State of the Open Science Grid

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OSG Executive Director
Professor of Physics
UCSD/SDSC**

575 Weeks from Week 01 of 2006 to Week 01 of 2017

120 Million hours/month

80 Million hours/month

40 Million hours/month

CMS

ATLAS

Accounting was not available at inception
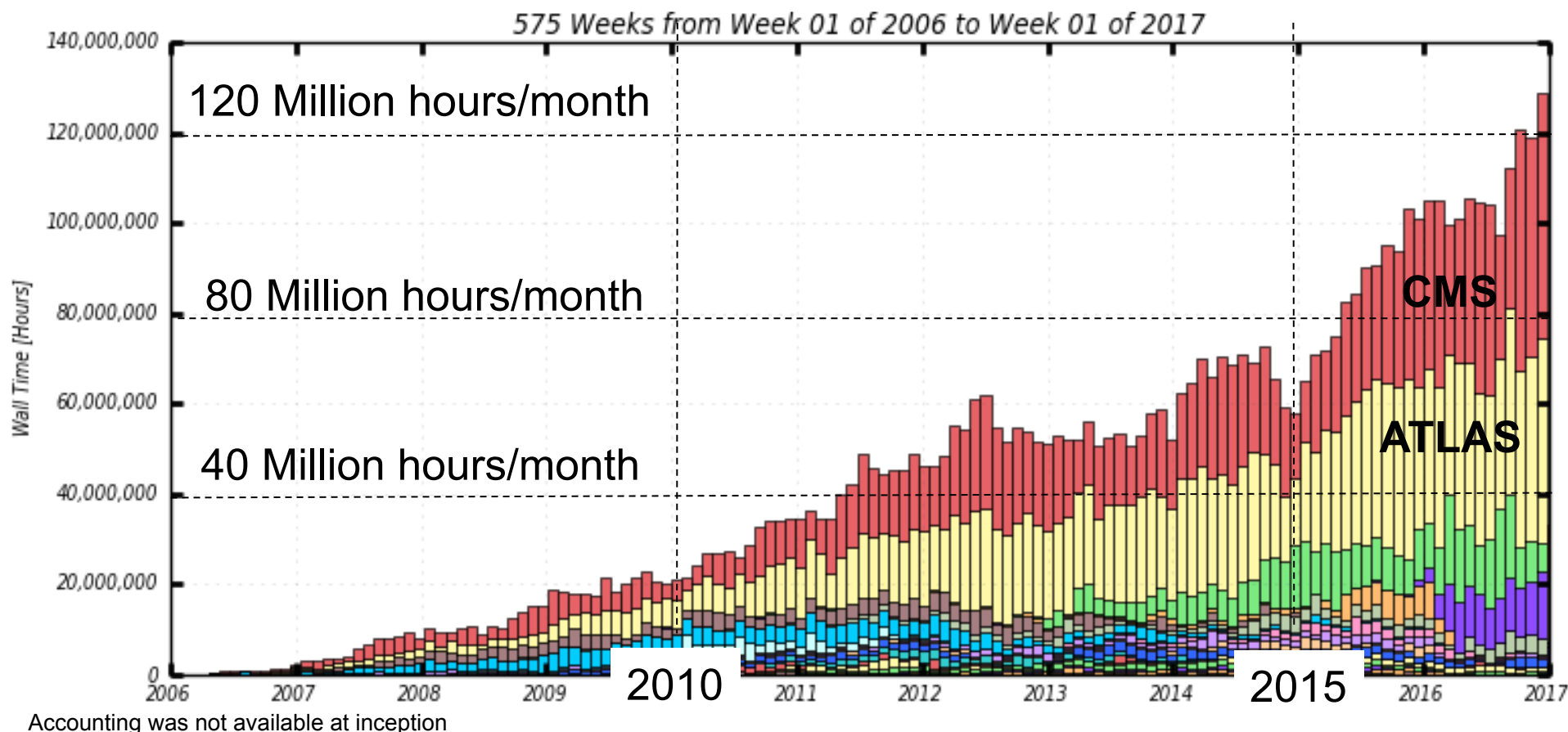
The Large Hadron Collider Experiments ATLAS & CMS dominate resources available on and use of OSG

