

# NSF CC\* NETWORKING #1827186:

*Paving the way for Institutional CI at the  
University of Nevada, Reno*



**SCOTTY STRACHAN, Ph.D.**  
*Director of Cyberinfrastructure  
Office of Information Technology  
University of Nevada, Reno*





## IN THIS TALK

What is going on with science & engineering **at Nevada**?

Status of UNR **CC\* Networking** project

How has this impacted the **institutional thinking**?

What are the **major challenges**?

**What's next** for UNR?

# REGIONAL RESEARCH AND EDUCATION NETWORKS IN THE UNITED STATES



## QUILT MEMBERS AND AFFILIATES



# RESEARCHER CHALLENGES AT AN EMERGING R1

Institutions are slow to change mindsets, try new solutions, or see sustainability value in technology

Nevada has a history of insular administration, but it's a **global research world** out there

**CI can help!**

**Streamline** researcher workflow

Transform **time management**

**Scale** research activity

Create foundation for **innovation**

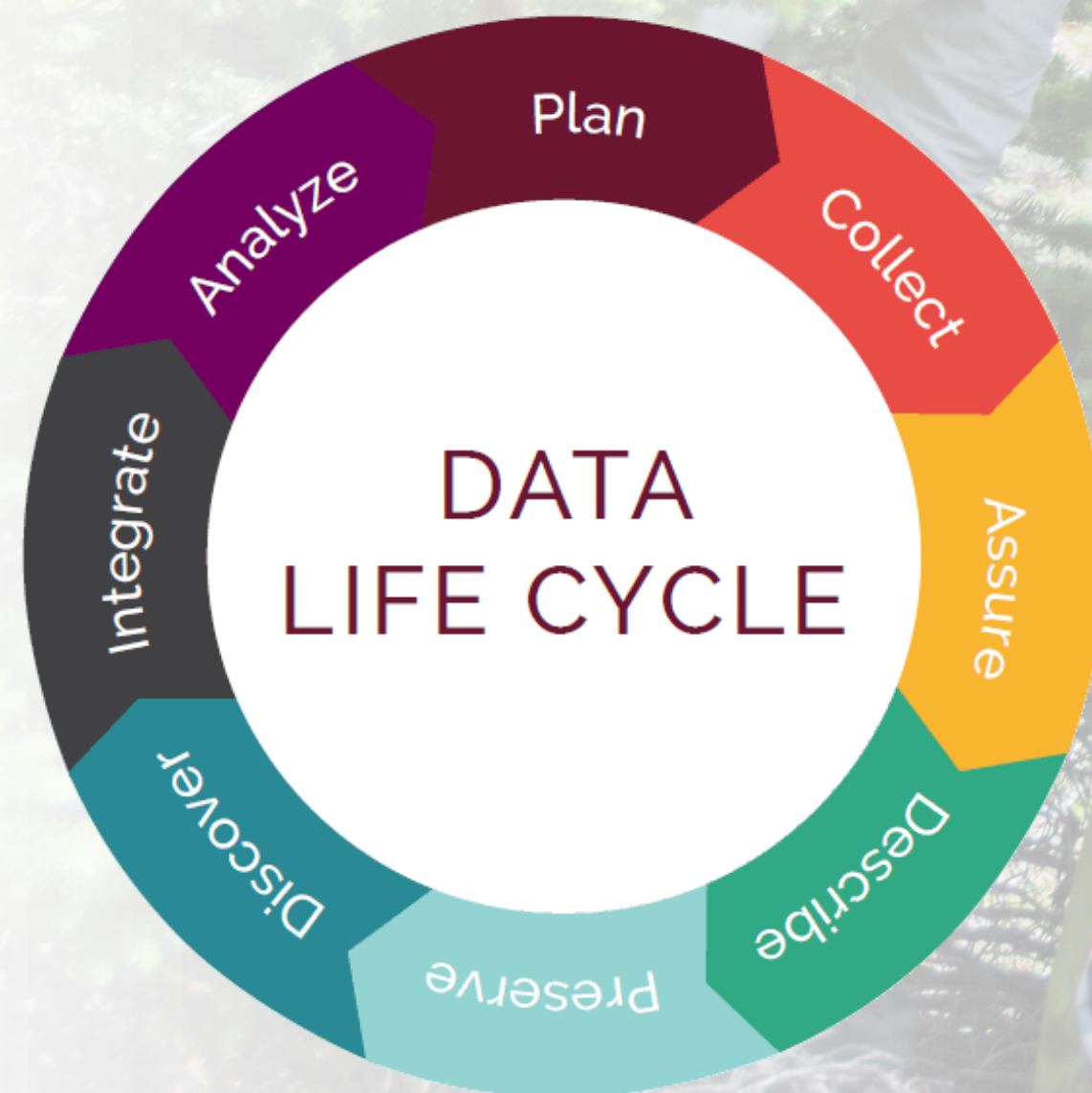


**As simple as it sounds,  
smaller institutions  
need a CI rally point**

# NETWORK ALL THE THINGS FOR BETTER SCIENCE

We live in a world  
dominated by technology.

The science process is  
no different.

