

As the U.S. National Science Foundation continues to support and invest in America's innovation economy, we also seek to foster collaboration, encourage knowledge sharing and facilitate meaningful discussions to drive innovation forward.

This glossary intends to support the development of a shared vocabulary used in the dynamic and ever-evolving innovation ecosystem space. By providing a collection of key terms, ideas and concepts, we hope to aid in navigating through and communicating about innovation, entrepreneurship and ecosystem building.

This is not a comprehensive document of every term or concept related to ecosystem development; rather, it is intended to be a starting point for useful and important topics within the innovation ecosystem space. Likewise, it is intended to be a living document and will adjust, change and grow.

The NSF Directorate for Technology, Innovation and Partnerships (TIP) harnesses the nation's vast and diverse talent pool to advance critical and emerging technologies, address pressing societal and economic challenges and accelerate the translation of research results from lab to market and society. TIP improves U.S. competitiveness, growth of the U.S. economy and the training of a diverse workforce for future, high-wage jobs. For more information about TIP, visit <https://new.nsf.gov/tip/latest>.

General Terms

Accelerator: A cohort-based program for entrepreneurs and startups that provides access to supportive services like mentorship and training. These programs usually run for a fixed term, usually several months, after which startups will “graduate” out of the program.^{1,2}

Adoption readiness levels (ARL): A framework, designed by the U.S. Department of Energy, that assesses the adoption risks of a technology and translates this risk assessment into a readiness score, representing the readiness of a technology to be adopted by the ecosystem.

Anchor institution: Large, place-based institutions that are rooted in place and have a significant stake in their local communities. Typically, but not always, these organizations are large nonprofits like universities, schools, libraries, hospitals and other medical and health care providers, or philanthropic institutions. A recent [National Academies](#) report noted that, “their economic, intellectual and human capital places anchor institutions in a unique position to improve and enrich the surrounding community.”

¹ Cohen, S., Fehder, D. C., Hochberg, Y. V., & Murray, F. 2019. [The Design of Startup Accelerators](#). Research Policy.

² Desai, S. & Looze, J. 2020. [Accelerators: The Basics. Entrepreneurship Issue Brief](#), Ewing Marion Kauffman Foundation.

Angel investor: An individual that provides initial money to a startup company in exchange for ownership equity in the company.

CHIPS and Science Act of 2022: The “CHIPS and Science Act of 2022,” which was passed by the 117th Congress (2021-2022), is designed to boost U.S. competitiveness, innovation and national security. Through the law, Congress requires the establishment of a number of new regional innovation programs, including NSF Regional Innovation Engines (NSF Engines), Regional Technology and Innovation Hubs at the Economic Development Administration, and Regional Clean Energy Innovation at the Department of Energy. Additionally, the law established the Directorate for Technology, Innovation and Partnerships at NSF, charged with investing in use-inspired and translational research and development through a variety of novel programs such as NSF Engines, Translation Accelerators, Entrepreneurial Fellowships, test beds and future programs to be developed. ^{3, 4}

Collaboration: Relationships in which each party is as committed to the partners’ interests as it is to its own and works toward a shared goal — a key distinction from cooperation, detailed below. ⁵

Communities of practice: Groups of people who share a concern or passion for something they do and learn how to do it better as they interact regularly. These groups are formed by people who engage in a process of collective learning in a shared domain of human endeavor. ⁶ This framework is an important approach to sharing knowledge among leaders and practitioners in the ecosystem and economic development sector.

Cooperation: Cooperation is motivated by the benefits each party expects to receive from combining ideas, information and resources. Cooperative behavior is primarily extrinsically motivated, and parties engaged in cooperation still act in their self-interest. ⁷

Cross-sector partnerships: Relatively intensive, trusted, long-term interactions between organizations from at least two sectors (business, government and/or civil society) aimed at addressing a particular problem or set of problems. In an NSF Engines context, partners are organizations that actively participate and collaborate in joint R&D, translation and other technological innovation projects, workforce development or other NSF Engines activities. ⁸

³ Lawhorn, J. M., Gallo, M. E., Levin, A. G., & Blevins, E. G. April 3, 2023. [Regional Innovation: Federal Programs and Issues for Consideration](#). Congressional Research Service, R47495.

