GENI Operations and Integration Activities (by proposed/current organizations)

Note: This document contains a list of current and anticipated GENI activities, broken down by potential future performers. This should be considered a draft and everything is subject to debate: the activities and their priorities, the performers and the assignments of activities to performers.

 GENI Council
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1. Authorize significant non-maintenance improvements in hardware, capacity, or tools.

2. Review periodic operations reports (including metrics) and set long-term priorities.

3. Authorize decommissioning for GENI-wide operations support (e.g. phasing out starter racks).

4. Maintain and revise GENI Recommended Use Policy.

5. Maintain and revise GENI Aggregate Provider's Agreement.

6. Maintain and revise GENI policies for granting GENI accounts and privileges on GENI resources.

GENI Admin
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1. Track government property hardware (or transition ownership from government to sites)

2. Track warranties for new GENI-purchased hardware (for free vendor support) (Sites track their own warranties if they own their equipment.)

3. Tracking and renewals of geni.net domain, GENI AS, and any services owned by GENI (e.g. web hosting).

4. Contract and budget/expense tracking and coordination for yearly operations subcontracts.

GENI Site Engineers (may also include a Co-ordination Committee)
(distributed contributors at core networks, regional networks, campuses, and industry that provide GENI resources)
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1. Provide standard IP connectivity for the GENI control plane and layer2 VLAN

connectivity to research networks for the GENI data plane. Provide multicast VLANs when needed (not the norm). Configure, debug, and repair connectivity or investigate issues with drops, latency , etc. Engineer and maintain compatibility of local GENI resources with local Firewalls, IDTs, IT procedures and acceptable use policies. (Notes: The Aggregate Provider's Agreement describes at a high-level how site engineers work with GENI. The GENI Recommended Use Policy describes at a high level GENI-wide use policy.)

2. Provide integration support to adapt GENI infrastructure to changes in core, regional, or GENI interfaces or functions (past examples: data center moves, ION decommissioning in the core network, addition of Science DMZs).

3. Diagnose and repair reported site or aggregate resource problems, scheduled maintenance activities and LLR issues.   Notify operations of site events that impact GENI (e.g. power outages, planned maintenance, moves) Coordinate work with Operations and Maintenance Group.

4. Purchase and install replacement hardware for failed rack or switch components (or retire equipment and contribute to "spares" pool for other locations. (There is no longer any hardware maintenance contract in effect for GENI-owned hardware.)

5. Plan for GENI upgrades, enhancements, and refreshes.

6. Support requests from the GENI Council.

GENI Operations and Maintenance Group
(distributed group of contributors with dev ops and network engineering expertise (currently GPO, GMOC, UKY, U of Utah, RENCI, MAX, Rutgers and LLR Reps).
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1. Support and track requests from site engineers, site coordination committee, and GENI council.

2. Provide integration support to adapt GENI infrastructure to changes in core, region, or GENI interfaces or functions (e.g. data center moves, ION decommissioning in the core network, addition of Science DMZs).

3. Diagnose and repair reported site or aggregate resource problems, scheduled maintenance activities and LLR issues. (Coordinate activities with Site Engineers.) (Support for production resources and some prototypes currently.)

4. Provide problem reporting, tracking, and response coordination where needed
        -Operate 24x7x365 operations support desk (available via web, email or phone) (Provide GENI-wide tracking, reporting, and Emergency Stop /LLR response at any hour. Track scheduled maintenances of software, hardware and networks.) GMOC
        - Coordinate with other related support desks (e.g. AL2S ticketing and

