

National Science Foundation
Regional Innovation Engines
(NSF Engines)
Broad Agency Announcement (BAA)

Catalyzing and accelerating innovation ecosystems across the United States to advance critical technologies, address societal and economic challenges, promote economic growth and job creation, and cultivate regional talent.

EXECUTIVE SUMMARY

Federal Awarding Agency Name	National Science Foundation
Funding Opportunity Title	NSF Regional Innovation Engines (NSF Engines)
Announcement Type	Broad Agency Announcement
Communications	For more information, including FAQs and other resources, please visit the NSF Engines program website . All queries related to the NSF Engines program should be sent to the following email address: engines@nsf.gov .
Submission Instructions	For submission of concept outlines, letters of intent, and full proposals in response to this BAA, please use the following link to access the NSF Submission Portal: https://baam.nsf.gov . For technical support, please contact the BAAM helpdesk at BAAMSupport@nsf.gov .
Funding Opportunity Description	The NSF Regional Innovation Engines (NSF Engines) program is a bold new initiative, committed to creating regional-scale, technology-driven innovation ecosystems throughout every region of the United States, accelerating emerging technologies, driving economic growth, addressing key societal challenges, and maintaining national competitiveness. The NSF Engines program aims to fund regional coalitions of partnering organizations to establish NSF Engines that will catalyze technology and science-based regional innovation ecosystems. Each Engine must focus on addressing specific aspects of a major societal and/or economic challenge that are of significant interest in the Engine’s defined “region of service,” where such a region could range from a metropolitan area (including its adjacent rural regions) to an area spanning parts of several states. The mission of an Engine

	<p>must be clearly rooted in regional interests and the development of regional talent. The emphasis on “regions” expresses NSF’s aim to stimulate innovation-driven economic growth within a particular region of service. The NSF Engines program is particularly interested in creating new business and economic growth in those regions of America that have not fully participated in the technology boom of the past several decades.</p> <p>NSF will fund Engines to carry out an integrated and comprehensive set of activities spanning use-inspired research, translation-to-practice, entrepreneurship, and workforce development to nurture and accelerate regional industries. Engines must also work to bring together an inclusive and diverse network of partners and stakeholders who will participate in the regional innovation ecosystem. With the goal of advancing emerging industries and creating societal and economic value, NSF Engines will emphasize research that meaningfully engages the consumers of research outcomes in motivating that research as well as in the subsequent prototyping and piloting of research-based solutions (i.e., co-design and co-creation), the translation of research results to practice, entrepreneurship, and direct economic growth.</p>
Award Information	<p>Under this BAA, The NSF Engines program is soliciting two different types of proposals: Type-1 and Type-2.</p> <p>Anticipated Award Type: All award Types will be Cooperative Agreements.</p> <p>Type-1 Awards</p> <ul style="list-style-type: none"> • Purpose: Type-1 awards are development awards intended to enable awardees to lay the groundwork for submitting a successful Type-2 proposal to launch a full-scale NSF Engine. Type-1 awardees will need to re-apply independently for a Type-2 award. However, receiving a Type-1 award is not a pre-requisite to apply for a Type-2 award. • Anticipated Number of Awards: The NSF Engines program anticipates making up to 50 Type-1 awards. The actual number of awards made will be dependent upon the quality of the proposals received and availability of funding. • Duration and Award Amount: The duration of a Type-1 award is up to 24 months and the maximum proposed budget for each Type-1 award must not exceed \$1,000,000. <p>Type-2 Awards</p> <ul style="list-style-type: none"> • Purpose: Type-2 awards are for regions and proposing teams that are prepared to launch an NSF Engine by the expected award date. Applicants are encouraged to review the BAA for guidance on determining the appropriate proposal type for your region. • Anticipated Number of Awards: The NSF Engines program anticipates making five Type-2 awards through this funding opportunity. The actual number of awards made will be dependent upon the quality of the proposals received and available funding. • Duration and Award Amount: Type-2 awards are up to \$160M over a period of up to 10 years, spanning distinct phases. <p>See the BAA for details on phase definitions and funding.</p>
Key Dates	<p>Before submitting a full proposal (Type-1 or Type-2), all proposers must submit a Concept Outline and a Letter-of-Intent (LOI). NSF will only review Full</p>

	<p>Proposals submitted by applicants whose Concept Outlines have been approved by NSF.</p> <p>DEADLINE DATES (by 5 p.m., submitter’s local time on the dates specified below). Failure to meet the established deadline date and time will result in the submission not being reviewed.</p> <p>Type-1 and Type-2 Concept Outlines: Due June 30, 2022</p> <p>Type-1 Letters of Intent: Due August 31, 2022</p> <p>Type-1 Full Proposals: Due September 29, 2022</p> <p>Type-2 Letters of Intent: Due December 15, 2022</p> <p>Type-2 Full Proposals: Due January 31, 2023</p>
Award Notification	<p>Subject to the availability of funding, successful applicants should expect to receive award notification approximately eight months following the Full Proposal Deadline set forth in this BAA.</p>
Eligible Applicants	<p>Full Proposals must be submitted by a single lead organization with any partner organizations listed as subawardees. Separately submitted collaborative proposals will not be accepted. [See the NSF Proposal and Award Policies and Procedures Guide (PAPPG) Chapter I.E for further information.]</p> <p>The following organizational types are eligible to submit proposals in response to this BAA:</p> <ul style="list-style-type: none"> • US-based non-profit, non-academic organizations; • US-based for-profit organizations; and • Institutions of Higher Education (IHEs) accredited in and having a campus located in the US (International Branch Campuses of US IHEs are not eligible to submit proposals under this BAA). <p>The following organizational types are eligible to receive NSF funds through subawards under this BAA:</p> <ul style="list-style-type: none"> • US-based non-profit, non-academic organizations; • US-based for-profit organizations; • Federally Funded Research and Development Centers; • National Laboratories; • State, Local, and Tribal governments, limited to agencies, offices, divisions, or other units specifically dedicated to innovation, economic and/or workforce development; and • Institutions of Higher Education (IHEs) accredited in and having a campus located in the US (International Branch campuses of US IHEs are not eligible to receive funds under this BAA). <p>The following are not eligible to serve as partners under this BAA:</p> <ul style="list-style-type: none"> • Any organization on the Department of Commerce’s Bureau of Industry and Security (BIS) Entity List; and • Unaffiliated individuals. <p>International partners are not permitted to be included as part of a proposal submitted to NSF pursuant to this BAA. After an award has been made, however, an international partner/collaborator may be added in accordance</p>

	with the procedures established in Section VII.A.2.3. No international partners may receive funding from NSF.
Informational Webinars and Proposer Day(s)	<p>The NSF Engines program will conduct multiple events to provide information to potential proposers on the objectives of this BAA and to promote teaming and coalition-building. Information on the dates, times, and registration will be posted on the program website below, when available.</p> <p>https://beta.nsf.gov/funding/initiatives/regional-innovation-engines</p>
Training Requirements	<p>The NSF Engines program will host several training activities focused on catalyzing and growing thriving regional-scale innovation ecosystems. The nature and frequency of training activities will vary based on award type (Type-1 or Type-2). Members of an Engine's leadership team must attend all required training activities. Training activities may include virtual and in-person events. Details on the expected time commitment and participation levels will be provided by NSF during the pre-award stage, after the completion of the merit review process.</p>
Post Award Evaluation and Assessment	<p>Beyond Year 1 of a Type-2 award, NSF will annually conduct a comprehensive assessment of the Engine's performance, which will inform subsequent-year funding. A determination by NSF that the Engine has failed to perform during the annual review may result in termination of the award.</p> <p>In addition, NSF will conduct phase-transition reviews involving NSF Program Directors and a Site Visit Team to assess the Engine's accomplishments and future tasks, with an emphasis on tangible outcomes, overall societal and economic impacts, and progress toward achieving long-term goals and milestones. A determination by NSF that the Engine has failed to perform during any phase-transition review may result in termination of the award.</p>

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Definitions and Key Terms

STEM	Science, Technology, Engineering, and Mathematics
Use-Inspired Research	Research that seeks to develop solutions to specific known challenges motivated by the needs of stakeholders.
Project Director	The individual named as the Project Director is the full-time Chief Executive Officer (CEO) of the Engine. Throughout the BAA, the terms Project Director and CEO are used interchangeably.
Leadership Team	The team that oversees the vision, strategy, and activities of the Engine (see Section II.C.2). This includes the full-time CEO and all personnel charged with leading core management functions.
Senior Personnel	An individual who serves on the Leadership Team of the Engine.
Core Partner	An entity that contributes and/or receives significant resources as part of the Engine activities.
IHE	An Institution of Higher Education
PAPPG	NSF Proposal and Award Policies and Procedures Guide (PAPPG)
Cooperative Agreement	See PAPPG, Introduction, Section D, for further information.

Point(s) of Contact

All communication relating to the NSF Engines program should be sent to the following email address:

- engines@nsf.gov

For questions related to the submission portal, contact:

- BAAMSupport@nsf.gov

[Sign up here](#) to receive updates on this funding opportunity.

I. Introduction

The National Challenge. Innovations in science and engineering have enabled the United States to become a world-leading economy, powered by a well-trained scientific and technical workforce. With advances across multiple areas of science and technology unleashing waves of innovation around the globe, the U.S. is now facing competition from many countries for talent and leadership in science, engineering, technology, and education, with major implications for economic and industrial competitiveness as well as national security. To ensure the U.S. remains in the vanguard of competitiveness, the U.S. must rapidly expand its innovation capacity by leveraging the resources, creativity, and ingenuity of every region of the country. Presently, thriving innovation activity within the U.S. tends to be highly concentrated in only a few geographic regions of the country. While this has yielded significant economic and societal benefits, the U.S. must

take full advantage of the innovation potential and talent across the Nation and enable new regions to become flourishing ecosystems of R&D-based economic growth.

Innovative ideas, highly-funded research activities, and new inventions alone are not enough to yield the type of outcomes and societal impacts at the speed and scale necessary to enhance global competitiveness and leadership. Regions with thriving innovation activity are functioning systems, characterized by trusted knowledge-sharing, resource expansion, intentional workforce development, continuous and growing capital inflow, and multi-stakeholder partnerships involving government, universities, industry, entrepreneurs, and venture capitalists. These systems have become known as *regional innovation ecosystems* and include not only these elements, but also strategic plans and legal frameworks that incentivize partnership networks among stakeholders, spurring value-driven innovations.

NSF's Unique Role. As part of its mission, NSF plays a pivotal role in driving the Nation's progress across the spectrum from discovery to innovation. Many of the technologies and industries that are the focus of national conversations around competitiveness today, including artificial intelligence (AI), advanced manufacturing, advanced wireless, biotechnology, and quantum information science (QIS), are rooted in sustained NSF support for research at the frontiers of science and engineering over many decades. Moreover, NSF has a proven track record of advancing research outcomes to commercialization, while successfully bridging the interests of academia, government, commercial industry, startups, and small businesses. For example, NSF established the first Small Business Innovation Research (SBIR) program in 1977; today, this program, known as America's Seed Fund™, has been adopted across the Federal Government. Likewise, NSF pioneered the Innovation Corps (I-Corps™) program in 2011; over the last decade, the program has been adopted by other federal agencies as well as state governments. In addition, NSF has been a strong advocate of addressing research-investment gaps across regions, institution types and demographics underrepresented in STEM, for example, through the Established Program to Stimulate Competitiveness in Research (EPSCoR) and NSF INCLUDES program.

Most recently, NSF has established the Directorate for Technology, Innovation and Partnerships (TIP), whose mission is to advance emerging technologies, address critical societal and economic challenges, strengthen and scale pathways to translate discoveries to the market and society, and tap into the Nation's broad, diverse talent pool providing opportunities for anyone, anywhere interested in engaging in the innovation ecosystem. The ***NSF Regional Innovation Engines (NSF Engines) program*** will serve as a flagship funding program of the TIP directorate, with the goal of expanding and accelerating scientific and technological innovation within the U.S. by catalyzing regional innovation ecosystems throughout every region of our Nation.

