

Critical Resilient Interdependent Infrastructure Systems and Processes (CRISP)

at the National Science Foundation (NSF)

*Directorates for: (1) Computer & Information Systems & Engineering;
(2) Engineering; (3) Social, Behavioral & Economic Sciences*

Solicitation: NSF 15-531

Webinar

January 22, 2015



Critical Resilient Interdependent Infrastructure Systems and Processes (CRISP)

Solicitation NSF 15-531

Elise Miller-Hooks

Full Proposal Due Date

- March 20, 2015



Question & Answer Session at End of Webinar

**Submit questions during webinar to:
kwebster@nsf.gov**

(This email is only valid during this webinar)



Solicitation

Solicitation URL

http://www.nsf.gov/mobile/publications/pub_summ.jsp?WT.z_pims_id=505180&ods_key=nsf15531

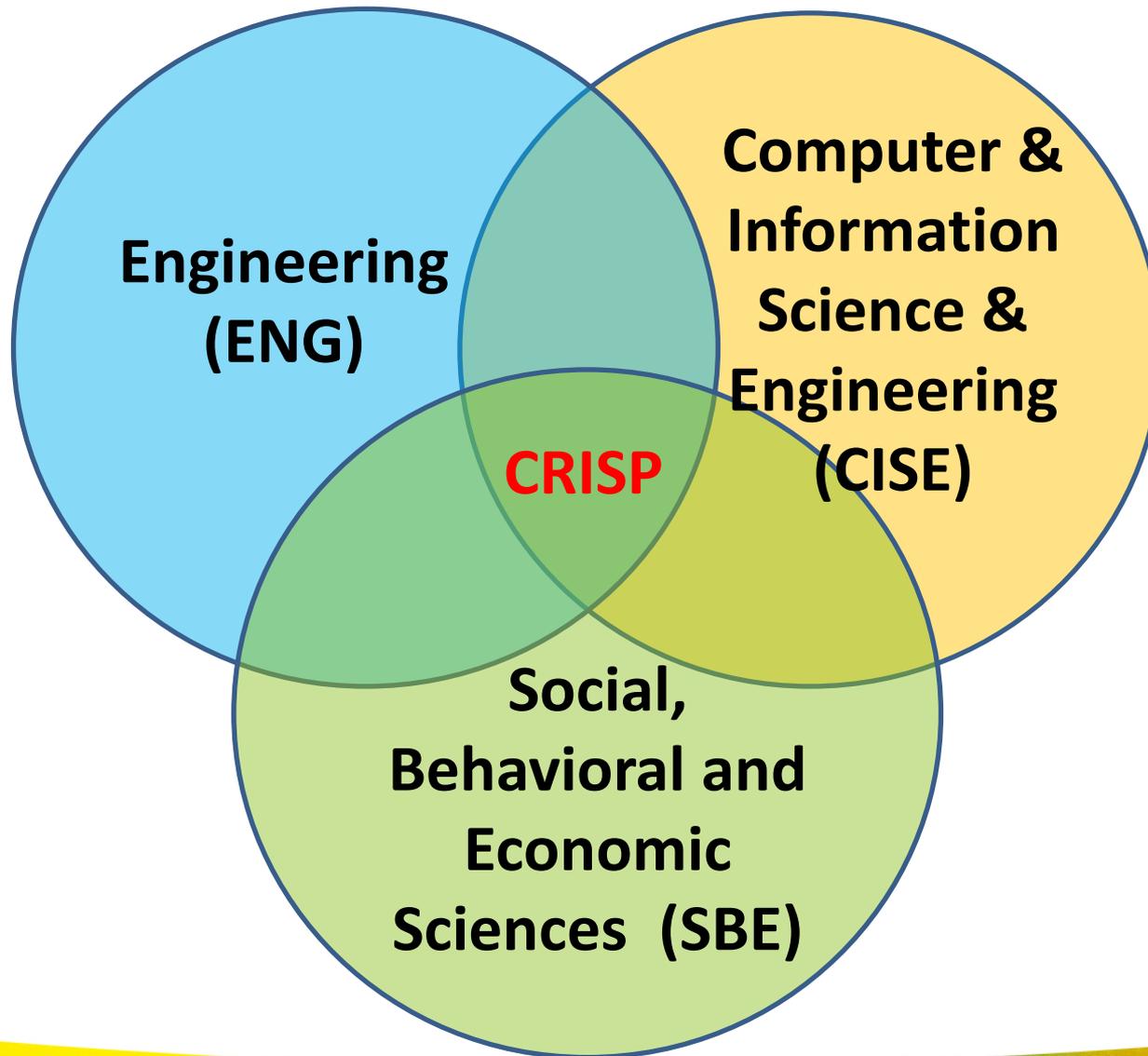


Proposal Submission Due Date

- 2015 Full Proposal Due Date
 - March 20, 2015 (4:59 pm proposer's local time)
- Proposer's local time with FastLane timestamp
 - Any submission past the 4:59 pm deadline is considered late (even one second past the deadline); proposal will be returned without review



Participating Directorates



Cognizant Program Officers

Elise Miller-Hooks	ENG/CMMI	elisemh@nsf.gov
Bruce Hamilton	ENG/CBET	bhamilto@nsf.gov
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Gurdip Singh	CISE/CNS	gsingh@nsf.gov
Dennis Wenger	ENG/CMMI	dwenger@nsf.gov



Background

- Anticipated Funding Amount: \$20 million
 - *Type 1 Awards*: Projects will be of 3 years in duration with a maximum total budget of \$500,000
 - *Type 2 Awards*: Projects will be of 3-4 years in duration with a total budget ranging from \$1 million - \$2.5 million
- Distinguishing Requirement:
 - at least one PI or co-PI who is an ***engineer***
 - at least one PI or co-PI who is a ***computer, information or computational scientist***
 - at least one PI or co-PI who is a ***social, economic or behavioral scientist***



Type 1 Awards

- Theory, modeling, data collection and metrics projects that create:
 - knowledge, representations, methodologies, case studies, approachesto conceptualize and study interdependent infrastructures as processes, services and systems
- Objective of team building to help clarify
 - basic terminology
 - assumptions and premises that enable theories
 - model and metric formalizationsfor interdependent infrastructures as processes and services
- Not intended for empirical testing of models/theories



Type 2 Awards

- Interdisciplinary research to conduct:
 - major new interdependent infrastructure research using empirical data
- Expected to include creation of knowledge, representations, methodologies and approaches to
 - conceptualize and study interdependent infrastructures as processes, services and systems



Critical Infrastructures

