BASICS

Building Analytical & Support Infrastructure for Critical Security tools

Report on

Open Source Digital Safety Tool Ecosystem

Internews

Local voices. Global change.

Intro to BASICS Project

Open source digital safety tools are critical lifelines for at-risk populations and organizations globally, yet many powerful and widely used tools are maintained by individuals or small groups of volunteers who are often under-resourced, lack the ability to receive grant funding, and do not have the means to hire additional support to advance their project's goals. These developers are also often based in Western countries, with limited exposure to targeted and vulnerable populations who use their tools.

Internews' BASICS project (Building Analytical and Support Infrastructure for Critical Security tools) aims to increase capacity and improve long-term sustainability for critical open source privacy and security tools used by human rights defenders around the world.

BASICS aimed to improve both the sustainability and relevance of critical open source security and privacy tools in two distinct and complementary ways:

- Addressing core capacity gaps and improving the tool teams' diversity by embedding experts who can also represent the needs and experiences of marginalized populations directly in the tool team; and
- Providing long-term support by helping tool teams integrate privacy-respecting metrics and impact measurement techniques to be able to track usage patterns, and consequently improve their knowledge of how features are being adopted and used.

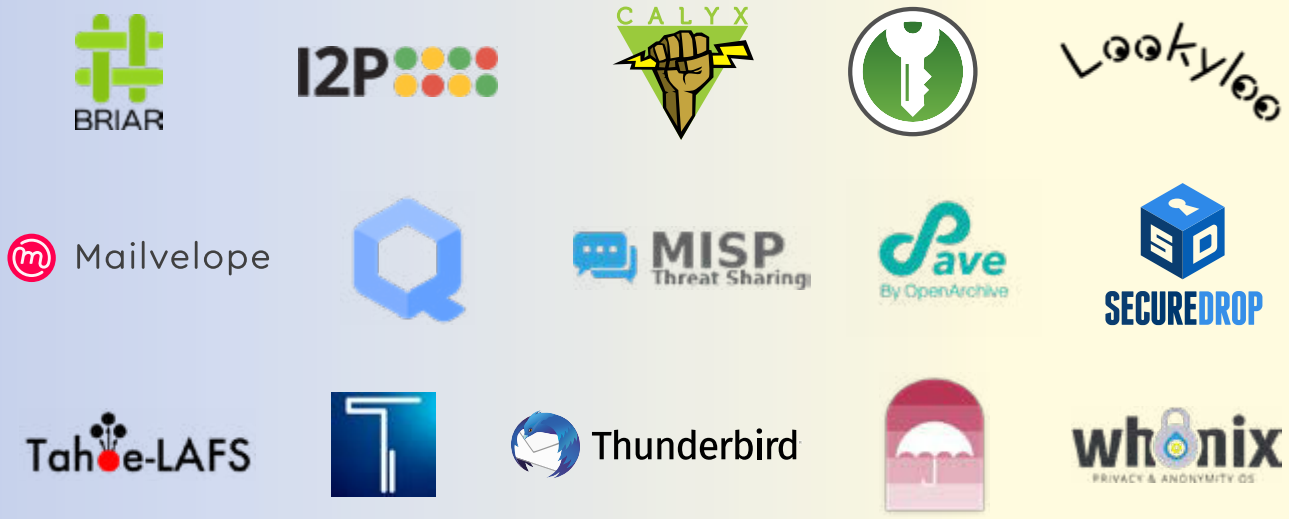
This report focuses on the former, under "Objective 1: Build the capacity of Internet freedom tool developer teams to create sustainable and effective products for at-risk populations."

BASICS built ties between tool teams and the communities they serve by placing skilled individuals from targeted and vulnerable populations with the tool teams as contributing specialists who helped address tool needs (as identified through a collaborative assessment and planning process). Tool teams who worked with contributing specialists had the opportunity not only to scale and become more sustainable, but to do so with an understanding of the challenges faced in Internet repressive environments.

Scope

Beginning in May 2020, Internews worked with 15 open source digital safety "tool teams" – the leaders who develop, design, and maintain these tools – to conduct needs assessments and co-develop Capacity Action Plans designed to address key goals and pain points for each tool.

