



U.S. DEPARTMENT OF
ENERGY

Office of
Science

An Update from the Office of Science

NUFO Annual Meeting

June 14, 2016

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Three topics + discussion

- SC's strategic opportunities/challenges
- Communicating the stories of the user facilities
- Thinking critically about the user experience
- Discussion time!

Thank you for being here!



Office of Science Leadership Team in Washington/Germantown



Cherry Murray
Director, Office of Science

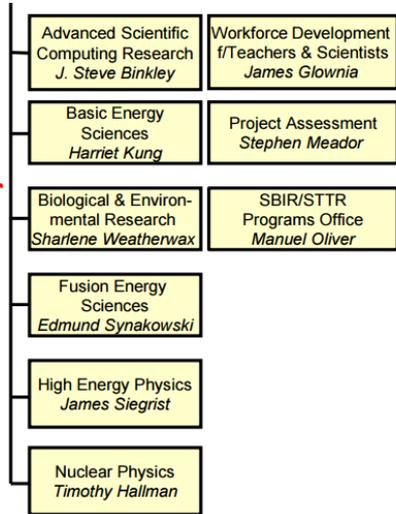


Patricia Dehmer
Deputy Director for
Science Programs

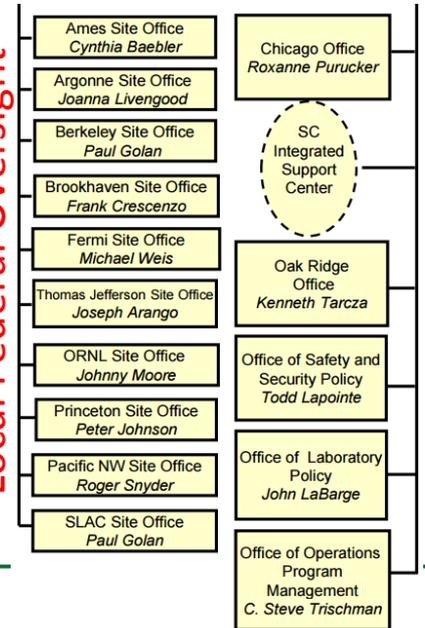


Joseph McBrearty
Deputy Director for
Field Operations

The User Facility Owners

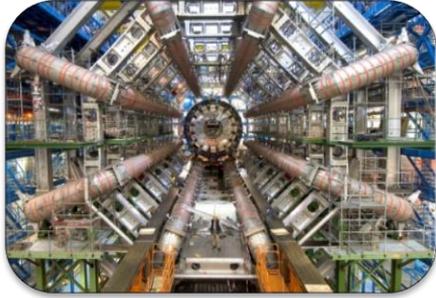


Local Federal Oversight

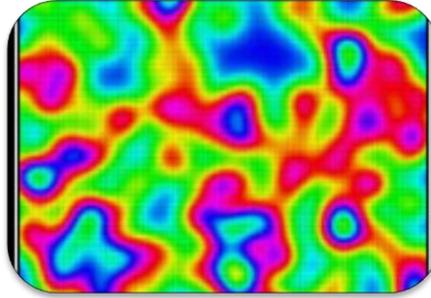


Office of Science FY 2016: \$5.35B

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



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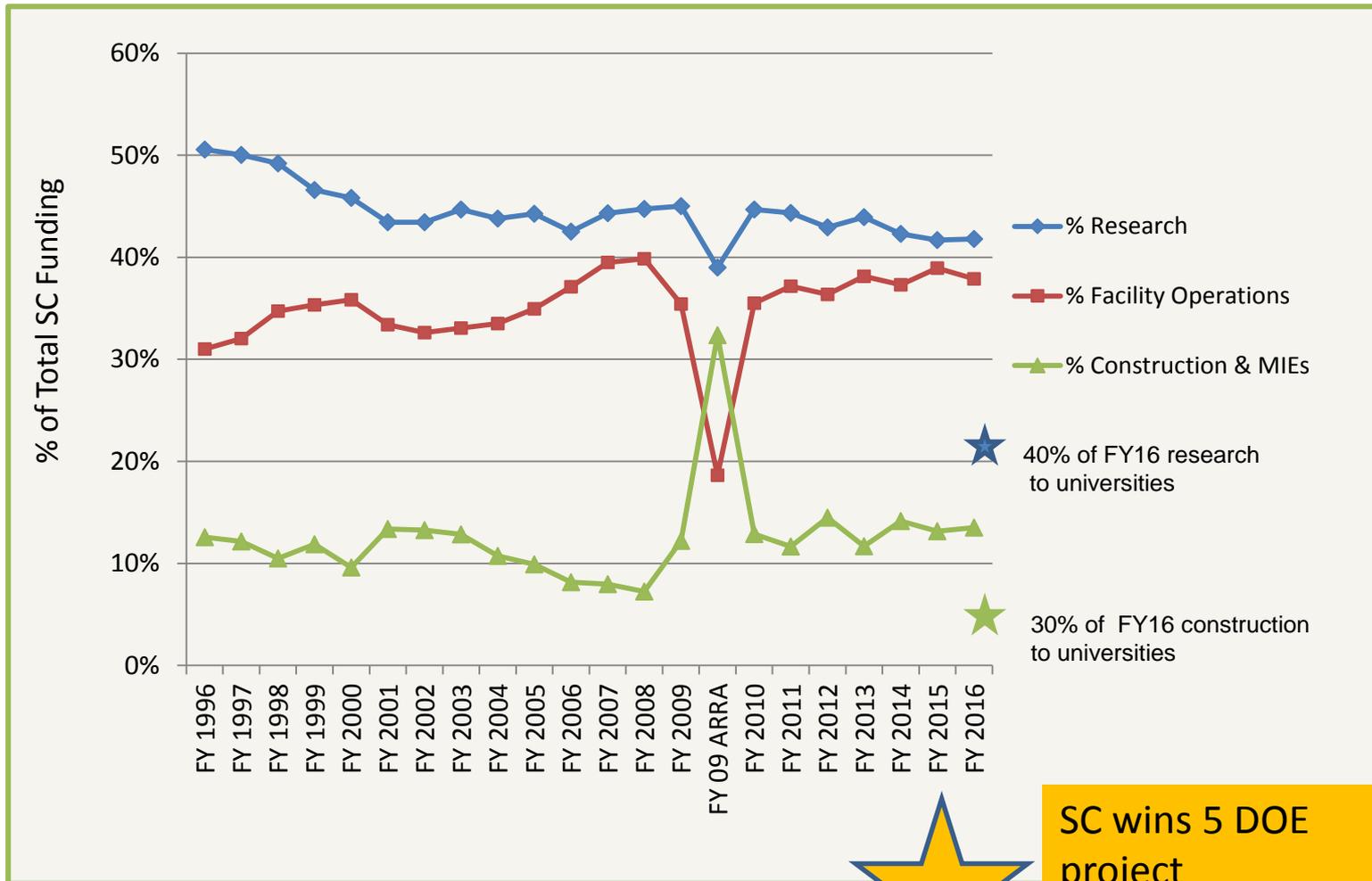
FY2017 Issues and Priorities

