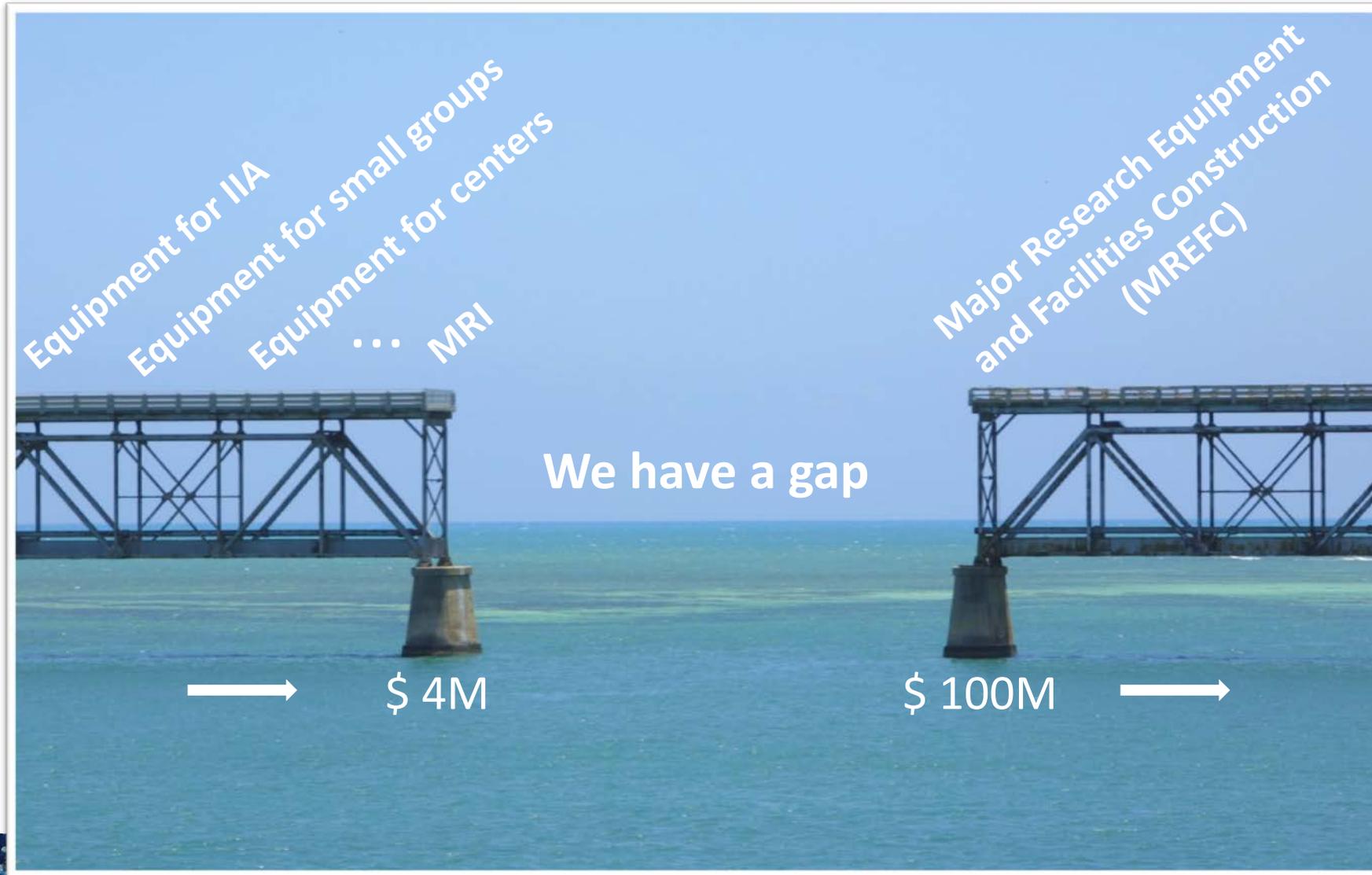


A Neglected Scale of Infrastructure



Crim & Kurose, NSB,
November 2015

Photo Credit: Nathan D. Holmes



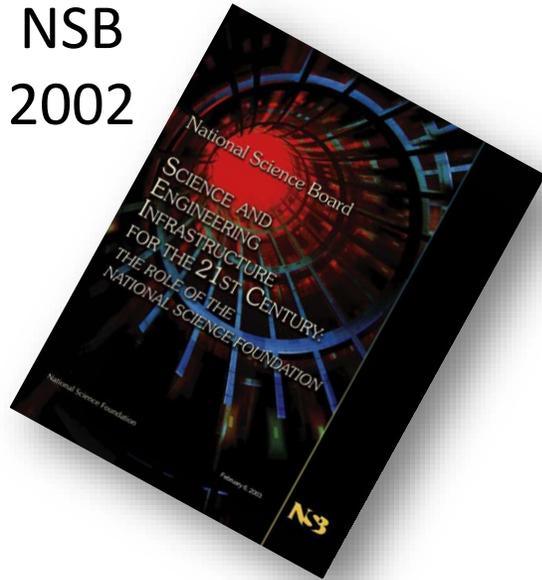
National Science Board Report NSB 11-80

- 2011 report on mid-scale instrumentation in response to America COMPETES Act of 2010.
- “the Board does not recommend that NSF expand existing Foundation-wide programs or create a new Foundation-wide program for mid-scale instrumentation at this time.