A call for interest was circulated among digital safety tool developers. Ultimately, there were 15 participating tool teams:



Briar, Calyx, Invisible Internet Project (I2P), KeePassXC, Lookyloo, Mailvelope, MISP, Qubes, Save, SecureDrop, Tahoe-LAFS, Tella, Thunderbird PGP team, Umbrella and Whonix. Note that Whonix received a needs assessment and Capacity Action Plan but did not participate in the rest of the BASICS program.

To ensure that the tools BASICS would support are relevant and useful, Internews conducted a market analysis to identify the most well-known and commonly used tools among at-risk communities. Unlike traditional market analyses, the BASICS Market Analysis assumed that readily available user data and market trends are at least partially inaccurate, because vital but small tools may float under the public radar, while well-established tools occupy an oversized space. Because there are no existing reliable sources of data to indicate how widely any given tool is used, the market analysis primarily looked at 12 different digital security guides recommended by the organizational security community to determine a tool's usage within the market. (The full market analysis is published here.) However, even widely used tools are often not promoted in traditional digital security resources for fear that they may lack longevity, as unmaintained tools pose a significant security risk for those who continue to use them. (The risk of unmain-

tained tools is one of the motivating factors behind the BASICS program.) Tools may also be "used" only during specific times of need – for example, during an internet shutdown – but are absolutely critical to the communities facing limited information channels.

We found that secure communication (e.g. Signal, OpenPGP), secure browsing (e.g. Tor, HTTPS Everywhere) and password protection (e.g. KeePass XC) are the security needs most often cited in digital security guides. However, while there is an active and vibrant community of developers and designers committed to the creation and maintenance of open source tools, many of the guides that educate people on digital security are not regularly updated. Current tools that not only record consistent usership but were identified as commonly used among at-risk communities are often not spotlighted in major resources. Conversely, many recommended tools were neither open source nor free despite the wide availability of open source alternatives providing the same service.

Ultimately, Internews chose to support interested tools on the basis of a) their prominence in digital security guides, b) the frequency of their recommendation by Internews' network partners in at-risk communities, and c) information on the tools' user base as reported by the tool teams.

TOOL "DEMOGRAPHICS"

*Internews received expressions of interest from **21 open source digital safety tools.***

Some highlights that reveal the tenuousness of some of these teams:

45% of tool teams had *only 1 or 2 core maintainers*

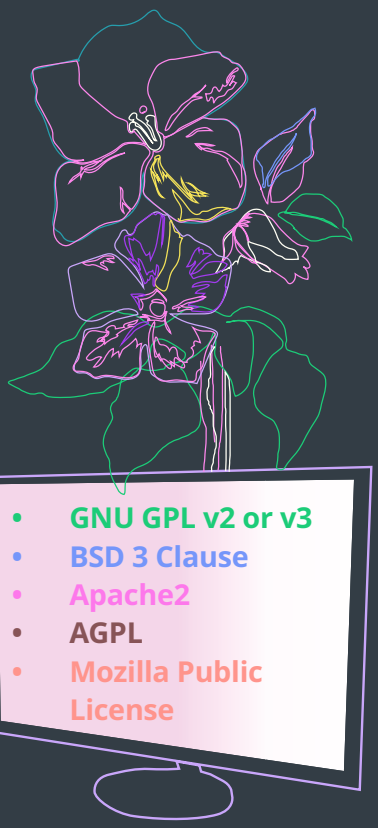
45% of tool teams had *fewer than 6 regular contributors*

Just over **20%** of tool teams' maintainers *are volunteers* (i.e. unpaid for their work)

Among maintainers who were paid for their time, **65%** worked only on a *part-time basis*