⁴ H.R.4346, 117th Congress. CHIPS and Science Act of 2022. <https://www.congress.gov/bill/117th-congress/house-bill/4346/text>.

⁵ Snow, C.C., 2015. Organizing in the Age of Competition, Cooperation, and Collaboration. *Journal of leadership & organizational studies*, 22(4), pp.433-442.

⁶ Wegner, E. & Wegner, B. 2015. An Introduction to Communities of Practice: A Brief Overview of the Concept and its Uses.

⁷ Snow, C.C., 2015. Organizing in the Age of Competition, Cooperation, and Collaboration. *Journal of Leadership & Organizational Studies*, 22(4), pp.433-442.

⁸ Tether, B.S., 2002. Who Co-operates for Innovation, and Why: An Empirical Analysis. *Research policy*, 31(6), pp.947-967.

Diversity, equity, inclusion and accessibility (DEIA): Refers to a set of practices intended to ensure that people from a broad set of demographic, socioeconomic and geographic backgrounds are represented and able to thrive in a workforce and to ensure that an organization’s actions and services to the public consider the needs and desired outcomes for all its constituents. This definition aligns with [the executive order issued by President Joseph Biden on June 25, 2023](#), outlining key definitions and direction for the federal government on DEIA, including the development and issuance of a government-wide DEIA strategic plan to be updated as appropriate, at a minimum of every four years.

Economic competitiveness: Economic strengths and challenges that determine the ability of a region, cluster of regions or a nation to effectively compete and thrive in the economic landscape.

Economic development: The process that creates the conditions for economic growth and improved quality of life by expanding the capacity of individuals, firms and communities to maximize the use of their talents and skills to support innovation, lower transaction costs and responsibly produce and trade valuable goods and services. ⁹ These conditions can, but do not always, create the conditions for wage growth and new high-paying jobs.

Ecosystem: The definition of the term has expanded from the biological — a system composed of all the organisms found in a particular physical environment and interacting with each other — to also mean a set of complex systems interacting together and resembling a biological system. See “innovation ecosystem” in this glossary for a topical definition of an ecosystem within the field of technology and innovation.

Ecosystem builders: Individuals or organizations that focus their work on building a system of support and resources for research, innovation, economic development, entrepreneurship and regional growth in their communities, industries or sectors.

EDA: The Economic Development Administration, a bureau of the U.S. Department of Commerce.

Entrepreneurial mindset: A way of thinking characterized by recognizing and acting on opportunities, making decisions with limited information and remaining adaptable and resilient in conditions that are uncertain and complex. ¹⁰

⁹ Key definitions as employed and understood in [EDA’s Performance Measurement and Program Evaluation methods](#). [Economic Development Agency](#).

¹⁰ Somers, M. Nov. 3, 2022. [3 Traits of an Entrepreneurial Mindset](#), quoting Rowena Barrett, Pro Vice Chancellor for Entrepreneurship, Queensland University of Technology. MIT Sloan School’s Ideas Made to Matter.

Entrepreneur: An individual who takes an idea and transforms that idea into a product, service, public asset or company and brings it to market. Additionally, there is often a qualification that entrepreneurs are the first to take on the risk of a new venture. Harvard Business School's Howard Stevenson says, "Entrepreneurship is the pursuit of opportunity without regard to resources currently controlled."¹¹ Brad Feld, one of the founders of Techstars, has defined the term as, "someone who creates a new company from scratch."¹²

Entrepreneurship: The practice of revitalizing mature organizations or starting new organizations, particularly new businesses, to deliver a new product or service to market, generally in response to identified opportunities.¹³ This practice is led by entrepreneurs.

Equality: A situation in which each individual or group of people is given the same resources or opportunities.

Equity (in DEIA context): The consistent and systematic fair, just and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment.¹⁴ Recognition that each person or group of people has different circumstances and needs for allocation of resources and opportunities to reach an equal outcome.

Equity (in investment context): While "equity" can refer to multiple concepts in the world of investing, in the context of raising capital, "equity" typically refers to an ownership interest in a company.¹⁵

Incubator: A collaborative program for organizations — often startups — designed to provide access to key resources through the early stages of launching an organization, business or product. These resources often include seed funding, shared workspace, back-office support, mentoring, training and networking opportunities for emerging businesses, organizations and initiatives.

