Empowering Measurement Users at ESnet

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ESnet
Internet2 TechEx 2023

Stardust

Network Measurement and Analysis for ESnet

Extensible / Open Architecture

NSF NetSAGE project derived Approach

- ➔ Integrate where we can, innovate where it makes a difference.
  - ◆ metadata and viz
- ➔ Loose coupling to avoid lock in

Authenticated access methods for many user groups.

Dashboards, Indexed APIs and “Raw”

- ➔ Grafana user editable dashboards
- ➔ Elasticsearch Query API access
- ➔ Kafka feeds
- ➔ RBAC with 2 Factor

Multi Datasource

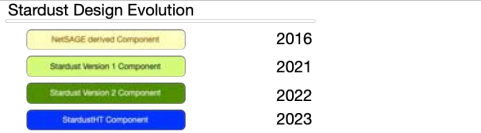
Low and High Cardinality

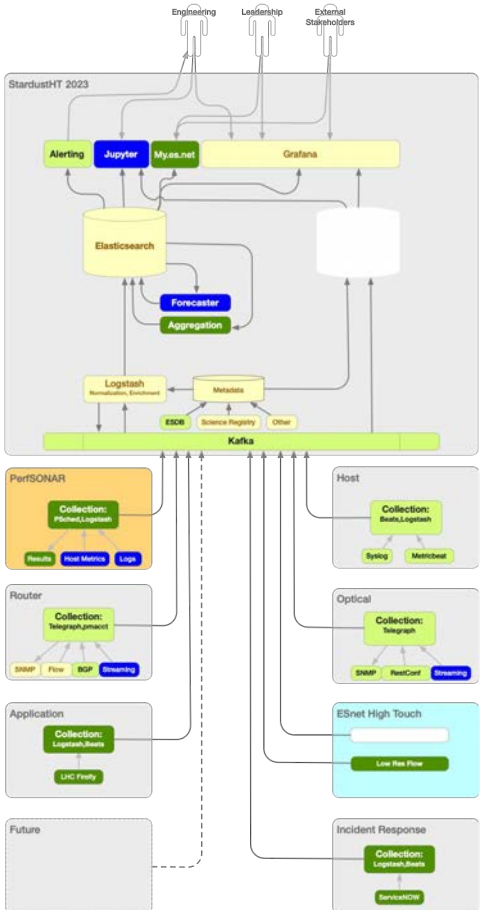
- ➔ Network Traffic Flows
- ➔ Interface Usage
- ➔ Optical Line System Performance
- ➔ perfSONAR
- ➔ High Touch measurements
- ➔ LHC Firefly measurements

Flexible aggregation

Variable time buckets and dimension reduction

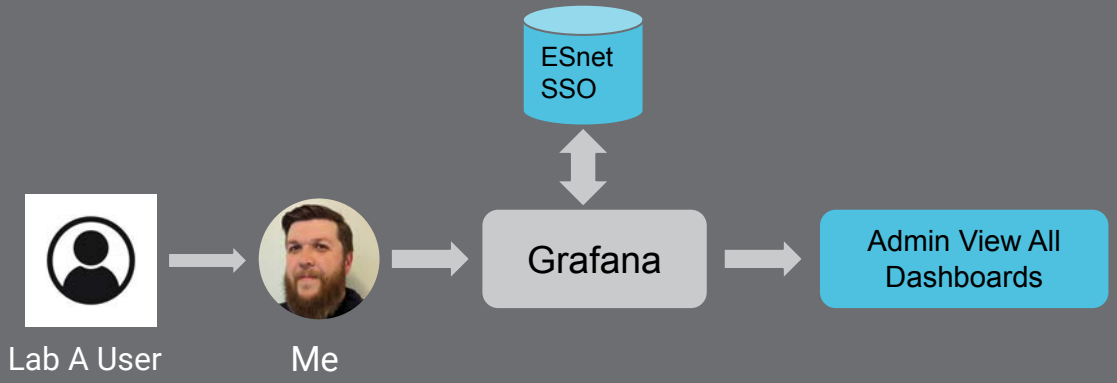
- ➔ Summarize in time
  - ◆ Hourly summary
- ➔ Summarize by dimension
  - ◆ All NERSC traffic
- ➔ Variable retention
  - ◆ hourly data for a year
  - ◆ 30 sec data for 90 days





