

## Frequently Asked Questions (FAQs) for Materials Innovation Platforms (MIP)

### GENERAL

#### 1: What is the MIP Program?

Materials Innovation Platforms (MIP) is a mid-scale infrastructure program in the Division of Materials Research (DMR) designed to accelerate advances in materials research. MIPs respond to the increasing complexity of materials research that requires close collaboration of interdisciplinary and transdisciplinary teams and access to cutting edge tools. These tools, in a user facility, benefit both a user program and in-house research. The in-house research scientists, facility users, and other contributors form a scientific ecosystem and share tools, codes, samples, data, and know-how in order to strengthen collaboration among the scientists and enable them to work together in a new modality.

#### 2: What are the major activities of a MIP?

The major activities of a MIP include:

- Develop next-generation experimental and computational tools, as well as advancing the capabilities of the current state-of-the-art tools;
- Conduct in-house research by a transdisciplinary team in a focused topic designed to address a grand challenge of fundamental science and meet a national need;
- Operate a user facility that provides unique materials research tools, samples, data, and technical services open to a diverse community of external researchers at various institutions; and
- Serve as an educational focal point for training the next generation of tool developers and users.

#### 3: What is the focus of the MIP competition in 2019?

The second MIP competition, in 2019, focuses on the convergence of materials research with biological sciences for developing new materials.

### ELIGIBILITY

#### 4: Is there a limit on the number of MIP proposals that can be submitted from an institution?

Yes. Only one MIP proposal may be submitted from an institution as the lead institution.

The two institutions that were awarded a MIP in the 2015 competition as the lead institution are not eligible to submit a MIP proposal as a lead institution in the 2019 competition.

#### 5: May a scientist be involved in more than one MIP proposal?

No. Individuals may appear as Senior Personnel (Principal Investigator/Project Director, co-PI, and other faculty or equivalent with biographical sketches included in the proposal) on only one MIP proposal. All Senior Personnel must:

- Be listed at the beginning of the Project Description;

- Provide their 2-page Biographical Sketches;
- Provide their Current and Pending Support;
- Provide their Collaborators and Other Affiliations (COA) Information as a Single Copy Document; and
- Be included in an Excel file emailed to [mip@nsf.gov](mailto:mip@nsf.gov) within one business day after the proposal submission.

**6: Can a scientist who submitted a proposal to a Topical Materials Research Program (TMRP, see [NSF 17-580](#), [NSF 18-500](#), and [NSF 19-515](#)) in fall 2018 or later be a Senior Personnel of a MIP proposal?**

Yes.

**7: Can a scientist who submitted a proposal to the Designing Materials to Revolutionize and Engineer our Future (DMREF) program ([NSF 19-516](#)) between January 28 and February 4, 2019 be a Senior Personnel of a MIP proposal?**

Yes.

## TEAM

**8: Is there a limit on the number of Senior Personnel?**

A team of at least three Senior Personnel with complementary expertise in materials synthesis/processing, materials characterization, theory/modeling/simulation is required. The whole MIP team also includes Senior Personnel and technical staff with expertise in tool development, data, user facility operation, and other activities proposed by a MIP. Most of the proposals in the first MIP competition had 8-17 Senior Personnel. A proposal with a much larger group of Senior Personnel will have to articulate the efficacy of the arrangement.

**9: Is there a suggestion for the number of co-PIs listed on the Cover Sheet?**

For a MIP proposal, the Cover Sheet should list the proposed MIP Director as the PI. One or two co-PIs, who will be in key MIP leadership positions and can represent the MIP Director if s/he is absent (e.g., on travel), are suggested.

**10: Can a team be comprised of Senior Personnel from multiple institutions?**

Yes, but consider the following: The in-house research of a MIP is expected to be conducted in an iterative, tight-knit and closed-loop manner. In addition, the external users should have access to the expertise and resources of the MIP for synthesis/processing, characterization, theory/modeling/simulation, etc. A proposal with Senior Personnel at multiple institutions will need to articulate mechanisms to prevent the negative impact of distance on the in-house research and/or user facility operation. A subaward institution is not required to participate in both the in-house research and user facility operation.

