



GENI and Identity Management

LSN MAGIC Meeting – January 8, 2014

Chip Elliott & Marshall Brinn
GENI Project Office
www.geni.net

GENI's design target has been large-scale infrastructure for CS experiments

Science Issues

We cannot currently understand or predict the behavior of complex, large-scale networks



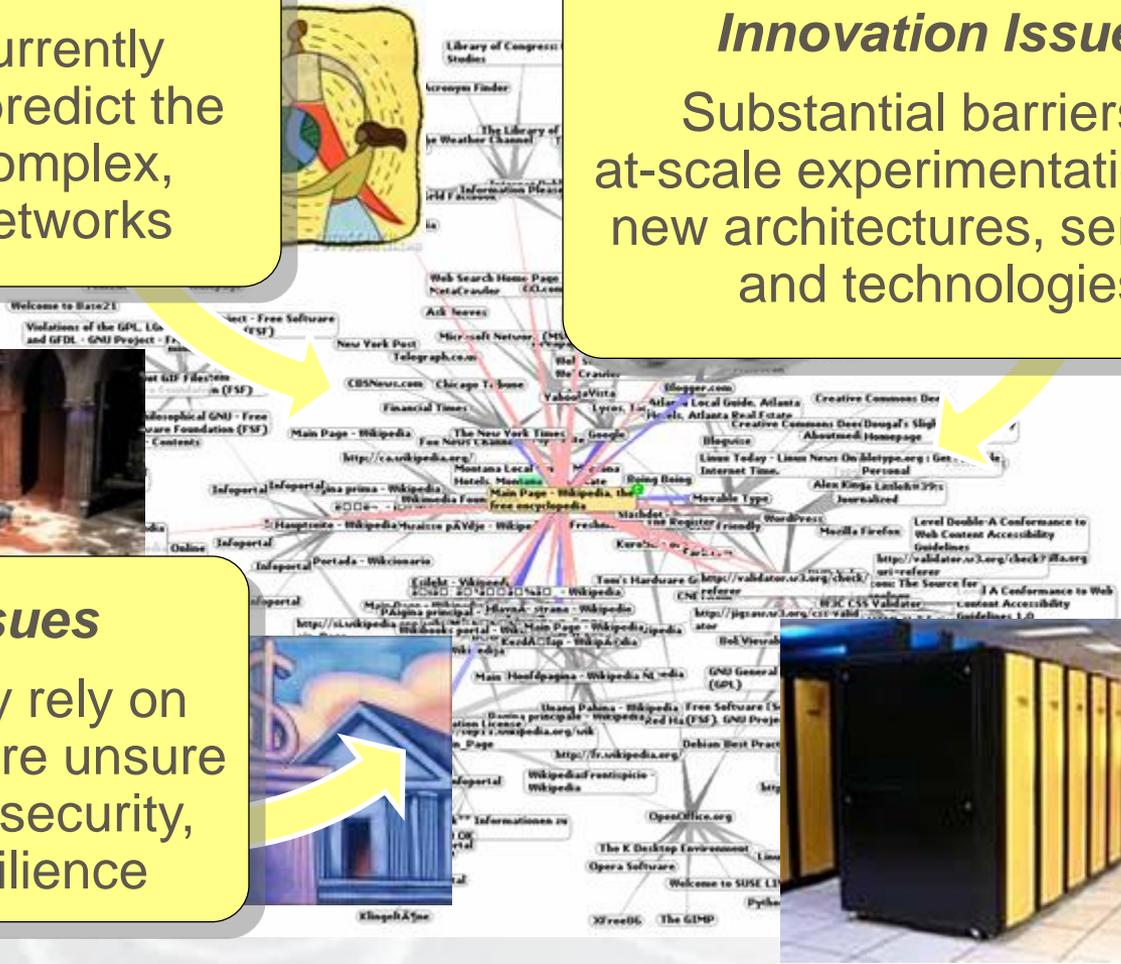
Innovation Issues

Substantial barriers to at-scale experimentation with new architectures, services, and technologies

