Cybersecurity Innovation for Cyberinfrastructure (CICI) NSF 21-512

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Office of Advanced Cyberinfrastructure (OAC)

Computer & Information Science & Engineering (CISE)

WEBINAR: NOVEMBER 4, 2020

Webinar Goals

- Introduce CICI program and objectives
- Detail NSF 21-512 solicitation and changes
- Help ensure high-quality proposals aligned with program
- Answer questions from potential proposers

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Orientation: OAC and Scientific Cyberinfrastructure

- **Office of Advanced Cyberinfrastructure:** Supports and coordinates the development, acquisition and provisioning of state-of-the-art cyberinfrastructure resources, tools and services essential to the advancement and transformation of science and engineering.

- **Cyberinfrastructure:** Computation, data, software, networking to facilitate scientific discovery and innovation.

OAC: Enable Diverse Range of Science

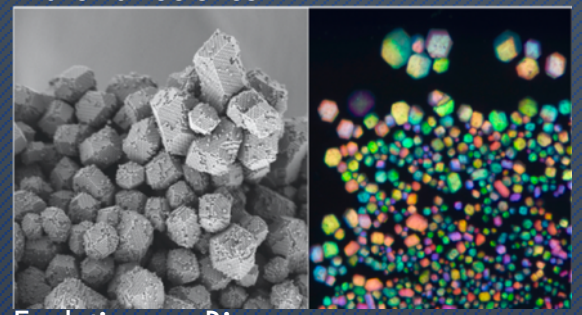
Quantum Computing

Computational Bio

Climatology

LHC

Material Science



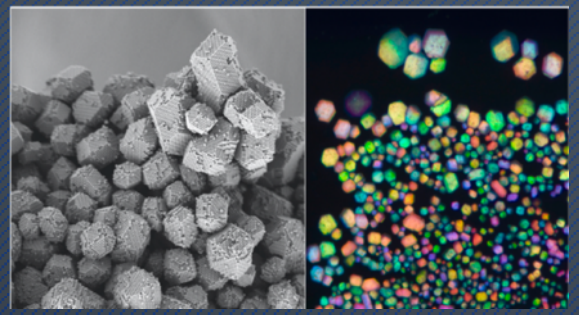
Evolutionary Bio

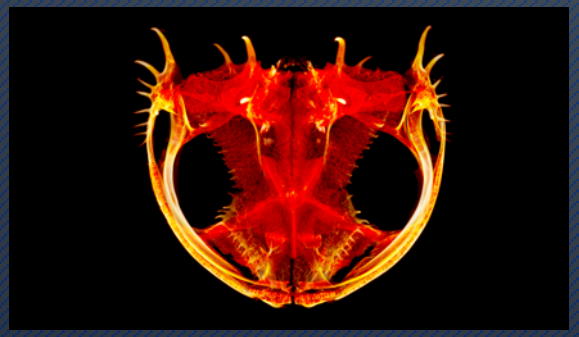
Significant Challenges:

- **Large instruments** producing
- **Big data** requiring
- **Big compute** for
- **Highly collaborative** scientists in
- **Different specializations** across
- **Widely Distributed infrastructure** that must be
- **Available,** ensure
- **Workflow Integrity**, and be
- **Easy to use** while adhering to
- **Regulatory** or policy requirements

OAC: Enable Diverse Range of Science

Security Issues Across these Challenges!