II. NSF Engines Program Description

A. Mission, Scope, and Objectives

The NSF Engines program represents a bold new initiative to significantly expand our Nation's innovation capacity in key areas of national interest by establishing Engines designed to seed, scale, and sustain new and thriving innovation ecosystems throughout every region of the U.S.

Each Engine is expected to produce measurable societal impacts and to produce a range of tangible outcomes that span economic, technological, educational, and workforce dimensions through intentional partnerships and engagement of diverse stakeholders across regional, and where applicable, national levels. Each Engine must demonstrate a strong commitment to diversity along several dimensions (e.g., perspectives, gender, types of organizations), equity,

inclusion, and accessibility in intent, actions, and outcomes. In support of these objectives, the NSF Engines program seeks to expand the breadth of institution types that take on leadership roles in center-scale activities, such as Minority-Serving Institutions, institutions in EPSCoR jurisdictions, industry, and other organizations not traditionally supported by NSF.

Furthermore, each Engine must be focused on addressing critical emerging technologies and specific aspects of a major societal or economic challenge that are of significant interest in its defined region of service. The mission of an Engine must be clearly rooted in regional interests and the development of regional talent. The emphasis on “regions” in the program expresses NSF’s aim to stimulate innovation-driven economic growth within a particular “region of service,” where such a region could range from a metropolitan area (including its adjacent rural regions) to an area spanning parts of several states.

Funding for this program will prioritize regions across the Nation without well-established innovation ecosystems. Engines in regions of the country where prospective ecosystem members exist, but where innovation activities are only loosely connected, are of particular interest. While participating organizations in each Engine should largely comprise organizations from within the region of service, the increasingly distributed nature of our society means that partners who transcend that geographical area are also appropriate. All Engine partners should be relevant to the goals of the Engine and their roles in the economic development of the region of service must be justified. It is expected that Engines will leverage appropriate partnerships across the country to achieve their goals, in a way that complements other ongoing efforts (e.g., investments from NSF and other federal/state agencies, private-sector activity). Further, mentoring from experienced organizations is strongly encouraged, and organizations operating in existing mature innovation ecosystems are welcome to join with proposers supporting other regions of service to provide such support.

Centered around a given topic area, each Engine must aim to achieve the following overarching objectives:

1. Develop, recruit, and maintain a trusted network of partners that work together to create and enhance the capacity for innovation in a region of service, spanning a diversity of sectors and organizational types¹.
2. Drive innovation informed by:
 - National, societal, and/or economic challenge(s) that motivates the choice of the topic area for the Engine;
 - The needs of the regional stakeholders; and
 - Limits and gaps in current research, technologies, and industry practices.
3. Create startups and small businesses and expand existing businesses by the development and advancement of critical technologies and innovations.
4. Cultivate the regional workforce through the training and education of technicians, researchers, practitioners, entrepreneurs, and other community members.
5. Embody a culture of diversity, equity, inclusion, and accessibility (DEIA) throughout its leadership and activities.
6. Develop an Engine that can sustain itself beyond the period of the NSF award by:

¹ Examples: industry including small businesses, corporations, and startups; academia including minority-serving institutions, community colleges, and other IHEs; federal, state, local, and tribal governments; and non-profit organizations.

- Increasing the level of industrial and commercial investment in research and development (R&D) and workforce development activities within the region of service;
 - Meeting the evolving regional workforce needs; and
 - Developing new revenue streams through the creation of startup ventures, products, and other innovative business models
7. As the ecosystem matures, intentionally prioritize inclusive economic growth opportunities that create community wealth, including for those stakeholders and residents who do not directly participate in the NSF Engine.

B. The NSF Engines Model

As noted previously, the NSF Engines program constitutes a bold new initiative that will create regional-scale innovation ecosystems throughout the U.S. and usher in a significant revolution of economic growth. The bold and transformational nature of this effort is reflected in the program's goals, as described above; the nature and types of partnerships expected; the outputs that will be tracked and assessed (notably an emphasis on technology and workforce capabilities); the level of post-award oversight; the budgets of the expected Engines, which are an order of magnitude greater than traditional NSF center-scale awards; and the duration of NSF funding for the Engines, i.e., a ten-year award lifetime, paired with an intentional focus on longer-term sustainability from day one.

B.1. Topic Areas

To best support the needs of regions across the Nation, proposing teams will identify their Engine topic areas. Teams should be aware that a competitive topic area must:

- Address compelling national, societal, and/or economic challenge(s);
- Accelerate advances in emerging technologies and industries;
- Have the potential for disruptive R&D that makes tangible progress towards addressing the challenge while creating startups, small businesses, etc.;
- Be driven by needs, capabilities, and applications important to the local regional economy; and
- Consider and potentially leverage other existing large-scale efforts in the topic area.

An Engine does not need to address the entire breadth of its chosen Topic Area but should clearly define its scope and goals within its topic area. Specifically, proposing teams should consider topics that (1) are well-defined yet ambitious (Engines with “a clear north star”), (2) cannot be achieved by a small group of stakeholders acting alone, and (3) uniquely require the mix of cross-sector collaboration, agility, and significant seed funding offered by the NSF Engine model.

Proposing teams will need to submit a Concept Outline that includes their proposed topic area prior to submission of a full proposal. See Section V.A.1 for information on Concept Outlines.

B.2. Ecosystem of Partners and Stakeholders

An effective Engine will develop an ecosystem that draws in expertise, involvement, and synergy across a wide range of partners, such as institutions of higher education (IHEs), for-profit industry including small businesses, federal, state, local, and tribal governments, and non-profit organizations. The Engine should draw on the broad strengths and capabilities of relevant

stakeholders and organizations who will drive the efforts needed to grow and sustain the innovation ecosystem in the Engine's region of service. While the lead organization and core leadership team must be located within the defined region of service, partners may be located beyond that region.

Proposers from less mature ecosystems are encouraged to explore collaborations and mentorship relationships with their more mature counterparts. Such activities could include startup-exchange programs where companies spend time and receive mentorship in both ecosystems, executive and entrepreneur-in-residence programs, co-developed investor roadshows or joint investment vehicles, visiting faculty and student programs, accelerator curriculum development, and other synergistic programs that strengthen the proposer's regional ecosystem. The primary beneficiary of these activities should be the region of service.

The partnerships created should inform and co-create use-inspired scientific and technological innovations and foster translational and entrepreneurial outcomes that advance the Engine's societally-relevant topic area, while growing and strengthening the innovation workforce. Ultimately, the Engine's consortium of partner organizations should help sustain it in the long term through funding, resources, and management. The expectation is that these partnerships will be deep and sustained.

In a thriving innovation ecosystem, the set of partners is likely to evolve over time, growing and shifting as the Engine and its specific projects and initiatives progress. The Engine should therefore develop a process model where relevant stakeholders can modify their levels of engagement as necessary and appropriate.

B.3. Core Functions of an Engine

Engines have three core functions: (1) use-inspired scientific and technical research, (2) translation of innovations to practice, and (3) workforce development to grow and sustain regional innovation. It is the responsibility of each Engine to customize these components and their accompanying processes and mechanisms to meet the needs of its region of service.

- (1) **Use-Inspired Research and Development** – The driving force behind a successful Engine will be the generation of new ideas, projects and knowledge that are inspired and informed by the identified needs of regional partners and stakeholders (i.e., “market pull”), and in alignment with the Engine's topic area. The pursuit of these advances will entail integrating knowledge, methods, and expertise from different disciplines. A thriving Engine should also enable new projects and innovation opportunities to naturally emerge.
- (2) **Translation of Innovations to Practice** – A successful Engine will enable tangible translational outcomes such as goods, products, startups, and services. Outcomes may also inform the development of new policies and regulations put forward by regional or national entities. Each Engine must establish the processes, structure and expertise required to support continuous and timely identification and implementation of translation opportunities. Successful translation requires ongoing stakeholder engagement and evaluation to ensure that value is created.
- (3) **Workforce Development to Grow and Sustain Regional Innovation** – A robust innovation ecosystem requires a diverse, skilled, and adaptable workforce driven by its labor market needs. Engines should therefore support the creation and implementation of recruitment, education, training, retention, and workforce development programs at all levels relevant to the proposed topic area, including internships, co-ops, vocational training, joint appointments (e.g., between academic, industry, and government entities),

and other experiential learning opportunities. Training must be designed with diversity, equity, inclusion, and accessibility as foundational principles. Training opportunities should be made available to all participants, including management, students, faculty researchers, entrepreneurs, community members, and industry and government personnel. Engines must emphasize the training, workforce development, and translational (e.g., entrepreneurial) aspects with the same importance ascribed to the technical and scientific foci.

B.4. Engine Culture

A key goal of the NSF Engines program is for each Engine to catalyze the creation of a thriving, diverse, sustainable innovation ecosystem that delivers equitable economic growth in the Engine's region of service. The NSF Engines program differs from traditional NSF center-scale programs in the pursuit of an integrated set of cultural adaptations: (a) it is grounded in the tackling of a broad societal and/or economic challenge; (b) it looks to the formation of lasting and meaningful partnerships that lead to co-design of solutions and rapid translation to practice; (c) it emphasizes training, workforce development, and translational (e.g., entrepreneurial) aspects with the same importance ascribed to the technical and scientific foci; (d) it requires meaningful diversity, equity, inclusion, and accessibility efforts and outcomes as an essential, integrated part of the organizational culture; and (e) it establishes an evaluation framework with well-defined milestones and indicators against which performance of an Engine will be measured at specific checkpoints.

(1) Culture of Innovation

To help realize a thriving innovation ecosystem, each Engine is expected to embody a culture of innovation throughout its management structure, processes, partners, and stakeholders, and in carrying out its core functions. Each Engine should actively promote trust, a diversity of perspectives, risk-taking, and knowledge sharing. This operational model necessarily implies that the Engine should be nimble and the direction of research and transition to practice will be subject to real-time course correction as the Engine evolves. Engines are expected to produce meaningful outcomes early and throughout the award duration.

Creating a culture of innovation requires integrating the strengths of the Engine's partners. Each Engine should encourage interactions within its ecosystem at various levels (e.g., senior leadership, management, technicians, researchers, practitioners, entrepreneurs) and among stakeholders (e.g., through joint appointments between industry and IHEs, entrepreneurs-in-residence, and other creative talent placement mechanisms). Additionally, each Engine partner is expected to consider whether its institutional processes will allow it to embody a culture of innovation that leads to societal and economic benefit. For instance, IHE partners are expected to address, during the award period, the possibility that traditional methods for evaluating tenure and promotion may not sufficiently value the type of work to be conducted in and outputs from the Engine; IHE partners should define institutional policies to reward faculty for participation in the Engine's activities that may not lead to traditional academic outcomes such as research publications. Concurrently, for-profit organizations participating as leads or core partners in an Engine should take steps to invest both monetary and non-monetary resources in the region of service that may not meet traditional return-on-investment (ROI) expectations. For example, this may include developing a framework that would allow industry partners and other Engine stakeholders to collectively support the pre-competitive R&D space, investing in the relevant community-growth initiatives including workforce development and education efforts to support

the Engine's topic area and region of service, and developing products, services, and other outputs that will benefit society.

(2) Culture of Diversity, Equity, Inclusion and Accessibility

Comprehensive long-term solutions that truly benefit the whole of society will demand a diversity of perspectives, individuals, and cultures. Engine stakeholders should be broadly representative of the region of service and are expected to play a key role in defining the Engine's goals and desired impacts. Furthermore, every Engine must have a demonstrated, intense, and meaningful focus on improving diversity (with respect to race, gender, persons with disabilities and socioeconomic status) throughout its regional science and technology ecosystem. Each Engine must go beyond perfunctory outreach initiatives that merely introduce groups that are underrepresented in STEM fields to Engine activities, with limited outcomes in terms of continuous engagement.

