U.S. DEPARTMENT OF ENERGY | Office of Science

DOE Office of Science User Facilities

NSF Large Facilities Office Annual Workshop

May 3, 2017

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Outline

- Background on the user facilities
- Our journey to create a corporate framework
- Early gains
- Acknowledgement: my colleague, Mariam Elsayed, has been a key to this work

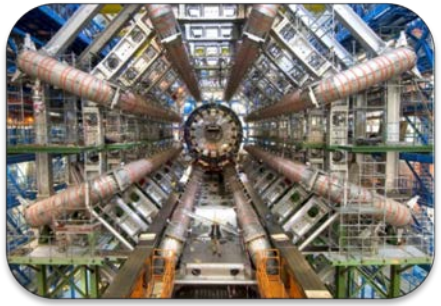
SC = “Office of Science”

The Journey

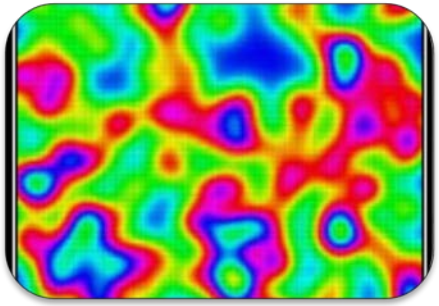
- We defined “user facility.”
- We defined “user.”
- We learned how each facility counts users.
- We built a database of users (“user statistics”).
- We built tools to show others.

Office of Science FY 2016: $5.35B

Dr. Murray slide

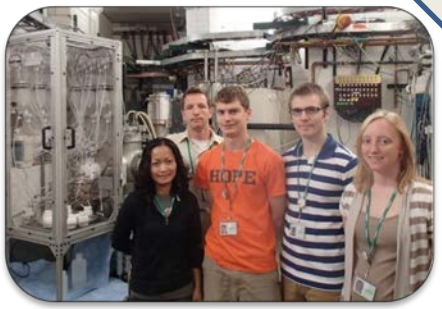


Largest Supporter of Physical Sciences in the U.S.*



Research: 42%, $2.2B

~40% of Research to Universities



> 22,000 Scientists Supported

Funding at >300 Institutions including all 17 DOE Labs

Construction:

13.5%, $723M

Facility Operations:

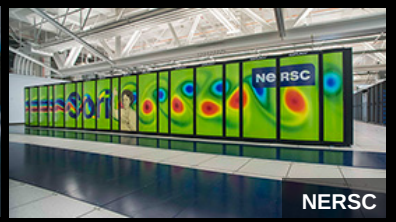
38%, $2.02B

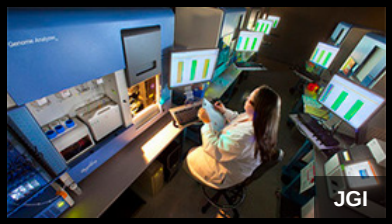
>33,000 Scientific Facility Users**

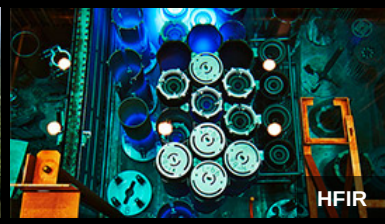
* 43% of all physical sciences, 30% of computer science and math

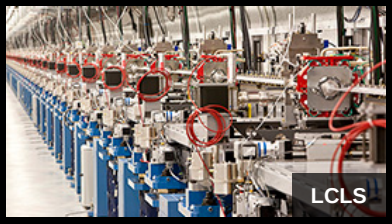
** from all 50 states and DC

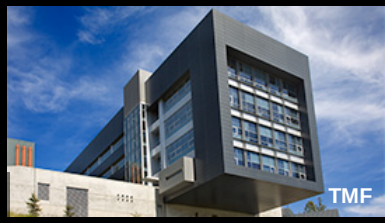
FY 2017
27 scientific user facilities

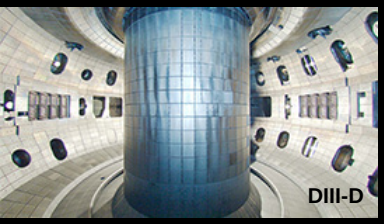


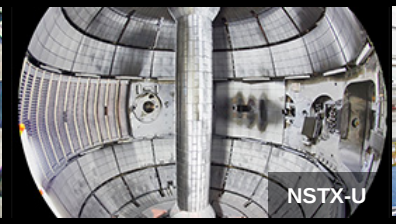


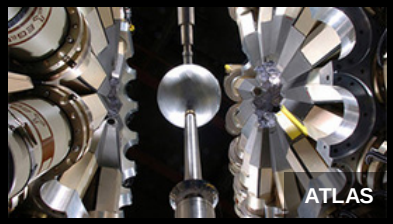


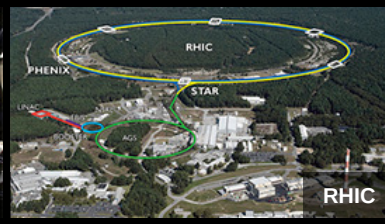


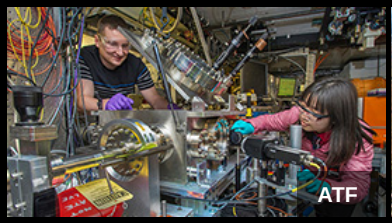












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A user facility is a federally sponsored research facility available for external use to advance scientific or technical knowledge under the following conditions

Open

The facility is open to all interested potential users without regard to nationality or institutional affiliation.

Accessible

The facility provides resources sufficient for users to conduct work safely and efficiently.

Competitive

Allocation of facility resources is determined by merit review of the proposed work.