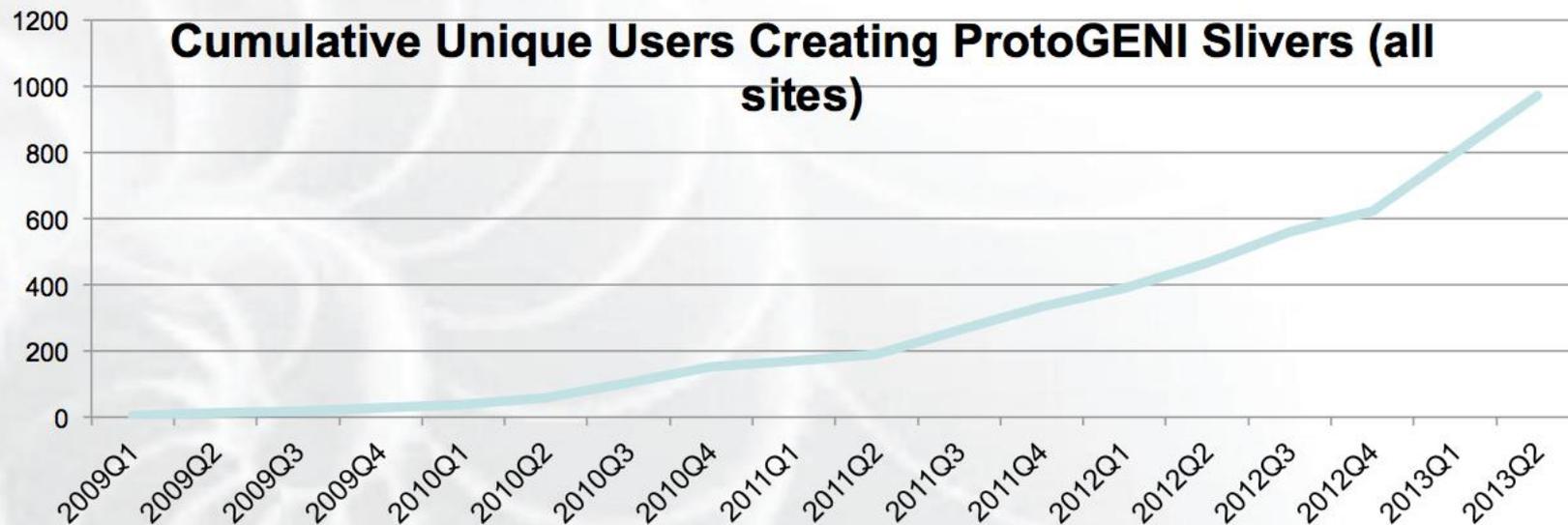
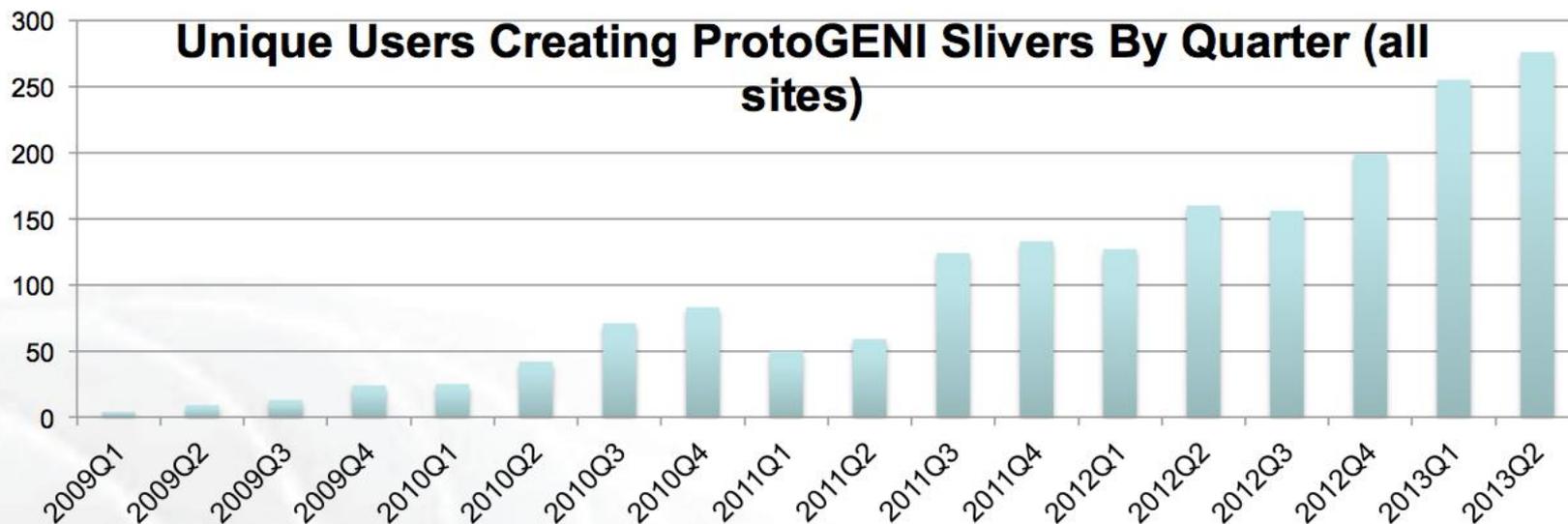


