Early stage funding markets for science: an analysis

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Abstract

Early stage funding is a growing category in science philanthropy that benefits both basic and applied research. "Early stage" refers to high-risk, high-reward projects that are not yet well-funded.

In the summer of 2022, with support from Schmidt Futures, I took a closer look at several emerging funding mechanisms – *rapid grants*, *scout programs*, and *focused research organizations (FROs)* – to understand how they serve the needs of early stage science.

Early stage funders share common interests, including a desire for reduced administrative burden, faster application cycles, and a higher tolerance for risk and failure. They favor qualitative, rather than quantitative, heuristics to evaluate opportunities and measure impact.

The growth of early stage funding has made it possible to fund more types of science research, from prototyping to "public infrastructure" (such as open-access tooling and datasets). Early-career scientists, in particular, benefit from this type of funding. All of this has been accomplished with fewer administrative costs than expected, which suggests there are operational learnings that other funders could emulate.

While progress is encouraging so far, early stage funders are not a panacea for all of science funding's problems. Grant sizes are still small (typically <$1 million), and the long-term impact of these programs is still unknown. Further work is needed to attract more funders and capital; to increase awareness of these opportunities among early-career scientists; and to demonstrate to federal government agencies what's working well and identify what can be adapted for larger-scale programs.

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Executive summary

Changes in science philanthropy in the past decade – a significant growth in capital spend, changing career interests from science and engineering PhD graduates, and increased urgency since the onset of the COVID-19 pandemic – have converged to create the beginnings of a "seed stage" market for science, which addresses a critical funding gap for early stage discovery and prototyping.

In the summer of 2022, with support from Schmidt Futures, I took a closer look at several emerging science funding mechanisms – rapid grants, scout programs, and FROs – to understand how they serve the needs of early stage science. I also conducted interviews with funders, program administrators, and grantees to understand their goals, operations, and intended impact, and how their work fits into the existing science funding landscape.

Early stage funding is a growing category in science philanthropy that benefits both basic and applied research. "Early stage" refers to high-risk, high-reward projects that are not yet well-funded. (One scientist described this stage of funding as "pre-R01.") Federal government agencies, such as the National Institutes of Health (NIH) and National Science Foundation (NSF), which provided 42% of funding for basic research and 35% of funding for applied research in 2017[1], mostly favor *growth stage* opportunities: research that has been partially de-risked and requires higher levels of financial support.

Note that "early stage" is not synonymous with basic research. A project could be about testing an idea that no one has ever tried before, as with basic research, but it could also be about creating a prototype or proof-of-concept, as with applied research. For example, Fast Grants is focused on funding COVID-19 research, while Revive & Restore's Catalyst Fund supports projects that translate biotechnology concepts to wildlife conservation applications.

While it is understandable why government agencies, who are beholden to public interests, gravitate towards lower-risk, growth stage opportunities, we would typically expect philanthropy to fill the gaps for early-stage science funding in the United States, as it does for other public goods. Historically, philanthropy served this role well, particularly in the late 19th century and early 20th century.

Since WWII, however, as the United States government expanded its role as a science funder, science philanthropy began to skew towards growth stage opportunities, serving as "follow-on" capital for projects with existing sources of funding, rather than funding the earliest stages of research. The recent growth of early stage funding, then, is an encouraging development for the science philanthropy sector itself.

Early stage science funders share common interests, including a desire for reduced administrative burden and fewer reporting requirements, faster application cycles, and a higher

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[1] https://ncses.nsf.gov/pubs/nsb20201/u-s-r-d-performance-and-funding

risk tolerance. They favor qualitative, rather than quantitative, heuristics to evaluate opportunities and measure impact, as well as a *champion* (one reviewer who's strongly in favor) rather than *consensus* (majority rule) review process. Because outcomes are uncertain, expected project failure rates are higher overall, but early stage funders are comfortable with this risk, and seek to fund many opportunities in order to find a few hits.

The availability of early stage funding has also made it possible to fund new areas and types of research that are typically not well-suited to existing sources of capital, including proofs-of-concept and prototyping, laying the groundwork for new research fields, interdisciplinary research, and "public infrastructure" for science (such as open-access tooling and datasets).

Early stage funders have also begun to develop new funding mechanisms that better suit their needs, including:

- **Rapid grants:** Grants that are designed for a faster turnaround, usually a few months. Often suited for early stage or proof-of-concept research, or for situations that require an emergency response.
- **Scout programs:** A method of grantmaking where funds are distributed through a network of scouts, or "regrantors." Scouts are chosen by the grantmaking organization and are typically well-networked or embedded in the organization's intended field of impact.
- **Focused research organizations (FROs):** A special purpose organization that is time-bounded (e.g., 5-10 years) and focused on accomplishing a scientific or technical goal that isn't adequately addressed by academia or industry – for example, the development of a new platform technology, or publishing a large dataset.