Unique

The facility capability does not compete with an available private sector capability.

Free

User fees are not charged for non-proprietary work if the user intends to publish the research results in the open literature. Full cost recovery is required for proprietary work.

Collaborative

The facility supports a formal user organization to represent the users and facilitate sharing of information, forming collaborations, and organizing research efforts among users.

Communicating the Story of the User Facilities

The Long Game

"I have constituents who depend on our national labs."

"Your state/district has a national lab and mine doesn't."

Challenges to Telling the Story of the User Facilities

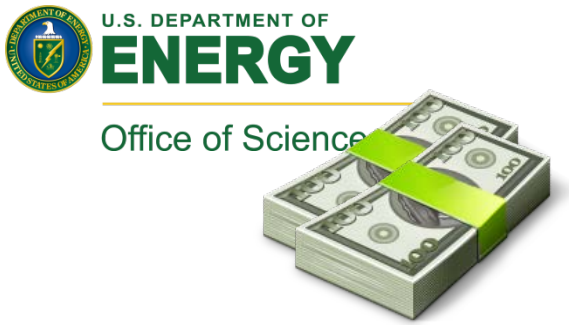
- No corporate data on the users
- Heterogeneous portfolio
- Complex institutional relationships

SC's Cognizance Challenge

Grantee

Facility user

User Facility



Telling the whole story is challenging

Users

Scientific Disciplines

Sponsor Agencies

Host Institutions

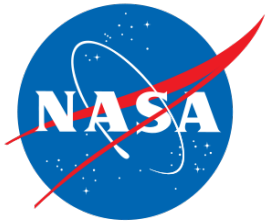
Technical Specs

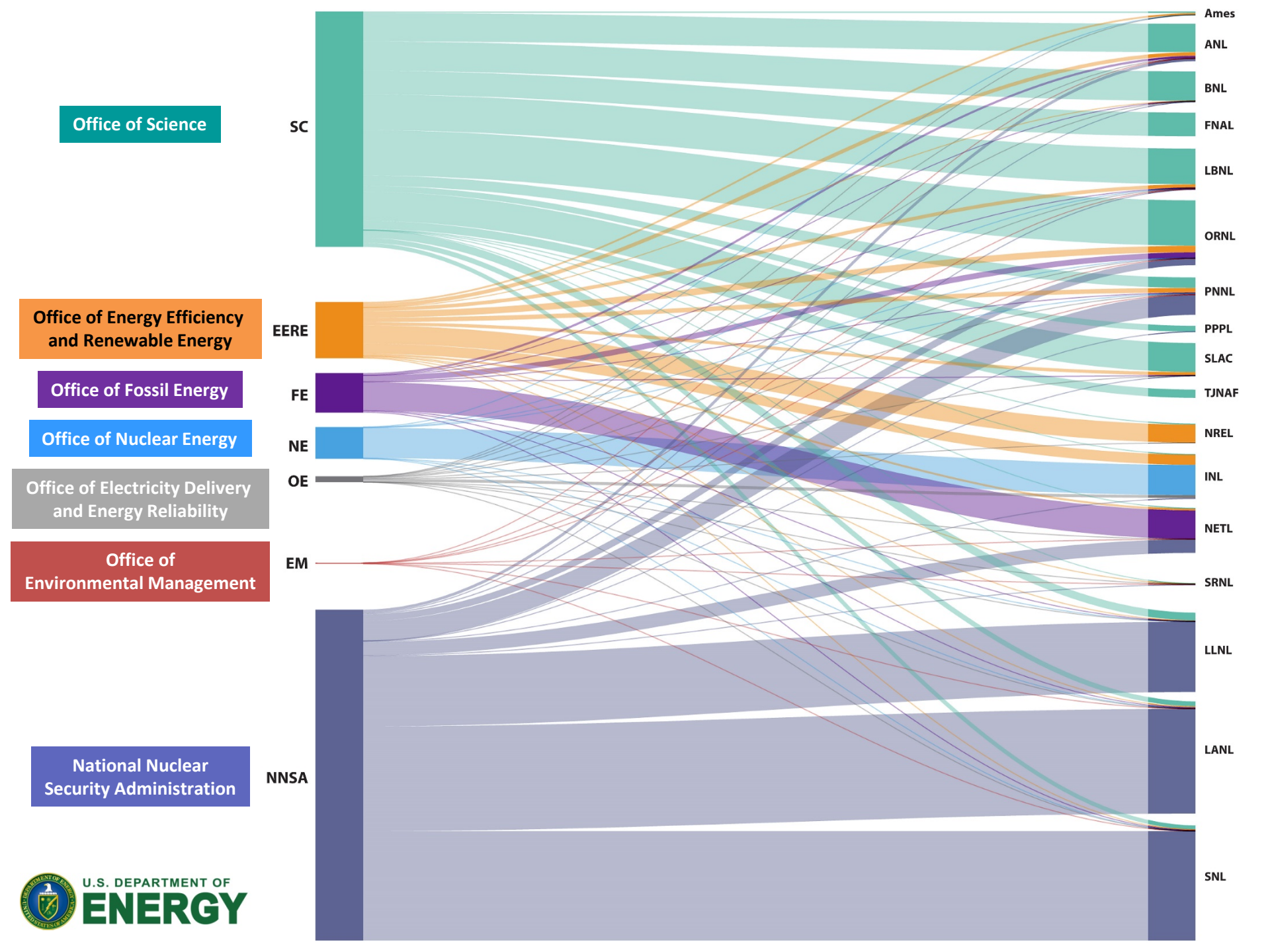
Scientific User Facilities of the Nation

"No, not *those* kinds of users!"

