



# 20 Years of perfSONAR... and the Road Ahead

April 8 & 10, 2025

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*perfSONAR is developed by a partnership of*

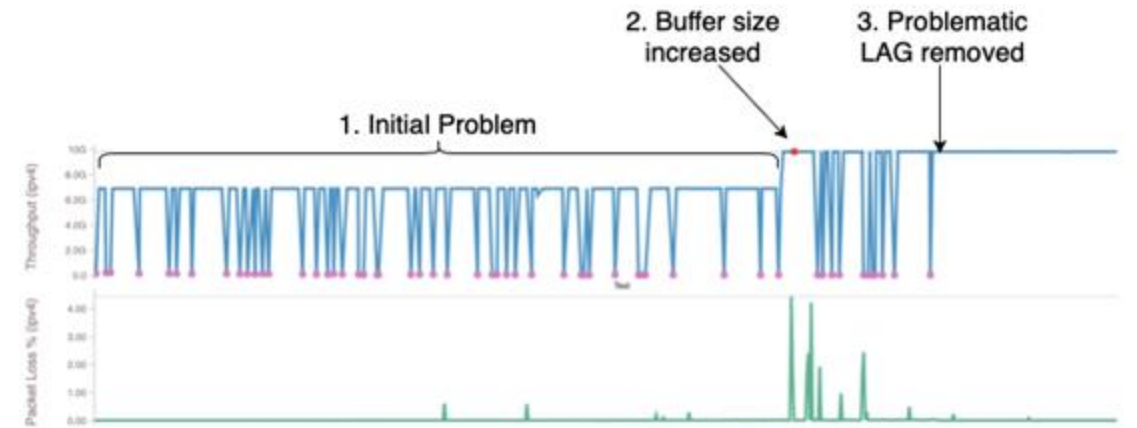


# perfSONAR

- perfSONAR is an **open source software suite** that runs, stores and displays **active measurements** such as **throughput, packet loss, latency and traceroute**
- Primarily maintained by consortium of **ESnet, GEANT, Indiana University, Internet2, RNP** and the **University of Michigan**
- **Over 2000 registered public deployments** around the world across hundreds of institutions



Map of perfSONAR deployments around the globe



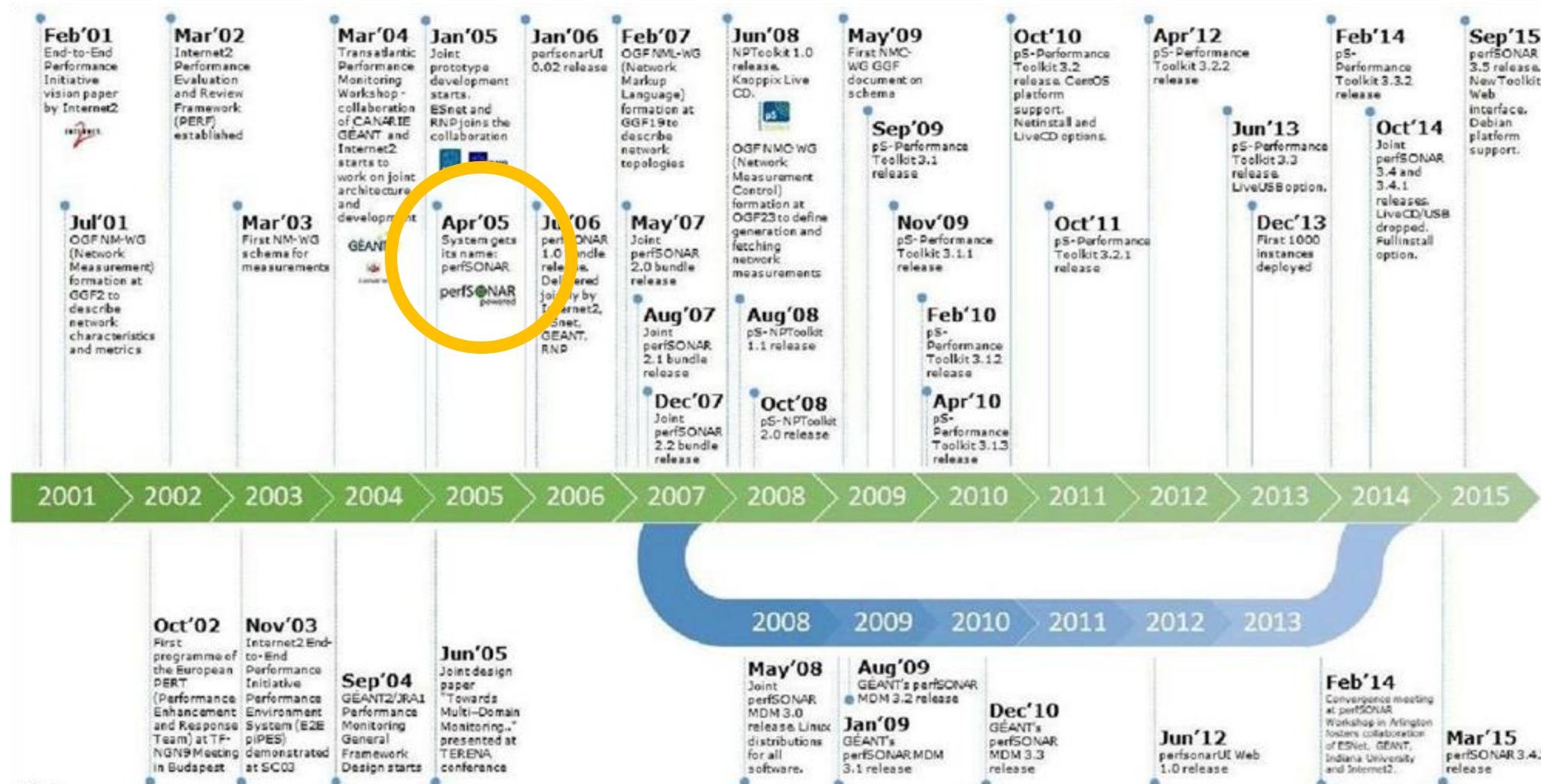
Graph of low throughput from Pan-STARRS Hawaii to Queen's University Belfast

## Example perfSONAR use cases:

- Solving global network performance issues for researchers transmitting data from **Pan-STARRS Hawaii to Queen's University Belfast** (see above graph)
- Identifying packet loss issues at **UT Arlington**
- Identifying performance bottlenecks as **Large Hadron Collider (LHC)** prepares for the "high luminosity" era

