The NetSage Measurement Framework

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Overview

● Combines data from various sources into a single view
● Dashboards are open to public
● Privacy-aware
● Designed to answer end user questions

Network projects and their coverage:
● **NEAAR:** Europe, Africa
● **TransPAC4:**
Seattle, Tokyo, Guam, Hong Kong
● **PIREN:**
Hawai'i, Guam, Sydney, Seattle, Los Angeles
● **Amlight:**
Miami, Fortazela, Cape Town, Sao Paulo, Boca Raton, Panama, Puerto Rico, Santiago
● **Pacific Wave Exchange**
● **Starlight Exchange**
● **Amlight Exchange**
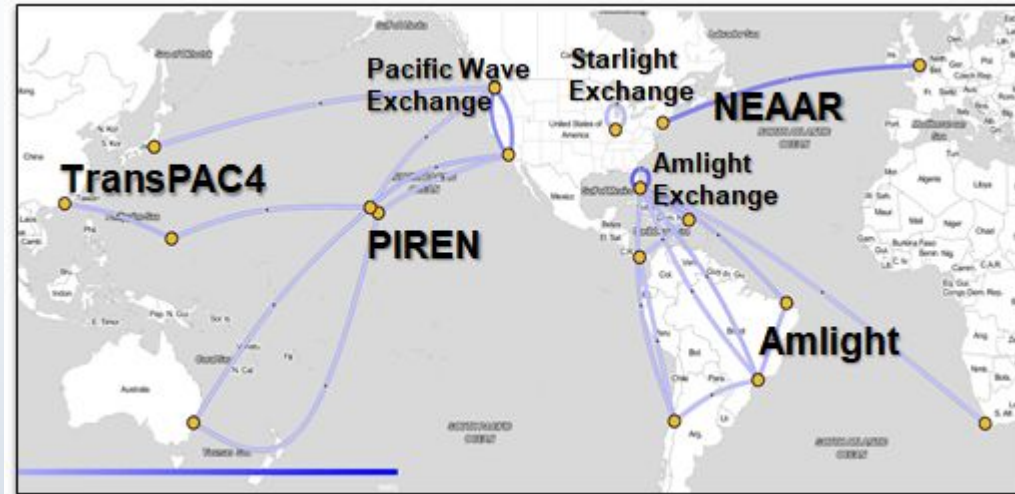
NetSage Architecture and IRNC Deployment