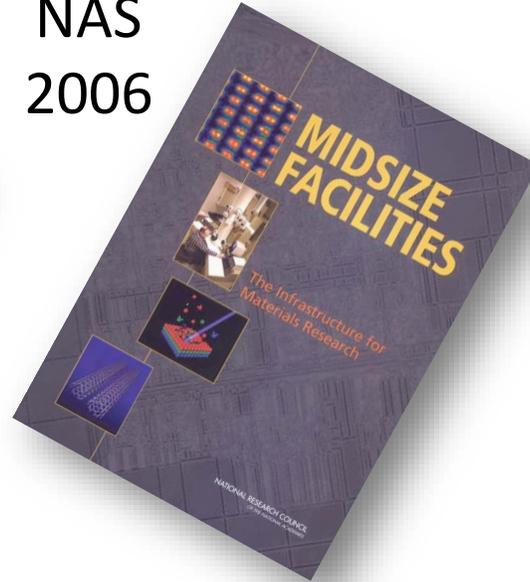


Examples of Community Calls

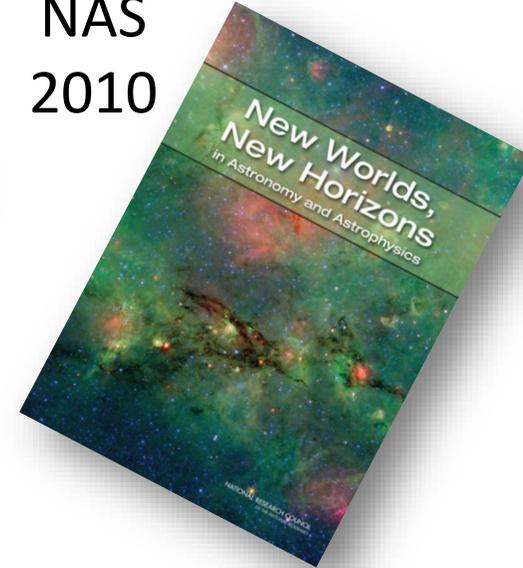
NSB
2002



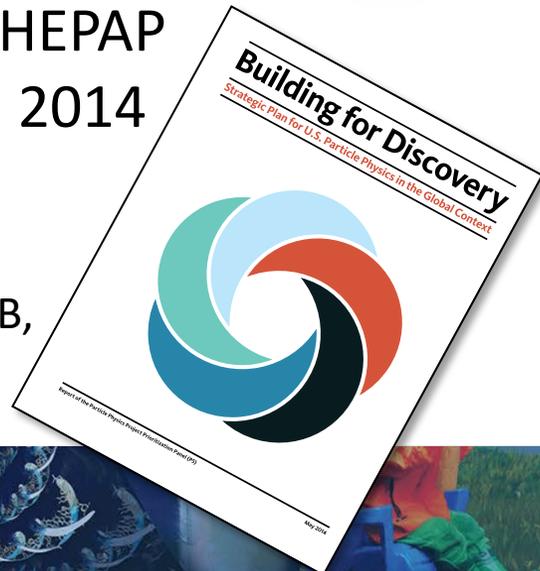
NAS
2006



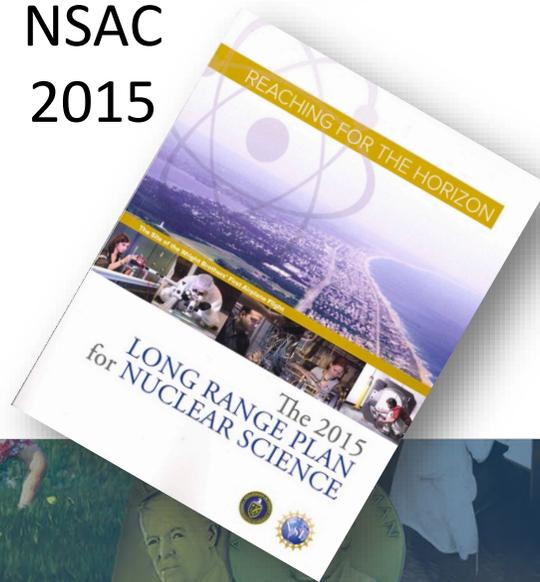
NAS
2010



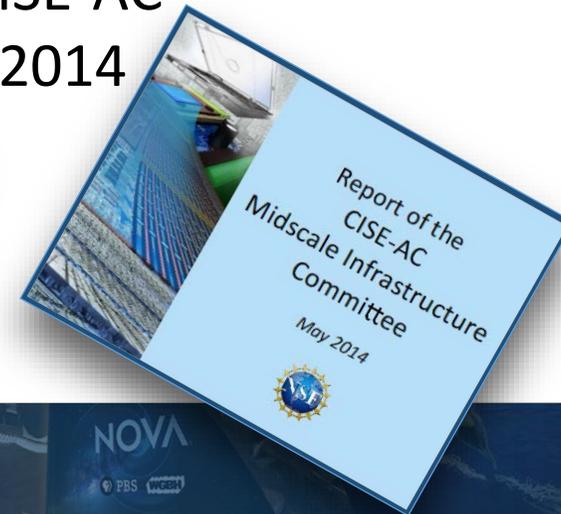
HEPAP
2014



NSAC
2015



CISE-AC
2014



Crim & Kurose, NSB,
November 2015



Reduction in Mid-scale Threshold

- Lower limit to MREFC reduced to \$70 million for all Directorates in late 2016.



American Innovation and Competitiveness Act (AICA), Public Law 114-329, January 2017

- Section 109: NSF Mid-scale Project Investments
 - (b)(1) “The Foundation shall evaluate the existing and future needs, across all disciplines supported by the Foundation, for mid-scale projects.”
 - (b)(2) “The Director of the Foundation shall develop a strategy to address the needs identified in paragraph (1).”



NSF Request for Information

- Request for Information on Mid-Scale Research Infrastructure in the \$20-100 million range, NSF 18-013, issued in October 2017.