1.4 Billion hours a year

125 Million Core hours
in the past 30 days

Over the last 12 months
140 Million jobs consumed
1.4 Billion hours of computing
involving **2 Billion** data transfers to
move **193 Petabytes**

This aggregate was accomplished by
federating 131 clusters
that contributed 1h to 100M hours each

http://display.grid.iu.edu

In the last 24 Hours	
394,000	Jobs
2,826,000	CPU Hours
6,620,000	Transfers
501	TB Transfers
In the last 30 Days	
12,417,000	Jobs
125,468,000	CPU Hours
237,979,000	Transfers
15,128	TB Transfers
In the last 12 Months	
136,196,000	Jobs
1,370,125,000	CPU Hours
1,995,990,000	Transfers
193,000	TB Transfers

Vision

Research Computing is the new Library

- Over hundreds of years, the defining common research service at Universities was the Library.
  - defining service was the curation of information to support the creation of knowledge
- Modern Science needs so much more …
  - compute, storage, networking, …

=> Cyberinfrastructure

Cyberinfrastructure consists of computing systems, data storage systems, advanced instruments and data repositories, visualization environments, and people, all linked by high speed networks to make possible scholarly innovation and discoveries not otherwise possible.

Indiana University Knowledge Base
… found by fkw via google.

To advance Open Science, Universities will increasingly need to provide Cyberinfrastructure as a common good for their research communities.

port

UCSD

Xenon1T

Stockholm University — Stockholm
Westfälische Wilhelms-Universität Münster — Muenster
JGU Mainz — Mainz
Max-Planck-Institut für Kernphysik Heidelberg — MPIK
UNI Freiburg — Freiburg
University of Zurich — Zurich
NYU Abu Dhabi — NYUAD
LPNHE Paris — LPNHE
Bologna — LNGS — Torino — INFN
Weizmann Institute of Science — Weizmann

~1
24
+3

Smithsonian Astrophysical Observatory

Adler Planetarium

Argonne National Lab

Barnard College / Columbia University

Bartol Research Institute / University of Delaware

University of California, Los Angeles

University of California, Santa Cruz

University of Chicago

University of Iowa

University of Minnesota

McGill University, Montreal

University College Dublin

Cork Institute of Technology

Galway-Mayo Institute of Technology

National University of Ireland, Galway

VERITAS

Argonne NATIONAL LABORATORY
BERKELEY LAB
NIST
Fermilab
Case WESTERN RESERVE UNIVERSITY
McGill
Colorado University of Colorado at Boulder
UC DAVIS UNIVERSITY OF CALIFORNIA
KICP Kavli Institute for Cosmological Physics AT THE UNIVERSITY OF CHICAGO
Berkeley University of California
THE UNIVERSITY OF CHICAGO
LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN
Harvard-Smithsonian Center for Astrophysics
M UNIVERSITY OF MICHIGAN
I UNIVERSITY OF ILLINOIS
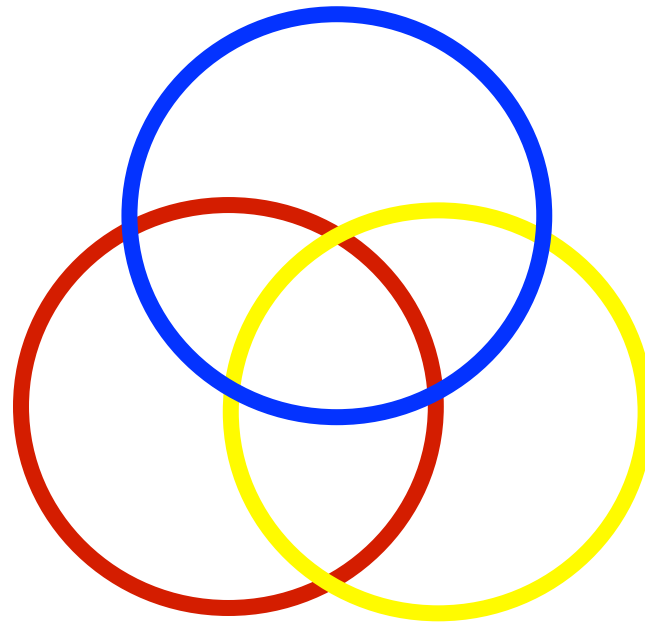SLAC NATIONAL ACCELERATOR LABORATORY

SPT3G

8

OSG advances the local, national and international integration of Cyberinfrastructure in support of Open Science.