Society Issues

We increasingly rely on the Internet but are unsure we can trust its security, privacy or resilience



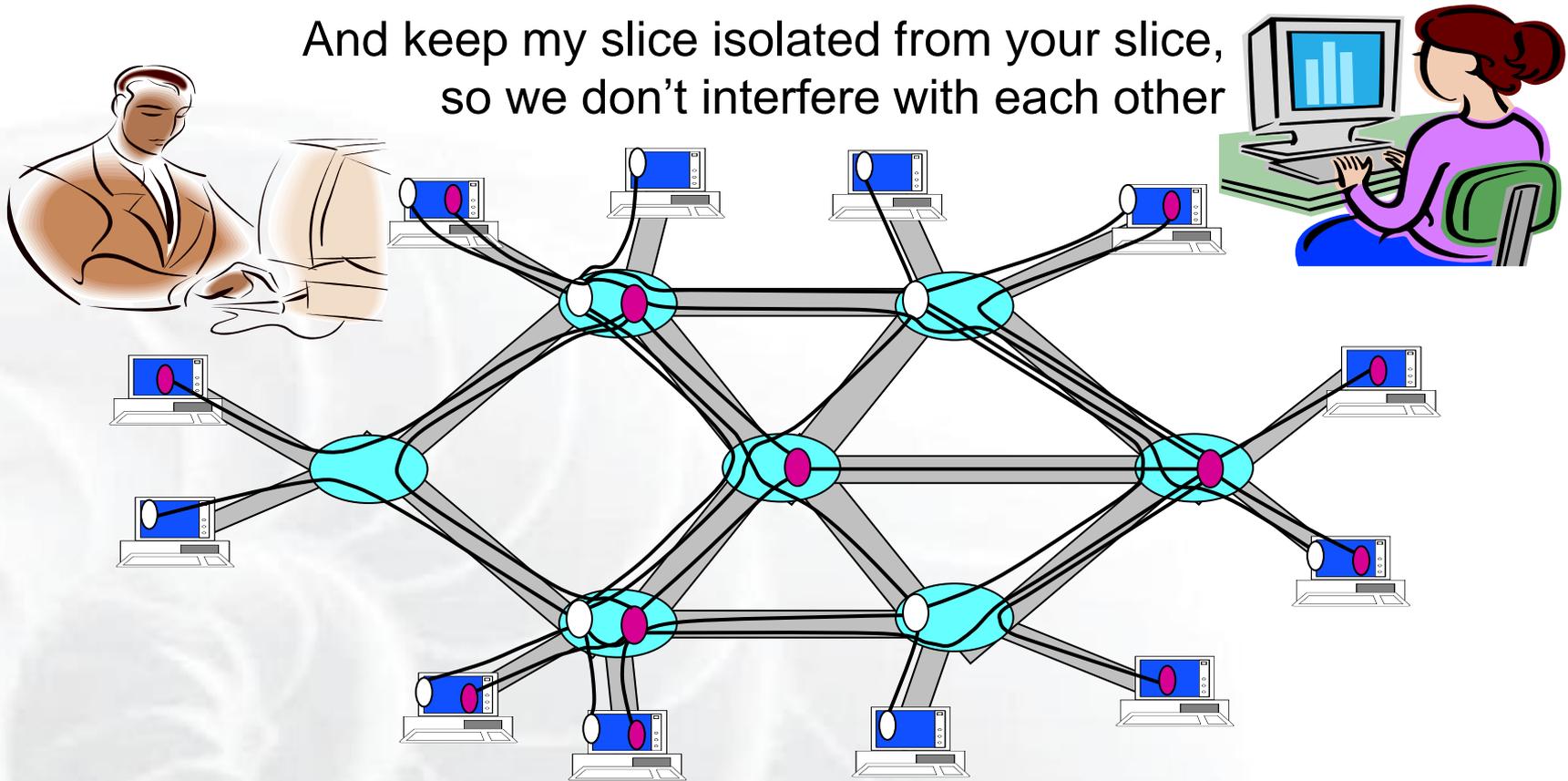
Lively growth in GENI-enabled research



- GENI is a nationwide suite of infrastructure for “**at scale**” experiments in networking, distributed systems, security, and novel applications.
- GENI opens up huge new opportunities
 - **Leading-edge research** in next-generation internets
 - **Rapid innovation** in novel, large-scale applications

Install the software I want *throughout* my network slice
