GENI Future Planning Session: Summary, Wrap-up and Open Issues

June 17, 2015

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Let us introduce ourselves…

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- **Session 1: Operations and Sustainment**

- **Session 2: Community Development**

- **Session 3: Governance, Administration and Finance**

- **Session 4: Summary, Wrap-up and Open Issues**

1. How should the need for stability be balanced against the need for new capability; what are the tradeoffs?

2. What are the qualities we should look for in an entity tasked with carrying out operations efforts; who do you think is ready, willing and able to assume that role?

3. What would be an appropriate refresh schedule and how should we set priorities for repair and upgrade for both existing and new sites?

4. What would be some reasonable alternatives for addressing the issues of software obsolescence and incompatibility?

5. How do we address the competing needs of the stakeholders?

1. What are the GENI stakeholder segments?

    a) What are their common needs?

    b) Where do they conflict?

    c) How should the conflicts be resolved?

2. Are we doing a good job reaching our current list of communities?

    a. How do we add to this list?

    b. How do we reach the community members?

3. In addressing the needs of various GENI segments:

    a. What is covered by GENI and what is covered by new research programs?

    b. How should division of that coverage be negotiated?

1. What sort of organizational structure would be best suited for managing each of the key subsets of GENI activities which are expected to continue in the future; can you suggest some candidates who are ready, willing and able to participate in this management function?

2. What are some reasonable alternatives for a governance/decision making process that appropriately balances the need for efficiency against the need for broad community input; which constituencies need to be involved?

3. What are the various needs and requirements over the next five years and how will the various stakeholders provide input regarding those needs?

4. How will the various funding needs be met over the next five years?

    a. Who will pay?

    b. Who will secure the funding sources?

We want to hear from you…

- Now:
  - Complete the index cards on your table
    - Broad community participation is essential for a successful planning process.
      - Are you willing to join a planning committee? Encourage some of your colleagues to get involved? Do something else? Please let us know what you would be willing to do.
      - What factors do you want to make sure are included in the planning for GENI's future?
      - Who else should be included in these discussions?

- Later:
  - Share additional thoughts after the session at: future@geni.net

Session Participation

- Session One: Operations and Sustainment
  - 35 attendees

- Session Two: Community Development
  - 26 attendees

- Session Three: Governance, Administration and Finance
  - 24 attendees

- Session 4: Summary, Wrap-up and Open Issues
  - 23 attendees

Operations and Sustainment

How should the need for stability be balanced against the need for new capability; what are the tradeoffs?

– Is it a false choice; does new capability have to be the opposite of stability?

– Key elements of stability:

- Tools and procedures must continue working across semesters
- Resources must be sufficiently robust so you have confidence that they will be available when you need them

– Important to query community to set priorities appropriately

– Key <u>funding challenge</u>: NSF favors research support over staff support

- Maintenance and operations support are often difficult to fund and this adversely impacts stability
- In contrast, funding for new capabilities is easier to obtain
- Consequently the balance between new capability and stability may be sub-optimal

What are the qualities we should look for in an entity tasked with carrying out operations efforts; who do you think is ready, willing and able to assume that role?

- Key qualities: deep engagement with operational research folks

- Potential candidates:
  - Real-time and Network Systems
  - Campus CIO/OIT staff
  - Additional support personnel as needed to support these candidates

- Critically important that these candidates listen carefully to the researchers to ensure their needs are properly addressed

Challenges of shared infrastructure:

– How to segment / how to coordinate

– Alternatives run from centrally controlled (GPO-type model) to fully distributed (i.e. no GPO equivalent)

– Whatever model is chosen, it is important to keep in mind that the campuses play a big role in the coordination of resources

What would be an appropriate refresh schedule and how should we set priorities for repair and upgrade for both existing and new sites?

- Are we really talking about refresh or is it something more dynamic

- Three aspects to hardware refresh: repair / upgrade / new site

- Need to support research changes very quickly and react quickly to new research fields

- Repair
  - Base the decision on operation statics, nature of the project, project need and provider input

- Upgrade
  - Use common components (building blocks)
  - Treat upgrades like IT projects
  - Balance the phasing in of new while maintaining the old

- New site
  - Recommendation that a committee be established to look at the whole ecosystem.
  - Committee to be responsible for anticipating and addressing future needs
  - New site strategy to be based on committee recommendations

What would be some reasonable alternatives for addressing the issues of software obsolescence and incompatibility?