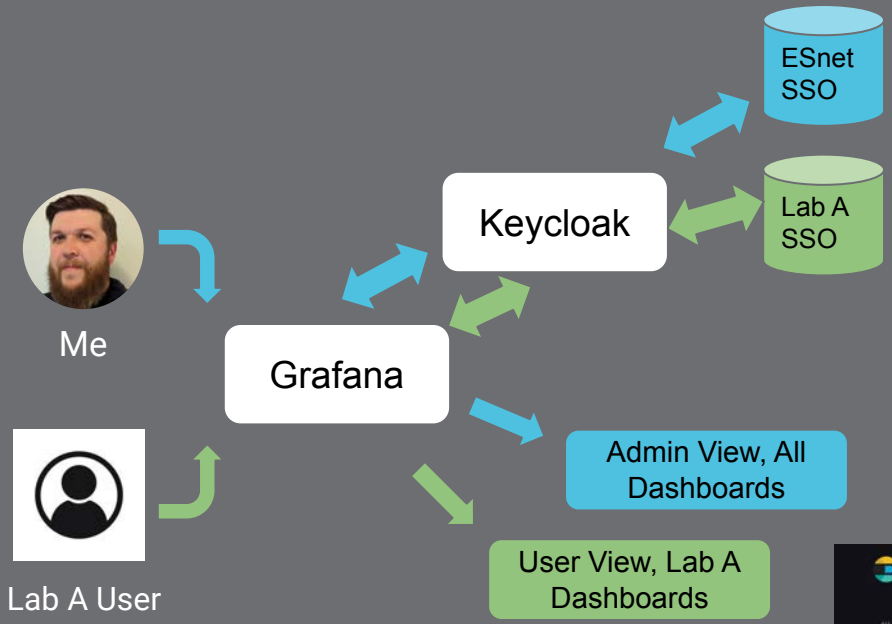
Setting the Stage

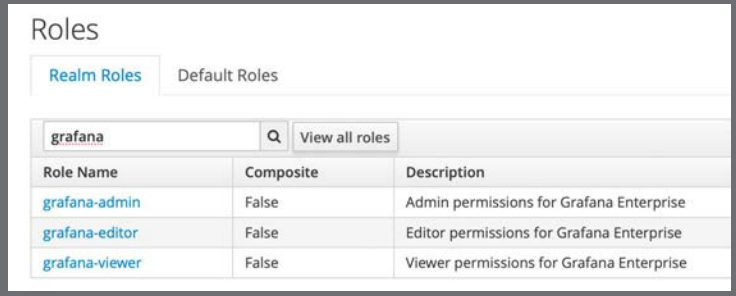
We collect tons of network data… but we haven't have good mechanisms to securely share sensitive info with external users.