- “For the purposes of this RFI, NSF defines Research Infrastructure (RI) as any combination of facilities, equipment, instrumentation, computational hardware and software, and the necessary human capital in support of the same. This includes upgrades to existing major research facilities.”



RFI Responses: 192 total, ~\$10 billion

DIR	#	High Impact
BIO	13	2
CISE	16	7
EHR	3	1
ENG	27	5
GEO	58	33
MPS	60	36
SBE	15	2

Big Idea	High Impact
Future of Work	1
Harnessing Data	6
New Arctic	7
Quantum	9
Rules of Life	2
Windows on Universe	15

NSF FY 2019 Budget Request

NSF's 10 BIG IDEAS FY 2019 REQUEST FUNDING

(Dollars in Millions)

Big Ideas	FY 2019 Request
Research Ideas	\$180.00
Harnessing the Data Revolution for 21st- Century Science and Engineering - HDR (CISE/ITR) ¹	30.00
Navigating the New Arctic - NNA (GEO/ICER)	30.00
The Future of Work at the Human-Technology Frontier - FW-HTF (ENG/EFMA) ¹	30.00
The Quantum Leap - QL (MPS/OMA)	30.00
Understanding the Rules of Life - URoL (BIO/EF)	30.00
Windows on the Universe - WoU (MPS/OMA)	30.00
Process Ideas	\$102.50
Growing Convergence Research - GCR (IA)	16.00
Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science - NSF INCLUDES (EHR)	20.00
Mid-Scale Research Infrastructure (IA)	60.00
NSF 2026 Fund (IA)	6.50
Total, NSF Big Ideas	\$282.50