(into firewalls, routers, clouds, ...)

And keep my slice isolated from your slice,
so we don't interfere with each other



We can run many different “future internets” in parallel

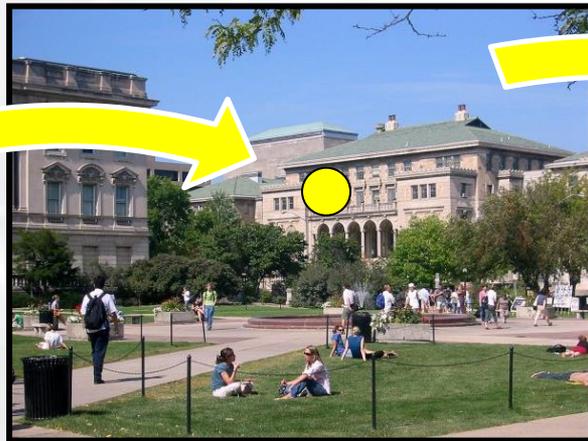
- **How can we afford / build GENI at sufficient scale?**
 - Clearly infeasible to build research testbed “as big as the Internet”
 - Therefore we are “GENI-enabling” testbeds, commercial equipment, campuses, regional and backbone networks
 - **Students are early adopters / participants in at-scale experiments**
 - Key strategy for building an at-scale suite of infrastructure



