



National Science Foundation
WHERE DISCOVERIES BEGIN



National Science Foundation

Mid-scale Research Infrastructure-1

Mid-scale RI-1 Working Group
FY 21/22 Competition Outreach
November 4 & 5, 2020

Times: 1:00p.m. – 2:30 p.m. Eastern

Please submit questions through the chat function in Zoom

*It is expected that these slides and a video of this webcast will
be available at:*

https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505602





Mid-scale RI-1 Working Group

OIA	Randy Phelps	rphelps@nsf.gov
BIO	Rob Fleischmann	rfleisch@nsf.gov
CISE	Deepankar Medhi	dmedhi@nsf.gov
EHR	Andrea Nixon	anixon@nsf.gov
ENG	Aranya Chakraborty	achakrab@nsf.gov
GEO	Michael E. Jackson	mejacks@nsf.gov
MPS	Guebre X. Tessema	gtessema@nsf.gov
SBE	Joseph Whitmeyer	jwhitmey@nsf.gov
OISE	Maija Kukla	mkukla@nsf.gov
EPSCoR	Timothy VanReken	tvanreke@nsf.gov
BFA	Florence Rabanal	frabanal@nsf.gov
	Michael Horneffer	mhorneff@nsf.gov
	Xiofeng Guo	xguo@nsf.gov



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Mid-scale Research Infrastructure-1

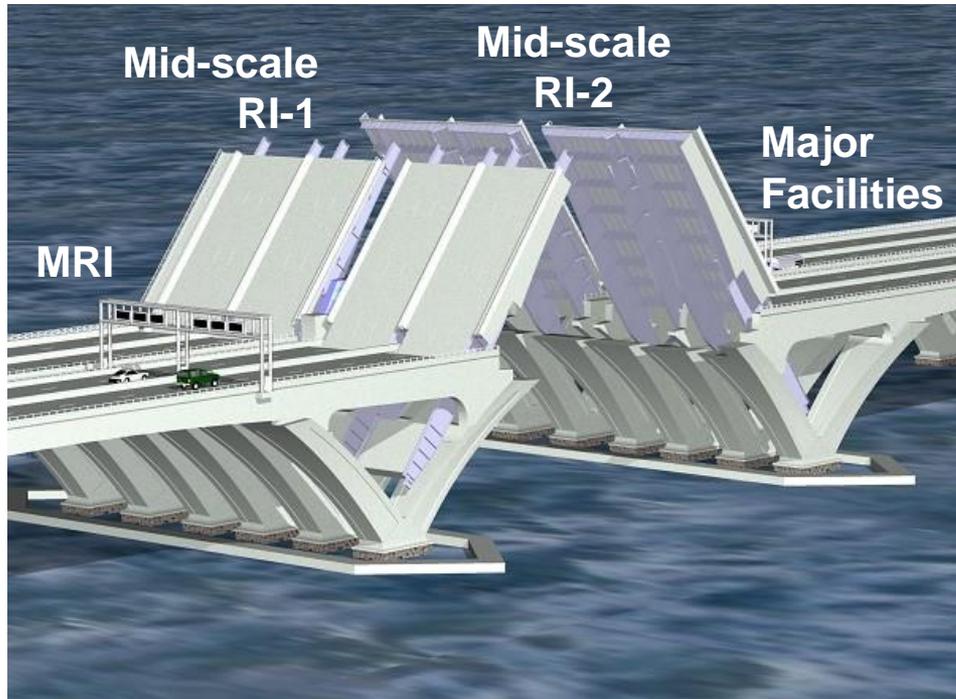
Format:

- ***Mid-scale RI Overview***
- ***Mid-scale RI-1***
- ***General Q&A***
- ***Directorate “Breakout Sessions”***





Mid-scale Research Infrastructure



- Many important potential experiments and facilities fall between the \$100K to \$4M¹ Major Research Instrumentation (MRI) program and the > \$100M Major Multi-user Facilities range.
- This gap results in missed opportunities that may leave essential science undone.
- NSF needed a new agile process for funding experimental research capabilities in the mid-scale range.
 - Mid-scale RI-1: \$6 - <\$20 M
 - Mid-scale RI-2: \$20 - \$100 M

¹\$5.7 million with the addition of Congressionally mandated cost sharing



Mid-scale RI

Mid-scale RI-1 supports:

- ✓ Implementation projects: any combination of equipment, instrumentation, cyberinfrastructure, broadly used large-scale datasets, and the commissioning and/or personnel needed to successfully complete the project.
- ✓ Design projects: intended to lead to eventual implementation of a mid-scale class project.

