GENI

Global Environment for Network Innovations

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NANOG43

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Clearinghouse for all GENI news and documents

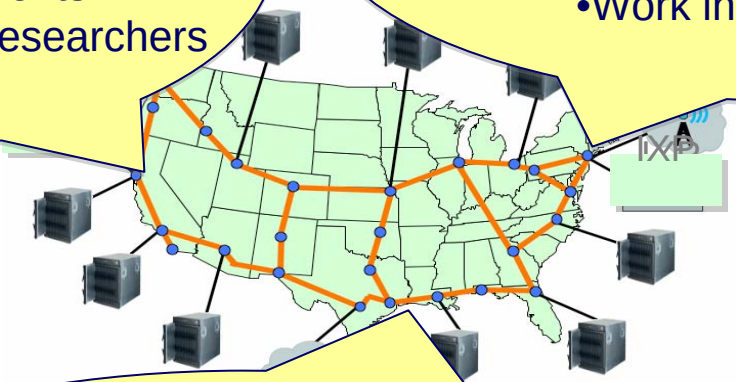
Outline

- What is GENI?
- How will people use GENI?
- Can GENI benefit operators?
- Can operators benefit GENI?

GENI: A national facility where we can explore radical designs for future global networking infrastructure

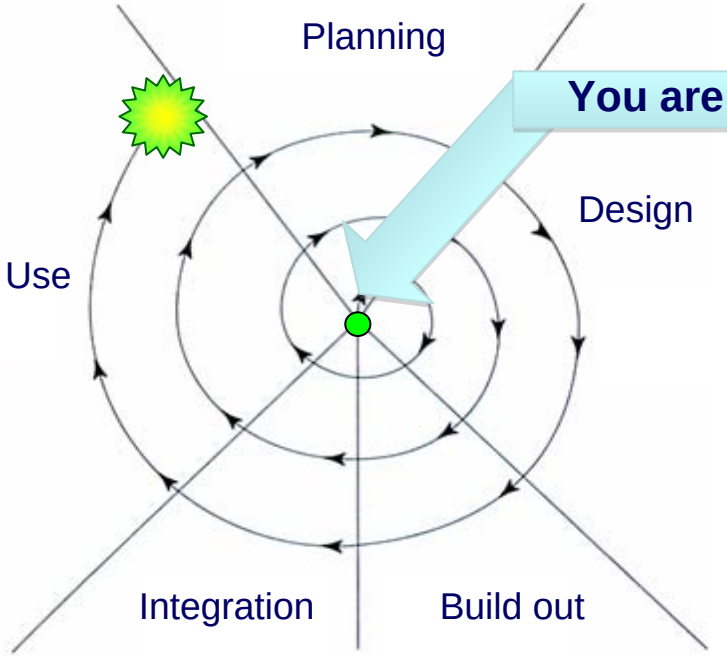
National facility:
- Large wide-area footprint
- Enable large-scale, end-to-end experiments
- Share with many researchers Using virtual slices

Explore:
- Experiment and prototype
- Run in a stable infrastructure with real traffic and network complexity
- Work in an open environment



Future Infrastructure:
- Enable networks without IP
- Include technologies for the next 10-20 years
- Make CPUs, disk farms, switches, optical and wireless components equally accessible and programmable
- Support integral security and privacy
- Involve end users actively in research

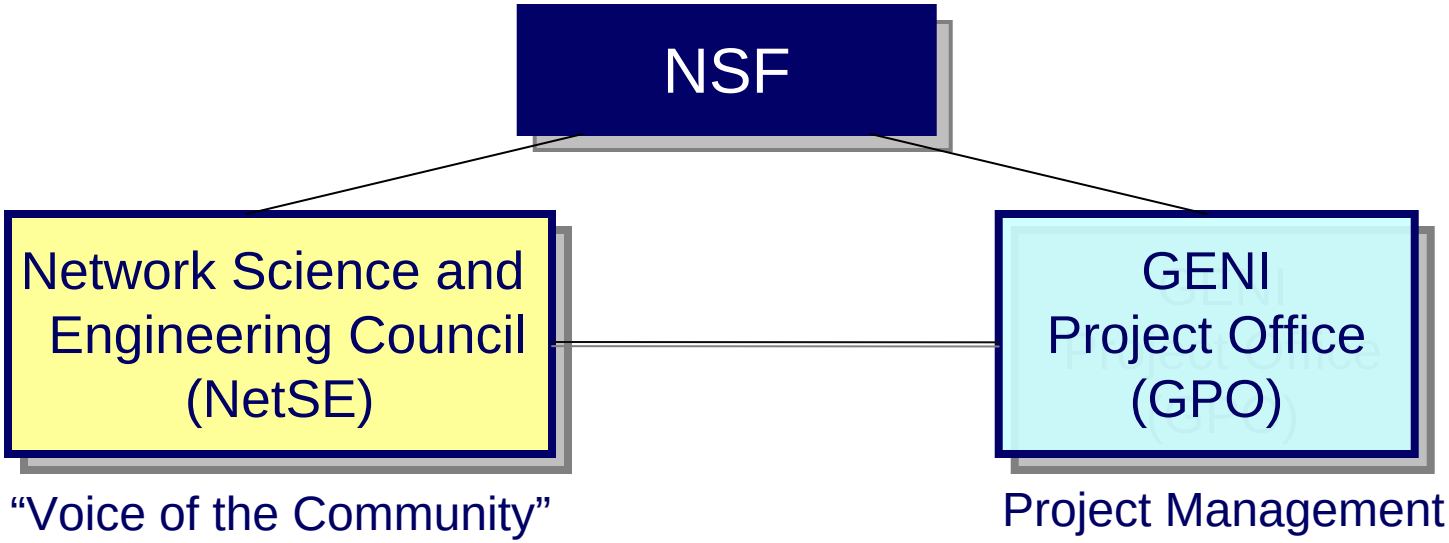
How will we build GENI?



