Computer and Information Science and Engineering (CISE)

U.S. National Science Foundation

NSF Directorates

- Biological Sciences
- **Computer and information Science and Engineering**
- Engineering
- Geosciences
- Mathematical and Physical Sciences
- Social, Behavioral and Economic Sciences
- STEM Education
- Technology Innovation and Partnerships

Ref.: https://www.nsf.gov/staff/organizational_chart.pdf

CISE by the Numbers

NSF funds 80% of federally-funded CS in the US at academic institutions.

$1,012M
Enacted FY22 Budget

6,466
Proposals evaluated

1,780
Awards made

28%
Funding rate

376
institutions supported

6,621
Grad Students

20,390
Individuals from Sr. Researchers to Undergrads

50 + 2
states and territories funded

74
Minority-serving Institutions (MSIs) with awards

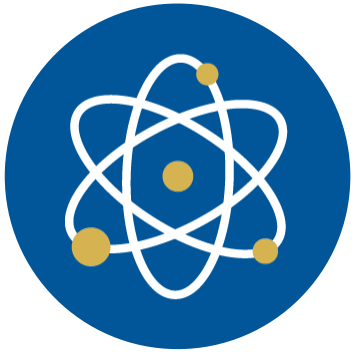
All data depicted is for FY 22

The Mission of the Directorate for Computer and Information Science and Engineering

- Uphold its leadership in computing, communications, and information science and engineering
- Promote understanding of the principles and uses of advanced computing, communications, and information systems in service to society
- Support advanced cyberinfrastructure that enables and accelerates discovery and innovation across all science and engineering disciplines, and
- Contribute to universal, transparent, and affordable participation in an information-based society

Ref.: https://www.nsf.gov/cise/about.jsp

Aligning Priorities



NSB Vision 2030

NSF Vision

Administration Pillars

CISE Organization and Leadership

Office of Advanced Cyberinfrastructure (OAC)

Manish Parashar
Office Director

Amy Walton
Deputy Office Director

Computing & Communication Foundations (CCF)

Dilma Da Silva
Division Director

Irina Dolinskaya,
Deputy Division Director

CISE Leadership

Margaret Martonosi,
Assistant Director

Joydip Kundu,
Deputy Assistant Director

Ann Von Lehman, Acting
Deputy Division Director

Behrooz Shirazi,
Acting Division Director

Computer & Network Systems (CNS)

Wendy Nilsen,
Deputy Division Director

Michael Littman,
Division Director

Information & Intelligent Systems (IIS)

CCF Overview

Supports research and education on the foundations of computing, communication, hardware, software and emerging technologies such as quantum information science and bio-inspired systems.

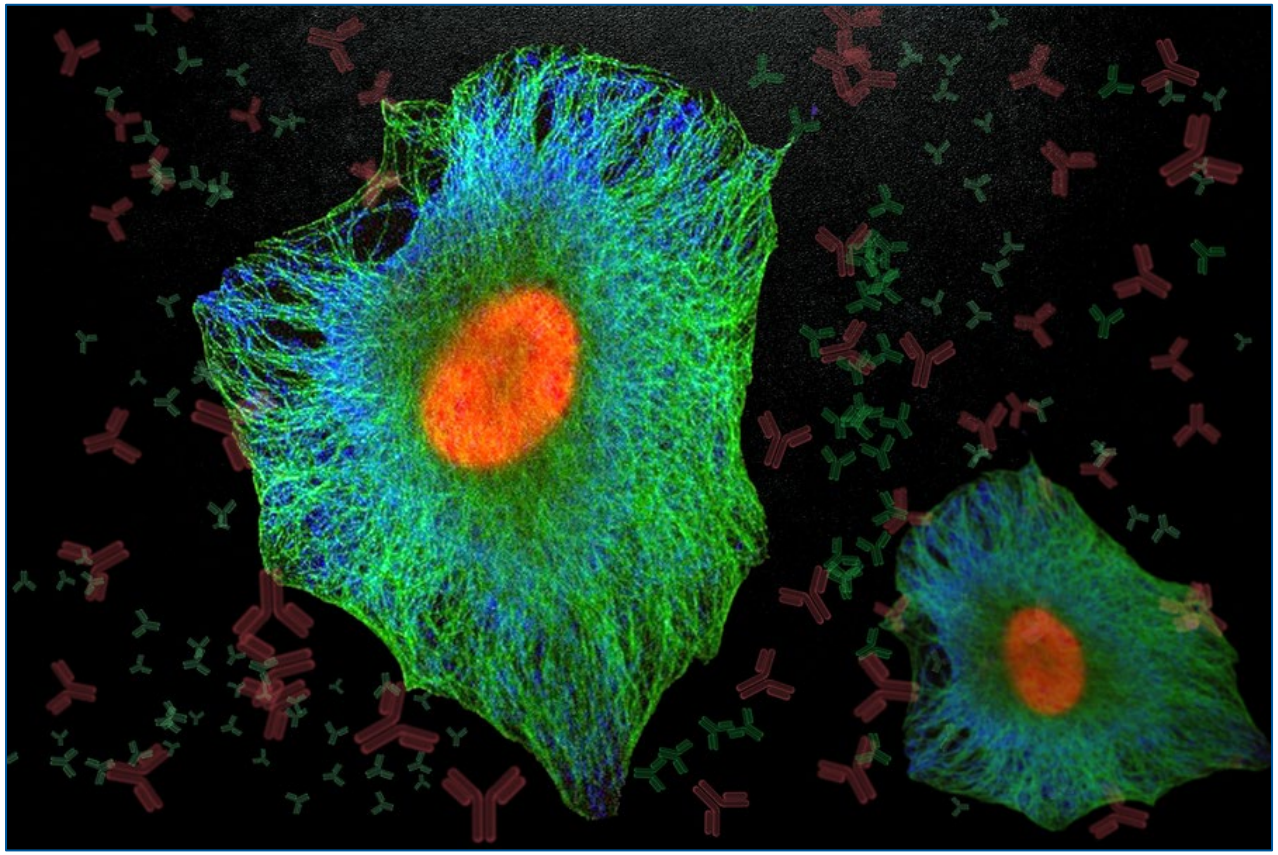


Photo caption: A New technique could fine-tune the production of monoclonal antibodies and other proteins. Credit: MIT. From https://bit.ly/3IPg8kH

IIS Overview

Supports research and education on the interrelated roles of people, computers and information to advance knowledge of artificial intelligence, data management, assistive technologies, and human-centered computing.