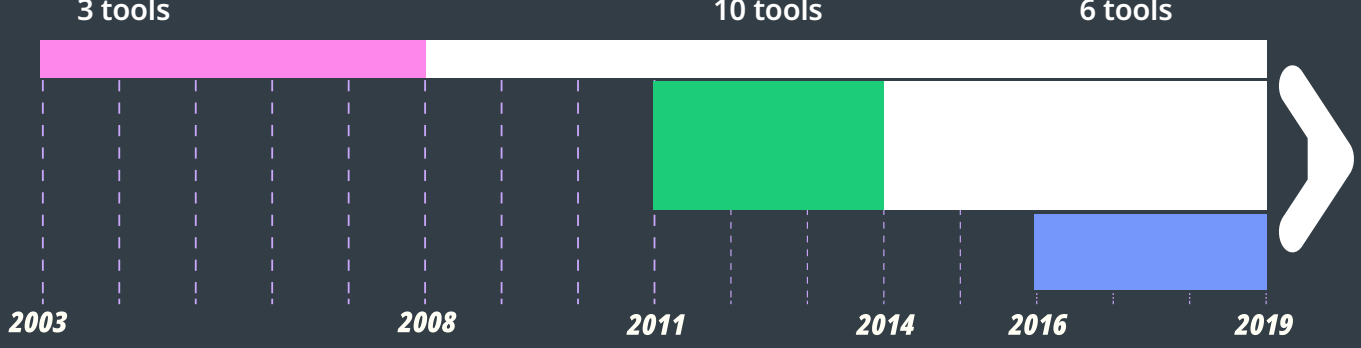
Just under ***20%*** of tool teams (4 out of 21) ***had never received funding before***, and of those ***75%*** had also ***never applied for funding before.***

Frequently, tools have ***multiple licenses for different software components.*** Common licenses in use by tools who expressed interest in BASICS, from ***most to least frequently*** cited:



- GNU GPL v2 or v3
- BSD 3 Clause
- Apache2
- AGPL
- Mozilla Public License

Most tool teams have been *developing and maintaining their tool for many years.* ***Date when tool development first began:***



Number of regular contributors:

6 tools *have 10 to 15 contributors*

3 tools *have 7 to 9 contributors*

4 tools *have 1 to 3 contributors*

4 tools *have 4 to 6 contributors*

1 tool *has 20 contributors*

Are maintainers paid or volunteer?

Paid (11)

Mixture of both (4)

Volunteer (4)

Number of core maintainers:

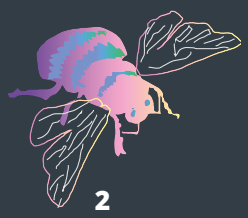
Working full-time

5 tools — *1-2*

4 tools — *3-5*

2 tools — *7-12*

Working part-time



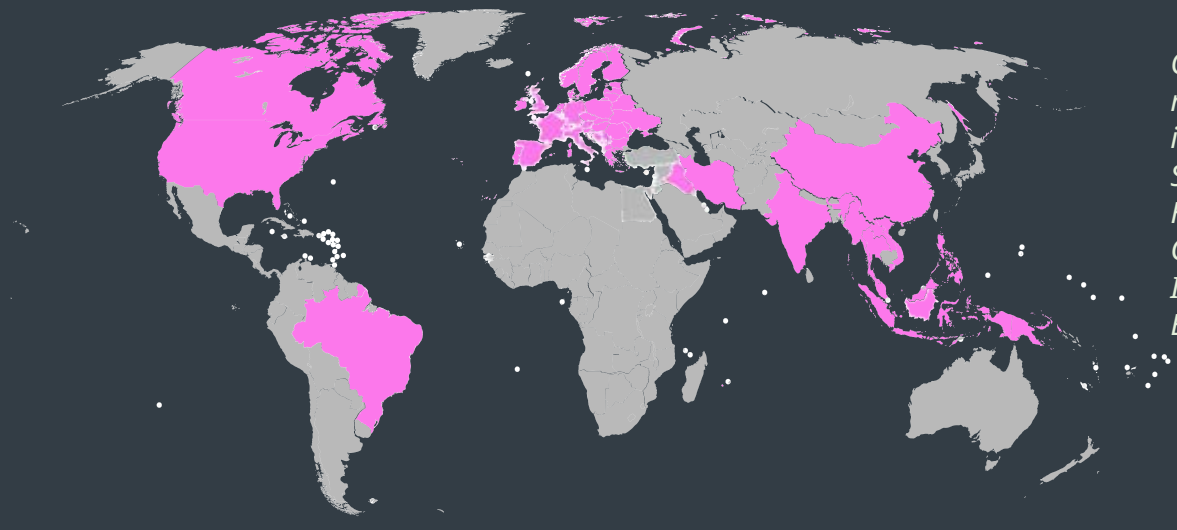
2 tools — *3-5*

2 tools — *1*

2 tools — *8-15*

Countries where maintainers live

Overwhelmingly, most maintainers are based in the US, Canada, and/or Western Europe



Other locations mentioned include: SE Asia, India, Hong Kong, China, Serbia, Iran, Iraq & Brazil.

