

INTERNET2

2022
TECHNOLOGY
exchange

Technology, team, & process:
An overview of automation in the Internet2 network.



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The Preamble

- Automation architecture and design intent
- Brief digression into weedy IAM details
- Context around team and process
- Invitation to participate

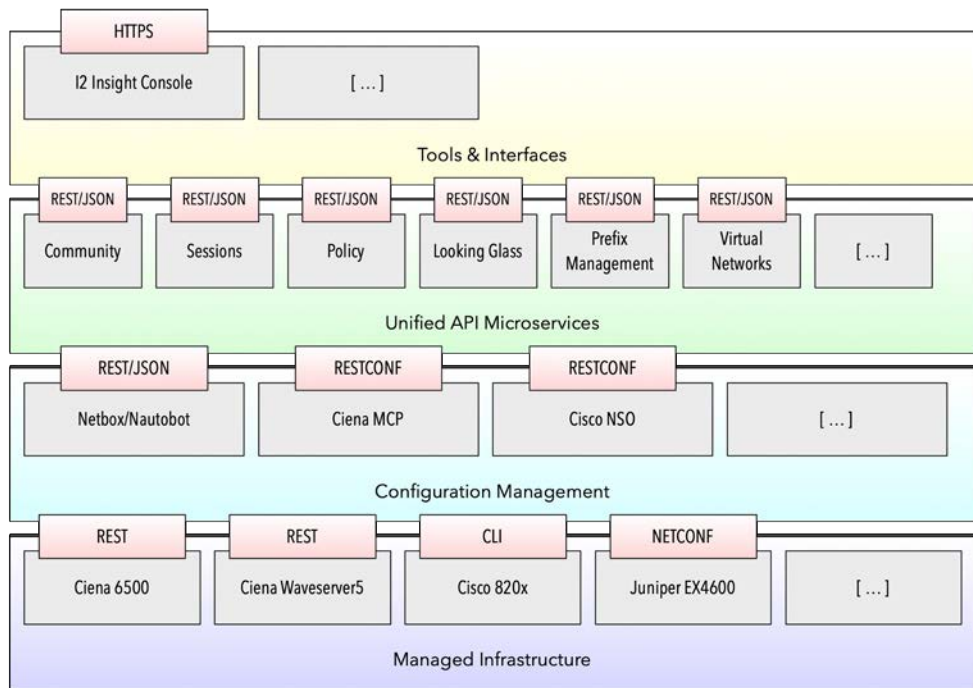


The Stack



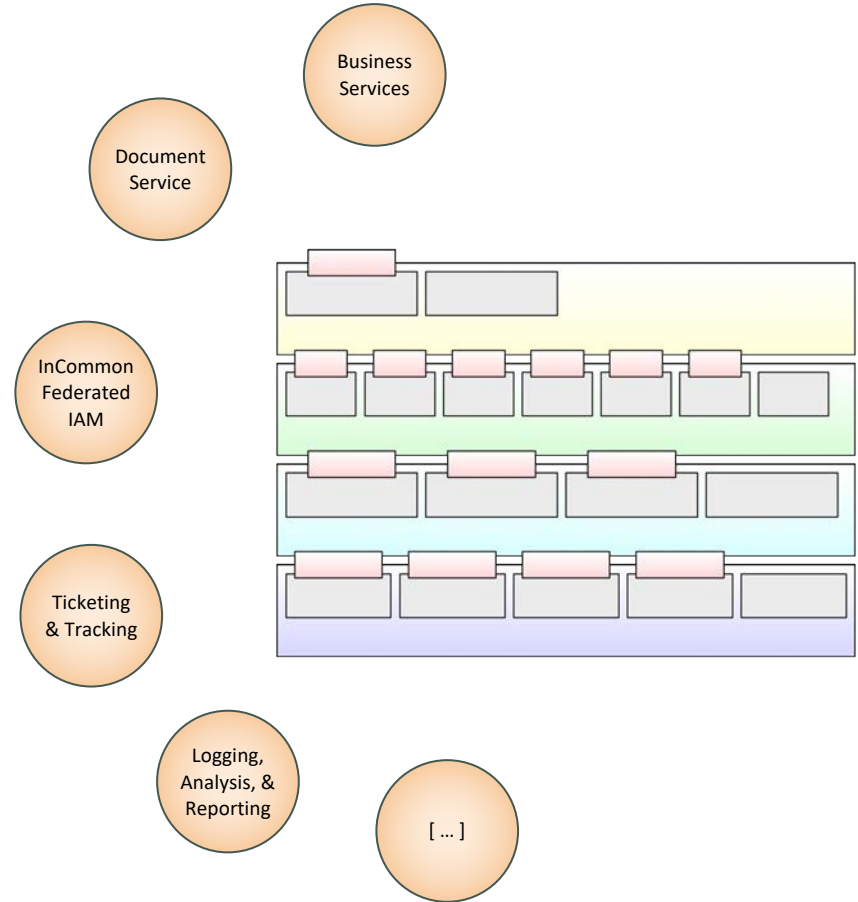
The architecture:

- Infrastructure under management:
 - **Optical:** Ciena 6500s, Ciena Waveserver 5s
 - **Packet:** Cisco 8201/8202s (NGI), Juniper EX4600 (SMN)
 - Other devices in progress or planned for the future.
- Configuration management applications:
 - **Optical:** Ciena Manage, Control, & Plan (MCP)
 - **Packet:** Cisco Network Services Orchestrator (NSO)
 - **Source-of-Intent:** Netbox/Nautobot
 - Other applications in progress or planned for the future.
- Middleware API that abstracts/unifies functionality:
 - **Community, Sessions, Policy:** Foundational access control and authorization framework integrated w/InCommon IAM services.
 - **Looking Glass:** Updated version of current Router Proxy service.
 - **Prefix Management:** New workflow for prefix submission and BGP peering session management.
 - **Virtual Networks:** Updated and enhanced version of OESS/CC services.
 - Other API services in progress or planned for the future.
- User-facing CLI and GUI tools and interfaces:
 - **I2 Insight Console:** Central landing page and convenient access to all Internet2 network services.
 - Other tools planned for the future.



The integrations:

- Business services:
 - Could be integrated to provide **organizational**, **contractual**, or **billing** information.
 - Includes Salesforce, LinkSquares, et al.
- Document service:
 - **Single point-of-documentation** to enhance management of all Internet2 Network Services-related service documentation.
 - Provides an API for searching and retrieval to allow embedding specific documentation at point-of-need.
- InCommon Federated IAM:
 - Externalizes and distributes all **credentialing** and **attribution**.
 - Relies upon services maintained by Internet2's Trust & Identity division.
- Ticketing & Tracking:
 - Integration to external ITSM system(s) for **service requests** and **general workflow** management.
 - Includes ServiceNow as our initial integration.
- Logging, Analysis, & Reporting:
 - Central aggregation point for **system and audit event logging**.
 - Current focus on Splunk and/or New Relic.



The intent:

new relic

Search
+ Add data
All Capabilities
All entities
APM & services
Query your data
Apps
Browser
Dashboards
Alerts & AI
Errors Inbox
Hosts
Infrastructure
Logs
Mobile
Synthetic monitoring

1,242 logs found

Internet2 Lightning

Accounts
Network Connectors

37 items - Sorted by Account Name - Filtered by All accounts - Network B...

Account Name ↑

- 1 SROX (Three Rivers Optical Exchange)
- 2 Big Ten Academic Alliance Omnipop
- 3 CAAREN (Capital Area Advanced Research and Education Network)
- 4 CEN (Connecticut Education Network)
- 5 CENIC (Corporation for Education Network Initiatives in California)
- 6 Drexel University
- 7 FLR (Florida LambdaRail, LLC)
- 8 GPN (Great Plains Network)
- 9 Indiana GigaPop
- 10 KINBER (Keystone Initiative for Network Based Education & Research)
- 11 KYRON (Kentucky Regional Optical Network)
- 12 LEARN (Lonestar Education and Research Network)
- 13 Link Oregon
- 14 Louisiana Board of Regents / LOIN (Louisiana Optical Network)
- 15 MAGPI (Mid-Atlantic GigaPop)
- 16 MARIA (Mid-Atlantic Research Infrastructure Alliance)
- 17 MAX (Mid-Atlantic Crossroads)
- 18 MCNC
- 19 Merrit Network, Inc.
- 20 MissON (Mississippi Optical Network)
- 21 MREN (Metropolitan Research & Education Network)
- 22 Nevada System of Higher Education - System Office
- 23 N2Edge
- 24 Northern Lights GigaPop
- 25 NoX (Northern Crossroads)
- 26 NYSENet, Inc.
- 27 OARnet (Ohio Academic Resources Network)
- 28 OSHEAN, Inc.

INTERNET2 Identity Services

Select an Identity Provider

Please select a trusted identity provider from the list below by beginning to type in the edit box.

If you do not find your organization in this list, there are two options:

1. You can [login with your Google account](#).
2. You can [login with your Internet2 Guest account](#). If you are new, you may [create an Internet2 Guest account](#) (see [Guest Account Guide](#)).