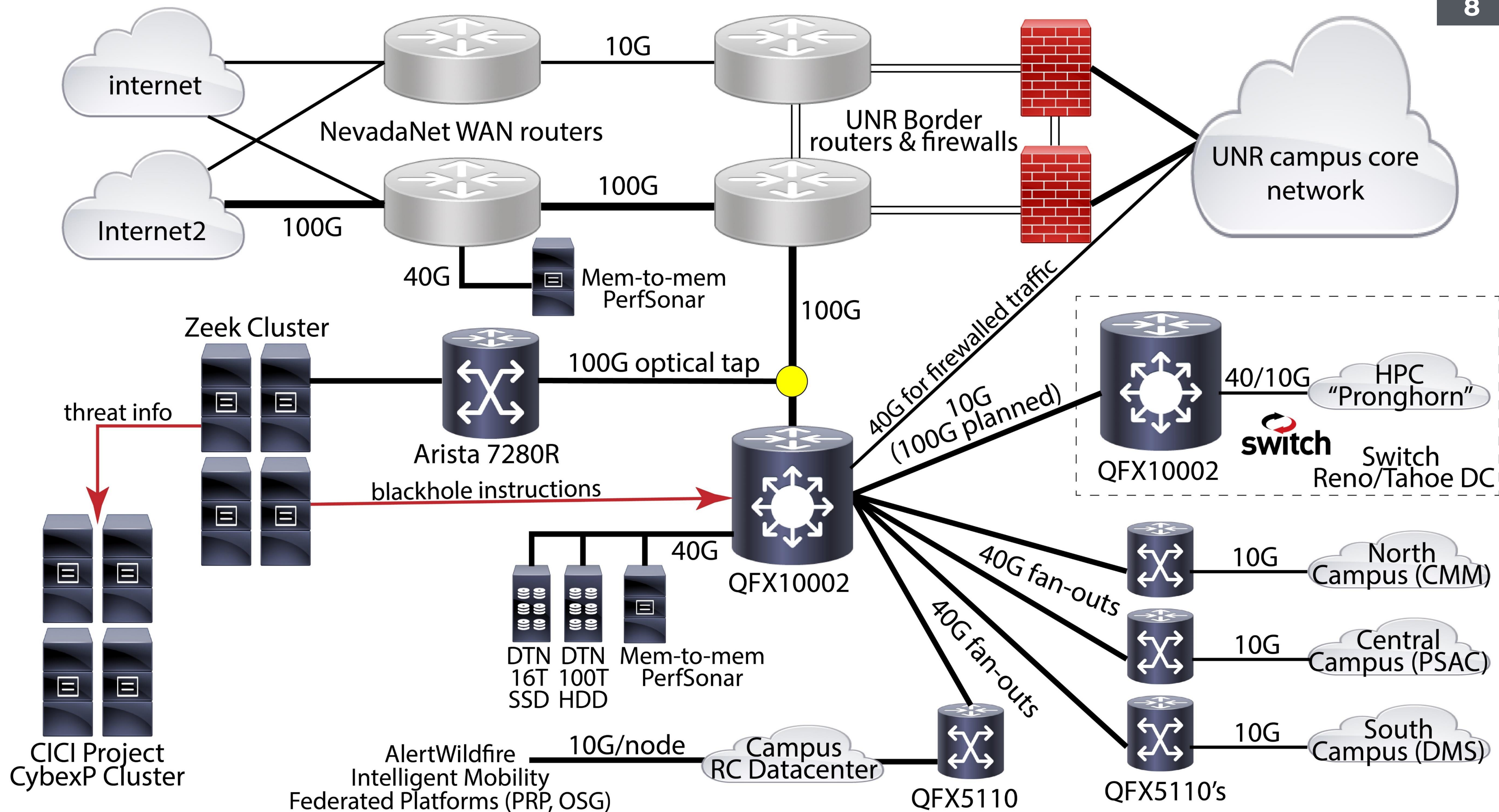


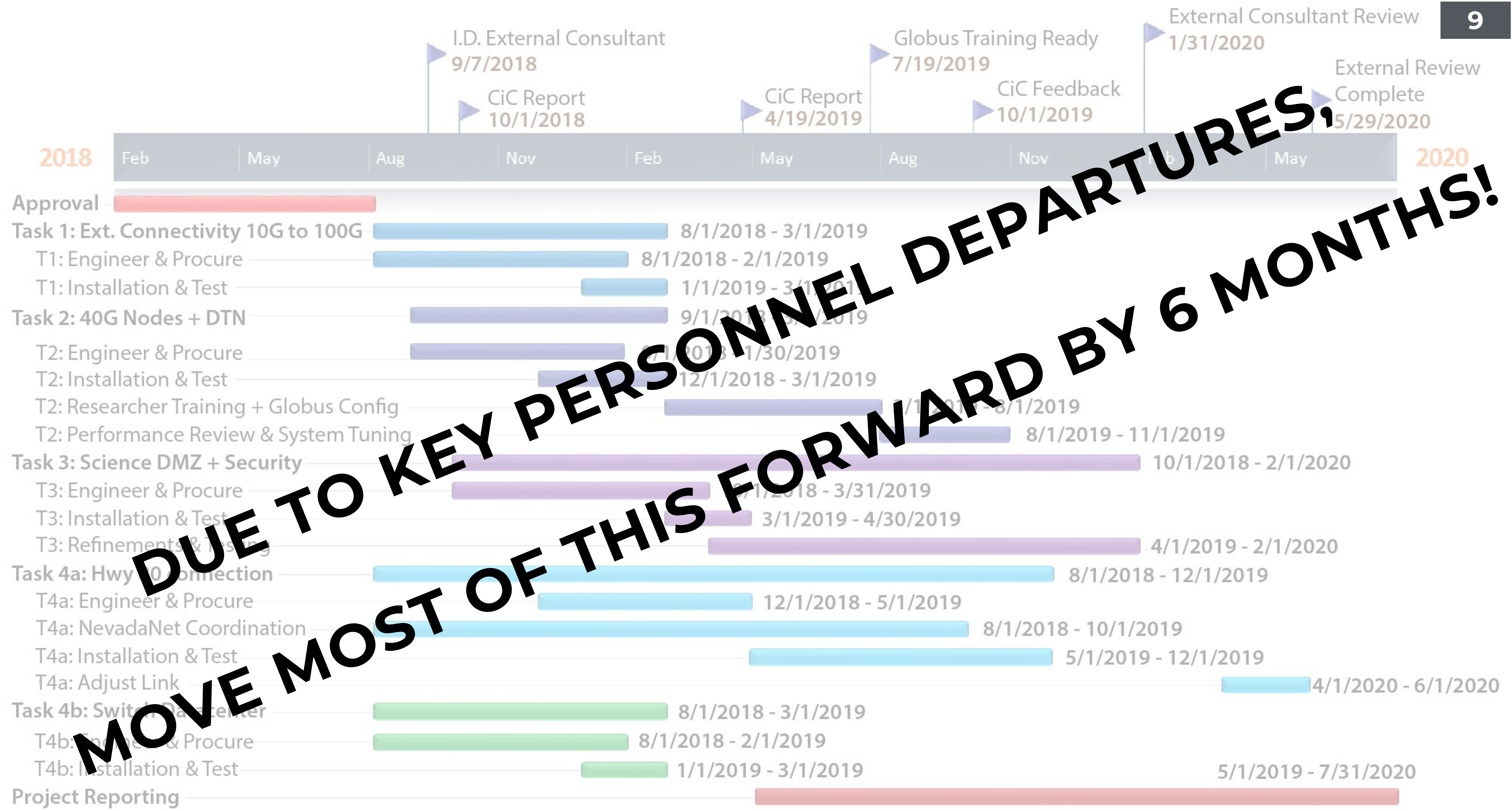
NevCAN subalpine station

## Primary Goals:

## Task Progress:

The diagram illustrates the UNR Campus Production Network and the Proposed Science DMZ. The top section shows the Internet and Internet2 connections to the NSHE SCS Routers (MLX) via 20G and 100G links. These routers connect to the UNR Border & Firewalls via 2x 10G LAG links. The UNR Border & Firewalls connect to the UNR Campus Production Network. The bottom section, labeled 'Proposed Science DMZ', shows a central QFX10002 Juniper Switch connected to a 100G Tap and a 10G (current) link scheduled for upgrade