Reel 1

Telling the whole story is challenging

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Office of Energy Efficiency and Renewable Energy
Office of Fossil Energy
Office of Nuclear Energy
Office of Electricity Delivery and Energy Reliability
Office of Environmental Management
National Nuclear Security Administration
SC
EERE
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NE
OE
EM
NNSA
Ames
ANL
BNL
FNAL
LBNL
ORNL
PNNL
PPPL
SLAC
TJNAF
NREL
INL
NETL
SRNL
LLNL
LANL
SNL
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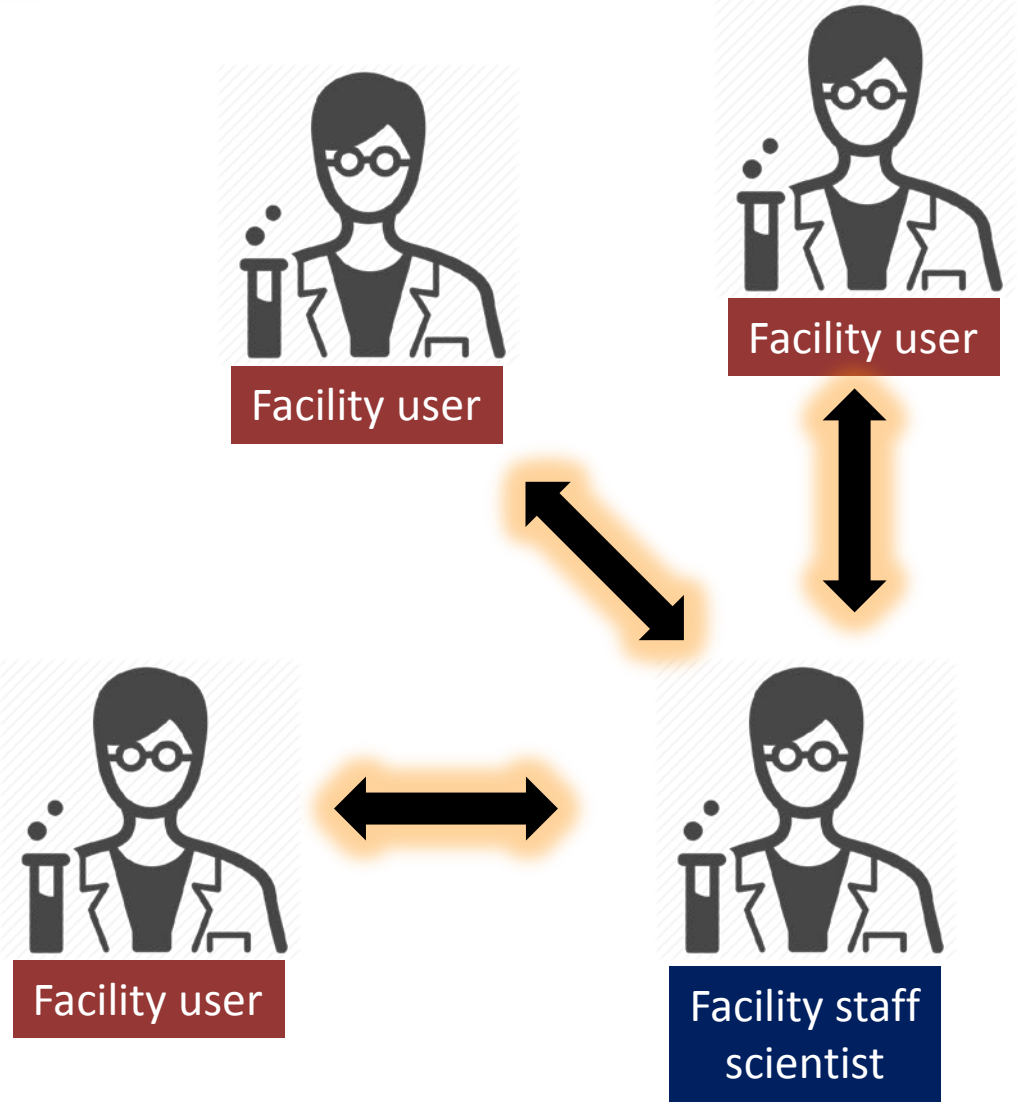
User Facilities are hubs



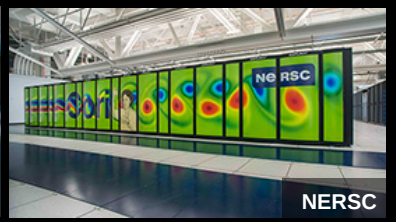
Discovery
new science across disciplines