Enter your organization's name

Enter the name of the organization you are affiliated with...

Remember selection for this web browser session.
 Remember selection permanently and bypass this step from now on.

[Help](#)

California State University

California State University endpoint for: Microsoft Azure

Router config

Endpoint description

172.28.252.113/38
IP4 Address

IP6 Address

65808
ASN

BGP Key

Delete Peering

core1.losa2.net.internet2.edu - hostname: core1.losa2.net - output (50s averages) 0 b/s 3.33 b/s 301 mb/s 0 b/s state (30m averages) core1.losa2.net.internet2.edu 172.20.252.113 OESS-VRF-3616 1 state 1 state 1 state



The Weeds



The InCommon integration:

- Technically, integration with the **Internet2 Identity Services** platform.
- Authentication:
 - Via **home identity provider**, using familiar SSO credentials, for any eduGAIN/InCommon-affiliated organization.
 - Alternatively, via an **Internet2 Guest Account**, if you don't currently have a home identity provider.
 - Note:
 - If you're interested in getting into the business of running an identity provider, Internet2 has identified several **InCommon Catalysts** to help you get started.
- Identity:
 - Authentication links you to your **Internet2 identity**.
 - msimpson @ Internet2 -> mike.simpson@at.internet2.edu
 - aadams @ UA -> alice.adams@at.internet2.edu
- Affiliation and attribution:
 - Identity is associated with **organizational affiliations and roles**:
 - "Alice Adams is a network engineer at the University of Arizona."
- Policy and authorization:
 - Affiliations and roles intersect with **policy configuration** to determine **authorizations** for specific functions in the API and tools:
 - "Network engineers can view BGP peering session information associated with their organization."

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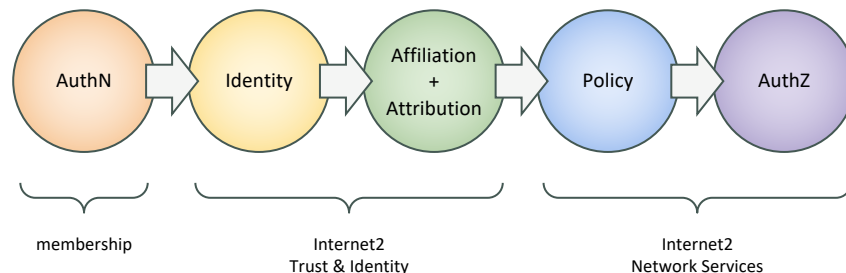
Enter your organization's name

Enter the name of the organization you are affiliated with...

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[Help](#)

[I'm having trouble logging in](#)



The Context



The team:

“Infrastructure Systems & Software” (“ISS”, “NS-ISS”, “I2-NS-ISS”)

Focused on:

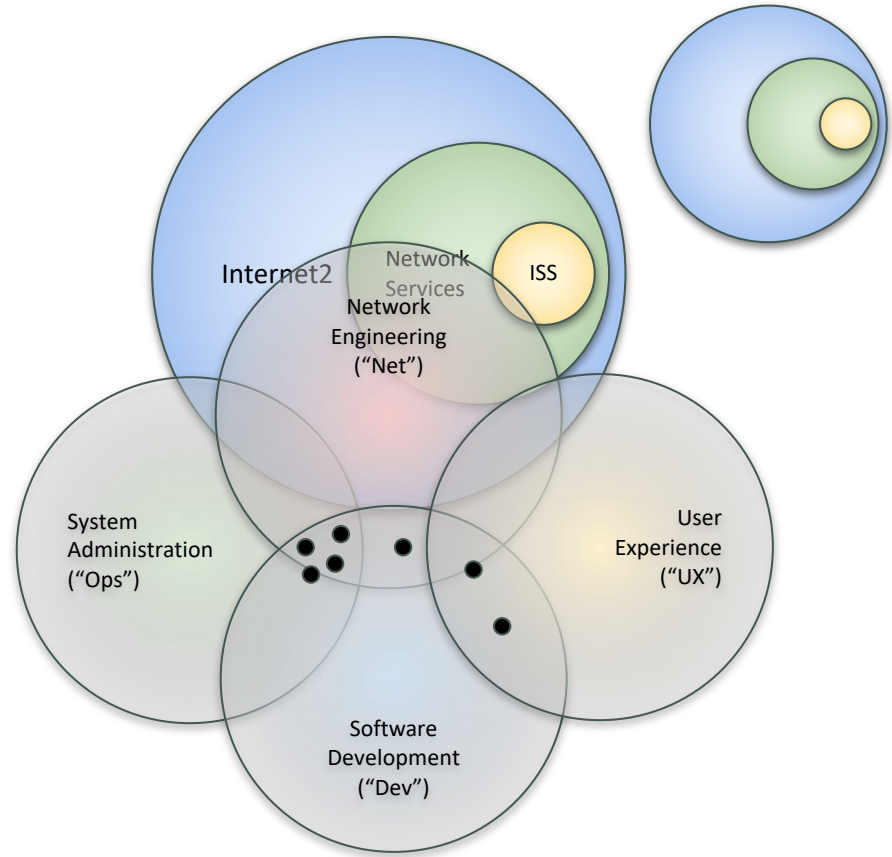
- Network modeling, automation, and orchestration software
- Network performance testing and monitoring
- Network telemetry collection and analysis