Assessment Process

In order to assess the "health" of the open source teams maintaining many of these critical digital safety tools, Internews developed and administered a lightweight needs assessment process for 15 tool teams.[1] This assessment was developed based on a number of existing resources. In particular, it adapts concepts from:

- the Internews Organizational Capacity Assessment (OCA)
- the SAFETAG Capacity Assessment
- the Linux Foundation's CHAOSS (Community Health Analytics Open Source Software) project[2]
- the Apache Project Maturity Model[3]
- the OSS Watch Openness Rating[4]
- and the URSSI maturity model for open source software.[5]

The goal of the assessment was to develop a Capacity Action Plan that could help guide priorities for the project team over approximately the next year. Outcomes from the assessment could also be used to develop grant proposals and a clear rationale supporting the project's need for various resources.

The first step was for the tool team to consult a rubric to rate the health of their open source project in 10 key areas:

1. Code
2. Licenses & Copyright
3. Releases
4. Quality
5. Community
6. Diversity & Inclusion
7. Transparency & Consensus Building
8. Governance
9. User Friendliness
10. Open Source Sustainability

1 See complete list above.

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4 Openness Rating: How open is your software project? by OSS Watch Team is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

5 Copyright © 2019 Sebastian P. Benthall/URSSI.

Next, Internews facilitated a team discussion around Strategic Planning and a SWOT Analysis (Strengths, Weaknesses, Opportunities, Threats) to clarify the "big picture" for the project. Finally, the project team selected their "Top 5" key areas from the self-rating rubric that were most important to the project team, and with Internews, talked through detailed questions to identify needs, opportunities, and the team vision for each area.

The output of these approximately two-hour facilitated assessment conversations was a Capacity Action Plan summarizing the goals and pain points the project teams wanted to address. The entire needs assessment process was later translated into a self-guided web-based version that can be accessed by any open source project team, and which can be accessed here.

Averaging the self-scores across all 15 teams, we get a rough picture of the "health" of the open source digital safety ecosystem with reference to each key area. Most teams' self-perception is that they are performing well on the technical aspects of their project (the code, quality, licenses and copyright), whereas areas related to community, users, and open source governance and sustainability were more likely to leave room for improvement. The following chart shows the average score for each of the 10 self-assessment areas, from most- to least-healthy.

Area of Assessment	Total Self-Assessment Average
Code	4
Quality	4
Licenses & Copyright	4
Releases	3
Open Source Sustainability	3
User Friendliness	3
Community	3
Transparency & Consensus Building	2
Governance	1
Diversity & Inclusion	1

The two lowest-ranked areas were in Diversity & Inclusion and Governance. At the time of assessment, few project teams had established formal governance processes for their project. Most teams expressed that they felt it was difficult to improve their diversity and inclusion without first establishing a thriving community around the project, which was typically also a yet-to-be-realized goal.

Priority Needs Based on Assessment

Looking at the self-scores based on the rubric, certain areas of "health" were identified most frequently among the 15 project teams as priority needs (i.e. were chosen as among their "top 5"):

Community

selected by
13 out of 15 teams

Diversity & Inclusion

selected by
13 out of 15 teams

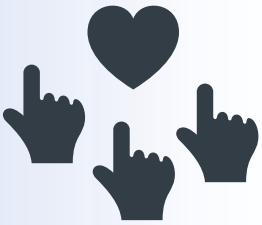
User Friendliness

selected by
10 out of 15 teams

Open Source Sustainability

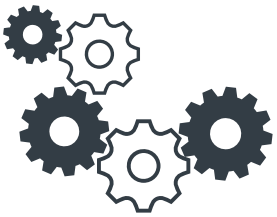
selected by
11 out of 15 teams

Among the areas chosen by at least 50% of the teams as one of their Top 5 most important areas to address, (where 1 is ranked most important and 5 least important), the highest importance on average was given to:



User Friendliness
Average Rank: 2
selected by 9 teams

Open Source Sustainability
Average Rank: 2
selected by 10 teams



Community
Average Rank: 3
selected by 12 teams

Diversity & Inclusion was ranked in the top 5 for 13 out of 15 teams assessed, although on average it was only ranked 4th in importance. From this we conclude that diversity and inclusion is an area that most teams view as needing improvement; and, although deemed important, it is not generally seen as of the highest/most urgent importance.