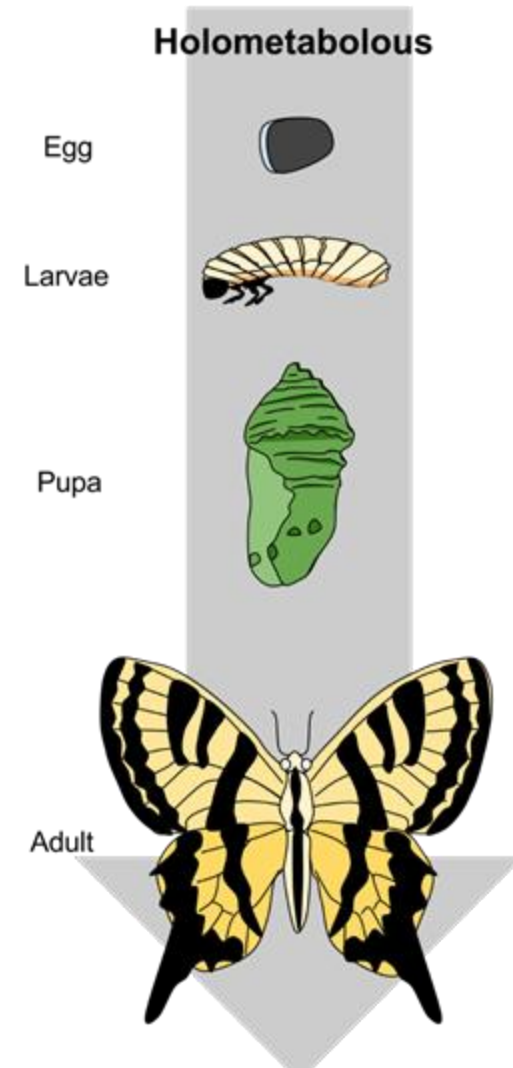
# perf20NAR years

# 20 years of experience



# perfSONAR's Metamorphosis

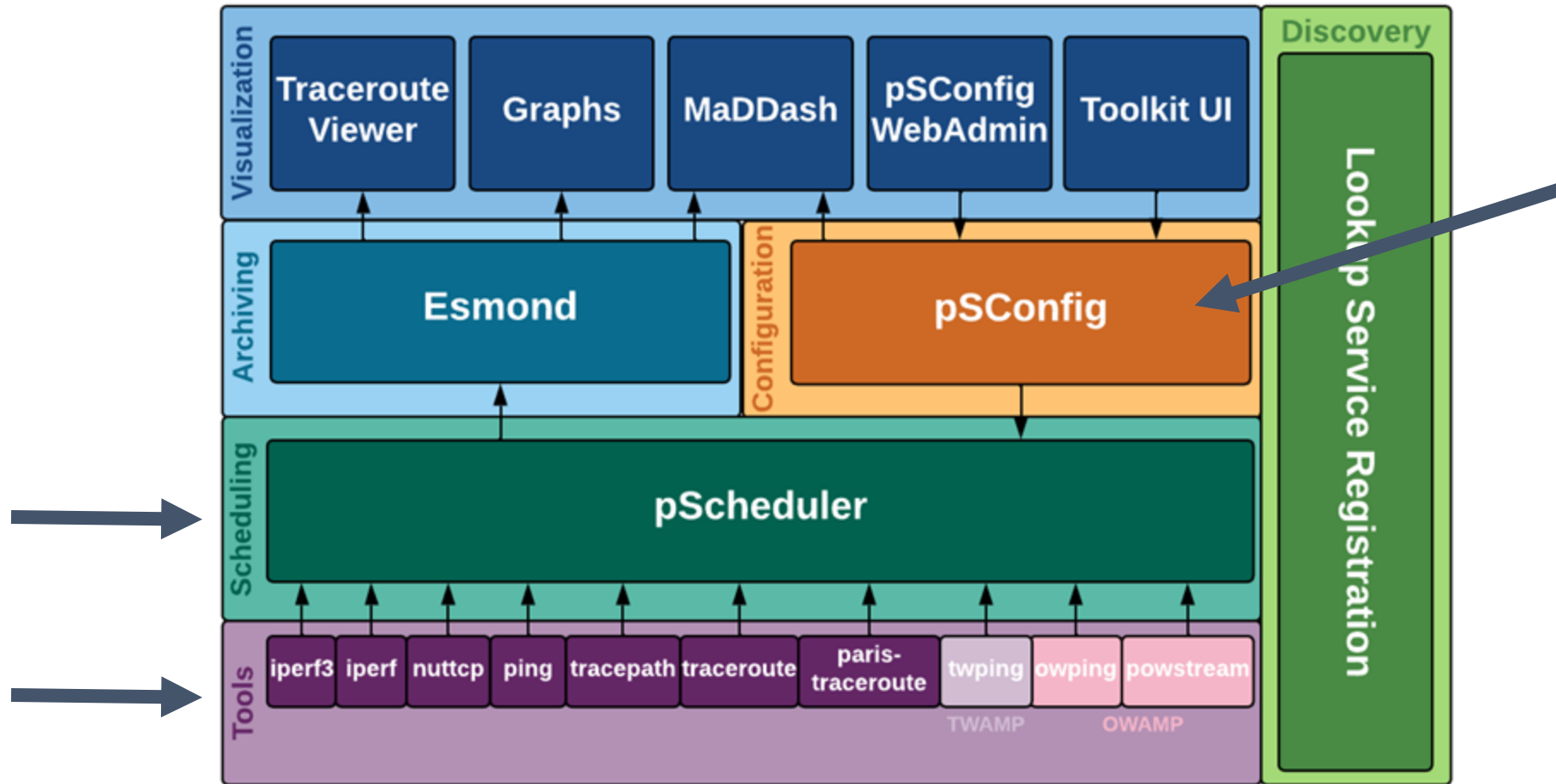
- As perfSONAR reaches 20 years old, it also approaches an important point in its history
- 5.0 kicked off a stage of metamorphosis that will largely wrap-up by the time we hit 5.3.0 later this year
- Let's take a step back and look at these changes...



