Cyberinfrastructure Research, Learning and Workforce Development (LWD) Programs

Office of Advanced Cyberinfrastructure Division (OAC)
Computer and Information Science & Engineering (CISE)
National Science Foundation
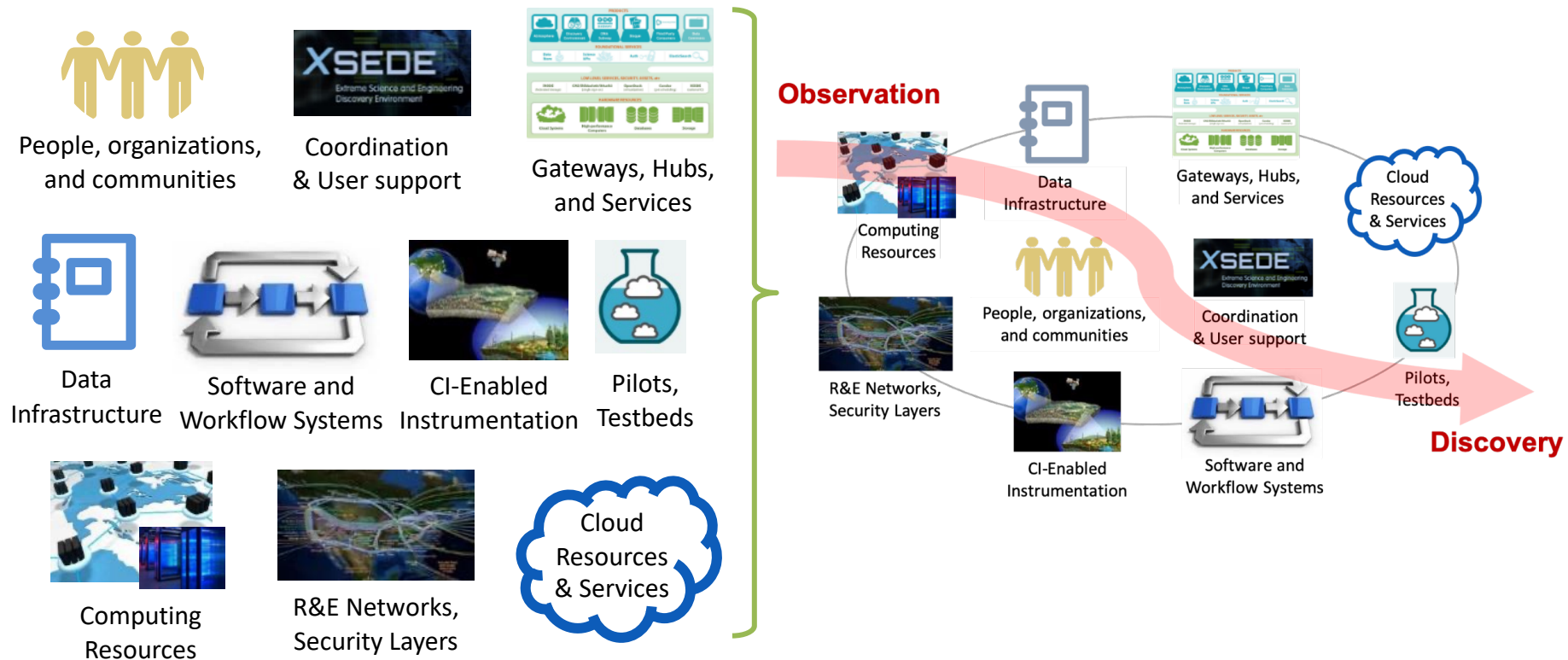
Alan Sussman

Questions: alasussm@nsf.gov

MUG Workshop, August 2021

National Science Foundation
WHERE DISCOVERIES BEGIN

NSF Office of Advanced Cyberinfrastructure (OAC)

Foster a cyberinfrastructure ecosystem to transform science and engineering research... through Research CI and CI research

LWD: Communities of Concern

CI Contributors

Cyber Scientists
to develop
new capabilities

CI Professionals

Professional Staff
to deploy & support
new capabilities

CI Users

Area Scientists
to exploit
new capabilities

OAC

Learning and Workforce Development

Student Research Training

- REU SITES – NSF 19-582

Faculty Early Career Research

- CRII – NSF 21-591
- CAREER – NSF 20-525

Training/Workforce Development

- CyberTraining - NSF 19-524

Research/Development Programs

- OAC Core Research – part of CISE Core Research – NSF 20-591
  OAC is only division with deadline for Smalls
- Cyberinfrastructure for Sustained Scientific Innovation (CSSI) – NSF 20-592

OAC Core Goals

- Advanced Cyberinfrastructure (CI) research to impact the future capabilities of research CI
  - New knowledge in design, development, and utilization of robust research CI

- Research career paths of cyber scientists/engineers
  - Computer as well as Computational and Data-driven Science and Engineering with advanced CI research thrusts

- Next deadline in November/December 2021

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Characteristics of OAC-Core

- Translational research
  - Design, development, deployment, experimentation, and application of advanced research CI
  - Spanning design to practice
- Other characteristics (optional):
  - Multi-disciplinary,
  - Extreme-scale,
  - Driven by science and engineering research,
  - End-to-end solution, <u>or</u>
  - Deployable as robust research CI