These mechanisms represent an emerging set of grant "vehicles" that are particularly suitable for the funding and practice of early stage science, both basic and applied. If funders continue to utilize and experiment with these vehicles, we could see the continued growth of an early stage science funding market, which would enable a growing number of entrepreneurial, early-career scientists to pursue their most innovative ideas. Additionally, early stage grantmaking norms could positively influence the practices of other funders, such as foundations, federal government agencies, and corporations.

While their progress is encouraging so far, early stage funders are not a panacea for all of science funding's problems. Early stage grant sizes are still small (<$1 million in most cases), and the long-term impact of these new programs is still unknown. If they are successful, scientists still need to seek additional funding from other, traditional sources in order to continue their work.

However, the emergence of early stage science funders can be understood as complementary, rather than competitive, to growth stage sources of funding. Federal research grants are often too time-consuming to pursue for ideas that are not yet mature; it is difficult to find dedicated funding for experimental ideas, which are typically relegated to “nights and weekends” work for scientists. Even the limited availability of early stage science funding serves a distinct purpose in the research lifecycle: many grant recipients interviewed for this report said their work would not have happened without these new programs.

Further work is needed to develop these early experiments into a full-fledged “seed capital” market for science: attract more funders and capital; increase awareness of these opportunities among early-career scientists; and demonstrate to federal government agencies what’s working well and identify what can be adapted for larger-scale programs.

A list of initiatives profiled in this report can be found in the Appendix (p. 41). The majority are less than two years old. The long-term impact of these initiatives remains to be seen, but thus far, they have been remarkably effective at funding innovative, as well as practically useful, research that might have otherwise gone unsupported. More importantly, funders and program administrators have accomplished this goal with fewer administrative costs than is typically required, which suggests there are operational learnings that other funders could emulate.

Evolutions in science philanthropy landscape

Philanthropy is often thought of as the “risk capital” counterpart to government funding. Just as venture capital provides funding for high-risk, high-reward ideas in the private markets, philanthropy fills a similar gap for public goods that are not yet ready for government funding.

While venture capital was invented shortly after World War II, it was only in the late 1990s – half a century after its onset – that we saw a massive expansion of venture capital, thanks to the favorable unit economics of software. In the 2010s, “seed stage” venture capital emerged as a new class of funding – smaller checks, written at earlier stages – due to technology advancements that lowered the costs of starting a software company and made it economically feasible to invest at earlier stages.

The availability of seed stage venture capital made it possible for more founders to find funding for their ideas. According to Crunchbase data, from 2006 to 2010, just over 3,000 companies received seed funding; from 2010 to 2015, that number grew to nearly 18,000.[2] Previously, founders had to raise money from friends and family or angel investors to fund the earliest stages of their work. Without the growth of seed stage venture capital, many of these founders might not have been able to pursue their ideas.

Science philanthropy is poised to undergo a similar revolution, due to a confluence of changes in environmental conditions in the past few years:

- **A growth in available capital for science philanthropy,** and from new types of funders;
- **An emergency response to the COVID-19 pandemic** that required funders to move more quickly;
- **A growth in the number of PhD graduates,** combined with a weakening academic job market, which motivates early-career scientists to seek alternative paths.

Taken together, these three conditions have made it easier for science funders to back innovative ideas from entrepreneurial scientific and technical talent at earlier stages than before.

Science philanthropy became more growth-oriented, post-WWII

Science philanthropy historically served a prominent role in funding early stage opportunities, particularly in the late 19th century and early 20th century. The Rockefeller Foundation’s support of research into the causes and control of yellow fever, for example, led to the development of a vaccine by virologist Max Theiler and his collaborators in the 1930s.

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[2] https://news.crunchbase.com/venture/seed-funding-startups-top-vc-firms-a16z-nea-khosla/

Prior to the invention of modern philanthropy, science patronage, such as that of the Medici family in the 15th and 16th centuries, and self-funded "gentleman scientists" in the 17th through early 19th centuries, provides a strong historical precedent for the role of private funders in science.

Since World War II, however, which led the United States government to greatly expand its role as the primary funder of science research, philanthropy has served more of a "follow-on" role to existing sources of funding, which tend to support later-stage opportunities. While science philanthropy is still thought of as a form of risk capital, operationally speaking, philanthropic funders favor supporting established organizations and do not move as quickly as they should, which means that private foundations have become increasingly less well-suited to meeting the needs of early stage science.