Instead, diversity, equity, inclusion, and accessibility must be interwoven into the very fabric of each Engine, across all foundational components (e.g., use-inspired research, partnerships, translation, workforce development). In addition, this inclusiveness should be evident in the organizational structure, the leadership team, the associated partners and stakeholders, and end-user communities. Ultimately, an NSF Engine's coalition of partners is expected to include a diversity of organizations and stakeholders that will enable the Engine to provide value to its entire region of service. To help support these objectives, the NSF Engines program seeks to tap into the breadth of organizations and institution types to take on leadership roles within Engines. For example, in the context of academic institutions, NSF Engines must engage the range of institution types in its region including those dedicated to serving groups traditionally underrepresented such as [Minority Serving Institutions](#), as well as two-year colleges, community colleges, vocational and technical colleges, and others. The Engine must ensure equitable and mutually beneficial partnerships among its coalition of partners, including with respect to scope of work, capacity-building, and funding distribution.

C. Engine Leadership and Organization Structure

C.1. Leadership Principles

An Engine will require a deeply collaborative and effective leadership team focused on: (1) achieving well-defined research and translation milestones; (2) creating innovative workforce development activities; (3) developing and sustaining effective stakeholder partnerships; and (4) securing essential resources. An effective Engine leadership team must have a clear intellectual vision, strong regional knowledge, discernable leadership experience, successful entrepreneurial experience, a track record of delivering results, a solid background in building high-impact education and workforce development programs, and the proven ability to communicate clearly and effectively with diverse audiences. Further, teams must embrace diversity, equity, inclusiveness, and accessibility, including by effectively integrating members with different areas of expertise, vocabulary, perspectives, and priorities regarding the problems to be addressed.

Individuals on the Engine leadership team should be drawn from the range of stakeholder groups to bring diverse perspectives on all aspects of the Engine's operations. The leadership team is responsible for developing and implementing the necessary policies, practices, and formal agreements (e.g., partnership, data agreements) to facilitate the necessary partnerships and to create an environment that drives innovation.

Members of the Engine's leadership team are expected to participate in NSF-organized convenings for training and cross-team collaboration. This training will require frequent

participation from all members of the Engines leadership team and will be a significant time investment. Details on the expected time commitment and participation levels will be provided by NSF during the pre-award stage after the completion of the merit review process.

C.2. Organization and Management

Lead Organization: The lead organization is responsible for oversight of all aspects of the Engine, including the Engine core functions (see Section II.B.3), finances, contracts, subawards, evaluation, and all reporting requirements. The lead organization must have a significant presence and vested interest in the region of service.

Project Director/Chief Executive Officer (CEO): Each Engine must be led by a visionary full-time chief executive, who is the senior official in charge of managing the Engine and is responsible for its overall success. The Engine CEO is responsible for leading the development and execution of the long-term strategic plans of the Engine, with the ultimate goal of building a sustainable regional innovation ecosystem that provides value to all stakeholders. The Engine CEO must be employed by the lead organization. See Section IV.D for further information about this role.

Core Management: Essential responsibilities of the leadership team are identified below. A single individual may take on multiple roles, if appropriate. If known at the time of proposal submission, personnel fulfilling these roles should be explicitly identified along with their qualifications for the role.

- Innovation leadership
- Administration of the Engine
- Leadership for core functions
 - Use-inspired research and development
 - Translation of innovations to practice
 - Workforce development to grow and sustain regional innovation, including education initiatives
- Partnership development and stakeholder engagement
- Diversity, equity, inclusion, and accessibility
- Communications and Outreach
- Evaluation and Assessment

Boards: Once awarded, each Engine must form at least two boards:

- Governance Board: Composed of the lead Engine organization and a representative set of the Engine's partners, this board provides, at a minimum, administrative oversight of the Engine's activities and is responsible for the Engine's performance. The CEO is a member of the Governance Board.
- Advisory Board: Composed of individuals external to the Engine, this board provides, at a minimum, recommendations to the Governance Board as needed.

Core Partners: The core partner organizations must work with the lead organization to:

- Support the Engine's vision and strategic plans, via a formalized partnership agreement;
- Provide resources to support the Engine's activities;
- Agree on a common process framework to develop and support the Engine's activities;
- Have employees actively engaged in key activities of the Engine;
- Agree on intellectual property (IP) policies; and
- Define an approach for establishing and overseeing appropriate security, including cybersecurity, safeguards.

D. Evaluation Plan

Each Engine must develop a comprehensive Evaluation Plan that establishes appropriate criteria, goals, and indicators for success, along with growth indicators, aligned with the Engine's vision. This plan should incorporate the expectations and guidance for the various phases of an Engine, as described in Section II.F and Appendix A. Through the evaluation process, successful teams will at a minimum demonstrate:

- The “added value” of being funded as an Engine (rather than a set of individually-funded projects) – i.e., creating opportunities that take advantage of the scope, scale, synergy, multi-disciplinarity, duration, equipment, and facilities that an Engine award can uniquely provide;
- Effective partnerships with diverse stakeholders to advance technology and solutions addressing the societal and economic challenge(s), and to facilitate knowledge transfer among the participants;
- Achievement of strategic goals shared by the lead and partnering organizations;
- Integration of meaningful diversity, equity, inclusion, and accessibility practices across all aspects of the Engine, including the leadership team, core functions, ecosystem, and operations;
- Effective implementation of a wide range of educational and workforce training opportunities, including internships, co-ops, vocational training, joint appointments, and other experiential learning opportunities, for technicians, researchers, practitioners, community members, and entrepreneurs at all levels of the workforce needed within the Engine;
- Successfully attracting, leveraging, and effectively utilizing complementary funding from other sources beyond NSF; and
- Links and synergistic collaborations with existing innovation ecosystems and other hubs and assets within the region, including federally-funded R&D centers.

Engines are expected to continuously monitor and assess their performance against established goals and associated indicators. Such assessments are expected to involve active participation and input from all stakeholders engaged in or impacted by the Engine's activities. NSF will include the Engine's own parameters for measuring performance in determining eligibility for continued funding.

The Engine proposal must describe the process by which the Evaluation Plan will be used by the Engine team throughout the Engine's duration. Evaluation should focus on outcomes that demonstrate achievement of the Engine's goals and should further provide indicators that capture the quality, depth, and impact rather than simply raw numbers. See Sections III.C and VII.A.2.1 for additional information on how the Evaluation Plan will be used during the post-award assessment process.

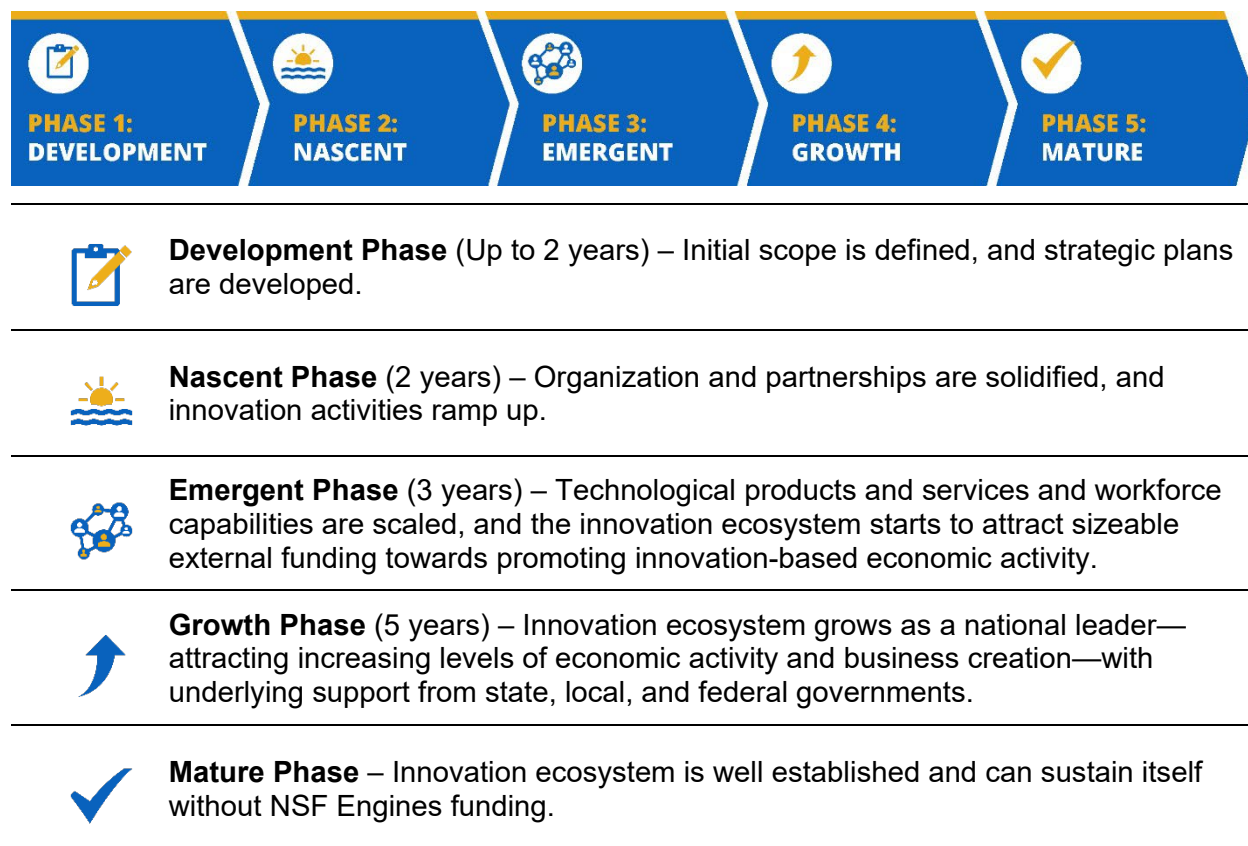
Engines should use the evaluation plans and associated annual reports not only as a reporting mechanism for NSF to track progress versus specific metrics, but also as a tool for stakeholders of the Engine to see traction and progress toward outcomes of value to them.

E. Long-Term Sustainability Plan

NSF's investment in Engines must be paired with an intentional focus on long-term sustainability. For example, a key success indicator for an Engine is its ability to secure and sustain capital

inflow to its region of service. Thus, each proposer should consider the steps needed to sustain and continue to grow the Engine beyond the end of the NSF funding period.

F. Phases of an Innovation Ecosystem and Timeline of an NSF Engine



The graphic above illustrates the five-phase model that underlies NSF’s vision for establishing sustainable NSF Engines and accelerating the growth of their associated regional innovation ecosystems. During the Development Phase, the Engine structure and scope are clearly established, concrete plans to create the Engine are developed, the geographical region of service is defined, the process of partnership building begins and initial commitments from partners and stakeholders are established. Support for the Development Phase has a duration up to 24 months and is intended to enable teams to prepare proposals to establish a full NSF Engine, beginning in the Nascent Phase.

The Nascent Phase is a two-year period and considered the ramp-up period, which would typically include hiring full-time CEO, administrative staff, and other personnel required to carry out the Engine’s strategic plans, finalizing agreements (e.g., IP/partnership agreements), and implementing the core Engine functions. At the beginning of the Nascent Phase, a coalition of regional core partners should have already been established, with firm commitments of resources in support of the Engine.

In the three-year long Emergent Phase, the Engine begins to expand on its early successes and works to expand its scientific, technical, education, and workforce portfolio to seek more ambitious growth targets in science and technology as well as in economic impact.

In the Growth Phase, spanning five years, the Engine seeks to emerge as a national leader in its topic area.

The Engine can then transition to a self-sustaining innovation ecosystem in the Mature Phase where it can operate without funding from the NSF Engines program. A detailed description of the various maturity characteristics of these phases is provided in Appendix A.

An NSF Engine spans the first four phases described above. Through this BAA, NSF will support two award types. Type-1 awards will support the Development Phase only. Type-2 awards span the Nascent, Emergent, and Growth Phases. The table below highlights key features and distinctions among the two award Types. Detailed information for each award type can be found in Section III of this document.