Inclusive economy: Economies that expand opportunities for more broadly shared prosperity, particularly those facing the greatest barriers to advancing their well-being.¹⁶

Innovation: A dynamic process in which new ideas turn into practical value in the world. Per the Organization for Economic Cooperation and Development's Oslo Manual 2018, these generally include activities that introduce a new or significantly improved product, good, service or process typically aligned with a market need.

NSF Innovation Corps (I-Corps™): An immersive entrepreneurial training program that prepares scientists and engineers to extend their focus beyond the laboratory to increase the economic and societal impact of NSF-funded and other basic research projects. I-Corps uses a customer discovery process to help researchers identify a value proposition for their ideas that aligns with a market need and opportunity. NSF launched the I-Corps program in 2011. Since then, several other federal agencies (notably NIH and DOE) have implemented the I-Corps program as well.

Innovation district: A concentrated area of physical spaces that cluster entrepreneurs, lab spaces, startups and academia.

Innovation ecosystem: An interconnected network of people, organizations, institutions and resources that coevolves capabilities around a shared set of technologies, knowledge and/or skills and works cooperatively and competitively to drive innovation, prosperity and opportunity around a shared problem set, technology and/or societal challenge, possibly in a defined place or region.[17] An innovation ecosystem will help place-based or topic-based communities prosper through a "multiplier effect" leading to connections, synergies or new opportunities, and successive, compounding economic growth as well as the development of future opportunities for decades to come.¹⁷

Invention: The process of creating something that has never been made before.

Key technology focus area (KTFA): The "CHIPS and Science Act of 2022" specified [10 key technology](#) focus areas that call for research and development and acceleration of technologies by statute: artificial intelligence, high performance computing, quantum technology, advanced manufacturing, disaster prevention, advanced communications, cybersecurity, biotechnology, advanced energy efficiency and materials science.

Open innovation: Rather than a siloed approach, an approach to innovation that allows ideas to flow in and out of institutions and organizations to accelerate innovation and advance the development of new technologies.

Platform: A medium of communication, interaction and connectedness between people, organizations and/or institutions. These platforms can serve as a foundation for delivering technology services, determining shared ideas and principles or matching buyers with suppliers. Coming from the information technology paradigm, a platform can be thought of as "anything you can build upon."¹⁸

Platform technology: A technology or group of technologies used as a base upon which to develop applications, processes or additional technologies.

¹¹ Schurenberg, E. Jan. 9, 2012. What's an Entrepreneur? The Best Answer Ever. Inc. magazine.

¹² Feld, B. July 19, 2015. Do We Need a New Word For Entrepreneur? Accessed: July 11, 2023, at <https://feld.com/archives/2015/07/need-new-word-entrepreneur/>.

¹³ Onuoha, G., 2007. Entrepreneurship. AIST International Journal 10, 20-32 ¹⁴ The White House. Executive Order on Diversity, Equity, Inclusion, and Accessibility in the Federal Workforce. June 25, 2021.

¹⁵ SEC. Cutting Through the Jargon From A to Z. Accessed on July 11, 2023. <https://www.sec.gov/education/glossary/jargon-z>.

¹⁶ Benner, C. & Pastor, M., December 2016. Inclusive Economy Indicators: Framework & Indicator Recommendations. The Rockefeller Foundation.

¹⁷ Granstrand & Holgersson. March 2020. Innovation Ecosystems: A Conceptual Review and a New Definition. Technovation, volumes 90-91 (2020).

¹⁸ Bridgwater, A. May 2015. [What's the Difference Between a Software Product and a Platform?](#) Forbes.com

Place-based: A general planning approach that focuses on geographical places as the pivotal starting point for planning and development, specifically within a geographic region or community.

Place-based innovation: Efforts to leverage a region's existing geography, resources, culture, civic organizations, research institutions, universities and industries to establish clusters of innovation, address community needs and spur regional economic development.

Public-private partnership: A cooperative arrangement between public and private institutions toward a shared goal or goals, often over the long term. These partnerships are an increasingly essential part of thriving innovation ecosystems and are central to understanding how place-based economic development strategies succeed.

