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Perspective directions of a further GENI development:

1. Connecting with non-US test beds (Europe, Russia, Asia). We need the common architecture and the interfaces for that on the different levels. May be it is worth to organize the international working group with focus on this problem.

This group could cover the network federalization policy and regulation problems. This group can also issue the requirements to SDX.

2. Recent GENI topology fits WAN backbone networks. But for real use-cases now, it's also important to have topology with a lot of backup paths.

That will fits requirements of real L2 network for distributed Enterprise (companies with branches), for WAN segments (local regions' segments connected to the backbone), data centers, SDX segments, etc.

3. SDN-T is also promising topic that would be good to work with in GENI. What the proper architecture for Automated Switched Optical Network should be based on SDN approach?

4. GENI might be place to test new approaches in NFV orchestration. For example, <http://sdn-space.com/>.

5. Standardization and development of Virtual Laboratory (VL) API. VL is a network and compute environment that provide services for scientific research (simulation tools, calculation tools, visualization tools).

VL API will produce possibility to exchange the research experience among different cloud platforms.

6. Development of a universal cloud platform monitoring system. There are a lot of parameters that cloud be stored in cloud platform logs.

The idea is to provide user-oriented (cloud admin-oriented) metrics to simplify the analysis of huge amount of monitored parameters.

7. There several types of migration in cloud environment, e.g. virtual resource migration (VM, storage and etc) and infrastructure migration

(openstack farm, vmware esxi farm and etc).

We can also distinguish the control migration, when the resource stay on the same geographic place, but their owner is changed.

The idea is to developed special API of «control migration» among several cloud platforms.

8. One of the most exciting opportunities opened by GENI is a its ability to consolidate diverse computation resources, owned and controlled by different organizations, into a single heterogeneous environment, and time-share it among the project participants. It would be very attractive to cover HPC resources. The problem is HPC basic software does not allow the level of resources control and management.

There are a lot of interesting and perspective scientific problems, which is hard to solve at the supercomputers due to their narrow specialization.

These projects often lack progress because the research center does not have enough funds to maintain required computational facilities.

Cloud services do not solve the problem because they do not visualize a full set of features provided by the physical equipment, do not have specialized hardware, and may still be rather expensive.

A shared environment, provided by GENI allows these centers to access the required resources in a lower cost:

each participant of the collaboration can use the resources of the others, as long as she grants access to her own resources occasionally.

GENI infrastructure can be viewed as a torrent-tracker to share hardware. If you seed a lot, you can count for hardware of the other participants.

It is worth to mention, this service is able to operate world-wide, because it provides mutual benefits to all the participants.

In order to improve this feature, GENI has to focus on involvement of small organizations, which are interested in application of GENI environment to their own tasks.

GENI has to extend the list of supported equipment, enable usage of commodity servers and specialized hardware instead of GENI racks with a certain specification.

There is much work to do to lower the entry bound and simplify the process of integration into the GENI environment.

The billing system should be less obscure, transparent to all the participants.

9. Finally a little bit science fiction idea to combine 3D printing with OTN as a

new transportation system.

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