As is well known, time is perhaps the most precious resource of an open source tool team, hence anything that falls below the level of a top priority is unlikely to receive much attention. This insight reveals that without additional resources, project teams are unlikely to make meaningful improvements to their diversity and inclusion efforts, despite recognizing their importance.

Consultants

Open source digital safety tools are often maintained by small, homogenous, and informal or volunteer teams. These tool teams lack the capacity and diversity to be able to quickly respond to emergent threats or significantly scale their work. By supporting these teams through direct capacity in the form of experts sourced from targeted and vulnerable populations in the Global South, BASICS sought to address both the capacity and diversity problems, providing tool teams a path to not only scale and become more sustainable, but to do so with an understanding of the challenges faced in Internet repressive environments.

Ultimately 20 expert consultants were hired to partner with project teams on their identified areas of need. 13 of 20 (65%) also represented vulnerable populations and 9 out of 20 (45%) were women.

Consultant	Area of Expertise	Tool Team(s) Supported	Primary Citizenship
Joan	Community Management	Tella, Lookyloo, SecureDrop	USA
Cleopatra	Community Management & Documentation	Umbrella, Briar, MISP	Cameroon
Viktoriia	Communications & Marketing	Tella, Tahoe-LAFS, Save	Ukraine
Bobkevin	Communications & Marketing	Mailvelope	Tanzania
Maya	User Research	Calyx, Lookyloo	Bulgaria
Hope*	User Research	Invisible Internet Project	Uganda
Lucie	User Research	Invisible Internet Project	USA
Nicolas	User Experience & Design	Thunderbird PGP	France
Ese	Android Development, User Experience	Calyx	Nigeria
Zeynep*	Android Development	Save	Turkey
Dhekra	iOS Development	Tella	Tunisia
Eugene	iOS development	Tella	Canada
Xavi	C++ Development	KeePassXC	Spain
Cory	Python Development	SecureDrop	USA
Anxhelo	Web Development	Tahoe-LAFS	Albania
Eric	Issue & Code Management	Qubes, Save	Kenya
Ajibola	Testing & Release Management	Tahoe-LAFS	Nigeria
Fon	Testing & Release Management	Tahoe-LAFS	Cameroon
Francisco	Testing & QA	Qubes	Portugal
Cléo	Project/Product Management	Tella	France

*this person's name has been changed to a pseudonym to protect their privacy

Out of 20 consultant contracts, 12 (60%) lasted a total of 6 months or more. 15 out of 20 contracts (75%) were extended from the originally planned close date at the request of the tool team(s).

Consultant	Contract Length	Extended?	Extended Contract Length	Total Contract Length
Maya	6 months	*Y*	8.5 months	**14.5 months**
Bobkevin	6 months	*Y*	6 months	**12 months**
Ese	6 months	*Y*	2.5 months	**8.5 months**
Xavi	6 months	*Y*	2.5 months	**8.5 months**
Nicolas	6 months	*Y*	2.5 months	**8.5 months**
Eric	3 months	*Y*	5 months	**8 months**
Cory	2 months	*Y*	6 months	**8 months**
Zeynep	8 months	*N*		**8 months**
Cleopatra	3 months	*Y*	4 months	**7 months**
Lucie	2 months	*Y*	4 months	**6 months**
Eugene	6 months	*N*		**6 months**
Francisco	6 months	*N*		**6 months**
Fon	4 months	*Y*	1 month	**5 months**
Joan	3 months	*Y*	1 month	**4 months**
Dhekra	3 months	*Y*	1 month	**4 months**
Viktoriia	3 months	*Y*	.5 month	**3.5 months**
Anxhelo	3 months	*Y*	1 month	**4 months**
Cléo	2 months	*Y*	1 month	**3 months**
*Ajibola***	2 months	*N*		**2 months**
*Hope***	1 month	*N*		**1 month**

**this consultant was originally hired on a longer contract but the contract ended early

Consultants also made fruitful connections thanks to the larger Internet Freedom community. For example, User Research consultants reached out to the community to recruit participants for user surveys and interviews, and one of the marketing and communications consultants held a training workshop on their tool for the IFF community.