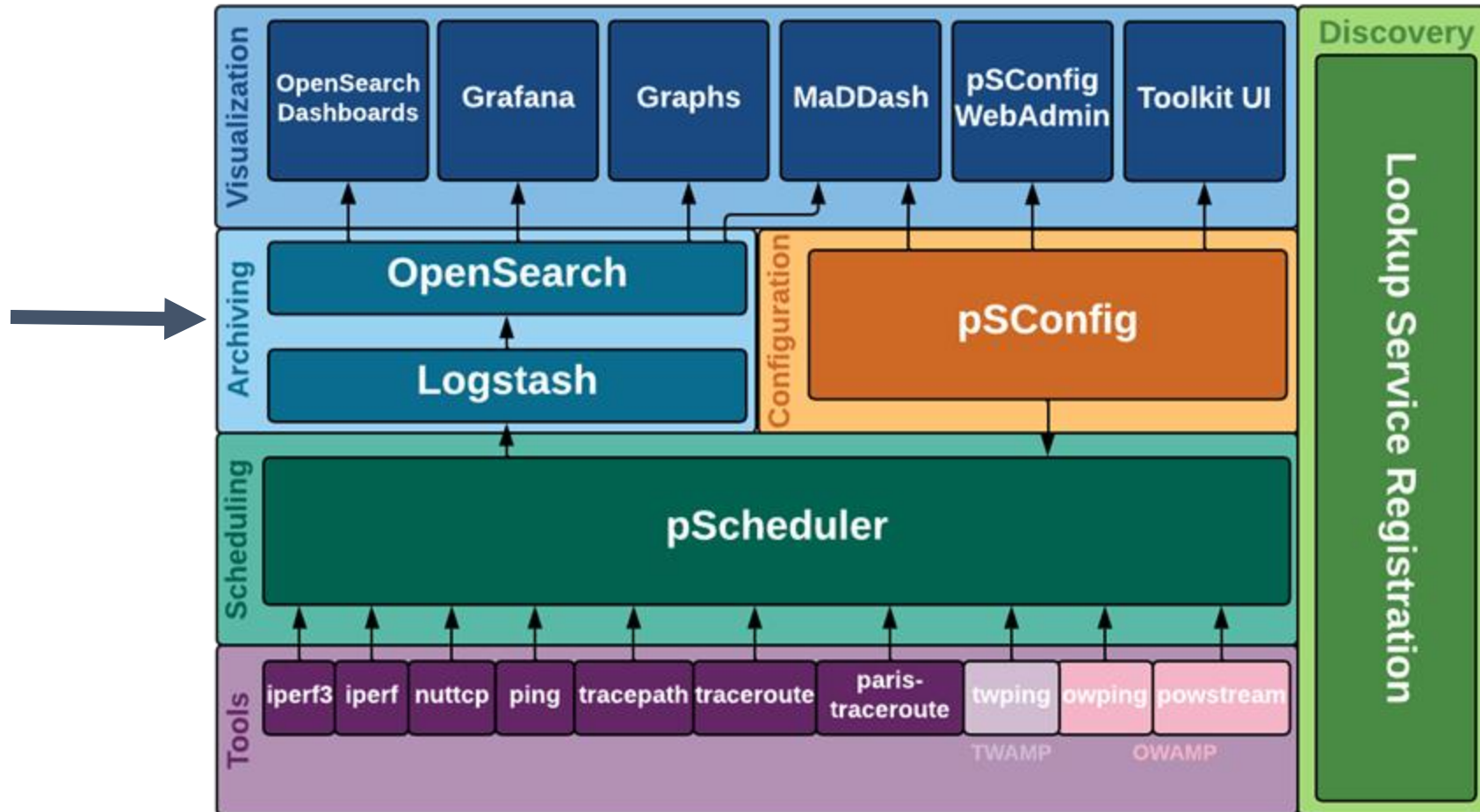


# What's been happening the past few years?

# perfSONAR in 2020 (4.X)

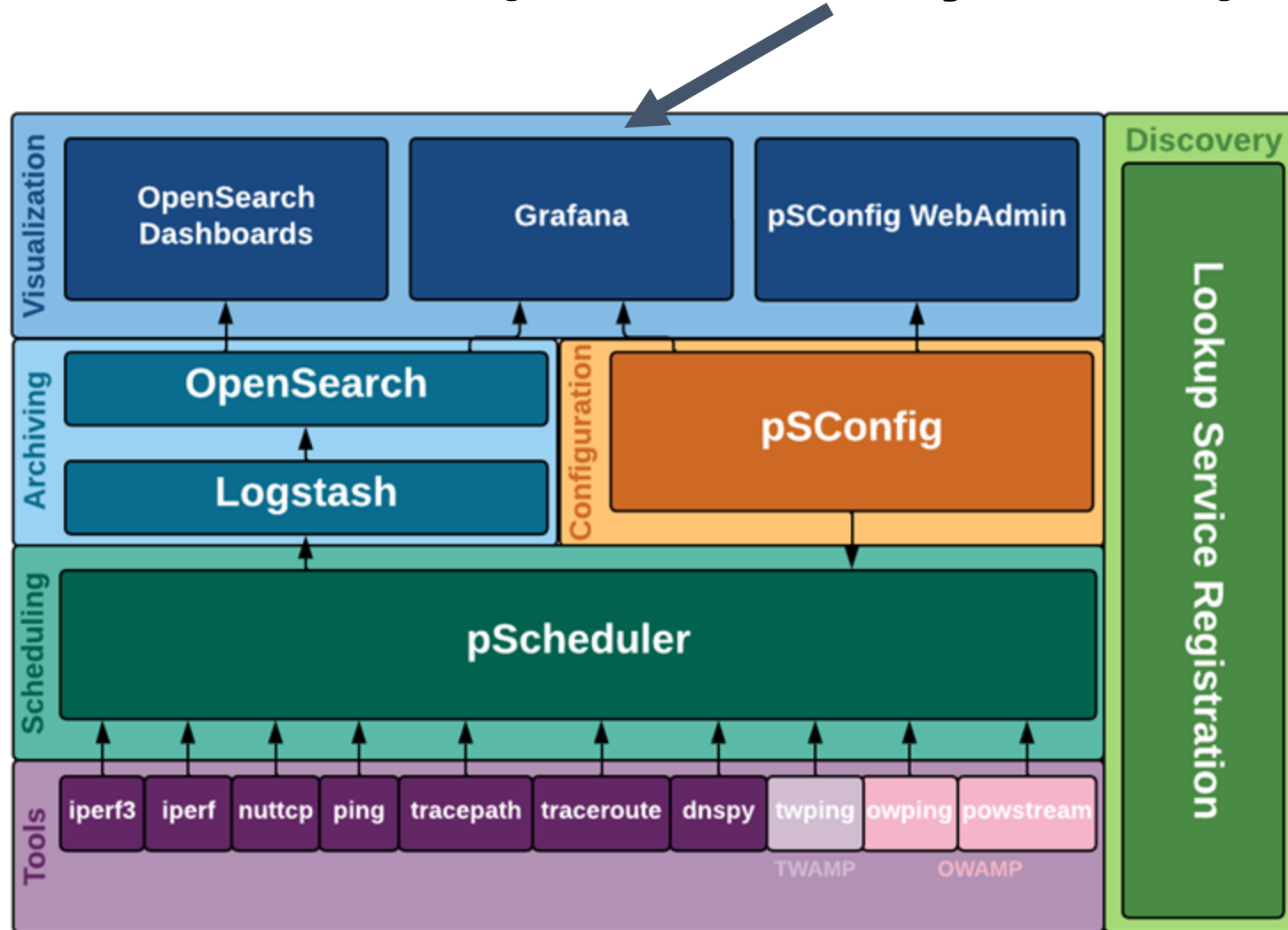


# perfSONAR 5.0 (2023)



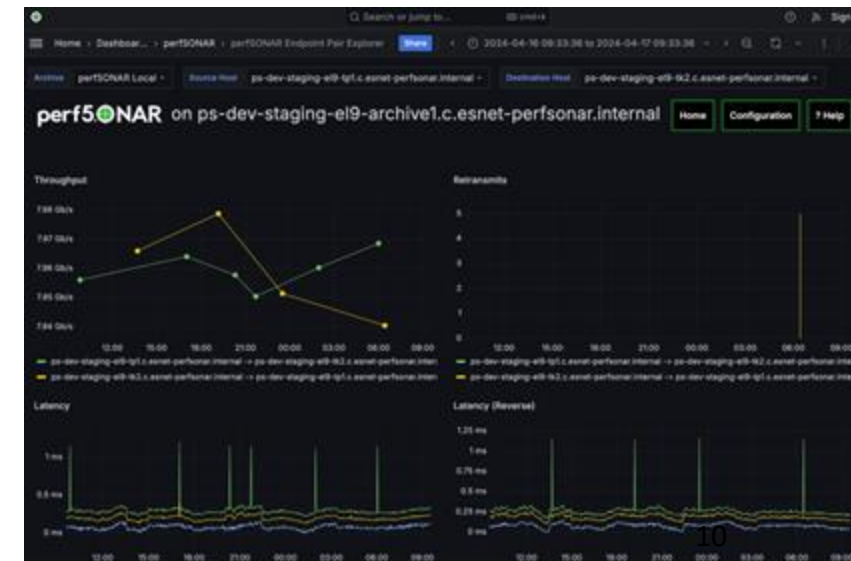


# perfSONAR 5.1-5.2 (2024-Early 2025)



# perfSONAR 5.1.0-.4

- **New Grafana Interface**
  - Customizable visualization, better integration with other data
- **Threaded iperf3 Support**
  - Ability to test at 100Gbps+
- **Python pSConfig**
  - Better maintainability of more modern codebase
- **Better Instrumentation and Troubleshooting Tools**
  - Makes it easier to identify issues when perfSONAR misbehaves
- **OS Support**
  - Debian 11, Debian 12 and Ubuntu 22 support. No CentOS 7 support.