In her 2013 analysis of the science philanthropy landscape, Fiona Murray examined how much private grant funding goes towards fundamental versus translational research, and whether funders supported existing, well-funded research fields versus new areas of exploration.[3] Murray concluded that, *"compared to the patrons of science who first supported the emergence and professionalization of research in the United States in the mid- to late-eighteen hundreds, most of today's patrons generally work to supplement Federal funding across fields"* and that there is *"little support for the proposition that science patrons usually fill "gaps" left by Federal funding."* In addition, she found that "few philanthropists appear to seek to identify such gaps."[4]

Murray suggests that most philanthropic funders are focused on opportunities with "high" levels of funding, regardless of whether they are fundamental or translational. Private funders largely augment *existing* patterns of government funding, rather than supporting greenfield opportunities that aren't able to find funding elsewhere. A 2022 preliminary analysis of Form 990s by Louis M. Shekhtman, Alexander J. Gates, and Albert-László Barabási supports Murray's thesis: while philanthropic grants are distributed across a greater *number* of recipients than federal funding, in terms of dollar amounts, they are equally concentrated, with most dollars going to a limited number of recipients, and two-thirds of grants repeating to the same recipients in the following year.[5]

Among "low" (i.e. early stage) funding opportunities, Murray points to the archetypes of Nathan Myhrvold, a philanthropist who supports underfunded fields like paleontology and the search for intelligent extraterrestrial life, as well as the Gates Foundation, which provided critical funding for malaria research on the translational side, but notes that these "filling in the gap" approaches are not emulated enough by private science funders.[6]

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[3] One limitation of Murray's research is that she uses data from the Chronicle of Philanthropy on major (>$1 million) individual gifts, which doesn't tell us about how philanthropic funders give on the smaller side (<$1 million).

[4] https://www.journals.uchicago.edu/doi/full/10.1086/668238

[5] https://arxiv.org/pdf/2206.10661.pdf

[6] https://www.journals.uchicago.edu/doi/full/10.1086/668238

While Murray was focused on highlighting opportunities to fund research *fields* – rather than approaches within a given field – that are underfunded or overlooked, we can similarly understand the value of early stage science funders as filling the gaps, within or across fields, that are not adequately being met by existing sources of capital.

Private science grantmaking has more than doubled in the past decade

Since Murray published her report in 2013, philanthropic capital for science has more than doubled. Shekhtman et al.'s analysis of Form 990s filed by nonprofit organizations in the United States suggests that philanthropies now give and receive an estimated $30 billion per year to scientific research, surpassing the NIH's annual grant spending in 2019, and more than triple that of the NSF.[7] As of 2016, philanthropic capital accounts for up to 44% of basic research funding at American universities and non-profit research institutes.[8]

In addition to more philanthropic capital being allocated towards science, in the last few years, we've seen an influx of new *types* of science funders, particularly from those who made their wealth in tech and cryptocurrency, who are often drawn to science as a cause area. These funders are used to working quickly and are comfortable with high-risk, high-reward environments.

Several program administrators interviewed for this report mentioned that they had had more success raising funding from high net worth individuals, particularly those from tech and cryptocurrency, than foundations. For example, Fast Grants, a rapid grant program for COVID-19 science, noted that "relatively few organizations contributed to Fast Grants. The project seemed a bit weird and individuals seemed much more willing to take the "risk"."[9]

While Shekhtman et al. identified nearly 70,000 nonprofit organizations that gave or received science funding from 2010 to 2019, just 200 funders accounted for two-thirds of the total funds given to science. Half of funds remain locally focused within the same state. The addition of even a handful of new major funders, then, can have a significant impact on science grantmaking.[10]

COVID-19 pandemic made science funding move faster

After the outbreak of the COVID-19 pandemic in 2020, many actors – philanthropic funders, government, and scientists themselves – were moved by a new sense of urgency. A 2022

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[7] Note: this figure does not include scientific giving from LLCs, an increasingly popular funding vehicle among philanthropists in recent years. https://arxiv.org/pdf/2206.10661.pdf

[8] https://sciencephilanthropyalliance.org/philanthropy-a-critical-player-in-supporting-scientific-research-alliance-blog/

[9] https://future.com/what-we-learned-doing-fast-grants/

[10] https://arxiv.org/pdf/2206.10661.pdf

survey by Rockefeller Philanthropy Advisors of 150 philanthropic organizations in 30 countries found that one-third of respondents said they accelerated their giving timelines due to the pandemic.[11]

In March 2020, United States Congress significantly increased the National Science Foundation (NSF)'s budget for its Rapid Response Research (RAPID) program, driven by the need to "prevent, prepare for, and respond" to threats presented by COVID-19.[12] For comparison, in 2019, the NSF awarded $11.5 million in RAPID grants; in 2020, that budget grew more than tenfold to $120.1 million.[13] The prior existence of this grant program enabled the NSF to respond more quickly to the COVID crisis than if they had to create a new program from scratch.

Started in 1990 as part of the Small Grants for Exploratory Research (SGER) program, RAPID awards grants of up to $200,000 for "quick-response research on natural or anthropogenic events and similar unanticipated occurrences." The RAPID program is one of several NSF programs that is not required to undergo external peer review, which enables administrators to make award decisions more quickly.

(The NSF also has a sister program, EArly-concept Grants for Exploratory Research (EAGER), which was created along with RAPID in 2009.[14] EAGER offers grants of up to $300,000 for early-stage, exploratory, "potentially transformative research ideas of approaches" through a related program.[15] While EAGER's annual budget was historically larger than RAPID's, averaging between five to six times larger in the period from 2015-2019, unlike RAPID, its budget did not experience a substantial increase after the onset of the COVID pandemic.[16])

The increased urgency of a public health crisis gave philanthropic science funders more motivation to seek new ways to disburse funds more quickly. It is no coincidence that rapid grants, scout programs, and FROs all became more widely adopted starting after 2020.