Strawman GENI Construction Plan

- **Large facility with a long lifetime---many things will change!**
  - **3-4 years planning and prototyping**
  - **Many years of operations and use**
- **GENI includes industry, research, and NSF**
- **We have to manage a lot of risks!**
  - **Spiral Development: add new prototypes and improve design with each spin**
  - **Spiral 1 up and running 6-12 months after first "go" decision**
  - **Federation: Existing projects join GENI**
    - **Improve reach and diversity**
    - **Provide expert solutions, not one-size fits all**
    - **Build in more real-world solutions**

GENI Organization



Key Roles and Responsibilities

NetSE

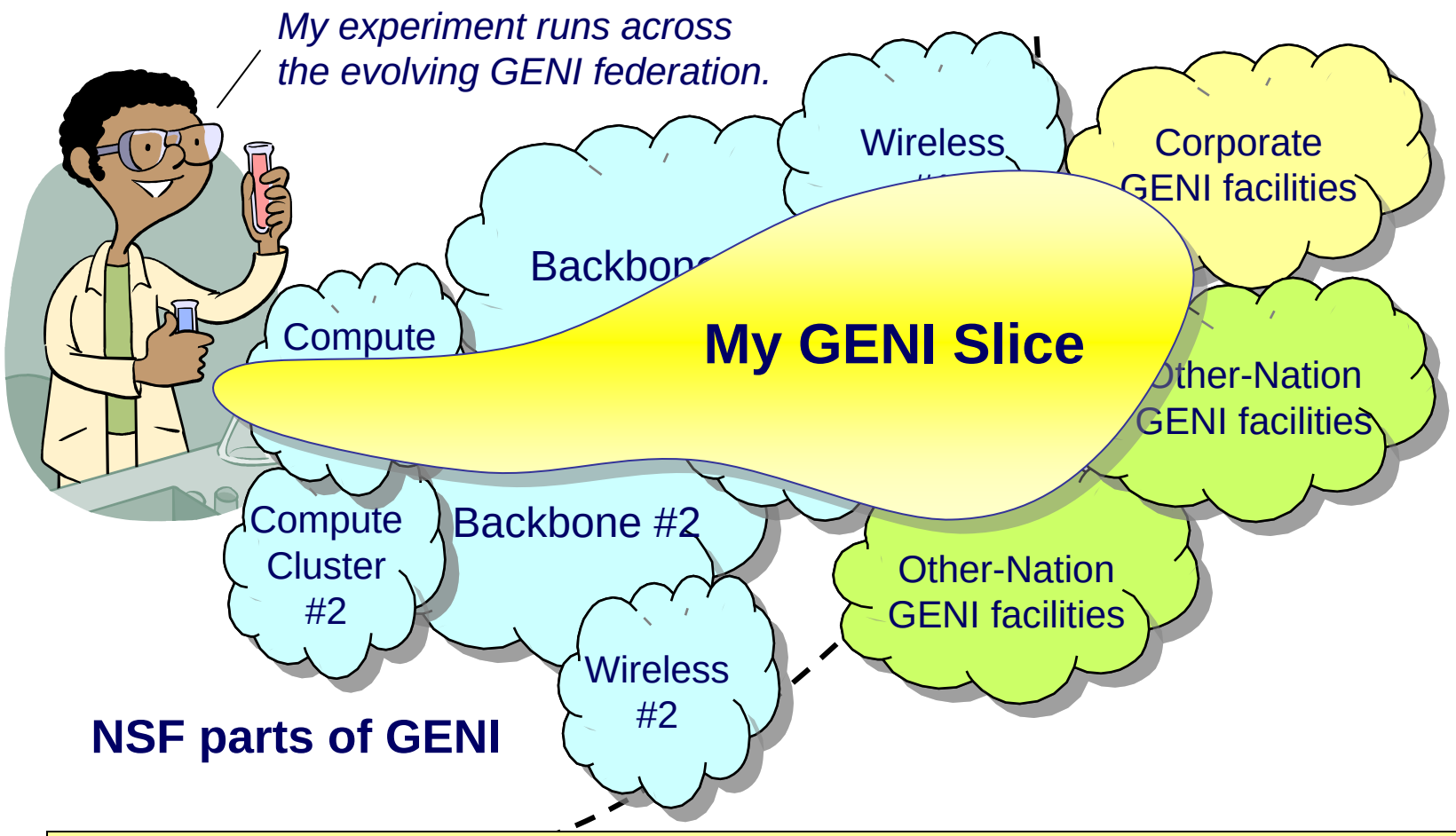
- Definitive source of "what we need in GENI"
- Authors of GENI Research & Education Plan
- Technical advisory & oversight to GPO