Regional innovation systems (RIS): A place-based form of technology-based economic development that involves private industry and public sector partners coordinating efforts to develop and grow regional economies and employment bases through the development, application and diffusion of technological and business knowledge.¹⁹

NSF Small Business Innovation Research (SBIR) program: Launched in 1977 by NSF as a pilot program, the SBIR program provides funding for startups and small businesses to engage in research and development with potential for commercialization. The NSF SBIR and Small Business Technology Transfer (STTR) programs have identical philosophies, review criteria, review processes and award dollar amounts. [The SBIR program was codified in 1982](#), requiring that all federal agencies with extramural research and development budgets exceeding \$100 million set aside 3.2% of their funding to support small businesses. Currently, 11 federal agencies participate in the SBIR program. For more information on NSF SBIR/STTR programs, also known as America's Seed Fund powered by NSF, visit: <https://seedfund.nsf.gov/>.

NSF Small Business Technology Transfer (STTR) program: The STTR program operates almost identically to the SBIR program, providing funding for startups and small businesses to engage in research and development with potential for commercialization. NSF's SBIR and STTR programs have identical philosophies, review criteria, review processes and award dollar amounts. The critical difference is that the STTR program requires that the small business proposer include an eligible research institution as a sub-awardee on the project budget. The STTR partner is typically either a not-for-profit institution focused on scientific or educational goals (such as a college or university) or a Federally Funded Research and Development Center.

For an STTR Phase I proposal, a minimum of 40% of the research, as measured by the budget, must be performed by the small business proposer, and a minimum of 30% must be performed by the partner research institution, with the balance permitted to be allocated to either of these or to other subawards or consultants. Established in 1992, federal agencies with extramural R&D budgets that exceed \$1 billion are required to reserve 0.45% of this extramural R&D budget for the STTR program. Currently five federal agencies participate in the STTR program. For more information on NSF SBIR/STTR programs, also known as America's Seed Fund powered by NSF, visit: <https://seedfund.nsf.gov/>.

Scale: Increasing the revenue of a business, generally without a corresponding substantial increase in resources. Scaling enables profitability in a business and an increase of that profit.

Small business: The U.S. Small Business Administration defines a small business as an independent business having fewer than 500 employees.

Stakeholders: A person, neighborhood, institution, group or organization that can affect or be affected by an issue or the achievement of the organization, initiative or institution's objectives.

Startup: An early stage, newly launched, often very small business or organization that is created to deliver a new product or service to market. It is also often thought of as a temporary organization searching for a repeatable and scalable business model.

Sustainability: In the Regional Innovation Systems (RIS) and innovation ecosystem context, sustainability refers to the conditions under which long-term viability of an organization, initiative, business, institution or approach can be created and maintained. This often includes, but is not limited to, financial considerations.

Talent: A person who has the aptitude or skill to do something well. Within a business context, talent is an employee who possesses the potential to drive organizational growth and is well suited to a specific job role. Talent is a key human capital resource in a successful innovation ecosystem.

Technology Readiness Level (TRL) Framework: A nine-point measurement scale developed at NASA during the 1970s that is used to assess the maturity level of a particular technology, with TRL 1 being the lowest and TRL 9 being the highest. For example, at TRL 1, scientific research is just beginning, whereas at TRL 9, the technology has been proven in an operational environment.²⁰

Technology transfer: The process by which innovations and technological development are transferred from one person or organization to another, often resulting in product development, commercialization, licensing or social entrepreneurship. Technology transfer may occur between universities, businesses or governments, and they may occur formally or informally.

Translation: An approach to research that seeks to produce more meaningful, applicable results. This is fundamentally about bridging the gap between knowledge gained through research and the use of research results in policy and/or practice.

Venture capital: A form of private equity and financing in which, in exchange for equity, investors provide funding to startup companies and small businesses that are believed to have high-growth potential. Venture capital is an important part of an innovation ecosystem, as the capital is necessary to support risky early-stage ventures.

¹⁹ Lawhorn, J. M., Gallo, M. E., Levin, A. G., & Blevins, E. G. April 3, 2023. [Regional Innovation: Federal Programs and Issues for Consideration](#). Congressional Research Service, R47495.

²⁰ [Technology Readiness Level](#). October 2012. NASA.

²¹ Haralson, L. E. April 2010. [What is workforce development?](#) Federal Reserve Bank of St. Louis.