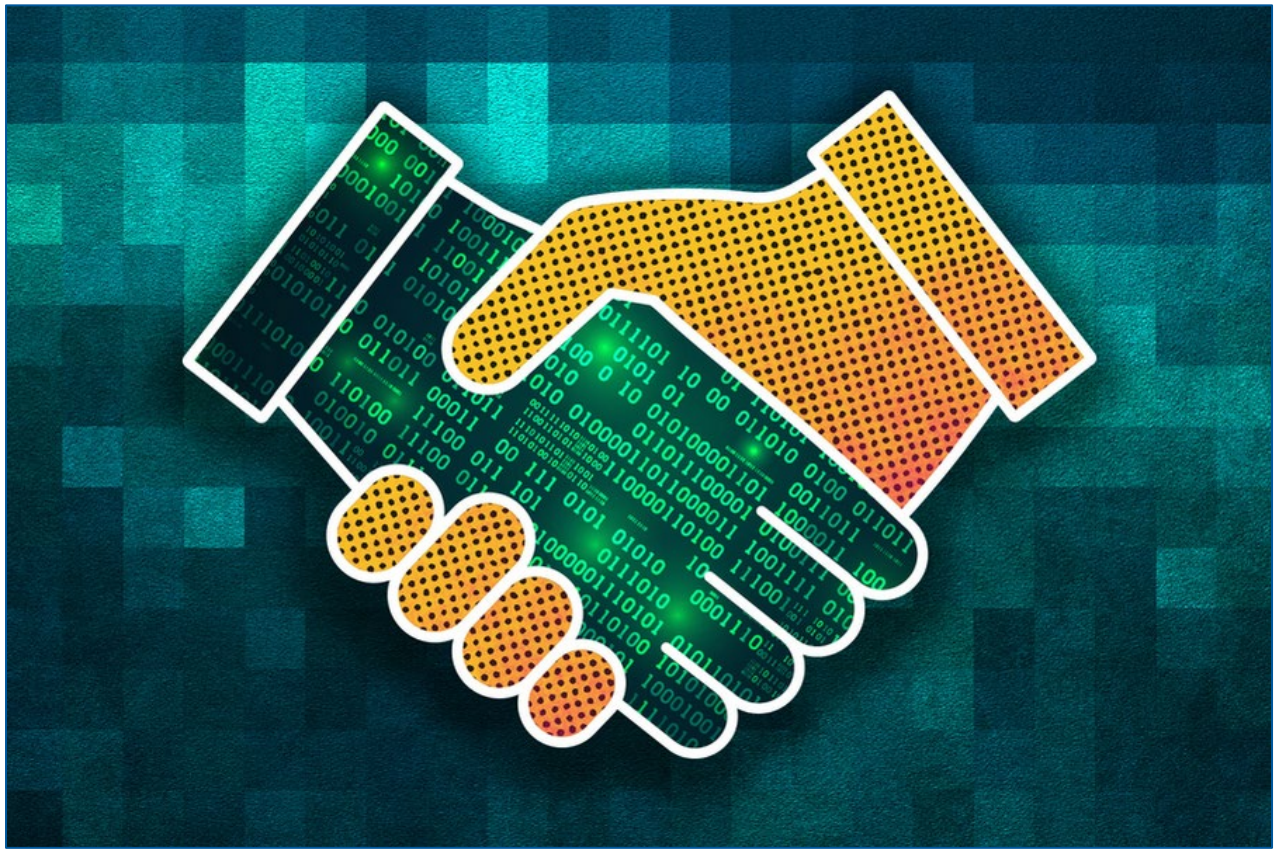


Photo caption: When should someone trust an AI assistant's predictions? Scientists are finding out. Credit: MIT. From https://bit.ly/41muekx

CNS Overview

Supports research and education on the fundamental properties of computer systems and networks, cyber-physical systems, secure and trustworthy cyberspace, and new architectures for future-generation computing and communication systems.

Photo caption: Climate change could lead to higher power costs on the U.S. West Coast. Credit: David R. Tribble/Wikimedia Commons. From https://bit.ly/3xNNVEE

OAC Overview

Supports the design, implementation and operation of research cyberinfrastructure essential for advancing research and education all areas of research and education in science and engineering.

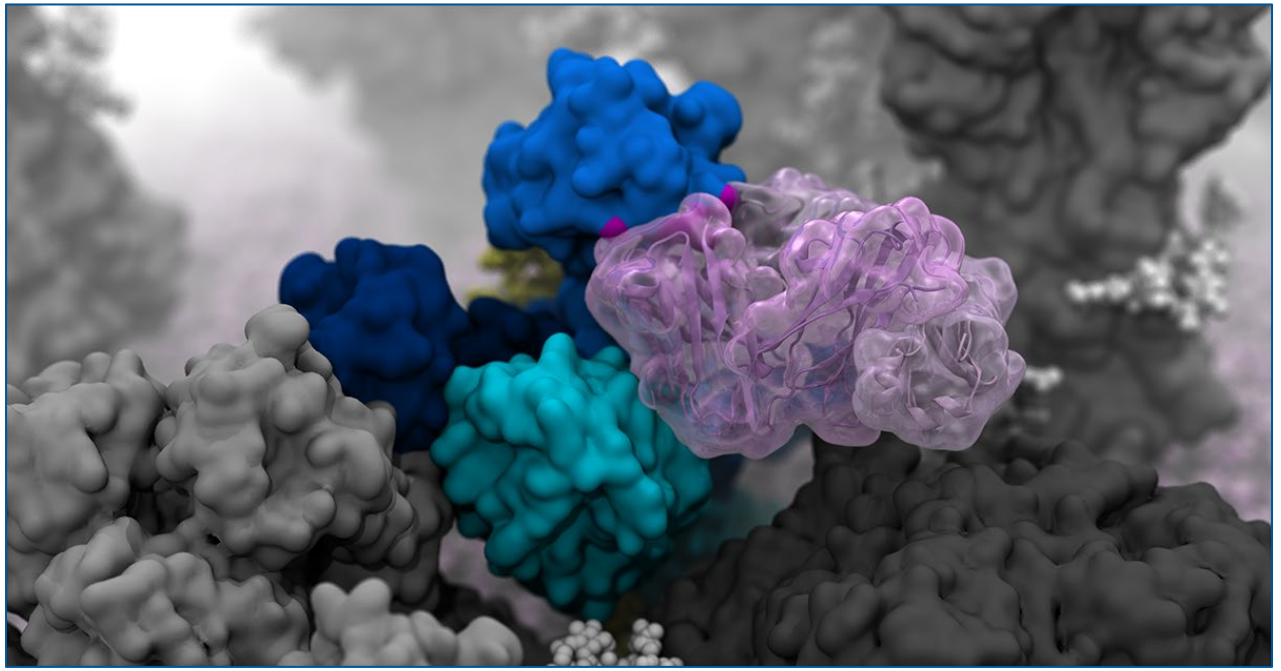


Photo caption: Researchers created high-resolution computer simulations that revealed the movement of H1N1 glycoproteins. Credit: Lorenzo Casalino / Amaro Lab / UC San Diego. From https://bit.ly/3xLAbKe

Outline

CISE Overview

Selected Programs

Closing Thoughts

CISE Core Research Investments

- Strong commitment to core/fundamental research – *the heart of what we do*
  - Core research spending accounts for a third or more of the overall CISE research budget
- Cast a broad net and let the best ideas surface
- Engage with our community to develop new research directions

NSF CISE Core PROGRAMS

IIS

Information and Intelligent Systems

- Human-Centered Computing
- Information Integration and Informatics
- Robust Intelligence

CCF

Computer and Communication Foundations

- Algorithmic Foundations
- Communications and Information Foundations
- Software and Hardware Foundations
- Foundations of Emerging Technologies

CNS

Computer and Network Systems

- Computer and Network Systems
- Education and Workforce Development

OAC

Office of Advanced Cyberinfrastructure

- OAC Core Research

Computer and Information Science and Engineering (CISE): Core Programs

PROGRAM SOLICITATION
NSF 23-561

REPLACES DOCUMENT(S):
NSF 22-631

National Science Foundation

Directorate for Computer and Information Science and Engineering
Division of Computing and Communication Foundations
Division of Information and Intelligent Systems
Division of Computer and Network Systems
Office of Advanced Cyberinfrastructure

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):

Proposals Accepted Anytime

SMALL Projects

Submission Window Date(s) (due by 5 p.m. submitter's local time):

October 01, 2023 - October 23, 2023

October 1 - October 23, Annually Thereafter

MEDIUM Projects

October 01, 2023 - October 23, 2023

October 1 - October 23, Annually Thereafter

OAC Core Projects

Ref.: https://www.nsf.gov/pubs/2023/nsf23561/nsf23561.pdf

Proposers are invited to submit proposals in several project classes, which are defined as follows:

- Small Projects -- up to $600,000 total budget with durations up to three years: projects in this class may be submitted to CCF, CNS, and IIS only;
- Medium Projects -- $600,001 to $1,200,000 total budget with durations up to four years: projects in this class may be submitted to CCF, CNS, and IIS only; and
- OAC Core Projects -- up to $600,000 total budget with durations up to three years: projects in this class may be submitted to OAC only.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research laboratories, professional societies and similar organizations located in the U.S. that are directly associated with educational or research activities.

Who May Serve as PI:

By the submission deadline, or for Small Projects, by the date of submission, any PI, co-PI, or other senior project personnel must hold either:

- a tenured or tenure-track position, *or*
- a primary, full-time, paid appointment in a research or teaching position

at a US-based campus of an organization eligible to submit to this solicitation (see above), with exceptions granted for family or medical leave, as determined by the submitting organization. Individuals with *primary* appointments at for-profit non-academic organizations or at overseas branch campuses of US IHEs are not eligible.

Computer and Information Science and Engineering (CISE): Core Programs

PROGRAM SOLICITATION
NSF 23-561

REPLACES DOCUMENT(S):
NSF 22-631

National Science Foundation

Directorate for Computer and Information Science and Engineering
Division of Computing and Communication Foundations
Division of Information and Intelligent Systems
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October 01, 2023 - October 23, 2023

October 1 - October 23, Annually Thereafter

OAC Core Projects

Ref.: https://www.nsf.gov/pubs/2023/nsf23561/nsf23561.pdf

II. PROGRAM DESCRIPTION

This solicitation covers submission to the following CISE core programs. Please see the individual program webpages below for more information on what is within scope for these programs:

CCF:

- Algorithmic Foundations (AF) program [Program Webpage] supports potentially transformative projects in the theory of algorithms and computational complexity, characterized by algorithmic innovation and rigorous analysis;
- Communications and Information Foundations (CIF) program [Program Webpage] supports foundational research that addresses the theoretical underpinnings of information acquisition, transmission, and processing in communications and information processing systems;
- Foundations of Emerging Technologies (FET) program [Program Webpage] supports foundational research at the intersection of computing and biological systems, nanoscale science and engineering, quantum information science, and other promising disruptive technologies supporting novel computing/communication models; and
- Software and Hardware Foundations (SHF) program [Program Webpage] supports foundational research in the design, verification, operation, and evaluation of computer hardware and software through novel approaches, robust theories, high-leverage tools, and lasting principles;

CNS:

- Computer Systems Research (CSR) [Program Webpage] supports the advancement and holistic design and development of integrated software and hardware computing systems; and
- Networking Technology and Systems (NeTS) [Program Webpage] supports research that advances wired and wireless networking systems, develops a better understanding of the fundamental properties and tradeoffs involved, as well as the abstractions and tools used in designing, building, measuring and managing them.

