

# Update on the Directorate for Mathematical and Physical Sciences

Anne L. Kinney  
Assistant Director  
August 14, 2018



DIRECTORATE FOR  
MATHEMATICAL &  
PHYSICAL SCIENCES



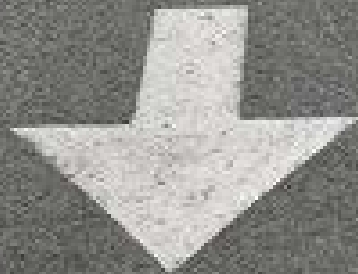


**HELLO**

my name is

Anne L. Kinney

# My Vision for the MPSAC-MPS Relationship



- MPS → Community
- MPS ← Community



# Science hors d'oeuvres

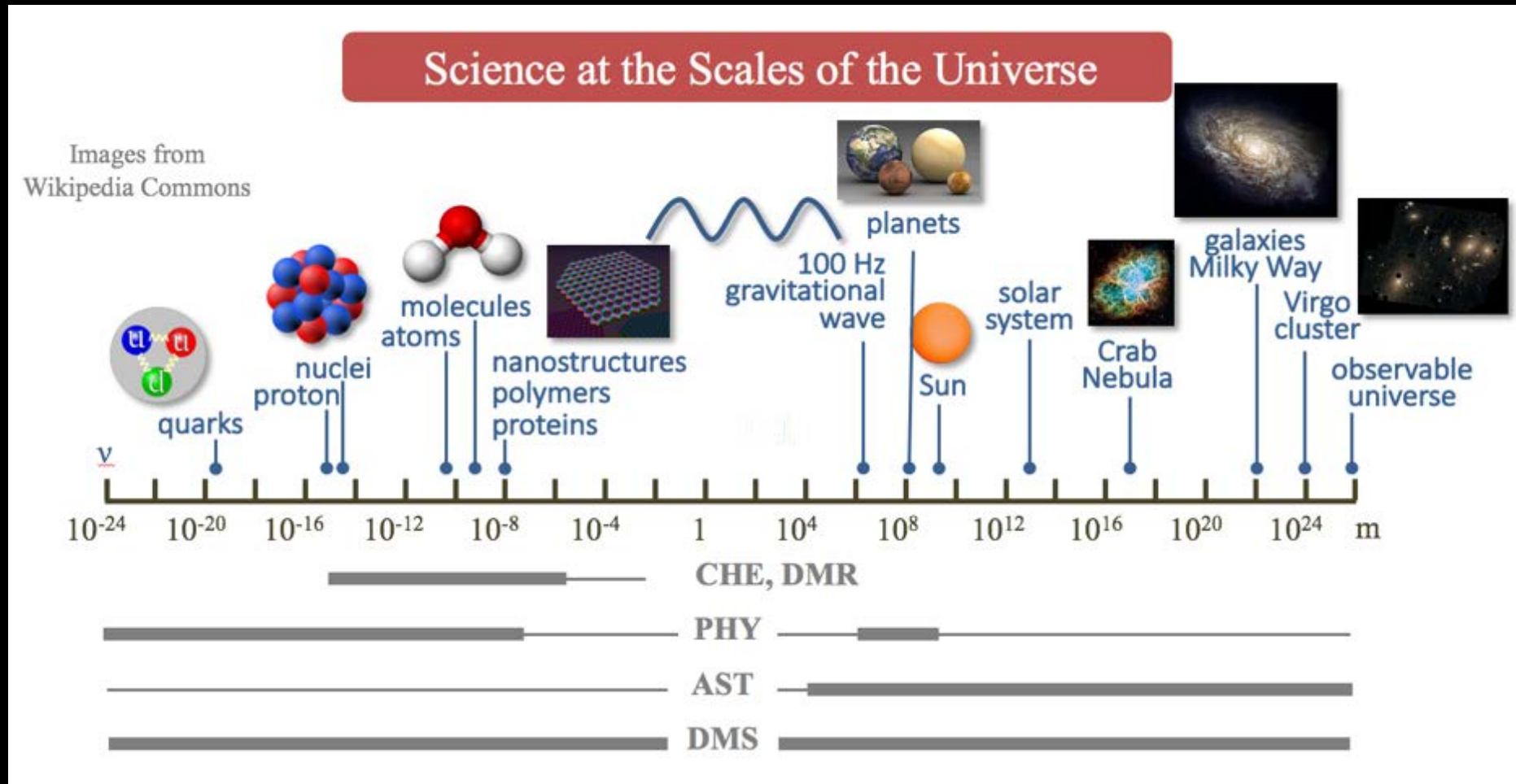


# NSTC Subcommittee on Quantum Information Science



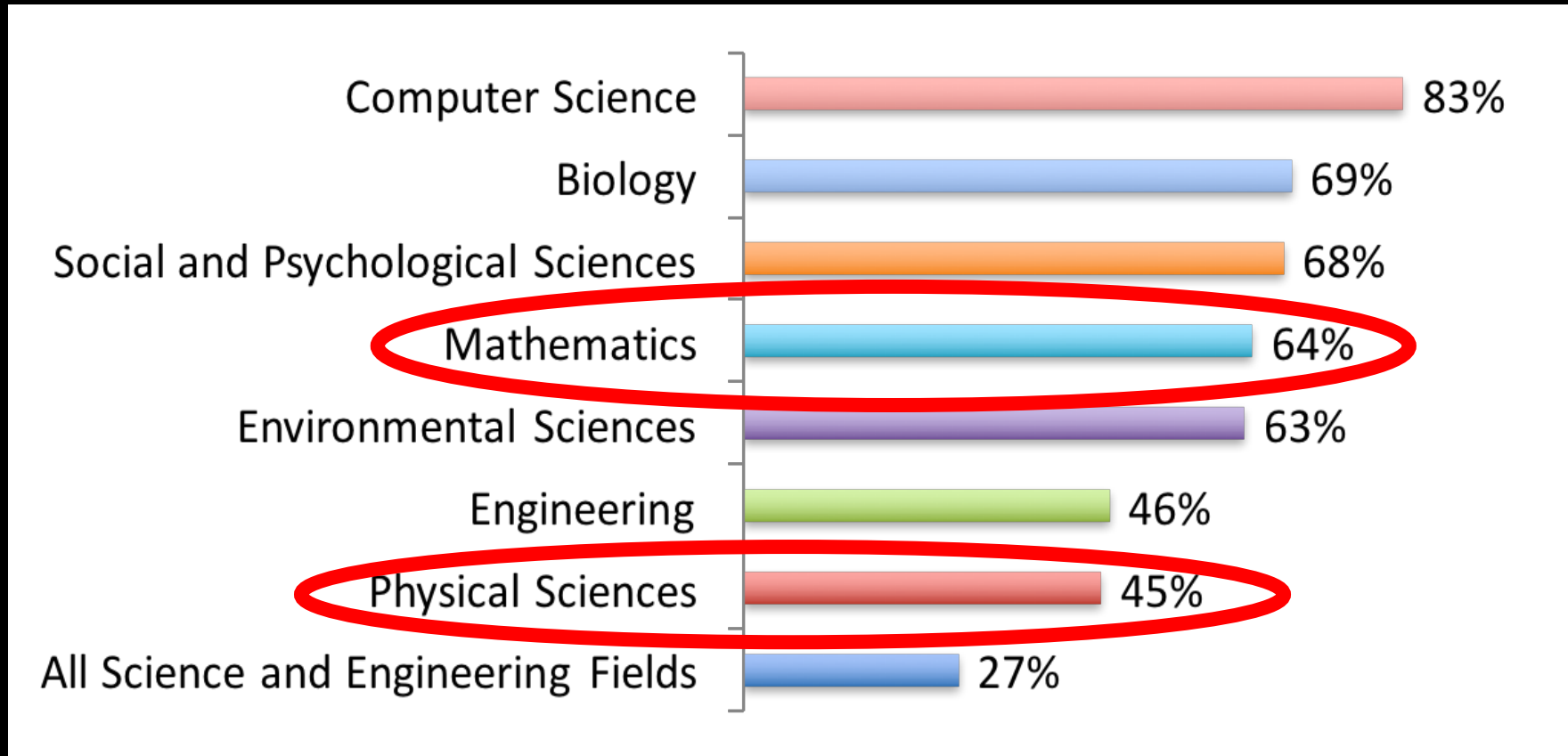
<https://www.aip.org/fyi/2018/science-committee-seeks-launch-national-quantum-initiative>