Critical infrastructures mainstay of national economy, security and health

Broad perspective

- Not only a collection of discrete components, but an ecosystem of interconnected and interdependent physical, cyber & human components
- Infrastructures seen broadly as processes delivering services



Critical Infrastructure Sectors



Food and Agriculture



Banking and Finance



Chemical



Commercial Facilities



Communications



Critical Manufacturing



Dams



Defense Industrial Base



Emergency Services



Energy



Government Facilities



Healthcare and Public Health



Information Technology



National Monuments and Icons



Nuclear Reactors, Materials and Waste



Postal and Shipping



Transportation Systems



Water



Interdependent Critical Infrastructure Systems (ICIs)

- Infrastructures are generally conceived here:
 - as networks of systems and processes
 - that function collaboratively and synergistically
 - that produce & distribute continuous flow of essential goods & services
 - as interdependent and connected
- Examples of interdependencies
 - (1) In a hazard event, emergency services (response/repair) required for restoration of critical services (power/transportation/healthcare...), and critical services enable emergency response/repair activities
 - (2) Manufacturing-Banking/Finance: Demand by manufacturing sector for financing depends on economy which affects loan rates, and economy depends on goods production from manufacturing sector



Overarching Goals

1. Create new approaches/solutions for design/operation of infrastructures as processes/services
2. Enhance understanding/design of interdependent critical infrastructure systems (ICIs) and processes that provide essential goods and services despite disruptions/failures/disturbances from any cause
 - natural, technological, organizational or malicious
 - various timescales and intensities
3. Create knowledge for innovation in ICIs to safely, securely, and effectively expand range of goods and services they enable
4. Improve effectiveness, efficiency, dependability with which they deliver existing goods and services



Research Objectives

1. Create new knowledge, approaches, solutions to:
 - increase resilience, performance, readiness in ICIs
2. Create frameworks/multidisciplinary models of ICIs, processes and services:
 - capable of analytical prediction of complex behaviors
 - capable of real-time control and dynamic adaptation/reconfiguration
 - responsive to system and policy changes
3. Develop frameworks to understand interdependencies created by interactions between:
 - physical, cyber, social, behavioral and economic ICI elements
4. Understand organizational, social, psychological, legal, economic, technical obstacles to:
 - improving ICIs, identifying strategies for overcoming obstacles