to 40G in 2018-19. This switch is also connected to a Security Analysis Cluster (SDN Blackhole Traffic), a perfSONAR Server w/DTN capability, and a QFX5110 Juniper Switch. The QFX5110 Juniper Switch is connected to three FIONA DTN switches, which in turn connect to various campus data centers: North Campus HMS Biochemistry Laboratories, Central Campus ARF Smart Mobility, Robotics, and South Campus LMR NSL, NRDC, NevCAN. A legend at the bottom indicates that the red color represents 'Proposed Hardware & Path Upgrades'.





**DUE TO KEY PERSONNEL DEPARTURES, MOVE MOST OF THIS FORWARD BY 6 MONTHS!**





# CHALLENGING INSTITUTIONAL PROCESSES:

Research timing,  
funding, & **expectations**  
are generally **opposite**  
to classic Enterprise IT  
**workflow & finances**

Research is agile, classic Enterprise IT is not.



**SHIFTING I.T.  
ENGAGEMENT  
TOWARDS  
UNIVERSAL  
SUPPORT:**

Individual funding is not  
always **in phase** with  
research **opportunity**,  
activity, and discovery

**All research efforts are trial-and-error.**



UC San Diego



Energy for What's Ahead™



- Wide-area, heterogeneous network
- Data capture, telemetry, control
- Real-time requirements
- Research in detection, notification
- Rapid increasing scale
- \$90k saved per Red Flag Day
- \$M's+ saved on early responses