Mid-scale RI-2 supports:

- ✓ Implementation projects only.



Mid-scale RI-1 (NSF 21-505) due dates

- **NSF 21-505** solicits proposals for the 2nd (FY21/22) Mid-scale RI-1 competition

**Preliminary Proposal
(Required)**

January 07, 2021

**Full Proposal Deadline
(By Invitation Only)**

April 23, 2021

- Mid-scale RI-2: Stay tuned.....



Mid-scale RI-1 (NSF 21-505)

Implementation Projects e.g., Acquisition, Assembly, Construction and Commissioning:

- a) Enable well-defined, limited-term research experiments with broad community buy-in and shared data resources and/or
- b) Shared-use, mid-scale RI for broad community use.

$\$6 \text{ million} \leq \text{Total Project Cost} < \20 million

Design Projects: Cover activities leading to preparation for implementation of a future mid-scale class project¹.

$\$600,000 \leq \text{Total Project Cost} < \20 million

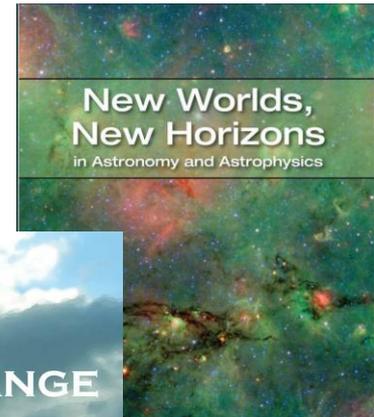
¹NSF makes no commitment to the implementation of projects supported through the design track of Mid-scale RI-1.



Mid-scale RI-1

Mid-scale RI-1 projects should:

- Emphasize strong scientific merit.
- *Fill research-community defined scientific needs or enable national research priorities to be met.*
- Enable US researchers to remain competitive in a global research environment.
- Training a diverse workforce in design and implementation of S&E infrastructure.





Mid-scale RI-1 will not support:

- Research that is not part of validation of operational readiness;
- Post-implementation research, training, operations or maintenance (proposals must describe plans);
- Projects with a TPC outside of solicitation limits;
- General-purpose buildings, support systems and equipment not directly required for the implementation and eventual operation of the proposed infrastructure;
- Multiple pieces of infrastructure or instrumentation packaged together to meet the minimum TPC but not functioning as an integrated system;
- Other non-RI organized activities, e.g., research centers.



Project Execution Plan (PEP)

- Scaled down from the full list of components required for Major Facilities projects
- PEP template for Mid-scale RI projects: illustrates how to cover the minimum required components (9 sections) of PEP
– Available at
https://www.nsf.gov/bfa/lfo/mid-scale_guidance.jsp



