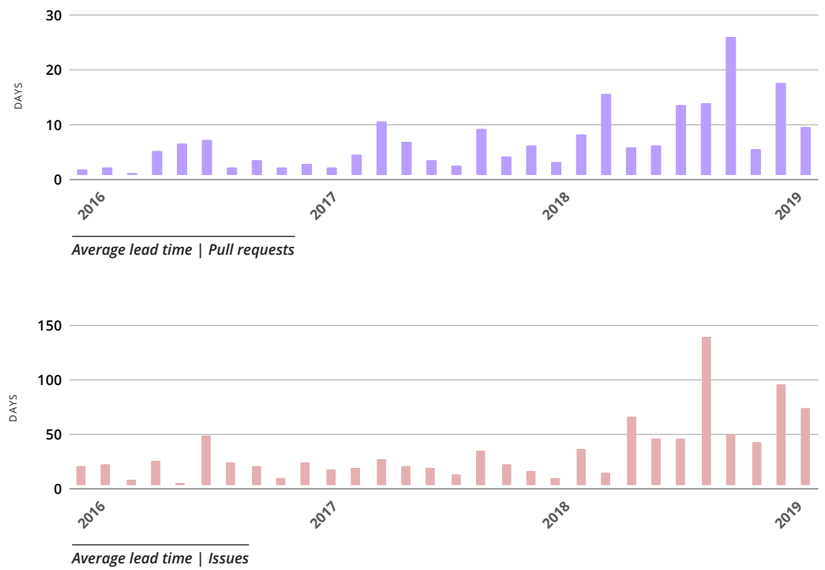


Understanding the Rebel Alliance

PRODUCTIVITY • Amount of contributions on GitHub/Git



PRODUCTIVITY • Lead time for pull requests and issues (GitHub/Git)



Survey Insights

Definitions of segments used when describing survey results:

- **Active:** have contributed to Mozilla or a related project in the last year.
- **Inactive:** have contributed to Mozilla or a related project longer than one year ago.
- **Never Active:** people who signed up for information but never interacted with Mozilla or a related project.

Employees are not included in the analysis.

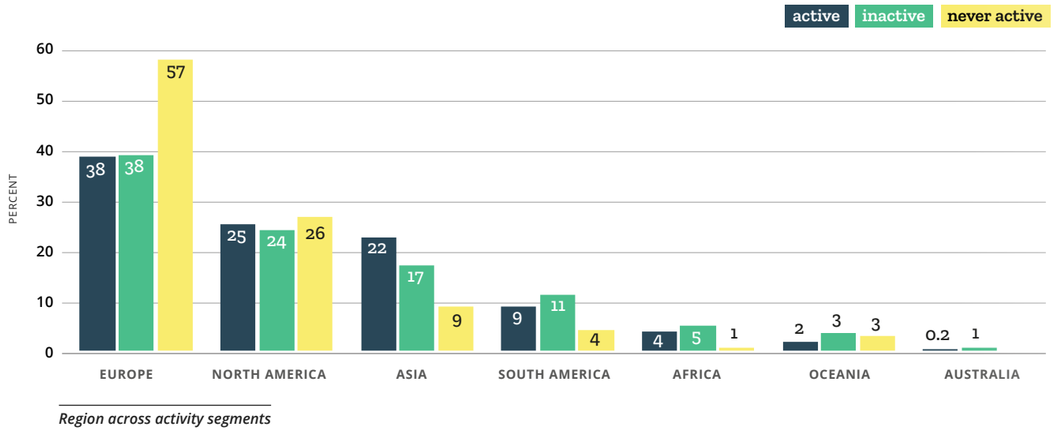
Have you contributed to Mozilla or related project within the past year?

	SHARE	COUNT
INACTIVE	13%	153
ACTIVE	41%	469
NEVER ACTIVE	46%	522

By the numbers....

1,144 people answered the survey, as provided in English (81%), Spanish (6%), German (5%), French (4%), Portuguese (2%), and Arabic (1%). They hailed from Europe (44%), North America (25%), Asia (17%), South America (8%), Africa (3%), and Oceania (2%).

The survey indicates most contributors are from Europe, which also has an unusually high rate of people who signalled interest but never participated (Never Active). Asia seems to have the most engaged contributors, with the highest proportion of Active and Inactive contributors to Never Actives



Region across activity segments

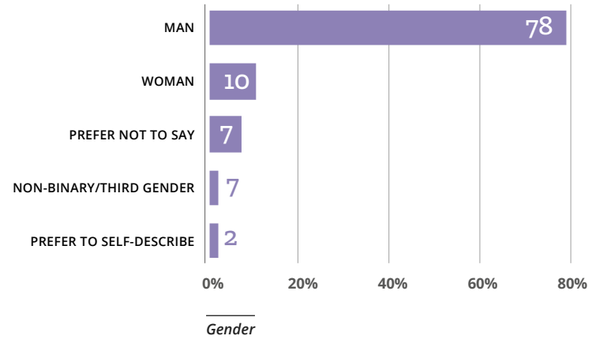
Most contributors were quite young: 60% were under the age of 35, with only 5% over the age of 54. Most respondents work full time. 8% said they have a disability.

10% of the respondents identified as a woman, whereas 78% identified as a man. 11% identified as non-binary/third gender or preferred to self-describe or just not disclose.

Encouraging the leap from interest to participation

It's notable that even those Never Active – that is, those who signalled an interest in participating but never followed through – bothered to respond to the survey, suggesting a genuine interest in Mozilla's work and the possibility of activating this group. 57% of this group were from Europe, with North America next (26%), followed by Asia (9%). This group was motivated by general interest (47%), to learn more about Firefox (44%), by Mozilla's mission (35%), and to learn more about open source projects (32%) (multiple answers permitted). 'Getting busy' was one reason for not participating (51%), but not knowing how to start or what to do were ranked basically equal to busyness, indicating we need to better understand how these contributors' initial experience didn't provide them what they needed. Perhaps we don't provide enough information designed for newcomers, or perhaps contributors couldn't easily figure out where their skills would be best applied or what contribution opportunities would best meet their goals.

25% of this Never Active'group were also younger than 25. This could indicate interest from students, perhaps particularly from Europe, who were unable to follow up.



Gender

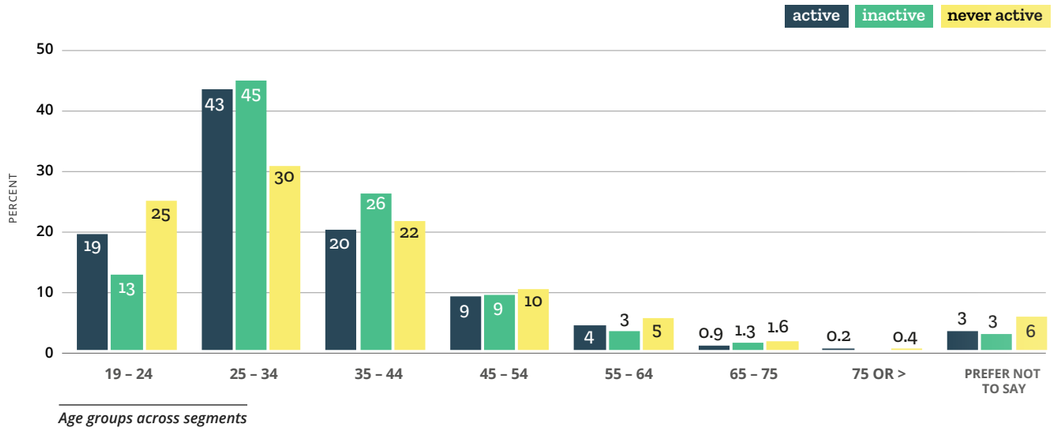
There's a significant gap in the security skills of those contributors we attract and those who actually participate. 20% of Never Actives also noted that they had skills in security, a category ranked after Coding (42%), QA/testing (28%), and Localization (23%). In contrast, Active and Inactive contributors rank 'security' as quite low on their list of skills. Again, not knowing how to start or what to do were cited as key reasons potential contributors didn't actually make the leap. Are we not tailoring our contribution opportunities well enough for new contributors with security skills?

Coding isn't necessarily dominant: contributors participate in a range of ways, and in-person events remain popular

Survey respondents participated in a range of areas beyond just open source code focused projects. Only 22% of Active contributors said they only participated in Mozilla's open source work. In-person events remain key to many contributors' sense of community and participation: attending, organizing and speaking at events remain very popular, followed by coding, localization, social media sharing and documentation.