**11: Can a team submit a MIP proposal as a collaborative proposal from multiple organizations?**

No, submission of a collaborative MIP proposal from multiple organizations is not allowed. Only the single proposal method, submitted by the lead institution with subawards to other institutions if any, can be used.

## **PLATFORM/KNOWLEDGE SHARING**

### **12: Is knowledge sharing limited to users plus scientists participating in the in-house research?**

No. A MIP is required to share knowledge among a community of practitioners, including in-house research scientists, users, and other contributors, in order to accelerate materials discovery and development and to increase its impacts. Different mechanisms and/or timelines could apply for knowledge sharing within the in-house research team; among users; and for the whole community of practitioners, providing an environment where knowledge is shared and at the same time competitors would not be afraid of divulging their best ideas when using MIP facilities.

### **13: To whom do the samples and synthesis recipes developed at a MIP belong?**

MIPs are designed to strengthen collaboration among scientists and enable them to work together in a new modality through sharing knowledge, including tools, codes, samples, data, and know-how. While a researcher can keep the specific samples produced at a MIP facility, the optimized recipe will normally become available to others for use after a finite period of time (e.g., one year) to allow for publication. Samples and recipes for proprietary research can be kept confidential by paying the full recovery costs.

### **14: Are data generated using a MIP facility mine?**

The data generated through the use of a MIP facility will normally become available to others for use after a finite period of time (e.g., one year) to allow for publication. The data for proprietary research can be kept confidential by paying the full recovery costs.

### **15: What is the relationship between knowledge sharing and data management?**

MIP creates and nurtures a scientific ecosystem that shares tools, codes, samples, data (including meta-data) and know-how. In other words, knowledge sharing activities of a MIP go beyond data management. Data management and sharing is a vital component of MIP's knowledge sharing activities.

The Data Management Plan (2 pages) should be used to provide additional details for data storage, access, sharing, etc. It should not simply duplicate content in the Platform/Knowledge Sharing section (5 pages) of the Project Description.

### **16: Can you provide additional details on the expectations for data management with respect to capturing metadata as well as data curation and sharing?**

The MIP Program does not recommend a single data management, sharing, or archiving approach; individual projects should develop/utilize specific approach that suits its needs.

[Chapter II.C.2.j](#) of NSF Proposal and Award Policies and Procedures Guide (PAPPG) provides information for data management and sharing. Below are some additional ideas for how one might approach addressing data management and sharing. Additionally, there are resources available online that give examples of practical science-data management (e.g., [Data Carpentry](#) and [DataONE](#)).

*Data Format.* Describe the format and media in which the data (including metadata and annotations) are stored. This should include details such as laboratory notebook records, instrument outputs, file formats, etc. When data are stored in formats not widely accessible, explain how the data can be converted to a more accessible format or otherwise be made available to interested parties.

*Access to Data, plus Data Sharing Practices and Policies.* “Access to data” refers to data made accessible without an explicit request from an interested party. Describe your plans for providing general access to data, including websites maintained by MIP and/or direct contributions to appropriate public databases or software repositories (e.g., [Github](#) and [Materials Project](#)). For software or code developed as part of the project, include a description of how users can access the code (e.g., licensing, open source, etc.). Also describe practices or policies regarding the release of data for access.

“Data sharing” refers to the release of data in response to a specific request from an interested party. Describe your policies for data sharing including, where applicable, provisions for protection of privacy, confidentiality, intellectual property, national security, or other rights or requirements. The discussion might include the NSF’s Public Access Policy.

*Policies for Re-Use, Re-Distribution, and Production of Derivatives.* Describe your policies regarding the use of data provided via general access or sharing. Practices for appropriate protection of privacy, confidentiality, security, intellectual property, and other rights should be communicated. Consider defining the rights and obligations of those who access, use, and share your data.

*Archiving of Data.* Describe plans for archiving data, as well as samples and other research products as appropriate. What are the physical and cyber resources and facilities that will be used for data preservation and storage? How long will the data be maintained after the award ends?