Key to preparing a PEP

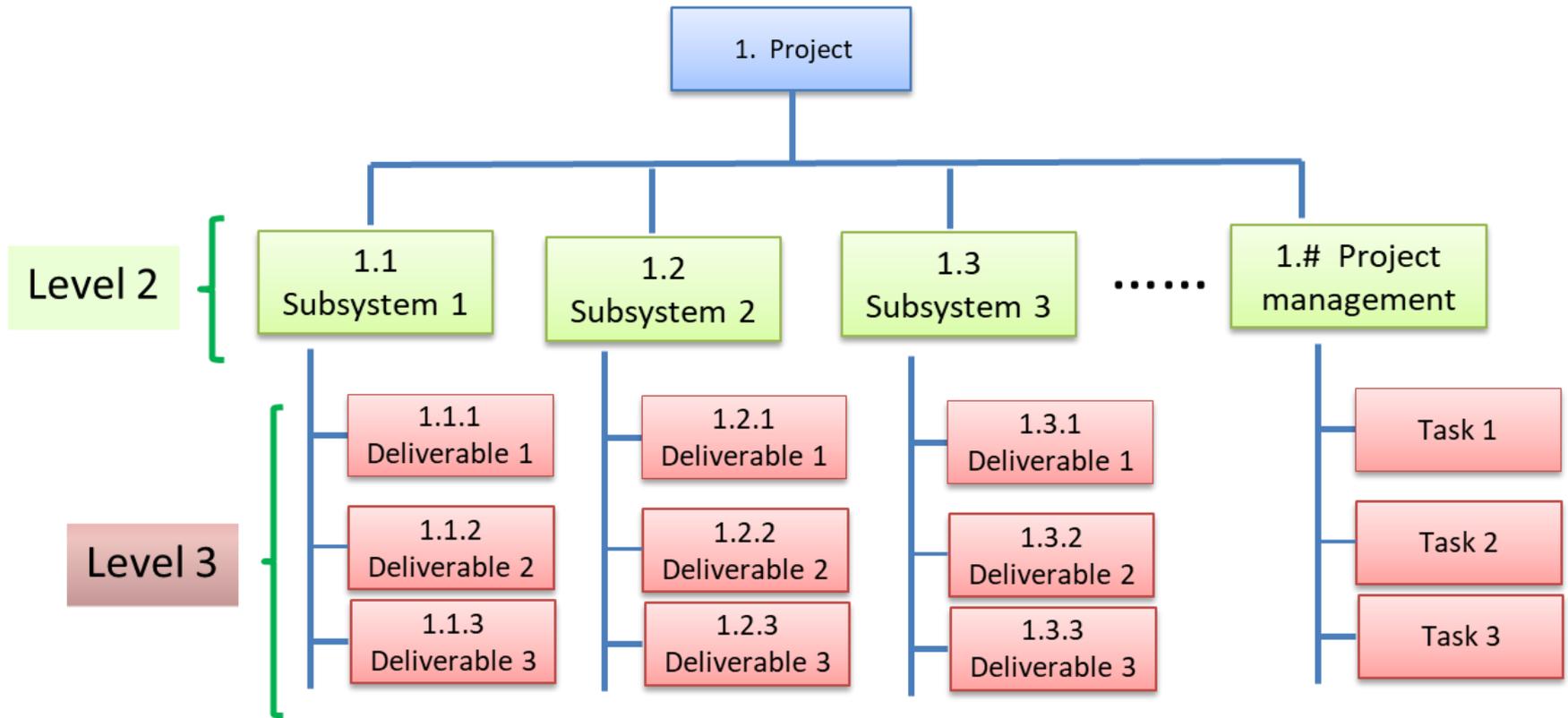
- Layout a Work Breakdown Structure (WBS) to define scope
- Use WBS to organize project:
 - project team with assigned responsibilities, cost, schedule/milestones, contingency and risks
- Credible performance management and control:

Quantitative measure of performance

 - 1) Technical progress vs. planned schedule
 - 2) Actual cost vs. planned budget
 - 3) Relate progress to actual cost



WBS Example:





A note about Earned Value Management (EVM)

- Systematic project management process based on the comparison of worked performed and work planned, e.g.,
 - **Planned value (PV):** The approved budget for work scheduled to be completed by a specified date;
 - **Earned value (EV):** The approved budget for work actually completed by the specified date;
 - **Actual cost (AC):** The costs actually incurred for the work completed by the specified date.
 - Report performance indices:
 - e.g., Schedule variance (SV) = Earned value (EV) – Planned value (PV)
 - e.g., Cost variance = PV-AC
 - e.g., Cost performance index (CPI) = EV/AC , $SPI=EV/PV$
 - Meets all requirements of quantitative measure of progress.