Inside Philanthropy noted in 2020 that the Science Philanthropy Alliance, a consortium of philanthropic funders who are particularly focused on basic science, *"has had to pivot from its highly deliberate approach to offering [faster] guidance for funders looking to plug right into a global health crisis."* Former Science Philanthropy Alliance president Valerie Conn said that when it came to the pandemic, *"[T]here isn't time for a six-month landscape survey. We had to become quick and dirty."*[17]

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[11] https://www.rockpa.org/wp-content/uploads/2022/07/Time-Horizons-2022-1.pdf

[12] https://www.science.org/content/article/congress-pumps-nsf-program-fast-track-covid-19-research

[13] https://www.nsf.gov/nsb/publications/2021/merit_review/FY-2020/nsb202145.pdf

[14] https://www.nsf.gov/nsb/publications/2020/merit_review/FY-2019/nsb202038.pdf

[15] https://www.nsf.gov/pubs/policydocs/pappg22_1/pappg_2.jsp#IIE3

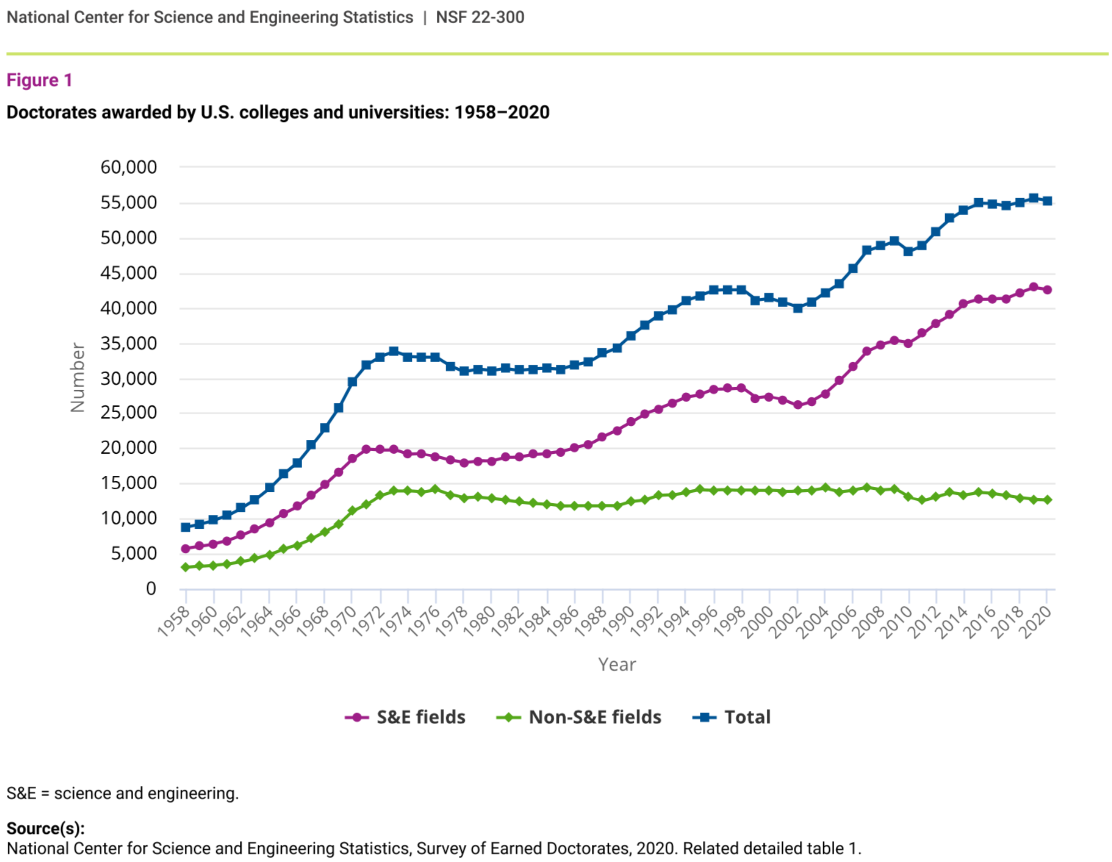
[16] https://www.nsf.gov/nsb/publications/2020/merit_review/FY-2019/nsb202038.pdf

[17] https://www.insidephilanthropy.com/home/2020/5/6/science-philanthropy-typically-requires-patience-now-funders-are-having-to-act-fast

PhD graduates are pursuing non-academic career paths

Finally, it is not just science funders who are changing in terms of interests and motivations, but also scientists themselves, particularly early-career scientists who have had to adapt their goals to a weakening academic job market.