Firefox, Localization, and Common Voice were the most popular contributor communities amongst all Active participants, while Firefox, Common Voice, and Add-ons were, respectively, the most popular areas of participation for new contributors.

Mozilla's contributors are relatively young, with almost 50% of Active and Inactive contributors between the ages of 25 and 34. Firefox, Localization, and Common Voice were the most popular communities for this age group



Age groups across segments

Participation related to local languages – Localization and Common Voice – are very popular with contributors. Mozilla has long championed localization of our products and services in any language. Athough it wasn't asked as a specific question, a desire to have technology work well in one's local language likely motivates many contributors.

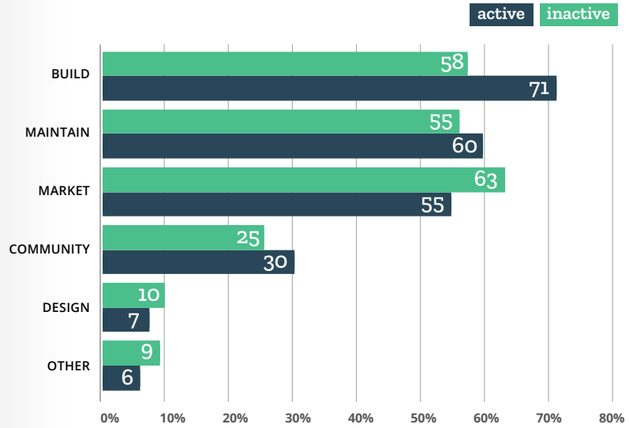
In 2017, we attempted to categorize participation as it relates to a simplified product lifecycle: design, build, market, maintain, and market. We included community building as a separate category, as many contributors view community building as part of their general support for Mozilla.

As we discuss in the later section Open Innovation Applied, Mozilla must work thoughtfully with external collaborators and contributors across the product lifecycle to bring in needed expertise, creativity, diverse viewpoints and capacity. In 2020, we'll bring more structure to our innovation processes and how we work with our contributor communities and expert networks. Future surveys should improve how we ask questions about participation as it aligns with Mozilla's evolving approach to innovation and product development. It would also be useful to dig more into precisely what contributors mean when they say they they participate in ommunity building so we can better evaluate the contributors' roles in keeping successful communities going and support appropriately.

This year's results are an interesting departure from 2017. In 2017, Community Building came across as the largest area of participation, followed by Market, Maintain, Build and Design. That was almost inverted in this report, with Build coming in first, followed by Market, Maintain, Community, then Design. Most participation still falls in the later stages of product development. As we improve our innovation pipeline and processes, this is something to evaluate.

> ***A desire to have technology work well in one's local language likely motivates many contributors***

Contribution does occur across the product lifecycle, but much less in the early stages of design and innovation



Contribution across product lifecycle

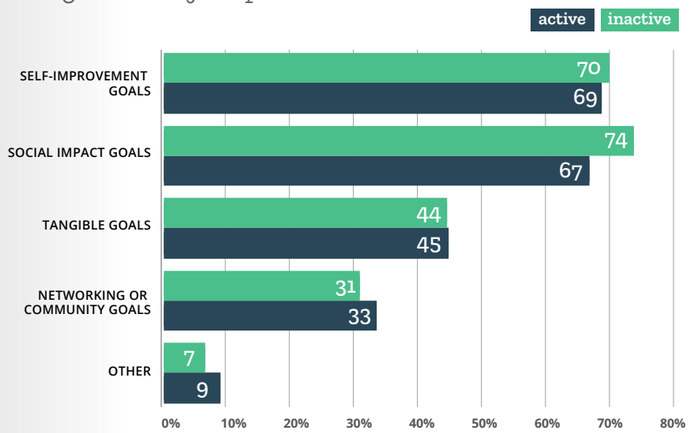
CATEGORIES INCLUDE:

- ***Community:*** *Diversity & Inclusion, Community building/Management*
- ***Maintain:*** *Localizing, Documenting/ Writing articles, Troubleshooting*
- ***Market:*** *Organizing or speaking at events, Teaching, Social media sharing, Attending an event, Campaigning*
- ***Build:*** *Coding, Quality Assurance/ Testing, Bug triaging, Voice recording/validation, Security*
- ***Design:*** *UX/UI*
- ***Other:*** *Other*

Contributors are generally positive about their experiences and very motivated by Mozilla's mission

Most responded that their contribution experience was extremely positive or positive (84%), with 11% neutral and 5% saying their experience was negative or extremely negative. Firefox had the most participants with negative experiences (15%), followed by Thunderbird (9%) and Mozilla's local/regional communities (7%). For those who had negative experiences, their main motivations were social impact, networking, and self-improvement. However, it's difficult to interpret much from these results without further inquiry. For example, the higher negative experience rate for Firefox could simply be because Firefox had the most survey respondents, and the negative responses might have little to do with the experience not matching motivations.

Contributors are largely motivated by Mozilla's mission, along with self-improvement



Contributor motivations

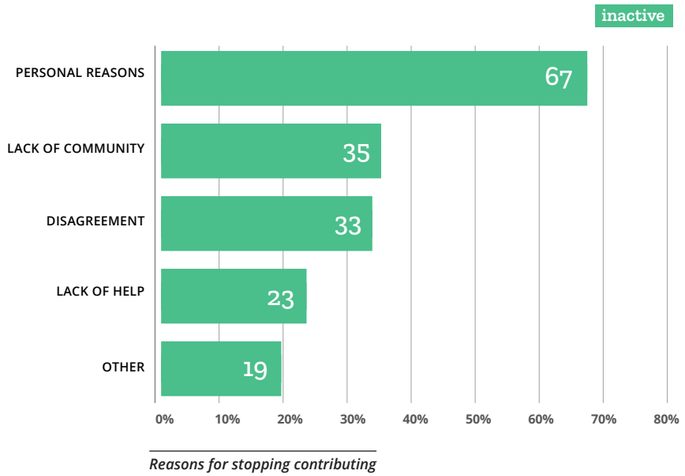
CATEGORIES INCLUDE:

- ***Self-improvement Goals:*** *To build my skills and experience, to build my resume/CV, As part of my job/ academic, To learn new things*
- ***Networking or Community Goals:*** *To build my professional network, To build my social network, To belong to a community*
- ***Tangible Goals:*** *To have fun, To make cool stuff/express my creativity, to work on a particular technology*
- ***Social Impact Goals:*** *To advance the mission of Mozilla, To have a visible impact on the world*
- ***Other:*** *Other*

As in 2017, the survey reconfirmed what we know anecdotally: contributors do work on Mozilla projects in order to improve their skills and knowledge of particular products and technologies, but they are also deeply motivated by Mozilla's mission to promote openness, innovation and opportunity on the web.

In general, the numbers here didn't change significantly over the past two years, despite greater mainstream understanding of how the Internet can negatively affect billions of lives due to more media coverage of online harassment, algorithmic decision making and profiling, surveillance advertising, election interference, and more. Still, the results indicate that Mozilla must always be very clear about how our work supports our mission and to craft contribution opportunities that can demonstrably help contributors to grow. As we work to build more trusted relationships with our users and distinguish Mozilla as a uniquely user-first, mission-driven consumer software organization, it will be interesting to see if the mission-driven motivation numbers rise.

Most contributors leave for personal reasons, but also because they feel a lack of community or find contributing difficult. These are things we can fix



Reasons for stopping contributing

CATEGORIES INCLUDE:

- ***Personal reasons:*** *I felt burned out, I got busy in my work or personal life*
- ***Lack of community:*** *I didn't have enough contact with staff, I didn't know if my contributions were having impact, I didn't have enough contact with other volunteers, I didn't get recognized for my contributions*
- ***Disagreement:*** *I was discouraged by negative behaviors/hostility, I didn't agree with how things were run, I didn't feel aligned with Mozilla's values anymore*
- ***Lack of help:*** *I didn't know where to start, I found the contribution tools/software hard to use, I didn't know what to do, I didn't have enough resources available, I couldn't contribute in my language*
- ***Other:*** *I didn't find the work interesting anymore, Other*

Digging deeper into the reasons why people leave would help us understand what problems are solvable across all contribution areas and what are more project-specific. For example, we suspect that there are changes we might be able to make across all project areas to better support contributors as their lives inevitably change. Is it largely a matter of 'task design', and could we design tasks that better fit busy schedules? Or is that contribution opportunities aren't as engaging once people have more competing demands, and can we address this? If not, how we can maintain an ongoing relationship with these 'alumni' contributors and increase the likelihood of providing value and encouraging re-engagement later on? Any improvements that help keep those who lives get busy to stay engaged might also help persuade those Not Actives to take the leap into participation.