Type-1	Type-2
<ul style="list-style-type: none"> - Duration: 2 years - Total funding: \$1 million over two years - Spans Development Phase only - Beyond Development Phase, additional NSF Engines program funding only via a successful new Type-2 proposal 	<ul style="list-style-type: none"> - Duration: up to 10 years - Initial 2-year budget: \$15 million - Total Funding: up to \$160 million over ten years - Spans Nascent, Emergent, and Growth Phases - Continued funding based on periodic evaluations and Engine performance

Type-1 proposals should be submitted by proposers who can demonstrably claim that their region of service is at the maturity level corresponding to the Development Phase (as described in Appendix A). Type-2 proposals should only be submitted by proposers who can demonstrably claim that their proposed Engine's region of service is at a maturity level corresponding to either the Nascent or Emergent Phase of an NSF Engine.

III. Award Information

The estimated program budget, number of awards, and average award size/duration are subject to the availability of funds. NSF expects to make Type-1 development awards in Winter 2023.

A. Type-1 Awards

Anticipated Award Type: Cooperative Agreement

Anticipated Number of Awards: The NSF Engines Program anticipates making up to 50 Type-1 awards. The actual number of awards made will be dependent upon the availability of funds, quality of the proposals received and the degree to which proposals meet the BAA's goals, NSF merit review criteria, and BAA-specific review criteria. The duration of a Type-1 award is up to 24 months and the maximum proposed budget for each Type-1 award must not exceed \$1,000,000.

The intent of a Type-1 award is to enable the awardee to lay the groundwork for submitting a successful Type-2 proposal. Therefore, a Type-1 awardee should understand and review expectations of Type-2 projects as part of their award activity. Type-1 awardees will need to re-apply independently for Type-2 award, though a Type-1 award is not a pre-requisite to apply for a Type-2 award.

B. Type-2 Awards

Anticipated Award Type: Cooperative Agreement

Anticipated Number of Awards: The NSF Engines Program anticipates making five Type-2 awards through this funding opportunity. The actual number of awards made will be dependent upon the availability of funds, quality of the proposals received and the degree to which proposals meet the BAA's goals, NSF merit review criteria, and BAA-specific review criteria.

Type-2 awards can receive funding up to 10 years. The initial two years of funding will support a ramp-up period. Continued support for the Engine will be contingent upon the Engine's overall performance, including meeting its annual performance goals and achieving the maturity characteristics expected for its current phase as the Engine matures.

During the ramp-up period, the Engine can be funded for a total of \$15,000,000, over two years.

The Engine can be funded at \$15,000,000 per year in Years 3-5.

The Engine can be funded at \$20,000,000 per year in Years 6-10.

The total amount of a Type-2 award will not exceed \$160,000,000 from NSF (over a period not exceeding ten years).

Beyond Year 1 of a Type-2 award, NSF will annually conduct a comprehensive assessment of the Engine's performance, which will inform subsequent-year funding. A determination by NSF that the Engine has failed to perform during the annual review may result in termination of the award.

In addition, NSF will conduct additional reviews involving NSF Program Directors and a Site Visit Team to assess the Engine's accomplishments and future tasks, with an emphasis on tangible outcomes, overall societal and economic impacts, and progress toward achieving long-term goals and milestones. A determination by NSF that the Engine has failed to perform during any review may result in termination of the award.

C. NSF Post-Award Assessment Including Site Visits of Engines

Type-1 Awards: No Site Visits will be conducted.

Type-2 Awards: NSF will negotiate the final Evaluation Plan with the awardee within six months of award date, based on the expected Engine maturity characteristics and outcomes listed in Appendix A. Post-award, NSF will assess the Engine's outcomes against this plan at assessment checkpoints, as defined in the cooperative agreement. Resource contributions made by participating organizations and partners of an Engine and the effective utilization of such resources in advancing the Engine's mission will be an important factor in the post-award evaluation and assessment process.

See Section VII.A.2.1 for additional details on the process, including Site Visits.

IV. Eligibility Information

A. Which Organizational Types Are Eligible to Submit Proposals in Response to This BAA

The following organizational types are eligible to submit proposals in response to this BAA:

- US-based non-profit, non-academic organizations;

- US-based for-profit organizations; and
- Institutions of Higher Education (IHEs) accredited in and having a campus located in the US (please note that International Branch Campuses of US IHEs are not eligible to submit proposals under this BAA).

Proposals must be submitted by a single lead organization with any partner organizations listed as subawardees. Separately submitted collaborative proposals will not be accepted. (See the NSF [Proposal and Award Policies and Procedures Guide \(PAPPG\)](#) Chapter II.D.3. for further information)

B. Which Organizational Types Are Eligible to Receive NSF Funding Through Subawards Under This BAA

The following organizational types are eligible to receive NSF funds through subawards under this BAA:

- US-based non-profit, non-academic organizations;
- US-based for-profit organizations;
- Federally Funded Research and Development Centers;
- National Laboratories;
- State, Local, and Tribal governments, limited to agencies, offices, or divisions specifically dedicated to innovation, economic and/or workforce development; and
- Institutions of Higher Education (IHEs) accredited in and having a campus located in the US (please note that International Branch Campuses of US IHEs are not eligible to submit proposals under this BAA)

C. Who Cannot Serve as Partners

The following are not eligible to serve as partners under this BAA:

- Any organization on the Department of Commerce's Bureau of Industry and Security (BIS) Entity List; and
- Unaffiliated individuals.

International partners are not permitted to be included as part of a proposal submitted to NSF pursuant to this BAA. After an award has been made, however, an international partner/collaborator may be added in accordance with the procedures established in Section VII.A.2.3. No international partners may receive funding from NSF.

D. Who May Serve as Project Director/CEO

The Project Director must be a senior member of the submitting organization's leadership and will also serve as the full-time CEO for the Engine. At the time of proposal submission, this role may be filled by an interim CEO until a full-time CEO is named or recruited. Designation of a full-time CEO must occur within the first six months of the start date of the award.

E. Limit on Number of Proposals per Organization

An organization may submit no more than one proposal in response to this BAA as the lead organization. If an organization exceeds this limitation, proposals will be accepted based on earliest date and time of proposal submission (i.e., the first proposal will be accepted, and the remainder will be returned without review).

V. Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

PAPPG Chapter II.C.2 contains guidance on the preparation of the required sections and disclosure information that must be submitted for a full Engine proposal. NSF, may, at its discretion, additionally request the proposer to submit a description of the proposer's process for collection and verification of proposal disclosure information from senior personnel that is submitted to NSF. The required sections of a full Engine proposal are as follows:

- Cover Sheet;
- Project Summary;
- Table of Contents;
- Project Description;
- References Cited;
- Biographical Sketch(es) (required for all individuals designated as senior personnel);
- Budget and Budget Justification;
- Existing and New Resources to be Made Available for the Project;
- Special Information and Supplementary Documentation; and
- Single Copy Documents.

The following information supplements, and, in some cases deviates from the requirements specified in the PAPPG. If a particular section of the proposal does not have specific instructional information below, the guidance in the PAPPG must be followed.

Each proposing organization that is new to NSF or has not had an active NSF assistance award within the previous five years should be prepared to submit basic organization and management information and certifications, when requested. The requisite information is described in the [NSF Prospective New Awardee Guide](#). The information contained in this Guide will assist the organization in preparing documents which NSF requires to conduct administrative and financial reviews of the organization.

Submissions that are incomplete, materially lacking or not responsive to the technical or administrative requirements of this BAA may not be reviewed or may be evaluated as-is without further opportunity for revision at the discretion of NSF's review process.

A.1. Concept Outlines

To be eligible to submit a full proposal, all proposers must submit a Concept Outline. Submitting a Concept Outline does not oblige potential proposers to submit a full proposal. The Concept Outline must describe the proposed topic area and intended region of service. The topic area of an NSF Engine must have applicability to a defined region of service and existing or future innovation ecosystem, hold national and societal significance, and require use-inspired research that will translate to practice under relatively short timelines.

The Concept Outline should be submitted via the NSF Submission Portal for the BAA (See Section V.C below for details). After submission of a Concept Outline, approval from a cognizant NSF Program Officer is required before proposers can submit a full proposal. The approval from the cognizant NSF Program Officer (in the form of an email) must be uploaded along with the full proposal.

Concept Outlines must include the following:

1. **Submission Title:** The title of the project should start with “NSF Engines: Type-<X>: <concept outline title>”, where <X> should be replaced with the appropriate proposal type (1 or 2).
2. **Project Personnel:** List of up to five key team members: names, affiliations, e-mail addresses.
3. **Targeted Unit(s):** Enter the following in the “Target Unit(s)” Section of the Concept Outline Submission Portal.
 - a. *Directorate:* Directorate for Technology, Innovation and Partnerships
 - b. *Division:* Division of Innovation and Technology Ecosystems
 - c. *Program/Funding Opportunity:* NSF Regional Innovation Engines Program

In the **Project Information** section of the Submission Portal, enter key terms and a concept outline narrative as described below. Note that the concept outline narrative must be written directly into the text box provided via the submission portal (i.e., document uploads are not accepted).

4. **Key Terms:** Up to five keywords representing the topic area
5. **Concept Outline Narrative:** (*up to two pages for Type-1 and up to five pages for Type-2 submissions*). The Concept Outline narrative must address each component below, with the following labeled sections: (Concept outlines for Type-1 proposals should only address Sections a-d, below):
 - a. **Topic Area:** Describe the national and societal significance of the broad topic area that the Engine is aiming to address.
 - b. **Region of Service:** A brief description of the intended geographical region of service, and the current state of the innovation ecosystem in the region of service (see Appendix A).
 - c. **Purpose and Vision of the proposed Engine:** The overall purpose and vision of the proposed Engine, which must list specific use-inspired challenge(s) that the Engine will address, as well as the current state of practice and major gaps the Engine will focus on (e.g., scientific and technological innovations, policy, products, services, workforce expertise).
 - d. **Regional Importance and Impact:** How the proposed region of service is well-positioned to create the Engine, catalyze the associated regional innovation ecosystem, and result in meaningful translational outputs (e.g., products, services, startup companies, tools, and technologies).

Narratives for Type-2 Concept Outlines must also include:

- e. **Partnerships:** The envisioned regional innovation ecosystem of partners and stakeholders, clearly identifying (1) existing core partners and their expected contributions and (2) potential additional partners, how such partners would help accomplish the Engine’s vision and core functions, and plans to recruit these partners prior to the submission of the proposal.
- f. **Workforce Development:** The future regional workforce needs in the proposed topic area.
- g. **Related Initiatives:** How the proposed NSF Engine differs from and/or leverages other existing large-scale efforts in the topic area.

Following approval of Concept Outlines, NSF intends to publish or otherwise make available a summary of the approved concept outlines, which will include the following information

about each concept outline: (1) submission title, (2) organization name, (3) topic area, (4) proposed region of service, and (5) name of principal investigator/project director.

*For Privacy Act purposes, at the end of your **Concept Outline Narrative**, you must include the following statement to authorize this disclosure: “I, [insert PI’s name], hereby consent to the disclosure of a summary of my Concept Outline, if approved, as described in the BAA.”*

Submitters are encouraged to consider the Review Criteria in Section VI.B.1 as they prepare the Concept Outline.

A.2. Letters of Intent (LOI) (up to two pages)

Submission of an LOI is required to be eligible to submit an Engine proposal. Failure to submit the requisite LOI will result in a full proposal not being reviewed.

Submitting an LOI does not oblige potential proposers to submit a full proposal. LOIs are not subject to merit review, but rather are used for internal planning purposes. Proposers will not receive any feedback on their LOI other than a message confirming receipt of the LOI. An organization may submit only one LOI as the lead organization. There is no limit on the number of LOIs in which an organization may be listed as a partner organization. The lead organization listed on a full Engine proposal must remain the same as the corresponding LOI. However, the composition of the team (i.e., senior personnel and partner organizations) may change at the discretion of the proposer between the LOI submission date and the time of submission of the full proposal.

LOIs must contain the following:

- A title that follows the format described in Section A.3.1 (for Type-1 proposers) or Section A.4.1 (for Type-2 proposer) below;
- The names and organizational affiliations of the Project Director and key Senior Personnel; for proposals with the intent to involve multiple organizations and partnerships, the same information should be provided for all subawardees to the extent it is known at the time; and
- A brief description of the proposal’s topic area, the region that the Engine intends to serve, and the nature of the proposed research, translation, workforce development and broad partnerships that will impact the Engine’s proposed activities.