Proposal Submission per NSF 15-1, Grant Proposal Guide

Submit proposal following NSF 15-1, Grant Proposal Guide, Proposal Preparation Instructions, Chapter II. Several recently added requirements of note:

- **Chapter II.C.2.d, Project Description...** must contain, as a separate section within the narrative, **a section labeled "Broader Impacts of the Proposed Work"**.
- **Chapter II.C.2.d(iii), Results from Prior NSF Support...** listing of publications resulting from an NSF award must provide **complete bibliographic citation** for each publication in either the Results from Prior NSF Support section or in the References Cited section of the proposal.
- **Chapter II.C.2.g, Budget and Budget Justification...** for the proposing organization must be no more than three pages. For proposals that contain a subaward(s), **each subaward must include a separate budget justification of no more than three pages.**

Noncompliance with requirements described in the most recent GPG will result in return without review.



Special Requirements Apply

- Some of the requirements:
 - Combined conflicts of interest pdf searchable table
 - Type 1: Team Document
 - Type 2: Management and Integration Plan
 - Title
 - Begins with “CRISP Type 1:”
 - Begins with “CRISP Type 2:”
 - An individual can be a PI/co-PI/senior investigator only at most one Type 1 and one Type 2 proposal



Additional Review Criteria

1. Does the proposal primarily address scientific research on interdependencies among critical infrastructures?
2. Does the research sufficiently reflect interdisciplinary efforts and help cultivate an interdisciplinary research community in critical infrastructure related to participating directorates?
3. Do the project personnel have the expertise to conduct necessary interdisciplinary research?



Predecessor RIPS: Awards Made

More info on current RIPS awards

http://www.nsf.gov/news/news_summ.jsp?cntn_id=132852

RIPS Type I

- (1) The Interdependent Criticality of Built, Social, and Information Infrastructures in Community Resilience: A New Framework and Participatory Process – *Lead: University of Colorado Boulder*
- (2) Human Geography Motifs to Evaluate Infrastructure Resilience – *Lead: University of Maryland*
- (3) A Meta-Network Systems Framework for Resilient Analysis and Design of Modern Interdependent Critical Infrastructures – *Lead: New York University*



RIPS: Awards Made

RIPS Type II

- (1) Quantifying Disaster Resilience of Critical Infrastructure-based Societal Systems with Emergent Behavior and Dynamic Interdependencies – *Lead: University of Maryland*
- (2) Towards Resilient Computational Models of Electricity – *Gas ICI* – *Lead: MIT*
- (3) Strategic Analysis and Design of Robust and Resilient Interdependent Power and Communication Networks – *Lead: Washington State University*
- (4) Vulnerability Assessment and Resilient Design – *Lead: University of Florida*
- (5) Resilience Simulation for Water, Power and Road Networks – *Lead: Arizona State University*
- (6) Participatory Modeling of Complex Urban Infrastructure Systems – *Lead: Georgia Tech*
- (7) Water and Electricity Infrastructure in the Southeast (WEIS) Approaches to Resilient and Interdependent Systems under Climate Change – *Lead: Carnegie Mellon University*



Questions and Answers

During Webinar, please email questions to
kwebster@nsf.gov

*After Webinar, please email additional questions to any
Program Director listed in the solicitation*



Program Officers – Q&A



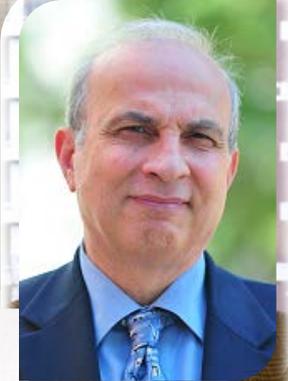
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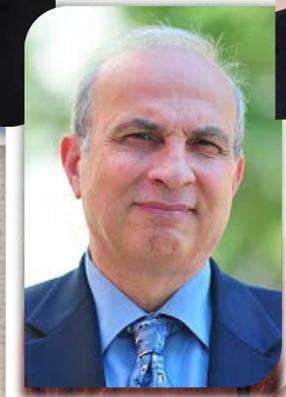
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