

Disrupting Operations of Illicit Supply Networks (D-ISN)

PROGRAM SOLICITATION

NSF 21-582

REPLACES DOCUMENT(S):

NSF 20-561



National Science Foundation

Directorate for Engineering
Division of Civil, Mechanical and Manufacturing Innovation

Directorate for Computer and Information Science and Engineering

Directorate for Social, Behavioral and Economic Sciences

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

July 28, 2021

April 22, 2022

IMPORTANT INFORMATION AND REVISION NOTES

The Disrupting Operations of Illicit Supply Networks program solicitation has been revised and prospective Principal Investigators (PIs) are encouraged to read the solicitation carefully. Among the changes are the following:

- Elimination of Track 2 (Planning Grants) proposals;
- Emphasis on illicit supply networks that produce and deliver opioids and have contributed to the national opioid epidemic;
- Clarification on who may serve as PI
- A Proposal Preparation Checklist has been added to aid in preparation of compliant proposals: this checklist provides a summary of key items, but does not replace the complete set of requirements in the NSF Proposal and Award Policies and Procedures Guide (PAPPG); and,
- Proposal deadlines have been revised.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 20-1), which is effective for proposals submitted, or due, on or after June 1, 2020.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Disrupting Operations of Illicit Supply Networks (D-ISN)

Synopsis of Program:

Criminal networks that illegally traffic in everything from people and drugs to human organs, natural resources and nuclear material pose grave threats to the health, prosperity and security of our Nation. As an important example, the opioid epidemic in the United States has largely been fueled by new synthetic opioids that are primarily produced in overseas facilities and distributed to the US through intermediate countries. These illicit supply chains flourish across national boundaries, both taking advantage of and contributing to regional instability. The profits generated through these activities finance ongoing conflicts across the globe. Making use of the same communications, logistics, transportation, and financial infrastructure that enable globally integrated commercial supply chains, illicit flows are now estimated to account for 4-6% of global GDP, or roughly \$2 trillion annually. Moreover, these networks use exploitative labor, such as child labor, forced labor and human trafficking, to source and produce goods and services that contribute to both illicit and legal commercial supply chains. The Disrupting Operations of Illicit Supply Networks (D-ISN) Solicitation supports research projects that take a systems approach to advance fundamental understanding of how networks that traffic in illicit or illicitly-produced goods and services operate, leading to technological breakthroughs that bolster our ability to disable these networks.

Major goals of NSF's D-ISN Solicitation include:

- *Improve understanding of the operations of illicit supply networks and strengthen the ability to detect, disrupt, and dismantle them.*
- *Support research on the illicit supply networks that fuel the national opioid epidemic*

- Enhance research communities that effectively integrate operational, computational, social, cultural and economic expertise to provide methods and strategies to combat this complex and elusive global security challenge.
- Catalyze game-changing technological innovations that can improve discovery and traceability of illicitly sourced product inputs.
- Provide research outcomes that inform U.S. national security, law enforcement and economic development needs and policies.

Proposals responding to this solicitation must be submitted to the Directorate for Engineering. Once received, however, the proposals will be managed by a cross-disciplinary team of NSF Program Directors.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Georgia-Ann Klutke, ENG/CMMI, telephone: (703) 292-2443, email: gaklutke@nsf.gov
- Yueyue Fan, ENG/CMMI, telephone: (703) 292-4453, email: yfan@nsf.gov
- Bruce Hamilton, ENG/CBET, telephone: (703) 292-7066, email: bhamilto@nsf.gov
- Mark S. Hurwitz, SBE/SES, telephone: (703) 292-5366, email: mhurwitz@nsf.gov
- Jeffrey W. Mantz, SBE/BCS, telephone: (703) 292-7783, email: jmantz@nsf.gov
- Wendy Nilsen, CISE/IIS, telephone: (703) 292-2568, email: wnilsen@nsf.gov
- Reggie S. Sheehan, SBE/SES, telephone: (703) 292-5389, email: rsheehan@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering
- 47.070 --- Computer and Information Science and Engineering
- 47.075 --- Social Behavioral and Economic Sciences

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 10 to 15 - per year, subject to availability of funds.