- What do we mean by obsolescence?
- What do we do with old software / who should own it?
- Relevant categories of software
  - Control
  - Tools, including UI
  - Miscellaneous, including disc images

– Recommend that we adopt a tiered approach

- Core should be the most stable and changes to the core should be limited to what we can afford
- Old software that required continued support
- New software

– Challenged to determine when to switch to a new software base

– Hardware dependence: important to encourage documentation of new software's dependence on existing software and hardware

– Tiered model:

- New
- Old (still supported);
- Core (limited to what we can afford)
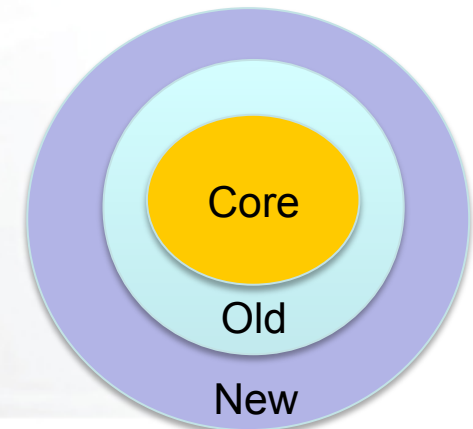
How do we address the competing needs of the stakeholders?

- Who are the stakeholders:
  - Researchers
  - Educators
  - CIO/IT Professionals
  - Infrastructure Builders
- Additional stakeholders include:
  - Cities
  - Application developers
  - Domain scientists (genomic science, etc.)

– Needs of researchers
- Programmability
- Software framework stability
- Repeatability
- Extendibility

– Educators
- Availability
- User support
- Usability

Community Development

What are the GENI stakeholder segments?

a) What are their common needs?

b) Where do they conflict?

c) How should the conflicts be resolved?

- GENI Segments
  - Researchers
    - Value stability, extensibility, state-of-the art resources, low level hardware / software access, availability of GENI environment and effective tools, efficient and supportive campus IT operations
    - Depending on discipline, GENI requirements vary
      - On the network / distributed computing side, preferences towards more GENI infrastructure
      - For other disciplines, preferences toward more high powered computing and a more collaborative model

- Educators
  - Same things as researchers, plus
  - Stability so students can complete their projects
  - Require a high level of predictability and user support
  - State-of the art software in some cases
  - Real-time performance for labs and courseware
  - No serious conflicts between researchers and educators with the possible exception of deadline timing

- Application Developers and Users
  - This includes Domain Scientists, cities and public safety agencies
    » They place a high value on stability and 24/7 availability

- Infrastructure Providers / Builders (e.g., I2 and Merit)
  - Infrastructure builders like to get paid for doing cool stuff
  - To date, GENI has blurred the distinction between the users and the builders and has looked for people who do both

- CIOs & IT Professionals
    - Don't ask them for resources; GENI must provide
    - They place a high value on stability; don't make waves
    - Cannot own an additional high maintenance obligation
    - Must keep college president, provost and faculty happy
    - They will participate in a collaboration only if it is advantageous than buying their own
    - Must have a credible support model
    - They will only support a community infrastructure which benefits their campus

Are we doing a good job reaching our current list of communities?

a)   **How do we add to this list?**

b)   **How do we reach the community members?**

- Support community including CIOs and IT professionals, infrastructure builders, industry, local government
  - Their infrastructure decisions are client driven
- Client community
  - College and university educators
  - Network researchers
  - Domain scientists
  - Excluded communities
    - Municipalities
    - Coding groups
    - K-12
    - Industry

- How do we add to this list?
  - Should we add to this list?; Can we afford to add additional stakeholders?
  - Work with US Ignite and local governments to add to the list of communities
  - Provide outreach in conferences
  - Encourage researches to cite GENI
- Room for improvement
  - Show IT staff value added in terms of campus connectivity
  - Make things more stable, accountable and transparent
- What we are currently doing?
  - GENI Wiki: Easier to find wrong things than right things
  - Tutorials: Onsite tutorials do a good job; we need better online tutorials to scale to community size
  - Summer Camp
  - Other docs
  - Feedback and travel grants
  - General
    - Need more pull and discoverability
    - Need to transition from ad hoc to systematic processes on outreach