GPO

- Project management and execution
- GENI architecture and system engineering
- Cost & schedule estimates for construction
- Authors of GENI facility construction plan
- Home for Working Groups

Using GENI

Researchers incorporate heterogeneous facilities over time



Goals: avoid technology "lock in," add new technologies as they mature, and potentially grow quickly by incorporating existing facilities into the overall "GENI ecosystem"

Using GENI

Reaching beyond one sphere of control

Researcher

Change my slice!

Let me try this!

Internet End User

GENI Clearinghouse

Federated Clearinghouse

Components

Components

Components

Components

Aggregate A
Computer Cluster

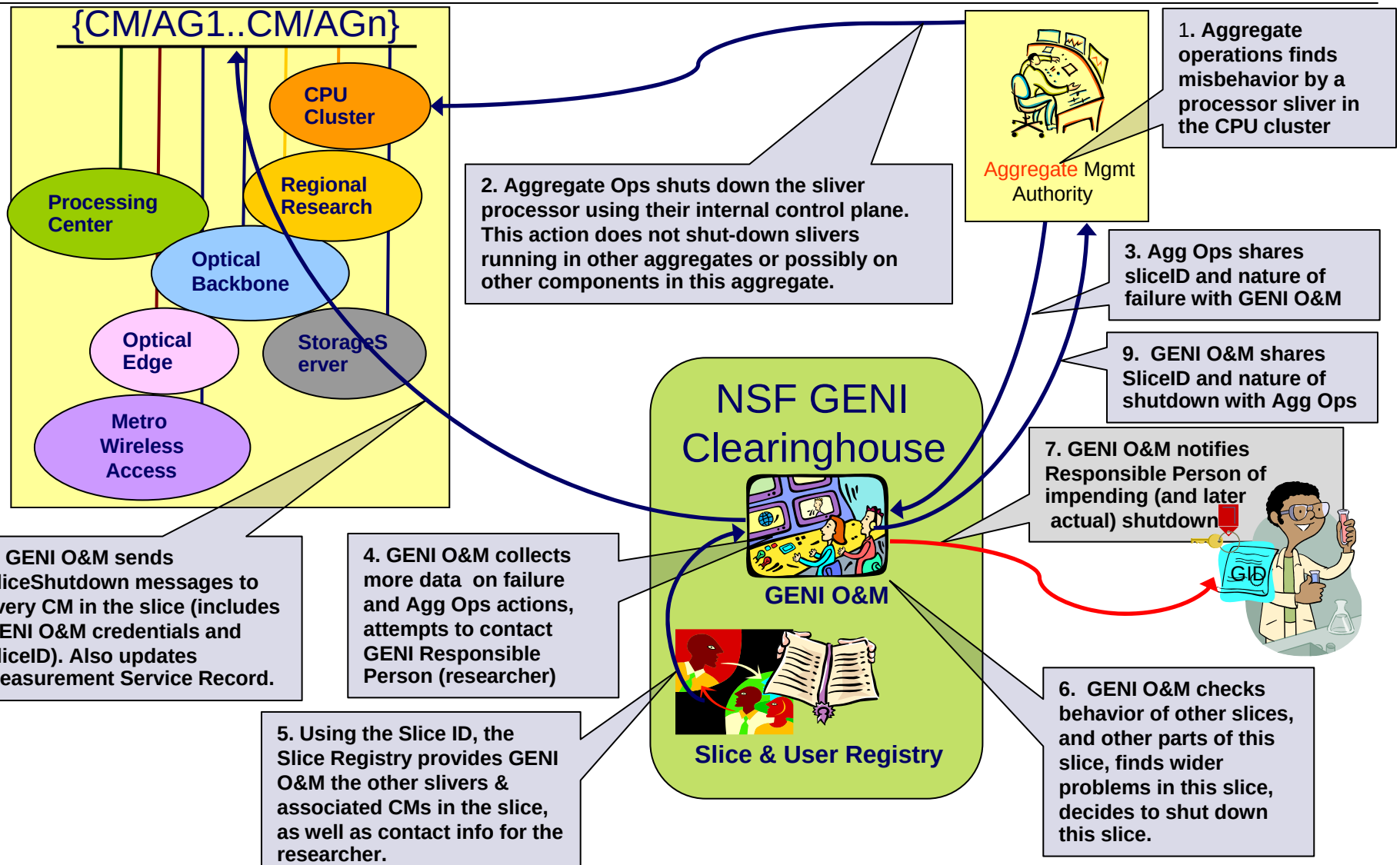
Aggregate B
Backbone Net

Aggregate C
Metro Wireless

Aggregate D
Commercial Resources

Using GENI

Operations Views



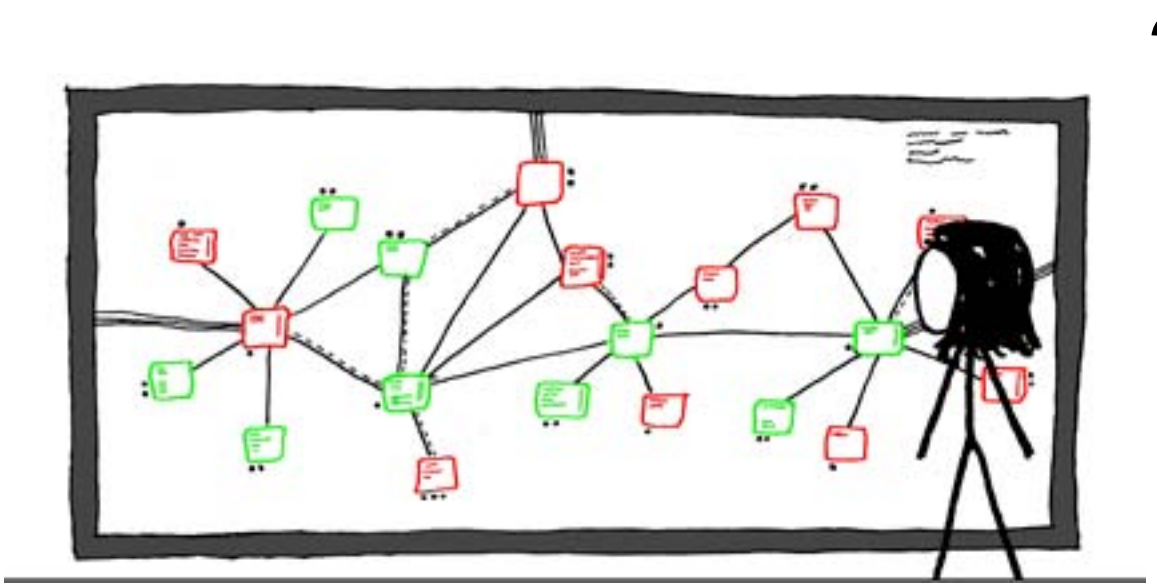
Can GENI benefit operators?

- Work on exchange point technologies, federation, peering
- Work on how O&M spans organizations
- Pro-active security, disaster recovery planning
- Inter-Provider services
- GENI end-user services for diagnosing networks?
- A place to try out your good ideas—e.g. test operations slices for operator tools?

GENI Working groups

- **Operations, Management, and Security**
  How do operators provision, operate, manage, and trouble-shoot GENI? Includes all mechanisms for securely operating the facility, and Operations & Management costs.
- **Substrates**
  All hardware, real-estate, facilities, etc., required for the GENI facility (including optical networks, wireless, computers, etc.) Includes operational expenses for the facility, except Operations & Management costs.
- **Control Framework with Federation**
  Written definitions of the core GENI mechanisms for providing experimental control of a node or collection of nodes. The very earliest version must incorporate federation.
- **Experiment Workflow**
  Tools and mechanisms by which a researcher designs and performs experiments using GENI. Includes all user interfaces for researchers, as well as data collection, archiving, etc.
- **User Opt-In**
  How do “real users” (not researchers) participate in GENI? Includes both mechanisms and considerations such as privacy, etc.

Questions



courtesy xkcd.com