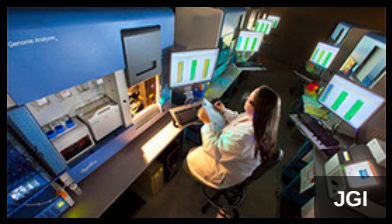
Service
National Laboratories

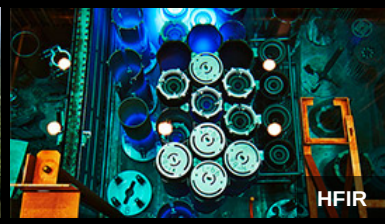
Collaboration
hub for new connections

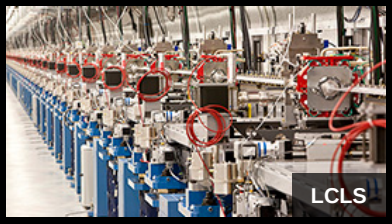
Vigor
pace and youth

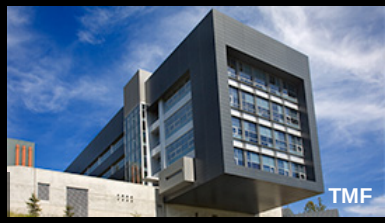
FY 2017
27 scientific user facilities

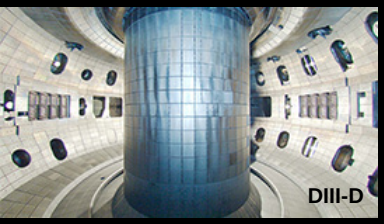


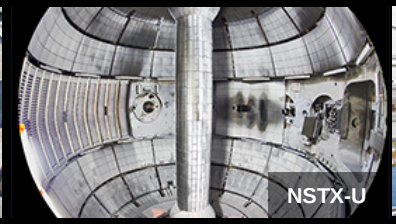


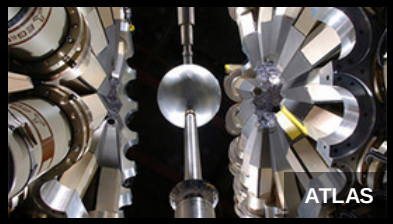


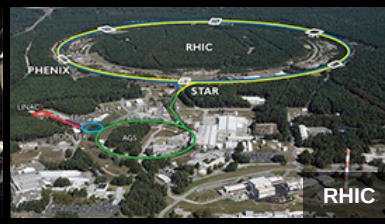


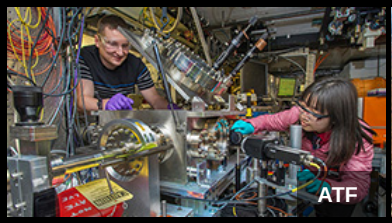












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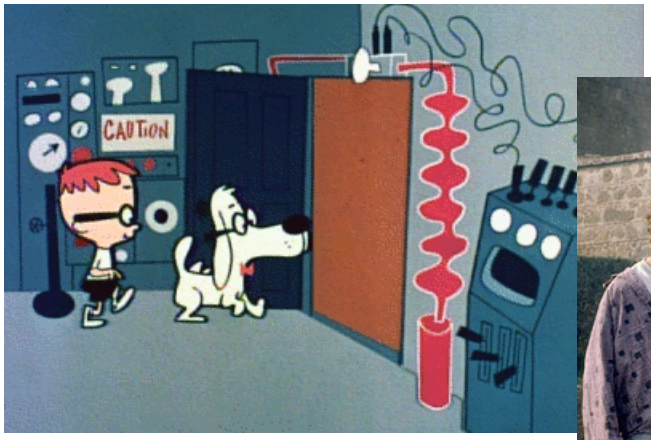
Why user statistics matter

- Telling the story of the user facilities
- Understanding how science is done, and how it is evolving
- **Let's go back in time to 2013**



Defining and counting users

- **Goals:**
  - understand and articulate the spectrum of user activity
  - check veracity of current practices (overcounting?)
  - identify gaps and opportunities (undercounting?)
  - improve transparency for facilities and stewards
  - respect historical data streams
  - avoid unfunded mandates/logistical nightmares for facilities

Strike a balance between

- creating a system for rigorous, historical, sortable corporate user statistics (inspired by BES experience with the synchrotrons)

and

- providing flexibility to facilities and stewards.

… and it has to work for all 31 SC user facilities

A note about process

Formed federal working group and defined “user facility” [2011]

Initial working group discussions / draft user definition [spring/summer 2012]

Information call to the SC user facilities [Aug-Sept 2012]

Refinement and vetting within the Office of Science [Late 2012 – early 2013]

Defining and counting users

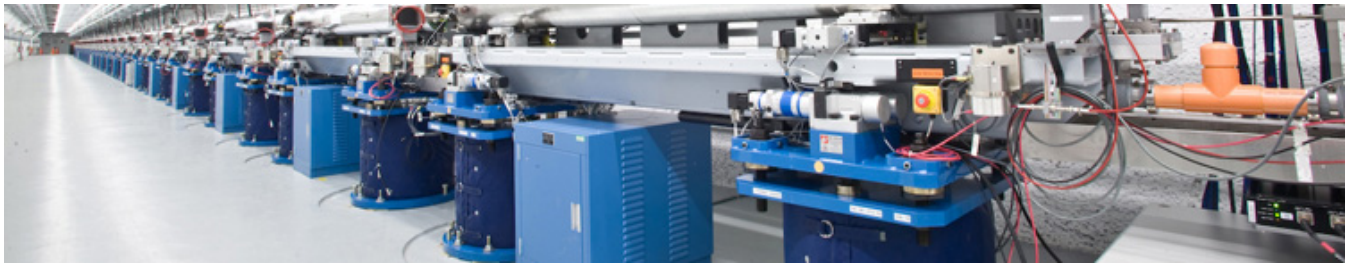
Outcome:

- a high-level **definition** applicable to all SC user facilities that defines three categories of user: On-Site, Remote, Data

coupled with

- a set of more detailed **"practices statements"** that explain the user statistics collection practices specific to each facility, or class of facilities.

  The stewards – the SC Science Programs – are the authors of these statements.



The high-level definition (applies to all SC user facilities)

A user is an individual or a member of a research team who is granted access to resources at a user facility through an approved peer-reviewed proposal. An individual is counted as a user only once for a given facility in a fiscal year.