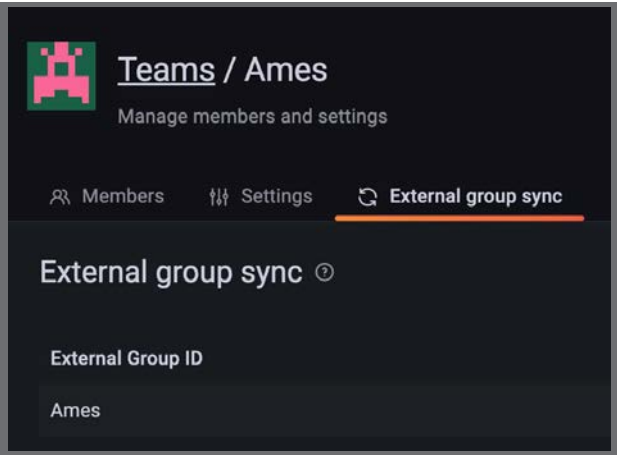


ESnet

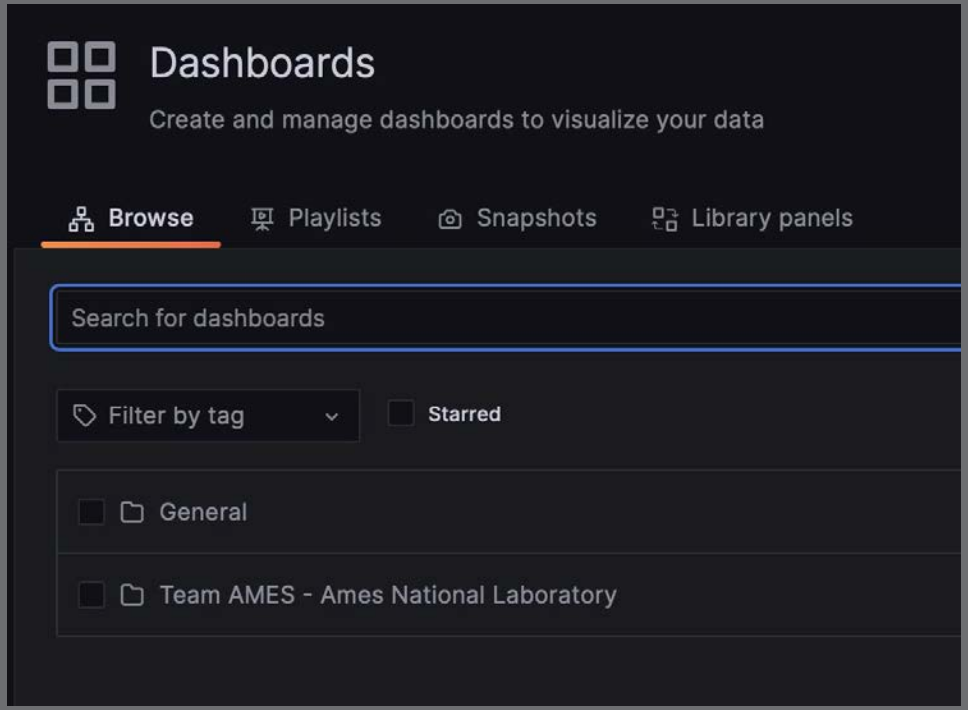
Adding External Users



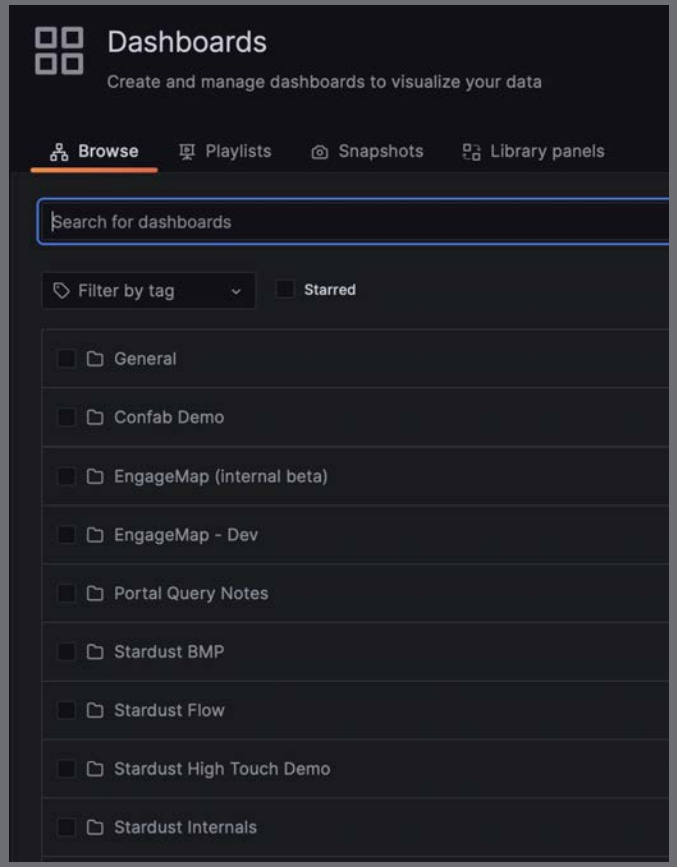