# perfSONAR 5.2.0-beta

- **Beta just released**
  - 20th anniversary [release](#)
- **No major new features**
  - Inside components updates (Grafana, OpenSearch)
- **New OS Support: Ubuntu 24**
  - Debian 11 & 12 and Ubuntu 20, 22 a 24
  - Alma Linux 9 or Rocky Linux 9
- **Docker image for ARM64**
- **Test it for yourself**

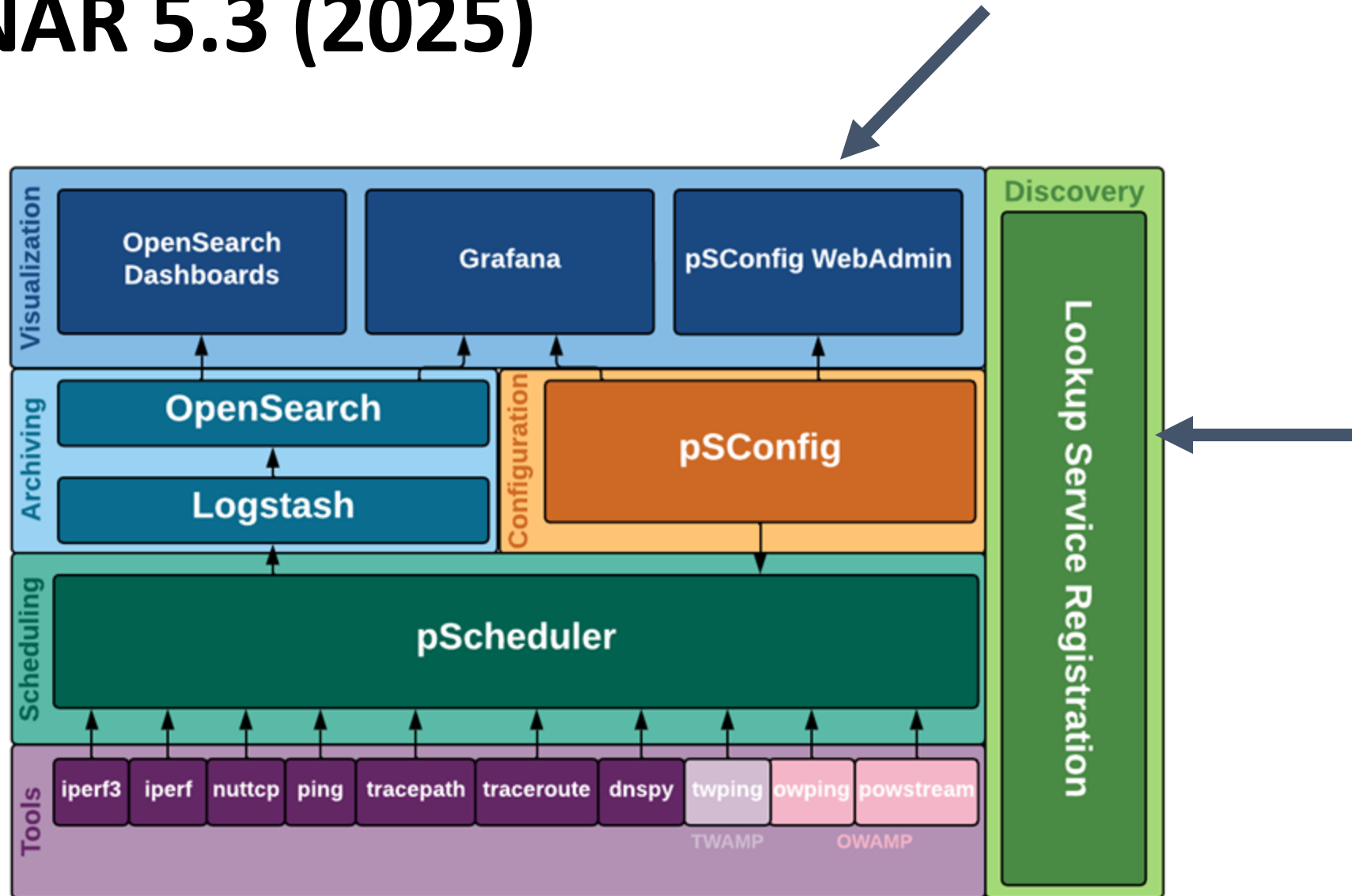


14 And [report bugs to GitHub](#) perfSONAR project

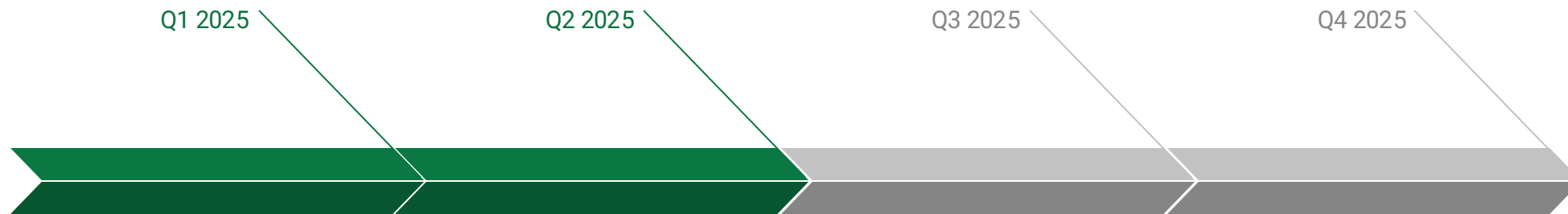


# What does 2025 look like?

# perfSONAR 5.3 (2025)



# Release Plan for 2025



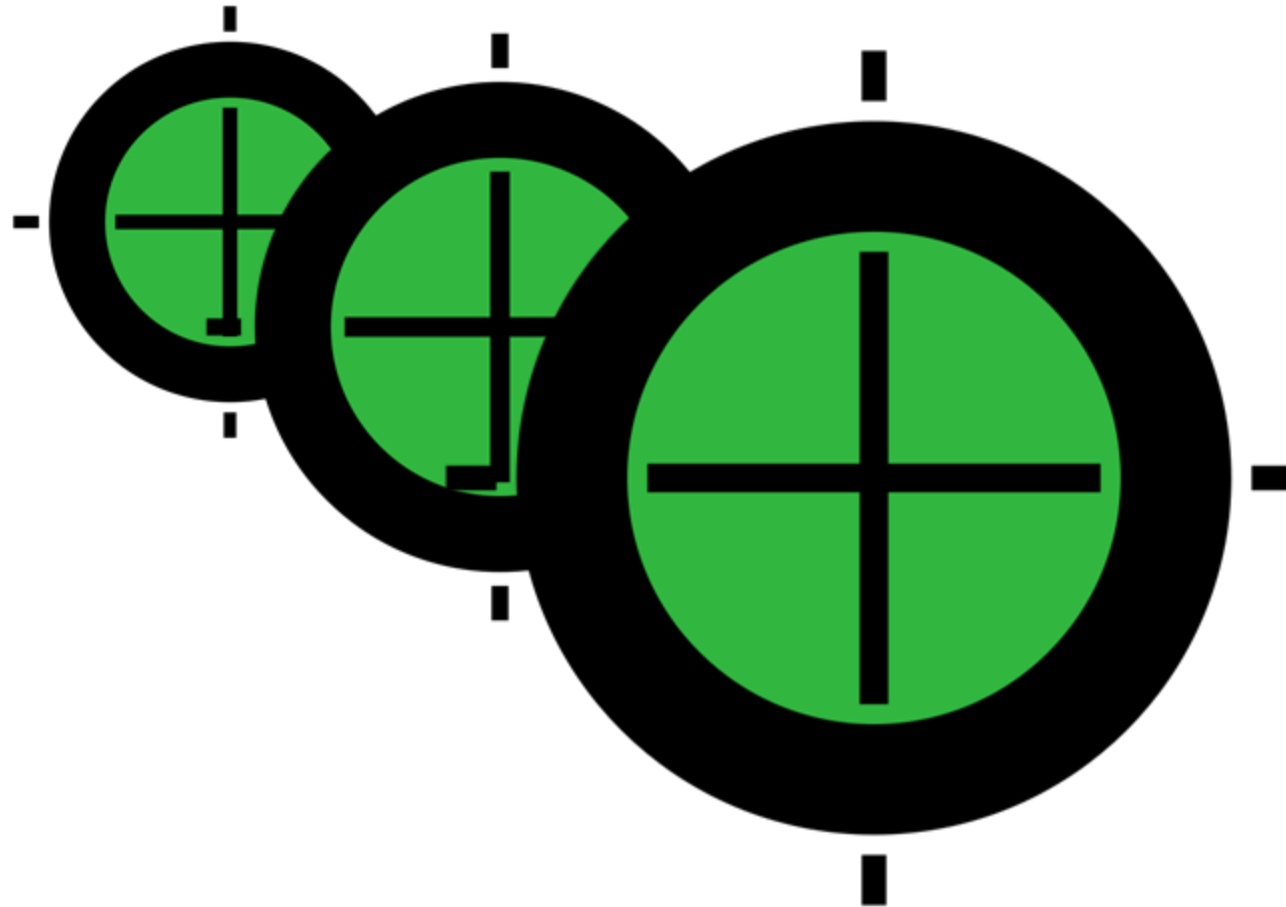
## perfSONAR 5.2.0

- Not a huge feature release, but multiple changes too big for a bugfix release
- Ubuntu 24 support
- Grafana and OpenSearch updates
- Lots of fixes and quality of life improvements

## perfSONAR 5.3.0

- Improving test configuration experience
- Lookup service enhancements
- Timekeeping improvements
- Micro-dependency analysis interface
- psGUI on-demand measurement UI

# Let's zoom in on a few specific features....





# pSCompose

*Next generation UI for test configuration*



# Test Configuration Today

**CONFIGS**  
Showing registered configs

7 Configs

- owamp1: Owamp Test 111 (Nov 29, 2017)
- Development Testbed (May 9, 2018)
- testz (Nov 29, 2017)
- throughput1 tcp (Dec 4, 2017)
- Testbed1 (Apr 25, 2018)
- Multi-type test mesh (Dec 7, 2017)
- Throughput1 based on Mar 27, 2018 toolkit8

**owamp1**  
MeshConfig URL: <http://mca-dev.gnoc.lu.edu/pub/config/> owamp1 [Open MeshConfig](#)

Name: Owamp Test 111  
Description: An owamp test  
Admins: Michael Johnson (mjohns@gnoc.lu.edu)  
Users who can update this configuration: Michael Johnson  
Central MA URLs: <https://perfonar-testbed-ma.gnoc.lu.edu/esmond/perfonar/archive/>

Force endpoint MAs:  Force archiving to the MA on each endpoint. Enabling this option will force the all test results to be stored in the individual MA for each host. This is useful if you don't have a central MA, or if you need to store at each endpoint for some other reason.