Skill sets (“NetDevOps”):

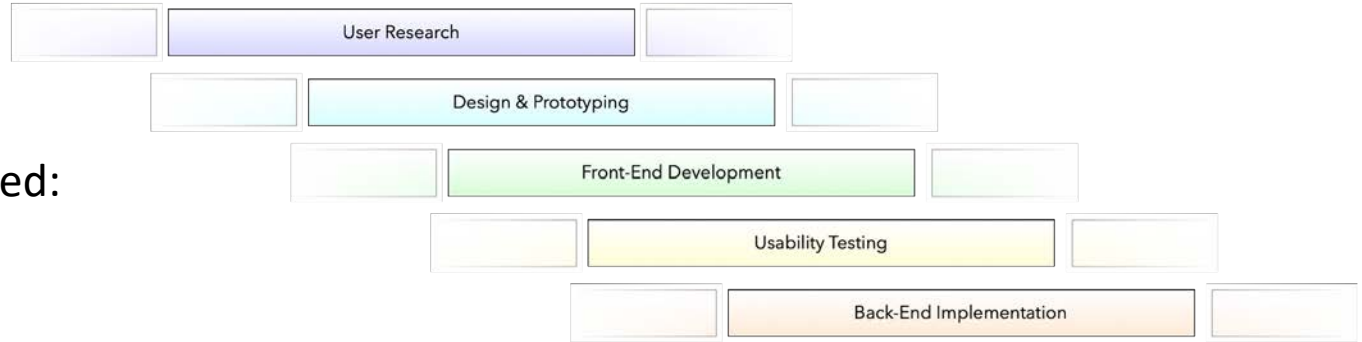
- Network Engineering (“Net”)
- Software Development (“Dev”)
- System Administration & Operation (“Ops”)
- (Through contractors):
 - User experience design (“UX”)
 - Front-end web development (“UI”)

Staff:

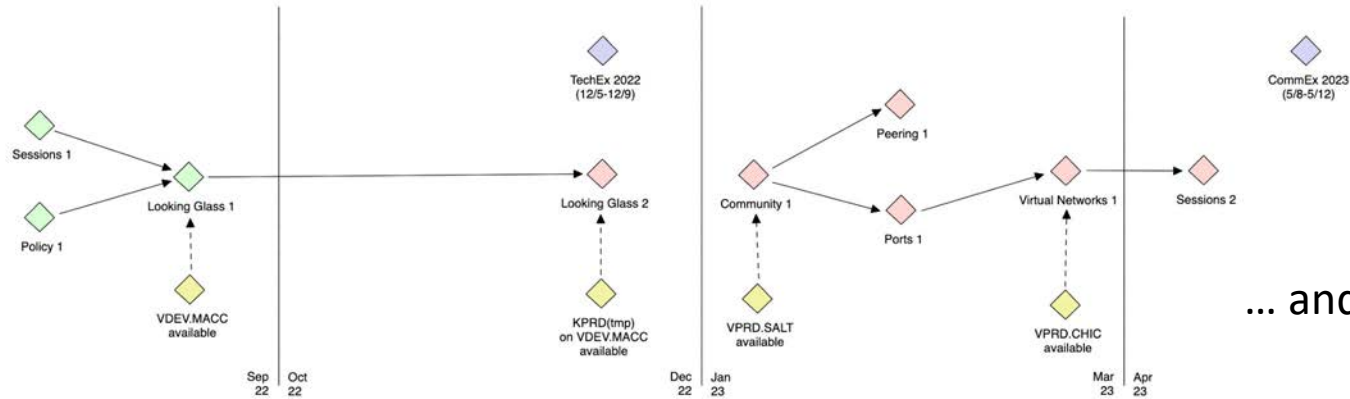
- Mike Simpson (Director)
- Karl Newell (Network Software Architect)
- Shannon Byrnes (Senior NetDevOps Engineer)
- James Harr (Senior NetDevOps Engineer)
- Mark Feit (Principal Software Engineer)
- (Contractors):
 - Christopher Green (UX/UI)
 - Gabriel Pompa (UI)



The process:



... is pipelined:



... and incremental.