## RESEARCH HIGHLIGHT:

### AlertWildfire Network



**260+ Cams**

Ridgetop HD+ near-IR PTZ



**5.8 TB/day**

Camera video + processing



**200 TB/year**

Long-term archive

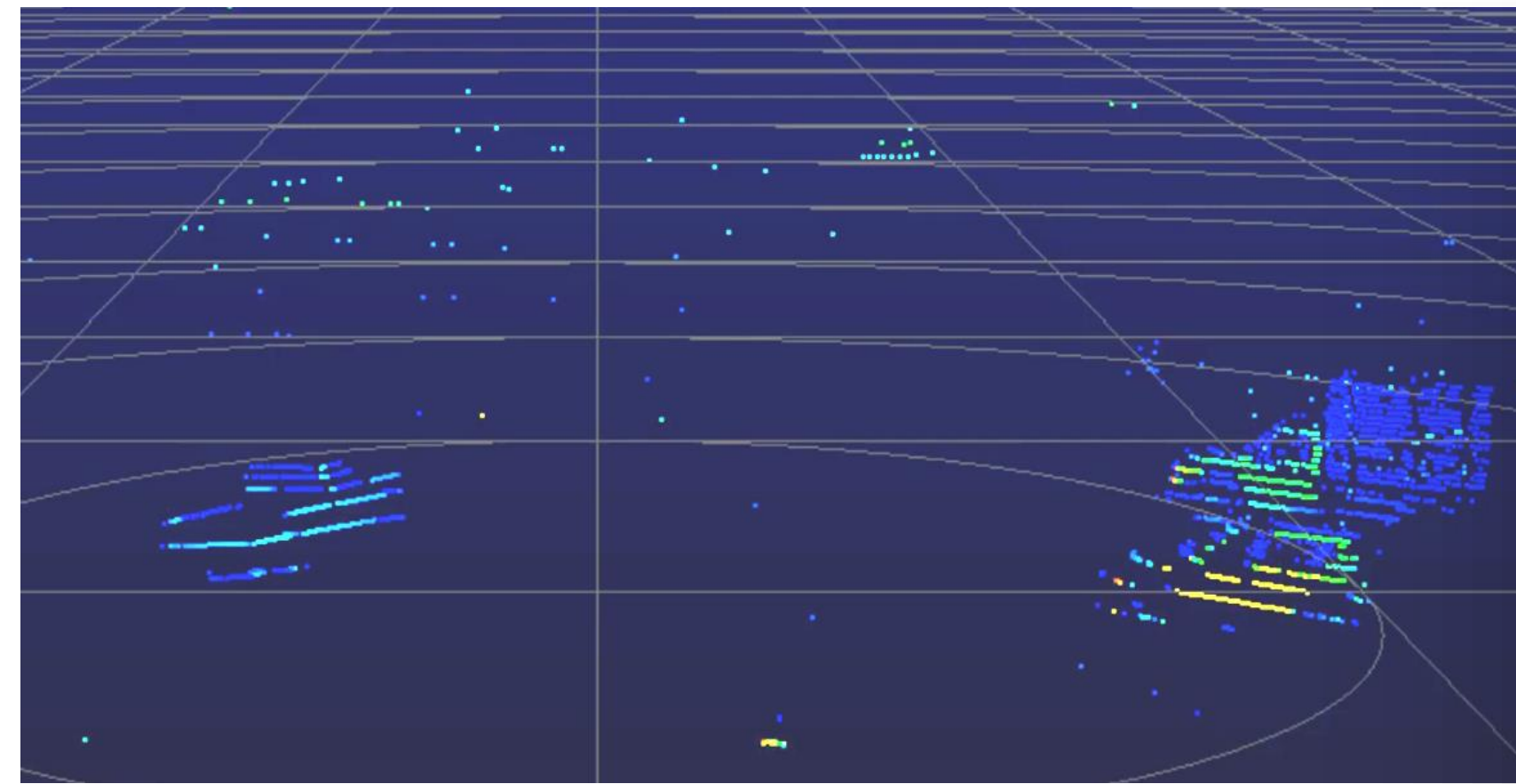


**100 AWS Cores**

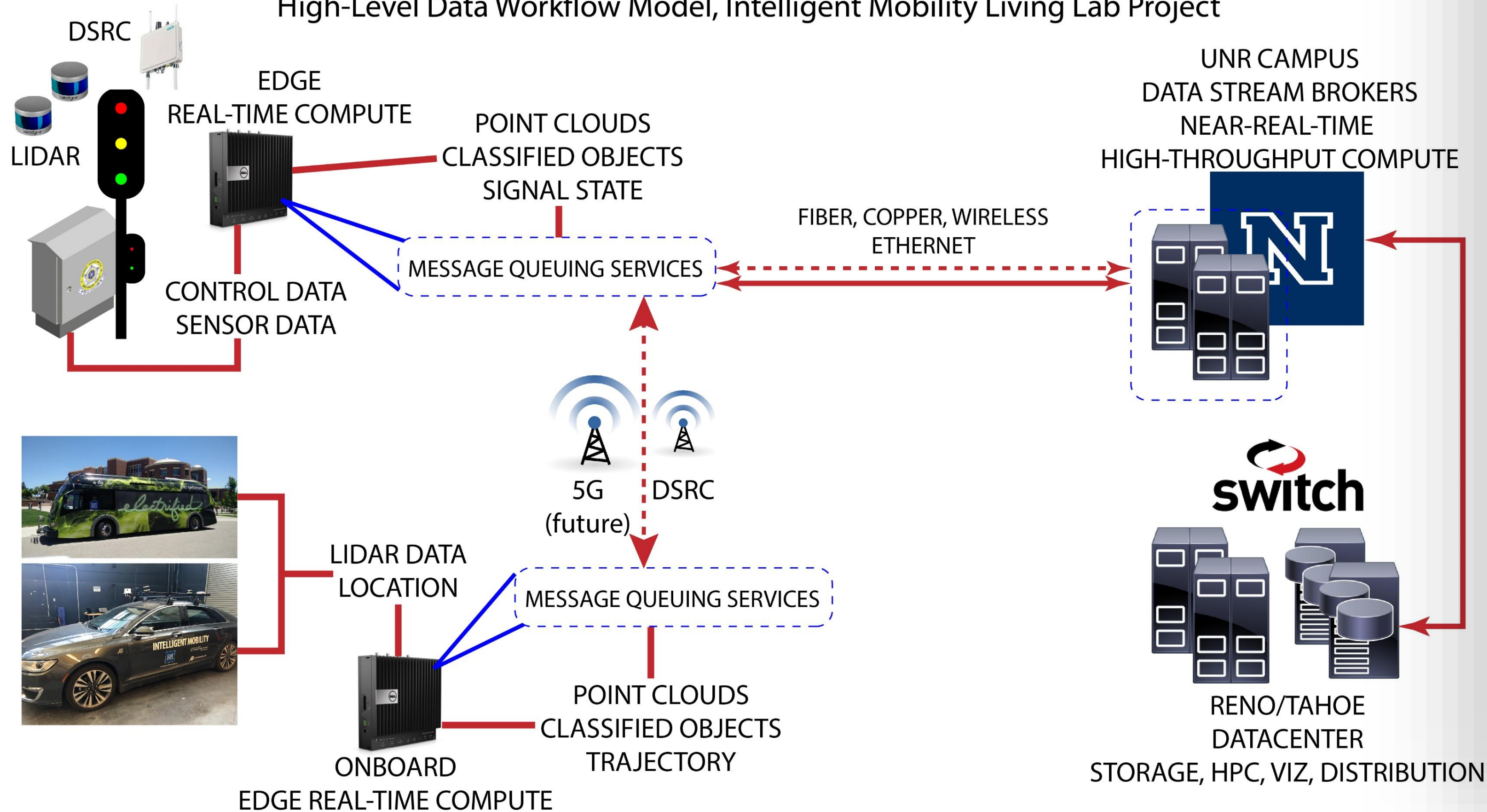
Edge to cloud workflows

Direct **partner access/control**, hourly time-lapse assembly, **triangulation** estimates, forking to **computer vision** researchers, long-term archive for **other uses**.

- All-mode traffic capture
- Speed & trajectory classification
- Near-miss & behavior analysis
- Experimental platform for:
  - Sensor fusion
  - Connected vehicles
  - Infrastructure-to-Everything
  - Local government orgs



High-Level Data Workflow Model, Intelligent Mobility Living Lab Project



## RESEARCH HIGHLIGHT:

### Intelligent Mobility @UNR



**JAN 2020**

Full Living Lab installed



**10 Intersections**

UNR-downtown corridor



**15-Node k8s**

Streaming data infrastructure



**5+ TB/day**

Raw LiDAR point-clouds

Research in traffic safety, autonomous vehicles, social perceptions: a "Living Lab" for **Connected Communities & industry.**



## University to hold inaugural Cyberinfrastructure Day March 27th

Academic researchers to converse  
with University leadership and  
technology providers about campus  
research technology support

Business & Technology | March 14, 2019  
Angela Rudolph

Researchers like Dr. Snow have an opportunity to  
have their voices heard by leadership and campus  
technology providers.



## CC\* project as CI rally point:

- UNR CI Day 2019
- Regional networking cooperation (UT, AZ, CA)
- Connecting City & University networks
- Aligning NevadaNet & UNR monitoring
- Kicking off GRA in CI pilot with UNR Graduate School