Test Name: Throughput1  
Service Type: Throughput  
Topology: Mesh

Map showing test locations in Chicago, Indianapolis, Nashville, and Atlanta.

Host Group A:  
perfonar-dev.gnoc.lu.edu  
resnet-ps.gatech.edu  
mca-dev.gnoc.lu.edu  
ut2-net2.mst2.org

**No Agent Hosts (Optional)**  
Enter Hostnames  
Defines an address that will not initiate tests when used in this group. This will override the no\_agent field specified in the host directive if defined. It is recommended you use the host directive to define this if a address cannot initiate tests for any group. Only use this form if you want a host to initiate tests when used in some groups but not others.

**Testspec**  
iperf3 TCP Test Between Testbeds Testspecs

```
random_start_percentage 25  ipv4_only 1
tool bwctl/iperf3  interval 14400  duration 20
protocol tcp
```

[Add New Test](#) or [Import from existing meshconfig](#)

**Add Test**

Test parameters

Type: Throughput  
Test name/description: Test name  
Interface: Default  
Protocol: TCP  
Time between tests: 6 Hours  
Test duration: 20 Seconds  
Advanced Parameters:  
Tool(s) in order of preference: iperf3, iperf  
Direction: Send and Receive  
Use Autoburn: Enabled  
Number of Parallel Streams:   
Omit interval (sec):   
Use Zero Copy: Disabled  
TOS bits: 0

Home / Configuration / Tests

Administrative Information | Host | Services | Tests

All scheduled tests  
Throughput tests will be running 0% of the time

Configure tests between this host and other hosts. [+ Host](#) [+ Test](#)

View by: Test | Host

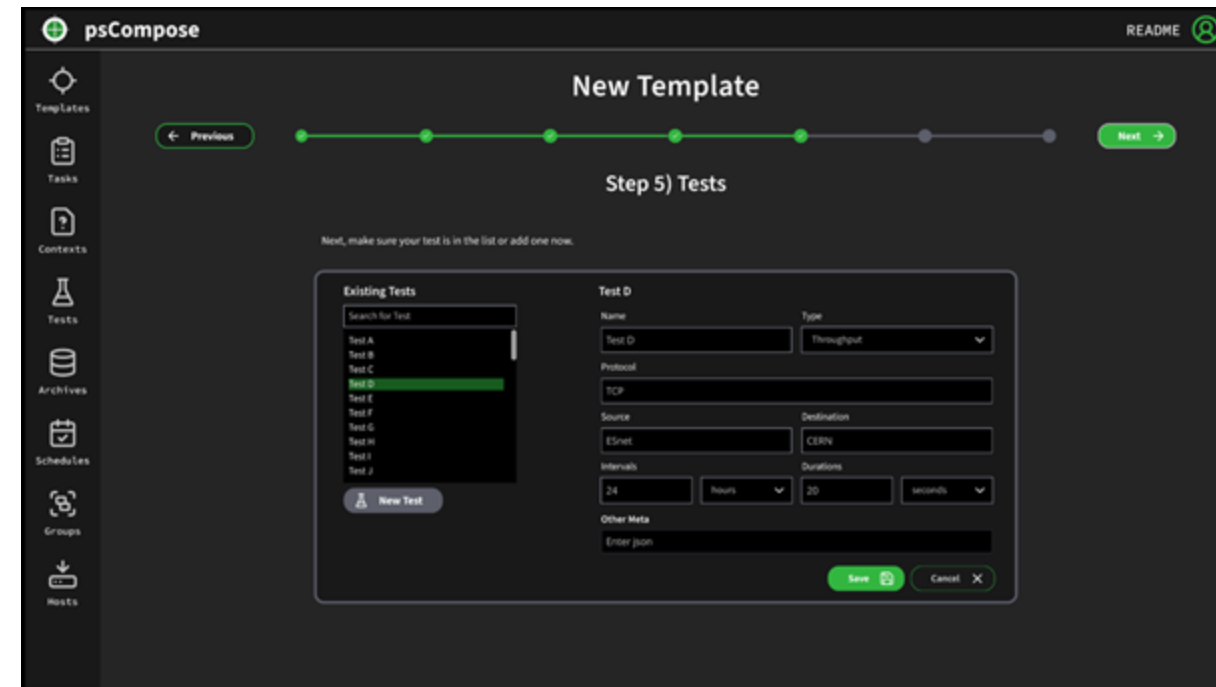
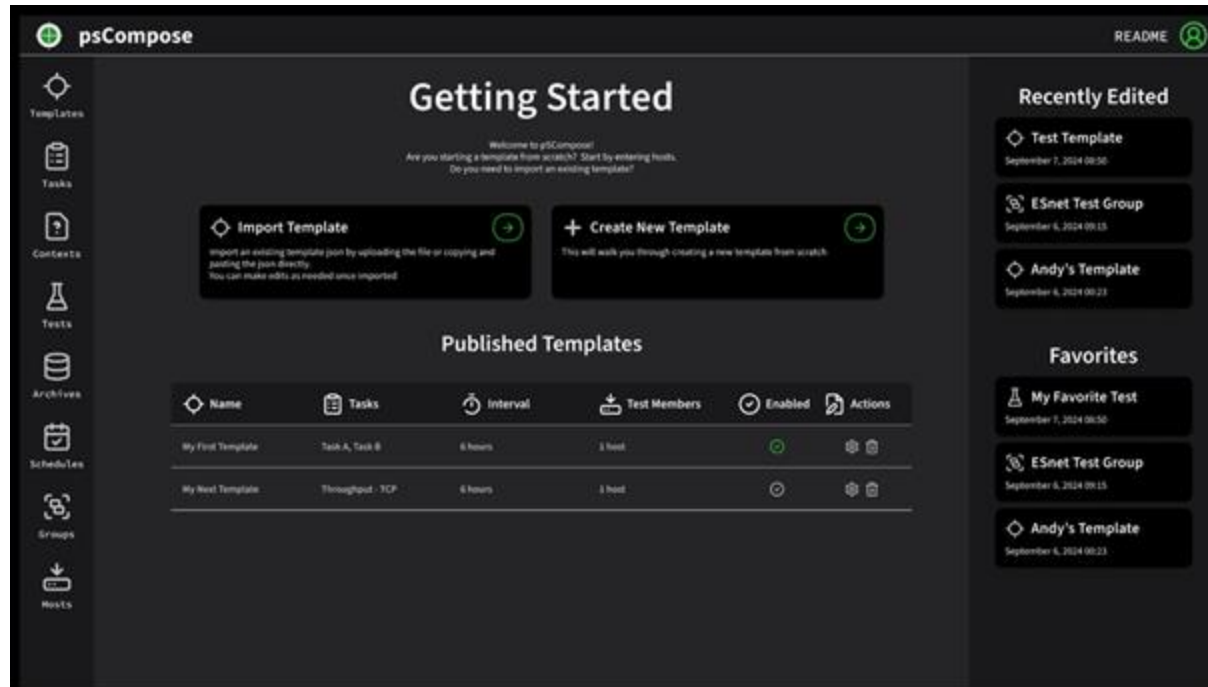
TEST NAME	TYPE	INTERVAL	TEST MEMBERS	ENABLED	ACTIONS
My Throughput Test	Throughput - TCP	6 hours	1 host	<input checked="" type="checkbox"/>	<a href="#">⊙</a> <a href="#">⊞</a>