Here, we spotlight the experiences of 3 consultants for a closer look at the impact of their participation in the BASICS program.

CLEOPATRA, a technical writer from Cameroon, was hired to support three tool teams (Briar, MISP, and Umbrella) on their community management and documentation needs. She had previously worked for Tor and done technical writing for Qubes. Cleopatra had been contributing to open source projects for over 3 years at the time of hire. She worked as a BASICS consultant for 6 months.

During her time as a BASICS consultant, Cleopatra completely revamped all documentation that relates to Umbrella, including building a user guide and FAQ; triaged, labeled, and updated tickets in the Briar issue tracker; restructured the Briar project website; wrote and updated Briar user manuals; and updated and added documentation for all aspects of the MISP project.

The teams she worked with described partnering with her as "an excellent experience" and called her a "valuable independent contributor" and "a total professional."

Cleopatra herself noted that "the experience has taught me the value of considerinwg the user's perspective when writing user documentation;" she also said that she learned a lot about writing API documentation, which will support the advancement of her career as a technical writer.

ESE, a technologist from Nigeria, was hired to support Calyx with Android development and implementation of UX designs for Android. He had previously worked for several years as a Senior Software Engineer and holds a Bachelors in Mechanical Engineering. Ese worked as a BASICS consultant for 9 months.

During his time as a BASICS consultant, Ese completed most of the work on Calyx's wallpaper app, did the lion's share of the work on the Dature Firewall app, created a bug reporting app, and worked on a feature to allow CalyxOS users to return to the list of apps and features that can be pre-installed during setup at any time (a frequently-requested user feature).

The Calyx team described Ese as "professional, polite, receptive to feedback, willing to ask questions and open to responses and feedback from the team." They also noted that every project Ese worked on was better than the one before due to his willingness to accept feedback and adapt to the Calyx team's approach.

Ese called his experience "quite interesting," as it was his first time working on a completely remote team. He described his time with Calyx and the BASICS program as "generally a fun and educational experience" and said he learned a lot about security, privacy, and systems engineering, which will be helpful to his work going forward.

FON, a computer engineer from Cameroon, was referred to the BASICS program by another consultant, Cleopatra. Fon describes himself as an open source contributor and evangelist and has participated in multiple Google Summers of Code. He holds a Bachelors of Technology in Computer Engineering. Fon was hired to support improvements to the Tahoe-LAFS release process.

During his time as a BASICS consultant, Fon refactored and cleaned up tests in the Tahoe-LAFS test suite and initiated work to automate their release process.

The Tahoe-LAFS team credited Fon with helping to make their releases more frequent due to his automation work, which subsequently signaled to the community that the project is still active, which will allow their community to grow. They described Fon as accepting of feedback and said he contributed both concrete and general suggestions to improve product documentation and community outreach.

Fon described his experience working with the Tahoe-LAFS team as "good" and "very supportive." He said that he gained more knowledge about some legacy tools and the Python programming language, as well as benefitting from interactions with technical team members who had many years' experience. Fon also noted that he learned about open source governance and how decisions are made in an open source project that include hobbyists and volunteers.

Impact

Internews has conducted closeout/endline meetings with all 14 tool teams.