External Users



Lab User



Admin User

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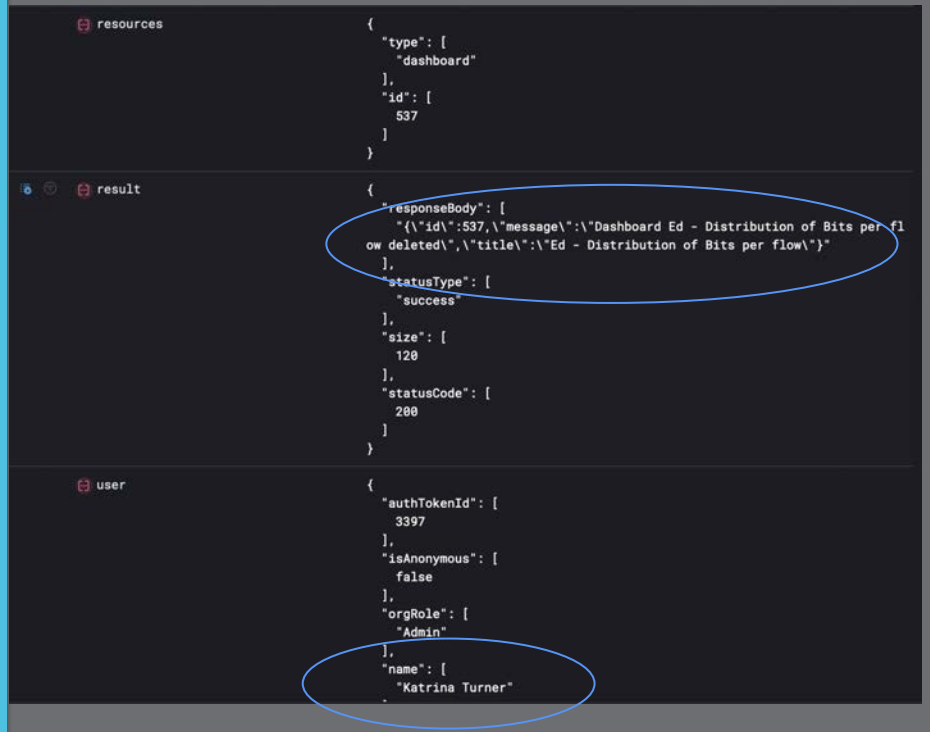
Internal Observability