- **BALANCE - Discovery research vs science for clean energy and departmental crosscuts**
- **BALANCE - Research funding vs scientific user facilities construction vs operation**
- **Exascale computing Project! National Strategic Computing Initiative**
- **International partnerships in Big Science**
 - **Defining moment in fusion sciences**
 - **LHC CMS, ATLAS upgrades at the same time as LBNF/DUNE**
- **Enhance communications with Congress and research universities**
- **Best practices in national lab management**



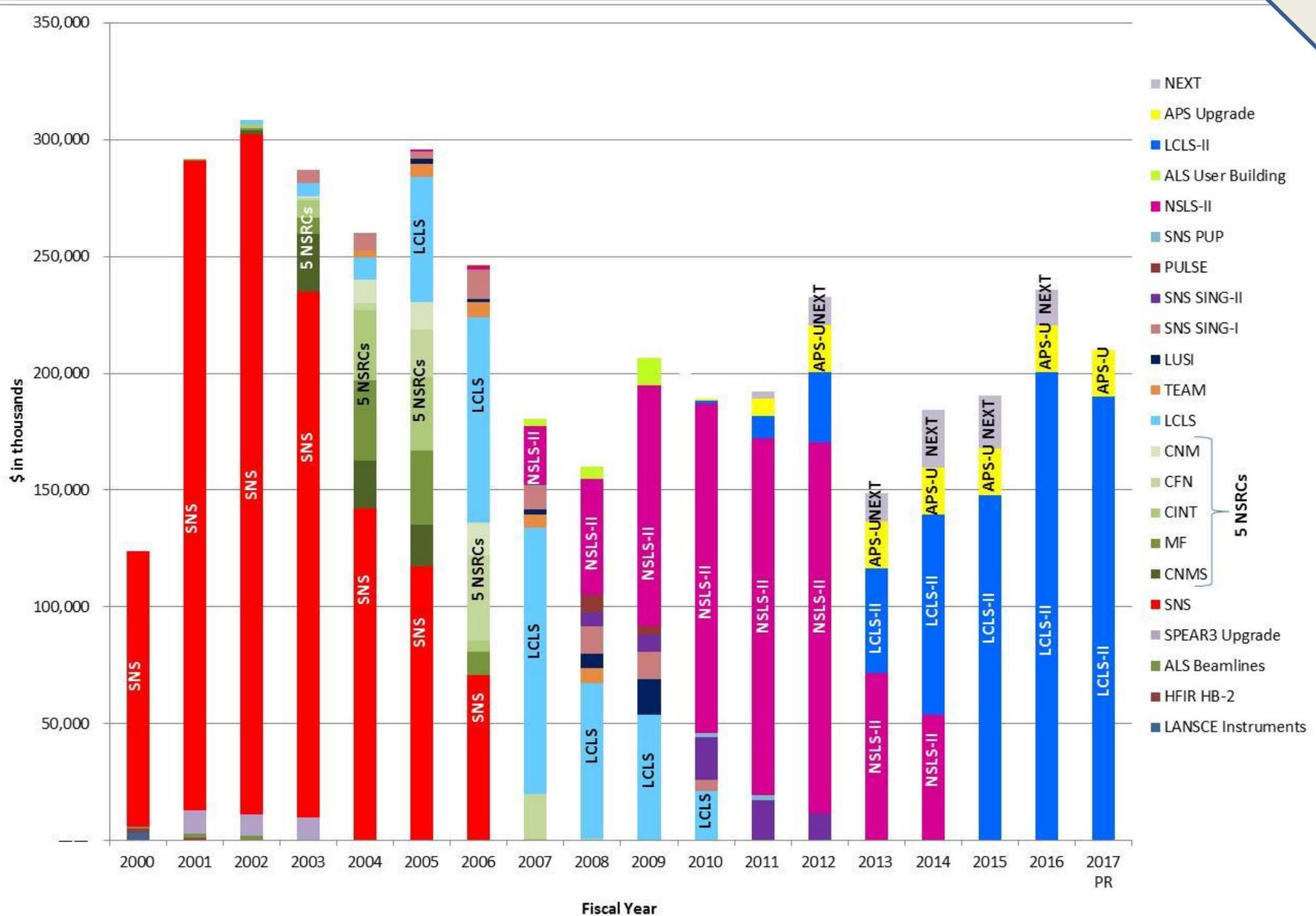
SC Investments in Research, Facilities, and Construction

Dr. Murray
slide



SC wins 5 DOE project management awards 2015!

BES Construction/MIE Funding Profile 2000 – 2017



FYI: The AIP Bulletin of Science Policy News

Federal Science Budget Tracker

Government Science Fellowships

Communicating with Congress

Federal Science Budget Tracker

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The *Federal Science Budget Tracker* provides up-to-date information on the status of fiscal year 2017 budgets and appropriations for the physical sciences.