9,076 views

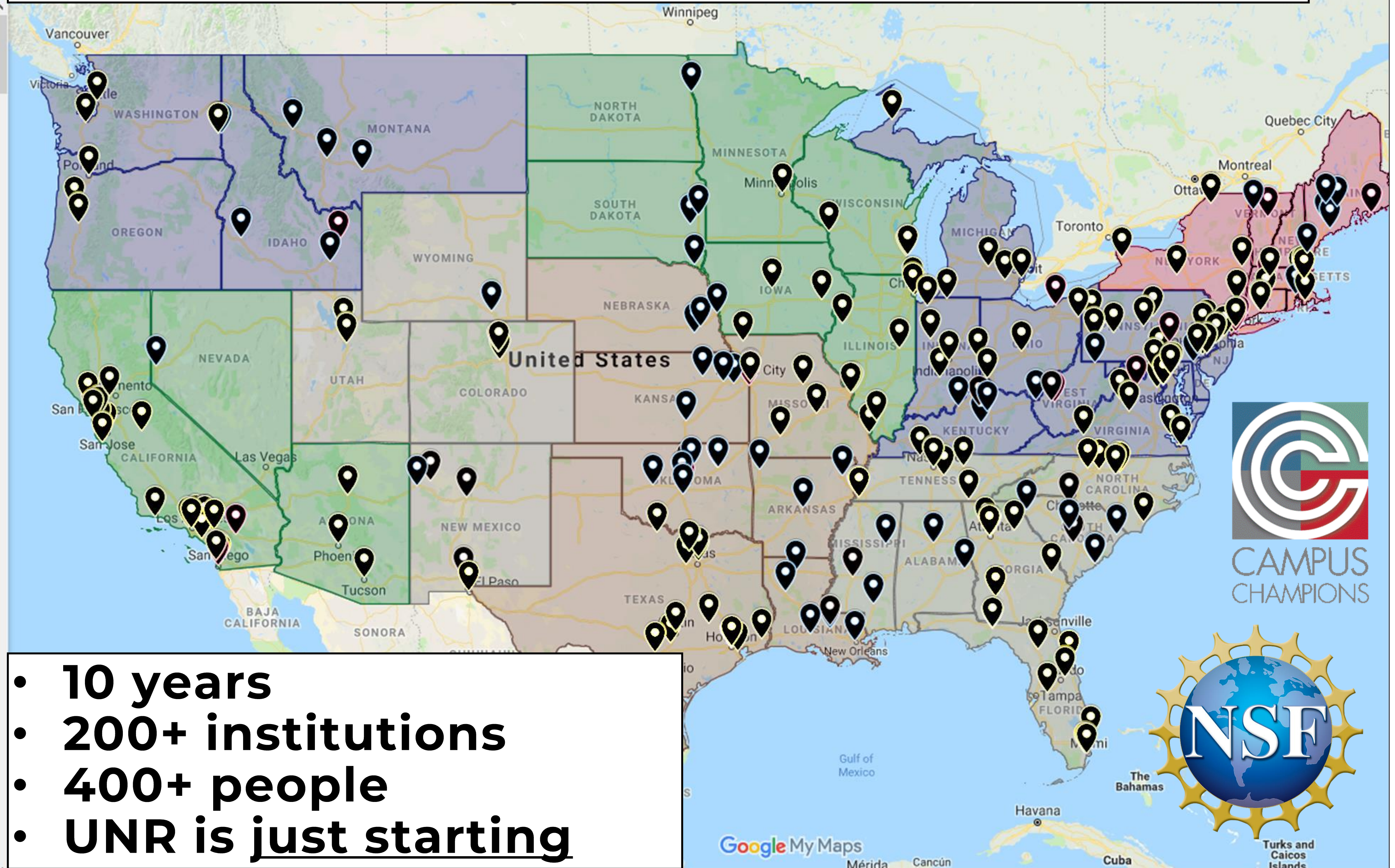
SHARE

champion map data 2018-11-03

📍 Academic institution

Arizona State University  
Austin Peay State University  
Bentley University  
Boston University  
Brandeis University  
California Institute of Technology  
Carnegie Mellon University  
Case Western Reserve University  
Claremont McKenna College  
Clarkson University  
College of Staten Island CUNY  
College of William and Mary  
Colorado School of Mines  
Columbia University  
Cornell University  
Dominican University of California  
Drexel University  
Duke University  
Earlham College  
Florida Atlantic University  
Florida Southern College  
Florida State University  
George Mason University

- 10 years
- 200+ institutions
- 400+ people
- UNR is just starting



# THANK YOU!

- Nevada is engaging the national CI community
- The CC\* DMZ grant is serving as a **catalyst**
- **Challenges:** leadership, priority, procedures
- **Transforming science & engineering workflows**
- Bringing **data-focused tools** to all faculty
- Forging new **community partnerships**

Cyberinfrastructure:  
The key to accelerating science discovery!

South Pahroc Range, NV