DESIGNING OPEN SOURCE COMMUNITIES FOR INCLUSION AND GREATER IMPACT

In 2019, the Open Innovation team worked with the DevTools team to research the challenges technically skilled working women faced in contributing. We learned that leadership opportunities were in high demand by women, as they help further career goals, yet these opportunities also felt the most out of reach. Too often, open source communities default to believing in the meritocratic narrative that everyone must start at the beginning and earn their role. Unfortunately, this is a false narrative of a path to equality: not everyone starts from the same set of advantages and therefore might not have the time to generate the volume and time investment needed to 'work up the ladder,' despite the quality of their more limited contributions. For example, a working mother might have fantastically thoughtful contributions, but with limited time to participate, she is less likely to reach leadership levels in projects that still work with an unobtainable meritocratic ideal in which volume and time matter.

The DevTools team actually needed more leadership-level contribution. More pull requests and issues were coming in, and there was a growing need for more patch testing and question answering.

To match product team needs to value for contributors, the Open Innovation team ran a four week Open Source Maintainer course that introduced a cohort of non-male technical contributors to leadership opportunities in Debugger. The course brought in one new underrepresented community leader who has demonstrably helped the product team. Along with our basic checklist for improving diversity and inclusion in open source communities, this course gives us another useful tool in designing contributor communities for success.

Contribution to other open source projects is an opportunity for cross-project collaboration and alignment, but it also means there is competition for limited time

The survey confirmed that approximately 80% of Active and Inactive contributors work on other open source projects. This gives Mozilla potentially influential connections across the open source ecosystem, a point that was also confirmed in the quantitative review of cross-repository contribution (see earlier section on External Influence). Again, there's value in better understanding these connections and what motivates those contributors who participate in Mozilla communities as well as other open source projects.

However, this also means there is competition for contributor attention and time: 45% of the currently Inactive survey respondents continue to contribute to other open source projects, begging the question of what made them place higher value elsewhere.

FOR FURTHER RESEARCH

- *What motivates those contributors who participate in Mozilla communities as well as other open source projects?*
- *For those Never Actives who signed up to participate but never followed through, what was problematic in their initial experience with Mozilla, and could these issues be addressed?*

The Rebel Alliance of Experts, Influencers, and Students

The analyses in this report strive to make visible the remarkable collection of individual volunteers and commercial contributors and the work they do to help Mozilla protect and promote the open web. However, there are numerous people and companies who help Mozilla in ways that aren't as easily captured as a data point from a GitHub/Git repository. For example, how could we graph the experience and passion of our Mozilla Fellows, who help Mozilla stay abreast of cutting-edge developments in technology and its social impacts and help us think more creatively about problems and solutions? Or how could we adequately measure the market influence we gain by collaborating with allies in standards setting efforts? This section describes the essential expert, influencer and student communities in which Mozilla invests and who in turn help us accomplish more than we ever could on our own.

Fellowships, Awards, and Research

Fostering an influential network of Internet leaders through fellowships, award programs and research

The Mozilla Foundation recruits and supports internet activists around the world in our fight for a sustainable, healthy, human centered internet. By supporting these leaders through year-long Fellowships, we've fostered a powerful expert network of over 100 researchers and scientists, engineers, policy experts, and organizational partners that greatly extends our knowledge and reach. These remarkable leaders often work with NGOs and other web activists with areas of expertise to which we wouldn't otherwise have access – especially on-the-ground, local expertise. And while Mozilla Fellows often work with tools we understand well, like code and policy, they also use mediums we wouldn't normally consider, like art and educational curricula, which help us reach new audiences and see problems and solutions in a new light. Their insights help advance our mission and, ultimately, build better products that empower users in the digital lives.

The Mozilla Foundation also makes direct, one-time financial investments in innovators through the Mozilla Awards program and promotes these innovations broadly through its networks and advocacy work.

The Foundation's annual Internet Health Report is a resource for the community, by the community: an open-source collection of data and original reporting about the state of the internet. The Foundation's grassroots advocacy work rallies millions of internet users around issues like online privacy and platform accountability. And the Mozilla Festival, the Foundation's flagship event in London, brings together 2,500 community members under one roof for a week each year.

In coordination with the corporate side of Mozilla, the Foundation also supports the Mozilla Open Source Support award program (MOSS), which recognizes groundbreaking, mission-aligned open source projects. In 2018, MOSS experimented with offering $5K in seed grants to 14 promising projects at MozFest and implemented guidelines to help improve its grantmaking diversity and inclusion. Perhaps a result of this work, MOSS recently processed a record number of applications – most from outside the US – and gave nearly $1M USD in funding to over 40 open source projects.

On the corporate side, the Mozilla Research Grant program helps us extend our expert network in universities, labs and research-focused registered non-profits. The program has a sharp focus on long term value to Mozilla, following a theory of change that investments help build the behaviors, influence, reputation, and inclusive innovation we need in that '2nd or 3d time horizon.' Investments lay the groundwork so we can build the things we'll need in the future to keep the Internet safe, open, and accessible to all, as it evolves through time.

Since 2017, the research grant program has awarded approximately $1.6 m USD to 36 researchers to 26 universities. The program has worked hard to improve diversity in the research space by looking for early career academics and supporting parents by stipulating that 10% of grant money can be used for childcare.

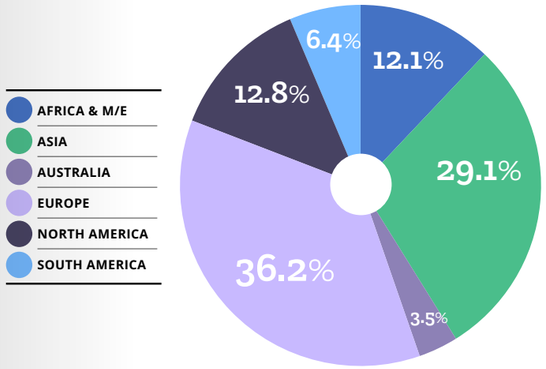
"I am confident that Mozilla was thinking about diversity when they created the Mozilla Research Grants program. As an early-career and female professor who had a baby in the middle of my MRG project, Mozilla's flexibility as a funder helped me to achieve some life/work balance during the critical pre-tenure phase of my career."

Karen Louise Smith, MRG Recipient 2017, Add-ons for Privacy: Open Source Advocacy Tactics for Internet Health

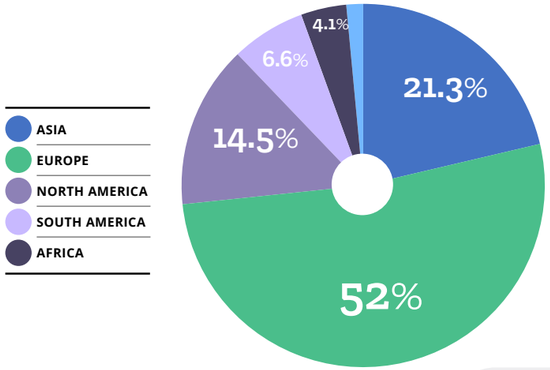
TechSpeakers

Mozilla's Tech Speakers program supports an international community of volunteers that engage developers and students around the globe through technical talks and workshops. The program recruits and trains community members to give presentations about open web technologies, Mozilla, and Firefox. Since its inception in 2015, the program has grown to include 141 participants, representing 44 countries. Tech Speakers are selected from diverse backgrounds using a standardized set of criteria. Collectively, they are fluent in over 50 of the world's most-common spoken languages, which helps Mozilla to reach audiences with which we've historically been unable to connect.