**17: What data management resources are available to help with data curation and sharing?**

There are resources available to scientists to aid in planning and implementing data management. University libraries and professional societies can be resources. Numerous non-governmental organizations offer resources and training in data management (e.g., [DataONE](#), [DMPTool](#), [LTER Intranet](#), and [Software Carpentry](#)); these can be quite helpful. If you are unsure where to deposit your data, [NIST Materials Resource Registry](#) and [re3data.org](#) have online

registries of research-data repositories. Please note that inclusion of a resource in this document is not intended as an endorsement by the NSF.

**18: What is the expectation for the use of artificial intelligence, machine learning and other data tools? What resources are available to help?**

Each MIP requires a transdisciplinary team and is encouraged to use artificial intelligence, machine learning, and/or other data tools, as appropriate, for in-house research and for supporting community efforts. Consider leveraging resources by looking at cyberinfrastructure funded by NSF and others. Opportunities for collaborations might develop by examining recent NSF awards of, for example, Cyberinfrastructure for Sustained Scientific Innovation ([CSSI](#)) and Partnerships between Science and Engineering Fields and the NSF TRIPODS Institutes ([TRIPODS+X](#)).

**19: What types of outreach activities are encouraged?**

A MIP should propose a limited number of outreach activities, focusing on reaching potential users as well as user training. Activities may include, but are not limited to webinars, workshops, and/or summer/winter schools. The use of cyber tools and social media is also encouraged.

## **RESEARCH**

**20: What is the appropriate scope of research?**

The MIP must focus on a grand challenge or challenges of fundamental research and align with national priorities. See the reports and documents referenced in the MIP solicitation and [MIP web site](#). The scope of in-house research should be well focused, smaller than the scope covered by the whole MIP, and synergistic to the user program.

**21: Since MIP focuses on a grand challenge and addresses a national priority, should proposals be device focused or engineering oriented?**

No. The MIP program supports fundamental research, which will lead to new technologies in the future.

**22: Can a MIP proposal include Senior Personnel only from one or two academic departments?**

It is expected that many grand challenges will not be overcome by one discipline alone and must be addressed through a transdisciplinary approach that utilizes expertise in materials science, physics, chemistry, engineering, biology, mathematics, and computer science. A specific MIP proposal may only need a subset of expertise listed above, or additional ones. It should also be noted that the emphasis here is expertise, not necessarily academic department affiliation.

**23: Could you please explain the closed -loop requirement?**

MIPs are driven by the Materials Genome Initiative (MGI) approach with materials synthesis/processing, materials characterization, and theory/modeling/simulation applied to targeted outcomes. The proposed activities must close-the-loop, i.e., be a collaborative and iterative process wherein, for example, theory guides computational simulation, computational simulation guides experiments, and experiments further inform theory. It should be noted that the loop can be entered from any point, not just from theory, and can be bidirectional (e.g., experimental results improve simulation). The interactive, closed-loop process is required for in-house research and is expected for the user program as a whole, but not required for individual user projects.

**24: Is the second MIP competition limited to biomaterials?**

No. The second MIP competition, in 2019, focuses on the convergence of materials research with biological sciences for developing new materials. The competition includes, but is not limited to, biomaterials.

**25: Is the second MIP competition limited to soft materials?**

No.

**26: Can research be proposed in multiple material classes or systems?**

Yes, provided that the proposal articulates a compelling cross-cutting intellectual theme that bridges multiple materials systems under the vision of the proposed MIP.

**27: Can research be proposed in a single material system?**

Yes, provided that the proposal articulates a compelling case that the MIP scope is not overly narrow.

## **TOOLS**

**28: Are tools for materials synthesis/processing more important than tools for materials characterization or modeling/simulation?**

In general, materials synthesis/processing, materials characterization and theory/modeling/simulation are equally important. Because, "synthesis has seen the least progress in the US in the last two decades," as stated in the [Closing the Loop: Materials Instrumentation](#) report, supporting tools for materials synthesis/processing is of high priority for the MIP Program.