Because even "more moderate size" physics experiments today involve **dozens of institutions across multiple countries** that need to be able to **share their resources** to **maximize their scientific throughput** !!!
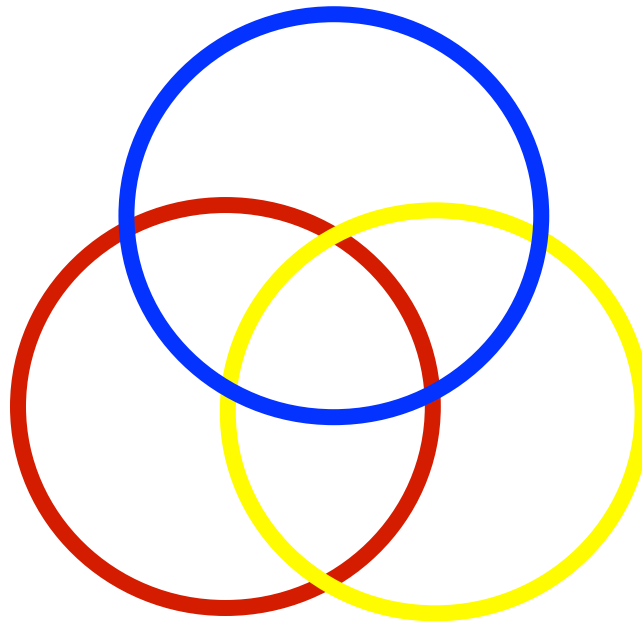
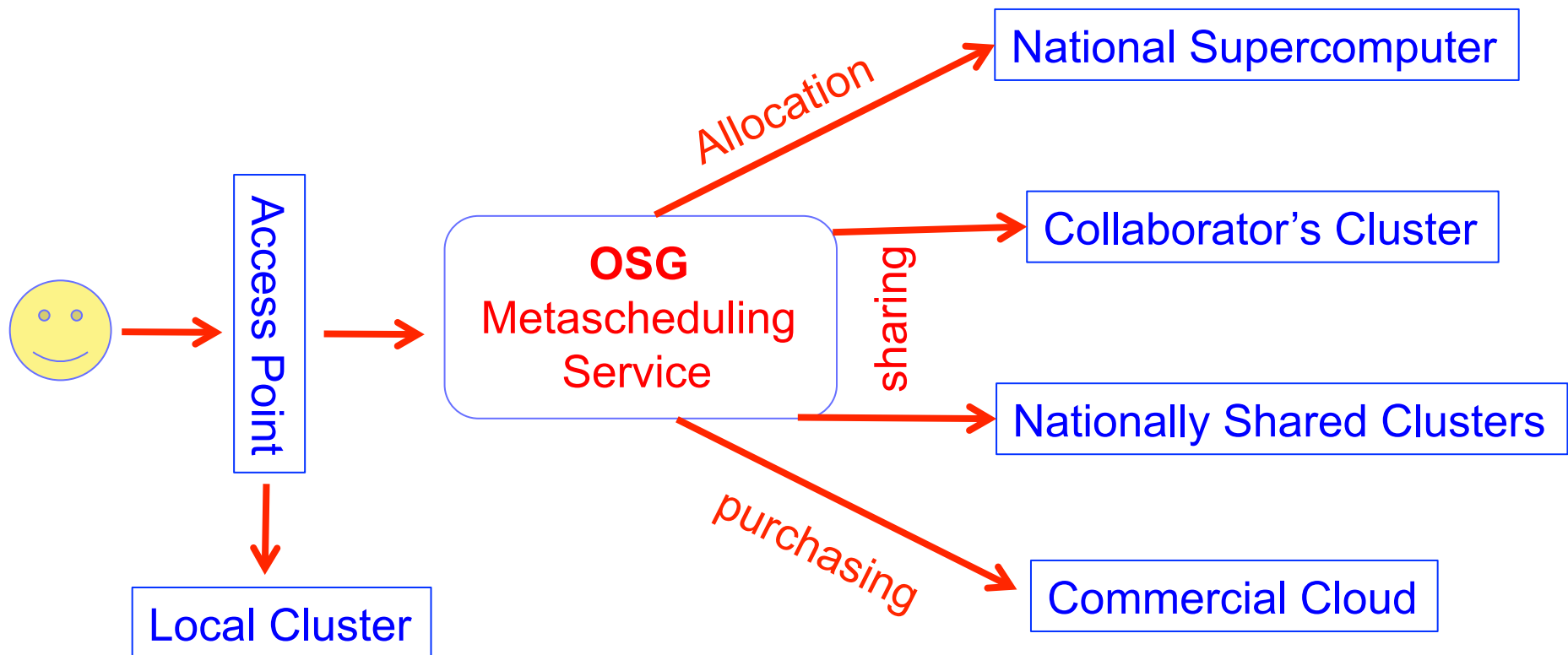We see this phenomenon of multi-institutional teams as a striking commonality across research disciplines.