Location of speakers

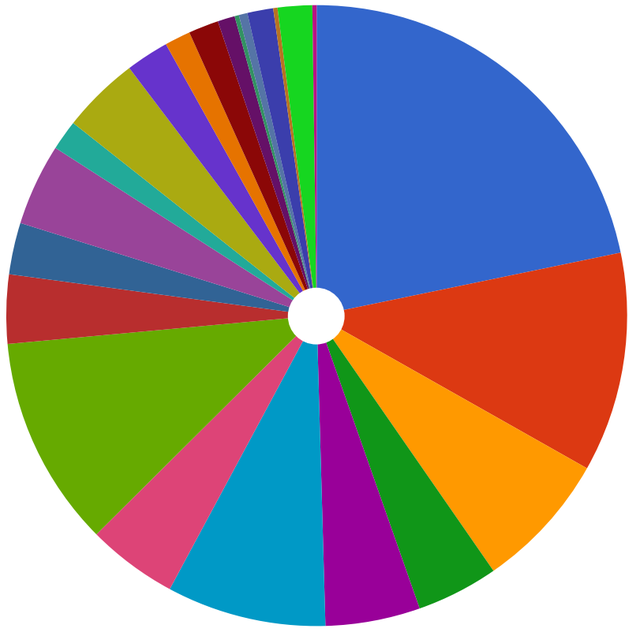


Presentations by Region



NOTE *The data for these graphs are for 2018*

2018 Tech Speaker Presentation Topics



VR / AR / MR	21.7%
RUST	11.4%
WEBEXTENSIONS	7.2%
LANGUAGES / FRAMEWORKS / LIBRARIES	4.3%
DIVERSITY	4.9%
OTHER	8.3%
IOT	4.7%
MOZILLA / OPEN SOURCE	11.0%
WEBASSEMBLY	3.6%
PWA	2.7%
DEV TOOLS / DEVELOPMENT	4.3%
HTML5 / GAME DEV	1.6%
FIREFOX / QUANTUM / BROWSER	4.0%
INFOSEC / PRIVACY	2.2%
TYPOGRAPHY	1.3%
CSS / GRID	1.6%
COMPATIBILITY	0.9%

VR/AR, Rust, and Mozilla and Open Source have been the most popular topics respectively since 2017. Progressive Web Apps (PWA) and the Distributed Web became topics of interest amongst Tech Speakers and their audiences in 2018, while Web Extensions and Web Assembly jumped in popularity.

The team has worked to improve gender parity by reaching out through channels popular with female programmers and better networking. In 2015, only one participant did not self-identify as male. In 2019, 64% identified as male and 36% as female.

Open Source Student Network: The next generation of Open Source contributors

Our 2017 report on contribution at Mozilla identified that the majority of volunteer contributors to our products and technologies were between the ages of 18-29 years and likely students. This understanding spurred us to deepen our investment in student communities through the Open Source Student Network (OSSN), a network for university and college Clubs across the US in which students learn about, create and contribute to open source projects. Mozilla helps OSSN members identify projects and find collaborators, mentorship and support. We also work directly with Club leaders to develop their skills and grow their Clubs.

100+

PARTNERS

Open Innovation Applied

INNOVATION IS A CHANGE IN THE PROCESS BY WHICH AN ORGANIZATION TRANSFORMS LABOR, CAPITAL, MATERIALS, OR INFORMATION INTO PRODUCTS AND SERVICES OF GREATER VALUE

Clayton Christensen

OPEN INNOVATION

Although there are countless definitions of innovation, we like the definition proposed by Clayton Christensen 25 years ago in The Innovator's Dilemma: ***"...innovation is a change in the process by which an organization transforms labor, capital, materials, or information into products and services of greater value."*** In other words, innovation is more than ideation or invention: innovation is a change in the way an organization plans, makes decisions, and executes work.

Mozilla's innovation potential is guided by our mission and our understanding of evolving user needs, as well as the open interplay with our rebel alliance.

Although there's more to successful innovation, our open by design principles apply well here. In practice, this means Mozilla should:

- *Understand how a product or technology can deliver value within a market and its ecosystem.*
- *Apply the right model of openness to bring our rebel alliance into our innovation and product development processes. The model should be designed to best develop and deliver this value.*
- *Work across the product lifecycle with external collaborators and contributors, including individual volunteers as well as organizational and commercial entities.*

This contributed essays in this section highlight several examples in which these principles have come to life across Mozilla.

Common Voice: Stakeholder Perspectives

Common Voice is a great example of how Mozilla has employed open innovation and an open by design approach, from ideation and development through project maintenance and marketing.

Common Voice is a Mozilla-led crowdsourcing initiative that's created a publicly available dataset of audio, transcribed in any language, that anyone can use to train voice-enabled applications. Launched in June 2017, Common Voice aims to democratize speech technologies through global collaboration with volunteers, developers, government agencies, academic institutions and researchers, and startups and established companies. Each stakeholder brings unique contributions to a valuable public resource that benefits everyone – and that none could build on their own.

COMMUNITY IMPACT: FROM CONCEPT IDEATION TO CAPACITY SCALING

In May 2017, Mozilla's Machine Learning Group and the Open Innovation team gathered in Taipei with a group of community members to address an industry-wide challenge: how can we collect large quantities of voice data to support open source machine learning?

Generating large volumes of high-quality voice data is a common problem for all speech-to-text (STT) engines. To train a speech engine requires thousands of hours of voice data. The high cost of commercial datasets is a barrier to entry for most open source projects and developers.

We ran ideation and design sprint exercises to generate ideas and best practices around crowdsourcing voice data. These were presented as paper prototypes and guerilla-tested on the streets of Taipei, ultimately leading to the Common Voice crowdsourcing project.

This launch is not the only example of how community members helped grow and shape the direction of the project over the past two years. Since the Common Voice team enabled multi-language support in June 2018, the process of launching new languages has been a completely community-driven process that has surpassed all expectations. From passionate volunteers to professional linguists, researchers, and students, a large community has enthusiastically rallied around the Common Voice project and enabled voice data collection in 48 languages, with dozens more in progress. The launch of each new language requires translating the website and adding tens of thousands of sentences for people to read. These sentences must meet certain criteria in order to ensure the highest quality voice dataset.

Open Innovation Applied

"Common Voice is an open source project with access points, contribution opportunities and self-evolved feedback mechanisms in many areas, both technical and non-technical."

That is probably the most underestimated and least trivial component of the entire project. It takes millions of clips per language to train a production quality speech recognition engine. But that's not all. In order to make the Common Voice dataset as useful as possible, the team decided to only to allow source text that is available under a Creative Commons (CC0) license, meaning there is no copyright or other legal restrictions. Applying this standard means it's more difficult to find and collect source sentences, but this requirement allows anyone to use the resulting voice data without usage restrictions or authorization from Mozilla.

In the early days, sentence collection was an immature process. Sentences were submitted through different channels (email, GitHub/Git, discourse, even instant messages...), which led to a heavy workload for staff and volunteers in maintaining quality. To address this issue, members of the Common Voice community built a tool to centralize the sentence collection and review process, automating the quality checks and establishing a workflow for peer-reviews.

Common Voice is an open source project with access points, contribution opportunities and self-evolved feedback mechanisms in many areas, both technical and non-technical. I've been a part of it almost from the beginning, and I'm looking forward to see it further unfold and be a catalyst for innovation here in Taiwan and across the globe.

Mozilla community members participate in ideation exercises during the Taipei design sprint.

IRVIN CHEN
Member of the Mozilla Reps Council, Mozilla Taiwan Community

FOSTERING RESEARCH

We are a small cross-disciplinary research unit based at Bangor University, Wales, made up of linguists, terminologists and software developers. For many years, we have conducted projects that seek to apply a whole range of language technologies for supporting the Welsh language speaking community as well as to collaborate with other minoritized language communities. With the advent of Alexa, Siri and other intelligent speech interfaces, speech technologies for Welsh have been a widely understood and accepted priority if Welsh speakers are to be able to participate in recent evolution of human computer interaction.

We began our work on Welsh language speech recognition in late 2014. Recognizing that we had no data, we developed our own crowdsourcing speech corpus (called 'Paldaruo') ap for iOS and Android. It received a good response, with hundreds of individuals contributing their speech into a corpus of 40 hours of Welsh speech which is available to all under a permissive creative commons license. The data was subsequently used to recognize questions for a small set of skills supported by a prototype Welsh language personal assistant.