Since 2002, the number of doctorates awarded per year in science and engineering fields has grown by roughly 60 percent.[18] But the number of academic faculty positions have not increased commensurately.



National Center for Science and Engineering Statistics | NSF 22-300

Figure 1

Doctorates awarded by U.S. colleges and universities: 1958–2020

S&E = science and engineering.

Source(s):
National Center for Science and Engineering Statistics, Survey of Earned Doctorates, 2020. Related detailed table 1.

Growth in science and engineering doctorates, relative to other fields.
(Source: NCSES)

In 2013, Richard Larson, Navid Ghaffarzadegan, and Yi Xue asked the difficult question, *"Are we producing more PhDs than needed?"*, finding that only 12.8% of PhD graduates are able to obtain tenure-track academic positions in the United States.[19] While most postdocs hoped to

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[18] https://ncses.nsf.gov/pubs/nsf22300/report/u-s-doctorate-awards
[19] https://onlinelibrary.wiley.com/doi/10.1002/sres.2210

pursue a career in academia at the start of the pandemic[20], there are simply not enough tenure-track faculty positions available, relative to the number of postdocs.

The COVID-19 pandemic only accelerated the postdoc job squeeze, as the number of faculty positions dropped an estimated 70% for the 2020-21 academic year, compared to the previous three years.[21] Although these numbers have since rebounded, it's likely that PhD graduates who were caught in the pandemic years were forced to revisit their expectations and interests – nearly a quarter of postdocs surveyed in 2021 said that they had changed their career plans due to the pandemic [22] – leaving them more open to pursuing nontraditional career paths.

In recent years, an academic career appears to have become less desirable to PhD graduates in science. *Science* interviewed a small group of researchers who were hiring for science postdocs in 2022 and found that most faced serious challenges with recruiting, both in terms of the number of applicants, and the quality of applications. One hiring manager claimed that, "The number of applications is 10 times less than 2018-2019."[23]

What might a PhD graduate do, if not pursue a career in academia? Industry jobs pay better salaries and offer an opportunity to put their skills to work in an applied environment. (To put "better salaries" into context: a 2021 survey of postdocs found that one-third of respondents said they couldn't meet their basic needs with their current salaries, including childcare, healthcare, food, and transportation.[24])

Postdocs are often portrayed as an underpaid, struggling workforce in search of jobs that don't exist. Nancy Schwartz, dean and director of postdoctoral affairs at the University of Chicago, describes postdocs as "this vulnerable, intermediate group that nobody takes care of"[25].

However, if we set aside our expectations that postdocs "ought" to pursue academic careers, we might instead view them as an untapped pool of highly skilled, high-potential technical talent that is strongly motivated to seek better-paying, challenging job opportunities elsewhere. In this respect, they are not unlike the scrappy, young founders who found a place to shine in startups after the 2008 economic recession, thanks to the availability of venture capital as a means of funding their most ambitious ideas. A weakened academic job market, then, creates a strong opportunity for early stage science funders to find and support cutting-edge science talent in the prime of their careers.

We are seeing more programs that are oriented towards helping early-career scientists pursue careers outside of academic institutions. For example, Activate, founded in 2015, offers a

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[20] https://www.nature.com/articles/d41586-020-03381-3

[21] https://www.science.org/content/article/amid-pandemic-us-faculty-job-openings-plummet

[22] https://www.biorxiv.org/content/10.1101/2021.11.19.468693v1.full.pdf

[23] https://www.science.org/content/article/professors-struggle-recruit-postdocs-calls-structural-change-academia-intensify

[24] https://www.the-scientist.com/news-opinion/pandemic-amplifies-postdoc-struggles-69558

[25] https://www.the-scientist.com/news-opinion/pandemic-amplifies-postdoc-struggles-69558

two-year fellowship to help scientists and engineers bring their technology to market.[26] New Science, launched in 2021, offers a fellowship program to accelerate the research of “talented young scientists who are working on ambitious ideas in the basic life sciences.”[27]

Additionally, if the costs of performing and distributing research can be lowered, a $200,000 grant can go further than it used to, which could make early-stage opportunities more attractive to private science funders. Emerging trends such as cloud labs, for example, could make it possible for scientists to perform bench work remotely. Shorter grant writing and publishing processes could also theoretically reduce the costs of a scientist’s time.

Most of the grantees interviewed for this report were in roughly the postdoc phase of their careers: that is to say, early-career scientists. Some were postdocs who, thanks to the availability of early stage funding, were able to pursue their ideas today, instead of waiting decades until they were more established in their careers. Others were slightly later in their careers, but had received funding for projects they had first dreamed up during their postdocs, but didn’t have the resources to pursue back then.

These scientists have less patience for navigating excessive bureaucracy and career hierarchies, where working even in a well-funded lab means supporting senior scientists’ research instead of pursuing one’s own ideas. Some mentioned they had discovered these new grant programs through nontraditional paths, such as cold emailing, reading blogs or Twitter, or via word-of-mouth. Others mentioned wanting to own their IP – in some cases, because they’ve considered commercializing their research – which made working in a university lab less appealing.