Who dunnit?

Visualize Events

Grafana

Syslog events, Logstash

elasticsearch

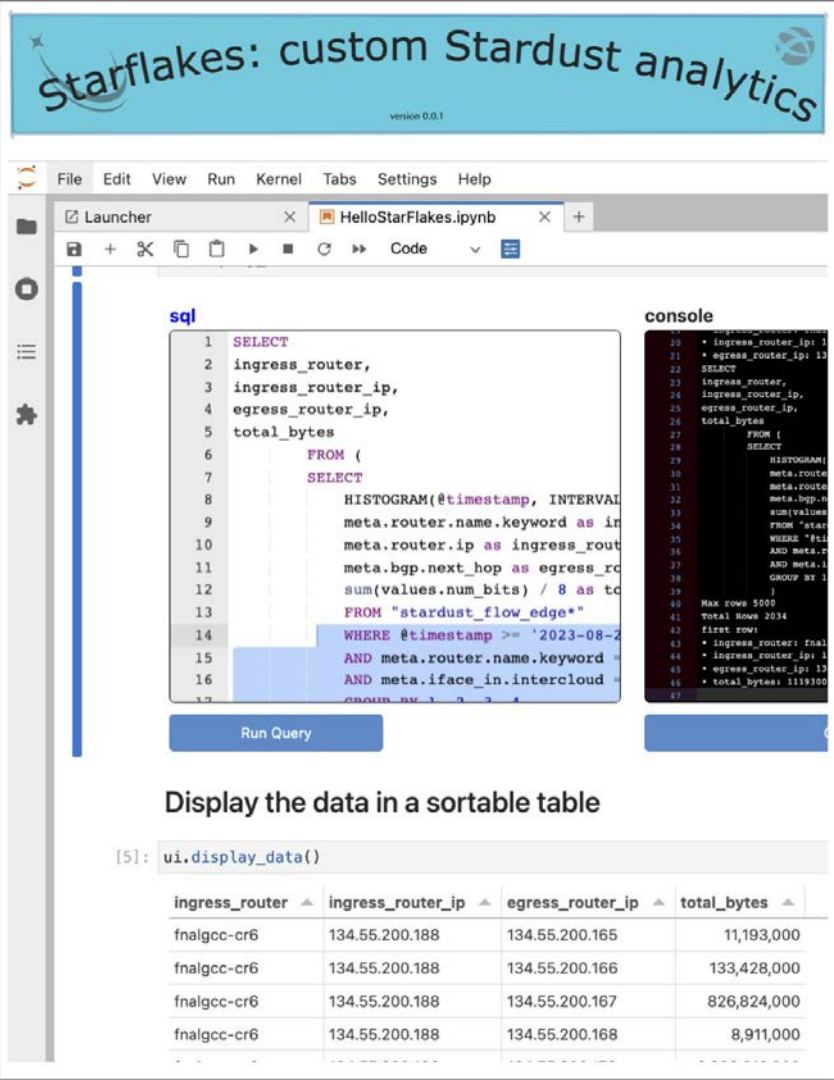
ESnet

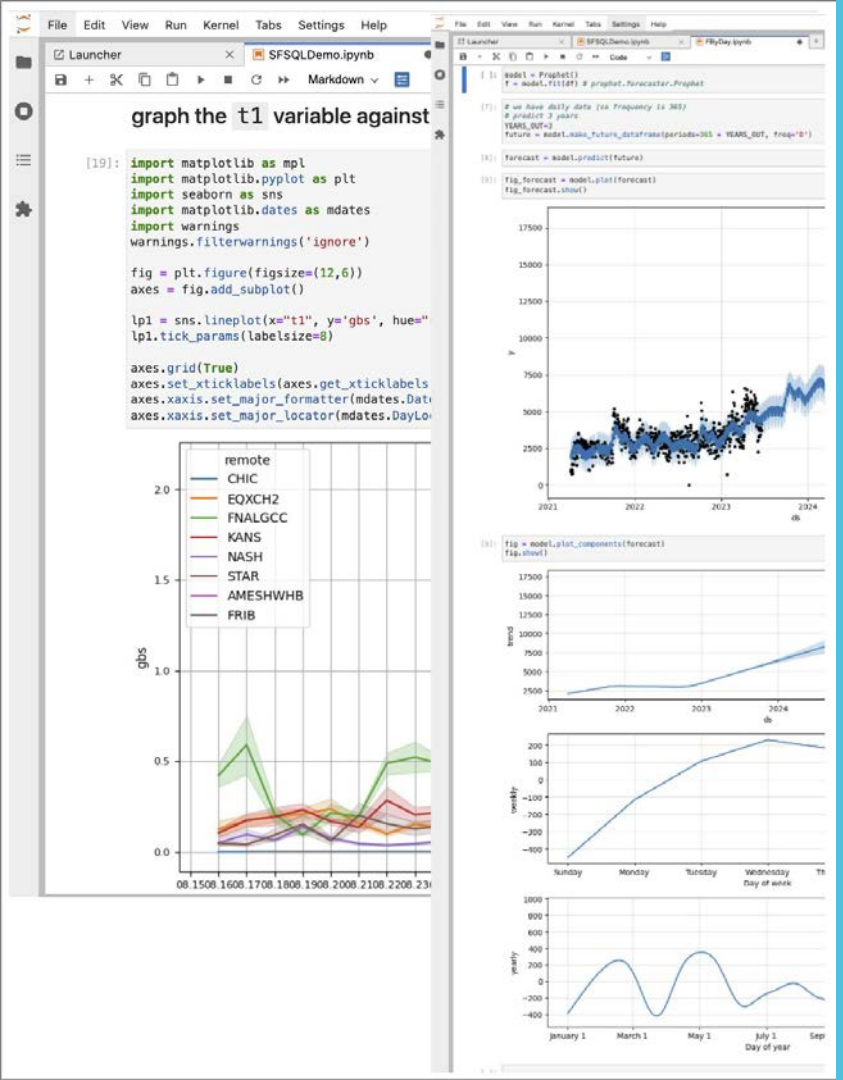
Starflakes

What if you wanted to extract data and do your own, arbitrarily complex analysis?

Working on building a Jupyter environment for researchers

- SQL interface to Elastic, lower barrier to entry
- Python, Pandas, Numpy, etc, the usual suspects for data analysis





Covering New Ground

Examples of using the Prophet library in python for forecasting and capacity planning of the network