The tabs below open to tables detailing federal spending proposals and outcomes for the agencies and programs that sponsor the physical sciences. The final tab contains an index of FYI bulletins that report on the progress of the fiscal year 2017 budget cycle – from the president’s request to congressional consideration to final appropriations law. The tables are updated on a timely basis as new spending proposals and other information become available.

If you have any questions or comments about this page, please email fyi@aip.org.

- [President's FY17 Budget Request](#)
- [Congress' FY17 Spending Allocations](#)
- [Department of Energy](#)
- [>>> Office of Science & ARPA-E](#)
- [>>> National Nuclear Security Administration](#)
- [>>> Nuclear Energy](#)
- [National Aeronautics and Space Administration](#)
- [National Science Foundation](#)



Federal Budget Status: You Can Follow Along at Home!

<https://www.aip.org/policy/federal-science-budget-tracker>

FY17 DOE Office of Science & ARPA-E Appropriations Summary Table

Funding Line	FY15 Current	FY16 Enacted	FY17 Request*	Change 16-17	House	Change 16-17	Senate	Change 16-17	Final	Change 16-17
OFFICE OF SCIENCE	5,133	5,350	5,572	4.1%	5,400	0.9%	5,400	0.9%		
Advanced Scientific Computing Research	523	621	663	6.8%	621	0.0%	656	5.7%		
Exascale Computing Project	0	0	154	-	151	-	154	-		
Oak Ridge Leadership Computing Facility	109	104	107	2.6%	110	5.4%	110	5.4%		
Argonne Leadership Computing Facility	89	77	80	3.9%	80	3.9%	80	3.9%		
National Energy Research Scientific Computing Center	76	86	92	7.1%	92	7.1%	92	7.1%		
Basic Energy Sciences	1,683	1,849	1,937	4.7%	1,860	0.6%	1,913	3.4%		
Synchrotron Radiation Sources	450	482	489	1.5%	489	1.5%	489	1.5%		
High Flux Neutron Sources	245	265	261	-1.3%	261	-1.3%	265	0.1%		
Linac Coherent Light Source-II	139	200	190	-5.1%	190	-5.1%	190	-5.1%		
Energy Frontier Research Centers	100	110	143	29.6%	98	-11.1%	-	-		
Advanced Photon Source Upgrade	20	20	20	0.0%	35	75.0%	50	150.0%		
EPSCoR	10	15	8.5	-42.3%	10	-32.3%	20	35.4%		
Biological &	573	609	662	8.7%	595	-2.3%	637	4.6%		



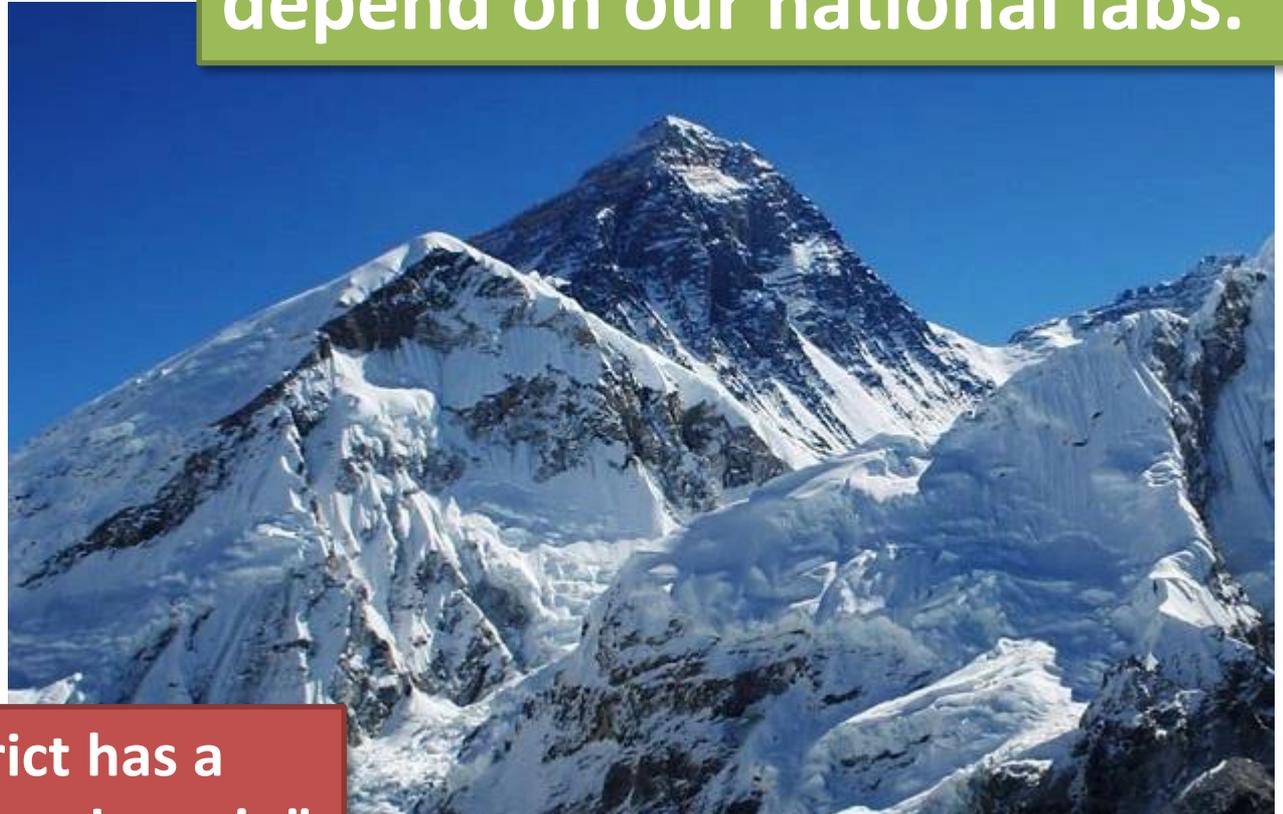
Communicating the Story of the User Facilities