It’s not yet clear what the long-term career prospects are for PhD graduates who choose a non-academic path, but if more scientists start to pursue their interests, it could lay the groundwork for an expanded set of options, such as more scientists who become startup founders and early employees, or increased science funding made available for researchers at earlier stages of their careers. This growing pool of talent, combined with a new wave of science funders who are well-suited to their needs, offer a hopeful glimpse at how, in the coming years, science research norms could change significantly, starting from the bottom up.

Changing grantmaking norms

Early stage science funders operate differently from growth stage funders in more ways than just the size of their grants. They are especially interested in addressing some of the long-entrenched issues that impede science: time-consuming application cycles, supporting new and interdisciplinary research fields, funding individuals and not just organizations, and development of “public goods” infrastructure for scientists.

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[26] https://www.activate.org/fellowship

[27] https://newscience.org/one-year-fellowship/

Faster, simpler application cycles

Firstly, we can observe changes in *how* science is being funded: namely, that it moves much more quickly at earlier stages. One established funder noted that while philanthropic funding for early stage opportunities is not in itself new, the *way* in which new science funders work is noticeably different.

Among early stage funders, speed and reducing administrative burden are in vogue: moving quickly is more important than time-consuming deliberations, especially because these funders are usually making many smaller grants, rather than a few major ones.

Typically, grant application cycles are notoriously long in science. In a survey of Fast Grants' recipients, 57% of respondents said they spend more than one quarter of their time on grant applications.[28] Putting together a grant application can take months, followed by waiting another six months to a year after submission to get a final decision.

But long application processes are not compatible with the speed required for early stage funding. Because they're evaluating opportunities with uncertain outcomes, successful early stage funders need to find and back a greater number of projects in hopes of finding the few that do succeed.

An emerging set of early stage funding mechanisms, then, reflect improvements to the speed of the application process itself. Rapid grants and scout programs, especially, are designed to deploy capital quickly. Grants can be made to individuals, not just nonprofit organizations or institutions. Applications are short; review processes are fast; funds are disbursed quickly; reporting requirements are simplified.

One grantee, in describing the difference between ACX Grants, a rapid grant program, versus traditional NIH funding, explained that the former "didn't stop [them] from doing all the other work [they] had to be doing." Grant writing was typically an "exhausting endeavor" that required at least a month of full-time work (meaning, time spent not doing research); the difference in application cycles was "months versus days."

More types of science getting funded

Secondly, there are changes in *what's* being funded. The availability of early stage funding opens up new markets for science, enabling more scientists to pursue a wider set of projects that might have otherwise not been funded at all.

While early stage science funding is often assessed in comparison to government funding, their role should be thought of as complementary, not competitive. Sabrina Howell, for example, finds that firms who received an early stage R&D grant from the U.S. Department of Energy's SBIR program roughly doubled their chance of raising venture capital, and that these grants have

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[28] https://future.com/what-we-learned-doing-fast-grants/

"large, positive impacts on patenting and revenue." Howell emphasizes that "early-stage grants do not crowd out private capital. Instead they enable new technologies to go forward, transforming some awardees into privately profitable investment opportunities."[29]

To return to the analogy of startups, seed stage venture capital didn't replace the need for growth stage funding, but rather expanded the top of the funnel, giving more founders a chance to explore their most interesting ideas. Ten years later, the growth of seed stage funding is directly correlated to the unprecedented rise of technology startups, as well as financial returns. In order to fuel their continued growth, however, founders still need to raise more capital than seed stage investors can provide.

Several themes emerged when looking at the types of projects being funded by these new programs:

- **Development of new research fields:** Emerging fields that are still nascent and have high potential for "greenfield" exploration. For example, Impetus Grants is focused on longevity research; Unitary Fund funds projects related to quantum technology.
- **Interdisciplinary topics:** Fields that don't fit cleanly into a single source of funding, either because they require working across disciplines, or because they require an interdisciplinary set of skills to address. For example, Revive & Restore's Catalyst Fund is focused on bioscience (which requires drawing on both biomedical and conservation biology backgrounds), and E11 Bio is focused on brain circuit mapping (which requires both neuroscience and engineering skills).
- **Funding people, not just organizations:** A striking difference between these new programs, versus philanthropic funding from other sources, is apparent when browsing their grant lists, which often highlight individual researchers rather than their institutional affiliations. (Funders work with fiscal sponsors to disburse grants to nonaffiliated researchers, when necessary.) For example, Impetus Grants notes that for their first round of grants, *"the acceptance rate for students and PhDs was 26%, post-docs - 16%, and outsiders to academia - 9.6%, all of which aren't eligible for NIH grants."* Scout programs are focused on rewarding scientists, rather than their labs, for their work, even if they are affiliated with an academic institution. FROs are "university adjacent," but not explicitly affiliated with academic institutions.
- **Public infrastructure for science:** Developing tools, platforms, datasets, and other forms of infrastructure that solve common problems for scientists. These types of problems may be widely recognized, but scientists aren't incentivized to tackle them as a full-time endeavor, either because it is auxiliary to their main research focus, or because it is difficult to get funding from traditional sources for this type of work. For example, Convergent Research is incubating and supporting focused research organizations (FROs) that develop these types of tools for science. Unitary Fund also supports the development of "public goods" for quantum technology, such as toolkits, compilers, and programming languages.