# This is MPS. . .



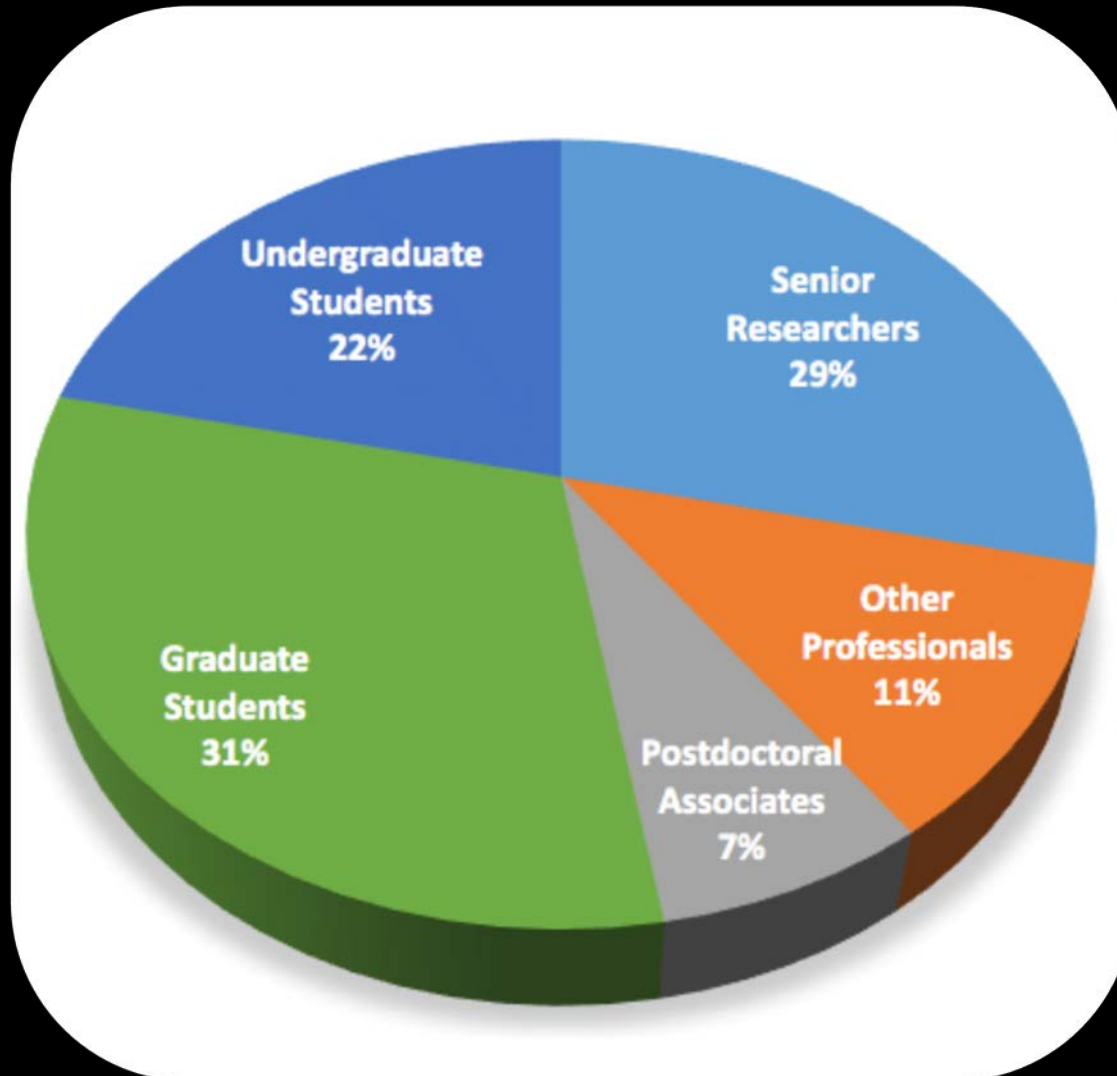
(slide from F. Crim talk)

# MPS exists in the context of . . .



**NSF Support of Academic Basic Research in Selected Fields**  
(as a percentage of total federal support)

# MPS supports over 28,000 people...



Undergraduate Students	6,248
Graduate Students	8,804
Postdoc Associates	1,988
Senior Researchers	8,236
Other Professionals	3,124
<b>Total</b>	<b>28,400</b>

Data Source: FY 2017 Actuals