The Long Game

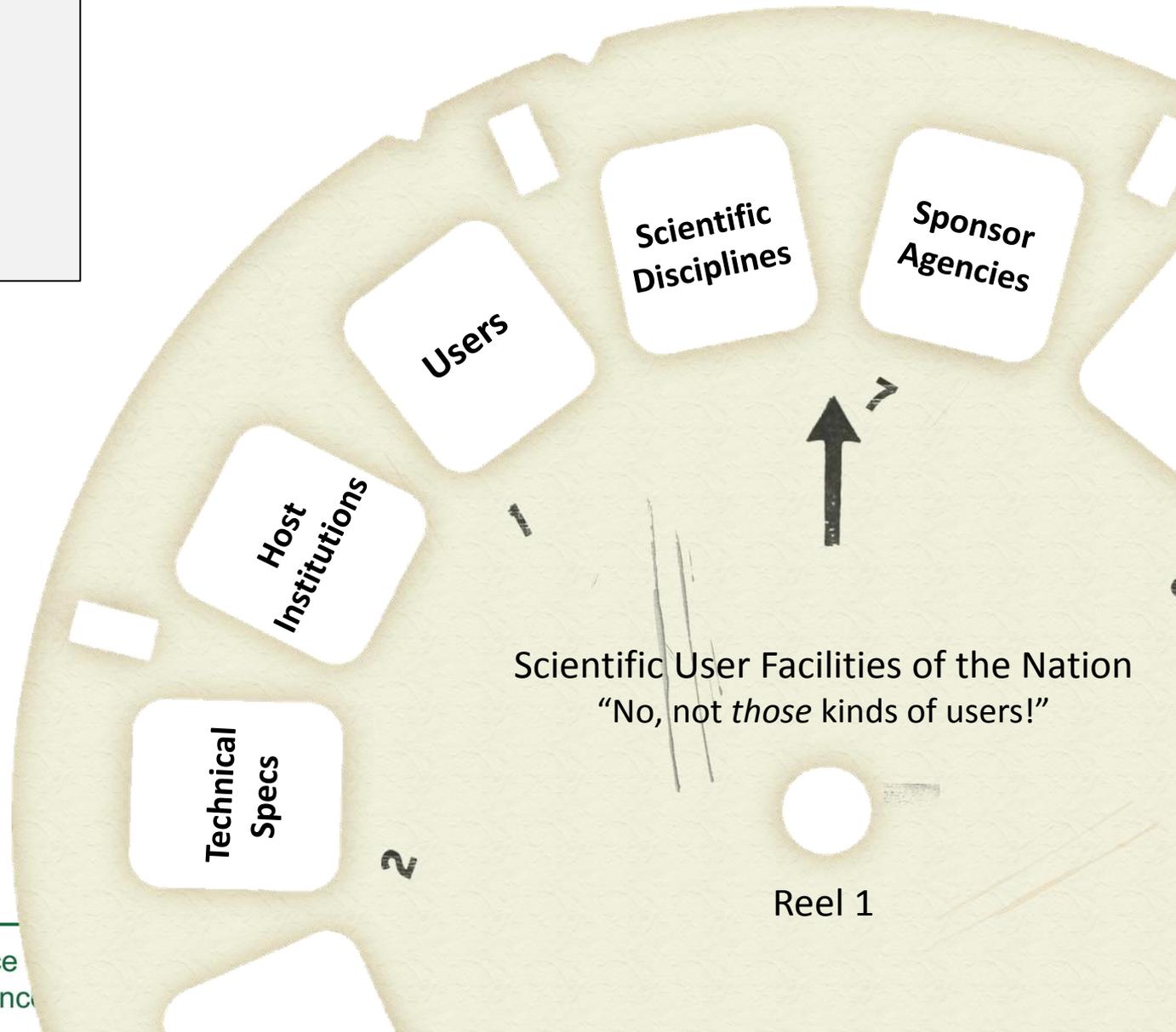
“I have constituents who depend on our national labs.”



“Your state/district has a national lab and mine doesn’t.”



Telling the whole story is challenging



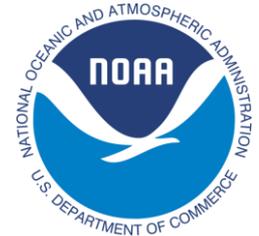
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Telling the whole story is challenging