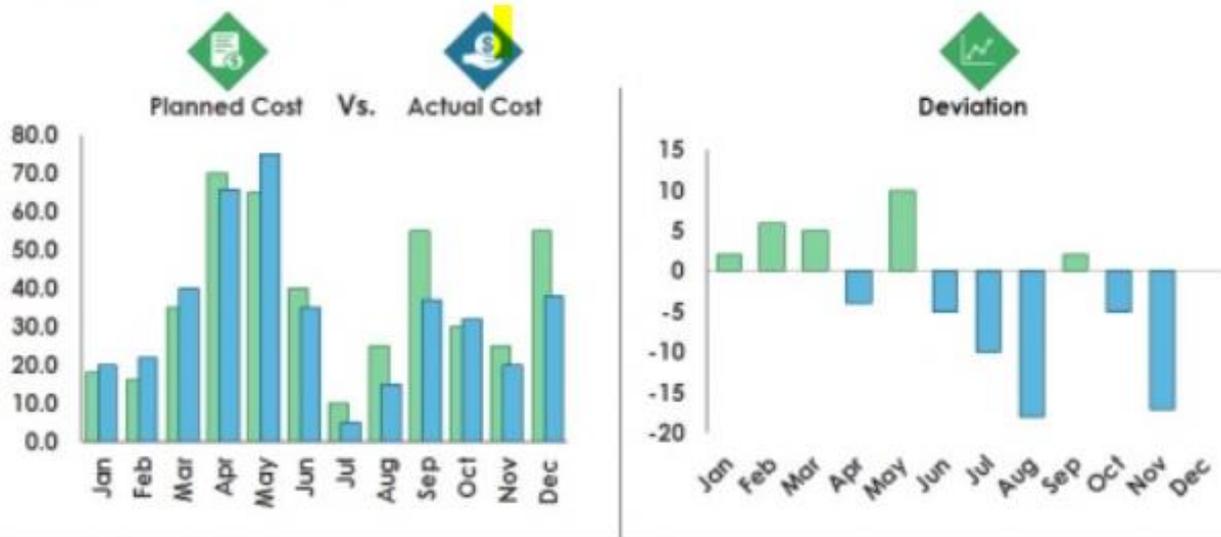
A note about Earned Value Management (EVM)

- NSF established scaled EVM to aid mid-scale projects
 - reduce administrative burden
 - meet the management requirements
 - Scaled EVM practice guide available in draft form
(to be available at: https://www.nsf.gov/bfa/lfo/mid-scale_guidance.jsp)
- Alternatives to scaled EVM, examples next



➤ Compared actual cost to planned budget

Budgeting- Planned/Actual comparison



Type of Cost	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Planned Cost	50	100										150
Actual Cost	100											100
Value Difference	50	-100	0	0	0	0	0	0	0	0	0	-50