because they occupy the overlap
in the venn diagram of the science teams

Universities play a special role

Integrating CI across campuses means
integrating CI for many science teams at once !!!

# Transparent Computing across different resource types

OSG integrates computing across different resource types and business models.

Enabling Science
via
distributed High Throughput Computing (dHTC)

dHTC

- Any scientific problem that can be decomposed such as to benefit from automation of a large number of individually schedulable jobs will benefit from dHTC.
    - CPU, GPU, node level multi-core, data production, data analysis, …

- Things we don't do: large scale MPI
- Things that require special care: large IO jobs

Commonality Across Science

- OSG's business model is to empower Scientists and their home institutions to work together for long term sustainability.
  - OSG provides knowledge & software infrastructure.
  - OSG can offer storage and service hosting to jump start projects, but prefers to enable institutions for growth and sustainability.

- OSG provides global integration across commercial and academic computing.
  - OSG respects local ownership and control.

HPCwire award for work with LIGO

OSG allowed LIGO to operate seamlessly across:
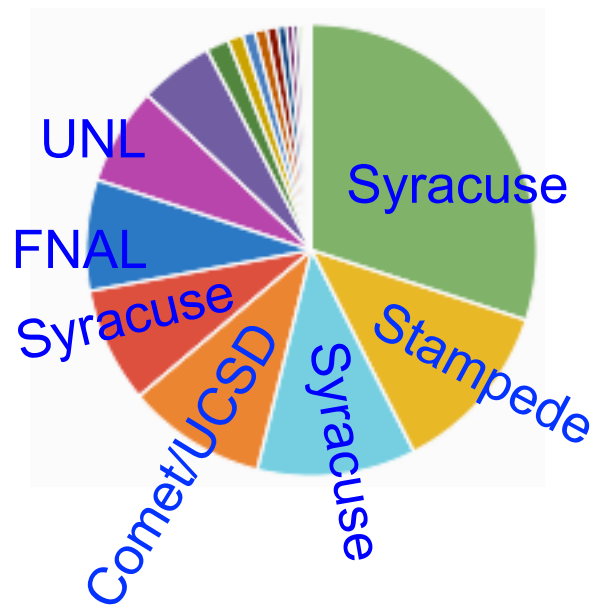
- **Resources they own at Syracuse University**
- **Other Resources SU shares.**
- **Resources others in US share.**
- **Their XD resources allocations.**

Resource use on OSG relevant to gravitational wave detection in 2015.

What's the alternative?

- The LHC experiments could be forced into circling the wagons, and ignore the rest of the scientific community.

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- **This has not always been an easy sell to the agencies.**

What's next ?

- **OSG is funded until June 2018.**

- We think that the vision that drives OSG is as important today as it was in 2004.

  - We think we have done well ...

  - ...but there's a lot left to do that warrants another 5 years.

- We invite you to join us in convincing the agencies that the vision of OSG is important enough to continue pursuing.

opensciencegrid

osgusers

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support.opensciencegrid.org

🔗 www.opensciencegrid.org/links