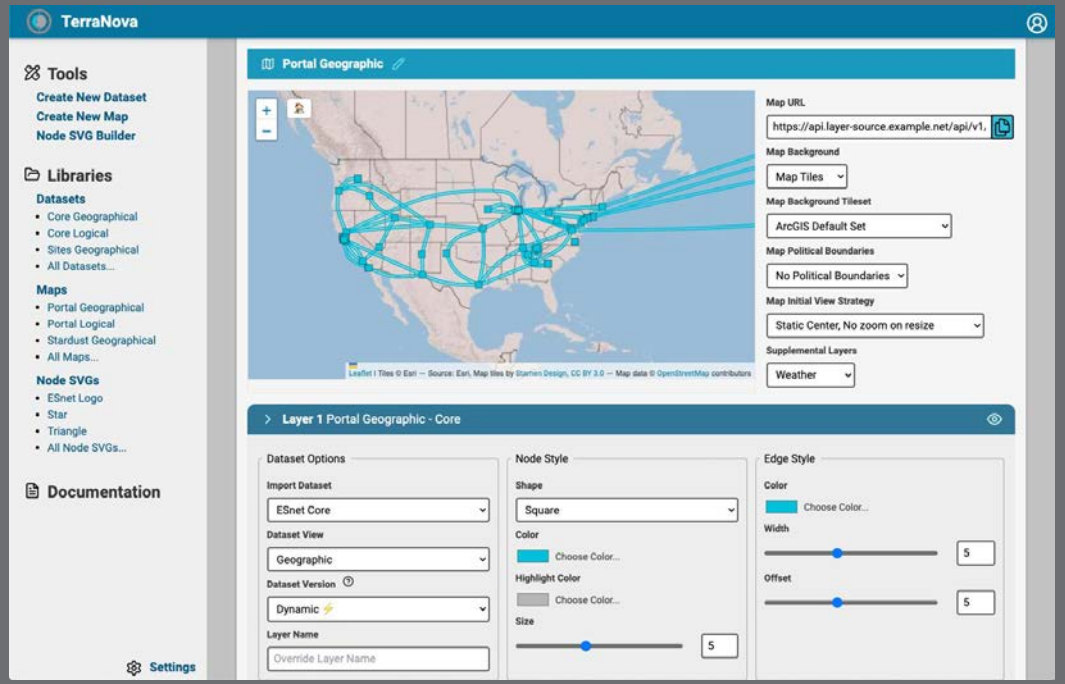
ESnet

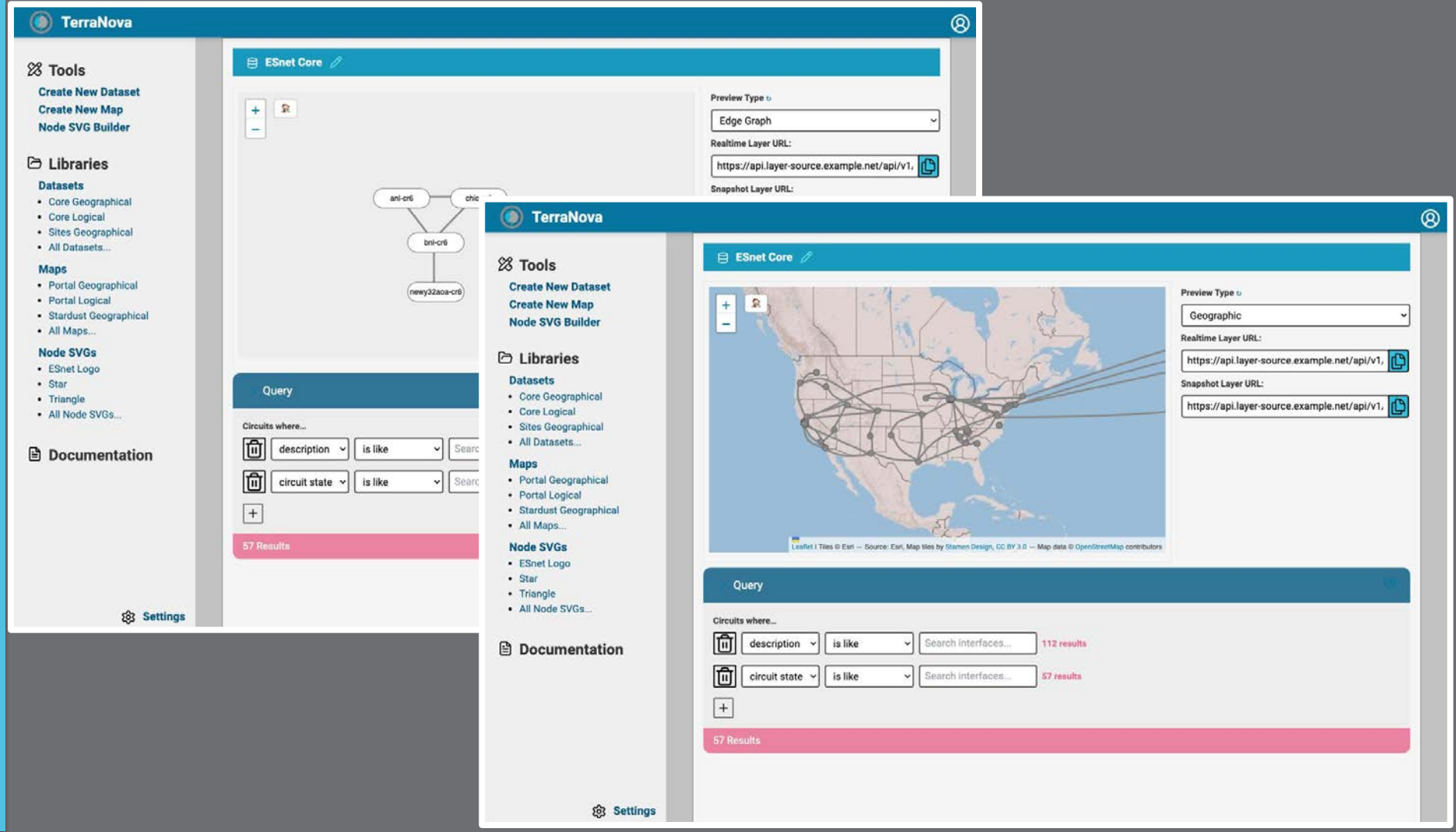
Visualizing the Network

Current maps maintained by software developers, not network engineers.