➤ Compared actual cost to planned budget

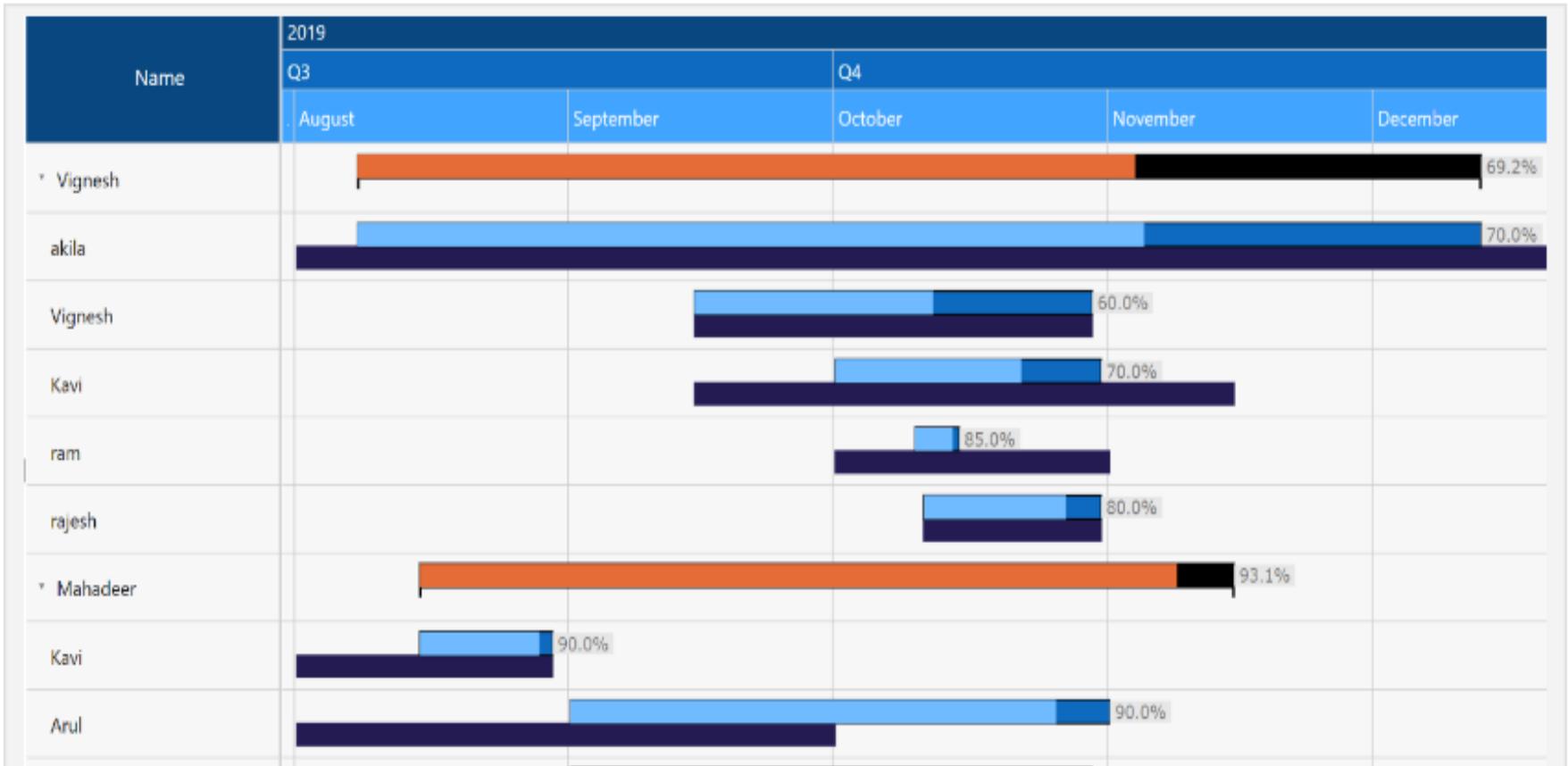
Quarterly Budget Analysis

Budget Item	This Quarter			Year-to-Date		
	Budget	Actual	Variance	Budget	Actual	Variance
Sales Revenue	\$500,000	\$550,000	\$50,000	\$1,000,000	\$1,200,000	\$200,000
Cost of sales	30,000	320,000	20,000	600,000	640,000	40,000
Gross Profits	\$200,000	\$230,000	\$30,000	\$400,000	\$560,000	\$160,000
Variable Expenses						
Selling Expenses	\$100,000	\$120,000	\$20,000	\$200,000	\$240,000	\$40,000
Depreciation	10,000	8,000	(2,000)	20,000	16,000	(4,000)
Total Variable Expenses	\$110,000	\$128,000	\$18,000	\$220,000	\$256,000	\$36,000
Fixed Expenses						
Rent	\$60,000	\$70,000	\$10,000	\$120,000	\$150,000	\$30,000
Depreciation	20,000	19,000	(1,000)	40,000	38,000	(2,000)
Total Fixed Expenses	\$80,000	\$89,000	\$9,000	\$160,000	\$188,000	\$28,000
Income from Operations	\$10,000	\$13,000	\$3,000	\$20,000	\$116,000	\$96,000
Interest Income	2,000	3,000	1,000	4,000	6,000	2,000
Interest Expenses	1,000	1,500	500	2,000	3,000	1,000
Net Income Before Taxes	\$7,000	\$8,500	\$1,500	\$14,000	\$107,000	\$93,000
Taxes	2,000	15,000	(500)	4,000	3,000	(1,000)
Net Income After Taxes	\$5,000	\$7,000	\$2,000	\$10,000	\$104,000	\$94,000
Balance Sheet Items						
Loan Repayments	14,000	13,000	(1,000)	28,000	26,000	(2,000)
Owner Withdrawals (Or Dividends)	5,000	5,000	5,000	5,000	25,000	5,000
Fixed Asset Expenditures	100,000	90,000	(10,000)	100,000	90,000	(10,000)

This slide is 100% editable. Adapt it to your needs and capture your audience's attention.