IIS:

- Human-Centered Computing (HCC) program [Program Webpage] supports research in human-computer interaction, integrating across fields including computing, information, social, and behavioral sciences, to (re)design technologies that amplify human capabilities, and understand how human, technical, and contextual aspects of computing and communication systems shape their benefits, effects, and risks;
- Information Integration and Informatics (III) program [Program Webpage] supports research on computational approaches to the full data lifecycle to maximize the utility of information resources; and
- Robust Intelligence (RI) program [Program Webpage] supports computational research to understand and enable intelligent systems in complex, realistic contexts.

OAC:

- OAC Core Research (OAC Core) program [Program Webpage] supports translational research on the design, development, deployment, experimentation, and application of advanced research cyberinfrastructure (CI) to enable new frontiers of discovery and innovation.

Computer and Information Science and Engineering (CISE): Core Programs, Large Projects

PROGRAM SOLICITATION
NSF 23-524

REPLACES DOCUMENT(S):
NSF 19-589

National Science Foundation

Directorate for Computer and Information Science and Engineering
Division of Computing and Communication Foundations
Division of Computer and Network Systems
Division of Information and Intelligent Systems

Submission Window Date(s) (due by 5 p.m. submitter's local time):

February 14, 2023 - February 28, 2023

September 16, 2024 - September 30, 2024

September 14, 2026 - September 28, 2026

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 4

Anticipated Funding Amount: $20,000,000

Length of Project Description –
- Describe the research and education activities to be undertaken in up to 20 pages.

Objective

To address groundbreaking computer and information science and engineering research problems across CISE disciplines that can only be addressed by large research teams with combined contributions that are clearly beyond the sum of each of their individual contributions;

- Research agendas may tackle a major fundamental problem in a single field, or span multiple fields, or subfields.
- To encourage organizational collaborations and linkages within and between campuses, schools, other relevant organizations (such as industry and nonprofits/foundations) as appropriate, to creatively assemble teams with appropriate expertise; and

Management and Coordination plan

- The specific roles of the PI, co-PIs, other senior personnel, and paid consultants at all organizations involved to demonstrate that the project personnel have distinct but complementary expertise;
- How the project will be managed within or across organizations, including how team coordination will be evaluated;
- The methods, measures, and/or metrics related to how the team will evaluate technical milestones, and their impact on the project;
- Identification of the specific coordination mechanisms that will enable cross-organization and/or cross-expertise scientific integration and achieve synergy within the team; and
- Pointers to the budget line items that support these management and coordination mechanisms.

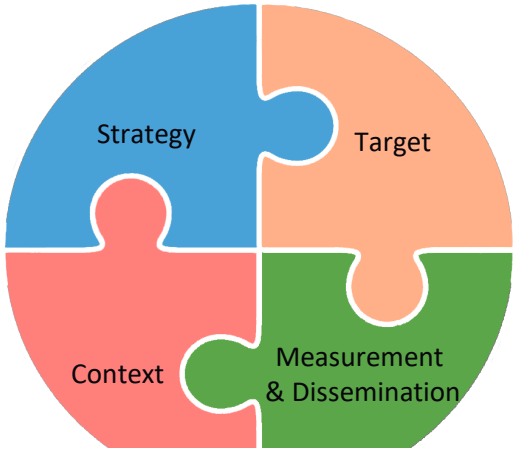
Post-award site visit

CISE Core Medium and Large Projects

Broadening Participation in Computing (BPC) Plan

Increasing participation in computing and closely related disciplines by longstanding underrepresented groups and populations including women, Blacks and African Americans, Hispanics and Latinos, American Indians, Alaska Natives, Native Hawaiians, other Pacific Islanders, and persons with disabilities in computing and closely related disciplines. All levels within these groups are relevant, from K-12 to workforce

- CISE requires meaningful BPC activities in all Core research programs
- BPC Plan are included as a supplemental document in a proposal
- An approved BPC plan **must be** in place **at the time of award**



BPCnet
RESOURCE PORTAL

Ref.: FAQ: https://www.nsf.gov/pubs/2022/nsf22125/nsf22125.jsp

Computing education & workforce

Computer Science for All (CSforAll)

Research and Research Practitioner Partnership

- Partnership between educators, researchers, and computer scientists
- Build community and sustain research-based efforts
- Supports evidence-based instructional materials, curricula, activities and assessments, and teacher professional development and support
- *Provide access to computer science (CS) and computational thinking (CT) education to all U.S. students*
- Proposal deadline - Second Wednesday in Feb annually

Ref.: https://www.nsf.gov/pubs/2020/nsf20539/nsf20539.htm

Computer and Information Science and Engineering Graduate Fellowships (CSGrad4US)

- Increase the number and diversity of domestic graduate students pursuing research and innovation careers in CISE fields
- Provide an opportunity for bachelor's degree holders working in industry or other sectors to return to academia and pursue research-based doctoral degrees

At Steady State:

- We hope to fund 70 Fellows/year

	2021	2022
Number of Fellows	34	68
Demographics		
Women	32%	44%
Hispanic/Latinx	9%	16%
Black/African American	3%	10%
Disability	15%	24%
Current Status		
Enrolled in graduate school	47%	-
Applying this year	29%	100%

Ref.: https://www.nsf.gov/pubs/2023/nsf23074/nsf23074.jsp

CISE Research Initiation Initiative (CRII)

Encouraging *research independence* immediately upon obtaining one's first academic position

- Hold a primary appointment (*for OAC, a full- or part-time appointment*) where the PI would normally submit proposals to CISE programs
- **Only open to faculty at non-R1 institutions**
- Be untenured
- Be in the first three years of a *tenure-track*, or *research science*, or *education* position (*or equivalent*) as of the submission deadline
- As of the submission deadline, the PI may not have received any other grants in the PI role from any institution or agency *excluding award as a co-PI on another's grant, workshop travel grants, Graduate Research Fellowship awards, non-NSF awards, …*

- Proposals (<= $175,000 for exactly 2 years)

Ref.: https://www.nsf.gov/pubs/2023/nsf23576/nsf23576.htm

Faculty Early Career Development (CAREER) Program

- NSF's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through:
  - Outstanding research and Excellent education
  - Integration of education and research within the context of the mission of their organizations
- Since its inception in 1996:
  - > 200 programs have reviewed CAREER proposals
  - > 7,000 awards
- PIs are allowed only one submission per competition and three attempts
- *CISE CAREER Proposal Writing Workshops held each Spring*
- Proposal deadline is July 26, 2023

Proposal Writing Workshops, Aspiring PI Meetings, and Early-career Workshops

Strengthening research and education activities through community

Introduces early-career faculty to NSF, merit review process, and peers and senior researchers in their field.

CRA
Computing Research Association

NSF CISE CAREER Proposal Writing Workshop 2022

In: Featured Announcements, Funding, NSF /

Credit: NeTS Early Career Workshop

Expeditions in Computing (Expeditions)

PROGRAM SOLICITATION
NSF 20-544

REPLACES DOCUMENT(S):
NSF 18-528

National Science Foundation

Directorate for Computer and Information Science and Eng
Division of Computing and Communication Foundations
Division of Computer and Network Systems
Division of Information and Intelligent Systems
Office of Advanced Cyberinfrastructure

Preliminary Proposal Due Date(s) ***(required)*** (due by 5 p.m. submitter's

June 23, 2020

Expeditions

June 16, 2022

Expeditions

June 19, 2024

Expeditions

June 19, 2026

Expeditions

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Expeditions in Computing (Expeditions)

Synopsis of Program:

The far-reaching impact and rate of innovation in the computer and information science and engineering fields has been remarkable, generating economic prosperity and enhancing the quality of life for people throughout the world.