Projects will be funded for up to four years for a total of \$1,000,000 (\$250,000 per year).

Anticipated Funding Amount: \$10,000,000 to \$15,000,000

-in FY 2021, subject to the availability of funds and the quality of the proposals received.

Eligibility Information

Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), Chapter I.E. Unaffiliated individuals are not eligible to submit proposals in response to this solicitation.

Who May Serve as PI:

Principal Investigators (PI) from academic organizations must be at the faculty level, tenured or tenure-track, as determined by the submitting organization. If the proposal is submitted by a non-profit, non-academic organization, the lead PI must meet all of the following requirements: (1) the PI has a continuing appointment that is expected to last for the duration of a D-ISN grant; (2) the appointment has substantial research responsibilities; and (3) the proposed project is related to the PI's job responsibilities as well as to the mission of the department or organization. In addition, a minimum of two collaborating Senior Personnel (e.g. co-PIs, Collaborating PIs) must participate. At least one member of the project team (PI or co-PI) must have a full-time, tenured or tenure-track faculty appointment within a College/Department of Engineering.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI:

An investigator may participate as Principal Investigator (PI), co-Principal Investigator (co-PI), Project Director (PD), Senior Personnel or Consultant in **no more than two** proposals submitted in response to this solicitation. **These eligibility constraints will be strictly enforced in order to treat everyone fairly and consistently.** In the event that an individual exceeds this limit, proposals received within the limit will be accepted based on earliest date and time of proposal submission (i.e., the first two proposals received will be accepted, and the remainder will be returned without review). **No exceptions will be made.**

Limit on Number of PIs, co-PIs, Senior Personnel per Collaborative Project:

Projects from teams of three or more PI and co-PIs or a PI, co-PI and Senior Personnel will be considered. Collaborative Proposals with fewer PI/co-PIs/Senior Personnel are not permitted and will be returned without review.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
 - Full Proposals submitted via FastLane: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - Full Proposals submitted via Research.gov: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:**

Not Applicable
- **Other Budgetary Limitations:**

Not Applicable

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):
 - July 28, 2021
 - April 22, 2022

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements:

Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

In FY2018 and FY2019, NSF published Dear Colleague Letters (DCLs) requesting cross-disciplinary research proposals to address the rising threat from supply networks that illegally traffic in everything from people to natural resources to drugs. The response to these DCLs, and subsequent solicitation NSF 20-561, and the resulting portfolio of awards highlighted the scale and complexity of the challenge as well as the need to strengthen connections between the engineering, computer and information science, and social science research communities to address it. Illicitly sourced goods and services, fueled by the same global forces and technologies that have amplified global trade over the last decades, are now estimated to account for \$2 trillion in annual revenues. Profits from these illegal activities are used to support regional conflicts, exploit vulnerable populations, and destroy the environment.

It is important to keep in mind that the underlying reason for illicit trade is profit, but it also comes at great human cost. In the US, the rise of illicitly manufactured but easily available synthetic opioids has helped fuel a devastating and lethal epidemic that has resulted in hundreds of thousands of premature overdose deaths in the last decade, as well as unimaginable violence to protect the criminal enterprise. Counterfeit and pirated goods, including pharmaceuticals, safety-critical industrial components, and arms account for annual revenues of \$900 billion - \$1 trillion.

One of the most egregious forms of illicit trade involves modern slavery, including trafficking in persons for purposes of sexual exploitation and the use of forced labor and child labor for production of both illicit goods as well as agricultural, mined, and manufactured products that enter legitimate commercial supply chains. The most recent estimates indicate that 25 million people are trapped in forced labor and 152 million children are engaged in child labor. Forced labor is also widely implicated in the illicit trade in natural resources, including wildlife poaching, illegal logging, and trafficking in minerals and other commodities. [U.S. Department of Labor reporting](#) highlights widespread use of child labor or forced labor in the production of more than 150 goods in more than 70 countries. The Department's reporting also identifies the use of forced child labor in the production of 34 products from 25 countries, as well as provides details on the prevalence and sectoral distribution of child labor in more than 130 trade beneficiary countries.