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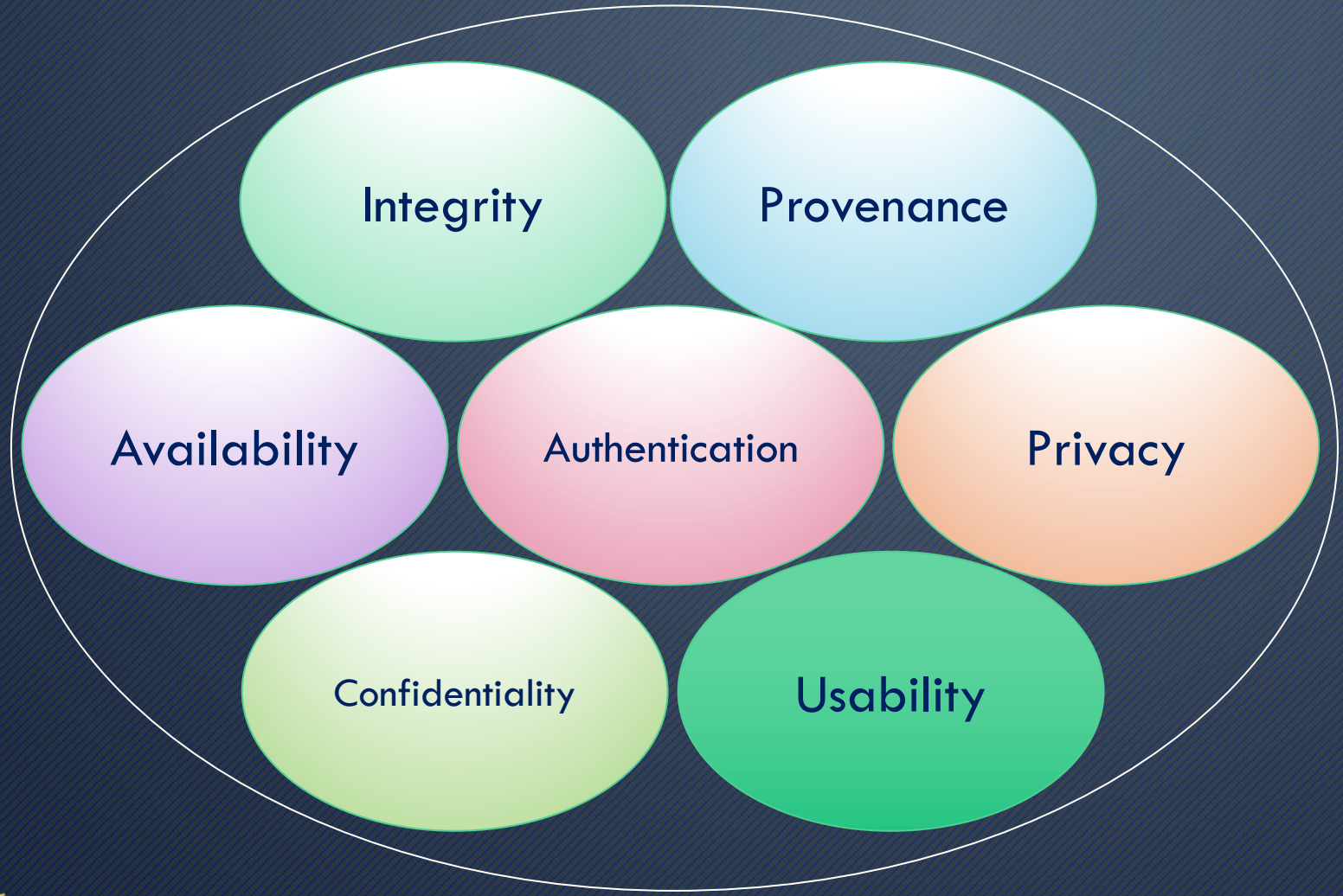
SECURE INFRASTRUCTURE