More than a decade ago, the National Science Foundation's (NSF) Directorate for Computer and Information Science and Engineering (CISE) established the *Expeditions in Computing* (*Expeditions*) program to build on past successes and provide the CISE research and education community with the opportunity to pursue ambitious, fundamental research agendas that promise to define the future of computing and information.

In planning ***Expeditions* projects**, investigators are strongly encouraged to come together within or across departments or institutions to combine their creative talents in the identification of compelling, transformative research agendas that look ahead by at least a decade and promise disruptive innovations in computer and information science and engineering for many years to come.

Now funded at levels up to $15,000,000 for seven years, *Expeditions* projects represent some of the largest single investments currently made by the CISE directorate. Together with the Science and Technology Centers and the National Artificial Intelligence Research Institutes that CISE supports, *Expeditions* projects form the centerpiece of the directorate's center-scale award portfolio. With awards funded at levels that promote the formation of large research teams, CISE recognizes that concurrent research advances in multiple fields or sub-fields are often necessary to stimulate deep and enduring outcomes. The awards made in this program will complement research areas supported by other CISE programs, which target particular computer and information science and engineering fields.

Additionally, CISE offers ***Innovation Transition (InTrans)* awards** for teams nearing the end of their *Expeditions* as well as Secure and Trustworthy Cyberspace (SaTC) and Cyber-Physical Systems (CPS) Frontier projects. The goal of *InTrans* is to continue the long-term vision and objectives of CISE's center-scale projects. Through InTrans awards, CISE will provide limited funds to match industry support.

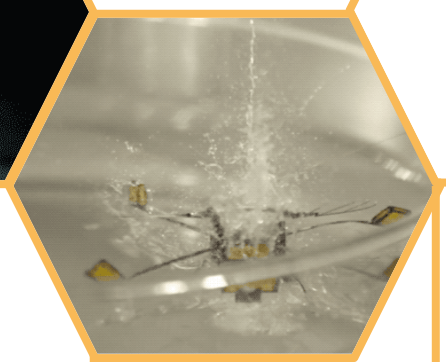
Flight of the RoboBees

2009 — *Expeditions in Computing* awarded to interdisciplinary team with a goal of constructing the smallest flying robots, modeled after a bee

2011 — Pop-up manufacturing technique developed

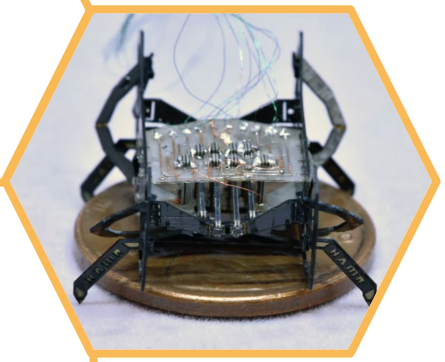
2012 — First controlled flight of an insect-scale robot, tethered to a power source

2016 — RoboBee capable of perching to conserve energy



2017 — First microrobot to repeatedly move in and out of complex environments

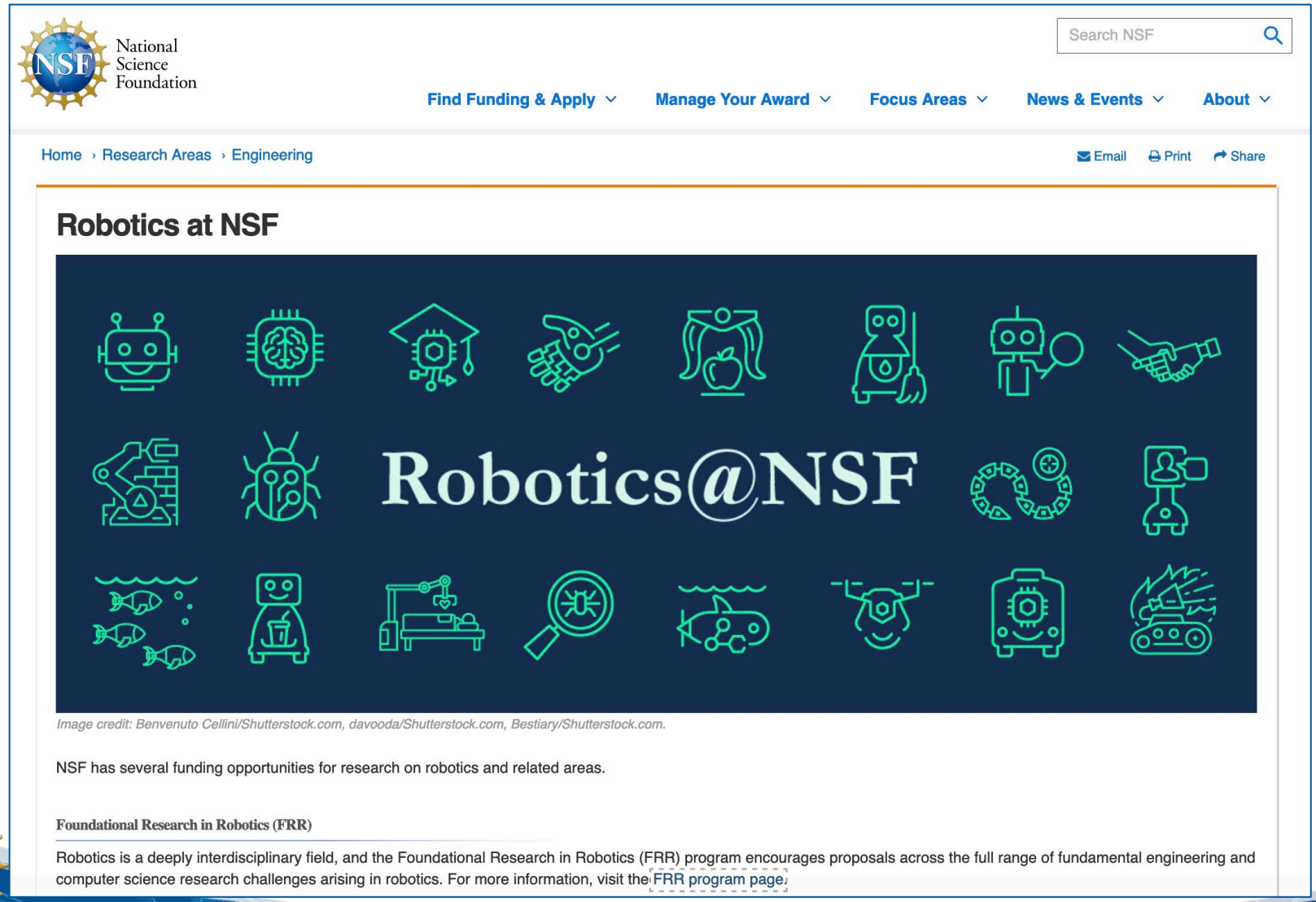
2018 — Lightest vehicle to achieve sustained untethered flight



2020 — Pop-up manufacturing method allows robotic designs to easily change in scale while maintaining their basic design

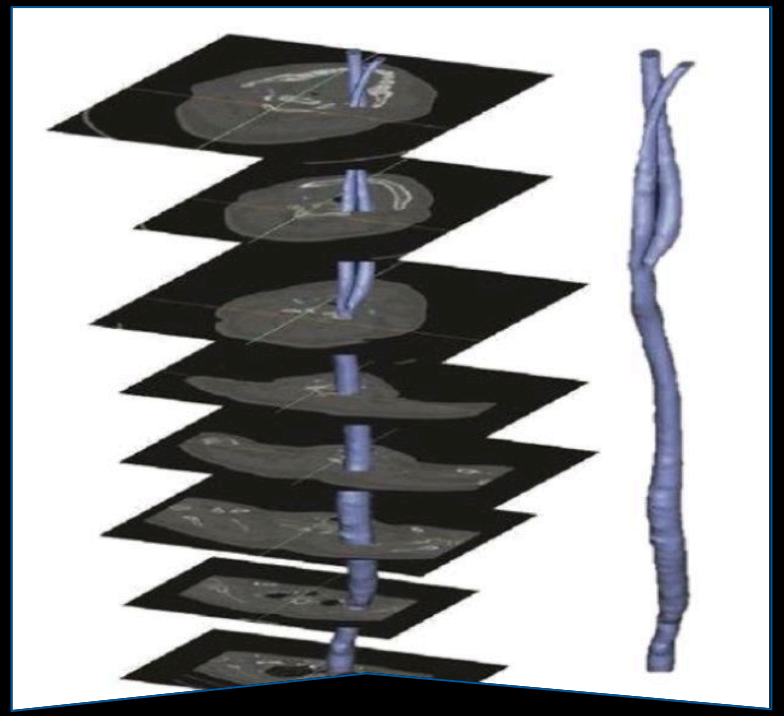
2022 — Pop-up manufacturing method is harnessed to launch a surgical robotics startup