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[29] https://www.aeaweb.org/articles?id=10.1257/aer.20150808

Emergence of new grant mechanisms

Finally, early stage funders are beginning to experiment with new grant mechanisms, which are better suited to their goals of rapid capital deployment, reduced administrative burden, and higher risk tolerance.

In the following sections, we'll look at three emerging trends – rapid grants, scout programs, and focused research organizations (FROs) – that are becoming popular among early stage science funders:

- **Rapid grants:** Grants that are designed for a faster turnaround, usually a few months. Often suited for experimental or proof-of-concept research, or for situations that require an emergency response.
- **Scout programs:** A method of grantmaking where funds are distributed through a network of scouts, or "regrantors." Scouts are chosen by the grantmaking organization and are typically well-networked or embedded in the organization's intended field of impact.
- **Focused research organizations (FROs):** A special purpose organization that is time-bounded (e.g., 5-10 years) and focused on accomplishing a scientific or technical goal that isn't adequately addressed by academia or industry – for example, the development of a new platform technology, or publishing a large dataset.

While each of these funding vehicles differ in terms of goals, size and scale, and target market, they also all became popular around the same time: after the onset of the COVID-19 pandemic. By understanding why these mechanisms appeal to new funders, we can better understand how science philanthropy is evolving.

	Rapid grants (p. 18)	**Scout programs (p. 23)**	**Focused research organizations (FROs) (p. 29)**
Description	Grants that are awarded on short timelines (weeks or a couple of months)	Identify grant opportunities via "scouts": respected individuals that are well-connected in an organization's field of impact (ex. scientists)	Special purpose organizations that are time-limited (5-10 years) and focused on accomplishing a specific technical or scientific goal
Target stage of research	Basic, applied	Basic	Basic, applied
Typical grant size	<$1 million	$100-200,000 budget per scout	$25-75 million per FRO, allocated over 5-10 years

Examples	Fast Grants, Impetus Grants, ACX Grants	Experiment Foundation science angels, Hypothesis Fund, Future Fund regrantor program	E11 Bio, Cultivarium, Rejuvenome
Primary advantages	Faster application process; award decisions made quickly	Increased exposure to new grant opportunities; less administrative burden; can be empowering to science communities	Blends the best of industry and academia in terms of work environment; well-suited for funding public infrastructure in science
Primary limitations	Small grant size - grantees need to seek additional funding sources if successful	Quality of grants depends upon quality of scout network. Small grant size - grantees need to seek additional funding sources if successful	Time-limited; significant amounts of capital required to set up

An overview of funding mechanisms covered in this report.

Deep dive: Rapid grants

Background

Unlike the other two funding mechanisms in this report, rapid grants are not new. Historically, they have been used to address issues that require immediate attention, such as a pathogen outbreak, public health crisis, or other type of emergency response. However, what is new is that, given an increased interest in faster funding since the onset of the COVID-19 pandemic, rapid grant programs are *expanding* in scope of application and adoption.

Several of the organizations profiled in in this report, such as Foundation Far's **Rapid Outcomes from Agricultural Research (ROAR)**, Woodwell Climate Research Center's **Fund for Climate Solutions**, and Revive & Restore's **Catalyst Science Fund** launched their rapid grant programs well before the pandemic and provide a historical precedent for newer programs today, with motivations ranging from addressing time-sensitive research needs to supporting early stage, pre-federal funding ideas.

Rapid grant program name	Organization	Field	Date launched	Purpose
Rapid Outcomes from Agricultural Research (ROAR)	Foundation Far	Agriculture	2014	Address urgent research and outreach needs, due to anticipated pathogen outbreaks
Catalyst Science Fund	Revive & Restore	Biotechnology, conservation biology	2018	Fund proof-of-concept projects that translate biotechnology learnings into wildlife conservation applications
Fund for Climate Solutions	Woodwell Climate Research Center	Climate	2018	Support experimental ideas from internal researchers more quickly than what government funding can provide

Various motivations for starting a rapid grant program.

Since 2020, urgent research needs stemming from the COVID-19 pandemic, which most federal funding programs were not designed to address, led to an expansion of the use of rapid grants. Preparing, submitting, and waiting to hear back about an NIH grant could take one to two years, whereas rapid grant cycles can be short as a few weeks to a month.