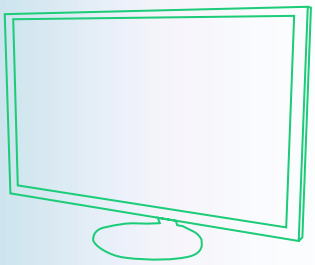
SUSTAINABILITY

Over 85% of teams (12 out of 14) achieved at least half of the milestone goals they set for themselves as part of their Capacity Action Plan. Looking solely at those where the expert consultants' work impacted achievement of the milestone, all teams completed 50% or more of those goals and approximately 78% (11 out of 14) of teams achieved 75% or more of goals impacted by BASICS. The (perhaps obvious) conclusion to be drawn is that investing resources matters for open source digital safety tool teams' ability to perform against their own goals. Without the added resources of expert consultant help, teams were unlikely to achieve more than about half of their stated goals. Where help was added, goal completion was significantly higher. Based on conversations with the tool teams, this is most likely because time is at such a premium for maintainers, and there is not typically enough time to devote to achieving every priority or goal without added resources.

Tool Team	Percent of Milestones Completed Impacted by BASICS	Percent of All Milestones Completed
Lookyloo	100%	86%
Qubes	100%	50%
Umbrella	94%	55%
I2P	86%	90%
Calyx	85%	81%
MISP	83%	55%
Briar	83%	52%
KeePassXC	83%	86%
SecureDrop	82%	66%
Thunderbird	80%	45%
Tahoe-LAFS	77%	67%
Tella	70%	57%
Save	59%	53%
Mailvelope	50%	26%

*green cells have values greater than 75%

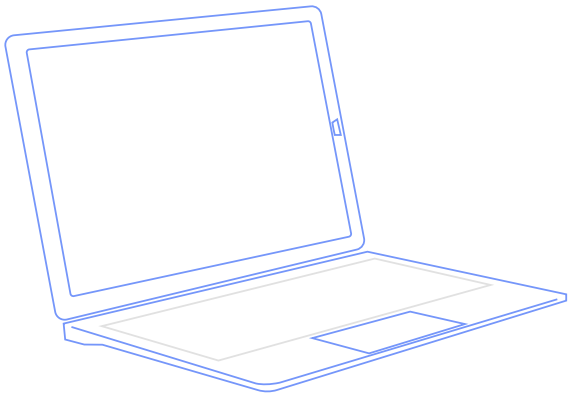
In addition to these quantitative measures of impact, members of the tool teams offered qualitative commentary on the benefits they received by participating in the BASICS program:



"The bug reporting and feedback app [created by the consultant] will contribute significantly to the CalyxOS project's long-term sustainability by streamlining communications with users around issues they encounter. This will allow us to more closely track and respond to the needs and issues of actual users, and free up development time otherwise spent tracking and following-up on issues raised by users in a wide range of environments. This also creates an avenue for future user research and requests for feedback. Our team has benefited tremendously not just from our participation in the BASICS program, but also from everything we've learned in our interactions and conversations with the team at Internews." –**CalyxOS**

"It was extremely important and useful to have Cleopatra build documentation and a lot of easily human-readable text for what MISP is. Having someone start from scratch and create the documentation [for how to start from scratch], which made it easier for others in the future, was helpful." The team expressed that they had been overwhelmed by the backlog of requests and issues, and that having a consultant bring some order to that was very much appreciated. –**MISP**

"Extremely happy to have participated in the program. Super useful and improved the project a lot. Made our life a lot easier." – **Lookyloo**



DIVERSITY & INCLUSION

Looking specifically at the impact of the program on tool teams' diversity and inclusion self-scores, 12 out of 14 teams rated improvements from the beginning to the end of the program, with the biggest jump adding 3 points to their baseline score.

Team	Diversity & Inclusion
Umbrella	2 > 5
Tella	0 > 3
KeePassXC	0 > 3
Lookyloo	0 > 3
Tahoe-LAFS	0 > 2.5
Qubes	2 > 4
I2P	2 > 4
Calyx	1 > 3
Mailvelope	0 > 2
SecureDrop	1 > 3
MISP	1 > 2
Briar	0 > 1
Thunderbird	3 > 3
Save	2 >2

Most of these teams added a published Code of Conduct as part of the requirements for participation in the BASICS program, which contributed to improvements in their Diversity & Inclusion self-scores. It should be emphasized that these scores are a result of tool teams' self-perception, and may not directly imply anything about the makeup of their leadership team or contributor community.

UNANTICIPATED IMPACTS

At the outset of the BASICS program, we expected to see impacts on tool team sustainability as well as their diversity and inclusion. Through conversations with the participating tool teams, we learned of additional, unanticipated positive impacts of the program.