Despite initial successes we realised that continued development to achieve parity with English language capabilities and provision would require levels of investment and human capacity that are simply unachievable for less-resourced languages such as Welsh. As we were struggling with this realisation we were delighted that Mozilla decided to put its efforts and resources into open source speech data and technologies. Mozilla stands apart from other multinational technology organisations in that it is open and actively seeks, encourages and responds to community engagement. A demonstration of this was its inclusion of Welsh in the launch of multilingual CommonVoice, following from engaging with us and our previous work, to the bemusement of others in the industry. Being part of a larger, multinational and multilingual project gives credibility and status to a minoritized language that in turn attracts more people to contribute more data.

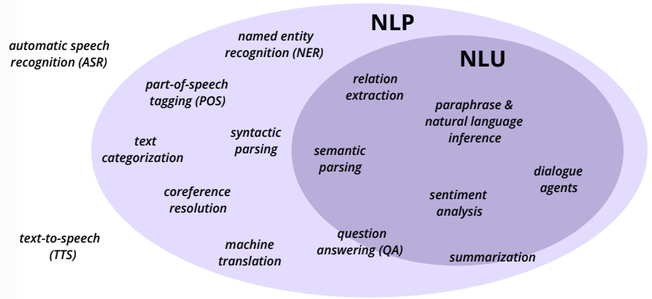
Continued collaboration with Mozilla has led us quite early on to train models in DeepSpeech with Welsh CommonVoice and Paldaruo data, as well as to continuously evaluate transfer-learning approaches. These models were successfully utilised in our more recent Android based user/consumer ready version of a Welsh language personal assistant. This also led to new resources being openly and permissively available on GitHub/Git.

The first year of Welsh CommonVoice and DeepSpeech has shown it has motivated a community of volunteers, developers and other individuals in companies and organisations to engage and contribute efforts. As researchers and developers that are particularly close to this less-resourced language community, we have never observed this dynamic before. Its disruptive influence is exciting and we look forward to benefiting not only from more data, but from a community empowered for the first time to innovate and collaborate on solutions for local Welsh language speech related requirements and problems.

DELYTH PRYS (L)
DEWI BRYN JONES (R)
Language Technologies Unit, Bangor University, Wales

Open Innovation Applied

TERMINOLOGY: NLU VS. NLP VS. ASR



CREATING THE IMAGENET DATASET FOR VOICE

Although the technology behind automatic speech recognition is over half a century old, new techniques are emerging to process speech. Progress in deep learning methods, the availability of ubiquitous computer power, and access to voice datasets to train AI systems to recognize speech, e.g., through recording help desk interactions or processing on-line videos, have helped make significant advances in speech recognition in recent years. Examples of popular automatic speech recognition use cases include:

- ***Voice Assistants like Amazon's Alexa***
- ***Natural language search like Google***
- ***Question Answering like IBM Watson***

Interest in natural language understanding and processing is now massive due the ease with which humans interact through voice in many languages – enabling technology companies to reach bigger audiences worldwide through existing and new voice driven tools and technologies such as digital assistants, domain specific helpers (e.g., banking) and robots. You can see the relationship between the various elements of Natural Language Processing, Understanding & Automatic Speech Recognition in the diagram below entitled "NLU, vs, NLP vs. ASR" that are needed in these tools. However access to high quality voice data is the essential ingredient for most aspects of ASR.

Some companies now dominate voice use cases through their popular technology, and are gathering relevant voice data in large quantities organically through the use of their tools. Naturally the bulk of the high quality voice data that is being accumulated in this way is unavailable as open source for use at universities and research institutions - nor is it available for use by industry and start-ups, other than possibly through negotiated contracts.

There are side effects arising from the dominance of cloud companies in the voice tech domain, when institutions such as banks integrate with popular voice tech owned by cloud companies as the institutions move their applications to the cloud. The integration gives the owners of the voice software and cloud companies access to domain specific language, methods and processes utilized in the tools created by banks etc – and access to more varied voice data that continues to remain private.

Corporations, as well as startups and individuals, are energized through the availability of high quality open datasets. A seminal example in visual object recognition is the ImageNet dataset created by researcher Fei Fei Li. The work on ImageNet started in 2006, and was followed by annual ImageNet based contests. In 2012 contest caused the tech industry to pay attention with contestants introducing innovations such as the use of GPUs and then extremely deep neural networks. It is time for open innovations in voice, with support and outreach for minor languages and dialects as well as popular languages – Mozilla's Common Voice is a step in that direction.

JIM SPORER
Director, Cognitive Opentech Group (COG), IBM Research

Bridging the Web Compatibility Gap with a Holistic Approach

Web compatibility (or WebCompat) is a fundamental part of Mozilla's strategy, reflecting the importance of a seamless experience for Firefox users as well as our ability to influence the web standards community.

Problems with web compatibility (the "WebCompat gap") can make a user's Firefox experience inferior to other browsers. This is perhaps most important in comparison to the market leading browser, Chrome.

Monitoring and addressing the WebCompat gap is difficult. The emergence of a single issue is often complex. Many different points within the developer and user flow can lead to compatibility breaks.

Since 2018, the Open Innovation, WebCompat and Data Science teams have worked together to improve the volume and the quality of web compatibility data so users can have a better Firefox experience. The teams have designed and tested mechanisms to engage the developer and user communities to tackle web compatibility from different perspectives and time scales.

We spoke with Michael Taylor, Engineering Manager of Web Compatibility, about challenges and how the cross-team collaboration has opened new perspectives.

In layman's terms: What is web compatibility and what's causing the "WebCompat gap"?

It's an interesting question, because I'm not convinced that the term means the same thing to all people. I've worked on this area for about eight years now, and even to me it's still hard to do the elevator pitch.

Let me try: The term "web compatibility" is frequently used by various teams inside Mozilla as a proxy for a range of issues that affect a user's experience on the web in a browser that leads to a sub-par experience. This ranges from "this looks a little different" to "I need to open Chrome to get my work done." The root causes may stem from a combination of what I will call internal factors, such as interoperability gaps, browser interventions, and performance issues – things we have in our hands. And then there are external factors, like developer mindshare, browser market share, competitor marketing efforts, etc. – things we don't quite control.

You've been working on WebCompat for quite some time now. What are the main challenges?

Oh wow, where to start... Well, to a large extent, the obvious issues (i.e., things easily observed visually or detected by diffing screenshots of homepages) have been solved.

Many of the issues we struggle with relate to complex user interactions, problems a few clicks deep inside a page, or to issues— bugs or blind spots—within our own tooling to help us reason about compatibility issues.

Web Compatibility is work that has existed since the day that competing browser engines entered the market. It's not a problem that can be solved entirely in a quarter or two, or ignored as unimportant. Even if we can successfully solve all the technical issues within our control, we can still end up with WebCompat issues.

It feels like an uphill battle in a lot of ways. But most problems worth solving are an uphill battle.

... an uphill battle with limited resources?

Yes, it's a big problem given what we're trying to tackle. You can't solve everything. You have to prioritize and focus on where you can have the most impact.

There's a small group of very active community members, pre-release users, who help to file bugs. They are doing a tremendous job, but the process doesn't work at scale. Web compatibility is a really interesting area to work on, because it's challenging and complex. At the same time it is a very tough area to attract contributors, because it's not glamorous.

"Getting outside input has unlocked some new thinking. Rather than making more T-shirts or more stickers and trying to make people like us, let's change our notion of what it means to contribute to this WebCompat effort."

If you're really excited about shipping code and winning and having something for your CV - this is not the job for you. You have to be motivated by the greater good, the long term success, when the work we're doing today is going to make a huge difference.

In 2018, you started working with Open Innovation and other teams within Mozilla, like Data Science and the Mozilla Developer Network (MDN) conducting experiments and SHIELD studies. Could you shed some light on what you did?

It started with an interesting pivot of the notion what "contributions" are. There is a traditional Mozilla sense focussing on individual contributors, dealing with bugs, writing code and fixing things. But if you're trying to understand where the internet is broken in Firefox, you have to think at scale. So we asked ourselves, is it possible to prompt Firefox users to help us? Can we find ways to get as close to the large release population as possible and can we prompt them to report bugs for sites that they really care about.

We learned a lot, and there's some pretty detailed documentation of the iterations of the Blipz experiment, through which we tried to enhance the user experience for reporting issues. That process started a really cool collaboration with the Open Innovation and Data Science teams with whom we're trying to improve both the volume as well as the quality of the data that we use to address and measure web compatibility.