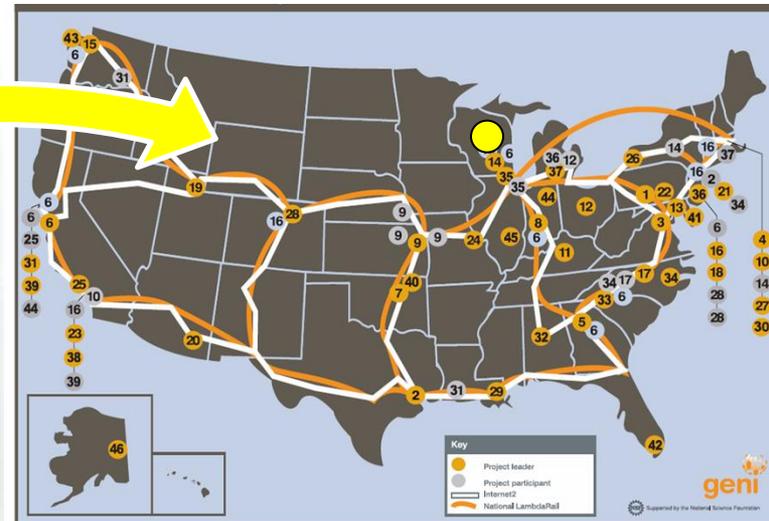
HP ProCurve 5400 Switch

NEC WiMAX Base Station

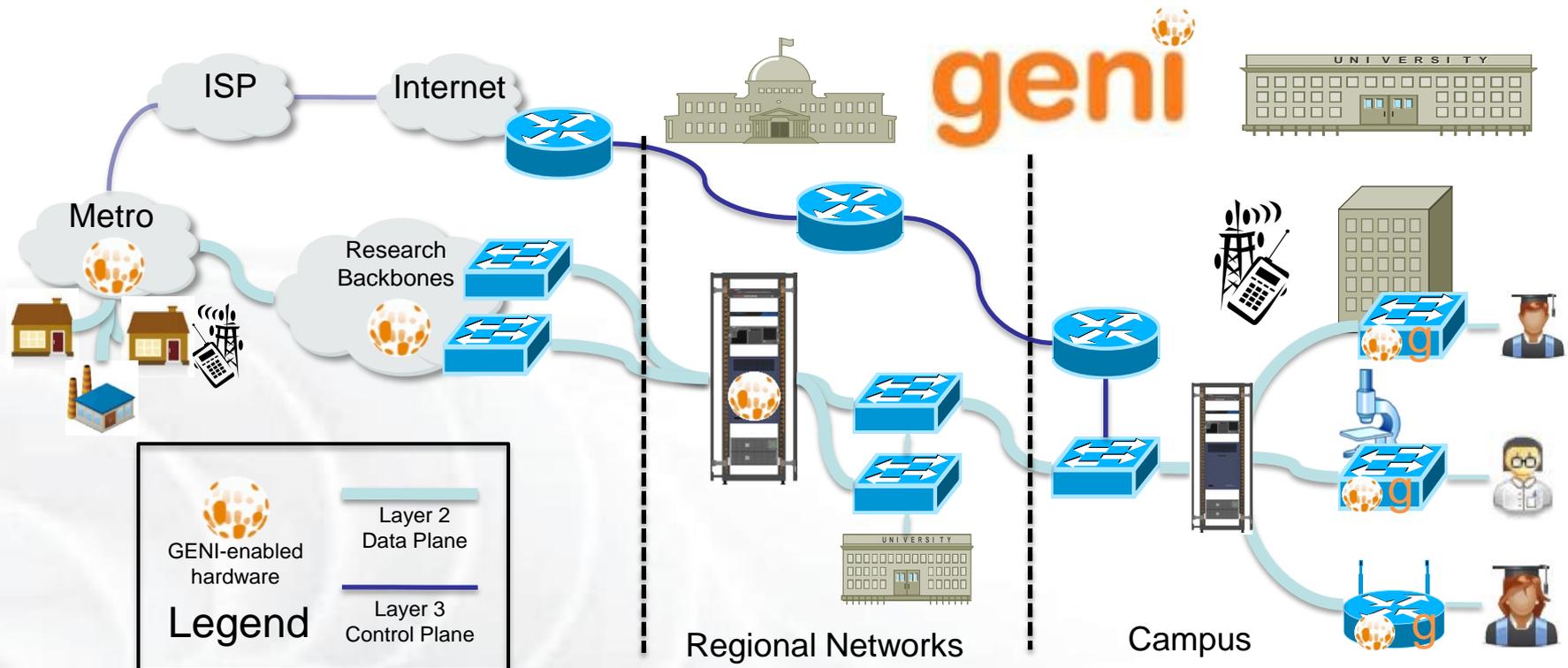
GENI-enabled equipment



GENI-enabled campuses, students as early adopters



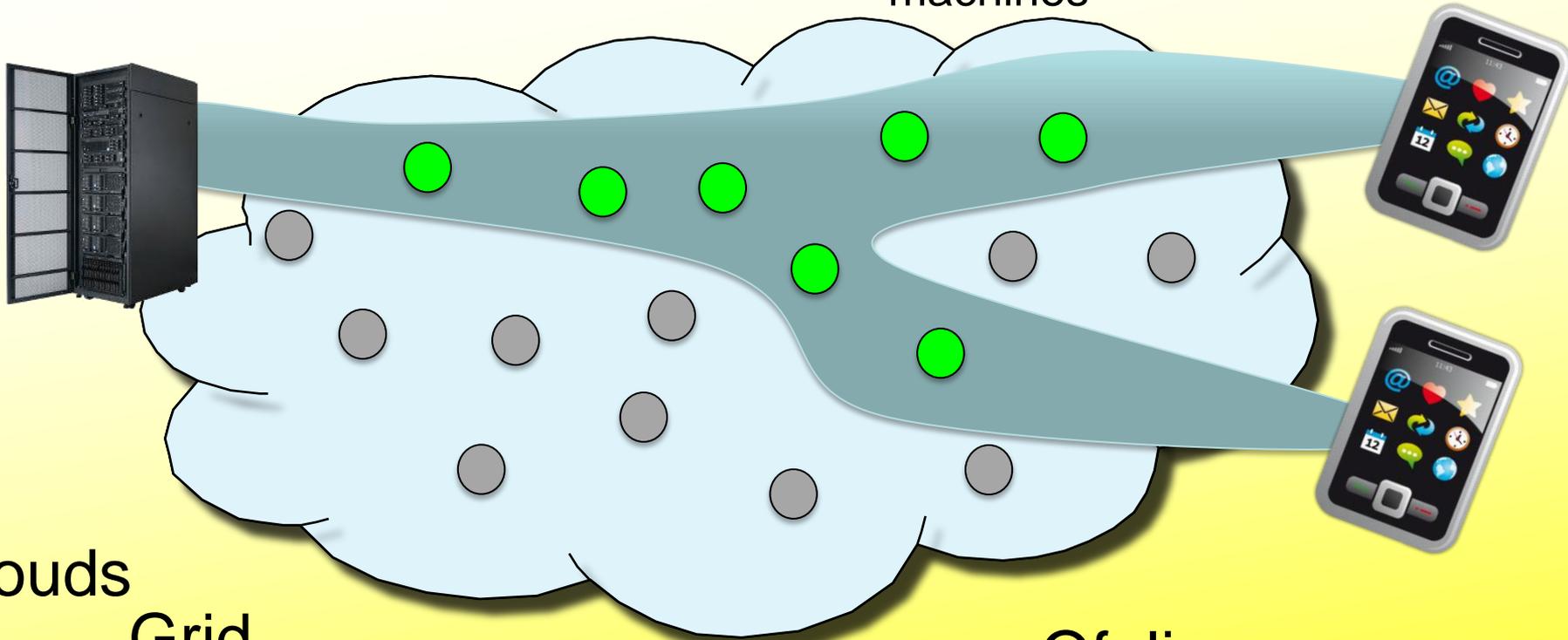
“At scale” GENI prototype



- Flexible network / cloud research infrastructure
- Also suitable for physics, genomics, other domain science
- Support “hybrid circuit” model plus much more (OpenFlow)
- Distributed cloud (racks) for content caching, acceleration, etc.