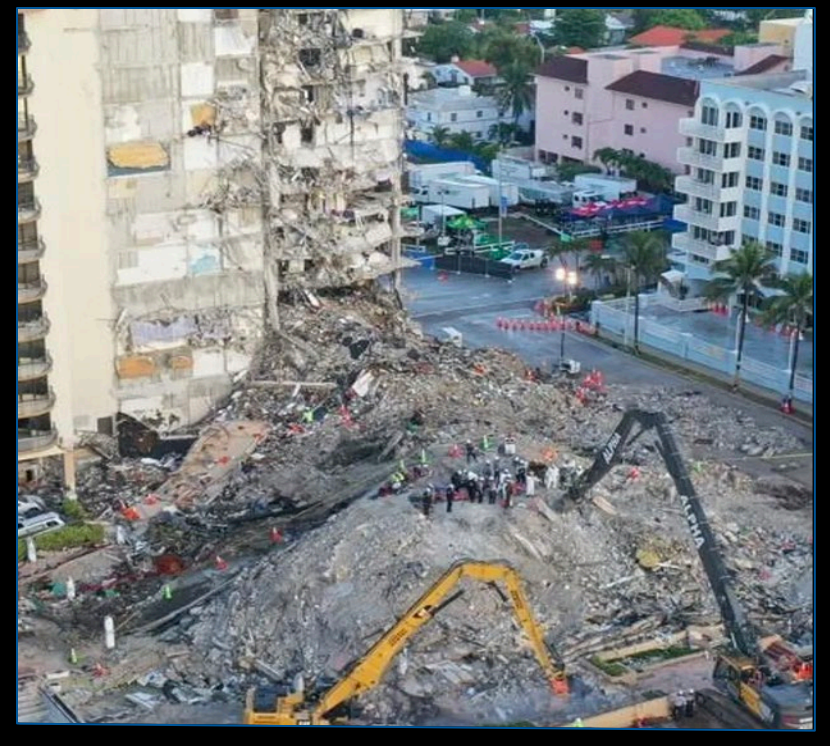
CISE-ENG Foundational Research in Robotics (FRR)



NSF funding opportunities for robotics related research: nsf.gov/robotics

FRR proposals accepted anytime





Grants for Rapid Response Research (RAPID)

The RAPID funding mechanism is used for proposals having a severe urgency with regard to availability of, or access to data, facilities or specialized equipment, including *quick-response research on natural or anthropogenic disasters and similar unanticipated events*.

- The Project Description is expected to be brief (2 to 5 pages) .. why the proposed research is of an urgent nature and why a RAPID
- Only internal merit review is required for RAPID proposals
- Requests may be for up to $200K and of one year duration

Cyber-Physical Systems (CPS)

Deeply integrating computation, communication, and control into physical systems

- Cyber-physical systems (CPS) are engineered systems that are built from, and depend upon, the seamless integration of computation and physical components.
- Aims to develop the core system science needed to engineer complex cyber-physical systems.
- Serves multiple key national priority sector areas.
- Includes *Transition to Practice (TTP)* option.
- Cross-Directorate and Cross-Agency Solicitation: NSF CISE and ENG with DHS, DOT/FHA, NIH, USDA.
- Submit Smalls and Mediums anytime
- The large ”Frontier” proposals for FY23 are due by 15 Jun 23