Data Ingest Pipeline
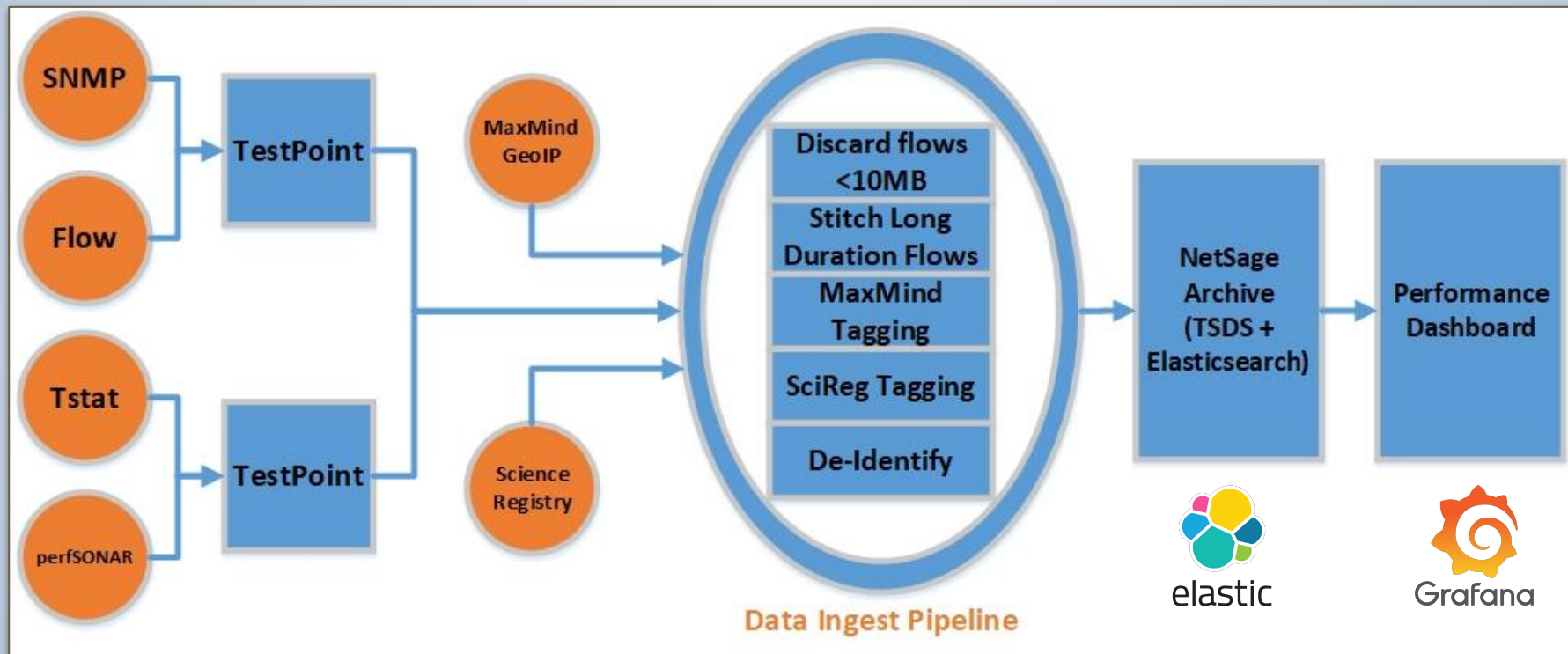
Design Methodology

Immersive Empathic Design Methodology:

- Dashboards designed iteratively based on end users needs and questions

NetSage Users:

- IRNC resource owners and operators who wanted to know the status of the resources;
- Collaborative research teams trying to understand resource use and how their data transfers would behave;
- Engineering staff to ensure effective resource use; and
- Funding staff to understand who uses the resources.
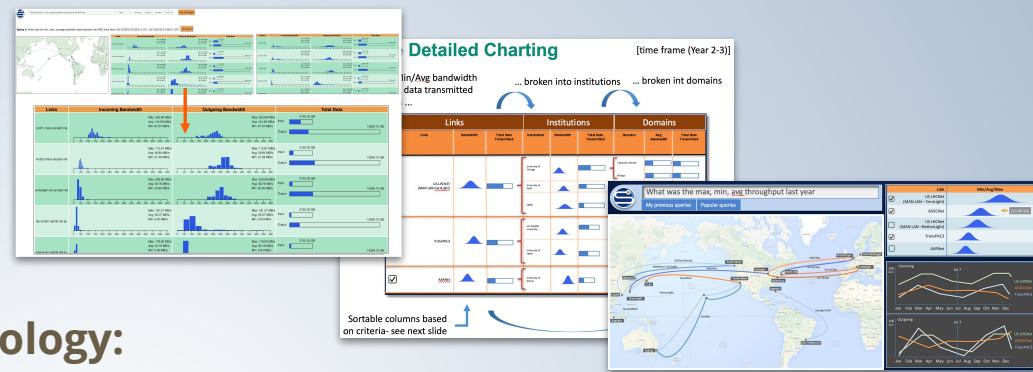
Dashboards