# Budget

# FY 2019 President's Budget Request: \$1.345 Billion

## MPS Funding (Dollars in Millions)

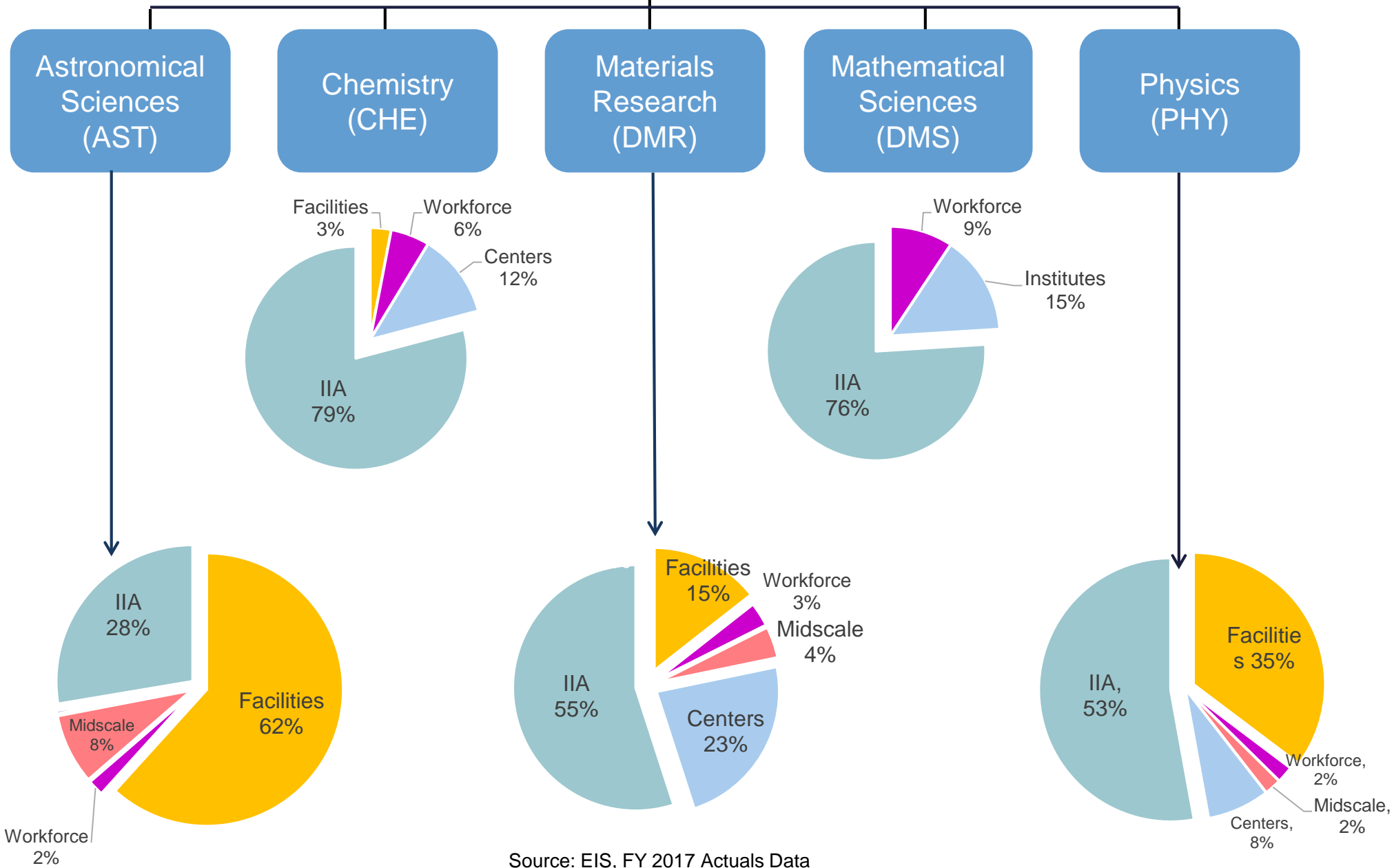
	FY 2017	FY 2018	FY 2019 Request
Astronomical Sciences (AST)	\$252.05	\$307.26	\$230.69
Chemistry (CHE)	\$246.24	\$245.74	\$230.58
Materials Research (DMR)	\$314.31	\$337.31	\$295.05
Mathematical Sciences (DMS)	\$233.54	\$236.51	\$218.82
Physics (PHY)	\$281.43	\$310.84	\$266.73
Office of Multidisciplinary Activities (OMA)	\$34.86	\$60.27	\$103.45
Total	\$1,362.43	\$1,497.93	\$1,345.32