You've made changes that haven't been saved. [Cancel](#) [Save](#)

# pSConfig Test Configuration

- **Simplified and Consolidate UIs**
  - We want one UI to serve Toolkit UI and PWA role
  - Leverage Lookup Service for host completion
  - Make it easy and clear to set common fields needed for Grafana, etc
- **Align Tech Stack**
  - An update call not strictly required, need to determine what is easiest for clients (delete+add vs update)
- **Leverage Flexibility of pScheduler and pSConfig**
  - We don't want to issue a code update everytime a new test type implemented or new options added

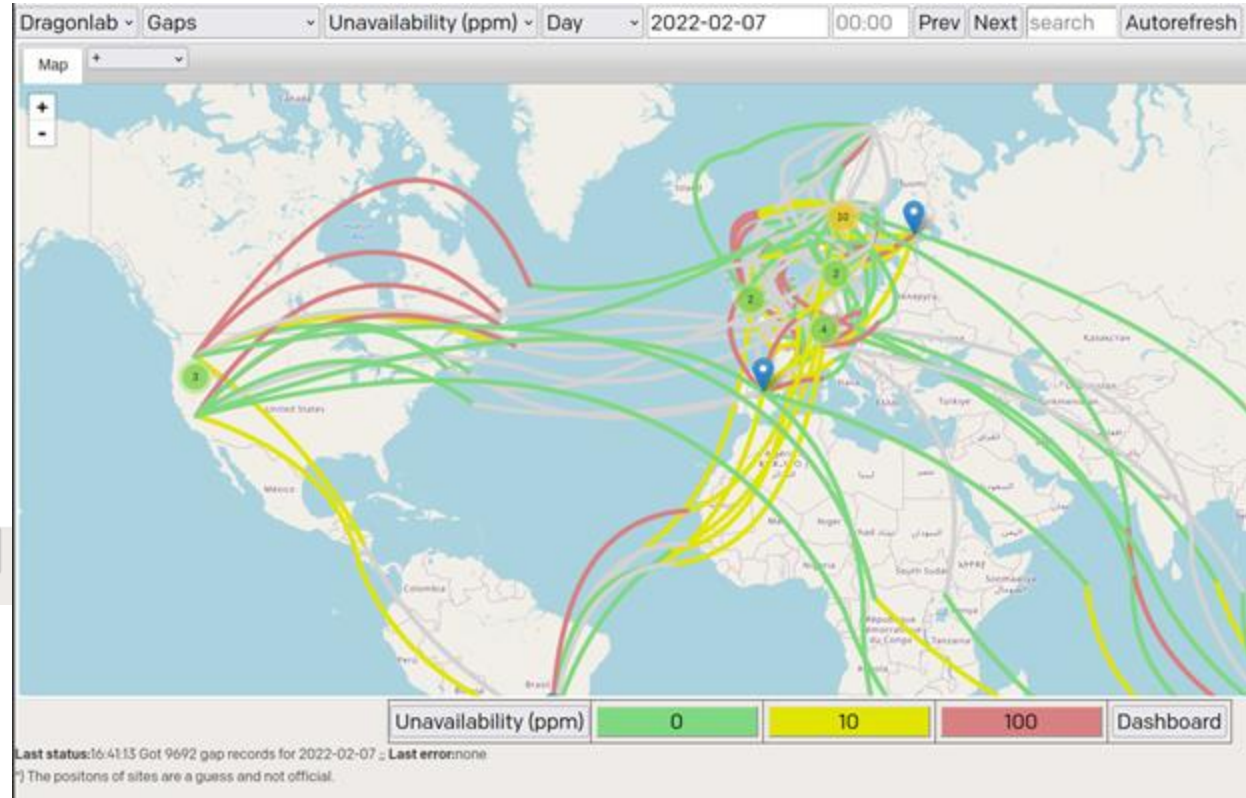
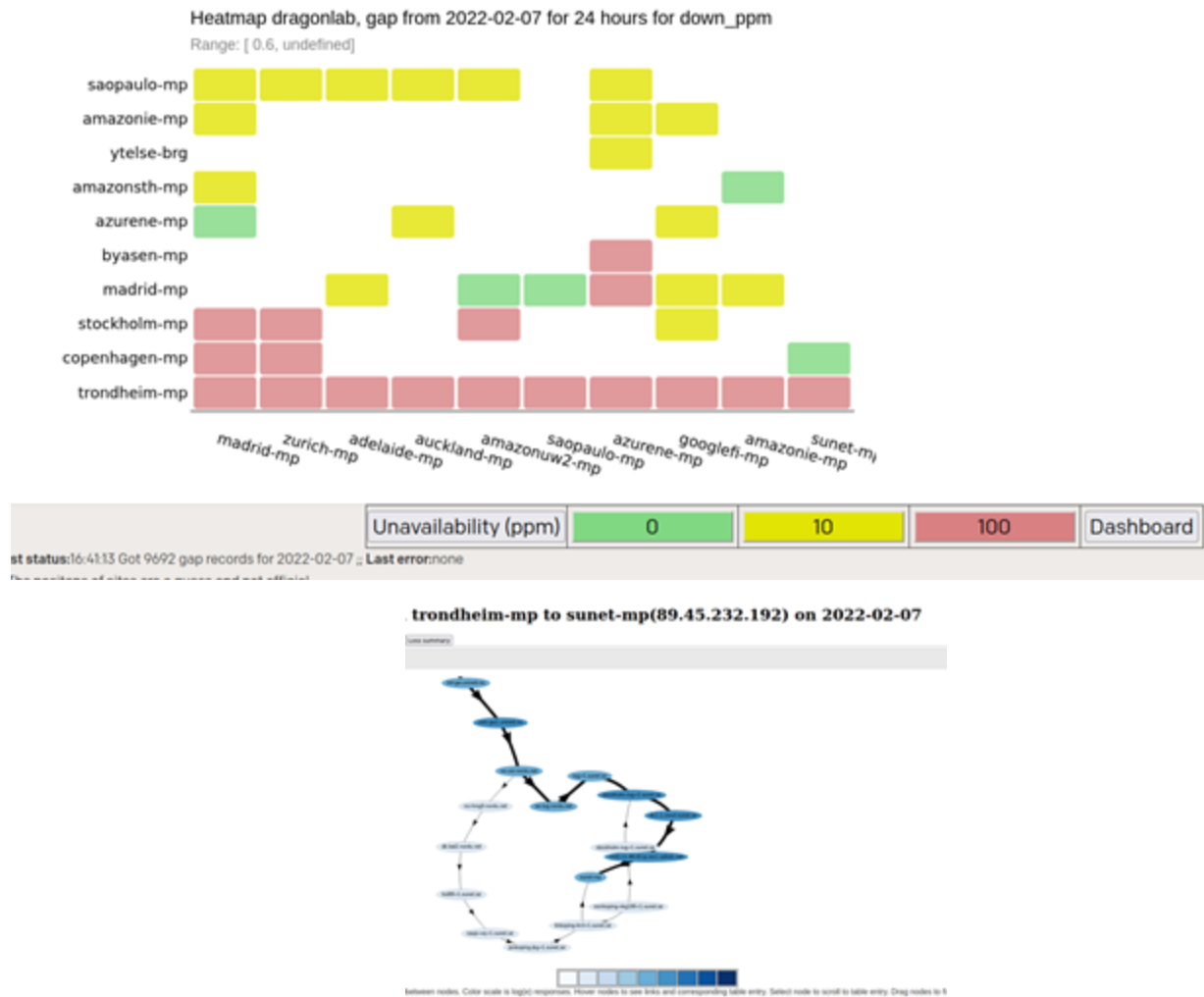
# Development Underway...