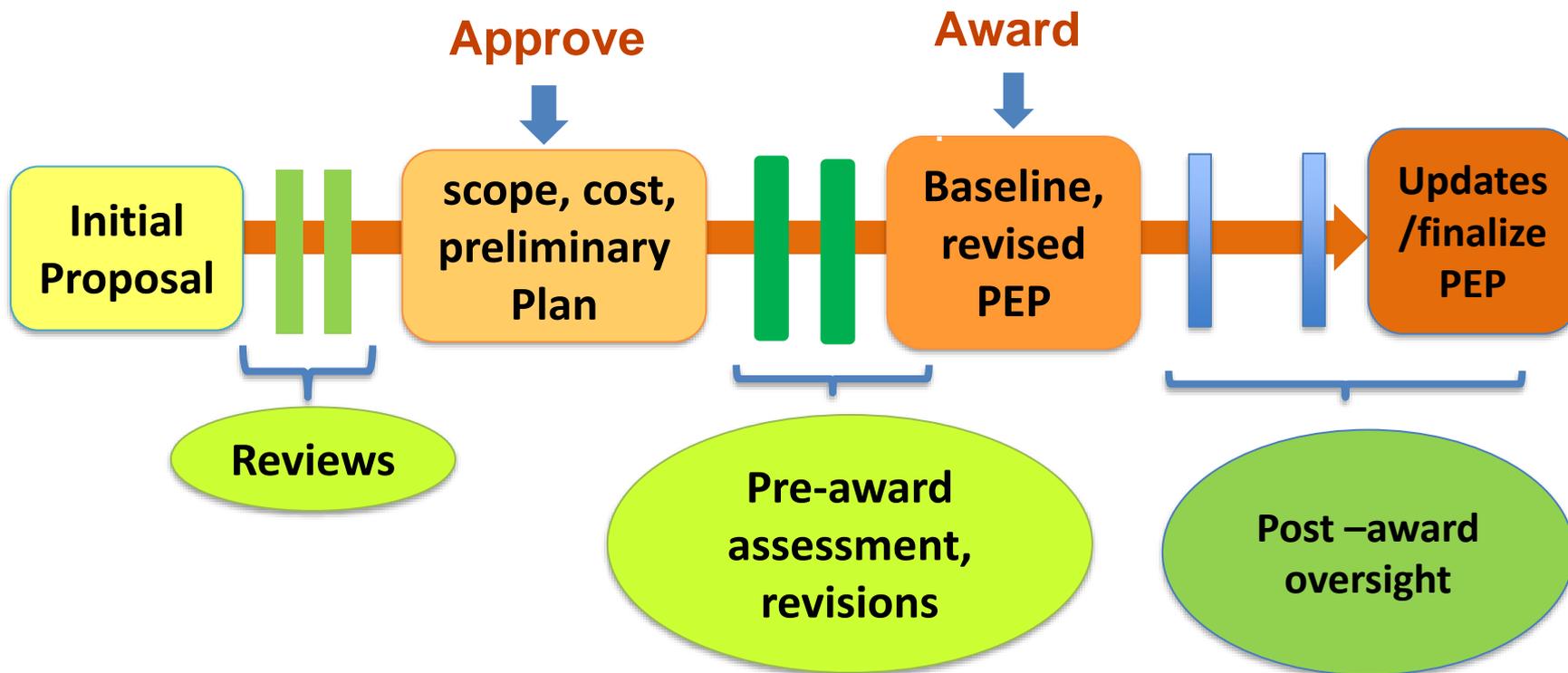
➤ Relate the progress and the actual cost



Project progress with both Actual and Plan timeline



Pre- and post-award process overview





Mid-scale RI-1 (NSF 21-505)