When submitting a LOI in response to this BAA, please note the conditions outlined below:

- A minimum of 0 and maximum of 20 other senior project personnel can be named in the LOI, but this limitation does not constrain the actual number of participating personnel; and
- A minimum of 0 and maximum of 20 other participating organizations can be named in the LOI, but this limitation does not constrain the actual number of participating organizations.

A.3. Type-1 Proposals

A.3.1. Cover Sheet: The title of the project should start with “**NSF Engines: Type-1:** <proposal title>”. The cover sheet must also include the name of the Project Director and the Unique Entity Identifier number of the lead organization.

A.3.2. Project Summary (up to one page): The project summary should include the following section headings: (1) Purpose and Vision (2) Regional Importance and Impact, (3) Partnerships, and (4) Keywords. In the Keywords section, proposals must include at least one keyword that describes the topic area(s) of national interest that is being explored in the proposed project, to

assist in identifying reviewers with appropriate knowledge and expertise to review the proposal. For additional details on what should be included in each section of the summary, proposers should consider the corresponding review criteria identified in Section VI.B.2. No separate sections for overview, intellectual merit and broader impacts are required, a deviation from the PAPPG.

A.3.3. Project Description (up to 15 pages): The project description should include the following sections in the order specified below:

- a) **Overview, Vision, and Rationale.** Describe the overall purpose and vision of the Engine including specific societal and/or economic challenge(s) to be addressed and the envisioned regional innovation ecosystem. Describe how the proposed region is well positioned to create the Engine and why this is the right time to create the proposed Engine. Justify how this proposal aligns with the current maturity phase of the region's innovation ecosystem, as discussed in Section II.F. Discuss the current state of practice and the major gaps that the Engine is aiming to address (e.g., scientific and technological innovations, policy, products, services, workforce expertise). Describe how the proposed Engine can be expected to create innovation sector jobs (in the short-term and long-term) through a combination of workforce development programs, new business creation, and the growth of corporate footprint in the region.
- b) **Proposing Team.** This section must start with a table that includes all currently identified Engine organizations and personnel. Personnel fulfilling core management functions should be identified along with their qualifications for these roles. Proposals must describe the gaps in expertise and partnerships needed for the Engine, and how additional relevant personnel, partners, and other stakeholders who can support the Engine's activities will be brought on board.
- c) **Strategic Plan.** This section should describe the Engine's high-level goals and objectives for each of the following areas (see Section II.B):
 - (i) Use-inspired research and development;
 - (ii) Translation of innovations to practice;
 - (iii) Workforce development to grow and sustain regional innovation; and
 - (iv) An ecosystem of partners and stakeholders advancing regional innovation

This section should provide plans for the activities that the team will undertake leading to a Type-2 proposal by the end of the award period. Proposers should be strategic in assembling the necessary components, infrastructure, and partnerships for their Engines.

- d) **Management Plan:** This section should describe the envisioned organizational structure, along with the activities to be carried out during the Development Phase that will enable the team to prepare well-developed and effective plans for a Type-2 proposal. This section should begin with a description of the organizational structure, which could be illustrated as an organizational chart. This section should include the following labeled subsections.
 - (i) Leadership Team
 - (ii) Culture of Innovation
 - (iii) Culture of Diversity, Equity, Inclusion and Accessibility
 - (iv) Partnerships
 - (v) Evaluation Plan

(vi) Long-Term Sustainability Plan

When preparing this section and the list of proposed activities, Type-1 proposers should consider the specific management requirements discussed in Section V.A.4.3(d) for Type-2 proposals.

NOTE: The project description does not need to contain a separate “broader impacts” section, as these are covered by the above sections; this is a deviation from the PAPPG. Other instructions from PAPPG Chapter II.C.2.d. apply.

A.3.4. References Cited: Follow instructions in PAPPG. See [PAPPG Chapter II.C.2.e.](#)

A.3.5. Biographical Sketch(es): All proposals submitted to NSF are required to include Biographical Sketches for all individuals designated as senior personnel be working on the project and are employed at the proposing organizations or at a subaward organization using the [NSF-approved template](#).

A.3.6. Budget and Budget Justification: Type-1 proposals must include a two-year budget. The budget must not exceed \$1,000,000. Proposers should plan on completing the effort within two years. No-cost extensions will be authorized only in extraordinary circumstances. See Section V.B below for details on the preparation of the budget and budget justification.

A.3.7. Existing and New Resources to be Made Available for the Project (up to three pages):

This section is used to assess how the proposed Engine will leverage existing and new resources for the project. Proposers should describe only those tangible resources (e.g., funding, facilities, equipment, human capital, datasets) that are directly applicable to the proposed Engine in its first two years of operation, should it be funded. Such information must be provided in this section, and not in other parts of the proposal (e.g., Budget Justification, Project Description).

Although the resources described are not voluntary committed cost sharing as defined in 2 CFR §200.1, the Foundation does expect that the resources identified in this section will be provided, or made available, should the proposal be funded. PAPPG Chapter VII.B.1 specifies procedures for use by the recipient when there are post award changes to objectives, scope, or methods/procedures.

Within this section, proposers should describe the resources in the following two distinctly labeled categories. In both categories, include only those resource contributions (e.g., funding, facilities, equipment, human capital, datasets) that will support and advance the Engine’s strategic goals.

1. **Currently Available Resources:** Provide information on the relevant currently existing resources available to the proposing team from internal and external sources, including all partner organizations. If a resource has already been contributed to an ongoing collaboration among a subset of the Engine’s participating organization and partners, describe what percentage of that resource will be available for the Engine’s activities. Proposers should briefly summarize how these resources will be allocated to specific activities described in the Project Description.
2. **New Resource Contributions:** Provide information on new resource contributions currently committed by external sources, as stated in their letters of collaboration (see Section V.A.5.1). New resource contributions that are not documented in a letter of collaboration

should not be included here. Proposers should briefly summarize how these new resources will contribute to activities described in the Project Description. Proposers will be asked to provide a detailed set of actual contributions prior to receiving an award.

NSF expects that the internal and external resources provided to the Engine will increase over the duration of the award thereby demonstrating increased partnership engagement and commitment to the long-term sustainability of the Engine, and continued growth of the innovation ecosystem. The availability and utilization of these resources will be assessed during the post-award evaluation process.

A.3.8. Current and Pending Support: Current and Pending Support information, as described in the PAPPG [Chapter II, Section C.\(2\)\(h\)](#), is **not** required to be provided by senior personnel at the time of proposal submission. Proposers will be notified after completion of external review if submission of current and pending support information is required. Such a request should not be construed to be an indicator of possible funding.

A.4. Type-2 Proposals

A.4.1. Cover Sheet: The title of the project should start with “**NSF Engines: Type-2:** <proposal title>”. The cover sheet must also include the name of the Project Director and the Unique Entity Identifier number of the lead organization.

A.4.2. Project Summary (up to two pages): The project summary should include the following section headings: (1) Purpose and Vision, (2) Regional Importance and Impact, (3) Partnerships, and (4) Workforce Development. For additional details on what should be included in each section of the summary, proposers should consider the corresponding review criteria identified in Section VI.B.3. No separate sections for overview, intellectual merit and broader impacts are required, a deviation from the PAPPG.

A.4.3. Project Description (up to 30 pages): Project descriptions must include the clearly labeled sections described below. Proposers must embed the concepts described in the “Engine Culture” (see Section II.B.4) within the entirety of project description.

- a) **Overview, Vision, and Rationale.** See the guidance for Type-1 proposals in Section V.A.3.3(a).
- b) **Proposing Team and Organizational Structure.** This section should describe the overall organizational structure, which could be illustrated as an organization chart. The section must include a table that lists all committed Engine organizations and personnel. Personnel fulfilling core management functions should be identified along with their qualifications for these roles. Proposals must also describe the role(s) of core partner organizations and individuals within the Engine along with their relevant expertise. This section should also reference the relevant activities and roles described in sections c) and d) below. While this section should discuss the roles and composition of the governance board, do not include a description of the advisory board in this section. While the Engine can include plans for advisory boards, proposers should not identify or contact potential members of such advisory boards prior to award.
- c) **Strategic and Implementation Plans.** This section should begin with an overall strategic plan that describes the Engine’s high-level goals and objectives to be accomplished by

the mid-point and the end of each phase of the proposed Engine (as described in Section II.F) through the award duration for each of the following (described in Section II.B):

- (i) Use-inspired research and development;
- (ii) Translation of innovations to practice;
- (iii) Workforce development to grow and sustain regional innovation; and
- (iv) An ecosystem of partners and stakeholders advancing regional innovation.

A well-developed strategic plan will integrate these components and describe their interdependencies. Separate subsections should then be provided for items (i) – (iv) noted in the preceding paragraph that include more detailed plans of how this strategy will be realized. As relevant, describe the state of practice and baseline data, as well as specific gaps that the Engine is aiming to address within a given component. Each subsection should additionally outline the corresponding measures and metrics for success, including plans to systematically gather and track data to measure growth over time. It should describe the path to achieving the proposed goals through specific activities, timelines, and milestones. The strategic plan should describe a holistic approach that promotes and enables a culture of innovation and diversity, equity, inclusion and accessibility, that is pervasive throughout all elements of the Engine, including its core functions and partners and stakeholder engagement.

This section should include a table of deliverables that identifies the planned, tangible deliverables. The deliverables should be mapped to the high-level strategic goals.

Workforce needs will require participation by all demographic groups and, as such, proposers should clearly describe their plans for workforce development initiatives that recruit and retain communities traditionally underrepresented in STEM.

- d) **Management Plan.** This section should describe the management and operational procedures and processes designed to ensure the Engine’s success in achieving its overall mission. The following labeled sections are required:

- (i) **Leadership Team:** Describe the leadership and management structure and plans, including the rationale for the proposed structure. Moreover, describe how all the necessary disciplines, skills, perspectives, and capabilities will be brought together during the formation of the leadership team (including the CEO) and the governance board.
- (ii) **Culture of innovation:** Describe how the Engine will promote and achieve a culture of innovation.
- (iii) **Culture of diversity, equity, inclusion and accessibility:** Describe how the Engine will promote and achieve a culture of diversity, equity, inclusion and accessibility.
- (iv) **Partnerships:** Describe how the Engine will establish trusted and mutually beneficial partnerships among all Engine partners and stakeholders. This could include, for example, outlining the rights and responsibilities of core and contributing partners, establishing and overseeing appropriate security of shared resources (e.g., data) and other cybersecurity safeguards, and licensing and royalty agreements.
- (v) **Evaluation Plan:** Describe the evaluation plan for the various activities undertaken by the Engine. This plan should include a table that summarizes the indicators and expected outcomes related to both the foundational components and the organizational structure.
- (vi) **Long-Term Sustainability Plan:** Describe how NSF’s investment in the Engine will be paired with an intentional focus on long-term sustainability. In particular, this

plan should layout the steps needed to sustain and continue to grow the Engine beyond the end of the NSF funding period.

NOTE: The project description does not need to contain a separate "broader impacts" section, as these are covered by the above sections; this is a deviation from the PAPPG. Other requirements specified in PAPPG Chapter II.C.2.d. apply.

A.4.4. References Cited: Follow instructions in PAPPG. See [PAPPG Chapter II.C.2.e.](#)

A.4.5. Biographical Sketch(es): All proposals submitted to NSF are required to include Biographical Sketches for all individuals designated as senior personnel be working on the project and are employed at the proposing organizations or at a subaward organization using the [NSF-approved template](#).

A.4.6. Budget: The maximum annual budgets permitted for Type-2 awards are specified in the table below. See Section V.B below for details on the preparation of the budget and budget justification.