- Each dashboard answers a specific end-user question.
- Summarize the types of dashboards- bandwidth, latency, loss, flow patterns of organizations & scientific disciplines.
- Built primarily in Grafana.
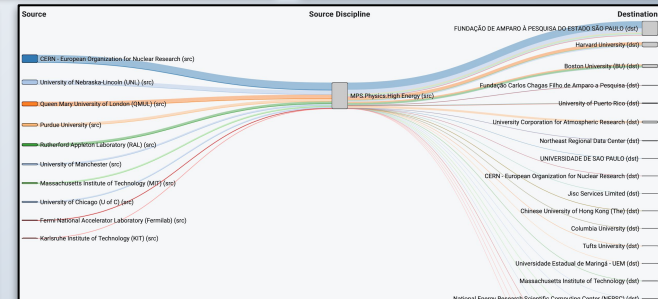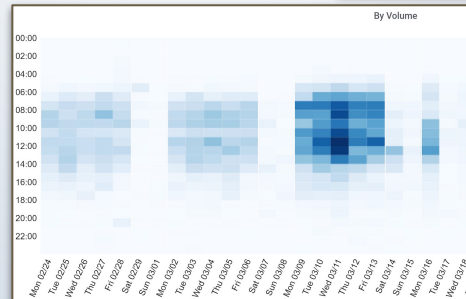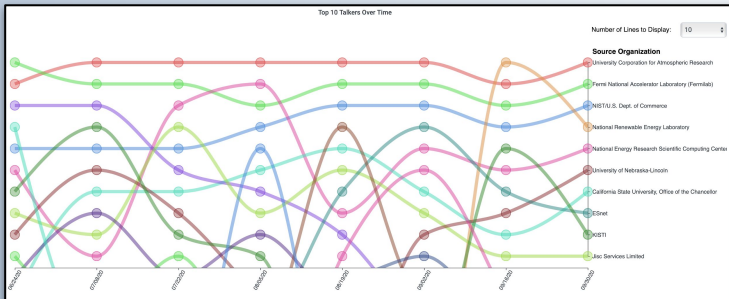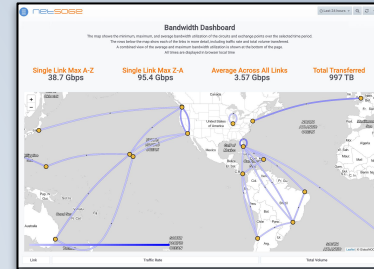
Dashboard Walk-through Video

1. Netsage.global landing page
2. International Landing page- bandwidth dashboard
3. NEAAR bandwidth example
4. Top flow by country [sankeys]
5. Top flow by science discipline [discipline map]
6. KISTI Example
7. Flow Analysis - dialog from Detection of Unusual Data Transfer Patterns (TransPAC4) [flow analysis]
8. Zoom COVID - dialog from Zoom slide [heatmaps]
9. Top Talkers over time

Related Work

Many other tools look at similar data, but geared towards network operation centers for single network providers.

NetSage is for broad range of users to analyze performance across multiple networks.

Particularly noteworthy is the community driven science registry to enable identification of specific scientific flows.

Functionality / Attribute	Graphical User Interface	SNMP Data	PerfSonar Data	Flow Data	Science Registry Data	Alerting	Open Source
NetSage	Y	Y	Y	Y	Y	N	Y
Argus	Y	N	N	N	N	Y	Y
Cacti	Y	Y	N	N	N	N	Y
Deep Field	Y	N	Y	N	N	N	N
Elastiflow	Y	N	N	Y	N	N	Y
InMon	Y	N	N	Y	N	Y	N
Kentik	Y	N	Y	Y	N	Y	N
WLCG Grafana Dash	Y	Y	Y	N	N	N	Y
Nagios	Y	N	N	N	N	Y	Y
NFSEN	Y	N	N	Y	N	Y	Y
Ntop	Y	Y	N	Y	N	Y	N
SolarWinds	Y	Y	Y	Y	N	Y	N

Future Work

Short term

- Small incremental improvements (visualizations, science registry, scalability) will continue to 2022.
- Global NOC will take over support for IRNC members as a managed service.

Long term

- Include network alarms/alerts
- Adapting for campus network environments

Explore NetSage for yourself at: netsage.global