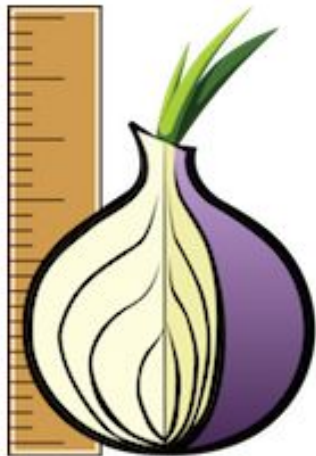


Tor Metrics Team, September 2016

Usability Analysis of Tor Metrics

A first approach



Tor METRICS

Introduction

The Tor Metrics website¹ boldly claims to be “the primary place to learn interesting facts about the Tor network”, and that claim might even be true. Yet we could do more to explain these facts to users. This usability analysis is a first approach to identify the most severe usability issues and suggest possible mitigations. Goals are to make visualizations more intuitive, but also to reduce the click count to reach information and to make or keep information accessible to users who rely on screen readers.

Start page and general issues

The Tor Metrics website (in short: Tor Metrics) is structured into a start page with filtering and sorting options and a results table with matching metrics, and subpages for metrics

¹ <https://metrics.torproject.org/>

which can be graphs, tables, links, and data. We start this analysis by looking at the start page and at general issues with the website.

Issue 1.1: Little introduction of Tor and Tor Metrics

The start page only contains a very brief statement what it's about by saying "Welcome to Tor Metrics, the primary place to learn interesting facts about the Tor network, the largest deployed anonymity network to date. If something can be measured safely, you'll find it here. And if you come across something that is missing here, please let us know."

The start page also contains a small link at the bottom of the metrics results table with more information "About Tor Metrics", though that page only contains frequently used terms and frequently asked questions, which might not be as useful for new users to gain an overview.

It would be more user-friendly to give a brief overview of Tor and Tor Metrics on the start page and link to subpages on Tor Metrics or on the Tor website for more information. This doesn't mean that the contents from the About page should go away, but they shouldn't be the primary place to learn about Tor Metrics.

Issue 1.2: No links to related services

Tor Metrics is the most user-facing service provided by the Tor metrics team, but it's not the only one. Other services include CollecTor², which is the primary data source behind Tor Metrics, Onionoo³, which is an API and also a secondary data source for Tor Metrics, Exonerator⁴, which is a service to look up IP addresses in the Tor network archive, and more. These services should be linked from Tor Metrics in a place where users would expect such links. Similarly, the metrics-lib library⁵ is not linked from Tor Metrics.

Issue 1.3: Links to metrics subpages should not be text

² <https://collector.torproject.org/>

³ <https://onionoo.torproject.org/>

⁴ <https://exonerator.torproject.org/>

⁵ <https://dist.torproject.org/descriptor/>

Most of the metrics subpages contain graphs, and using textual links for them seems not ideal. It would be better to use thumbnails, in addition to text which should be kept as alternative for screen readers, or some other visual indication of what users can expect when navigating to one of the subpages.

Somewhat related to this suggestion, it might be possible to include tags (like “Relays,” “Bandwidth,” etc.) and levels (“Basic” vs. “Advanced”) and even attributes like official vs. contributed as badges on top of thumbnails.

Issue 1.4: Links to technical reports are missing

Some of the metrics are based on non-trivial algorithms for processing Tor network data that are described in separate Tor technical reports. Yet, these technical reports are only linked from graph subpages and not listed in the main results table, though that would be quite easy to do. However, it’s unclear how big the audience for these reports would be, so there’s also the risk of cluttering Tor Metrics even more.

Issue 1.5: Website seriously lacks web design

Tor Metrics uses very minimal web design. Part of the reason might be that Tor Metrics uses rather cryptic JSP pages and Java Servlets which are not as widely known to web designers in the Tor community. A web redesign might have to happen with help of a (non-functional) design prototype that gets ported to existing JSPs/Servlets by metrics team developers. Ideally, the redesign would reuse templates from the main Tor website.

Graph subpages

Graph subpages are the primary type of subpages on Tor Metrics. Each graph subpage shows a graph together with a brief description, controls to customize the graph, download links for the graph in the PDF and SVG format, a link to the data page containing underlying data, and links to related metrics subpages.