Lots of hand tuning, games of telephone, brittle, etc.

Lack of consistent, structured “source of truth” for maps




TerraNova
Tools
Create New Dataset
Create New Map
Node SVG Builder
Libraries
Datasets
Core Geographical
Core Logical
Sites Geographical
All Datasets...
Maps
Portal Geographical
Portal Logical
Stardust Geographical
All Maps...
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ESnet Logo
Star
Triangle
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Snapshot Layer URL:
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57 Results
TerraNova
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Snapshot Layer URL:
https://api.layer-source.example.net/api/v1/
Leaflet | Tiles © Esri — Source: Esri, Map tiles by Stamen Design, CC BY 3.0 — Map data © OpenStreetMap contributors
Query
Circuits where...
description
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112 results
circuit state
is like
Search interfaces...
57 results
57 Results

Moving Beyond ESnet

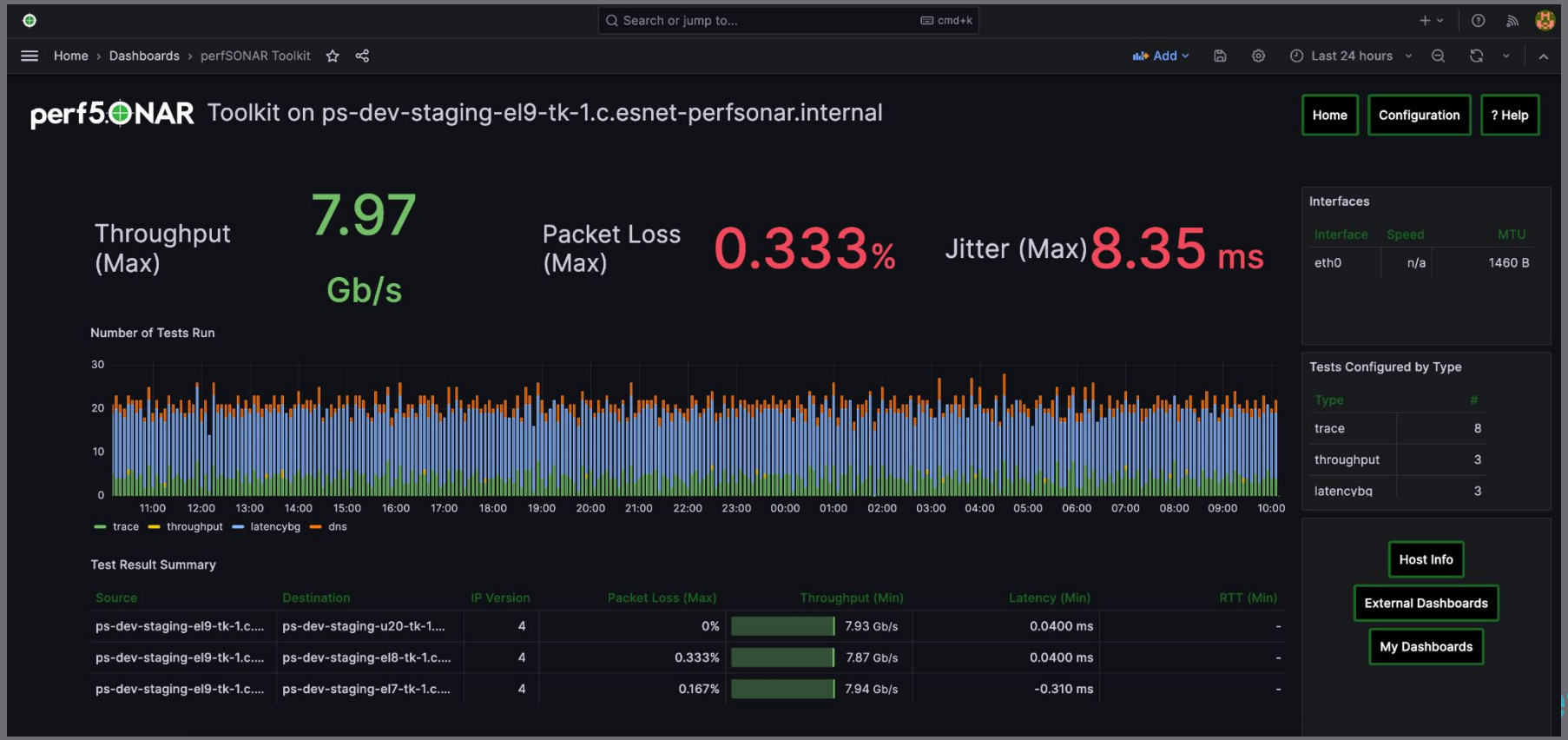
StellaNOVA

- A consortium for the Advancement of Network Observation, Visualization, and Analysis.
- Develop and socialize technical capabilities in the measurement space for R&E community
- Focus on developing tools, tactics, and techniques but will not offer measurement service