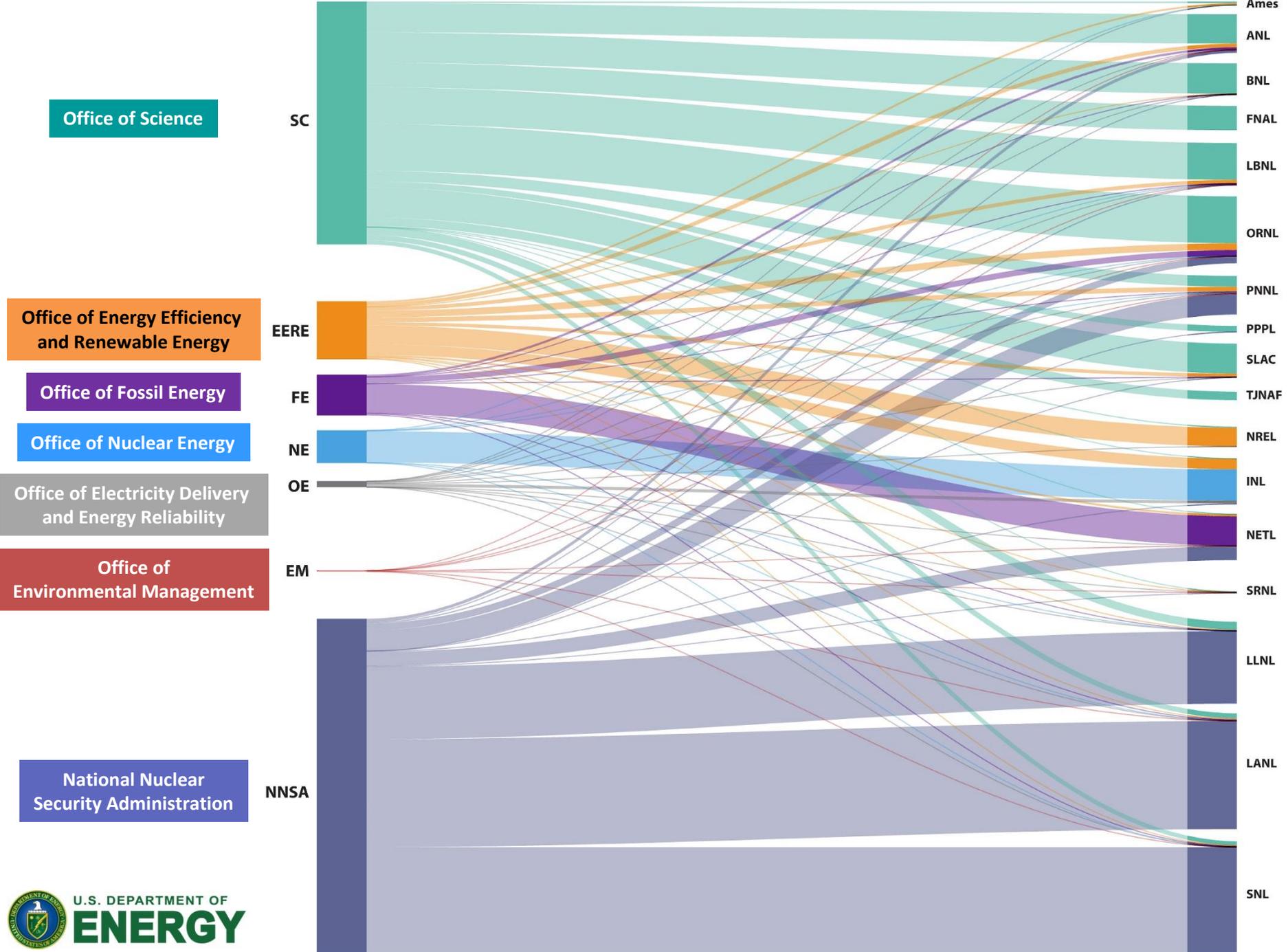


NIST

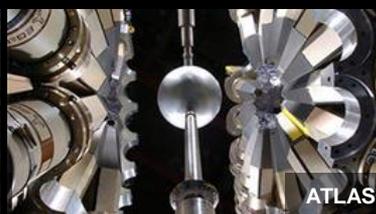
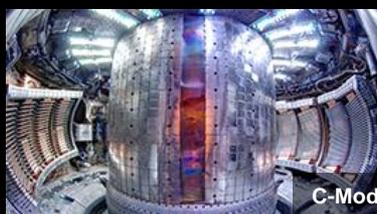
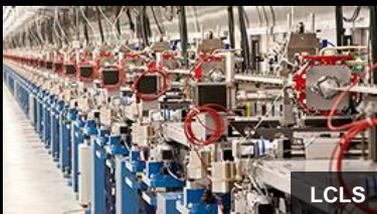
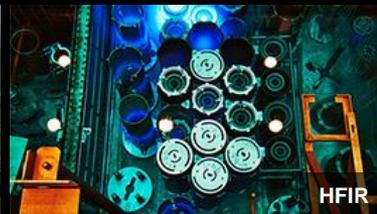


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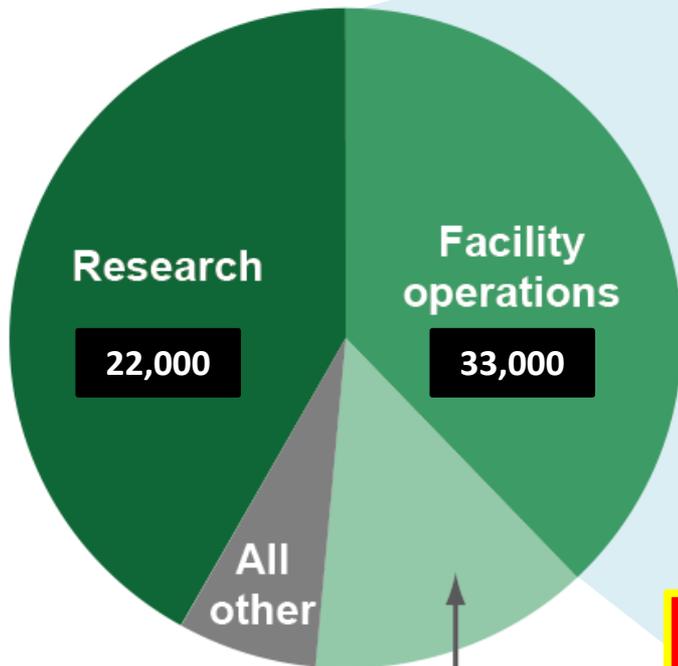


FY 2016 28 user facilities



Office of Science User Facilities

FY 2016 appropriations
\$5.3 billion



Facility construction and
major instrumentation

...but nothing beats
a great story

28 world-leading facilities serving
over 33,000 researchers annually

- supercomputers,
- high intensity x-ray, neutron, and electron sources,
- nanoscience facilities,
- genomic sequencing facilities,
- particle accelerators,
- fusion/plasma physics facilities
- atmospheric monitoring capabilities