OAC Vision: Securing Research Cyberinfrastructure



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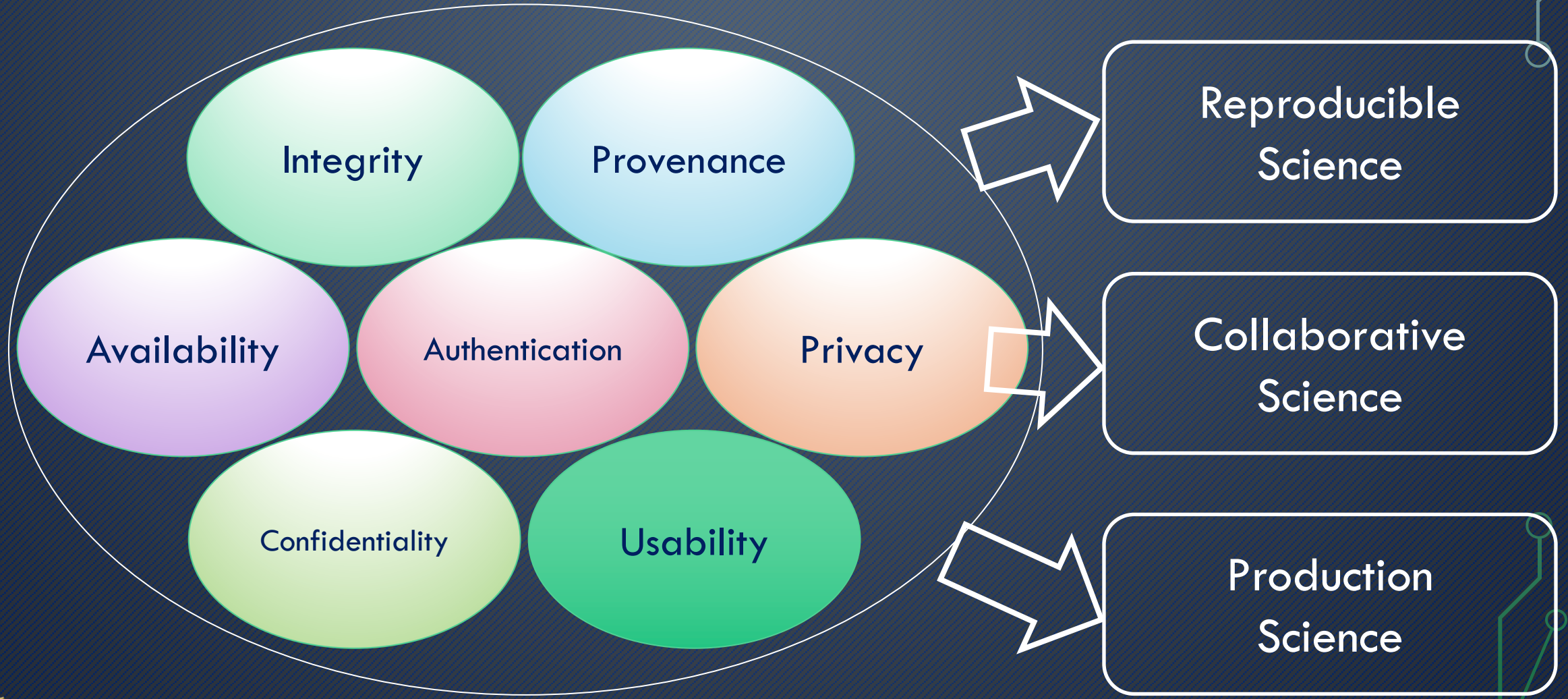

Cybersecurity Innovation for Cyberinfrastructure (CICI)

- Support applied research to secure science data, workflows, and infrastructure
- Develop, deploy, and integrate solutions that benefit the broader scientific community
- Operationalize emerging cybersecurity techniques into the science CI domain
- Develop new cybersecurity approaches specific to science CI domain and requirements

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NSF 21-512: CICI

- Changes since last solicitation (2019) after one-year hiatus
  - Programmatic rethink in consideration of success, CI evolution, and needs of the CI ecosystem and users (scientists)
  - Three new program areas: UCSS, RSSD, SIVD
  - Small (up to $500k) awards
  - Up to 3 years
- Due date: January 8, 2021
- Anticipate supporting 10-15 awards

CICI Program Area Key Themes

- Applied security research to benefit science, domain scientists, and scientific CI
- Recognize and leverage inherent differences in science CI ecosystem (data, software, workflows and workloads)
- Consider usability, adoption, and empowering domain scientists
- Discover (and mitigate) weaknesses and vulnerabilities in science CI
- Gather quantitative metrics where possible

CICI Program Areas

	Applied research to:
Usable and Collaborative Security for Science (**UCSS**)	Facilitate scientific collaboration, adopt security into scientific workflows. Overcome security and usability obstacles to data and resource sharing.
Reference Scientific Security Datasets (**RSSD**)	Capture science-specific workflow/workload behavior. Gather and curate canonical science workload datasets that can facilitate techniques to help secure science CI.
Scientific Infrastructure Vulnerability Discovery (**SIVD**)	Recognize the unique ecosystem of scientific CI, proactively discover vulnerabilities and weaknesses. Consider ethical and operational concerns, and leveraging existing testbeds and frameworks.