escalation). GMOC
        - New rack turn-up tickets (coordinating new rack provisioning and release to GENI) GMOC
        - Manage GENI account requests from GENI portal and IdP. (Many GENI resources manage their own accounts without the GENI portal, and this is not expected to change.) (Currently GPO, but expected to transition)
        - Provide engineering support for tracked issues and scheduled maintenance (during EST business hours only)
                IG racks (UKY and U of Utah)
                EG racks (RENCI)
                Wireless campus infrastructure (GPO and Rutgers)
                Stitching (MAX, I2 and GPO)
                Special VLANS (e.g. static, multipoint) (GPO and I2)
                Production AL2S AM (Internet2 Engineering)
                Production Stitching Computation Service (I2 and MAX)
                AL2S, FlowSpace Firewall, OESS (Internet2 engineering)
                Mesoscale OpenFlow network (Internet2 and GPO--will not transition)
                FOAM/FlowVisor (GPO, probably will not transition)
                OSCARS (for stitching) and its replacement (Internet2 Engineering, MAX)
                Special-purpose connections or hardware (e.g. multicast, GEC meeting VLANs, etc.) (varied groups)
                Security Incidents (reported by sites or detected by monitoring). (GPO, rack teams and others as needed. Frequently only GPO and rack teams.)
                LLR events (GMOC and 2 LLR representatives support incident response escalation. Currently role is filled by one volunteer and the GPO)
                Actionable monitoring or syslog reported events (anything else not already called separately where support is needed)
                GENI portal, clearinghouse and IdP events (Currently GPO, but expected to transition.)
        - Engineer and track GENI international connectivity.   (Organizations with international expertise, such as StarLight lead. GPO coordinates and tracks some resources such as VLANs.)

5. Maintain and revise operations workflows and procedures. (Currently GMOC and GPO, but expected to transition)
        - Security and Legal/Law Enforcement/Regulatory Events
        - Emergency Stop
        - Aggregate information pages on GENI wiki (site specific info on contacts, networks, VLANs
etc. needed for ops support)
        - Handoff coordination between ops organizations
        - Testing (e.g. site confirmation tests for racks)
        - Configuration procedures (for routine changes to GENI racks, e.g. changing VLANIDs, to avoid escalation)
        - Rack release procedures (track when a rack is ready for listing in portal and experimenter use, transition it from provisioning to operations). These will be modified for new GGF procedures.

- Event review procedures. (depends on new governance structure)

5. Maintain and Operate Operations Tools (currently many contributors in GENI)
- Monitoring
Aggregate data (provided by rack team developers at racks)
External checks (e.g. stitching, OF)
Wireless base stations and networks (based on WINLAB)
Maintain correct configuration of items to be monitored
Collect and archiving of GENI-wide monitoring data (UKY)
Generate alerts for events that require investigation or action
- Reporting
Track usage of links and devices, deciding when more is needed
Track slices and slivers (also queries for debugging/security events)
Track capacity to support usage planning
- GENI Wiki and repositories (config management and support, not content)
www.geni.net
GENI Engineering Wiki
Several development wikis and repositories, all transitioning to public
Githubs
- Stitching VLAN delegation page (MAX)
- Mailing lists (transitioning to public services like Google)
- IRC (already public service, requires minor channel maintenance)

6. Maintain running GENI Software services

The GPO currently manages a set of running GENI software services, the management
of which will be transitioned to broader GENI community in the coming years.
- GENI Clearinghouse : The Service Registry(SR), Member Authority (MA) and
Slice Authority (SA) service implementations.
- GENI Portal: The web-based tool for managing SSO-authenticated access to
GENI Clearinghouse and Aggregate services and resources.
- GENI IDP: The GENI-internal identify provider for those members who are
granted GENI accounts but do not have membership in an InCommon, Cafe or other
federated Identify provider.

This process will incorporate software revisions as appropriate, coordinating and
communicating upgrades with the various affected members of the GENI community.

7. Account maintenance processes

The Governing board makes policy decisions as to who is to be granted GENI accounts
and GENI privileges based on applicable GENI policy. These decisions are enacted by
maintainers of the underlying GENI Clearinghouse and IdP, in which such accounts are
created and privileges and attributes are added, modified and removed per direction of
the governing board.