Open

access through peer review of proposals

Free

for non-proprietary research

Unique

capabilities and people



SC's Cognizance Challenge



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User
Facility



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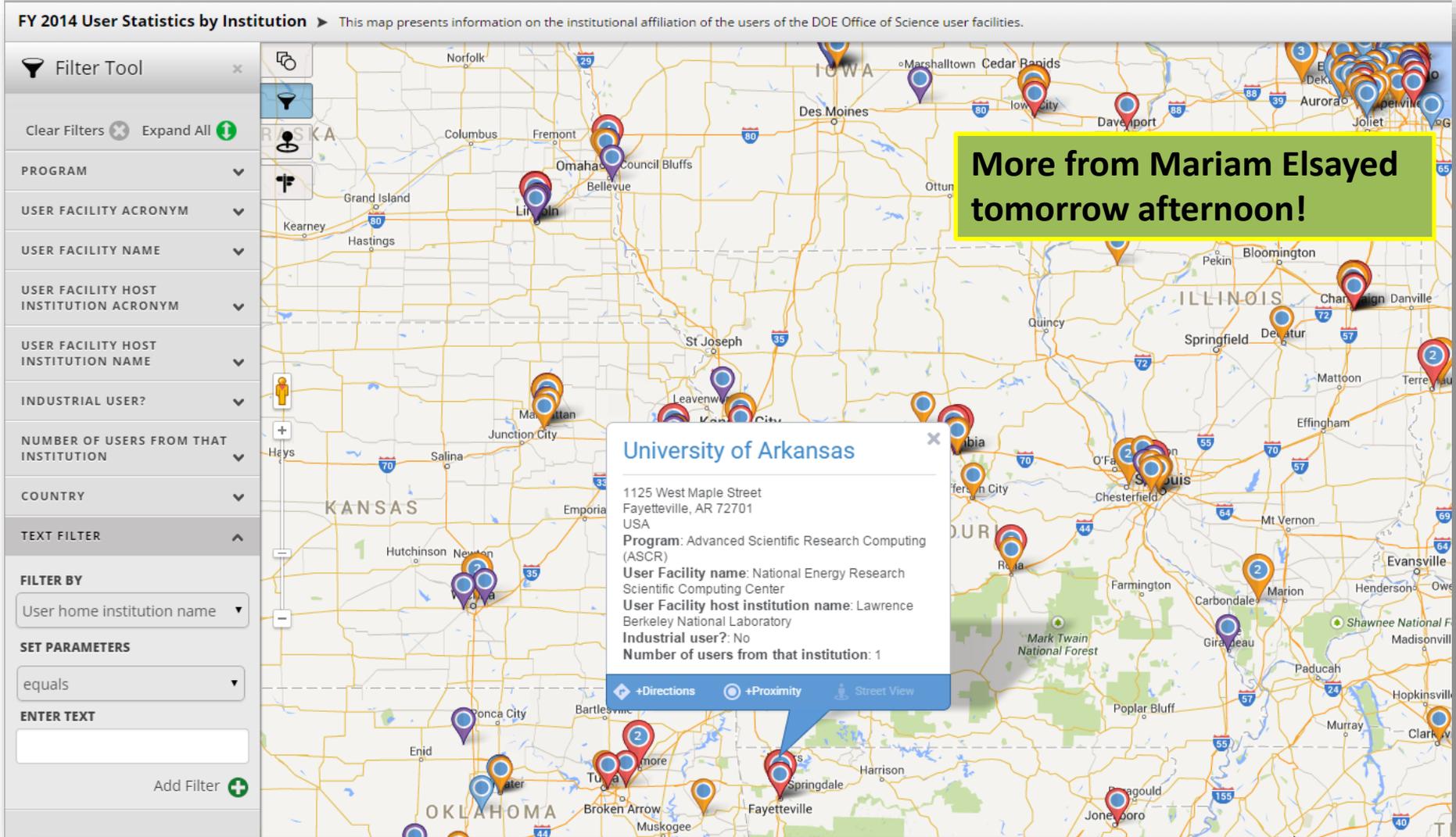
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Recent progress in overcoming the cognizance challenge

- 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.



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



National Lab Day on the Hill

April 20, 2016



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National Lab Day on the Hill

April 20, 2016



Motivations for user statistics

- Telling the story of the user facilities
- Understanding how science is done, and how it is evolving
 - Next: Thinking critically about the user experience

FY 2015 User Crossover Analysis

	C-Mod	ALCF	ALS	APS	ARM	ATF	ATLAS	CEBAF	CFN	CINT	CNM	CNM S	DIII-D	EMSL	Esnet	FACE T	Fermilab AC	HFIR	JGI	LCLS	NERSC	NSLS-II	NSTX-U	OLCF	RHIC	SNS	SSRL	TMF	
Alcator C-Mod	224	2	1										48									40		35	2				
ALCF	2	990	4	18	9		1	5	2	3	15		3	12	1	1	10	3		4	281		2	169	2	4	3	2	
ALS	1	4	2560	286	13			6	6	9	8	4		18			2	13	2	65	90	5			1	15	223	96	
APS		18	286	5471			8	14	19	8	154	29		19		2	5	77	3	77	26	25	1	1		163	183	5	
ARM		9	13		1121			2						23			2				71			15			3		
ATF						75		1								10					4				2				
ATLAS		1		8			392	5		1	5										3			1					
CEBAF		5	6	14	2	1	5	1510	1	1	7	3		3			36	2		1	44			14	29	7	4	1	
CFN		2	6	19				1	493	1	2	3		1				3		1	19	12		2		3	3	2	
CINT		3	9	8			1	1	1	502		9							2		6	1		4		2	8	2	
CNM		15	8	154			5	7	2		529			2			4	2		4	16	2			1		8	1	
CNM S			4	29				3	3	9		575				1	1	29	1		16			3		74	1	2	
DIII-D	48	3											557				1				86		87	14				1	
EMSL		12	18	19	23			3	1		2			713			2	2	39		64			13		3	12	3	
Esnet		1													48							2							
FACET		1		2		10						1				148	1			3	10					1	3		
Fermilab AC		10	2	5	2			36			4	1	1	2		1	1924			2	1	45		3	4	81	3	2	2
HFIR		3	13	77				2	3	2	2	29		2				492	2	2	4			3		235	7		
JGI			2	3							1		39				2	2	957	1	8					1	2		
LCLS		4	65	77				1	1		4					3	1	2	1	829	14	3		1		1	93		
NERSC	40	281	90	26	71	4	3	44	19	6	16	16	86	64	2	10	45	4	8	14	6332	2	41	304	142	13	14	30	
NSLS II			5	25					12	1	2									3	2	95				1	6	1	
NSTX-U	35	2		1									87				3				41		356	4					
OLCF	2	169		1	15		1	14	2	4		3	14	13			4	3		1	304		4	1107	1	4			
RHIC		2	1			2		29			1						81				142			1	1015	1			
SNS		4	15	163				7	3	2		74		3		1	3	235	1	1	13	1		4	1	843	7		
SSRL		3	223	183	3			4	3	8	8	1		12		3	2	7	2	93	14	6				7	1626	31	
TMF		2	96	5				1	2	2	1	2	1	3			2				30	1					31	677	