Funding Year	Maximum Allowable Budget
1	\$7,500,000
2	\$7,500,000
3	\$15,000,000
4	\$15,000,000
5	\$15,000,000
6	\$20,000,000
7	\$20,000,000
8	\$20,000,000
9	\$20,000,000
10	\$20,000,000
Total	\$160,000,000

Because a significant level of personnel effort is expected to advance emerging technologies and industry and achieve outcomes that benefit society and the economy, the Engine Project Director/CEO is required to be working full-time on the Engine project. Other senior personnel may request more than two months of salary support. Compensation for other senior personnel in excess of two months, while encouraged, must be well-justified in the budget justification. NSF recognizes that to fully engage in an NSF Engine, certain personnel may require funding beyond the general NSF limit of two months of regular salary in any one year. NSF strongly encourages proposed Engines to incorporate such needs within their budgets and activities, with adequate justification. For example, this could include academic year support for faculty or other personnel at non-R1 institutions to carry-out specific Engine activities or support for startups or non-profits providing technical assistance or engineering services.

A.4.7. Existing and New Resources to be Made Available for the Project (up to eight pages):

See the guidance for Type-1 Proposals in Section V.A.3.7.

A.4.8. Current and Pending Support: Current and Pending Support information, as described in the PAPPG [Chapter II, Section C.\(2\)\(h\)](#), is **not** required to be provided by Senior Personnel at the time of proposal submission. Proposers will be notified after completion of external review if

submission of current and pending support information is required. This request should not be construed to be an indicator of possible funding.

A.5. Supplementary Documents for Type-1 and Type-2 Proposals

A.5.1. Letters of Collaboration: Individuals and/or organizations whose roles are described in the proposal as providing substantive assistance or collaboration to the project must verify the nature of their participation, and/or specify the resources that they are committing or will make available to the project in a letter of collaboration, not to exceed one page. Each letter of collaboration must end with the following text.

By signing below, I acknowledge that I, or my organization, will collaborate and/or commit resources as detailed in the proposal, entitled "_____". I, or my organization, agree to undertake the tasks described, and commit to contribute or make available the resources described in the Project Description or the Existing and New Resources to be Made Available for the Project section of the proposal.

Signed: _____ Print Name: _____
Date: _____ Organization: _____

There is no limitation on the number of letters of collaboration.

Letters of support or endorsement for the project from entities that do not have a substantive role in the project are not accepted.

A.5.2. Data Management Plan (up to two pages): Within the Data Management Plan, proposals must address their plans for data-sharing across their team, across the topic areas with other teams, and with the general public, during the project and after its completion.

A.5.3. Consolidated Personnel List Spreadsheet (*the spreadsheet template is found in attachment 1 of the BAA website*): The Consolidated Personnel List is a spreadsheet listing with all key personnel, subaward and collaborations. Using the Excel spreadsheet template (Attachment 1), compile information for all persons identified in the proposal as "Project Director/CEO", "Other Senior Personnel", or "Other Personnel" who have a biographical sketch included in the proposal including "Subawardee" personnel, and "Collaborators" for individuals who formally submitted a Letter of Collaboration. The purpose of this document is to assist the program in managing reviewer selection. If you are unsure of whether to include someone in the Personnel List Spreadsheet, err on the side of including the person. Only one spreadsheet should be submitted per proposal. The file name must include the Proposal ID number and the CEO/PI/PD name and be converted into a PDF document. Once completed, the file should be uploaded as a PDF with your proposal submission.

A.5.4. Shared Infrastructure (if applicable, up to three pages): If the Engine plans include the development of shared research facilities (i.e., any facility that will not be used exclusively for Engine activities), then include a Shared Infrastructure document that describes plans to build, manage, and sustain such facilities.

A.5.5. Concept Outline Approval: Proposals must include an approval email from an NSF Engines Program Officer allowing submission of a full proposal. Proposals without this approval letter will not be reviewed.

A.6. Single Copy Documents for Type-1 and Type-2 Proposals

The following documents must be marked with a header “Single Copy Document.” These documents will not be shared with the reviewers of the proposal.

A.6.1. Proposal Certifications (required): The Authorized Organizational Representative (AOR) or equivalent is required to sign the Proposal Certifications (text included as Appendix E of this BAA) via the NSF Submission Portal. Failure to certify the requisite Proposal Certifications will result in a full proposal not being reviewed.

A.6.2. Collaborators and Other Affiliations Information (required): The COA template and a corresponding FAQ can be downloaded at <https://nsf.gov/bfa/dias/policy/coa.jsp>. Proposers should follow the guidance specified in Chapter II.C.1.e of the NSF PAPPG.

A.6.3. Proprietary Data Restrictions: Proposers are advised that proposals for any or all types may contain data the proposer does not want disclosed to the public for any purpose or used by the Federal Government except for evaluation and assessment purposes. If the proposer wishes to restrict such data, the cover page of all such documents must be submitted as a single copy document, marked with the following legend:

This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed – in whole or in part – for any purpose other than to evaluate this proposal. However, if an award is awarded to this proposer as a result of – or in connection with – the submission of these data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting award. This restriction does not limit the Government’s right to use information contained in these data if they are obtained from another source without restriction. The data subject to this restriction are contained in Sheets [insert numbers or other identification of sheets].

Each restricted data sheet shall be marked as follows:

Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this document. To the extent that such restrictions on proprietary data or information would not interfere with the intent of the Government to make the results of the work and projects awarded under the BAA available to all interested parties, and if in conformance with the Freedom of Information Act (5 U.S.C. 552, as amended), the Government will honor those desires.

B. Budgetary Information

B.1. Preparation of Budget and Budget Justification

The budget should be prepared in accordance with the guidance in [PAPPG Section II.C.2\(g\)](#), which requires each proposal to include a budget for each year of support requested. The amounts for each budget line item requested must be documented and justified in the budget justification as specified in the PAPPG. Additional guidance is provided below:

For all proposal types, a detailed budget is required for the first two award years only. As part of this detailed budget, separate budgets must be provided for subawards to the core partner organizations and any affiliated organizations whose technical personnel, administrative staff, faculty, and/or students would be supported by the budget.

During the proposal submission process, the lead organization will be required to enter its line-item budget into the applicable section of the NSF Submission Portal. For the subaward line-item (of the lead organization's budget sheet), the lead organization should enter the total amount for all subawards for each budget year, as known at the time of proposal submission. For each subaward organization, a separate budget and budget justification must be uploaded as a PDF. Please follow instructions within the NSF Submission Portal to ensure that all budget information is entered and uploaded correctly. Proposers should see Section V.C of this BAA for instructions on preparing PDFs and accessing the submission portal.

Prior to, and near, the end of each annual reporting period, each Type-2 awardee will be required to submit a two-year budget, covering the two-year period of the award following the current reporting period.

B.2. Infrastructure

No more than 20% of the NSF budget maybe used to build or upgrade infrastructure assets. If any portion of the budget is allocated for infrastructure, then the proposal needs to include, in the budget justification section, a plan for supporting operations and maintenance using funds other than from the NSF Engines award.

B.3. Indirect Cost (F&A) Calculations

The applicable U.S. federally-negotiated indirect cost rate(s) must be used in computing indirect costs (F&A) for the proposal. The amount for indirect costs should be calculated by applying the current negotiated indirect cost rate(s) to the approved base(s), and such amounts should be specified in the budget justification. Indirect cost recovery for IHEs is additionally restricted by 2 CFR § 200, Appendix III, paragraph C.7, which specifies federal agencies are required to use the negotiated F&A rate that is in effect at the time of the initial award throughout the life of the sponsored agreement. Additional information on the charging of indirect costs to an NSF award is available in PAPPG Chapter X.D.B.5.

B.4. Other Budgetary Requirements

Budgets for all projects must include funding for the Project Director and key Senior Personnel to attend at least two meetings per year organized by the NSF Engines program at locations within the U.S. It should also be noted that the NSF Engines program will host several training activities focused on catalyzing and growing thriving regional scale innovation ecosystems. The nature and frequency of training activities will vary based on award type (Type-1 or Type-2). All members of an Engine's leadership team must attend all required training activities. Training activities may include virtual and in-person events. Details on the expected time commitment and participation levels will be provided by NSF during the pre-award stage, after the completion of the merit review process.

Although many proposals submitted in response to this BAA will include the participation of for-profit organizations, NSF proposal budgets may not include profit or fees.

The overall Engine budget should be developed to ensure that funding is sufficient to achieve the Engine goals. Budgets should also include necessary resources for reporting, Site Visit costs, and travel for Engine-wide collaboration and NSF meetings. The budget submitted to NSF should only reflect NSF funding for the Engine.

C. Submission Portal Requirements

Please use the following link to access the NSF Submission Portal: <https://baam.nsf.gov>.

Users need to ensure that any PDF provided/uploaded to NSF shall follow these rules:

- The files should be portable (i.e., viewable in all browsers);
- The files should not be protected or encrypted;
- The files should not be an image-only document (i.e., should contain editable text to allow software readability); and
- None of the files should be a Portfolio PDF.

VI. NSF Proposal Processing and Review Procedures

A. Overview

If a proposal meets minimal NSF requirements for review, it is then carefully reviewed by a scientist, engineer, innovator, and/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 and activities represented by the proposal (e.g., research, translation, partnerships, workforce development) and reflect the diversity, equity, inclusion, and accessibility values espoused by this program. These reviewers are selected by Program Officers charged with oversight of the review process. 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/.

B. NSF Proposal Review Process

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. NSF's two standard review criteria – (1) Intellectual Merit and (2) Broader Impacts – are incorporated in the Additional Review Criteria described below. The Intellectual Merit criterion encompasses the potential to advance knowledge; and the Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes. Please refer to PAPPG Section III.A for comprehensive coverage on the Merit Review Principles and Criteria.

B.1. Additional Review Criteria for Concept Outlines

Concept Outlines will be reviewed internally by Program Officers from the NSF Engines program, and will be evaluated on how they address the following questions:

- a) **Purpose and Vision:** To what extent does the topic area defined by the proposed Engine address compelling national and/or societal challenge(s)? Are the scale and scope of the

proposed scientific and technical work likely to make significant progress on addressing the challenge? What new capabilities or outcomes (e.g., technologies, goods, products, startups, jobs) will result from this work? To what extent will the proposed Engine go beyond the state of practice and address major gaps, for example scientific, technological, and workforce expertise?

- b) **Regional Importance and Impact:** Is the maturity of the regional innovation ecosystem aligned with the goals of the Engines program? To what extent is the proposed work driven by applications, needs, and capabilities that are important to the local regional economy? (*Type-2 Concept Outlines only*): To what extent are the potential innovations that result from the proposed work likely to lead to translational efforts that will significantly strengthen the regional economy?

For Type-2 Concept Outlines only:

- c) **Partnerships:** Is the set of partners identified appropriate for addressing the proposed work? Are the partners relevant to the region and topic of choice, and is their role in the economic development of the region well-described?
- d) **Workforce Development:** Are the future regional workforce needs motivated by regional interests, including industries and other organizations?
- e) **Related Initiatives:** Does the Concept Outline identify existing large-scale efforts in the topic area?

B.2. Additional Review Criteria for Type-1 Proposals

In addition to intellectual merit and broader impacts, Type-1 proposals will be evaluated on how they address the following questions:

- a) **Purpose and Vision:** See the guidance for Concept Outlines.
- b) **Regional Importance and Impact:** See the guidance for Concept Outlines.
- c) **Leadership Team:** Does the proposal provide a reasonable plan for forming a visionary and effective leadership team, including the recruitment of a full-time CEO? Does the proposal describe a well-informed process by which all necessary disciplines, skills, perspectives, and capabilities will be brought together to form an interdependent, multidisciplinary, and diverse leadership team that can work and communicate effectively?
- d) **Partnerships:** Is the set of partners identified appropriate for addressing the proposed work? Are the partners relevant to the region and topic of choice, and is their role in the economic development of the region well-described? Does the proposal have an initial set of partners from multiple organizations? Does the proposal clearly define the types of partnerships needed for a Type-1 proposal and identify potential partners for a Type-1 proposal?
- e) **Workforce Development:** Does the vision for a workforce development plan address regional needs relevant to the proposed Engine mission? Does the proposed vision promote a well-justified balance in the training of diverse technicians, practitioners, researchers, and entrepreneurs?
- f) **Diversity, Equity, Inclusion, and Accessibility:** How well does the proposal describe the requirement that the Engine should embody diversity, equity, inclusion, and accessibility throughout all of its activities? Are there clear, measurable goals and metrics specified?
- g) **Risk Identification and Adaptability:** How well does the proposal address the opportunities, risks, and the competitive landscape for the proposed Engine including existing efforts funded under other government programs?