# Principles Applied to FY 2019 Request

- MPS Budget Request: **\$1.345 B**
- **Emphasis on Big Ideas**
  - MPS stewardship: Quantum Leap & Windows on the Universe
  - Joining: Harnessing the Data Revolution, Mid-Scale & Understanding the Rules of Life
- **Strategic investments in:**
  - Fundamental research in all MPS disciplines
  - MPS research facilities
  - Mid-Scale
  - Next generation researchers and workforce
  - External partnerships



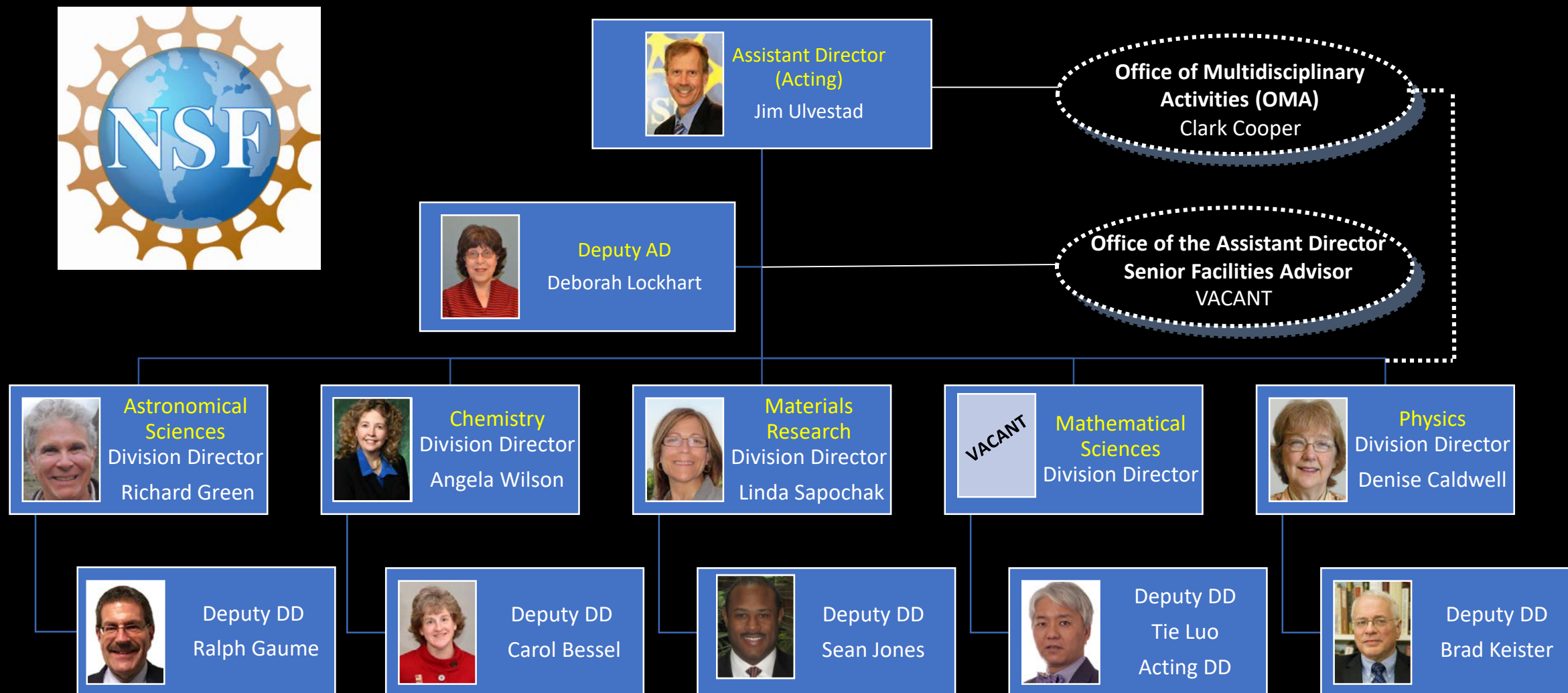
# Mathematical and Physical Sciences (MPS)