Each user of a scientific user facility is reported annually in one of three hierarchical subcategories:

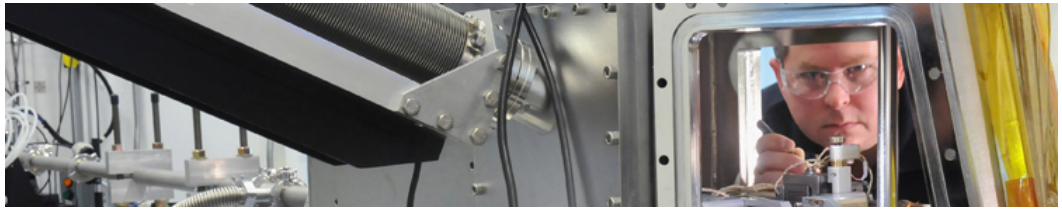
- **On-Site User** – an individual who is physically present at the facility at least once during the fiscal year.
- **Remote User** – an individual who remotely accesses the facility at least once during the fiscal year.
- **Data User** – an individual who remotely accesses data from an electronic archive supported by the facility at least once during the fiscal year.

Footnotes to the high-level definition

- A user need not be specifically named on the proposal; for example, personnel who join a research project after the proposal is approved are eligible to be counted as users. Individuals who pay for non-research specialty services and who are not covered by an approved peer-reviewed proposal or who visit the facility for tours or educational purposes are not counted as users. Accreditations to research "outputs" such as author lists of resultant publications or patents from work at the facility are not an acceptable basis for counting users.

- Each individual is counted as only one user per facility per fiscal year regardless of how much work they perform or the number of projects with which that user is associated. An individual who utilizes more than one Office of Science user facility may be counted by each facility. There is no expectation that user facilities will share or compare user databases. For most, but not all, facilities the annual reporting period is the fiscal year.

- Reporting of a user who qualifies in more than one subcategory should resolve to the "higher" subcategory. For most, but not all, facilities On-Site trumps Remote and Data, and Remote trumps Data.



Practices statements (tailored)

Each practices statement contains two sections:

- **Capabilities provided to users:**

  A summary description that provides context for the typical ways that users interface the facility. The description includes:

  - a short summary of the science that the facility enables
  - the defining physical characteristics of the facility that inform how individuals utilize the facility
  - the mode(s) in which it is utilized, including whether users work in series or in parallel
  - a summary of the differences between the types of users.

- **Methods of acquiring user statistics:**

  A description of how the facility counts the three categories of user: On-Site, Remote, and Data. In some instances the description includes the logistical criteria by which the facility counts users (e.g., through execution of a user agreement and completion of safety training).

Practices statement for all BES user facilities

- **On-Site User:** An individual who is physically present at the facility to conduct research on an approved research proposal.

  The facility shall count each user who has completed registration, training, safety documentation, has a valid user agreement, and has a badge that facilitates tracking.

- **Remote User:** An individual who has been granted the authority to remotely produce data through computer access, or by shipping samples to facility scientists for data measurements, or by receiving custom-manufactured materials, tools, or devices from the facility scientists because the facility has unique or unusual capabilities to fabricate.

  The facility shall count each user who has completed registration, obtained required permissions for remote access, has a valid user agreement, and submitted an experiment safety form.

- **Data Users:** N/A. None of these facilities generate electronic data archives that would be utilized by the external community. An individual who reduces and/or analyzes data and who is neither an On-Site nor a Remote User is not counted as a Data User.

Practices statements: example of tailoring

All BES user facilities

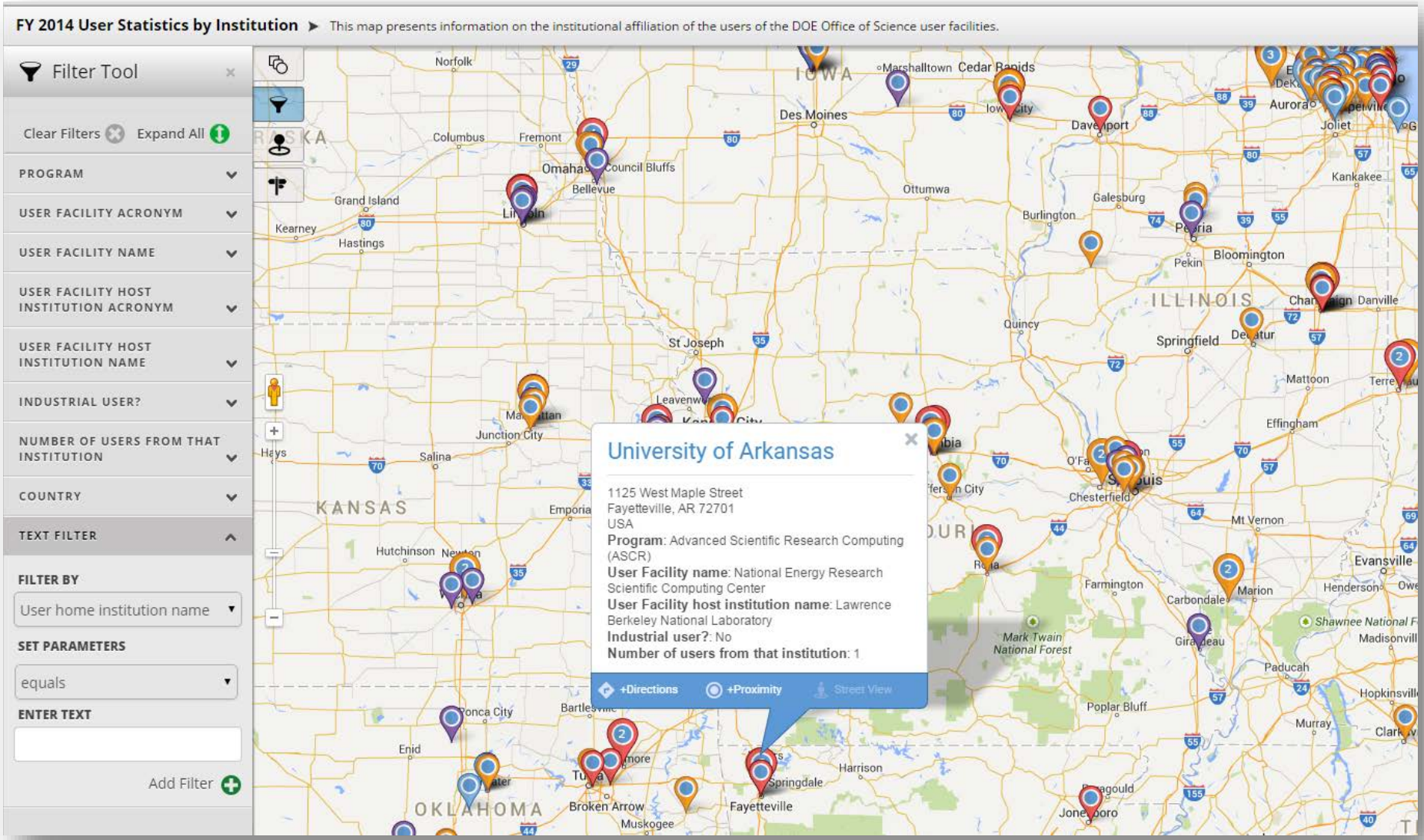
- **Remote User:** An individual who has been granted the authority to remotely produce data through computer access**, or by shipping samples to facility scientist for data measurements, or by receiving custom-manufactured materials, tools, or devices from the facility scientists because the facility has unique or unusual capabilities to fabricate.**