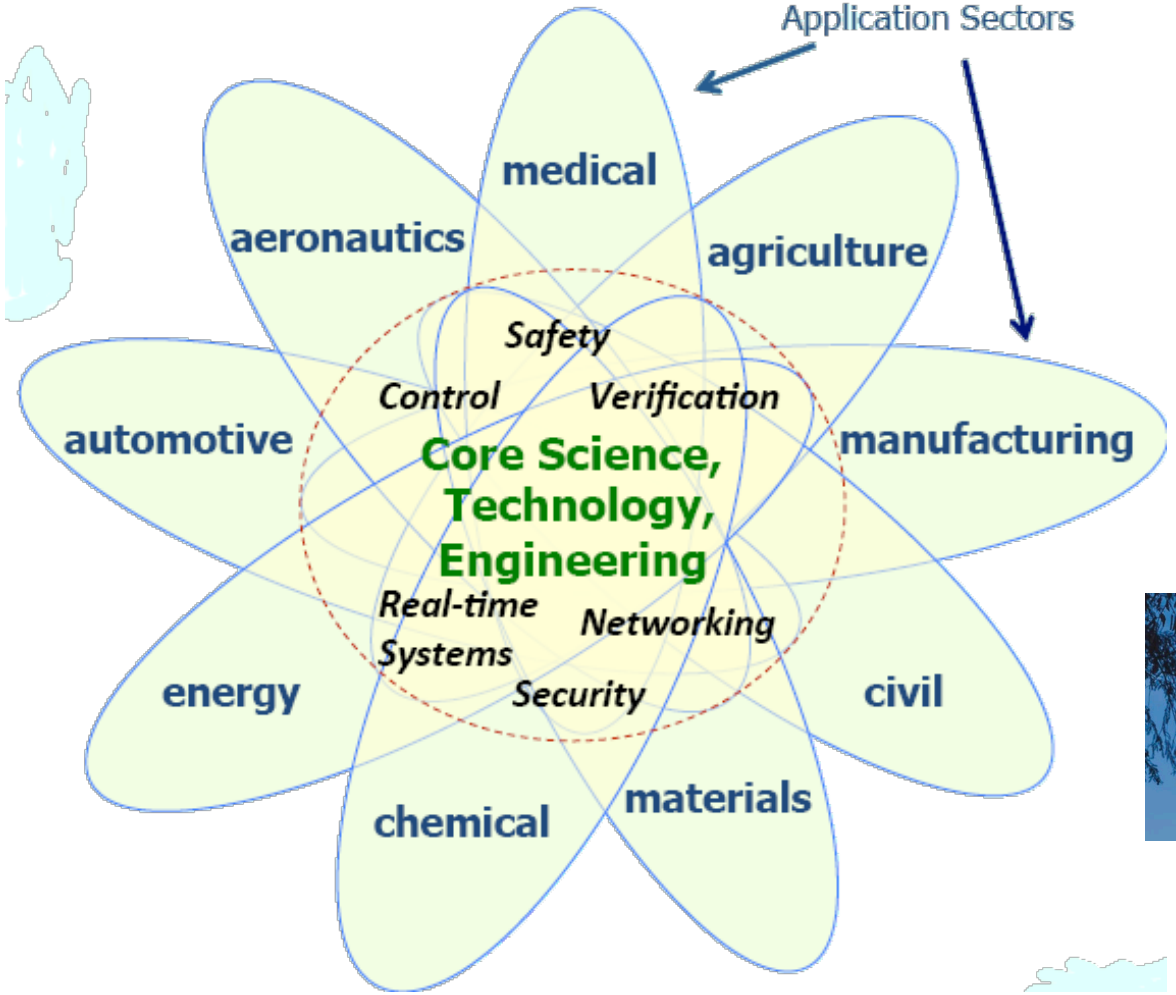
Transportation

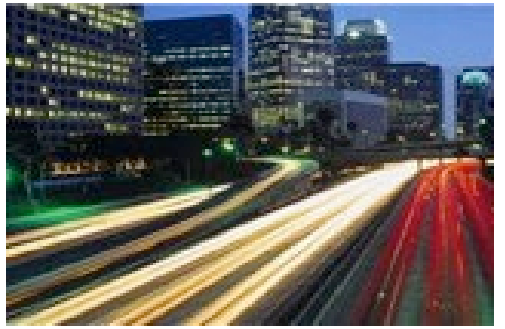
Energy

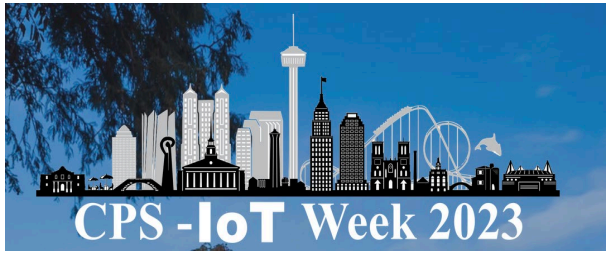
Healthcare

Critical Infrastructure

NSF Cyber-Physical Systems (CPS) Program





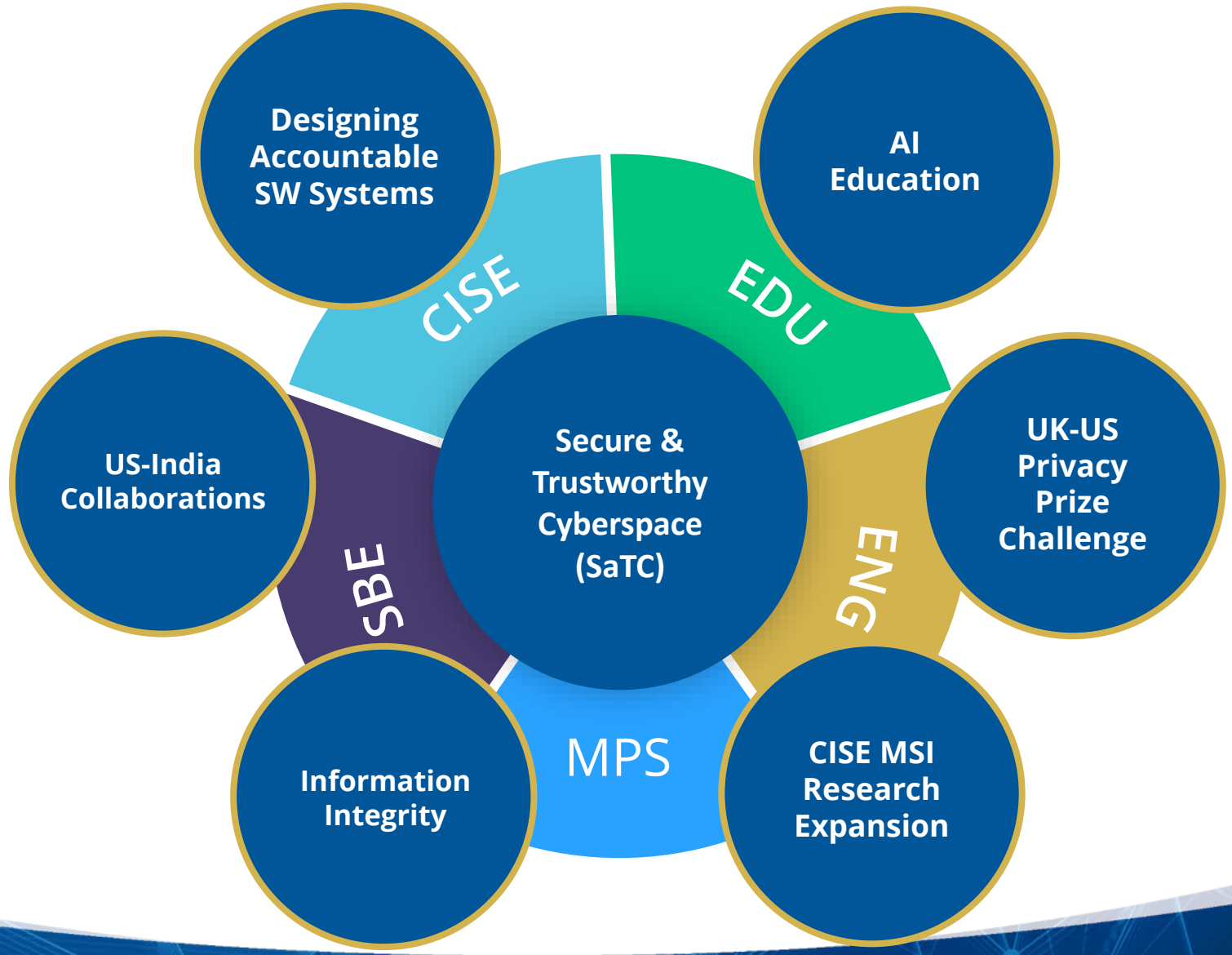


New! Safe Learning-Enabled Systems

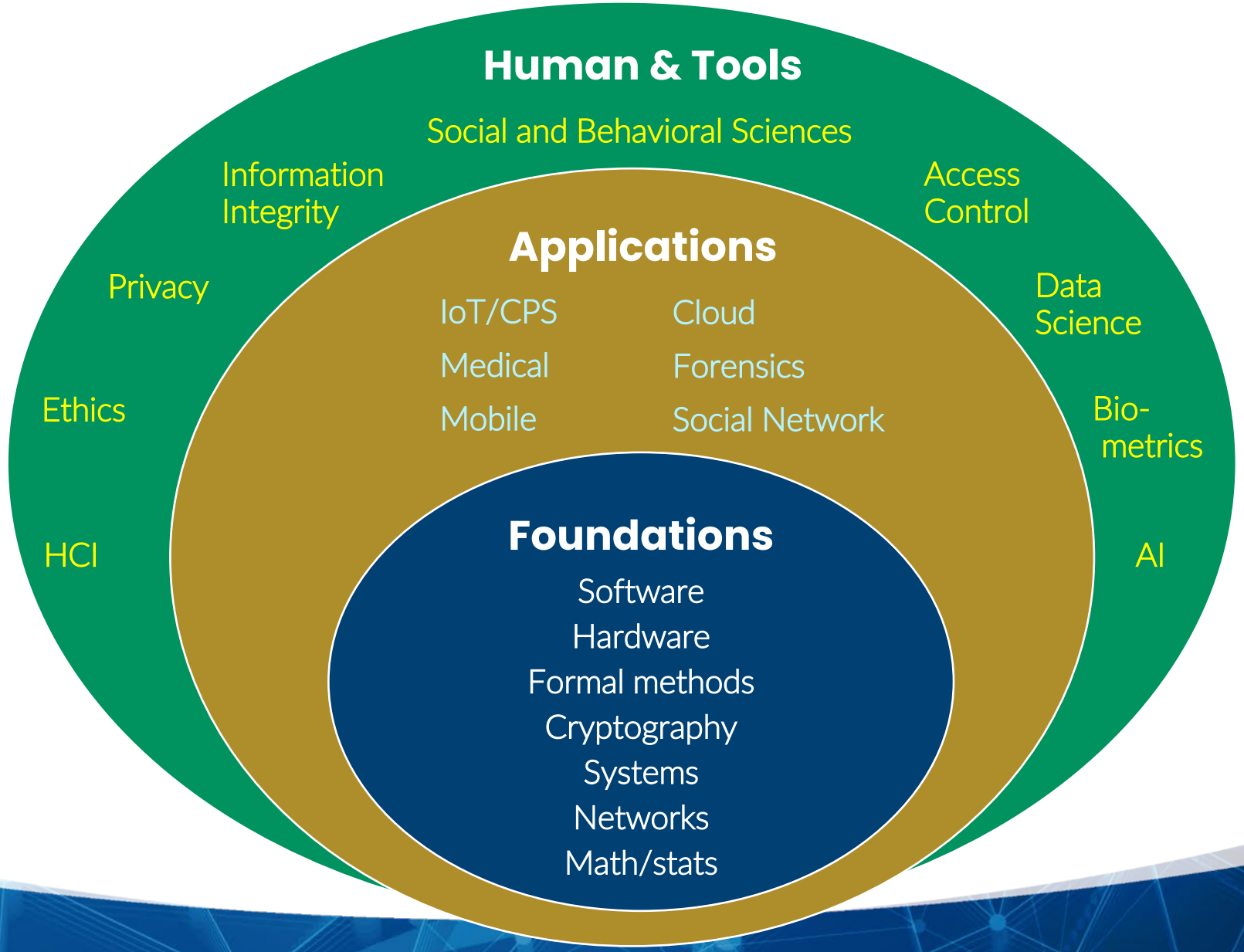
- As artificial intelligence (AI) systems rapidly increase in size, acquire new capabilities, and are deployed in high-stakes settings, their safety becomes extremely important
- Ensuring system safety requires more than improving accuracy, efficiency, and scalability: it requires ensuring that systems are robust to extreme events, and monitoring them for anomalous and unsafe behavior
  - Establish safety guarantees with respect to systematically generated data from realistic (yet appropriately pessimistic) operating environments
  - Resilience to “unknown unknowns”, which necessitates improved methods for monitoring for unexpected environmental hazards or anomalous system behaviors, including during deployment

https://www.nsf.gov/pubs/2023/nsf23562/nsf23562.htm

Secure and Trustworthy Cyberspace (SaTC)