Source: EIS, FY 2017 Actuals Data

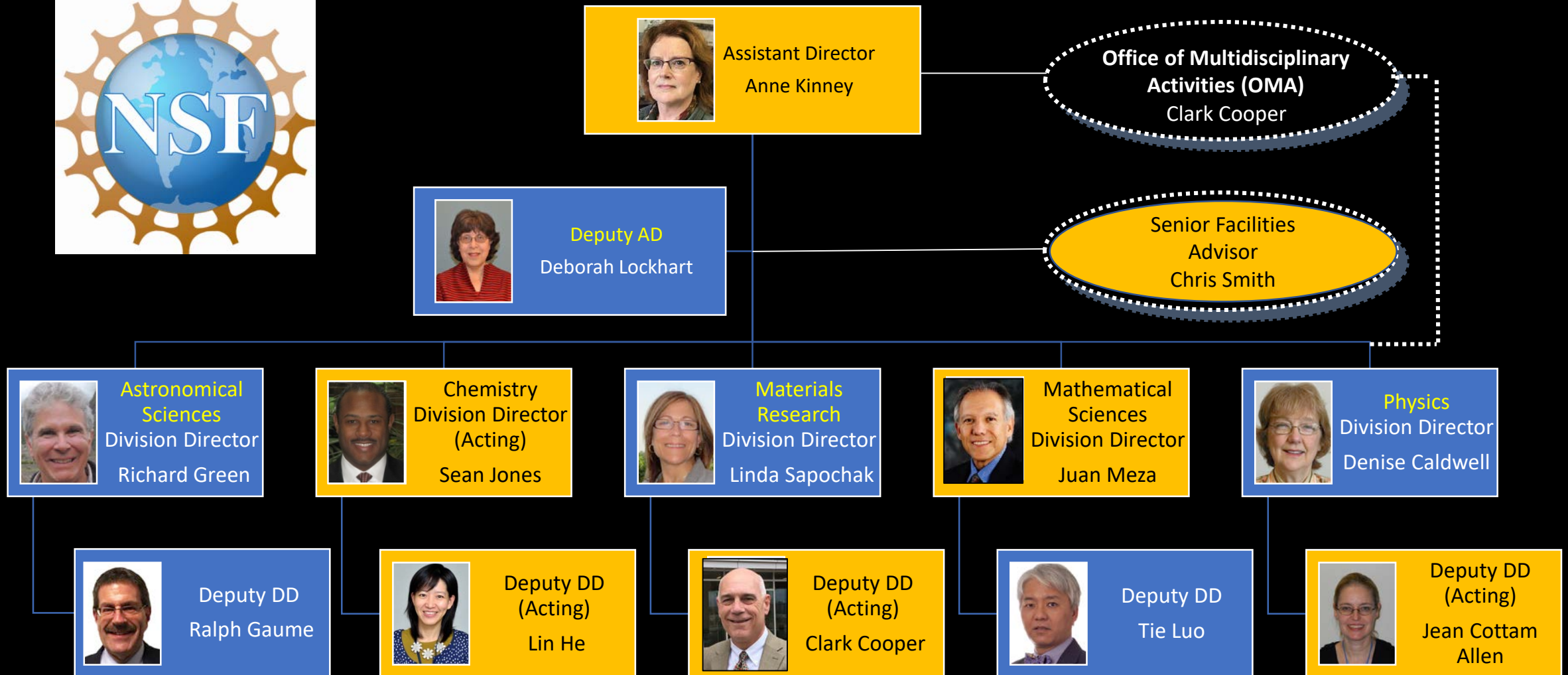
# Directorate for Mathematical and Physical Sciences

BEFORE: Last Time We Met On-Site (MPSAC Fall 2017)



# Directorate for Mathematical and Physical Sciences

As of 8/13/18





# —What's That?

The image is a screenshot of a Google search interface. At the top left is the Google logo. To its right is a search bar containing the text "what does nsf stand for?". Below the search bar are tabs for "All", "News", "Shopping", "Images", "Videos", "More", "Settings", and "Tools". The "All" tab is selected. Below the tabs, it says "About 11,100,000 results (0.64 seconds)". The main search result is for the "National Sanitation Foundation". It includes the NSF logo (a blue circle with "NSF" in white), the text "National Sanitation Foundation", and a description: "Regulatory Resources. NSF was originally established as the **National Sanitation Foundation** in 1944 at the University of Michigan School of Public Health as an independent, non-governmental, not-for-profit organization." Below this is a link: "Regulatory Resources - NSF International" with the URL "www.nsf.org/regulatory". To the right of the main text is a smaller NSF logo and the text "National Sanitation Foundation" and "angelwater.com NSF Certified Products".