We're also exploring automation for categorization of incoming bugs. Imagine we had five times the bugs coming in – 2000 to 3000 bugs a day. That would be incredible and terrifying. Creating opportunities and workflows for crowdsourcing contributions to certain aspects of bug triage could be a solution, which Open Innovation is evaluating. They're also exploring how machine learning and fuzzing can help identify WebCompat and interoperability bugs we don't know about, which is quite exciting.

Would you say there has been a change of perspective in tackling the WebCompat gap?

Yeah, I think so. In many ways, a lot of the work that we do in our day to day is very reactive: People experience issues, we're triage them, try to find a solution and then we put a bandaid on to stop the bleeding. And that's important. But in order to solve a multi-front problem, you need to be proactive instead of just fixing symptoms. Open Innovation added ideas and skills to the pool that we didn't have or simply lacked time for: ideation, prototyping, UX resources. Getting outside input has unlocked some new thinking. Rather than making more T-shirts or more stickers and trying to make people like us, let's change our notion of what it means to contribute to this WebCompat effort. Make it easier, work systematically, learn from data, make small but impactful tweaks. And if we can get great results that way, it would be a pretty novel and cool thing.

In an ideal world - what sort of alliances would you envision to close the WebCompat gap?

That's a great question and I don't know the perfect answer to that. What I think is very powerful is education

Education and outreach efforts are important to teach people the vision of why we should use web standards and why multiple web rendering engines are good for them, even though it makes their life a little bit more complex.

If all we want is for websites to work, if that's the most important thing to us, we should just switch to Blink. Do exactly what Edge did – they said the number one reason they switched was for web compatibility problems – and differentiate on UI features or services or something like that. But that's not very interesting to me.

Mozilla has a vision for the open web, and one of the most powerful ways we have to influence that is to maintain the independent implementation of Gecko. If we truly believe that having an independent web rendering engine is important, we have to make it easier to contribute, and we have to align allies in certain ways, be it on grassroots or enterprise level.

"If we truly believe that having an independent web rendering engine is important, we have to make it easier to contribute, and we have to align allies in certain ways, be it on grassroots or enterprise level."

Community-powered Customer Support

Delivering great products doesn't stop at release. Listening to our users and delivering timely and accurate support is crucial to ensuring our users have the best customer experience and that we continuously learn how to improve our products.

As a non-profit open source organisation, Mozilla has always succeeded through its network of great contributors. And the same goes for our customer support, which has been successfully driven by our community for over 10 years. Mozilla would not be able to support all its products without the efforts of our community. Every year, over 3,000 contributors help answer questions from the approximately 1 million users who come to support.mozilla.org for help every day (on average).

Maintaining a functional support service for multiple products at this scale is a complex. With the help of our community, we cover three global support channels: our huge knowledge base, which is localized into dozens of local languages; our 1:1 forum support; and our social media support on Twitter. Our core community is colorful and diverse, ranging from a Silicon Valley based IP attorney who built his own tools and templates to answer questions on the support forum during his spare time, to the university assistant from Palestine who localizes support content in Arabic and helps women in her region develop IT skills.

Besides daily maintenance, the work of our community revolves around numerous, complex product releases: getting the help content ready, making sure all new content and updates are localized, and creating briefings on release notes, new features and possible known issues. More importantly, the community really comes together around release dates, ensuring support is available for the large volume of incoming questions. They do all this by monitoring forums and social media, responding quickly, helping by reporting on common issues and bugs as well as by gathering insights and reporting back to our product teams.

Our global and multicultural community ensures that there is someone ready to answer your questions on support.mozilla.org 24/7, and most likely in your local language!

The work doesn't just revolve around delivering support, but also on how we ensure we future-proof our support services. The team has been working on many new programs that both explore how we deliver proactive support and how we can support our users across diverse platforms and channels.

One new program is our RESPOND tool, which allows support community members to respond to Google Play Store reviews. To ensure quality control, the system sends each response to be vetted by three other volunteers, who look at it from the perspectives of accuracy, solution, and quality. This ensures our contributors can respond to users where they are with a community-managed high level of quality control.

Our MVP was a great success, and the team is getting ready to roll out a new and improved version of the tool. The longer term plan is to expand this tool to deliver support beyond Twitter and our forums, responding to our users wherever they may be asking for help.

MADALINA ANA
Senior Project Manager
SUMO

PATRICK MCCLARD
Global Support
Manager

RINA TAMBO JENSEN
Director Design & Product,
Open Innovation

Policy and the Rebel Alliance in India and Kenya

In India, we've seen Mission-Driven Mozillians support and grow our campaign to make privacy real in the lives of 1.3 billion Indians. The Open Innovation, Policy, and Advocacy teams have worked together to drive campaigns advocating for strong data protection law in India and raising levels of privacy and security awareness in local communities. In February 2018, more than 1,000 members of Mozilla's India communities co-signed an open letter with executive chairwoman Mitchell Baker, demanding that the current draft of India's data protection law be strengthened. It was published as a full page advertisement in Hindustan Times, catching the attention of the public, as well as of regulatory officials in New Delhi. More recently, in August 2019, the community ran a postcard campaign in which more than 1,000 community members sent hand-written postcards to Members of Parliament asking them to stand up for privacy and make sure the data protection law got the discussion and debate it deserves. This is in addition to the ongoing work of several regional communities that regularly hold privacy awareness workshops in their schools, colleges and local neighborhoods using content they create themselves. In other ways, Mozilla has also supported the development of a broader privacy movement in India through events and public writing on the issue. On 24 August 2019, Mozilla co-organized a public meeting for privacy advocates across the country to celebrate the second anniversary of India's landmark Puttaswamy case, which reaffirmed that all Indians are guaranteed a fundamental right to privacy. Mitchell Baker and Edward Snowden sent personal messages to mark the event.

KENYA

The Mozilla Policy Team has been working closely with the Government of Kenya as well as civil society and private sector allies to influence the country's first data protection bill. This legislation would help to define the relationship between 50 million Kenyans and the government agencies and companies to which they entrust their data.

In May 2019, Mozilla's Policy and Legal Teams partnered with the Technology Service Providers of Kenya (TESPOK) to conduct a series of workshops in Nairobi around Mozilla's Lean Data Practices initiative. The workshops brought together TESPOK member companies' executives and lawyers, government officials, and civil society activists to think holistically about the decisions they make with the data they have, discuss practical ways to safeguard user data, and explore how to implement many of the provisions in the Kenyan Data Protection Bill.

Encouraging companies to think through the key concepts in the draft data protection bill and the topics the proposed data protection regulator will likely focus on, we introduced the basic tenets of LDP:

- ***staying lean by focusing on collecting only the data that is needed***
- ***building in security appropriate to the data collected***
- ***engaging users to help them understand how their data is used.***

Discussing these principles helped companies think about how to critically evaluate their data needs, ensuring that they stay lean by collecting only what is essential for conducting business, which would also help mitigate against vulnerabilities and potential breaches. Ultimately, data collected is data at risk. All participants said that they would make changes to their data processing practices following the workshop.

Good privacy practices are not limited to compliance, and this is why Lean Data Practices also encourages companies to engage their users by clearly explaining their data practices, making their privacy policies clear and more accessible, as well as creating awareness and educating users regarding their privacy policies. Increased transparency will create more trust with users and assure regulators that data collection is done in a way that respects user rights.

While Kenya's data protection bill has yet to be passed, one of the key goals of this legislation is to push companies to think critically about their data needs before they collect and store user data. Lean Data Practices will help many Kenyan companies do just that.

JOCHAI BEN-AVIE
Head of International
Public Policy

General Information

MAIN MENU

Contact

If you have any questions or thoughts on further exploration, please let us know! Email openinnovation@mozilla.com or rebelalliancereport@mozilla.com

Appreciation

We are deeply indebted to the patient and visionary experts at Bitergia, Analyse & Tal, and The Reaction Chamber, who respectively helped us gather and sort, analyze and visualize, and design the data into a readable report. We are also thankful to Open Tech Strategies, who helped us create the open source health framework along with Analyse & Tal, and with whom we collaborated in creating the open source archetypes.