Issue 2.1: There are far too many graph subpages

As of September 2016, there are 22 graph subpages on Tor Metrics, some of which being quite closely related, like “Relays and bridges in the network,” “Relays with Exit, Fast, Guard, Stable, and HSDir flags,” “Relays by version,” and “Relays by version.” All these graphs are time plots showing the number of running relays over time, either the total number or broken down by various relay criteria. It might be possible, and more user-friendly, to merge these graphs showing the same metric (like the number of relays over time) and offering controls to break down the metric by certain criteria. This would require adding new parameters to the website code, which is more complex than it should be.

Going back one more step, it might be a useful exercise to reorganize subpages into categories for the presented data, like “Number of relays” or “Advertised bandwidth capacity,” assign all matching existing graphs to these categories, add useful variants of graphs that don’t exist yet, and create a custom page for each category. This would require adding support for multiple graphs per subpage, which is currently not implemented.

As a side effect of reducing the number of graph subpages, it would be possible to add more background information on the data without risking to duplicate text over multiple subpages, and it would decrease the number of clicks tremendously.

A suggestion that would be more long term would be to give users the opportunity to assemble their “dashboard” with graphs they need. There are quite a few unresolved issues with such a feature, ranging from wanting to avoid creating user accounts and needing some alternative to probably needing existing web frameworks rather than implementing and maintaining own code for this.

Issue 2.2: There are no explanations of events in the data

Tor Metrics only provides visualizations of Tor network data that are to a certain extent self-explanatory but leaves the interpretation of actual events entirely to the user. This has several effects, ranging from users contacting Tor’s press people and asking about

sudden changes to dedicated volunteers collecting background information on certain events in unrelated places like the Tor wiki⁶.

A useful addition would be a list of events and explanations for certain changes in the Tor network, ideally combined with a feedback mechanism where users can submit new entries or ask for clarification on specific changes.

Issue 2.3: Additional information is distributed all over

Each graph subpage contains a single paragraph with high-level explanations of the graph, and it may contain links to FAQs, tech reports, and/or blog posts. Ideally, the graph subpage would contain all relevant information that is necessary for users to understand the graph and maybe even for researchers to reproduce it from raw data. Links should only be used for people who want to read the code or learn more about statistical details that 99% of Tor Metrics users wouldn't care about.

Issue 2.4: Graphs are not as interactive as they could be

Every change to a graph requires a round-trip to the server plus the time to generate a new graph image on the server. It would be much faster to get the data to the client and generate the graph in the browser. A smaller improvement would be faster graphing code on the server that reduces the delay in updating the graph.

Table subpages

Table subpages contain basic customizable tables based on the same data as graphs but showing data in tabular rather than visual form.

Issue 3.1: Tables should be combined with graphs

Tables have many disadvantages over graphs when it comes to interpreting relationships in the data, but they also have advantages by being more precise and providing exact input for own analyses. Ideally, they should be combined with graphs by making

⁶ <https://trac.torproject.org/projects/tor/wiki/doc/MetricsTimeline>

graphed data also available in tabular form. In fact, this would greatly improve usefulness of Tor Metrics for users who rely on screen readers.

Link subpages

Link subpages contain descriptions and thumbnails to visualizations contributed by third parties.

Issue 4.1: Distinction to official graphs is unclear

Link subpages were introduced to include useful visualizations of Tor network data without re-implementing and maintaining them on Tor Metrics. Still, it remains somewhat unclear how much these visualizations are endorsed by Tor Metrics. Maybe it's even necessary to distinguish different levels of endorsement, depending on how much the third-party visualization has been reviewed and whether the implementors are members of the Tor community.

Data subpages

Data subpages specify the .csv files that all graphs and tables are based on and that are also available for download. We didn't identify specific issues with those subpages yet. However, if table subpages get merged into graph subpages and if link subpages are turned into graph subpages with a "contributed" badge, we might need to think about dropping the type distinction of metrics. In theory, putting data formats on a separate data.html page with sections for each .csv file would be sufficient. This would also reduce the click count when looking for the data sources to several graphs, and after all, data subpages are probably what 99% of Tor Metrics users wouldn't care about, which is also why they're all "hidden" under "Advanced" metrics.