Total

Crossover

Users 128 556 867 1123 138 17 24 186 80 57 231 176 240 216 3 32 207 386 61 271 1395 58 173 559 260 538 613 179

Crossover % 57% 56% 34% 21% 12% 23% 6% 12% 16% 11% 44% 31% 43% 30% 6% 22% 11% 78% 6% 33% 22% 61% 49% 50% 26% 64% 38% 26%



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Inter-facility connections

- **Supercomputers + [any facility]**
- **Light sources + neutron sources**
- **Nanocenters + light/neutron sources**
- **BER-funded beamlines at light/neutron sources**
- **Joint Genome Institute + Environmental Molecular Science Laboratory**
- **NP and HEP colliders**
- **HEP accelerator research facilities**
- **FES tokamak facilities**

**The science drives
the connections**



FY 2016
28 user facilities



OLCF



ALCF



NERSC



ESnet



EMSL



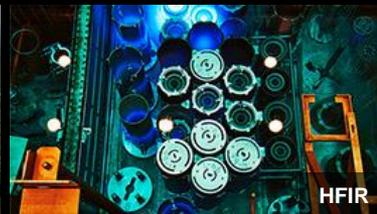
ARM



JGI



SNS



HFIR



CFN



CINT



CNM



CNMS

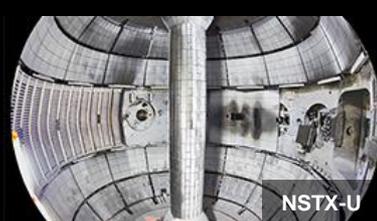


TMF

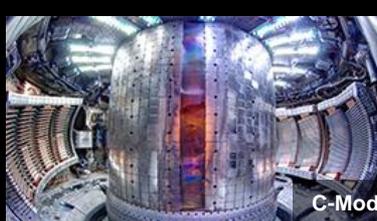
A network of resources



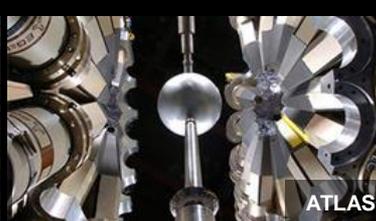
DIII-D



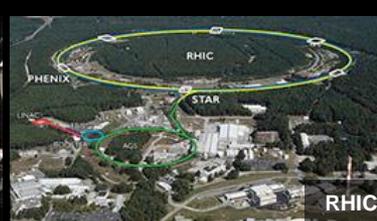
NSTX-U



C-Mod



ATLAS



RHIC



FACET



ATF

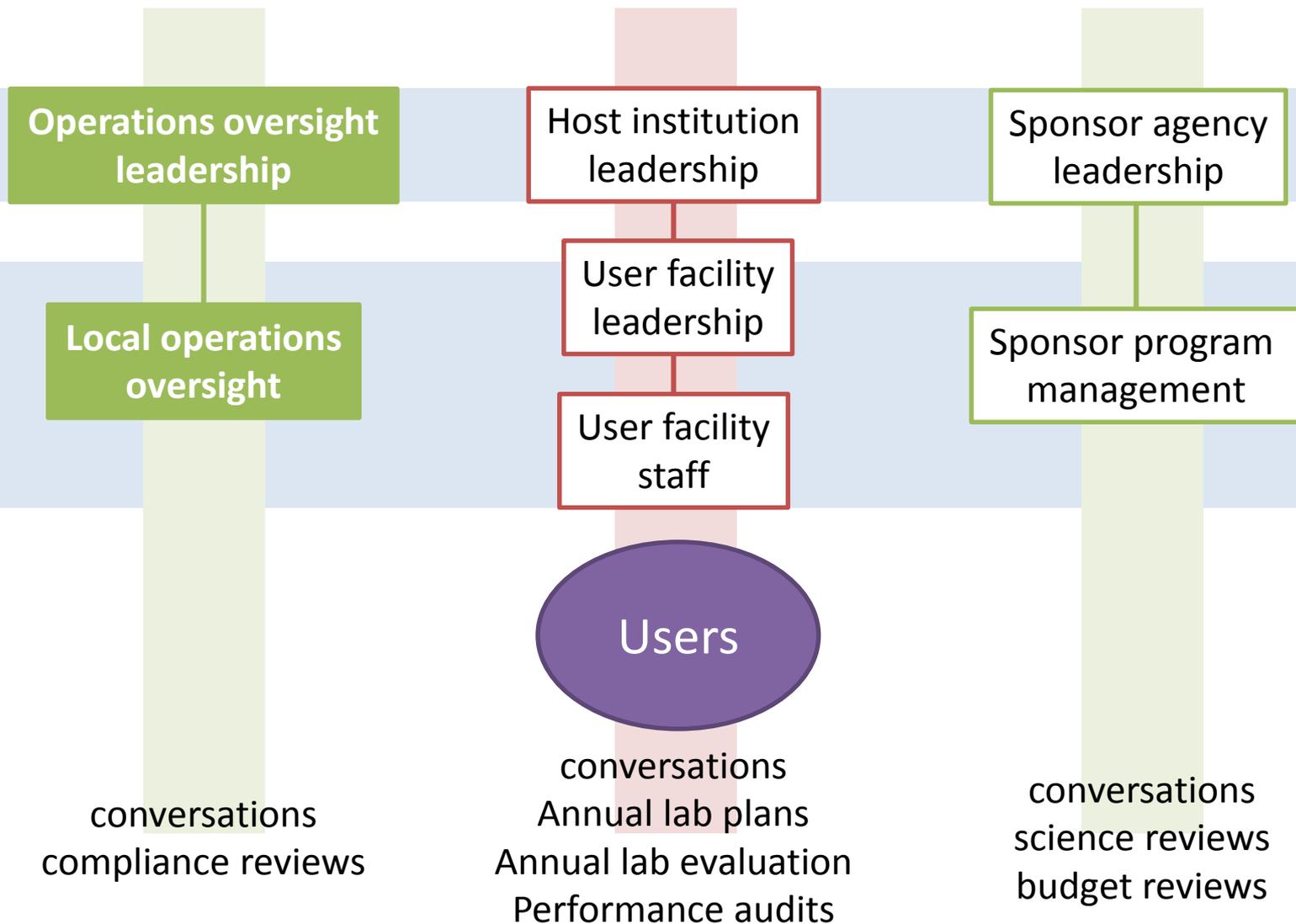


Fermilab AC



CEBAF

Complex organizational relationships



User Facilities in (Compliance) Context

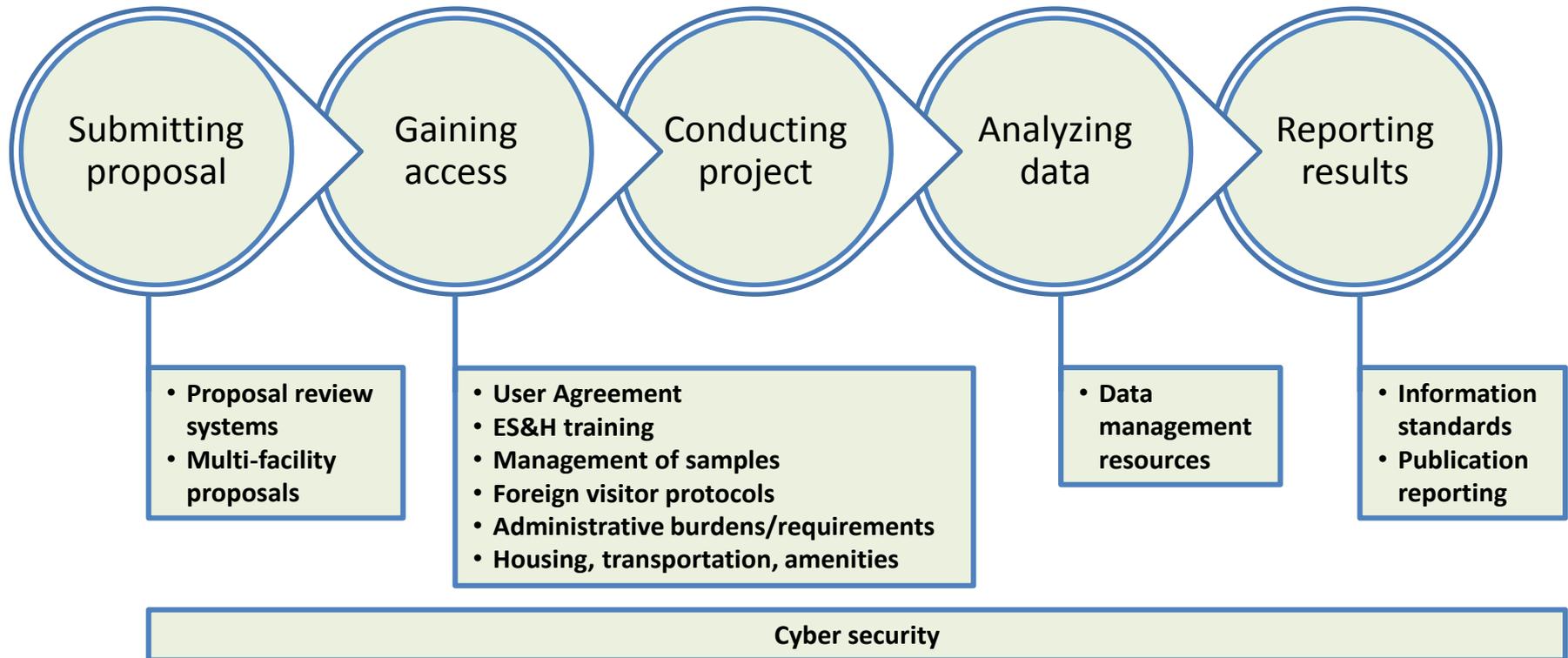


- U.S. Code
- U.S. Regulations, e.g., the Federal Acquisition Regulations (“the FAR”)
- Agency Regulations/Orders
- Agency Policies
- M&O Contract or Cooperative Agreement
- Host institution policies



My goal for this meeting: Explore this question

Are there actions the owners of the user facilities can take to enhance scientific productivity through improvements to the user experience?



Are there actions the owners of the user facilities can take to enhance scientific productivity through improvements to the user experience?

- This question is not intended to be a critique.
- It is motivated by an acknowledgement that the experiences for users and facility staff are the confluence of many factors—a cognizance challenge.
- Answering it requires sharing perspectives across several organizational/institutional stations.
- What we learn is likely to be portable.

1. Agree on problem areas
2. Agree on the root cause(s)
3. Propose solutions

Air, water, gravity ...

Thank you!

Questions?

ben.brown@science.doe.gov



Scientific User Facilities Characteristics

1. The facility is **open to all interested potential users** without regard to nationality or institutional affiliation.
2. Allocation of facility resources is determined by **merit review of the proposed work**.
3. **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**.
4. The facility provides resources sufficient for users to **conduct work safely and efficiently**.
5. **The facility supports a formal user organization** to represent the users and facilitate sharing of information, forming collaborations, and organizing research efforts among users.
6. The facility capability **does not compete with an available private sector capability**.