Open Sourcing

- Data ingest pipeline and index configurations made publicly example as reference - https://github.com/esnet/stardust-snmp-pipeline

perfSONAR flavored Stardust



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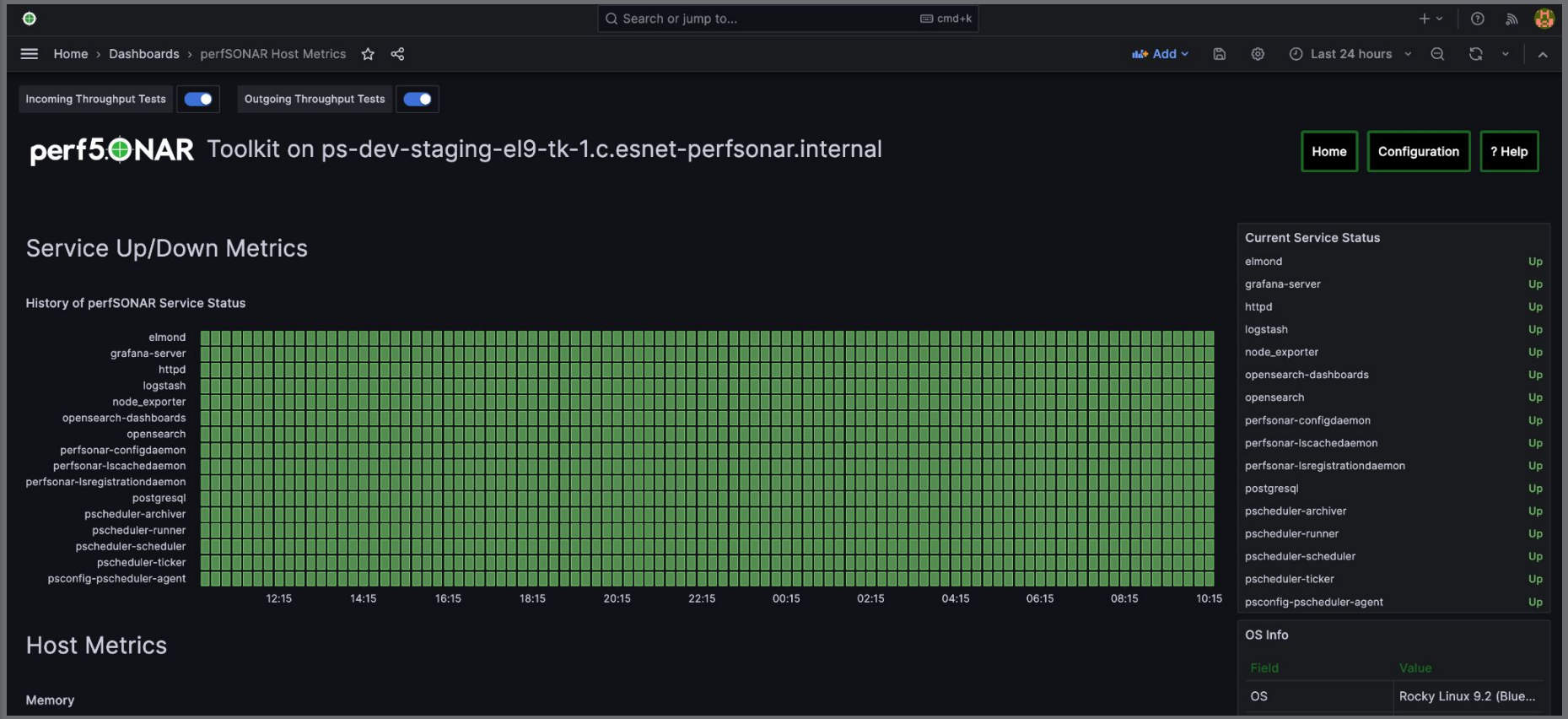

Thank You

Questions, comments, tomatoes, etc all welcome.

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