All NP user facilities

- **Remote User:** An individual who has been granted the authority to remotely produce data through computer access **or who has developed equipment or software at their home institution that plays a role in the production of data during the experiment.**

Results and Early Gains

You can explore interactive maps of SC grantees and facility users on our website



National Lab Day on the Hill
April 20, 2016

National Lab Day on the Hill
April 20, 2016

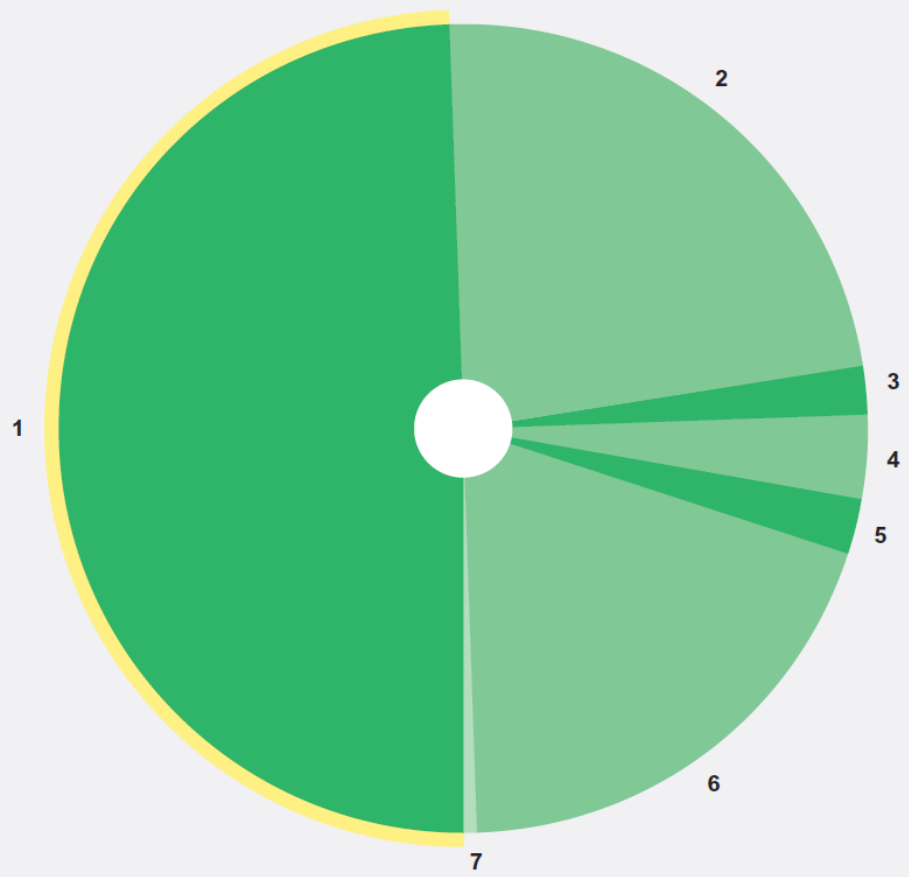
Office of Science User Facilities Summary Report, FY 2015

http://science.energy.gov/user-facilities

First ever corporate user/project level data!

Number of Users by Institution Type

Number of users by institution type



1	U.S. Academia	16,012
2	DOE National Laboratory	7,441
3	Other U.S. Federal	571
4	U.S. For-Profit	1,095
5	U.S. Not-for-Profit Research or Charitable Organization	761
6	International	6,207
7	Other	165

Quickfact

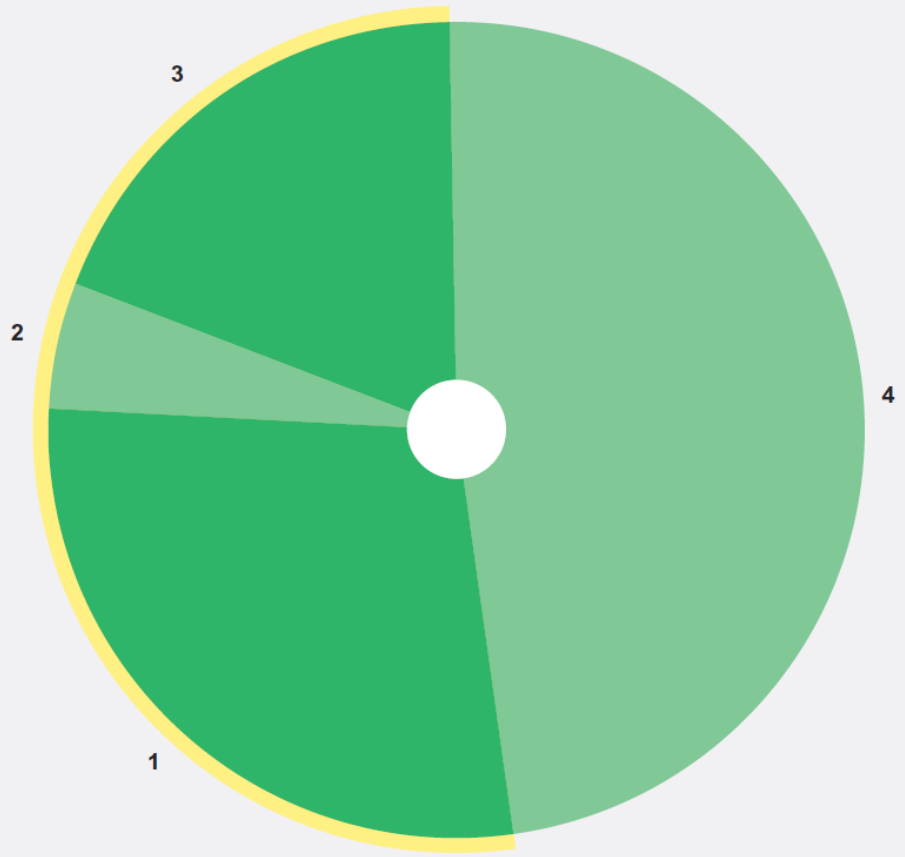
50%

of users come from U.S. Academia

Number of Users by Employment Level

Note: users for whom this information was not reported were omitted from this analysis

Number of users by employment level



1	Graduate Students	6,586
2	Undergraduate Students	1,165
3	Postdoctoral Research Associates	4,408
4	Faculty or Research Scientists	11,203

Quickfact

52%

of users are students or postdocs

User Projects with Support from One or More Federal Agency

Federal support of user projects

Department of Energy
5,574 projects

National Science Foundation
1,783 projects

National Institutes of Health
1,182 projects

Department of Defense
371 projects

National Aeronautics and Space Administration
174 projects

Department of Agriculture
45 projects

Other federal sponsors

Environmental Protection Agency
Department of Transportation
United States Geological Survey
Department of Homeland Security
Department of Education
Department of State
National Institute of Standards and Technology
National Oceanic and Atmospheric Administration
Centers for Disease Control and Prevention
Nuclear Regulatory Commission