– Additional stakeholders include:

- Cities
- Application developers
- Domain scientists (genomic science, etc.)
- Self sustaining industry partners

In addressing the needs of various GENI segments:

a. **What is covered by GENI and what is covered by new research programs?**

b. **How should division of that coverage be negotiated?**

- Stakeholders
  - Network researchers: directly funded by GENI and participant in GENI governance
  - Domain scientists: indirectly funded by GENI; shared infrastructure and shared governance
  - Educators: funded by GENI with input into governance issues

- Commercial operations: challenge to engage with GENI community / coerce; observer / commenter status on governance issues
- US Ignite and others: engage with GENI community and mutually agreed governance relationship
- Infrastructure builders (e.g., cloud lab): engage with GENI community and mutually agreed governance relationship

– What do we do by infrastructure and what do we do by policy?

- Currently both are used
- Depending on the stakeholder, one is more appropriate than the other
- Role of peer pressure in enforcing community standards
- Is GENI infrastructure, policy or both?
- This is different from the world of the old Internet when elements did not have to work together

– How to make new tools interoperable
– Two perspectives on the role of GENI:
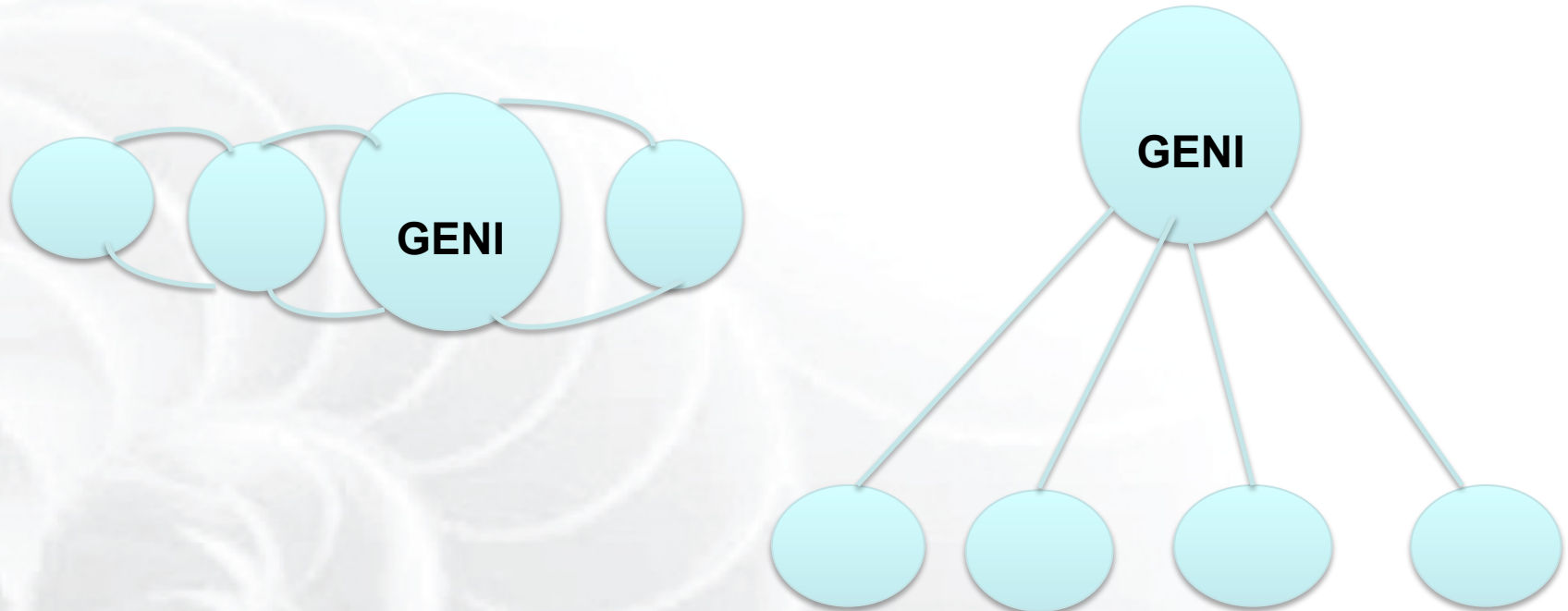
GENI