Rapidly create entire “sliced”
cyberinfrastructure / networks on demand

Fast spin new protocols,
switching strategies, virtual
machines



Clouds

Grid

Software defined
networks

Vnode

Ofelia

US Ignite

Network function
virtualization

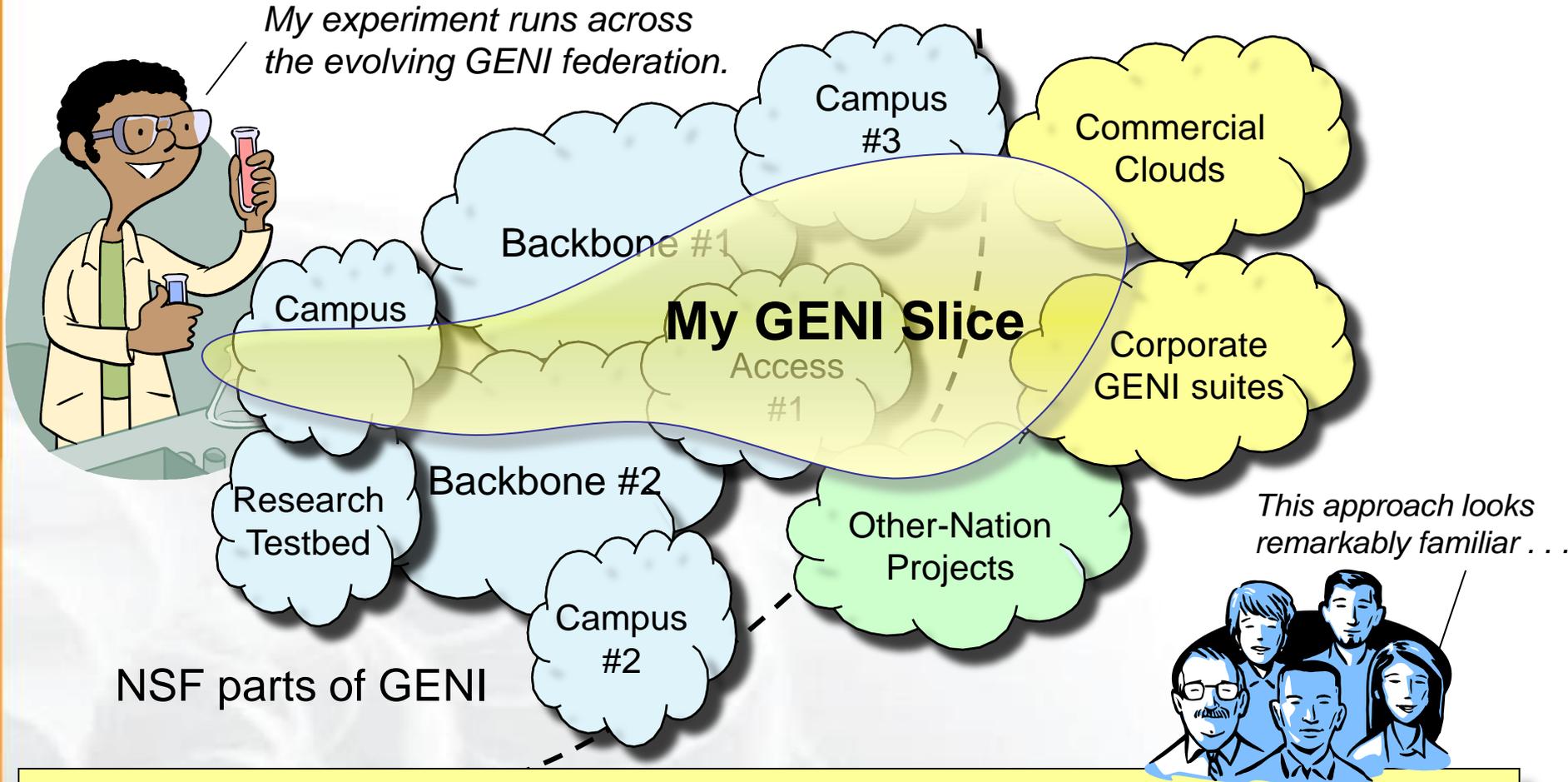
Inter-cloud

Wivi

FLARE

GENI

Researchers run experiments across GENI's federated infrastructure



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