# Micro-dependency

# Microdep: spot micro outages





# psGUI

# A pScheduler on-demand UI

perfSONAR GÉANT

Home Run measurement

**Nodes**

Source:   Destination:

**Test parameters**

Test:

IPv4  IPv6

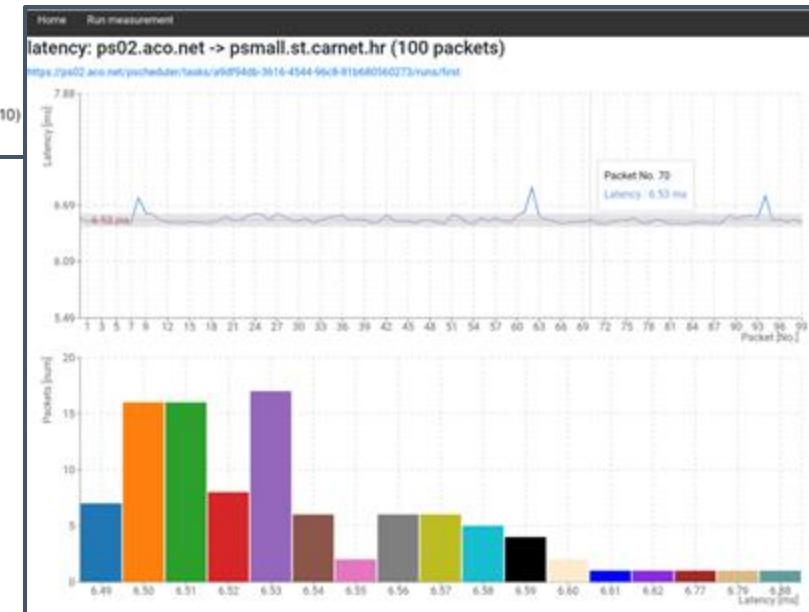
Test:

IPv4  IPv6

Packet Count:   
The number of packets to send (10 - 1000000)

Packet Interval:   
The number of seconds to delay between sending packets (0.000001 - 1)

Packet Timeout:   
The number of seconds to wait before declaring a packet lost (1 - 10)



Latency, throughput, trace

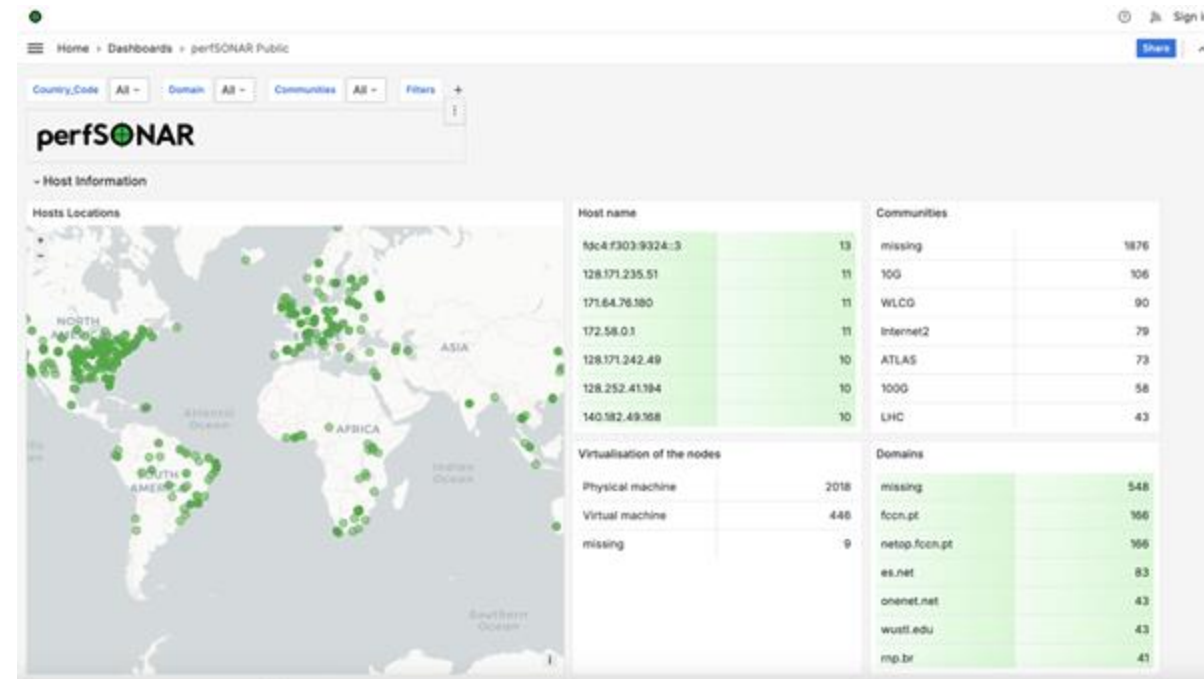


# Lookup Service Updates



# Lookup Service - What is it?

- Hosts register records to the service
  - Information about toolkit nodes
    - Hosts
    - Interfaces
    - Services
    - metadata
- APIs to discover toolkit hosts and related information
- Records are ensured to be current by setting expiration date
  - Hosts to re-register before expiry