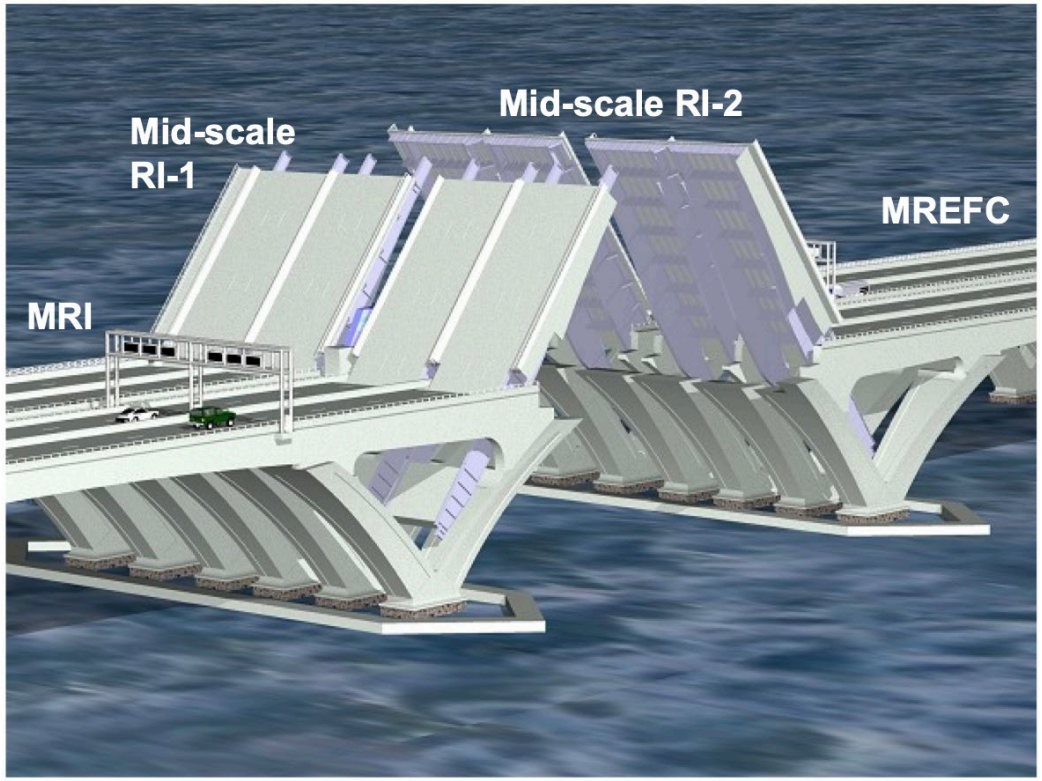
Secure and Trustworthy Cyberspace (SaTC)



Mid-scale Research Infrastructure

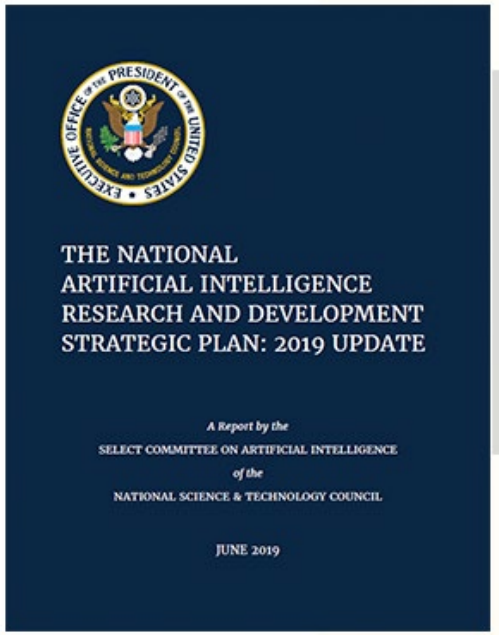
Mid Scale Research Infrastructure- 1 (Mid-Scale RI-1) and Mid Scale Research Infrastructure- 2 (Mid-Scale RI-2)

- Cyberinfrastructure that addresses community and national-scale computational- and data-intensive science and engineering research (RI-1), potentially transformative, large projects (RI-2)
- $4M – $20M for RI-1, $20M – $100M for RI-2



National Artificial Intelligence (AI) Research Institutes

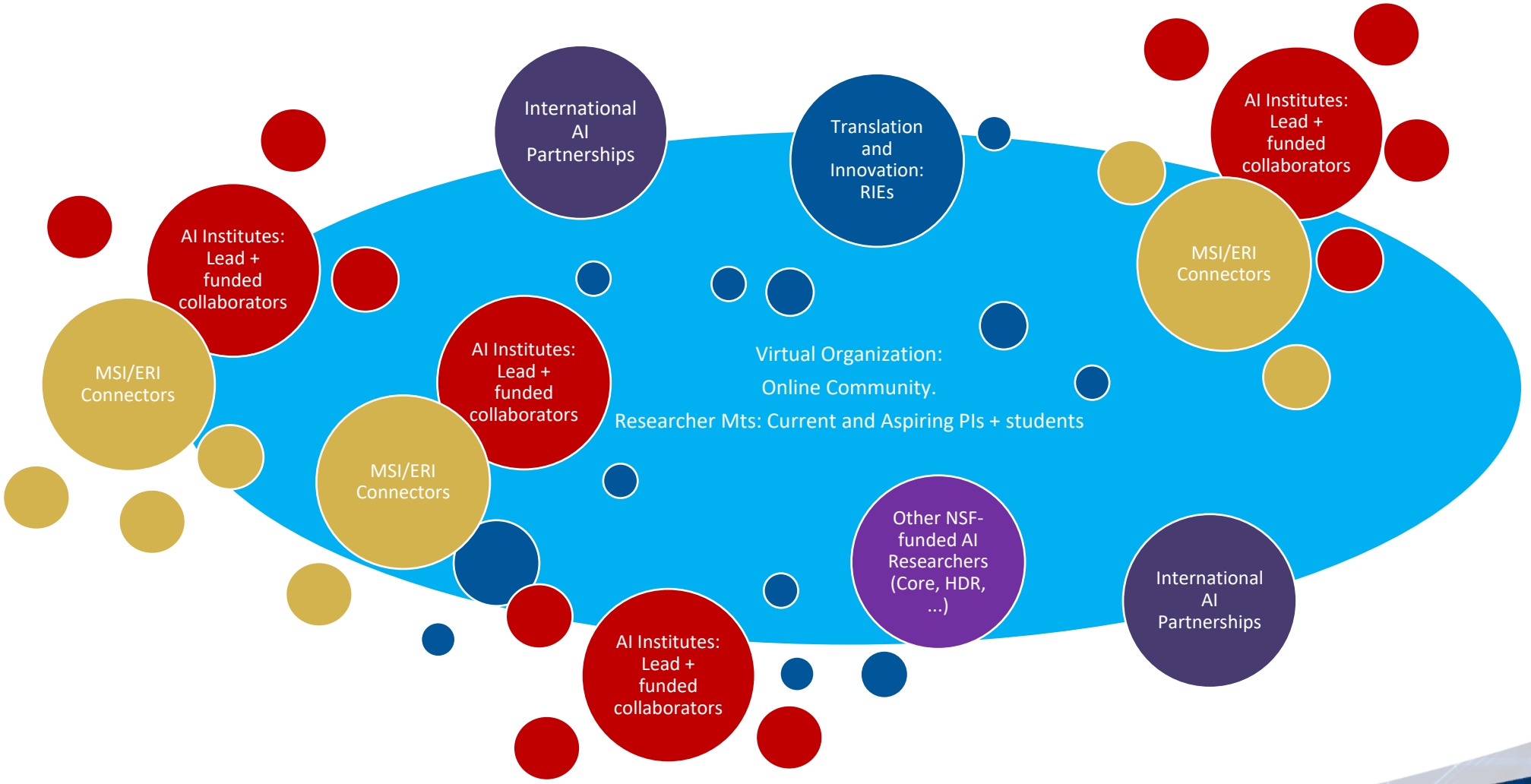
- Sustained investments in areas with the potential for long-term payoffs.
- Focus on societal challenges & enhancing national competitiveness in AI
- Emphasis on **convergent foundational** and **use-inspired research**
- Accelerate transformational, **AI-powered innovation**
- Grow a **workforce** of future AI researchers and practitioners
- Nexus points for Institute-level collaboration between universities, federal agencies, industries, and nonprofits



AI Institutes by the numbers

- 25 Institutes
- 100 funded organizations
- 680+ senior personnel
- 480+ Institute partnerships
- 21 funding divisions
- 50+ NSF program officers

Connecting the AI institutes – *Network of Networks*



Vision: National AI Research – Network of Networks

VO

AI Institutes Virtual Organization

Annual SAIL Leadership Summit
AIVO Web Site
ExpandAI Navigator
Community-led growth

MSI/Equity Connectors

ExpandAI Program

Capacity Building
Partnering opportunities

International AI Partnerships

NSF and NIFA funded Partnerships

Australia, Belgium, Chile, EU, France, Germany, India, Israel, Italy, Japan, Netherlands, New Zealand, South Korea, Spain, Switzerland , UK