We are also appreciative to everyone across Mozilla who helped bring this report to life. Special thanks to Jochai Ben-Avie, Irvin Chen, Michael Ellis, Mike Hoye, Emma Humphries, Caitlin Nieman, Amy Raikar, Michael Taylor, Kadir Topal, and Kevin Zawacki, as well as our partners at IBM and Bangor University, Wales. Thanks as well to Emma Irwin for her tireless championing of a thoughtful, data-driven-and-with-heart approach to inclusive communities, and to Don Marti for his deep open source expertise and unending reservoir of creativity.

We are most thankful to the people for whom we strive to make digital life safe, empowering, and fulfilling, and to our contributor communities, without whom we wouldn't succeed.

Appendix

DEFINITIONS

AMO: resource for finding and installing Add-ons for Mozilla products

Bugzilla: Mozilla's open source bug tracking system and testing tool

Discourse: open source forum and mailing list softawre often used by Mozilla communities

Employee: a person hired by Mozilla as staff or contractor during a noted time period.

GitHub/Git: open-source version control system used by many Mozilla projects

Kitsune: the open source technology platform that powers support at Mozilla.

Kuma: the contribution platform behind the Mozilla Developer Network

Non-employee: a person not hired by Mozilla as staff or contractor during a noted time period.

Pontoon: the open source localization tool used to localize all Mozilla products and web sites.

METHODOLOGY

The research for this report was executed in partnership with our data provider, Bitergia, a software development analytics company that specializes in open source analytics, with whom we also worked on the 2017 communities and contributors report. This year, we expanded the collaboration to include Analyse & Tal, an employee-owned, co-operative data analytics and visualization firm.

The quantitative analyses were based on data sources related to the development of Mozilla products and technologies from five different contribution platform: GitHub/Git, Bugzilla, Kitsune (Support), Pontoon (Localization), Kuma (Mozilla Developer Network), and the Add-ons database. It does not include Mercurial repos not mirrored in GitHub/Git, which are mainly related to Localization. Please see the beginning of the report for a complete description of the data sources, what is specifically counted as a contribution in these data sources, and time periods.

The qualitative survey ran between April and May 2019. The survey was created and managed by the Open Innovation team and included a total of 1,144 responses. It was sent to community members by posting to Bugzilla, Discourse, SUMO contributor forums, an email to 'vouched' Mozillian contributors, and to various open source communities.

We were unable to cross-validate of results from the qualitative and quantitative research methods. Ideally, we'd use survey data to strengthen our interpretation of the quantitative data. However, we felt there was value in asking a few demographic questions that created additional legal requirements for data protection, so we were unable to ask survey respondents if we could cross-reference their answers to a quantitative view of their contribution activity. Such cross-referencing would provide a more detailed understanding of contributor types and should be pursued in the future.

Our approach to contributor segmentation for the quantitative data was based on the unique historical dataset for each area of contribution and is more fully described in that section. Our approach to contributor segmentation for the qualitative survey reflects respondents' self-definitions around activity and is described further in the relevant section.

This report does not include all types of contribution across Mozilla. We are missing many aspects of contribution, some of which are more difficult to track and analyze, such as documentation and code reviews. Subsequent work could include these contribution types for a richer view of contributions and engagement across Mozilla's contributor communities.

No analyses include Firefox OS data, except one question in the survey, which is explicitly noted.

Personally Identifiable Information and matching identities

This research followed Mozilla's privacy policy and lean data practices. We only collected data that were required to deliver valuable insights, we protected these data through strong security, and we informed our communities of the work through direct messages and our privacy policy.

No private, personally identifiable information was shared with our partners.

Data: Contributor segments

Contributors were defined as core, casual, or regular if they made a certain threshold of contributions over their lifetime of contribution to that particular platform. The segment definitions were developed based on all contributions to the platform, including employee contributions.

In this historical, overall view for contributions per platform, we did recognize that there are contributors who don't participate much, with five or less registered contributions over their lifetime. Given time constraints and a desire for simplicity, we defined this 'visitor' segment similarly for all platforms – up to 5 lifetime contributions to a particular platform – and they are not part of any of the analyses unless otherwise stated. However, we can't ignore these contributors. New research on open source volunteering posits that non-habitual, episodic volunteers bring high innovation potential and important social networks as well as different patterns and motivations than habitual volunteers, and are too often overlooked in community management.

Data reliability: Employees and non-employee categorization

One of the benefits of Bitergia's GrimoireLabs open source analytics platform is its "Sorting Hat" component, which sorts matches and duplications across contributor identities. A good explanation of how this work is on their website. The tool itself is open source and available on GitHub/Git.

Understanding employee or non-employee affiliation is difficult and imprecise. Many employees contribute to our various systems using their personal email addresses instead of their staff ID. Many also use multiple, different IDs that are hard to match.

Because contributors can change affiliation – perhaps first volunteering and then being hired by Mozilla – in some instances we've had to merge those contributors' activities regardless of current affiliation and attribute that activity to their last registered affiliation. We must apply this method when looking over long time periods and considering contributors by segments. It's also the case for the network graphs, where we distill a contributor's activities over a long period of time into a single point in a static network graph. However, this is an edge case for most of the contributors, and it does not have a significant impact on the overall trends or insights. We estimate this affects between 250-500 contributors in total, depending on the time period.

In 2017, we manually vetted our top 1,000 contributors to be sure we were accurate in both non-duplications and employee/non-employee affiliation. This year, we built upon this dataset. Bitergia also helped us with cleaning up this dataset, using a more aggressive matching algorithm to remove an additional 2,641 duplicate identities.

To better understand the accuracy of our matched affiliations, we performed a qualitative check on assigned affiliations on a random sample. As the results would be most skewed by errors in the regular and core segment (due to the size of their contributions), the random sample was performed on two segments where we had identity information from SortingHat. In all, we had 4,563 contributors who matched these criteria, and our random sample test was performed on 10% of this subset.

In all, we found that we had an affiliation accuracy of 89.7 percent, meaning only 10.3 percent of the sample had wrong affiliations, meaning they were community categorized as staff, or vice versa.

It was more common for non-employees to be falsely classified as staff, suggesting that the Mozilla community is a bit larger than our analyses indicate. However, this is not a significant impact.

Data reliability: gender

Please see the section on Diversity and Inclusion for more details on the reliability of our quantitative analysis of gender.

Data reliability: categorization of contributions

Lastly, we worked with product teams and community managers across the organization to be sure we were looking at the right set of repositories and linking contribution from Pontoon (localization) and Kitsune (support) to the right products and projects. We did not include repositories we knew were dead or otherwise invalid (e.g. forks).

However, there are surely inaccuracies that need to be remedied in the future. Some of these are noted directly in the report, e.g. Firefox Android. In some areas, there were repositories that were hard to categorize in the timeframe we had for this report.

A note on the IT/Infrastructure and Web Properties contribution categories. These are both somewhat catch-alls for GitHub/Git repos and Bugzilla issues that are related either to IT infrastructure, such as cloud-based services for Firefox, or content and code for some of Mozilla's vast range of websites. Both of these categories should be better vetted in future reports to ensure a more accurate representation of Mozilla contribution. For example, non-employee contribution to some of the cloud-based services for Firefox might be better categorized as contributions to Firefox.

The GitHub/Git repos we viewed for this report and their categorization as well as cross-project mapping information are available upon request.

Mozilla's External Network Influence

To create the network overview of contribution across Mozilla and non-Mozilla project repositories, we used the GitHub/Git API to determine which other public repositories Mozilla contributors participated in, as defined by issues, commits and pull requests. We only considered public repositories that had more than five unique Mozilla contributors within the time period 2017-2019. In total, we registered 3.1 million contributions, from 7,041 non-employee Mozilla contributors to 5,377 other repositories.

The network is colored by using a simple modularity cluster algorithm, which groups projects into 6 clusters based on which repositories contributors have been active. The white circles represent an individual repository, and the size of the circle and label indicates the amount of unique Mozilla non-employee contributors to that repository.

The yellow cluster represents projects which tend to be run by individuals rather than organizations. Here we also find a few Rust specific projects, but we also find Linux specific projects which border to the blue cluster.

The green cluster encompasses a wide range of web technologies and web development tools, such as node.js, react, angular, vue.js, npm, babel, webpack and bootstrap. But we also find tools such as Visual Studio Code, Atom and Electron.

The blue cluster holds programming languages such as Go and Python, but also infrastructure projects such as Kubernetes and Ansible. On the edges of this cluster, we also find Homebrew and Travis, as well as ecosystems of repositories connected to operating systems.