<https://stats.perfsonar.net> powered by lookup service

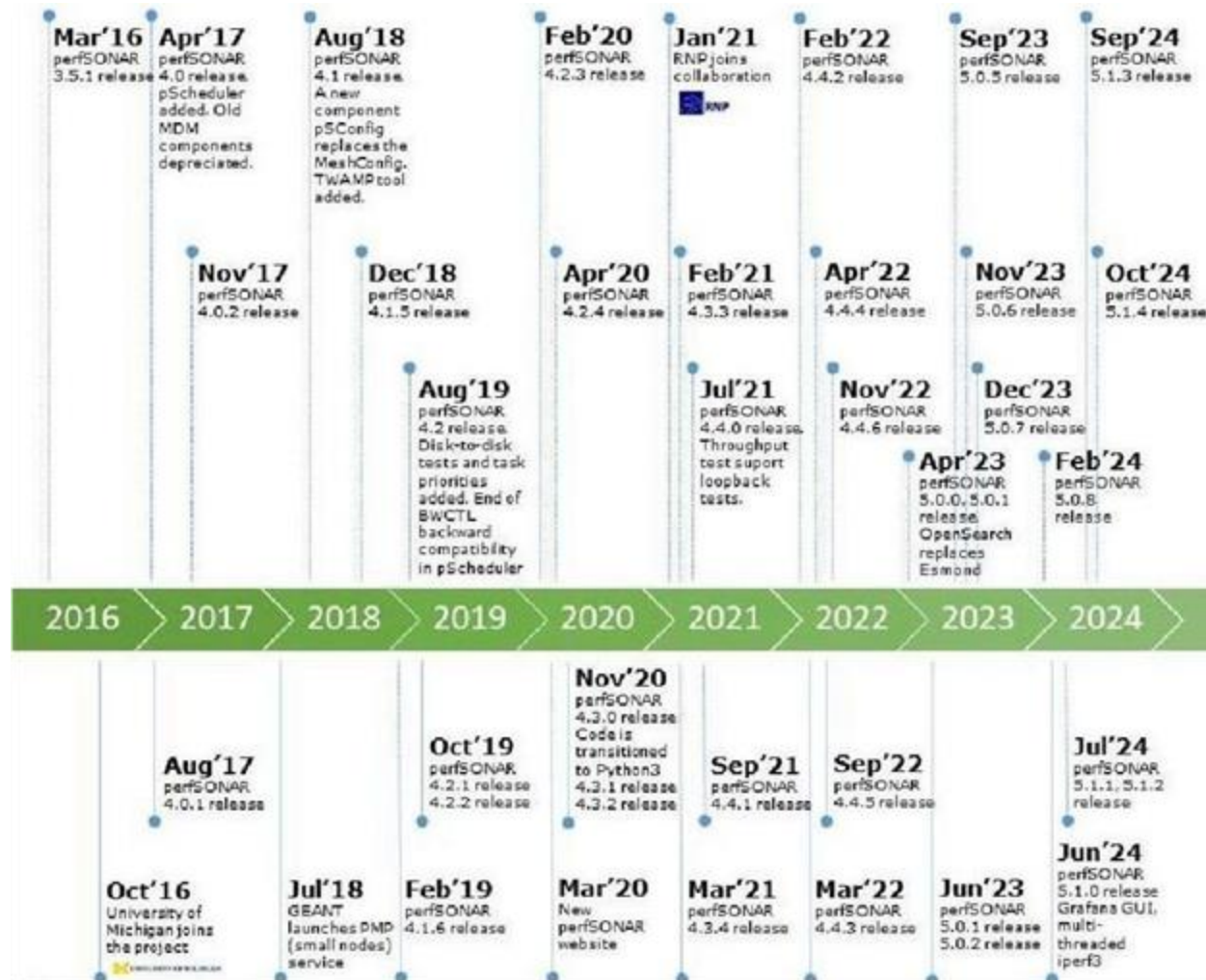
# Why Redesign?

- Minimize the number of API calls for each host registration
- Provide a way for clients to check the authenticity of information in LS
- Validate the data sent for registration
- Provide richer API for querying
- Provide uniformity in fields across records for easier data analysis
- Provide a way to snapshot data for evaluating registration evolutions over time
- Continue supporting record updates



- Simplify the registration process
- Provide better storage and query capabilities

# But also, 20 years of experience ...



April 2025

... means 20 years of collaboration

# perf20NAR years

Put yourself (or your organization) on the map!

<https://forms.gle/vsYmetjvyQRWwKUJ8>

Will then show up at

<https://stats.perfsonar.net>





# What happens after 5.3.0?

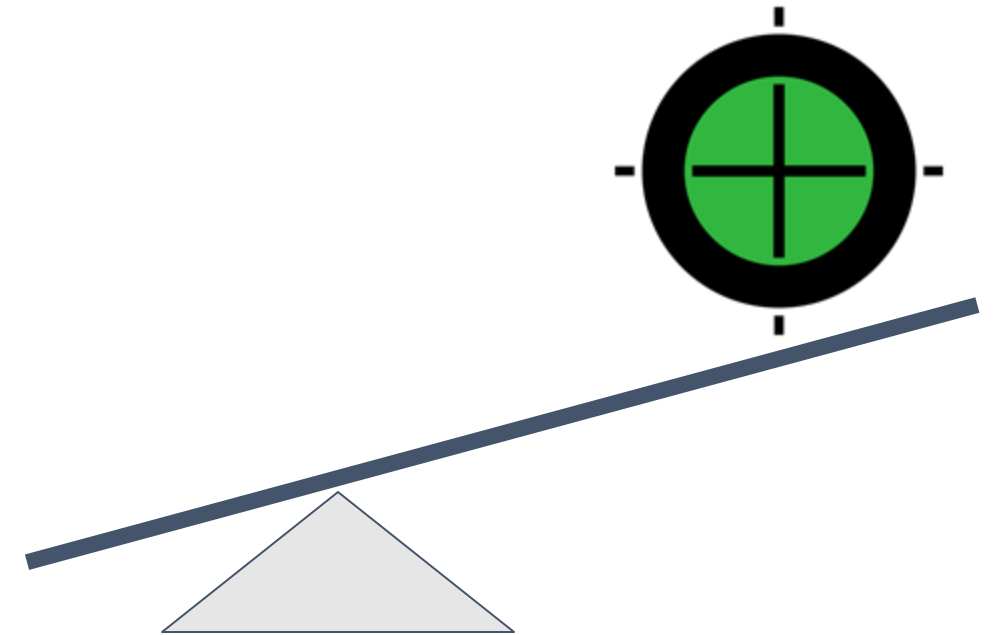
# Make it easier

- We've introduced a lot of change, we want to focus on refining pain points
- Updated trainings that focus on the new pieces
- Continue to update documentation and add better guides
- Explore new ways to interact with documentation like training LLM on docs or similar



# Leverage the changes of the last few years

- Our new platform opens up many new possibilities in
  - Alerting
  - Analysis
  - Visualization
  - Correlation with other data (e.g. Flow, SNMP/Streaming telemetry)
- Explore way to enable researchers to use the data



# Guided by our Community

- Most important is your continued feedback to help shape the future
- Checkout quarterly office hours as part of <https://www.es.net/science-engagement/ci-engineering-lunch-and-learn-series>
- Join our mailing list [perfsonar-user@perfsonar.net](mailto:perfsonar-user@perfsonar.net)
- Watch for community surveys





# perfSONAR



Thanks icon by priyanka from The Noun Project

## Thanks!

For more information,  
please visit our web site:  
<https://www.perfsonar.net>

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