B.3. Additional Review Criteria for Type-2 Proposals

In addition to intellectual merit and broader impacts, these proposals will be evaluated on how they address the following questions:

- a) **Purpose and Vision:** See the guidance for Concept Outlines.
- b) **Regional Importance and Impact:** To what extent is the proposed work driven by societal and/or economic challenge(s) that are important to the regional economy and is there a credible plan to move research to practice? To what extent are the potential innovations that result from the proposed work likely to lead to translational efforts that will strengthen the regional economy?
- c) **Leadership Team:** Does the proposal describe an experienced and visionary leadership team, including the CEO, capable of managing the Engine? Does the proposed leadership structure provide sufficient authority for making necessary culture change, adapting to changing conditions, or pivoting from efforts that are not having desired results? Does the proposal describe a well-informed process by which all necessary disciplines, skills, perspectives, and capabilities will be brought together to form an interdependent, multidisciplinary, and diverse leadership team that can work and communicate effectively?
- d) **Partnerships:** Is the set of partners identified appropriate for addressing the proposed work? Are the partners relevant to the region and topic of choice, and is their role in the economic development of the region well-described? Do these partners span an appropriate diversity of sectors (e.g., industry including small businesses, academia, federal, state, local, and tribal governments, and/or non-profits) as well as an appropriate diversity of organizational types (e.g., minority-serving institutions, primarily undergraduate institutions, community colleges)? Are the core partners fully engaged at all levels from leadership to technical and workforce development efforts? Is it clear that all partners are contributing to and benefiting from the partnership? Have the partners made significant contributions of resources and people? Is there a well-developed plan to grow the set of partners to address the goals of the Engine? How well does the proposed Engine outline plans for strategic engagement of stakeholders (e.g., industry, practitioners, regulatory, and non-profits)?
- e) **Workforce Development:** Does the workforce development plan address regional needs relevant to the Engine mission? For example, will the plan lead to a well-justified balance of technicians, practitioners, researchers, and entrepreneurs? Is there a process in place to ensure that it will engage a fully diverse set of candidates? Is it sufficiently resourced? Are multiple partners actively engaged in workforce development, and also in the co-design of the plan?
- f) **Existing and New Resources:** Is there a well-structured and executable plan to raise additional outside funds, beyond NSF funding, to launch and scale the proposed Engine's efforts? Does the region show a diverse coalition of local (and potentially national) funders that span local government, philanthropy, and industry investment to support the growth of the region? Has the proposed Engine brought in new funding commitments as a part of the coalition-building that is required at this maturity level?
- g) **Diversity, Equity, Inclusion, and Accessibility:** See the guidance for Type-1 Proposals.
- h) **Risk Identification and Adaptability:** How well does the proposal address the opportunities, risks, and the competitive landscape for the proposed Engine including existing efforts funded under other government programs? Is the proposed structure able to move quickly at speed and scale, and is it capable of adapting in real time?
- i) **Effectiveness and Sustainability:** How realistic and complete is the potential for long-term sustainability of the Engine? Does the Evaluation Plan include the relevant metrics for success appropriate to the various phases of the Engine?

C. Co-Funding Opportunities

NSF may share proposals submitted in response to this BAA with other federal agencies interested in co-funding projects.

VII. Award Administration

A. Award Conditions

A.1. General 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, and (5) the BAA 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 PAPPG Chapter VII.

A.2. Additional Award Conditions

A.2.1. Post-Award Assessment

NSF may elect to appoint an external assessment team to assist NSF with monitoring and assessment of an Engine awardee's performance.

For a Type-2 award, NSF expects to assess the Engine's operations at the end of Years 1, 2, 4, 5, 7, and 9 from the start date of the award. The review will assess progress relative to the goals specified in the cooperative agreement. Each assessment will include a review of the progress report submitted by the Engine and may include a Site Visit from NSF and/or an external review committee. Additional Engine funding for the years after an assessment is contingent upon the Engine's performance. NSF reserves the flexibility to require additional intermediate assessments.

For Type-2 awards, resource commitments made by participating organizations and other partners of an Engine and the utilization of such resources will be a factor in the assessment process.

If an Engine's performance is deemed to be unacceptable, NSF will work with the awardee to mitigate the issues. During this mitigation period, NSF may engage in more frequent assessments, including site visits, as necessary. If the Engine is unable to resolve performance issues, the Engine will be directed to ramp down its operations. The details of a mitigation period and/or ramp-down will be subject to negotiation between NSF and the awardee under the terms of the cooperative agreement.

A.2.2. Intellectual Property Rights

Awards will generally contain detailed provisions concerning patent rights, rights in technical data and computer software, data reporting requirements, and other terms and conditions which may be negotiated as part of the award process.

For a Type-2 award, the awardee organization must submit an Intellectual Property Management Plan to NSF within six months of award date. IP Management Plans are not to be submitted at the time of proposal submission. All awardees will be required to submit a formal IP Management Plan within six months of the award date.

Partnerships that facilitate the research effort and transition of research results to practice are key elements of the NSF Engines Program. As such, a clear IP Management Plan is essential for current and future partnerships. Both ownership and management of IP should be addressed in the IP Management Plan. The plan should include (1) IP contributed by partners included in this proposal, (2) IP that may be developed during the project, and (3) a plan for access to IP from (1) and (2) by potential future partners. All appropriate agreements will be required no later than six months after award date. *While IP Management plans are not required at the time of proposal submission, NSF recognizes that completing such agreements often requires significant time, and strongly encourages proposing teams to begin fleshing out the details of all appropriate agreements early in their teaming process to ensure that the team can meet the six-month deadline.*

Commitments from partner organizations for sharing of resources (such as data, research instrumentation, or any other required elements for carrying out the proposed work) can be described within the Existing and New Resources to be Made Available for the Project Section; Formal agreements are required within six months of the award date.

A.2.3. Foreign Collaboration Considerations

(1) Consideration of new collaborations with international organizations. The awardee will be required to provide the cognizant NSF Program Officer and Grants and Agreements Officer with advanced written notification of any potential collaboration with international organizations or governments in connection with its NSF-funded award scope. The awardee will then be required to await further guidance from NSF prior to further contacting the proposed international organization regarding this potential collaboration or negotiating terms of any potential agreement. Advance notification to NSF will be required to include a description of the intended scope of the potential collaboration; how it contributes to the mission of the Engine; the organizations proposed to be involved; the duration of the effort; any possible Engine access or exchange of non-public data; provisional concepts of governing structures; the associated benefit to the U.S. scientific community; or other thing of value. Following initial NSF guidance, if negotiations commence, the awardee will be required to notify NSF of any changes that were not incorporated when NSF provided its original guidance and await further guidance before reaching final agreement.

(2) Existing collaborations with international organizations. The awardee will be required to provide the cognizant NSF Program Officer and Grants and Agreements Officer with a written list

of all existing foreign collaborations in which it has entered in connection with its NSF-funded award scope, detailing the scope of the agreement, participants thereto, duration, location, and the value or level of effort provided by the awardee. The awardee will be required to provide NSF with notice of any pending changes or developments that modify the information in this list.

(3) Description of collaborations that should be reported: In general, a collaboration will involve some provision of a thing of value to, or from, the NSF facility or awardee. A thing of value includes but may not be limited to all resources made available to, or from, the awardee in support of and/or related to the NSF award, regardless of whether or not they have monetary value. Things of value also may include in-kind contributions (such as office/laboratory space, data, equipment, supplies, employees, students). In-kind contributions not intended for direct use on this award but resulting in provision of a thing of value from or to this award also must be reported. Collaborations do not include routine workshops, conferences, use of the awardee's services and facilities by foreign investigators resulting from its standard published process for evaluating requests for access, or the routine use of foreign facilities by awardee staff in accordance with the awardee's standard policies and procedures.

A.2.4. Research Security

(1) Awardees will be responsible for establishing and maintaining oversight over the security of the Engine's research activities, results, and shared resources. At the time of award, the awardee organization must submit a comprehensive research security plan for review by the NSF Chief of Research Security Strategy and Policy. The research security plan must include, at a minimum, the following elements:

- i. Cybersecurity protocols, procedures, and training;
- ii. Foreign travel security policies and processes;
- iii. Research security training; and
- iv. Export control training.

The awardee must designate a member of the Engine's leadership team as the research security point of contact with responsibility for implementation and oversight of the research security plan.

(2) Following approval of the research security plan, NSF will conduct regular reviews of the research security efforts of the Engines and their participating organizations.

A.2.5 Ensuring Adequate COVID-19 Safety Protocols

This clause implements Section 3(b) of Executive Order 14042, Ensuring Adequate COVID Safety Protocols for Federal Contractors, dated September 9, 2021 (published in the Federal Register on September 14, 2021, 86 FR 50985). Note that the Department of Labor has included "cooperative agreements" within the definition of "contract-like instrument" in its rule referenced at Section 2(e) of this Executive Order, which provides:

- a. For purposes of this order, the term "contract or contract-like instrument" shall have the meaning set forth in the Department of Labor's proposed rule, "Increasing the Minimum Wage for Federal Contractors," 86 Fed. Reg. 38816, 38887 (July 22, 2021). If the Department of Labor issues a final rule relating to that proposed rule, that term shall have the meaning set forth in that final rule.
- b. The awardee must comply with all guidance, including guidance conveyed through Frequently Asked Questions, as amended during the performance of this award, for awardee

workplace locations published by the Safer Federal Workforce Task Force (Task Force Guidance) at <https://www.saferfederalworkforce.gov/contractors/>.

- c. *Subawards*. The awardee must include the substance of this clause, including this paragraph (c), in subawards at any tier that exceed the simplified acquisition threshold, as defined in Federal Acquisition Regulation 2.101 on the date of subaward, and are for services, including construction, performed in whole or in part within the United States or its outlying areas. That threshold is presently \$250,000.
- d. *Definition*. As used in this clause, *United States or its outlying areas* means:
 1. The fifty States;
 2. The District of Columbia;
 3. The commonwealths of Puerto Rico and the Northern Mariana Islands;
 4. The territories of American Samoa, Guam, and the United States Virgin Islands; and
 5. The minor outlying islands of Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Islands, Navassa Island, Palmyra Atoll, and Wake Atoll.
- e. The Foundation will take no action to enforce this article, where the place of performance identified in the award is in a US state or outlying area subject to a court order prohibiting the application of requirements pursuant to the Executive Order (hereinafter, "Excluded States and Outlying Areas." A current list of such Excluded States and Outlying Areas is maintained at <https://www.saferfederalworkforce.gov/contractors/>.

B. Reporting Requirements

The Project Director/CEO must submit an annual project report to the cognizant Program Officer no later than 30 days prior to the end of the current budget period. No later than 120 days following the end date of the grant, the Project Director also is required to submit a final project report, and a project outcomes report for the general public.

An Engine should share its annual reports with all of its stakeholders to ensure they have insight into the Engine's traction and progress toward outcomes of value to them. Both quantitative metrics and qualitative anecdotes should be provided in these annual reports.

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 Senior Personnel on a given award. The Project Director/CEO should examine the formats of the required reports in advance to assure availability of required data.

The Project Director is 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 Project Director/CEO 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 Project Director/CEO.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the PAPPG Chapter VII.

B.1. Resource Commitment and Utilization Reporting

As part of each Engine's annual report, the lead organization should update the resources contributed by internal and external sources towards the activities of the Engine. Specifically, for each contribution, the lead organization must specify the source, nature of the contribution (e.g., funds, expertise, access to testbeds, data sets), estimated total amount of contribution to date, total usage of contributed resources to date, new contributions made during the most recently-completed year, and usage of resources during the most-recently completed year. This breakdown of contributions should indicate progress toward achieving the contributions anticipated in the original proposal (see Section V.A.4.7), plus additional contributions beyond those. NSF considers growing contributions to the Engine over time as a critical indicator of the Engine's success, reflecting the value-add of the Engine to its region of service.