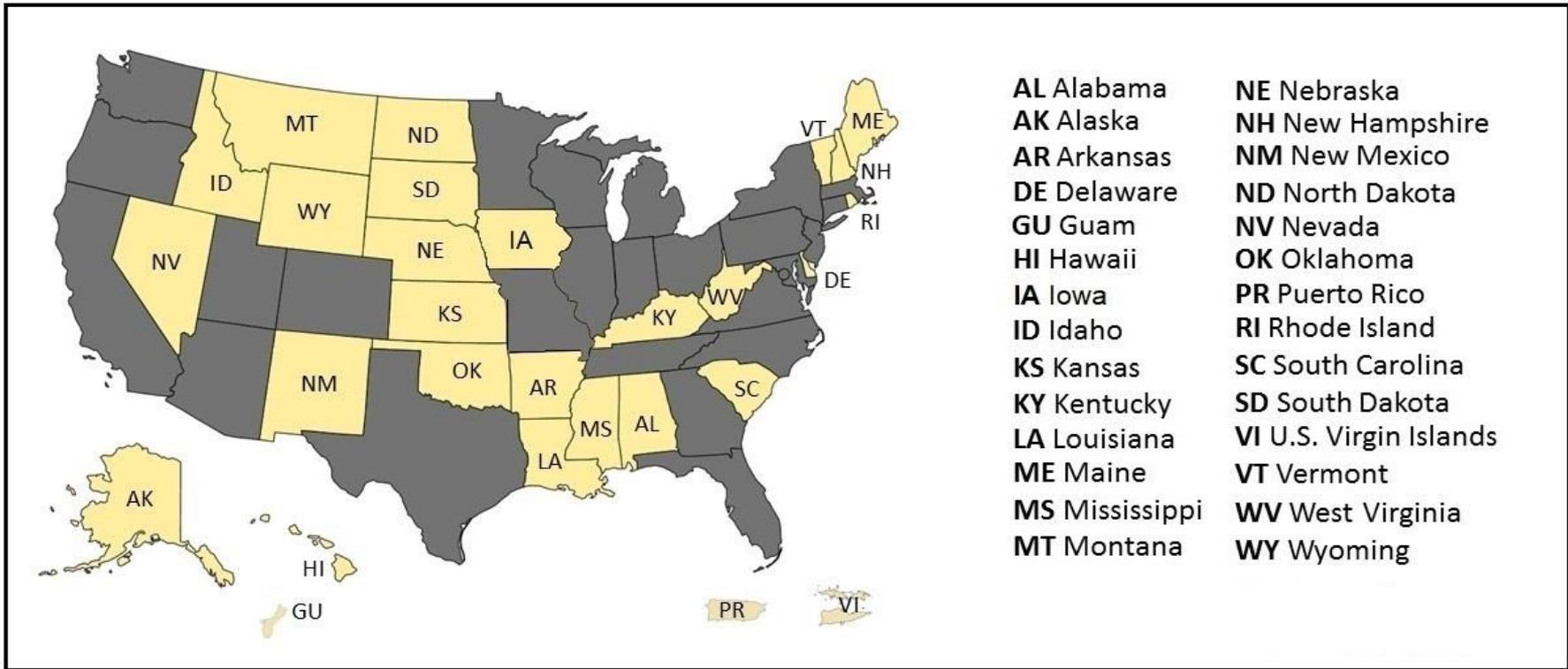
Established Program to Stimulate Competitive Research (EPSCoR)

<https://www.nsf.gov/od/oia/programs/epscor/index.jsp>

- *Mid-scale RI-1 proposals from institutions located in eligible EPSCoR jurisdictions are highly encouraged.*
- *The 2021 President's Budget Request reflects a strong desire to contribute to capacity-building infrastructure in EPSCoR jurisdictions.*
- *For EPSCoR co-funding, the lead submitting organization must be located in an eligible EPSCoR jurisdiction, with the infrastructure physically located in an eligible EPSCoR jurisdiction (generally but not necessarily the same jurisdiction).*
 - ✓ *For geographically distributed infrastructure, some sites may be located in non-EPSCoR jurisdictions, but the primary management location will be in an EPSCoR jurisdiction.*



NSF EPSCoR FY21 Co-funding Eligibility



EPSCoR states and other U.S. jurisdictions eligible for EPSCoR co-funding during FY 2021
This includes twenty-five states, Guam, Puerto Rico, and the U.S. Virgin Islands.