Google

what does nsf stand for?

All News Shopping Images Videos More Settings Tools

About 11,100,000 results (0.64 seconds)

## National Sanitation Foundation

Regulatory Resources. NSF was originally established as the **National Sanitation Foundation** in 1944 at the University of Michigan School of Public Health as an independent, non-governmental, not-for-profit organization.

[Regulatory Resources - NSF International](http://www.nsf.org/regulatory)  
[www.nsf.org/regulatory](http://www.nsf.org/regulatory)

**NSF**  
National Sanitation Foundation  
angelwater.com NSF Certified Products

# Progress on NSF Branding. . .



# NSF Leadership Working On The Hill





# ABBREVIATED AGENDA

- Big Ideas I: Quantum Leap
- Big Ideas II: Windows on the Universe
- Prep for meeting with NSF Director

-----Tomorrow-----

- Policy on Sexual Harassment
- Big Ideas III: Harnessing the Data Revolution
- Big Ideas IV: Understanding the Rules of Life
- Synthetic "Materials" Biology
- Subcommittee on Physics Frontiers Centers
- Working lunch: The NSF 2026 Idea Machine (creating the Big Ideas of the future)
- Discussion with NSF Director and Chief Operating Officer
- Wrap-up Discussions

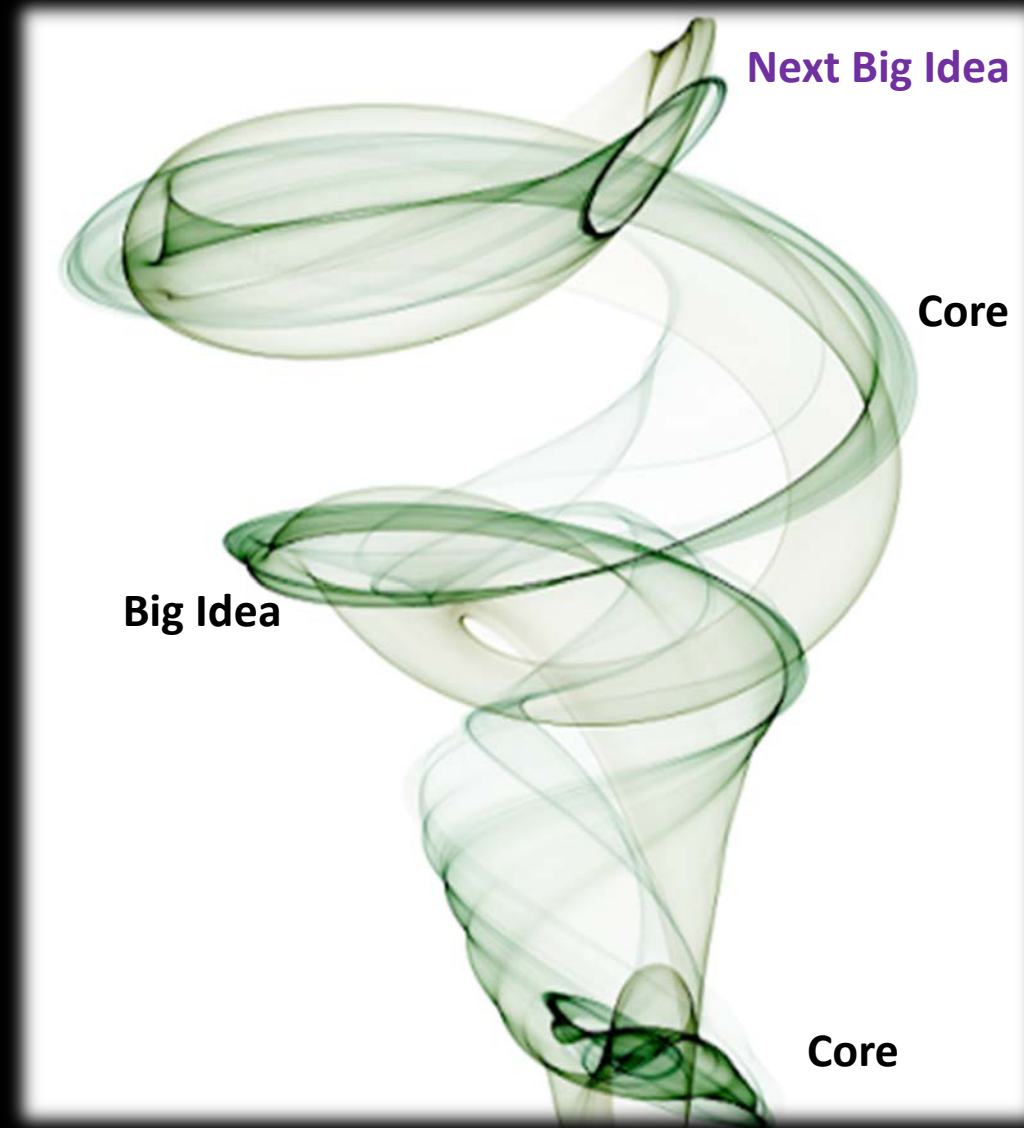
# Key Questions We've Asked the MPSAC:

- What sort of response have you been hearing from your scientific communities about these Big Ideas, in general?
- What is a reasonable expectation for the scientific outcomes for each Big Idea, for the \$30M/year level of strategic investment?
- Is there any discovery threshold that could be crossed by a somewhat increased level of investment?
- How can NSF best leverage its engagement with the basic research community to make unique gains under Quantum Leap, in the context of the developing national quantum initiative?
- To what extent is mid-scale investment critical to the two MPS-based Big Ideas, and to other aspects of the MPS programs?
- What are cross-cutting key topics for the next tranche of NSF Big Ideas that are germane to the MPS disciplines?
- How does investment in our longstanding core research programs relate to our new investments in the Big Ideas?

# The Future: Cross-Cutting Topics for future NSF Big Ideas

## Cross-Cutting Topics:

- Post-Quantum Cryptography (DMS, CISE)
- Exo Solar Planetary Atmosphere (BIO, GEO, MPS/AST)
- Materials Sustainable Development (BIO, ENG, MPS/DMR)
- Sustainable Chemistry (BIO, ENG, GEO, MPS/CHE)
- Multi-messenger Astrophysics (AST, GEO, MPS/AST, PHY)
- Opioids (BIO, ENG, GEO, MPS/CHE, SBE)
- Precision Measurement (, DOE, MPS/CHE, PHY, NIST)
- Math of Deep Learning (MPS/DMS, CISE)
- Synthetic “Materials” Biology (Air Force, BIO, ENG, MPS/CHE, DMR, PHY)