AI Institutes

National AI Research Institutes Program

25 Institutes
Program expects continued growth

ExpandAI program
Capacity building – MSI/Equity connectors

*Promoting **capacity development** in AI and **partnerships between MSIs and AI Institutes** to diversify and strengthen U.S. research, education pathways, and workforce-driven innovation, and enhance minority access to STEM careers.*

Capacity

Build AI capacity

MSI-specific goals
Institution support
Path to partnership

Partnership

Leverage AI Institutes

MSI-led awards
Institute subawards
Shared vision and goals
Institute integration plans

Policy

Lower barriers to success

Concept outlines
Submission windows
Flexible submissions

Ref.: https://www.nsf.gov/pubs/2023/nsf23506/nsf23506.htm

CISE, AI Institutes, and OISE
Collaborating internationally

NSF 22-046

Dear Colleague Letter: International Collaboration Supplements in National Artificial Intelligence Research Institutes

February 16, 2022

Dear Colleagues:

With this Dear Colleague Letter (DCL), NSF invites requests for supplemental funding from existing awardees of the National Artificial Intelligence (AI) Research Institutes program (NSF 20-503, NSF 20-604) to add a new — or strengthen an existing — international dimension to their award. International collaboration should advance efforts to achieve the goals of the institute as outlined in the existing NSF award. Supplemental funding requests should represent mutual benefit and true intellectual collaboration with international partners.

- Collaboration with OISE ($3M)
- 14 proposals
- 6 NSF awards; 4 NIFA awards

- 16 countries engaged

Australia, Belgium, Chile, EU, France, Germany, India, Israel, Italy, Japan, Netherlands, New Zealand, South Korea, Spain, Switzerland , UK

Ref.: https://www.nsf.gov/pubs/2022/nsf22046/nsf22046.jsp

NSF-CSIRO Partnership

NSF 22-086

Collaboration Opportunities in Responsible and Equitable AI under the U.S. National Science Foundation (NSF) and the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Targeting US-Australian research cooperation in responsible and equitable AI

43 Applications after prescreening by CSIRO, multinational review happening in Jan 2023

First round of awards announced on Feb 2023: https://beta.nsf.gov/news/new-nsf-australia-awards-will-tackle-responsible

Accelerating groundbreaking research in responsible and ethical artificial intelligence solutions to societal challenges

Ref.: https://www.nsf.gov/pubs/2022/nsf22086/nsf22086.jsp

Outline

CISE Overview

Selected Programs

Closing Thoughts

CISE Program Portfolio Snapshot

CISE Programs

- Principles and Practices of Scalable Systems
- CISE-MSI Research Expansion
- Expeditions in Computing
- Formal Methods in the Field
- Designing Accountable Software Systems.

Multi-Directorate Program Led by CISE

- Secure and Trustworthy Cyberspace
- Cyber-physical Systems
- National AI Research Institutes/ExpandAI.
- Cyberinfrastructure for Sustained Scientific Innovation (CSSI)
- Pathways to Enable Open-Source Ecosystems.
- Smart and Connected Health
- Smart and Connected Communities
- Civic Innovation Challenge (CIVIC)
- Foundational Research in Robotics
- Research on Emerging Technologies for Teaching and Learning.
- Internet Measurement Research

Early Career

- CAREER
- CISE Research Initiation Initiative (CRII)

Programs Led by Other Directorates with CISE Participation

- Designing Materials to Revolutionize and Engineer Our Future.
- Future Manufacturing.
- Spectrum Innovation Initiative.
- Neural and Cognitive Systems
- Mathematical and Scientific Foundations of Deep Learning and Related Areas MoDL+).
- ERCs (Eng Research Centers)
- . . . . .

Education Programs

- Computer Science for All
- Computing in Undergraduate Education.
- Louis Stokes Alliances for Minority Participation

Infrastructure

- Major research Instrumentation.
- Mid-Scale Research Infrastructure
- CCRI – CISE Community Research Infrastructure

NSF BIG IDEAS

- Future of Work
- Harnessing the Data Revolution
- Data Science Corps
- Quantum Leap
- Quantum Leap Faculty Fellows

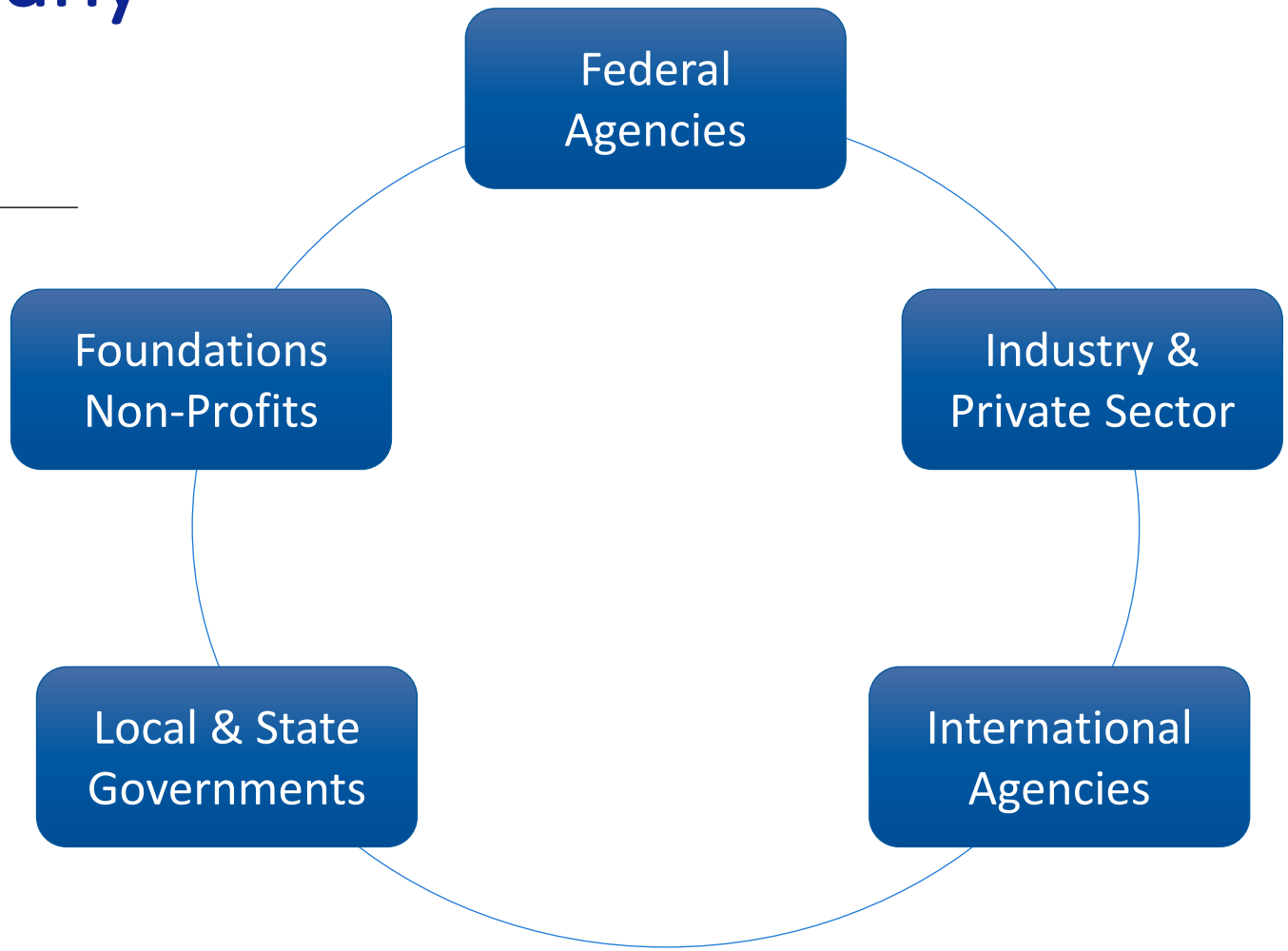
Entrepreneurship and Translation

- Convergence Accelerator
- I-Corps, SBIR/STTR.
- Industry/University Cooperative Research Centers (IUCRC)
- CISE InTrans supplements
- CISE Transition-to-Practice supplements
- . . . . .

CISE partners with many stakeholders

Three Primary Objectives:

- Deepen and grow research and innovation
- Make available research infrastructure
- Develop the workforce of the future



An amazing time to be in the CISE community !

Ubiquity

Computing is *everywhere* – across all of science and engineering, and all of society

Engagement

Computing intertwines with many *communities*

Urgency

Computing is *rapidly expanding and evolving*. There is tremendous opportunity … ***now!***


NSF