GENI Provisioning Contributors

Provisioning a new rack, network, or campus for GENI. This activity involves all the proposed teams and includes many steps, so it is not listed under any particular organization.   We do not expect a large number of new racks. Provisioning for InstaGENI racks is transitioning from GPO to UKY (both with Utah backup if needed). Provisioning for ExoGENI racks continues with RENCI, except for GENI-specific provisioning (e.g. hardware OpenFlow with an external controller), which GPO currently handles. Provisioning for network switching (layer2 data plane outside of GENI racks) is usually done by campus or network providers working with the GPO. Provisioning for wireless aggregates and campuses is done by GPO, Rutgers and site engineers.

Provisioning begins when someone notifies GENI about a resource that they intend to make available or purchase, and ends with the resource has been successfully integrated and tested (site confirmation testing for rack resources, other interoperability tests for other GENI resources). Some provisioning information (addresses, VLANs, site agreement with Aggregate Provider Agreement) is tracked by the operations and maintenance engineers after provisioning

Provisioning contributors should be familiar with network engineering and should be able to use scripting languages. The number of engineers depends on the number of new racks and their locations. Resources may take a few weeks or much longer to complete provisioning, depending on resource complexity and interactions with the site and other GEI contributors.

GENI Prototyping Contributors

The GPO often lends development and network engineering expertise to GENI-affiliated groups building new capabilities that are especially relevant to operations. Local site engineers at campuses and networks have also been involved in hosting, integration and support for prototypes before they were available to the general GENI community. We should consider how much of this activity should continue after 2017. Examples of current collaborations include projects listed below.

     SDXs (some work with SOX and StarLight, RENCI, U of Utah)
     Development SCS and AMs (MAX)
     WINLAB software for wireless infrastructure and tools (Rutgers)
     OpenFlow (hardware-based) v 1.3 rack upgrades (Internet2, UEN, and SOX)
     USIgnite racks (if they differ in function from current racks). USIgnite (not
underway currently)

GENI Software Maintainers
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1. Software repositories.

The GPO maintains several repositories of open source software containing the source for various critical GENI interfaces, services and tools. These repositories are maintained in GitHub, the control and maintenance of which will be transferred to the GENI community. Maintenance of these repositories entails reviewing and prioritizing open issues, reviewing and incorporating GitHub pull requests, ensuring that the current documentation matches the current capabilities and that new releases are publicized, appropriately tagged and maintained.

The management of the repositories (those with release, merge and push privileges) will be handled by a small group of developers from within the GENI community authorized by the GENI Council. The actual bug fixing and submission of pull requests will be done by the full community of GENI developers.

The following is the current list of GitHub software repositories:
- geni-ch : The software and documentation for the GENI Clearinghouse.
- geni-tools: The software for omni, stitcher and the gcf tool frameworks
- geni-portal : The software and documentation for the GENI Portal tool
- geni-ar : Tools for managing GENI account and privilege requests.
- geni-eds : The software and documentation for the GENI-internal Identify Provider (IdP).

Other software tools that are or are part of critical GENI tools such as Jacks, the Speaks-for Signing tool and GENI Desktop are maintained in their own repositories by their respective developers.

2. Software interfaces.

The GENI community will maintain a set of standard interfaces that are used within GENI and by other related projects and testbeds. The Aggregate Manager (AM) API and Common Federation (Clearinghouse) API are documents collaboratively managed by members of the GENI community as well as maintainers and developers of other testbeds (e.g. Fed4Fire, Emulab) The GENI community will continue to collaborate with these groups to ensure that these interfaces grow to meet changing requirements of the service and tool developers.

3. GENI Architecture Team

The GENI community will continue to manage and maintain the GENI architecture team, identifying issues and goals for future GENI architecture and development efforts, and prioritizing community-contributed issues identified in GitHub repositories.

In this capacity, the GENI Architecture Team will also advocate for architectural progress and uniformity across GENI and other national and international CISE cyberinfrastructure with the goal of expanding resources available to experimenters by

enhanced cross-organizational overall interoperability, connectivity and collaboration.