Another NSB Report Mandated by Congress

- NSB 2018-40 (October 2018): “Bridging the Gap: Building a Sustained Approach to Mid-scale Research Infrastructure and Cyberinfrastructure at NSF.”
 - “NSF should affirm and sustain the mid-scale Big Idea with a long-term *agency-level* commitment to mid-scale research infrastructure.”
 - “NSF should investigate the feasibility of using the MREFC account as one possible funding mechanism.”
 - “NSB and NSF should review existing infrastructure oversight and management structures to ensure compatibility with mid-scale range investments.”
 - “NSF, in cooperation with NSB, should develop an evaluation and assessment program to determine the full scope of the demand for mid-scale research infrastructure and ensure NSF’s programs and processes address that demand.”



Mid-scale Planning

- Two NSF Working Groups covering the range between MRI and MREFC funding limits.
- “Big mid-scale” Working Group:
 - Co-chairs are Brian Midson (GEO/OCE) and Allena Opper (MPS/PHY).
 - Additional members from all the other NSF research directorates, plus the Large Facilities Office.
- Working groups are responsible for planning mid-scale program and crafting the solicitations.



NSF 19-013 (Dear Colleague Letter)

- Published October 15, 2018
- Announced upcoming funding opportunities
- Overall objective: “to transform scientific and engineering research fields by making available new capabilities, while simultaneously training researchers in the acquisition, implementation, development, design, and/or construction of cutting-edge infrastructure.”



Upcoming Solicitations

- Broadly defined research infrastructure
 - Mid-scale disciplinary instrumentation
 - Implementation of mid-scale facilities
 - Cyberinfrastructure
 - Other infrastructure to support science, engineering, or education research objectives
 - Mid-scale upgrades to existing research infrastructure
- One solicitation to cover \$6 million to \$20 million range
 - Lower end is at the upper end of MRI, when you include the matching funding that is required in the MRI solicitation
- Second solicitation to cover \$20 million to \$70 million range
 - Projects above \$70 million fall into the MREFC category



Stay Tuned ...



NSF Mid-Scale Infrastructure Strategy Taking Shape



Backups Follow

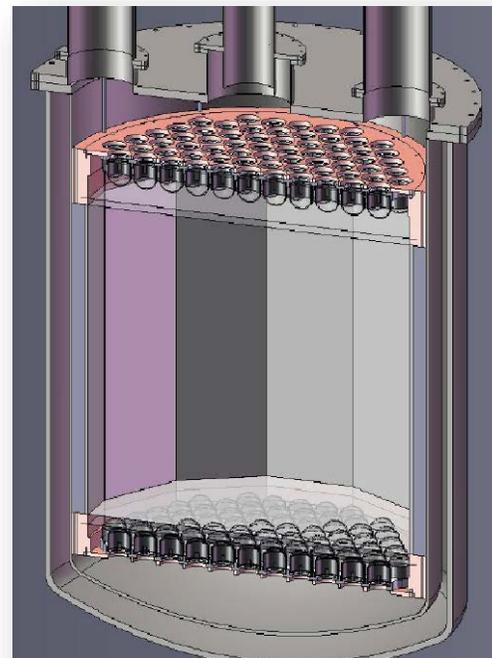


Neglected but not ignored

Limited funding carved out of existing budgets



Global Environment for
Network Innovations
(CISE) \$30M



Xenon 1T Dark Matter Project
(MPS/PHY) \$12M

Crim & Kurose, NSB,
November 2015



The NSF Big Idea on Mid-scale

MRI upper limit \$5.7 million (with matching)

MREFC lower limit reduced to \$70 million in late 2016



Mid-scale Working Groups

- Two working groups, covering (roughly) the funding ranges of \$6-20 million and \$20-70 million.
- These working groups, with guidance from NSF leadership, are responsible for developing implementation plans.



The ways of doing science are changing -particularly with respect to infrastructure

Increasing reliance on cyberinfrastructure

Increasingly diverse scales (space, \$, time)

Increasingly dynamic

Issues

- Funding
- Agility – shorter timescales
- Matching oversight to scale
- Rapidly evolving technologies
- Varied operational models



**How do we innovate to meet these evolving needs?
Do we need new programs and processes?**

Crim & Kurose, NSB,
November 2015