END

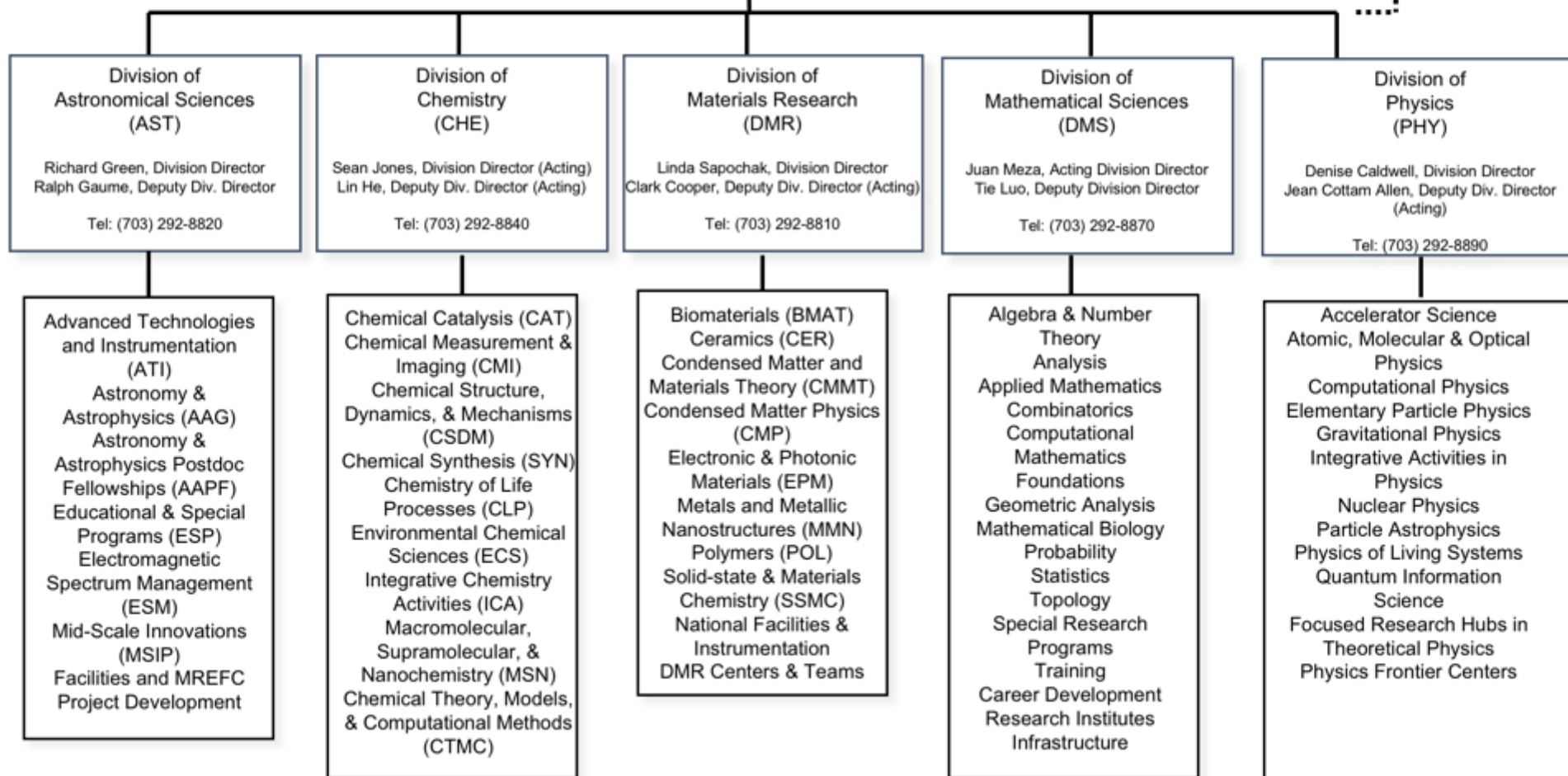


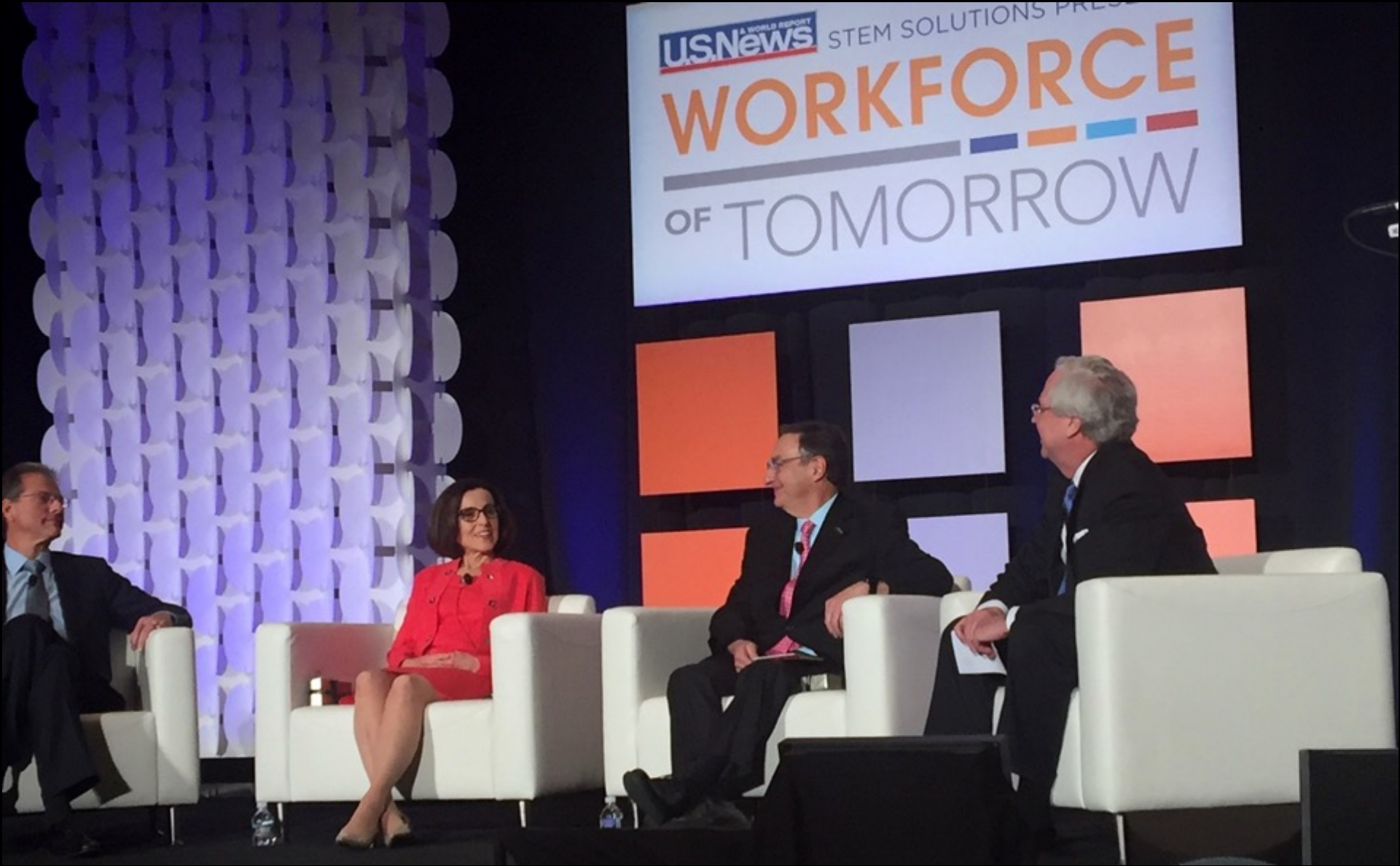
Directorate for Mathematical and Physical Sciences  
(MPS)

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Office of Multidisciplinary  
Activities (OMA)

Clark Cooper





NSF Director inducted into STEM Leadership Hall of Fame  
April 2018

# NSF Director at CoSTEM meeting, March 7, 2018



Backup slides on mid-scale?