B.2. Program Income Reporting Requirements

On an annual basis, the lead organization will be required to submit a "program income reporting worksheet" to NSF in order to report program income earned and expended for their award or to validate that the project did not earn and expend program income during the applicable period. Additional information regarding this requirement is available in PAPPG Chapter VIII.D.4.

Failure to report program income or to validate that no program income was earned/expended could result in suspension of future grant payments.

B.3. Additional Reporting Requirements

The NSF Engines program may require interim reports at various stages of an Engine award. These requirements and other reporting requirements will be specified in the cooperative agreement of the award.

VIII. Appendices

A. Characteristics of Various Phases of Innovation Ecosystems

The second column in the table below describes the general maturity characteristics of an innovation ecosystem at the beginning of each phase of an Engine. Proposers are encouraged to use this information to help assess the maturity level of their region and select the appropriate Engine proposal type. Additionally, the third column of the table provides example growth indicator categories that can help proposers as they craft their Engine Evaluation Plans. These metrics and indicators should be used to evaluate the growth of the Engine during the specified phase.

Engine Phase	General Maturity Characteristics of an Innovation Ecosystem (At the start of a given phase)	Examples of Engine Growth Indicator Categories (To be used for assessment during a given phase)
Phase 1: Development	Existing organizations and activities within the region focused on the broad Engine topic area, with existing collaborations or interest	Demonstration of the capacity to educate a capable workforce in the topic area

	<p>in collaborating and forming partnerships</p> <p>Capacity to educate a capable workforce in the topic area, though few, if any, education efforts focus on the topic area</p> <p>Existing evidence of startup efforts/companies within the topic area, which may be from the academic or entrepreneurial community in the region</p> <p>Demonstration of research funding in the topic area</p>	<p>Demonstration that diversity, equity, inclusion, and accessibility is deeply and meaningfully embedded across all aspects of the Engine development plans</p> <p>Engine scientific and technical expertise and capabilities within the topic area</p> <p>Progress and planning toward forming a visionary and effective leadership team, which includes a dedicated full-time CEO</p> <p>Envisioned, specific short- and long-range goals for the Engine's three core functions and the ecosystem of partners and stakeholders</p> <p>Engine team includes partners from academia, industry, and elsewhere, as relevant to the topic area and goals</p>
Phase 2: Nascent	<p>Millions of dollars in capital inflow per year from industry and government into the Engine and the region within the topic area</p> <p>Interim agreements in place between core partners that would allow partners to carry out proposed activities on day 1 of the award period, with the ability for agreements to be finalized within the first four months of the start of the award period</p> <p>Alignment among regional partners and stakeholders (e.g., researchers, industry, local government, end users) on the joint priorities around topic area and associated Engine goals, initial set of activities, and education/workforce needs</p>	<p>Initial set of workforce development activities across various levels, such as future academics, practitioners, and entrepreneurs, aligned with the demands of the topic area and stakeholder needs</p> <p>Initial set of scientific and technical activities that have the potential to yield translational outcomes, including specific products or services, of value to the Engine stakeholders</p> <p>Visionary Engine leadership team that includes the necessary management capabilities, including a dedicated full-time dedicated CEO, to drive and meet the ambitious goals of the specific Engine, for all aspects of the Engine, including technical, translational, and associated operational functions</p> <p>Demonstration that diversity, equity, inclusion, and accessibility is deeply and meaningfully embedded across all aspects of the Engine, including management, core functions, ecosystem, and operations</p>

		<p>Demonstration that Engine ecosystem of partners has expertise and capabilities within the topic area, the transfer of products/services to market (as measured by startup ventures launched from the Engine’s activities and follow-on funding raised by Engine startups), and the development of effective education and training pathways for the current and future workforce</p> <p>Demonstration of leveraging of NSF funds at the Engine ecosystem level</p>
<p>Phase 3: Emergent</p>	<p>Demonstration of joint activities and initial outputs between partners (e.g., researchers, industry, local government, and/or end users driven) by the needs/priorities of the involved stakeholders</p> <p>Formal agreements in place with new or existing Incubator or Tech Transfer Hub, coupled with demonstration of initial activities/outcomes</p> <p>Compared to Phase-2, an order of magnitude higher capital inflow from industry and government into the Engine and the region within the topic area</p>	<p>Demonstration that a capable workforce in the topic area at all levels, both future academics as well as practitioners and entrepreneurs, is being educated and trained</p> <p>Leadership by an established and effective team that is delivering the ambitious goals of the specific Engine and is fostering a culture of innovation and inclusion</p> <p>Demonstration that diversity, equity, inclusion, and accessibility are deeply and meaningfully embedded across all aspects of the Engine, including management, core functions, ecosystem, and operations</p> <p>Demonstration of scientific and technical outcomes within the topic area</p> <p>Demonstration that research and translation activities—including proof-of-concept/piloting—are making progress toward addressing the identified societal problem(s)</p> <p>Creation of an initial set of products/services which are poised for or have the potential for translation, based on confirmed market needs</p> <p>Startup ventures graduating from Engine programs and successfully raising follow-on capital from non-NSF sources (Engines</p>

		<p>should provide longitudinal data on Engine graduates)</p> <p>Demonstration of leveraging of NSF funds at the ecosystem, Engine, and startup level</p>
<p>Phase 4: Growth</p>	<p>Numerous successful examples of multi-partner connections with practical outcomes (e.g., services and products that may be commercialized) generated between researchers, industry, local government, and/or end users and driven by the needs/priorities of the involved stakeholders</p> <p>Engine region has a growing ecosystem of partners and stakeholders, along with a growing workforce, in the topic area</p> <p>Well-functioning startup Incubator and/or Technology Translation Hub for the Engine or that the Engine can leverage in the region</p> <p>Compared to Phase-3, an order of magnitude higher capital inflow from industry and government into the Engine and the region within the topic area</p>	<p>Demonstration of value bringing technologies to market through startups or tech-transfers that emerge or leverage Engine outcomes</p> <p>Growth of industry in the topic area within the region</p> <p>Demonstration of development of local talent across the skill sets needed in the topic area</p> <p>Demonstration that a capable workforce of academics, practitioners, and entrepreneurs is being educated and matched to workforce needs within the topic area across all levels</p> <p>Engine operations and processes are institutionalized, and departure of a few key individuals does not impact Engine functioning</p> <p>Demonstration that diversity, equity, inclusion, and accessibility is deeply and meaningfully embedded across all aspects of the Engine, including management, core functions, ecosystem, and operations</p> <p>Demonstration that the Engine is a leader, including producing substantial outcomes, in the scientific and technological topic area</p> <p>Progression of research and translation activities toward addressing the identified societal problem(s)</p> <p>Startup ventures graduating from Engine programs and successfully raising follow-on capital from non-NSF sources (Engines should provide longitudinal data on Engine graduates); Engine graduates and</p>

		<p>regional-based ventures in aligned topic areas achieving key inflection points, such as returning licensing revenue to the Engine, receiving multiple rounds of follow-on funding from institutional investors, startup exits, and initial public offerings</p> <p>Generation of new research and translation activities specific to the topic area</p> <p>Demonstration of substantial job creation in the topic area within the region of coverage</p> <p>Demonstration of leveraging of NSF funds</p>
<p>Phase 5: Mature</p>	<p>Mesh networks (robust connections) of researchers, industry, local government, and/or end users driven by the needs/priorities of the involved stakeholders</p> <p>Established innovation engine that attracts new partners and stakeholders seeking value (e.g., collaboration, funding, benefit of proximity for a new startup) within the topic area</p> <p>Ability to replicate the Engine operations, processes, and associated ecosystem of partners and stakeholders in new topic areas within an expedited timeline</p> <p>Compared to Phase-4, an order of magnitude higher capital inflow from industry and government into the Engine and the region within the topic area</p>	<p>Demonstration of a capable and robust workforce in the topic area at all levels, numbering in the thousands, across academics and practitioners and entrepreneurs, that is being educated and matched to satisfy the workforce demands of the region</p> <p>Compared to Phase-4, growth by an order of magnitude in delivered value bringing technologies to market through startups or tech-transfers that emerge or leverage Engine outcomes; evidence of a new generation of startups emerging from the talent diaspora of previous startups that launched and successfully scaled in the region.</p> <p>Within the topic area, demonstration that diversity, equity, inclusion, and accessibility is percolating into the region in meaningful ways</p> <p>Demonstration of the Engine’s national leadership, including producing substantial outcomes, in the scientific and technological topic area</p> <p>Fortuitous cycle of generation of new research and translation activities specific to the topic area</p>

B. Proposal Certification

Proposal Certification Page

Government-wide certifications and representations are provided by the proposer on an annual basis in SAM (see [PAPPG Chapter I.G.2.](#)²

The Authorized Organizational Representative (AOR) (or equivalent) is required to upload a signed copy of this document which contains NSF-specific proposal certifications. It is the proposing organization's responsibility to assure that only properly authorized individuals perform this function.

The required NSF-specific proposal certifications are as follows:

Certification for AOR (or Equivalent)

By signing this document, the AOR is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this proposal. Further, the proposer is hereby providing certifications regarding conflict of interest (when applicable), flood hazard insurance (when applicable), responsible conduct of research and organizational support as set forth in the NSF Proposal & Award Policies & Procedures Guide (PAPPG). Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U.S. Code, Title 18, Section 1001).

Certification Regarding Conflict of Interest

By signing this document, the AOR is stating that the organization has implemented and is enforcing a written policy on conflicts of interest (COI), consistent with the provisions of PAPPG Chapter IX.A.; that, to the best of his/her knowledge, all financial disclosures required by the conflict of interest policy were made; and that conflicts of interest, if any, were, or prior to the organization's expenditure of any funds under the award, will be, satisfactorily managed, reduced or eliminated in accordance with the organization's conflict of interest policy.

Conflicts that cannot be satisfactorily managed, reduced or eliminated and research that proceeds without the imposition of conditions or restrictions when a conflict of interest exists, must be disclosed to NSF via use of the Notifications and Requests Module in Research.gov.

Certification Regarding Flood Hazard Insurance

Two sections of the National Flood Insurance Act of 1968 (42 USC §4012a and §4106) bar Federal agencies from giving financial assistance for acquisition or construction purposes in any area identified by the Federal Emergency Management Agency (FEMA) as having special flood hazards unless the:

- (1) community in which that area is located participates in the national flood insurance program; and
- (2) building (and any related equipment) is covered by adequate flood insurance.

² Note that, if, pursuant to the Lobbying certification provided in SAM, submission of the [SF LLL](#) is required, the proposer must upload a signed copy of this document signed by the Authorized Organizational Representative (or equivalent).

By signing this document, the AOR (or equivalent) located in FEMA-designated special flood hazard areas is certifying that adequate flood insurance has been or will be obtained in the following situations:

- (1) for NSF grants for the construction of a building or facility, regardless of the dollar amount of the grant; and
- (2) for other NSF grants when more than \$25,000 has been budgeted in the proposal for repair, alteration, or improvement (construction) of a building or facility.

Certification Regarding Responsible Conduct of Research (RCR)

By signing this document, the AOR is certifying that, in accordance with PAPPG Chapter IX.B., the institution has a plan in place to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduates, graduate students and postdoctoral researchers who will be supported by NSF to conduct research.

The AOR shall require that the language of this certification be included in any award documents for all subawards at all tiers.

Certification Regarding Organizational Support

By signing this document, the AOR is certifying that there is organizational support for the proposal as required by Section 526 of the America COMPETES Reauthorization Act of 2010. This support extends to the portion of the proposal developed to satisfy the Broader Impacts Review Criterion as well as the Intellectual Merit Review Criterion, and any additional review criteria specified in the solicitation. Organizational support will be made available, as described in the proposal, in order to address the broader impacts and intellectual merit activities to be undertaken.

Certification Regarding Life Sciences Dual Use Research of Concern

By signing this document, the AOR is certifying that the organization will be or is in compliance with all aspects of the United States Government Policy for Institutional Oversight of Life Sciences Dual Use Research of Concern. (See PAPPG Chapter II.D.6. for additional information.)

Authorized Organizational Representative (or equivalent) Name:

Title:

Date:

Signature: