



Open Science Grid

The Open Vision of OSG

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Open Vision of OSG

- Open Science
- Open Facility
- Open Software Stack
- Open Ecosystem



Open Science

- Benefit Science in the broadest possible way
 - Diversity in Scientific Disciplines
 - Diversity in Scale
 - Single PI to global community
 - Accelerate transition to x10 larger scale irrespective of scale the Science is at today.
- Commonality in Method:

Distributed High Throughput Computing



Commonality of Method

- Within the last 5+ years we have proven that computing solutions in use by the LHC community are generalizable.
- This generalizability is due to the LHC community being perfectly suited to demonstrate the power of a paradigm:
Distributed High Throughput Computing (DHTC)
- The strength of this paradigm makes our vision attainable. It's the unifying concept around everything we do.



LHC as Exemplar to drive DHTC

- Large number of $O(10k)$ scientists
- Globally distributed
- Cohesive ...
- ... but with complex internal structure & competition
- Diverse range of application needs within the DHTC paradigm ...
- ... that continuously evolve over long time periods.
- DHTC style of computing is necessary for the LHC community to achieve its scientific goals.



Limitation of LHC Exemplar

- Few communities (none?) are as large and cohesive as LHC experiments.
- To succeed with smaller and/or less cohesive communities, we needed to develop support mechanisms that go beyond the community model implicit in “Virtual Organization”, and **serve individual PIs in addition to communities.**

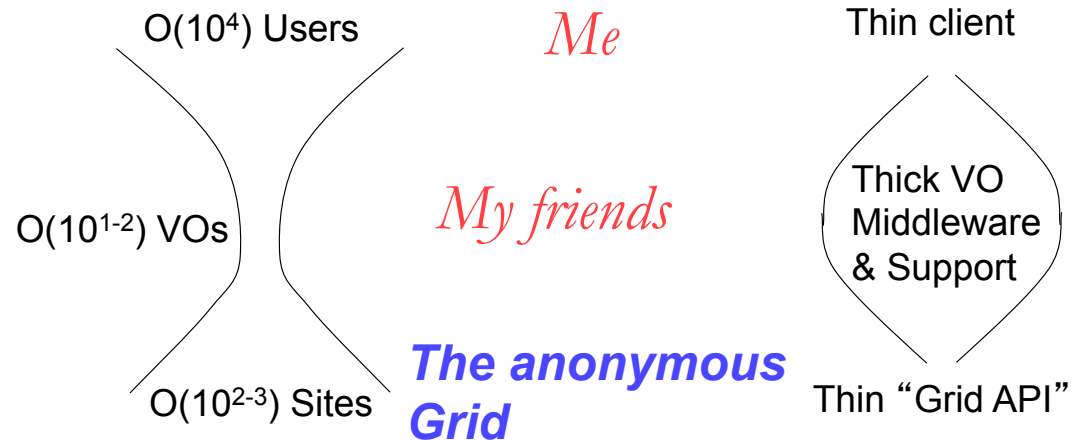
Community Support

Slide from Presentation at
U. Connecticut Medical School
February 1st 2007.

Depicts OSG philosophy
on “user support”
for close to a decade.

Within last ~2 years,
OSG accepted that
**not every PI has friends strong
enough to support them.**

Me -- *My friends* -- *The grid*
Domain science specific *Common to all sciences*



=> OSG VO = Friend of the single PI and small community.



Mechanisms to Support single PIs

- Campus VOs fully operated by a University IT organization.
- OSG VO providing the thick layer of VO middleware support.
- OSG XD providing an allocation based entry point => reaching new users this way!
- OSG Direct providing an on-ramp to the Open Facility from departmental clusters and workstations => submit local – compute global
- OSG Connect = OSG as a service

(More in Chander Sehgal and Rob Gardner's talks later)



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- Campus VOs fully operated by a University IT organization.
- **One size does not fit all !**
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Mechanisms to Support single PIs

- Campus VOs fully operated by a University IT organization.
- **One size does not fit all !**
- OSG XD providing an allocation based entry point =>
- **We learned that we need to diversify the tools we offer.**
- => submit local – compute global
- OSG Connect = OSG as a service

(More in Chander Sehgal and Rob Gardner's talks later)



OSG Connect – OSG as a service

- Within the last 5 years we learned that not all Campuses have IT organizations willing and capable of operating the necessary VO middleware layer.
- We thus started to offer OSG as a service that seamlessly integrates campus infrastructure with grid & cloud.
- We offer to run the service for interested Universities.
- We call this “OSG Connect”

This is the most recent addition to our toolbox

(More in Rob Gardner’s talk later)



Open Science Grid

DHTC and the power of sharing

- Sharing resources -> Open Facility
- Sharing Software -> Open Software Stack
- Sharing Knowledge -> Open Ecosystem



Open Facility

- Enable Operations of an open global facility
 - After initial registration, resources can be added/subtracted dynamically, and fully under the control of the owner.
 - Owner of resource decides who they trust, and want to share with, and may change this at any time.
 - Granularity of trust and policy of sharing has a large dynamic range.
 - On-ramping
 - Off-ramping
 - sharing
- are all supported individually and independently



Aside on Governance

Open Consortium

Includes anybody engaging with OSG in any way

Council represents Consortium

Stakeholder input

OSG Council

Provides high level guidance & governance

Selects Project leadership

Reports to Council

OSG Project

Executes program & vision on a day-to-day basis

(More in Ruth Pordes' talk later)



Open Software

- OSG supports a modular but fully integrated software stack.
- Anybody in the open consortium of OSG can:
 - Initiate additions to the software stack
 - Extract from it parts as desired
 - Deploy & use it within or outside the Open Facility



Open Ecosystem

- Mindshare across the OSG Consortium participants with the goal of advancing DHTC.
- Collaborative Software Development & Evolution
- Exploration of OSG facility Metrics to better understand DHTC

(More in Ruth Pordes' talk later)

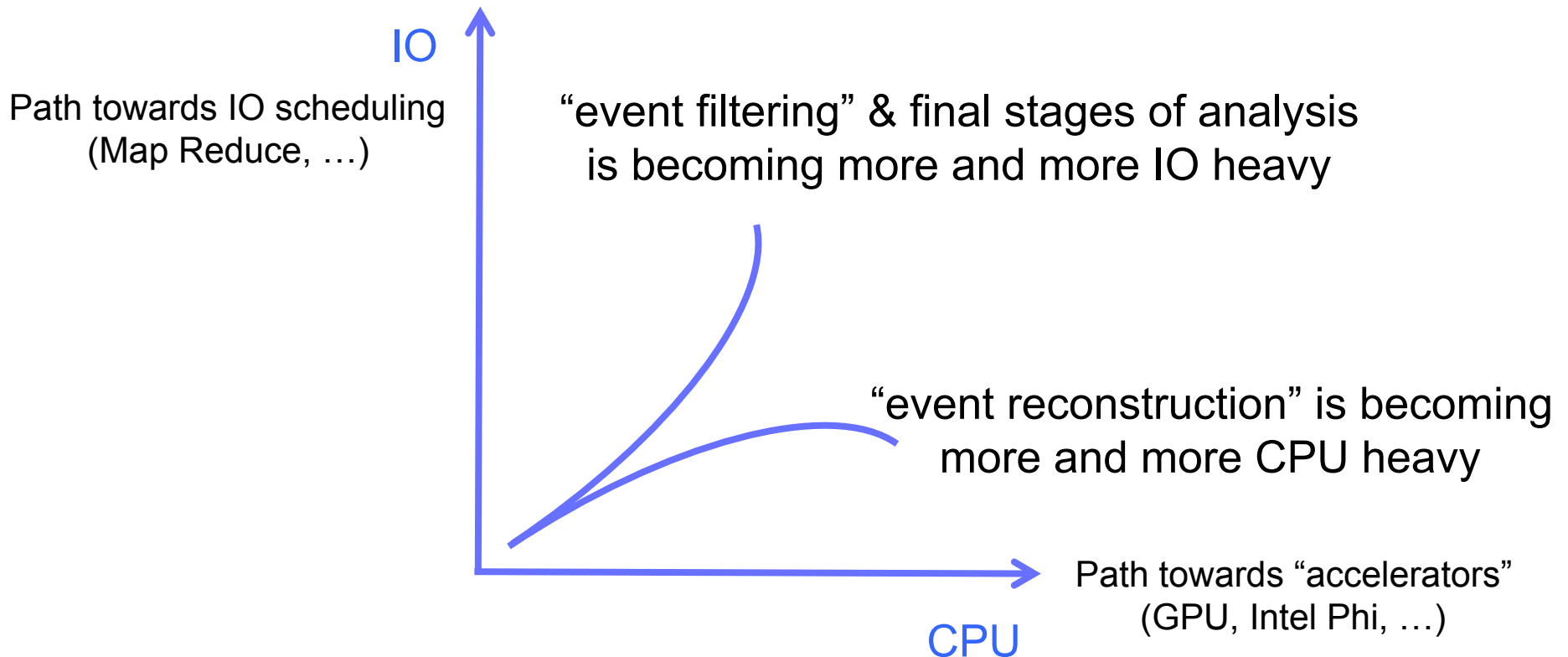


Open Transitions & Challenges

- Continued expansion in diversity & scale of scientific user base of OSG
- Single core to single node
- “Big” Data for “Small” Science
- Transparent computation across grid & cloud & HPC
- Scale up of resources by x2 is imminent
- Understand what software & hardware architecture changes mean for DHTC



Bifurcation of Application Needs drive new paradigms & architectures



The impact of this trend on “shared commodity clusters”
as well as DHTC is as yet unclear.



Benefits of Openness to HEP

- Solutions to the LHC Tier-3 problem
 - Campus infrastructures can be seamlessly integrated and used opportunistically.
- Collaborative relationships to the larger DHTC community.
- Openness benefits all the smaller experiments in HEP as well as activities like the Snowmass studies.



Summary & Conclusion

- Our vision & goals have been consistent over the last decade, and we do not see them changing in the future either.
- However, in order to be “Open” we had to be open minded in evolving our methods.
- We expect to continue to evolve also in the future.