ONBOARDING

For many teams, the process of adding a new team member highlighted some previously unrecognized challenges around their onboarding pro-

cesses. Through a bit of trial and error, tool teams learned where the gaps are and subsequently built documentation and processes to address them.

CONTINUING CONSULTANT WORK

A few of the tool teams were so satisfied with their consultant experiences that they found other funding to continue their work past the end of the BASICS program. These include:

- Save (Zeynep – Android Development)
- SecureDrop (Cory – Python Development)
- Tahoe-LAFS (Fon - Testing & Release Management)
- Tella (Dhekra – iOS Development)

One team also hired Internews' Technical Hiring Manager to advise them on improvements to their regular hiring process:

"We were so impressed with the technical hiring consultant, Jessica Rose, who worked with BASICS and our team for this role, that we hired her to revise The Calyx Institute's technical hiring process. Our initial plan was to develop a suite of open-source technical hiring templates, but we unfortunately had to scale this back to consultation on our hiring process, which we continue to iterate on."

Conclusions

Examining the question of the “health” of the open source digital safety tool ecosystem, based on our measurement and evaluation efforts of the BASICS program to date, the picture that emerges is decidedly mixed.

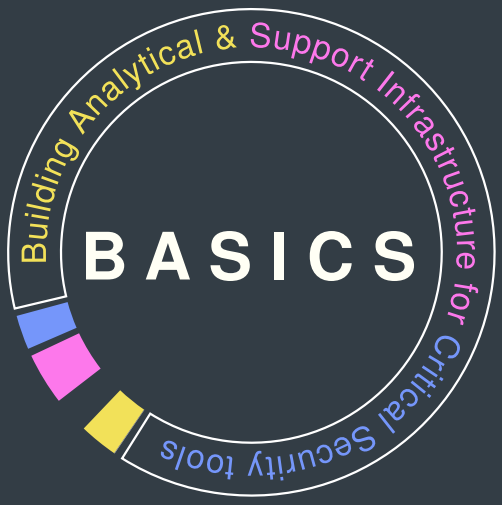
On the one hand, many tool teams are still under-resourced, rely on volunteers for critical tasks, and may not have a formal legal entity to accept donations and resources that could contribute to longer-term sustainability for the tool. On the other hand, the approach of the BASICS program has shown that even for those tool teams without legal entities, it is possible for funders and third-party organizations to provide resources that will increase capacity and improve tool team sustainability. Interventions like hiring the expert consultants retained under BASICS can support tool teams whose time is at a premium and already over-burdened. However, there is a time cost intrinsic to onboarding and mentoring these new team members. Therefore, longer consultant contracts are generally preferable to make the initial onboarding investment fully worthwhile.

From the consultant side, we learned that it is best for an individual consultant to support no more than two tool teams at a time, otherwise their efforts are spread too thin and it’s difficult to make a meaningful contribution, especially over a shorter time frame. It is also crucially important for tool teams to set clear expectations with consultants and to have regular communication and check-ins to track progress and provide feedback. Tool teams sometimes expected consultants to be highly self-directed, which was not always possible or feasible. It also frequently took up to 6 weeks for consultants to fully onboard and get familiar and comfortable with the workflow of a team before being able to make meaningful contributions; this ramp-up time should be anticipated so that tool teams and consultants can plan accordingly.

We also learned that tool teams welcome the extra help! However, by themselves they are not necessarily well equipped to recruit experts with non-developer skills and/or who hail from non-Western geographies. This is an area where funders and third party organizations can provide expertise and make a significant impact.

Finally, a major takeaway is that for most of these tool teams, improvements to diversity and inclusion are a secondary consideration to simply building community. In other words, most tools faced a challenge simply

in attracting contributors (and sometimes users) who could form a community around the tool – which is prerequisite to having a community that is then diverse and inclusive. The teams who worked with community manager consultants noted the difference that good contributor documentation made to their ability to build a contributor community, as well as an organized system for tagging and prioritizing open issues that can be easily understood by a newcomer. Implementing these foundational community-building practices is necessary before tool teams feel like they can do much of substance on their diversity and inclusion efforts.



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