The pink cluster to the right includes web standardization work, including repositories from the W3C and the WHATWG community. The top of this cluster also holds different 3D and VR/MR repositories, such as three.js and glTF.

Finally, the purple cluster at the top is more or less an ecosystem of repositories around ember.js, although we also find Rails in this cluster.

Note that both analyses used a filter to avoid many small repositories, by defining that each repo included needed contributions from at least 5 Mozilla non-employee contributors within the examined time period.

Open source projects and health

The Open Innovation team partnered with Analyse & Tal to help us better understand the health of our various contributor communities. Their work has also informed Mozilla's strategy to improve product support and localization. To bring in specific cross-industry expertise on open source, we also partnered with Open Tech Strategies, with whom we recently published a report on open source archetypes to help Mozilla and other organizations make informed decisions around open source goals, investment decisions, and tradeoffs (see Open Source Archetypes).

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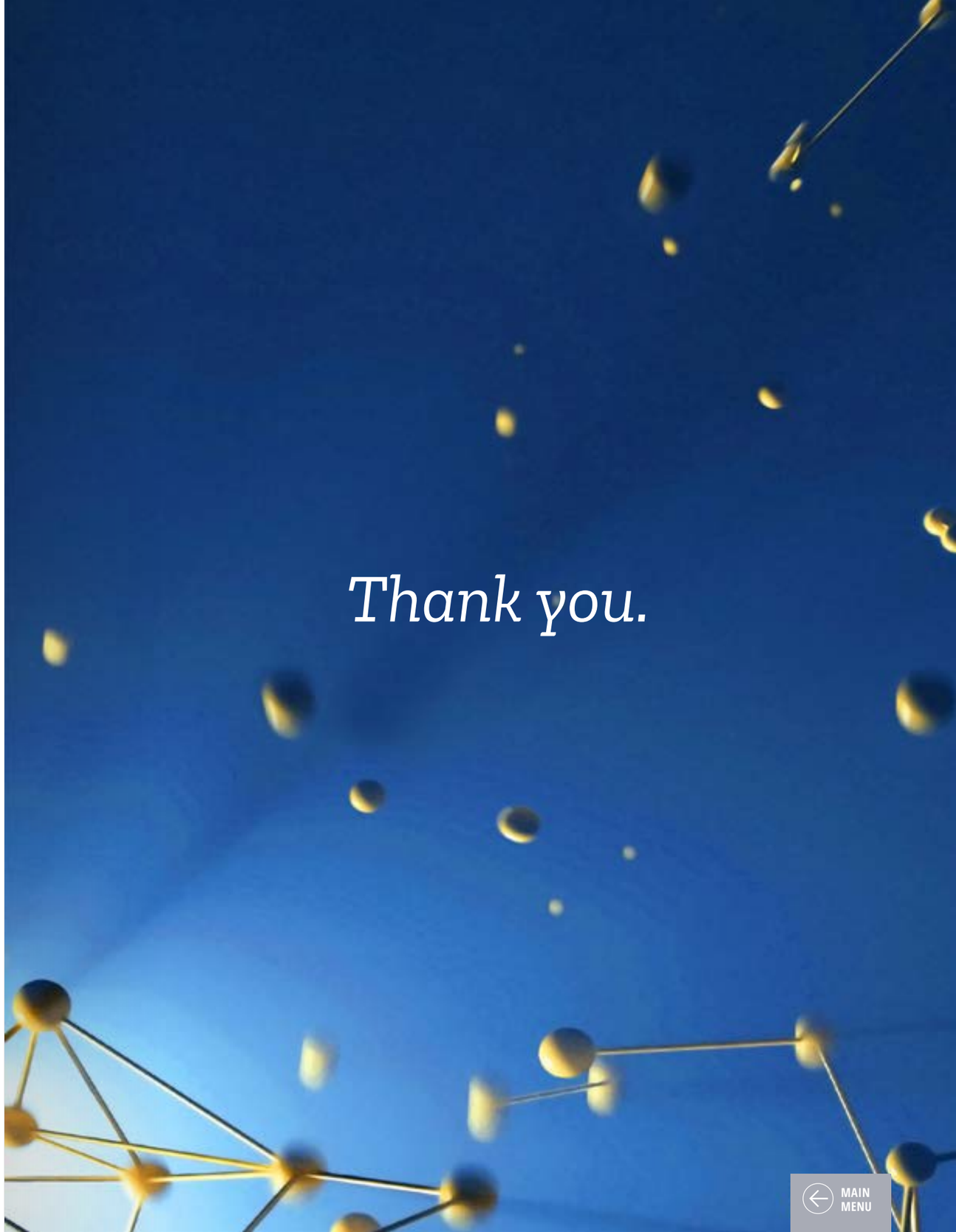

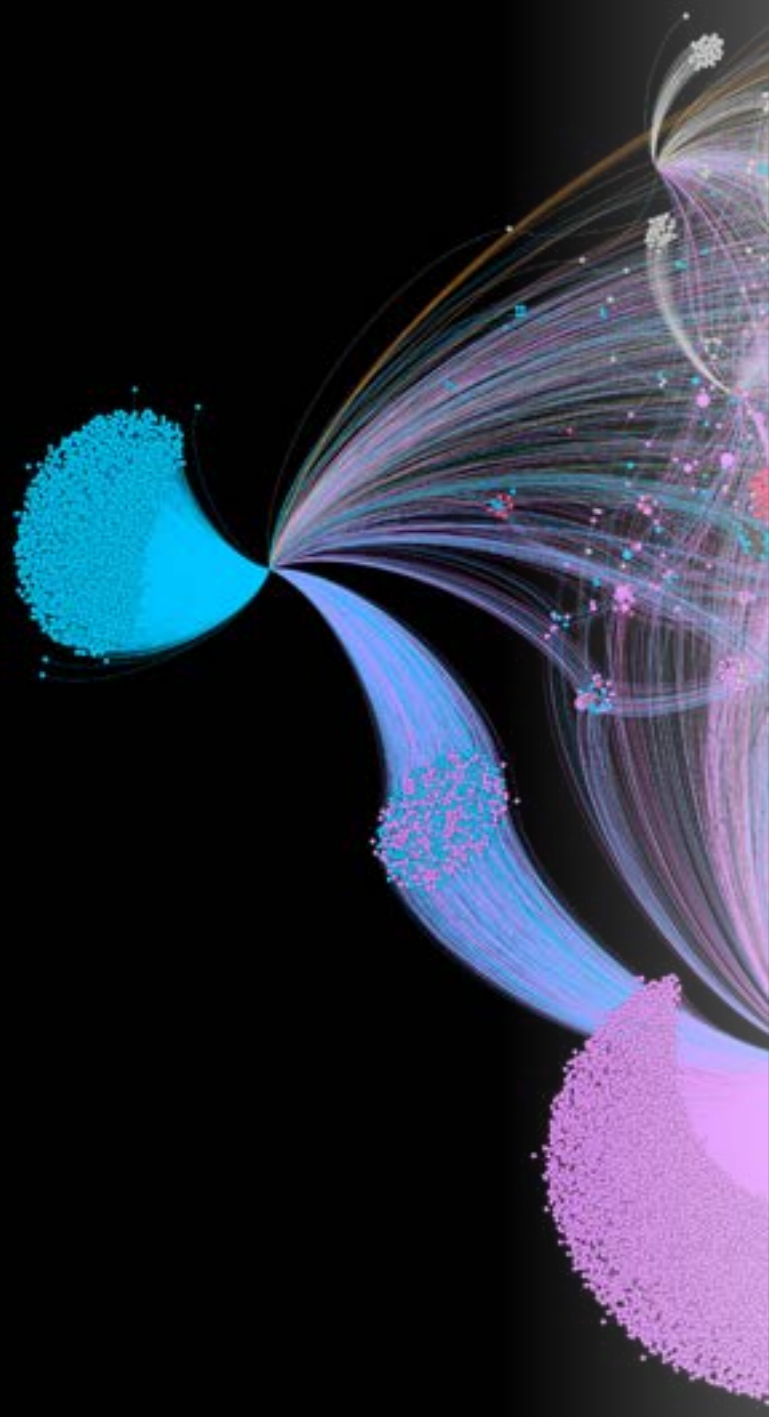

Mozilla & the Rebel Alliance

Report

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Open Innovation
January 2020