**29: Can one propose a MIP only with materials synthesis/processing tools?**

No. A MIP uses the MGI approach and needs tools for materials synthesis/processing, materials characterization, and modeling/simulation. A proposal may propose acquisition and development of new MIP tools, as well as utilizing existing ones.

**30: Can one propose a MIP only with materials characterization tools, or only with computation/simulation tools?**

No.

**31: Can the MIP funding be used to develop some tools that require 4 years of development time?**

Yes, provided that most of the tools needed for the user program and in-house research will be up and running in about two years. Proposers may also consider other funding mechanisms such as the Major Research Instrumentation ([MRI](#)), Mid-scale Research Infrastructure-1 ([Mid-scale RI-1](#)), and Mid-scale Research Infrastructure-2 ([Mid-scale RI-2](#)).

**32: Should a MIP proposal be limited only to tools with unique capabilities?**

No. While supporting instruments with unique capabilities is a high priority for the MIP Program, all major instruments needed for research should be included in a MIP proposal. A proposal may propose acquisition and development of new MIP instruments, as well as utilizing existing ones.

**33: The NSF's MRI Program is for instrument acquisition and development typically above \$100K. Can a MIP proposal request an instrument below \$100K, or above \$100K?**

Yes, a proposal may request instruments below and/or above \$100K. Proposers are encouraged to maximize the impacts of the MIP funding by placing a high priority for the needs in the materials research tools not met through MRI or other funding mechanisms. Proposers that need substantial cyberinfrastructure development may consider competing for funds through various opportunities of the NSF's Harnessing the Data Revolution Big Idea, such as Cyberinfrastructure for Sustained Scientific Innovation ([CSSI](#)).

Proposers are especially encouraged to use the MIP funding for development and acquisition of instruments that are unique in the world or in the United States.

## **USER FACILITY**

**34: Does each user proposal need to be closed loop?**

While it is expected that the user projects, collectively, will enable the whole community of practitioners towards closing the loop, an individual user project is not required to have an interactive, closed-loop process for materials synthesis/processing, materials characterization, and theory/modeling/simulation.

**35: How are external users defined?**

The external users are those who are neither MIP participants nor affiliated with the institution(s) where MIP user facilities are located.

**36: How are internal users defined?**

The internal users are those who are affiliated with the institution(s) where MIP user facilities are located, but not participating in in-house research funded by MIP.

**37: Can the MIP funding be used mainly for in-house research and internal users?**

No. Approximately 50% of the MIP funds provided by NSF, after subtracting instrument acquisition and development costs, should be devoted to the user facility operation. If the MIP annual budget is X and its instrument acquisition/development budget is Y, the user facility operation should have a budget of approximately  $0.5(X-Y)$  when the user facility operation reaches a steady state. In the first few years, the user facility operation budget may be lower than  $0.5(X-Y)$ .

Costs of user facility operation may include support of personnel who help users and maintain MIP tools, materials and supplies, a reasonable amount of user fees for using non-MIP tools, etc.

**38: Can the major equipment acquired through the MIP funding be used mainly for in-house research and by users within the awardee institution?**

No. Major equipment purchased and developed through the MIP funding must devote at least 50% of the instrument operational time to external users; in-house research and internal users use no more than 50%. The instrument operational time is the time available for scientific research and does not include the time needed for commissioning, maintenance, and repair. This 50% rule does not apply to the existing facilities, nor instruments acquired through other funding; the MIP Program does not set a minimum in these cases.

**39: If the use of MIP equipment is free, how do we respond to the Project Description section on user fee structure?**

MIPs may not charge academic users in the United States for reasonable time with experts, technicians, or use of equipment acquired through the MIP award. However, users may be charged for consumables and supplies, especially those that are expensive and not routine. In addition, user fees may be charged for using facilities already existing on campus prior to the MIP. Furthermore, full cost recovery is applied to proprietary research.

**40: Can user fees be charged for access to user facilities already existing on campus prior to the MIP?**

Yes.