Quickfact

5,688
projects supported by a non-DOE source

1,120
U.S. industrial users

Industrial Institutions

Industrial institutions

297 **U.S. For-Profit Institutions**

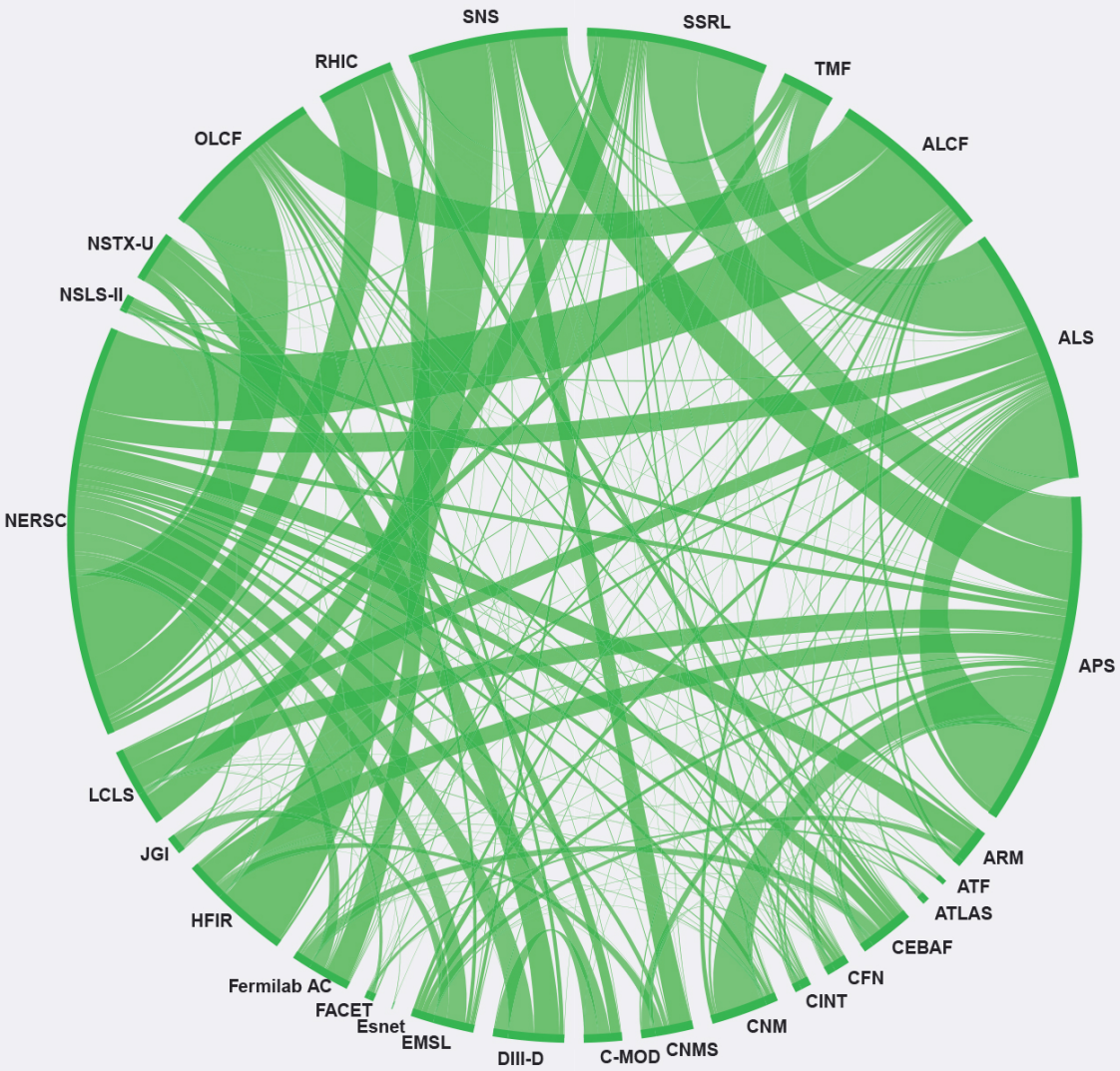
155 **U.S. Small Businesses**

55 **Global and U.S. Fortune 500**

3M	Caterpillar	Ford Motor	L-3 Communications	PPG Industries	Southern
ABB	Chevron	General Electric	Lockheed Martin	Procter & Gamble	Total
Abbvie	Cisco Systems	General Motors	Merck	Robert Bosch	Toyota Motor
Amgen	Colgate-Palmolive	Gilead Sciences	Micron Technology	SAIC	United Technologies
Apple	Corning	GlaxoSmithKline	Monsanto	Samsung Electronics	Western Digital
Applied Materials	Cummins	HP	NEC	Sanofi	
AstraZeneca	Dow Chemical	Honeywell Int.	Northrop Grumman	SABIC	
BASF	DuPont	IBM	Novartis	Schlumberger	
Boeing	Eli Lilly	Intel	Pfizer	Siemens	
BP	Exxon Mobil	Johnson & Johnson	POSCO	Sinopec Group	

User Crossover Among SC User Facilities, FY 2015

The width of the ribbon connecting two facilities corresponds to the number of users who utilized both of those facilities

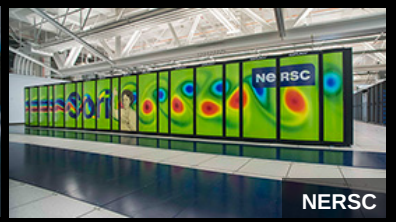


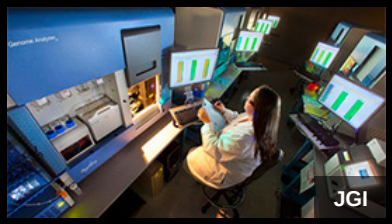
Quickfact

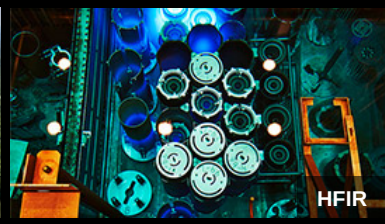
3,000+

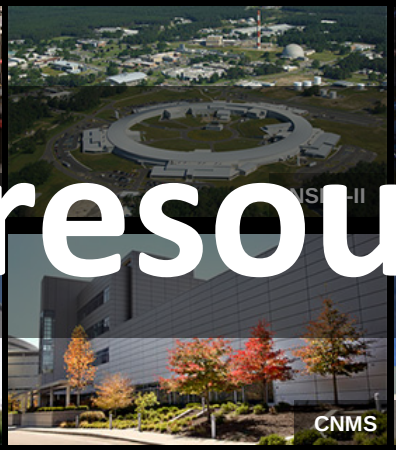
users performed research at two or more facilities in FY 2015

FY 2017
27 scientific
user facilities

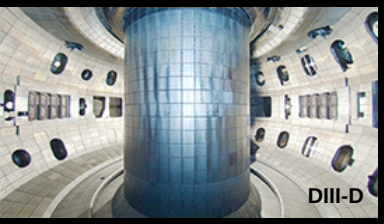


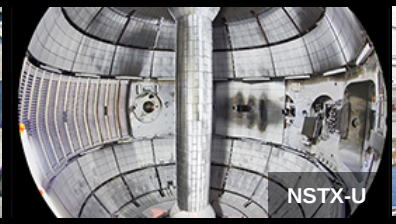


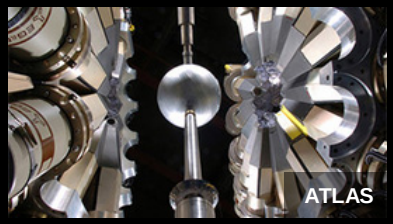


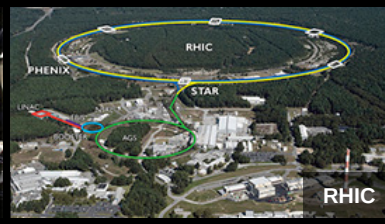


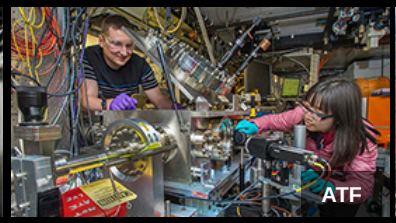
A network of resources











U.S. DEPARTMENT OF
ENERGY
Office of Science

The Journey:

Led by the Federal sponsors, collaborating and listening to the experts on the ground

- We defined “user facility.”
- We defined “user.”
- We learned how each facility counts users.
- We built a database of users.
- We built tools to show others.

Thank you!

Questions?

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