Successful CICI proposals describe

- Science drivers (applications and users)
- The scientific infrastructure / environment that will benefit
- Unique properties of the scientific domain or CI that influence the desired security functionality, design, or mechanisms
- Threat model in the science domain
- Plan for gathering quantitative metrics to assess security benefits

What CICI is not

- Not appropriate mechanism for non-security infrastructure efforts
  - Not intended to support pure infrastructure operation
- Not intended to support fundamental cybersecurity or privacy research
  - May be better served by Secure and Trustworthy Cyberspace (SaTC) program

Proposal Preparation

- The NSF proposal and award process is detailed in the Proposal & Award Policies & Procedures Guide (PAPPG, NSF 20-1).

  https://www.nsf.gov/pubs/policydocs/pappg20_1/

- Proposal titles "`CICI:[UCSS,RSSD,SVID]:title`"
  - E.g., "`CICI:RSSD:An amazing proposal`"

Eligibility

- **Proposals may only be submitted by:**
  - Universities and Colleges
  - Non-profit, non-academic organizations

- **Limit on Number of Proposals per PI/Co-PI/Senior Personnel: 2**
  - An individual may participate as Principal Investigator, co-Principal Investigator or other Senior Personnel on no more than two CICI proposals.

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Review Criteria

Reviewers and review panel will address:

- Intellectual Merit,
- Broader Impacts, and

Standard NSF Review Criteria

- CICI Specific Review Criteria

in their reviews, panel discussions, and panel summaries

CICI Specific Criteria

Project Motivation and Impact

- Science-driven
- Innovation

Cyberinfrastructure Plans

- Project plans, and system and process architecture
- Building on existing, recognized capabilities
- Close collaborations among stakeholders

Measurable Outcomes

- Sustained and sustainable impacts

CICI Specific Criteria

Project Motivation and Impact

- ***Science Driven***

To what extent is the proposed project science-driven? How will the project outcomes fill well-recognized science and engineering needs of the research community? What will be the broader impacts of the project, such as its benefits to science and engineering communities beyond its initial targets, under-represented communities, and education and workforce development? The project description should provide a compelling discussion of the potential to benefit its intended as well as broader communities.

- ***Innovation***

To what extent is the proposed project innovative? What innovative and transformational capabilities will the project bring to its target communities? How will the project integrate innovation and discovery into the project activities?

CICI Specific Criteria

Cyberinfrastructure Plans

- ***Project plans, and system and process architecture***

  How well detailed are the project plans, and logical and physical architectures? The project plan should include user interactions and provide a timeline including a proof-of-concept demonstration or prototyping of the proposed system or framework.

- ***Building on existing, recognized capabilities***

  To what extent does the proposed project build on existing, recognized capabilities? How will the project activities build on and leverage existing NSF, national, and open source cyberinfrastructure and cybersecurity investments, as appropriate?

- ***Close Collaboration among stakeholders***

  To what extent does the proposed project involve close collaborations among stakeholders? How will the project activities engage cyberinfrastructure (CI) experts, specialists, and scientists working in concert with the relevant domain scientists who are users of CI?

CICI Specific Criteria

Measurable Outcomes

- ***Sustained and Sustainable Impacts***

How will the project's outcomes and its activities have long-term impacts, and how will these be sustained beyond the lifetime of the award, as appropriate? Are the sustainability approaches following well-established models?

CICI Schedule

- Deadline for NSF 21-512

January 8, 2021

- **Schedule:**

NSF targets a 6-month dwell time

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Thank you!

Questions?

During Webinar: Via Zoom Q&A

Anytime: {rbeverly,kthompso}@nsf.gov