**BUDGET**

**41: Does the requested budget need to be evenly distributed over 5 years?**

No. The requested budget should consider (i) the total award amount for each MIP: \$15M to \$25M over 5 years; (ii) the scope of the proposed activities; and (iii) annual variations of needs. Equipment acquisition and development is expected to be mainly in the first few years. User facility operation may ramp up over time and is expected to reach a steady state by year 4. These two items, plus in-house research, are typically the three activities with the highest budget. It should be emphasized that knowledge sharing (including data management and



sharing) is critically important for a MIP even though its budget may be lower than these three activities.

For most of the MIP proposals submitted in 2015, the budget request in each of the first two years was higher than that in each of the remaining three years, due to instrument acquisition and development costs.

**42: How much funding is available?**

Each MIP is awarded through a cooperative agreement, with funding provided one year at a time. DMR plans to have \$12M in Fiscal Year 2020 to fund 1-3 MIP awards.

**43: How many students are expected to be involved or funded?**

Supporting professional staff is important to ensure long-term stability of MIP staffing, especially for user facility operation. In addition, NSF will consider supporting a small number of students for in-house research and/or, often on a part-time basis, for tool development and for providing user support.

**44: Can one request NSF funding for laboratory renovation, or buying a fume hood?**

No. The MIP Program will not support requests for building/room renovation, supporting equipment (e.g., fume hoods, cryogen storage systems, general-purpose computational or data storage systems), and infrastructure related to the supply of power, ventilation, water or research gases. See the MIP solicitation for a full list. These exclusions are similar to those for the NSF Major Research Instrumentation ([MRI](#)) Program.

**45: Is cost sharing allowed for MIP proposals?**

No. Inclusion of voluntary committed cost sharing is prohibited. Line M on the proposal budget will not be available for use by the proposer.

**46: Where do we describe resources available for the project?**

In order to assess the scope of the project, all organizational resources necessary for the project must be discussed in the Project Description (especially the Tools and Management Plan sections). The Facilities, Equipment and Other Resources section may be used to further describe organizational resources pertaining to the proposed MIP. This description should be narrative in nature and must not include any quantifiable financial information. These resources are not financially auditable by NSF and should not be included in the proposal budget or budget justification.

**47. Is MIP eligible for post-award supplements (such as an REU supplement)?**

Supplements are typically used to support activities un-expected at the time of proposal submission and not possible to be carried out by re-budgeting. A MIP proposal should be written with no expectation of any supplements during the 5-year award period.

In deciding whether or not REU would be proposed in a MIP proposal, consider how REU would benefit users.

## **SINGLE COPY DOCUMENTS**

### **48: How many suggested reviewers are needed?**

Suggest at least 10 scientists who are well qualified to review the proposal and can cover major activities of the proposed MIP such as materials synthesis/processing, materials characterization, theory/modeling/simulation, instrument development, data, and user facility operation.

Reviewers from universities, national laboratories and industry, in and outside of the US, are welcome.

No scientists listed in Collaborators and Other Affiliations (COA) should be suggested as a reviewer.

## **SUPPLEMENTARY DOCUMENTS**

### **49: Are letters of collaboration allowed?**

If a proposal involves collaboration with scientists not at the lead institution, include only official letters of collaboration from participating organizations. Such letters should not contain endorsements or evaluation of the proposed project. Details about collaborative work to be done under this project should be included within the Project Description, not in the letter(s) of collaboration.

### **50: Are letters from anticipated users of the MIP user facility allowed?**

No.

### **51: Are letters of support allowed?**

No.

## **OTHERS**

### **52: Does a MIP proposal need to name potential users of its facility?**

No.

### **53: Does a MIP proposal need to name members of its external advisory committee?**

No.

### **54: What will be the major oversight activities by NSF after a MIP award is made?**

The major MIP oversight activities by NSF include monthly video conferences, annual site visits or reverse site visits, and annual reports. The overall length of MIP annual reports is comparable to that of MRSEC annual reports.

The General Programmatic Terms and Conditions (PTCs) for the inaugural class of MIPs can be found at [https://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=NSF15522TPTC000](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=NSF15522TPTC000). The General PTCs for the upcoming MIP awards will share many similarities.