Illicit trafficking is a multi-faceted problem and its disruption requires multi-faceted approaches. Illicit traffickers are nimble and resilient, make great use of current and emerging technology to evade detection, and exploit gaps in regulation and oversight between states. *Traffickers do not segment themselves to specific commodities but rather respond to market opportunities.* Through this solicitation, NSF aims to mobilize the research communities in engineering, computer and information science, and social sciences to study the dynamics and operations of these illicit networks in order to enhance our ability to respond to this threat. *NSF believes that while knowledge of individual trafficking domains, such as drugs, labor, wildlife, or materials, is critical to understanding the dynamics and operations of these criminal enterprises, a domain-agnostic approach that acknowledges the flexibility of these networks to operate across commodity areas is required to inform an effective response.*

II. PROGRAM DESCRIPTION

This solicitation supports fundamental research to enable transformative change in our ability to detect, disrupt and disable illicit supply networks that traffic in persons, and tangible and virtual goods. These transformations will require well-coordinated, multi-disciplinary approaches that complement long-standing law-enforcement, victim-centric and trafficking domain-focused research efforts with fundamental, innovative, and high-risk research that draws from multiple domains of engineering, computer and information science, and the social, behavioral and economic sciences. Trafficking networks comprise complex, interconnected collections of entities, sometimes under centralized control but with decentralized information sharing. Research proposals should take a holistic, system-focused approach to understanding the operations and dynamics of illicit supply networks, including such issues as mapping illicit supply chains, characterizing their elements and their use of communications, transportation, financial infrastructures; understanding geospatial data patterns and networks of transactions that provide actionable insight into their activity; understanding how illicit production co-mingles with legal production in commercial supply chains and the underlying value chain that creates wealth through illicit activities; and how individuals are incentivized and/or exploited to participate in these activities.

Major goals of NSF's D-ISN include:

- *Improve understanding of the operations of illicit supply networks and strengthen the ability to detect, disrupt, and dismantle them.*
- *Catalyze game-changing technological innovations that can improve discovery and traceability of illicitly sourced products and illicitly sourced labor inputs to products.*
- *Support research on the illicit supply networks that fuel the national opioid epidemic.*
- *Enhance research communities that effectively integrate operational, computational, social, cultural and economic expertise to provide methods and strategies to combat this complex and elusive global security challenge.*
- *Provide research outcomes that inform U.S. national security, law enforcement and economic development needs and policies.*

This solicitation is for a two-year program to support the research needed to inform the economy, security, and resilience of the Nation and the world in responding to the global threat posed by illicit supply networks. The solicitation calls for fundamental research across engineering, computer and information science, and social sciences. Research proposals should address at least one or more of the five focus domain areas listed below.

D-ISN will support far-reaching, creative proposals for fundamental research that take convergent approaches to scientific, engineering and computational challenges related to disrupting operations of illicit supply networks. Proposals from teams of three or more PI and co-PIs or a PI, co-PI and Senior Personnel will be considered. Proposals with fewer PI/co-PIs/Senior Personnel are not permitted and will be returned without review. Project teams must demonstrate a systems-focus with clear evidence of appropriate expertise within the investigative team. Successful projects will include expertise in the trafficking domain and in at least two, and preferably three, of the fields of engineering, computer and information science, and social science. In addition, teams with access to

relevant data sources, through partnerships with existing governmental agencies, non-governmental organizations, multilateral organizations, law enforcement entities, and private companies are particularly encouraged.

The project must demonstrate domain knowledge in at least one, and preferably more than one, of the following five domain focus areas:

- Human trafficking, including sex and labor trafficking, and specific agricultural, manufacturing and other supply chains known to use labor exploitation.
- Illicit drug trafficking, especially natural and synthetic opioids.
- Natural resources trafficking, including wildlife, minerals, fishing, logging.
- Counterfeit and pirated goods trafficking, including falsified pharmaceuticals and safety-critical products.
- Trafficking in virtual products, e.g. credit cards, online identities.