Workforce development: A wide range of activities, policies and programs employed by organizations, institutions and people, often in place-based contexts, to sustain and retain a viable workforce that can support current and future business and industry. These activities can be undertaken by public-private partnerships, educational institutions or private businesses.²¹

NSF Engines-specific Terms

NSF Regional Innovation Engines (NSF Engines): Often referred to as NSF Engines, the program was authorized in Section 10388 of the “CHIPS and Science Act of 2022.” The program is designed to boost America’s innovation capacity, create sustainable innovation ecosystems and demonstrate inclusive economic growth. To reach this goal, the NSF Engines program will invest in and foster NSF Engines throughout the country. NSF Engines will be place-based ecosystems in U.S. geographic regions that do not have well-established innovation ecosystems already. An NSF Engine itself can receive up to \$160 million over 10 years of support from NSF to support the development of diverse regional coalitions of researchers, institutions, companies and civil society to conduct research and development that engages people in the process of creating solutions with economic and societal impacts. To learn more about NSF Engines, visit: <https://new.nsf.gov/funding/initiatives/regional-innovation-engines>.

Region of service: The NSF Engines program emphasizes the notion of stimulating innovation-driven economic growth within a well-defined “region of service.” The program leaves it up to proposers to define the region of service, ranging from a metropolitan area (including its adjacent rural regions) to an area spanning parts of several states. The NSF Engines program funding prioritizes U.S. geographic regions that do not have well-established innovation ecosystems.²²

Builder Platform: The NSF Builder Platform is a support system for NSF Engines. The Builder Platform is a human-centered, high-touch support network for NSF Engines awardees. The platform team comprises individuals who connect NSF Engines awardees with the talent, knowledge, resources and communities they need to excel in a heavily curated manner.

Type-1 (NSF Engines Development) awardees: Type-1 awardees are eligible for up to \$1 million in NSF funding over two years of support. Type-1 awards enable each awardee to lay the groundwork for establishing a new NSF Engine in their region for a given topic area. At the end of the Type-1 award period, awardees are expected to be well prepared to apply to become an NSF Engine in the nascent phase. These awards are also referred to as NSF Engines Development Awards.

Type-2 (NSF Engines) awardees: Type-2 awardees are eligible for up to \$160 million in NSF funding over 10 years of support. These awards support NSF Engines across three distinct phases — the Nascent, Emergent and Growth phases. Throughout the three phases, a given NSF Engine will create firm partner and constituent commitments, seek continued growth of its innovation ecosystem and help its regional innovation ecosystem emerge as a national leader in its topic area.

NSF Engines innovation ecosystem life cycle: There are multiple innovation ecosystem models that outline the development process to maturity. The graphic and definitions below illustrate and define the growth of an innovation ecosystem within the NSF Engines program using a five-phase model.



- **Development phase** – Initial scope is defined and strategic plans are developed.
- **Nascent phase** – Organization and partnerships are solidified and innovation activities ramp up.
- **Emergent phase** – Technological products and services and workforce capabilities are scaled, and the innovation ecosystem starts to attract sizeable external funding toward promoting innovation-based economic activity.
- **Growth phase** – Innovation ecosystem grows as a national leader, attracting increasing levels of economic activity and business creation, with underlying support from state, local and federal governments.
- **Mature phase** – Innovation ecosystem is well established and can sustain itself without NSF funding.

Technology, Innovation and Partnerships (TIP): NSF’s first new directorate in more than 30 years, TIP was authorized by the “CHIPS and Science Act of 2022.” The TIP Directorate was charged with the critical mission of advancing U.S. competitiveness through investments that accelerate the development of key technologies and address pressing societal and economic challenges. TIP advances use-inspired and translational research in all fields of science and engineering, giving rise to new industries and engaging all Americans — regardless of background or location — in the pursuit of new, high-wage jobs in science, technology, engineering and math (STEM).

National Science Foundation (NSF): An independent federal agency that supports science and engineering in all 50 states and U.S. territories. NSF was established in 1950 by Congress to promote the progress of science; advance the national health, prosperity and welfare; and secure the national defense. NSF fulfills its mission chiefly by making grants. NSF investments account for about 25% of federal support to America’s colleges and universities for basic research, that is, research driven by curiosity and discovery. It also support solutions-oriented research with the potential to produce nearer-term advancements for the American people.

²² [About NSF Engines](#). National Science Foundation.