ALFRED P. SLOAN FOUNDATION

THE LINUX FOUNDATION

moz://a

FORDFOUNDATION

Chan Zuckerberg Initiative

Sustain

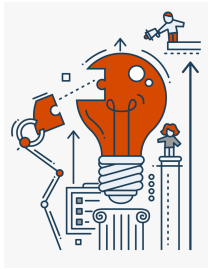
CHAOSS METRICS MODELS

Metrics Models: Response to CHAOSS Metrics, and How they Are Used in Practice

What can strong community metrics enable?

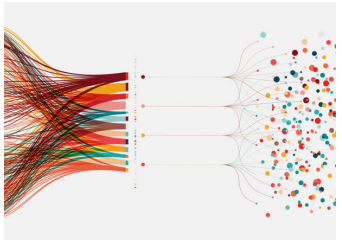
Building on community knowledge

What are the metric building blocks?



Staying informed in a sustainable way

How do we analyze them together?



Filtering through data noise

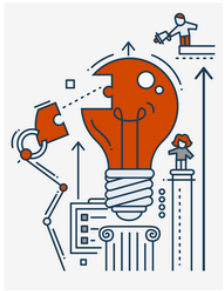
What are the succinct, actionable ways of looking at metrics together? (Hint: Metrics Models)

CHAOSS

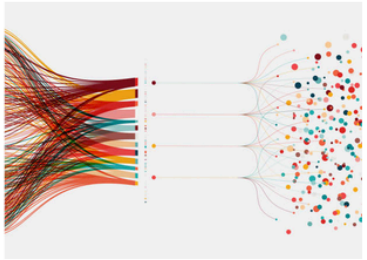
What can strong community metrics enable?

Keeping up with our community or others we care about

Building on community knowledge



Staying informed in a sustainable way

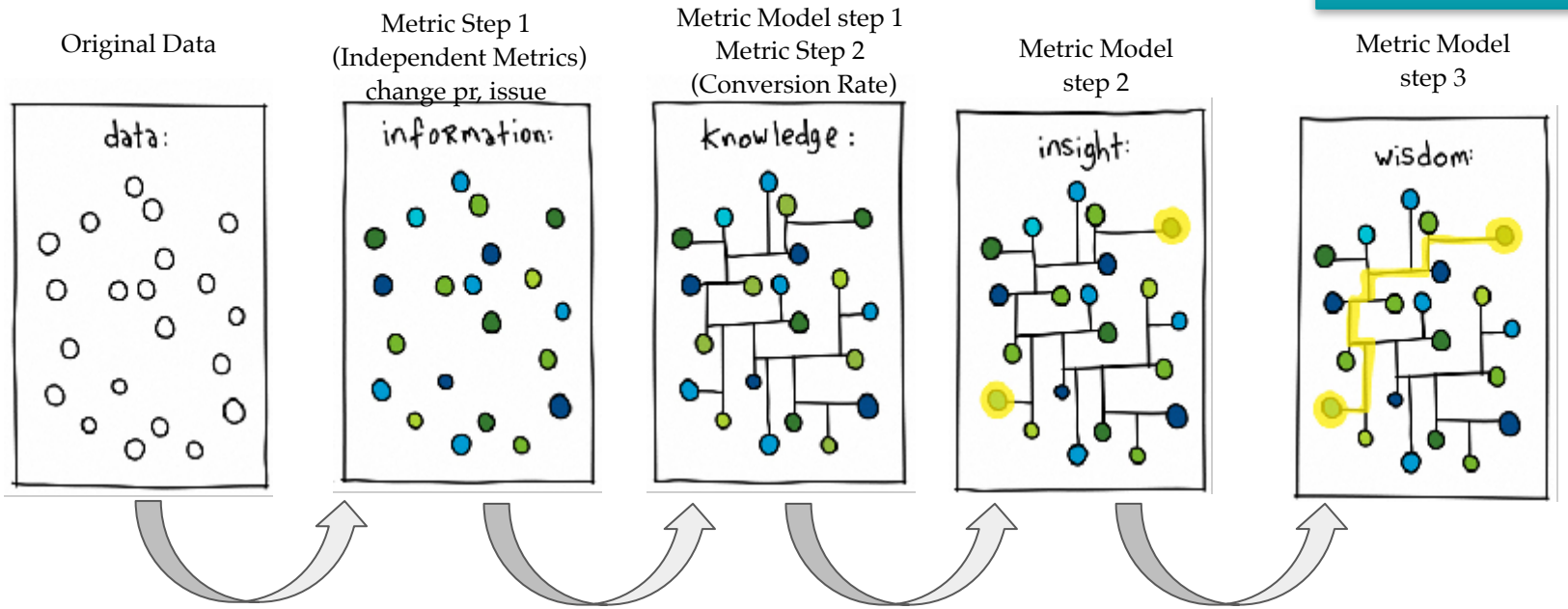


Filtering through data noise

CHAOSS

Moving from CHAOSS Metrics to CHAOSS Metrics Models

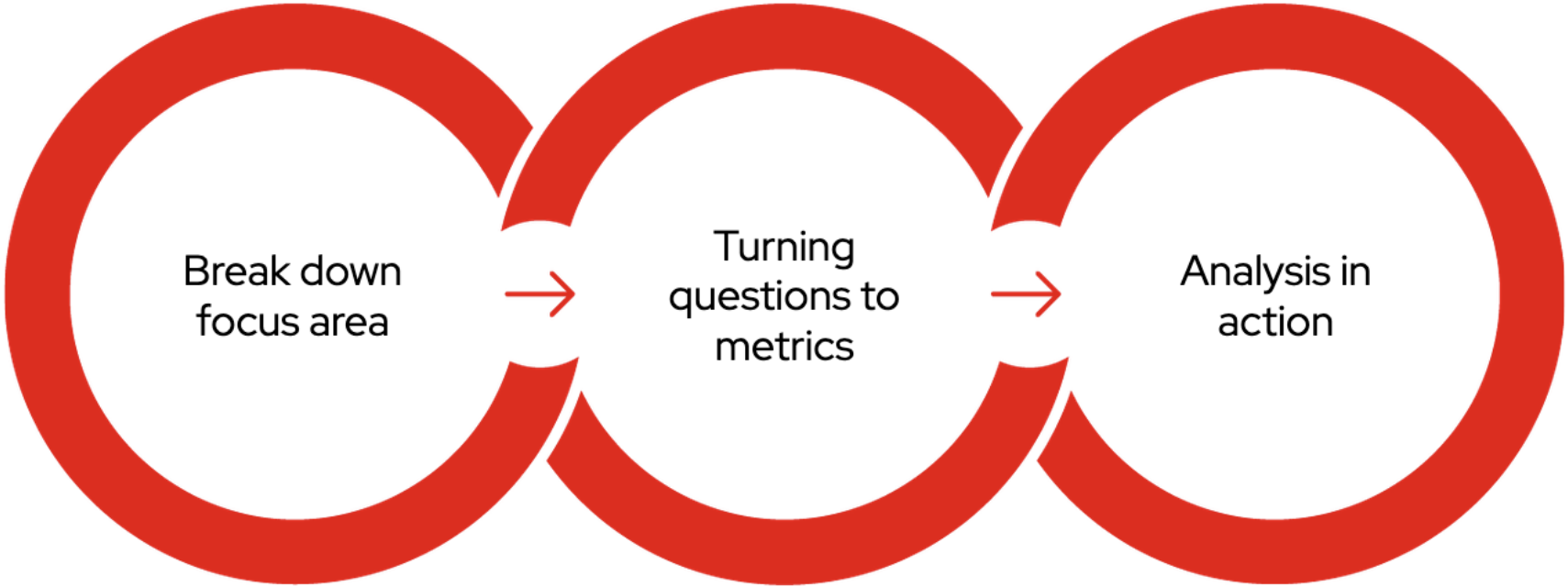
Data insights help us focus on the most actionable data.



Background: Insight helps you!

CHAOSS

Working toward Metrics Models: Starting Out



CHAOSS

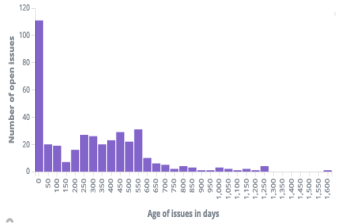
Metrics Models: Common, Useful Metric Assemblies

Original Data


```
[
  {
    "url": "https://api.github.com/repos/octocat/Hel
    "id": 1,
    "node_id": "MDExOlB1bGxSZXF1ZXN0MQ==",
    "html_url": "https://github.com/octocat/Hello-Wo
    "diff_url": "https://github.com/octocat/Hello-Wo
    "patch_url": "https://github.com/octocat/Hello-W
    "issue_url": "https://api.github.com/repos/octoc
    "commits_url": "https://api.github.com/repos/oct
    "review_comments_url": "https://api.github.com/r
    "review_comment_url": "https://api.github.com/re
    "comments_url": "https://api.github.com/repos/oc
    "statuses_url": "https://api.github.com/repos/oc
    "number": 1347,
    "state": "open",
    "locked": true,
    "title": "Amazing new feature",
    "user": {
      "login": "octocat",
      "id": 1,
      "node_id": "MDQ6VXNlcjE=",
      "avatar_url": "https://github.com/images/error
      "gravatar_id": "",
      "url": "https://api.github.com/users/octocat",
```

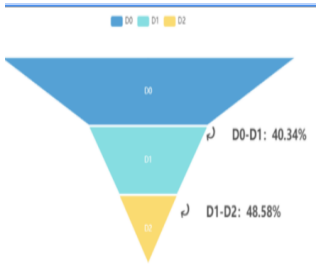

Pull Requests: Metric

Metric Step 1
(Independent Metrics)
change pr, issue



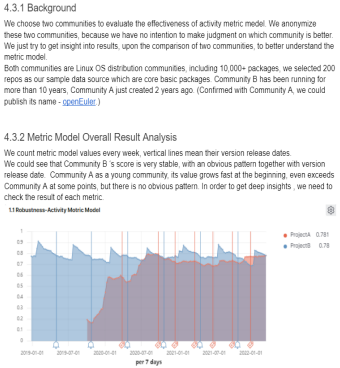
Issue Age: Metric

Metric Model step 1
Metric Step 2
(Conversion Rate)



New Contributors:
Metric

Metric Model
step 2



4.3.1 Background

We choose two communities to evaluate the effectiveness of activity metric model. We anonymize these two communities, because we have no intention to make judgment on which community is better. We just try to get insight into results, upon the comparison of two communities, to better understand the metric model.

Both communities are Linux OS distribution communities, including 10,000+ packages, we selected 200 repos as our sample data source which are core basic packages. Community B has been running for more than 10 years, Community A just created 2 years ago. (Confirmed with Community A, we could publish its name - openEuler)

4.3.2 Metric Model Overall Result Analysis

We count metric model values every week, vertical lines mean their version release dates.

We could see that Community B`s score is very stable, with an obvious pattern together with version release date. Community A as a young community, its value grows fast at the beginning, even exceeds Community A at some points, but there is no obvious pattern. In order to get deep insights , we need to check the result of each metric.

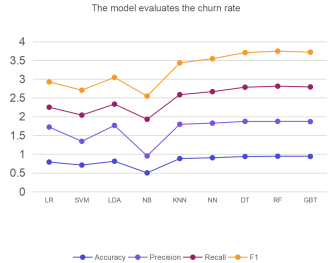
1.1 Robustness-Activity Metric Model

ProjectA 0.781
ProjectB 0.78

per 7 days

Community
Activity: Metric

Metric Model
step 3



	Actual Class P	Actual Class N
Predicted Class P	TP (True Positive)	FP (False Positive)
Predicted Class N	FN (False Negative)	TN (True Negative)

$$\text{Accuracy} = \frac{TP+TN}{TP+TN+FP+FN}$$

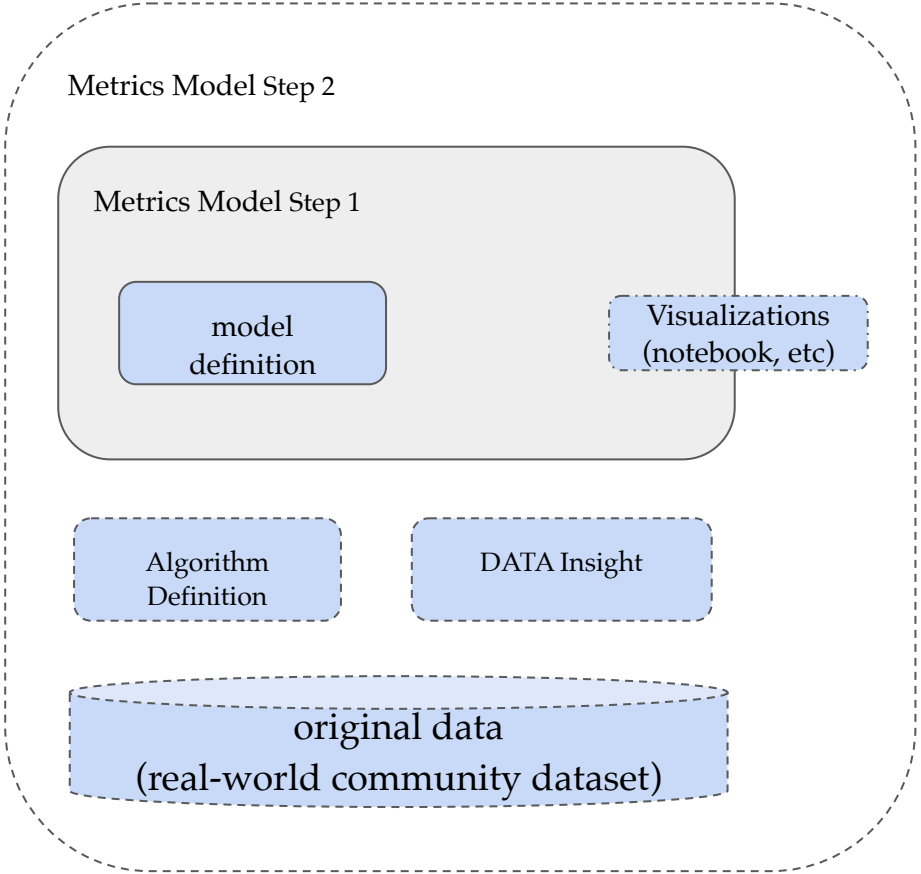
$$\text{Precision} = \frac{TP}{TP+FP}$$

$$\text{Recall} = \frac{TP}{TP+FN}$$

$$F1 = \frac{2\times Precision\times Recall}{Precision+Recall}$$

CHAOSS

Solution proposals



Hope to achieve the following goals:

1. Added "**data-insight**" , "**algorithm**", "**dataset**" in metric model repo.
2. In order to raise OSPOs and Community managers' expectations on the **value** created by metrics model. We introduce real-world community dataset.
3. It is the asset of CHAOSS in the future, with real community **datasets**: CHAOSS….
4. CHAOSS demo have **data-insight**, like data compare: A/B group comparison.

CHAOSS

Solution proposals

Metrics Model Step 2

Metrics Model Step 1

model definition

Visualizations (notebook, etc)

Algorithm Definition

DATA Insight

original data

survey dataset

Choose a sample size

confidence interval

Proportion of Pop

Relevant Attribut

$$n = \frac{z_{\alpha/2}{}^2 p(1-p)}{E^2}$$

Number of samples

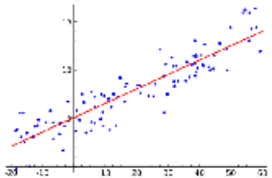
Margin of error

Design a questionnaire

10 9 8 7 6 5 4 3 2 1 0

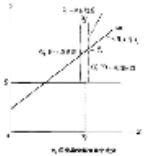
Use models for data filtering

Linear regression



Linear regression

Judging the rationality of the model



CHAOSS

Step 1: Break down focus area

And perspectives

Magic 8 Ball question

If you could answer anything, what would it be?

Data available

What will be the data source?

Question break down

With data, what sub questions could be answered to bring you closer to your proposed "8 ball" question?

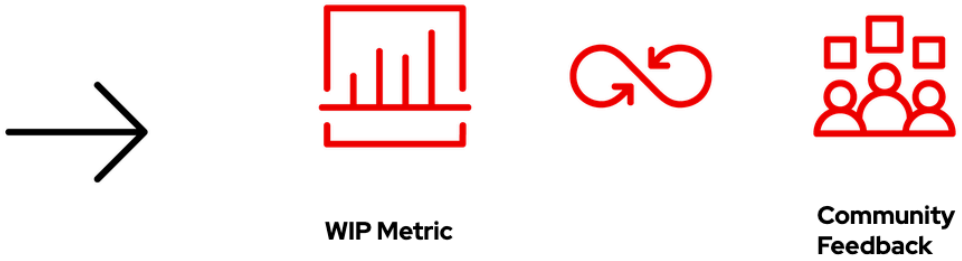
CHAOSS

Step 2: Converting a question to a metric

Repeat for each subpart determined in step 1

Determine the following for the proposed question:

- ❑ Specific data points needed
- ❑ Visualization to represent the data
- ❑ Insights and actions that come from this



CHAOSS

Step 3: Analysis in action

Alignment with prior knowledge

What are my assumptions?

Is something misunderstood?

Implement community initiatives

Informed by the data analysis

Should be measurable

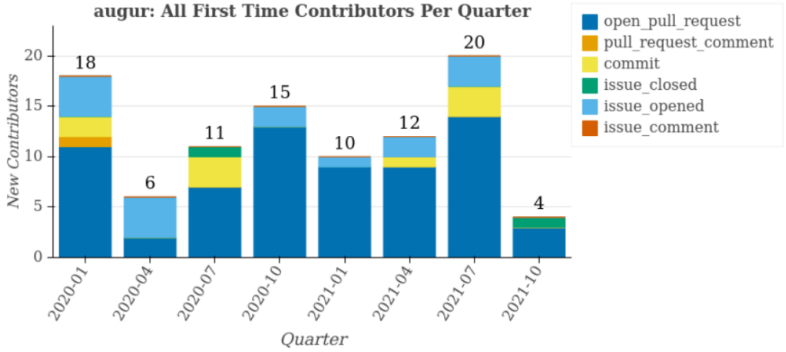
Observe community initiatives

Are you measuring the right thing?

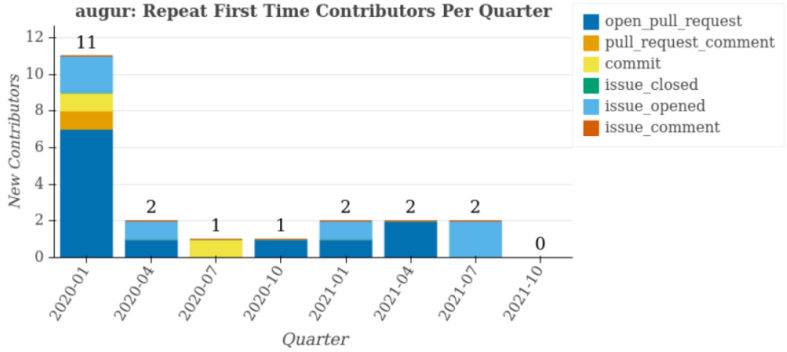
Does the initiative need to change?

CHAOSS

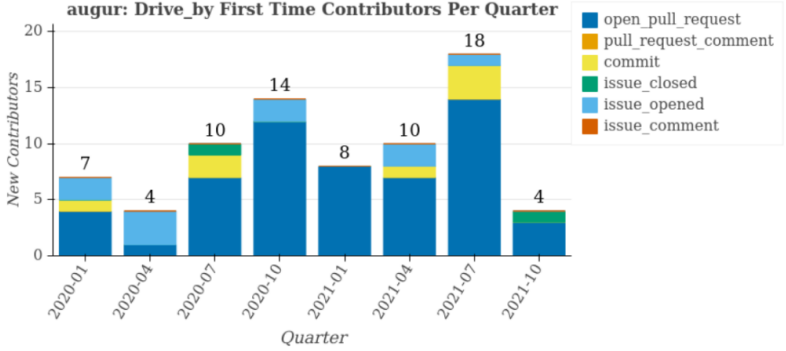
Example: Contributor Retention



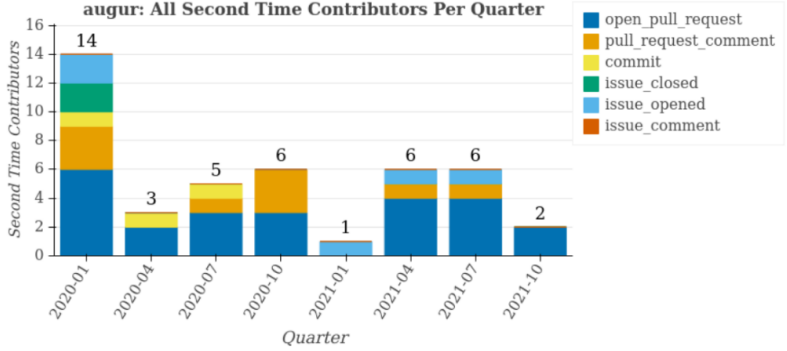
This graph shows all the first time contributors, whether they contribute once, or contribute multiple times. New contributors are individuals who make their first contribution in the specified time period.



This graph shows repeat contributors in the specified time period. Repeat contributors are contributors who have made 4 or more contributions in 365 days and their first contribution is in the specified time period. New contributors are individuals who make their first contribution in the specified time period.



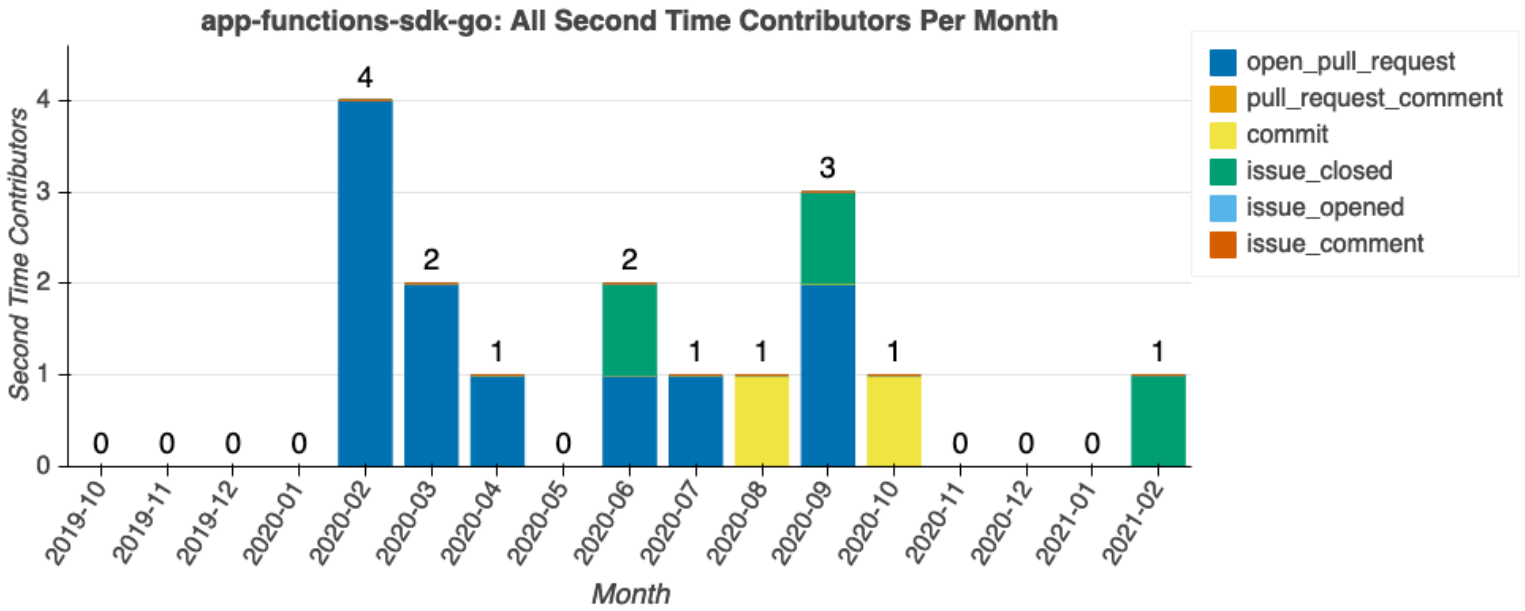
This graph shows fly by contributors in the specified time period. Fly by contributors are contributors who make less than the required 4 contributions in 365 days. New contributors are individuals who make their first contribution in the specified time period. Of course, then, “All fly-by’s are by definition first time contributors”. However, not all first time contributors are fly-by’s.



This graph shows the second contribution of all first time contributors in the specified time period.

Metrics Can Be Part of More Than One Model

From the Welcomingness Metrics Model

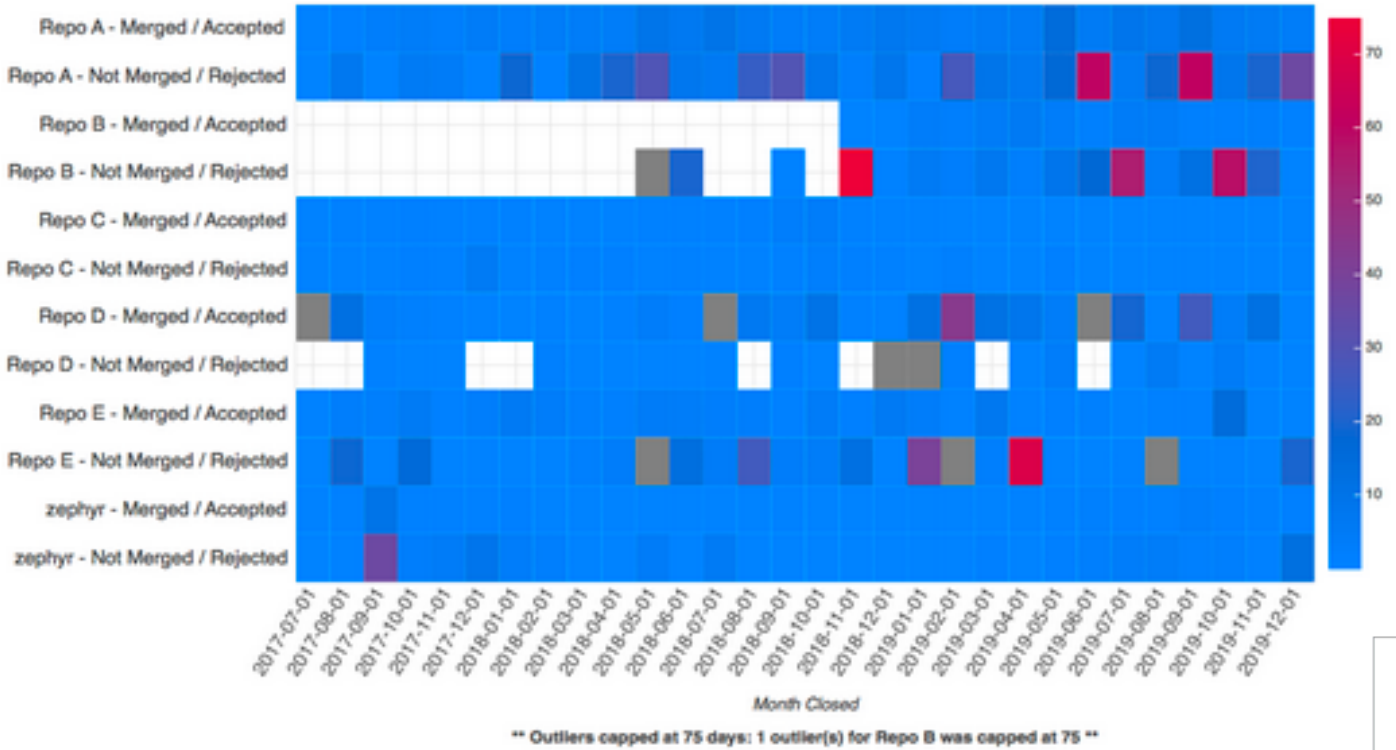


This graph shows the second contribution of all first time contributors in the specified time period.

CHAOSS

Other RTOS Repositories: Mean Days to First Response for Closed Pull Requests

Some Internal Slowing, But Outperforming Other Repositories