GENI

Governance, Administration and Finance

What sort of organizational structure would be best suited for managing each of the key subsets of GENI activities which are expected to continue in the future; can you suggest some candidates who are ready, willing and able to participate in this management function?

- Governance Functions – see next slide

Governance Functions

Governance Functions	Highly Centralized	Coordinated	Distributed
Project Management/Fundraising/ Budget/Legal	X		
System Engineer		X	
Strategic Planning/Priority	X (with input)		
Asset Ownership and Management	Software		Hardware
Ops / NOC/Help desk	X		
Infrastructure deployment and Expansion		X	
GENI Community Outreach and Growth	X		X
Enhancing GENI capabilities		Deciding	Doing

What are some reasonable alternatives for a governance/ decision making process that appropriately balances the need for efficiency against the need for broad community input; which constituencies need to be involved?

- Governance Model – see next slide

Researchers will drive the governance

– Executive Committee-Centric (modeled after DFN)

- Consults with advisory board
- Oversees infrastructure, tools, researchers, users
- Cross representation on sub groups
- Each stakeholder represented on executive committee
- Priorities set at semi-annual meetings
- Tasked with fostering collaboration with international efforts
- Small group formulates policy proposals; large group votes
- Decides how much each group gets funded
- Universities pay to join

– Don't reinvent the wheel; research how other organizations do this (e.g., astronomy, DFN)

What are the various needs and requirements over the next five years and how will the various stakeholders provide input regarding those needs?

- Core GENI
  - Maintaining relations/liaising with GENI-enabled holders
  - Responsible for infrastructure maintenance
- Users
  - Relationships with experimenters
  - Responsible for experimenter support
- NSF future cloud, etc.
  - Ongoing evolutions with GENI
- Relationship with GENI "peers" and other external stakeholders

- Ongoing operations
  - Consists of keeping things running, debugging and maintenance and staffing help desk
  - Monitoring functions

- Maintenance (hardware and software upgrades)
  - Emergency versus normal (every 2-3 years)
  - Hosting of tools; development
  - New elements (such as new software) – both development and integration

- Existing investments for infrastructure as universities
  - I2
  - Hidden costs
  - Staffing for GENI

Session Three – Question 3 (cont')

- User support and training, both local and global
  - User management and verification
  - Documentation
- Developing and growing out the community
- Internal and external evolution of GENI
- Law enforcement / regulatory requirements (as distinct from monitoring)
- Work on standards committee, including collaboration with other organizations and nations

How will the various funding needs be met over the next five years?

> **a. Who will pay?**
>
> **b. Who will secure the funding sources?**

- Money for operations
  - Refresh
  - Keeping the GENI Wiki up and running
  - Growing the GENI infrastructure

- Who will pay
    - IT (Cyber-Infrastructure Plan)
    - Regional governments
    - Local Governance with U.S. Ignite
    - Industry Funds
    - Student Fees (use of IDC reallocation mechanism; dependent on campus policies)

- Who will secure:
    - Experimenter utilizing their budget
    - CIOs
    - Regional government networks
    - Universities to secure funds from industry
- Top-down model
    - Consortium (fees by members)
- Bottom-up model
    - Usage pays for resources

Thank you for your participation
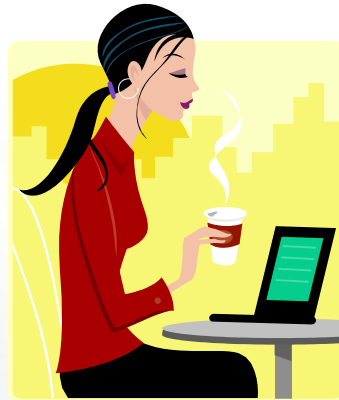
Share additional thoughts at:
future@geni.net