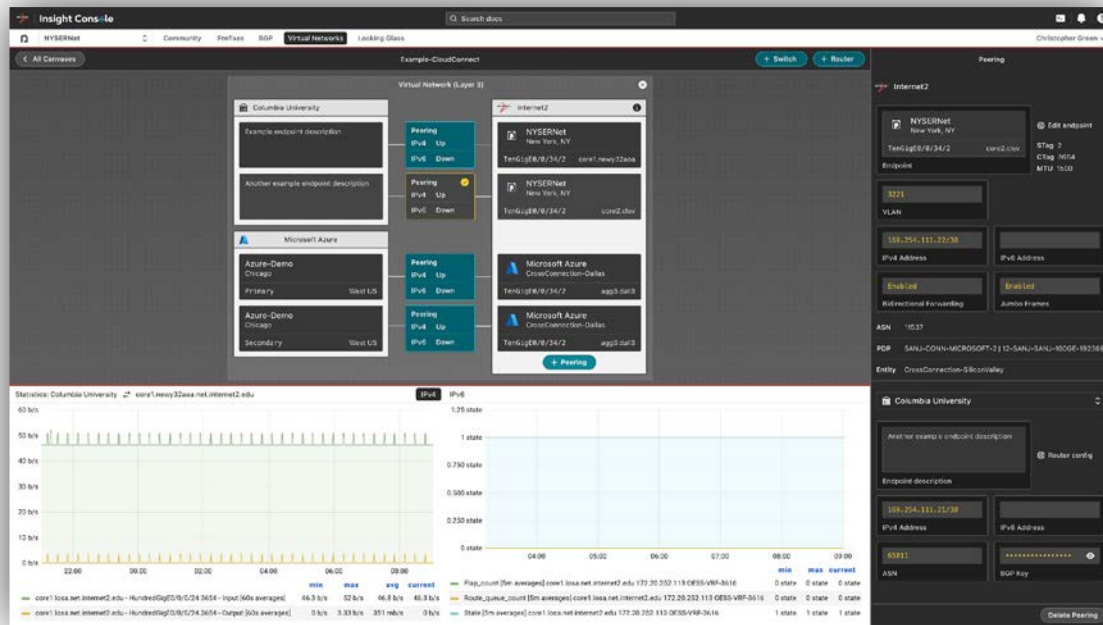
The Closer



Take Insight Console for a test drive



usability.ns.internet2.edu



Plaza Room 5
Drop-in or schedule in advance

feedback.ns.internet2.edu

The screenshot shows the 'Internet2 Insight Console' interface. At the top left is the Internet2 logo and the title 'Internet2 Insight Console'. At the top right is a user profile icon. Below the title, there is a message: 'We'd love to hear what you're thinking about. What can we do better? This is the place for you to vote, discuss and share ideas.' Below this is a text input field with the placeholder 'Enter your suggestion here...'. To the right of the input field is a search bar with the text 'Search' and a magnifying glass icon. Below the search bar, there is a 'VIEW' dropdown menu set to 'TRENDING' and a filter 'with ANY TAG'. The main content area displays a list of suggestions, each with a vote count, a title, a description, and a 'Looking Glass' button. The suggestions are: 1. 'Commands completing' (1 vote): 'Do all commands eventually complete? There's no way to tell if it's just taking a long time or if the process is stuck in a loop or something. I just selected all agg3 and agg4 routers (8 in all) and issued show interfaces desc. It's going on 5 minutes and no telling if these commands wi...'. 2. 'In Looking Glass, allow "j" and "e" as synonyms for "include" and "exclude"' (2 votes): 'In Looking Glass, allow "j" and "e" as synonyms for "include" and "exclude". Also allow section and synonyms.'. 3. 'In Looking Glass, add timestamps to each device output block' (1 vote): 'In Looking Glass, add timestamps to each device output block. (See attached screenshot.)'. 4. 'I want to share a URL which selects devices and pre-fills the command box in Looking Glass' (3 votes): 'When a Network Engineer follows the URL, Looking Glass should open with the devices and command box pre-filled.'. 5. 'Clear command output' (1 vote): (No description visible).

What should Insight Console do?
How can it be improved?
Share and vote on ideas.



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Thank you!



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