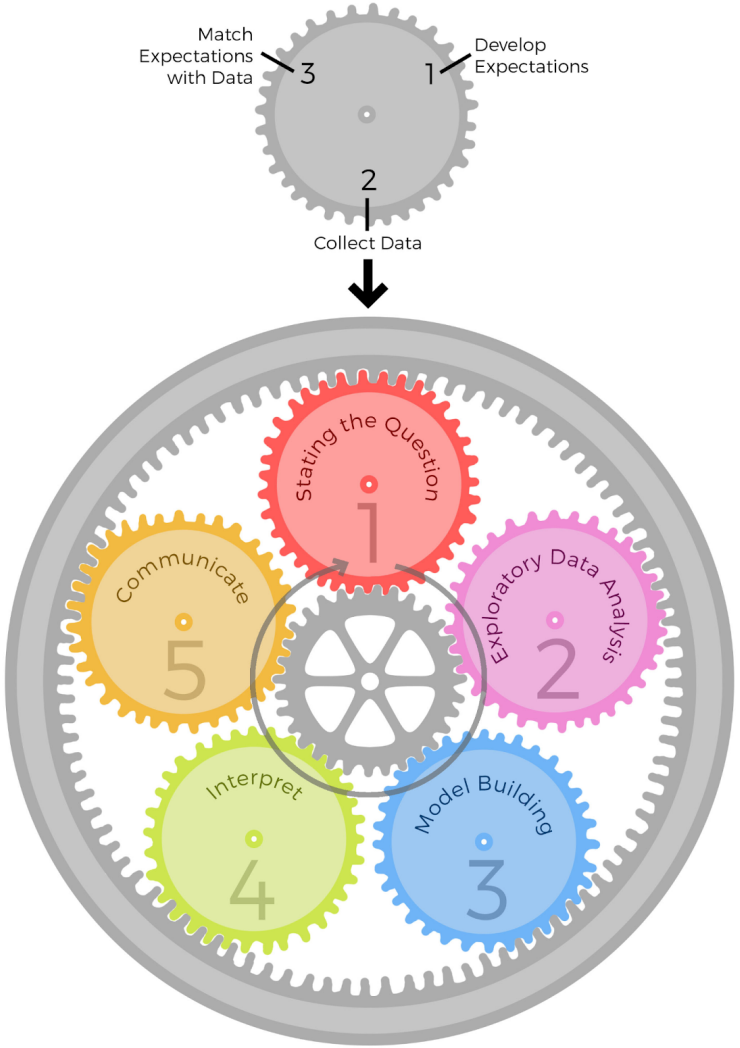
** Outliers capped at 75 days: 1 outlier(s) for Repo B was capped at 75 **

Comparisons: Competitive and Otherwise

Note: The gray areas represent months where there was at least 1 pull request closed during that month, but those pull requests did not have any comments

CHAOSS

Metrics Models and the Machine Learning Pipeline



CHAOSS

Thank You!

ALFRED P. SLOAN FOUNDATION

Chan Zuckerberg Initiative

CHAOSS