Research Areas

- *Architecture & middleware for extreme-scale systems:*
  - Design, benchmarking, and analysis; storage, networks, and I/O; Resource management, monitoring, fault tolerance, and cybersecurity
- *Scalable Algorithms and Applications:*
  - Numerical and high-performance scientific computing methods; Data, software and visualization; and Modeling and simulation
- *Advanced Cyberinfrastructure Ecosystem:*
  - Programming languages, libraries, and environments; Tools; Sociotechnical aspects

Cyberinfrastructure for Sustained Scientific Innovation (CSSI)

https://www.nsf.gov/pubs/2020/nsf20592/nsf20592.htm

- Supports the development and deployment of robust, reliable and sustainable data and software cyberinfrastructure

- Brings innovative capabilities towards sustained scientific innovation and discovery

- Provides opportunity to advance common approaches to sustain and innovate research cyberinfrastructures.

- Follows accepted data management and software development practices

Guiding Principles

Project Motivation *and Impact*	• Science-driven • Innovation
Cyberinfrastructure Plans	• Close collaborations among stakeholders • Building on existing, recognized capabilities • Project plans, and system and process architecture.
Measurable Outcomes	• Clear deliverables • Sustained and sustainable impacts • Metrics

Project Types	
Elements	Small groups that will create and deploy robust capabilities for which there is a demonstrated need that will advance one or more significant areas of science and engineering.
Frameworks	Larger, interdisciplinary teams organized around the development and application of common infrastructure aimed at solving common research problems faced by NSF researchers in one or more areas of science and engineering, resulting in a sustainable community framework serving a diverse community or communities.

Next Deadline: November 2021

Submit your questions to:
CSSIQueries@nsf.gov

Faculty Early Career Development Program (CAREER - NSF 20-525)

- Prestigious award supporting junior faculty as a teacher-scholar
  - Outstanding research, education and the integration of education and research
    - Presidential Early Career Awards …(PECASE – 4 from OAC last time – out of 20 best from NSF each year)
  - Number of OAC submissions steady, with broad variety of topics
  - >30 active OAC awardees; Deadlines: July 26, 2021, next should be in July 2022
- Open to non-tenure track faculty; Sr. personnel allowed
- Min $400K/5 years, typically ~$500K in CISE

Faculty Early Career Development Program (CAREER – contd)

- OAC encourages proposals that are either of
  - primary interest to OAC, or
  - secondary interest to OAC (add OAC in Cover Page)
- CAREER program page

  - http://www.nsf.gov/career
- CISE CAREER Proposal Writing Workshops
  - April 8, 2019, Alexandria: http://cisecareerworkshop.web.unc.edu
  - April 6, 2020, virtual, http://cisecareerworkshop.web.unc.edu
  - April 5-6, 2021, virtual, https://cisecareerworkshop.web.unc.edu

CISE Research Initiation Initiative
(CRII - NSF 21-591)

- Independent research for faculty or *research scientists* in their first three years
  - May not have any federal grant as PI; 2 chances;
  - New: Chair letter (w/template) certifies lack of essential resources
  - Tenure-track or research science or education position
- OAC research focus:
  - Advanced CI research: Translational, Use-inspired, multidisciplinary, End-to-end
  - Computational and data-intensive scientists in addition to computer scientists
- Award <$175K/ 2 yrs;
- Deadline: Sept. 20, 2021

Goals of CISE Research Initiation Initiative (CRII - contd.)

- Start a research program and career
  - The PI need not have significant prior research results or maturity
  - Start a path toward research independence
  - Develop collaborations within or across research disciplines
  - Undertake exploratory investigations
  - Acquire and test preliminary data
- Broaden community of researchers
  - Reach underserved sub-communities, under-represented groups, non-traditional institutions

CyberTraining – Training-based Workforce Development for Advanced Cyberinfrastructure (NSF 19-524)

- Twin Goals for *research* workforce preparation
    1. Broad adoption of CI tools/methods, or
    2. Curriculum/Instructional Materials Development and Integration

- Three project classes:
    - *Pilot:* Exploratory activities, $300K, 2 yrs
    - *Implementation:* Broadly accessible to community
        - *Small:* $500K, 4 yrs
        - *Medium:* foster a community, $1M, 4 yrs
    - *Large-scale Project Conceptualization:*
        - Planning grants for potential future institute-like CyberTraining projects, $500k, 2 yrs

- 3 communities of concerns
    - CI Professionals, CI Contributors, and CI Users

- Participation:
    - ENG, GEO, SBE, MPS (AST, DMR, PHY), EHR/DGE, CISE/CCF
    - *OAC – lead*
    - Send 1-page project summary

- Excellent community response
    - ~10-12 awards per year last several years

- Previous Deadline:
    - Jan. 20, 2021
    - Next one in Jan. 2022

Other LWD Opportunities within OAC

- INTERN DCL (NSF 21-013)
  - Supplements for Non-academic Graduate Student Research ~$50K/student
- EAGERs (<$300K), Workshops (<$50K), RCNs
  - Seed Exploration of Research, Training and Education, Broadening Participation
  - Students, Post-Docs, Faculty, CI Professionals
- Student Travel Grants
- *Discuss with me and other OAC Program Officers*
- To subscribe to *OAC Mailing List:*
  Send an email to:
  OAC-ANNOUNCE-subscribe-request@listserv.nsf.gov

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