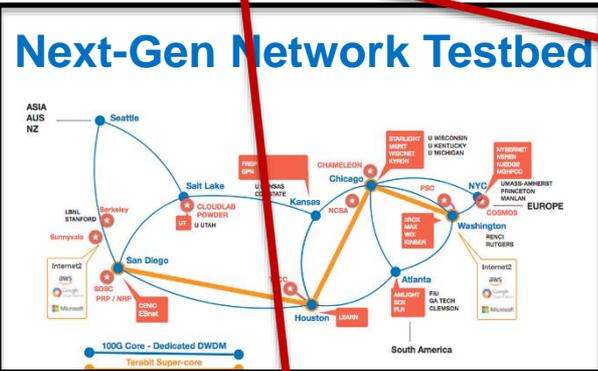
https://www.nsf.gov/od/oia/programs/epscor/Eligibility_Tables/FY2021_Eligibility.pdf



EPSCoR FY19/FY20 Mid-scale RI-1 Awards



Nation's 1st
1.2 GHz NMR



Next-Gen Atmospheric Research Aircraft



Molecular Liquids and Glass Formers
Structural Relaxation

Zimm Dynamics **diffusion** Rouse Dynamics
Bending Dynamics Confinement
Elastic Properties Membranes
Proteins Polymers Domain Motions
Unilamellar Phospholipid Vesicles
Complex Liquids Entanglements

World-class Neutron Spin Echo Spectrometer

Next-Gen CMB Design

Room-size Compact X-ray Free-electron Laser (CXFEL) Design

UV photocathode laser
Photoinjector
Linacs
Compression chicane
e-beam/IR laser interaction point
X-ray beam shaping
MX experiment chamber
Detector chamber
X-ray diagnostics

9.3 GHz RF frequency
1 kHz repetition rate @ 100 pC

EHT 2.0 Design



Zettawatt-Equivalent Ultra-short Pulse Laser System (ZEUS)

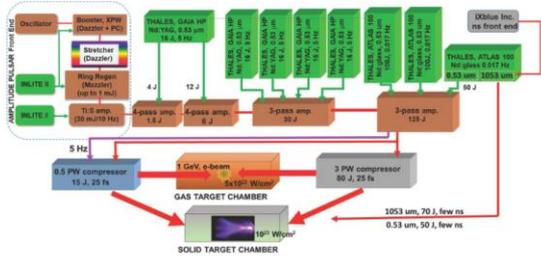
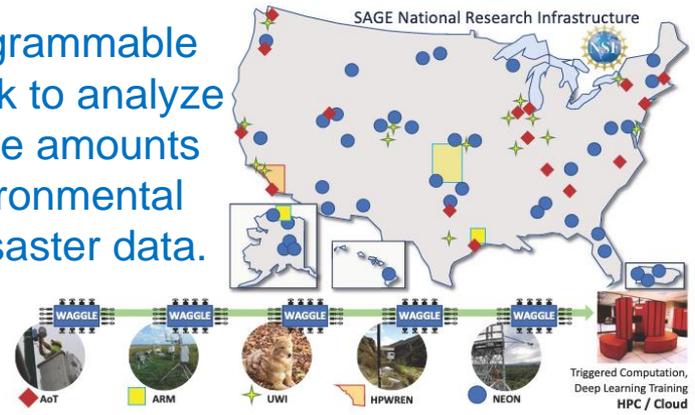


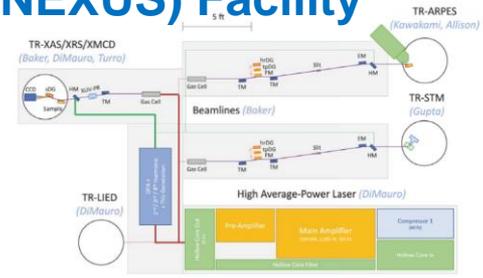
Table-top particle acceleration "equivalent to the 2-mile SLAC accelerator being reduced to a meter in length"

SAGE: A Software-defined Sensor Network

Reprogrammable network to analyze massive amounts of environmental and disaster data.



NSF National Extreme Ultrafast Science (NEXUS) Facility



National-user light source enabling measurements unique in the world

FY19/FY20 Mid-scale RI-1 Awards

***NSF Award Search:
Program Element: 108Y***



***Mid-scale RI-1
Directorate Breakout Sessions
1:45 p.m. – 2:30 p.m. Eastern
(45 minutes)***

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Thank You!