Of particular interest is research that addresses connections between these domains, for example, in understanding the intersectionality between forced labor and illegal fishing, wildlife trafficking and drug trafficking, and the contributions of exploited adult and child labor entering global commercial supply chains.

Educational activities that involve graduate and undergraduate students in this line of inquiry, and expose them to multi-disciplinary research activities, are of particular interest since these will help build a research community capable of addressing complex societal challenges for the future. Research teams are strongly encouraged to include components that integrate research and educational activities to advance engineering and scientific leadership in this space.

III. AWARD INFORMATION

This solicitation will consider proposals for Research Grants with a budget of up to \$1,000,000 and a maximum duration of 4 years (\$250,000 per year).

Project durations and budgets must be commensurate with the scope of the work proposed, and with guidance provided elsewhere in this solicitation regarding anticipated program resources. NSF anticipates a portfolio of awards with a range of budgets and durations up to these maxima, with average budgets of \$250,000 per year.

Estimated program budget, number of awards, and average award size/duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

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Principal Investigators (PI) from academic organizations must be at the faculty level, tenured or tenure-track, as determined by the submitting organization. If the proposal is submitted by a non-profit, non-academic organization, the lead PI must meet all of the following requirements: (1) the PI has a continuing appointment that is expected to last for the duration of a D-ISN grant; (2) the appointment has substantial research responsibilities; and (3) the proposed project is related to the PI's job responsibilities as well as to the mission of the department or organization. In addition, a minimum of two collaborating Senior Personnel (e.g. co-PIs, Collaborating PIs) must participate. At least one member of the project team (PI or co-PI) must have a full-time, tenured or tenure-track faculty appointment within a College/Department of Engineering.

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There are no restrictions or limits.

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V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via FastLane, Research.gov, or Grants.gov.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full Proposals submitted via Research.gov: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal and Award Policies and Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov*. The complete text of the *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via FastLane or Research.gov. PAPPG Chapter II.D.3 provides additional information on collaborative proposals.

See PAPPG Chapter II.C.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

The following information SUPPLEMENTS (not replaces) the guidelines provided in the NSF Proposal & Award Policies & Policies and Procedures Guide (PAPPG) and the Grants.gov Application Guide..

Proposal Title: The title of the proposal must begin with D-ISN, followed by a colon, then the title of the project (i.e., **D-ISN: Title**). If you submit a proposal as part of a set of collaborative proposals, the title of the proposal should begin with Collaborative Research followed by a colon, then D-ISN followed by a colon, and the title. For example, if you are submitting a collaborative set of proposals, then the title of each would be **Collaborative Research: D-ISN: Title**.

Proposals from PIs in institutions that have Research in Undergraduate Institutions (RUI) eligibility should have a proposal title that begins with Collaborative Research (if applicable) followed by a colon, then D-ISN followed by a colon, then RUI followed by a colon, and then the title, for example, **Collaborative Research: D-ISN: RUI: Title**.

Personnel Listed on the Cover Sheet: Provide complete information requested on the cover sheet for the PI and up to four Co-PIs.

Project Summary (1 page limit): At the beginning of the Overview section of the Project Summary enter the title of the D-ISN project, the name of the PI and the lead institution. Provide a summary description of the D-ISN project, including its transformative research and education goals, and the community (communities) that will be impacted by its results.

Project Description: There is a 15 page limit for all proposals. Within the project description, include a plan to evaluate the technologies developed, which could include results from applications of that technology to specific domains, efficacy studies, assessments of learning and engagement, and other such activities. The Evaluation Plan should be appropriate for the size and scope of the project.

In addition to the requirements of the PAPPG, the Project Description must fully describe the relevance of the project to the goals of NSF's D-ISN Solicitation and must frame the proposed research in terms of the potential contribution.

Please note that a Collaboration Plan must be submitted as a Supplementary Document for this solicitation; see guidance below.

Proposal Budget: It is expected that at least one of the PIs or co-PIs from each participating institution of a funded project will attend a D-ISN meeting held annually to present project research findings and/or capacity-building or community outreach activities. Requested budgets should include funds for travel to this annual event. For budget preparation purposes, PIs should assume these meetings will be held annually in the Washington, D.C. area.

Supplementary Documents: Supplementary documents are limited to the specific types of documents listed in the PAPPG, with the following exception:

- **Collaboration Plan:** Proposals must include a Collaboration Plan. The Collaboration Plan must be submitted as a supplementary document and cannot exceed two pages. Proposals that do not include a properly-labeled and complete Collaboration Plan will be returned without review. The Collaboration Plan must be labeled "Collaboration Plan" and must include: 1) the specific roles of the collaborating PIs, co-PIs, other Senior Personnel and paid consultants at all organizations involved; 2) how the project will be managed across institutions and disciplines; 3) identification of the specific collaboration mechanisms that will enable cross-institution and/or cross-discipline scientific integration (e.g., workshops, graduate student exchange, project meetings at conferences, use of videoconferencing and other communication tools, data and software repositories, etc.); and 4) specific references to the budget line items that support these collaboration mechanisms. **Information must also be provided on which specific member(s) of the research team will be responsible for the execution of the tasks described in the collaboration plan.**
- **Letters of Collaboration:** There are two types of collaboration, one involving individuals/organizations that are included in the budget, and the other involving individuals/organizations that are not included in the budget. Collaborations that are included in the budget should be described in the Project Description. Any substantial collaboration with individuals/organizations not included in the budget should be described in the Facilities, Equipment and Other Resources section of the proposal (see PAPPG Chapter II.C.2.i). In either case, whether or not the collaborator is included in the budget, a letter of collaboration from each named participating organization other than the submitting lead, non-lead, and/or subawardee institutions should be provided at the time of submission of the proposal. Such letters simply confirm the commitment to collaborate, as illustrated in the recommended format provided

in the PAPPG. They must explicitly state the nature of the collaboration, appear on the organization's letterhead and be signed by the appropriate organizational representative. These letters must not otherwise deviate from the restrictions and requirements set forth in the PAPPG, Chapter II.C.2.j.

Please note that letters of support may not be submitted. Such letters do not document collaborative arrangements of significance to the project, but primarily convey a sense of enthusiasm for the project and/or highlight the qualifications of the PI or co-PIs. Reviewers will be instructed not to consider these letters of support in reviewing the merits of the proposal.

- **Data Management Plan:** All proposals must include a supplementary document of no more than two pages in length labeled "Data Management Plan". This supplementary document should describe how the proposal will conform to NSF policy on the dissemination and sharing of research results (see Chapter II.C.2.j of the PAPPG for full policy implementation.) For additional information on NSF's policy on the dissemination and sharing of research results, see: <https://www.nsf.gov/bfa/dias/policy/dmp.jsp>.

For specific guidance on Data Management Plans submitted to the NSF/ENG directorate see: https://nsf.gov/eng/general/ENG_DMP_Policy.pdf

D-ISN Proposal Preparation Checklist:

The following checklist is provided as a reminder of the items that should be verified before submitting a proposal to this solicitation. These are a summary of the requirements described above and in the PAPPG. For the items marked with (RWR), the proposal will be returned without review if the required item is noncompliant at the submission deadline.

- (RWR) Project must include at least 3 team members: a PI and co-PIs; or a PI, co-PI and Senior Personnel.
- (RWR) A two-page Collaboration Plan must be included as a Supplementary Document.
- Letters of Collaboration are permitted as Supplementary Documents.
- Within the Project Description, a section labeled Evaluation Plan that details how the project will be evaluated.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

C. Due Dates

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

July 28, 2021

April 22, 2022

D. FastLane/Research.gov/Grants.gov Requirements

For Proposals Submitted Via FastLane or Research.gov:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For FastLane or Research.gov user support, call the FastLane and Research.gov Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov or rgov@nsf.gov. The FastLane and Research.gov Help Desk answers general technical questions related to the use of the FastLane and Research.gov systems. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: <https://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

Proposers that submitted via FastLane or Research.gov may use Research.gov to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 – 2022*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.C.2.d(i) contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.C.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
 - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and other underrepresented groups in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

In addition to NSB-approved merit review criteria, reviewers will be asked to consider the following questions:

- **Team:** To what extent does the team of investigators comprise a multidisciplinary group of scientists and engineers, appropriate to the project? Have the team members been selected to provide distinct, complementary expertise to the project? Are all fields of expertise needed to complete the proposed work represented on the team?
- **Responsiveness:** To what degree would the proposed work address a question or questions at the intersection of the operational environment, technological/computational approaches, and social systems? Does the proposed research effectively integrate diverse fields (e.g. engineering, computer and information science, and social sciences) to explore and understand the structure and operations of illicit supply networks with a view to their disruption? To what degree has the project team demonstrated that personnel have expertise in at least one of the five domain focus areas?

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

Special Award Conditions:

D-ISN Grantees' Meetings

To accelerate the rate of dissemination of ideas among researchers, to build an intellectual research core to address challenges of illicit supply networks, and to enable enhanced research collaborations, the D-ISN program plans to host annual principal investigator (PI/co-PI) meetings with participation from all funded projects and other representatives from academia, industry, government, and community organizations. PIs must participate in these PI/co-PI meetings throughout the duration of the award. For multi-institution projects, investigators from each collaborating institution are expected to participate. A substitute project representative may be designated to attend a PI/co-PI meeting, but only with prior approval from an NSF Program Officer. As noted in "Budget Preparation Instructions," budgets for all projects should include funding for one or more designated D-ISN project representatives (PI/co-PI, senior personnel or NSF-approved replacement) to attend each D-ISN PI/co-PI meeting during the proposed lifetime of the award. It is envisioned that D-ISN PI meetings will be held virtually through at least March 2022.

Acknowledgement of Support

Grantees will be required to include appropriate acknowledgment of NSF support under Disrupting Operations of Illicit Supply Networks in any publication (including World Wide Web pages) of any material based on or developed under the project, in the following terms:

"This material is based upon work supported by the National Science Foundation Disrupting Operations of Illicit Supply Networks under Grant No. (Grantee enters NSF grant number.)"

Grantees also will be required to orally acknowledge NSF support using the language specified above during all news media interviews, including popular media such as radio, television, and news magazines.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

Special Reporting Requirements:

Data Management Policy. Proposals submitted under this solicitation are required to include a Data Management Plan as detailed in Section V.A of this solicitation. Principal Investigators are required to provide updates on the status of metadata and data archival in annual project reports. Compliance with the project Data Management Plan must be documented in the final project report. URLs for archived metadata and data should be included in these reports in the section entitled "Products." Archiving of data and metadata, and execution of the Data Management Plan, must be completed prior to the submission of the final project report. Final project report approval is contingent upon successful data and metadata archiving and execution of the Data Management Plan.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Georgia-Ann Klutke, ENG/CMMI, telephone: (703) 292-2443, email: gaklutke@nsf.gov
- Yueyue Fan, ENG/CMMI, telephone: (703) 292-4453, email: yfan@nsf.gov
- Bruce Hamilton, ENG/CBET, telephone: (703) 292-7066, email: bhamilto@nsf.gov
- Mark S. Hurwitz, SBE/SES, telephone: (703) 292-5366, email: mhurwitz@nsf.gov
- Jeffrey W. Mantz, SBE/BCS, telephone: (703) 292-7783, email: jmantz@nsf.gov
- Wendy Nilsen, CISE/IIS, telephone: (703) 292-2568, email: wnilsen@nsf.gov
- Reggie S. Sheehan, SBE/SES, telephone: (703) 292-5389, email: rsheehan@nsf.gov

For questions related to the use of FastLane or Research.gov, contact:

- FastLane and Research.gov Help Desk: 1-800-673-6188
- FastLane Help Desk e-mail: fastlane@nsf.gov.
- Research.gov Help Desk e-mail: rgov@nsf.gov

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF [Grants Conferences](#). Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on [NSF's website](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at <https://www.grants.gov>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <https://www.nsf.gov>

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314

- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-8134
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See [System of Record Notices](#), NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposal File and Associated Records." Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
 Reports Clearance Officer
 Policy Office, Division of Institution and Award Support
 Office of Budget, Finance, and Award Management
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