In April 2020, Patrick Collison, Patrick Hsu, and Tyler Cowen launched Fast Grants, which they "hoped could be one of the faster sources of emergency science funding during the pandemic."[30] Its founders expressed concern that the NIH was not adapting quickly enough to emergency funding needs: that "scientists — among them the world's leading virologists and coronavirus researchers — were stuck on hold, waiting for decisions about whether they could repurpose their *existing* funding for this exponentially growing catastrophe."[31]

Fast Grants received 4,000 qualified applications, and their team awarded 260 grants for a total of $50 million that year. The speed with which it was developed, launched, and managed – its founders launched Fast Grants ten days after having the initial idea and made its first grants within 48 hours, with just four part-time staff and 20 external reviewers[32] – sparked a wider conversation about how to use rapid grants to circumvent slower funding processes and distribute funds to early-stage projects more quickly.

The success of Fast Grants inspired the creation of several more rapid grant programs: **Impetus Grants** (for longevity research), **Experiment Foundation**'s partnership with **FootPrint Coalition** (for climate research), **ACX Grants** (a grant initiative by psychiatrist and blogger Scott Alexander), and **Repro Grants** (for female reproductive biology research, funded by venture capital firm Fifty Years). Future Fund, while not explicitly a rapid grant program, cites Fast Grants as inspiration for its short application cycles.

Fast Grants was widely referenced in my conversations with science funders and program administrators as an example of how science grantmaking is changing. In an interview for Day One Project, Martin Borch Jensen, who co-founded Impetus Grants, said that, *"Coming from the world of NIH funding, it seemed to me that the results of [Fast Grants] were very similar to the year-ish cycle of applying for and receiving a grant from the NIH. If the paperwork and delays could be greatly reduced, while supporting an underfunded field, that seemed unambiguously good."*[33]

Characteristics

While every rapid grant program is different, common characteristics include:

- **Short proposals.** Applications are typically between one to three pages long.
- **Fast response time.** Decisions are frequently made in a matter of weeks, up to a couple of months.
- **Easy to receive funds.** Funding is disbursed to grantees in a timely manner. Individuals can often apply without an institutional affiliation.

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[30] https://future.com/what-we-learned-doing-fast-grants/
[31] https://future.com/what-we-learned-doing-fast-grants/
[32] https://future.com/what-we-learned-doing-fast-grants/
[33] https://www.dayoneproject.org/martinborchjensen/

- **Small-to-medium sized grants.** Grant size is typically less than $1 million per project, often in the range of hundreds of thousands of dollars, although some programs (such as **Unitary Fund** and Experiment Foundation) are much smaller, in the $5,000 range.

Several program administrators mentioned that they use some version of a *champion* versus *consensus* model, a distinction that I first heard described by Unitary Fund. While outside experts may be consulted for their perspective, administrators explicitly try to avoid replicating the "middling consensus" (to use one person's words) that comes with peer review-style panels. Instead, they look for *champions*: reviewers who are enthusiastically supportive of a grant application, and are willing to bear the risk of betting on it, even if consensus is not reached.

For example, Impetus Grants states that, *"We ask 'could this work' rather than 'could this fail', and are not looking for complete consensus among reviewers; if at least one reviewer is strongly supportive of the project, we will tend to fund it."*[34] Unitary Fund uses a similar heuristic, because they feel it helps them take more "creative risks" that are required at the earliest stages of research, as well as helping them reach decisions more quickly.

ACX Grants offers one example of how champion models uncovered an opportunity that might not have passed a typical consensus review. On his blog, program administrator Scott Alexander describes the decision to fund a project from biochemist Michael Todhunter to work on automating the testing of cell culture media. Alexander states that *"several of my biologist reviewers gave assessments like "I'm not sure anyone will use this, except for me personally I WOULD LOVE THIS SO MUCH"."* The personal excitement of reviewers trumped a general uncertainty about whether others would find it useful, which led to Todhunter's project getting funded.[35]

The champion approach is well-suited to the needs of early stage versus growth stage science funding. Experimental ideas are, almost by definition, less likely to find consensus; champions can send a stronger signal that the idea is worth pursuing. A champion stakes their reputation on backing a grantee; if they make several "bad bets" in a row, their perspective will be weighted less heavily by program administrators.

Some funders also prioritize helping grantees with mentorship and forming peer connections, either with the funders themselves, or by connecting them to others. At Unitary Fund, reviewers who champion a successfully-funded application will serve as the "board member", or mentor, for that project, working closely with the grantee to monitor their progress and support their work. Revive & Restore's Catalyst Fund similarly works closely with grantees to help them succeed, whether it's helping them find collaborators or identify and measure their project targets.

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[34] https://impetusgrants.org/

[35] https://astralcodexten.substack.com/p/acx-grants-results

For the most part, administrators seem to find rapid grant programs easy to set up and manage if they are part of an existing grantmaking organization. Everyone I interviewed enthusiastically recommended that other organizations consider adopting similar programs. In cases where there was no grantmaking organization already, as with Fast Grants and ACX Grants, partnering with a fiscal sponsor (in these cases, the Mercatus Center at George Mason University and the Center for Effective Altruism, respectively) can make it easier to manage and distribute funds to grantees.

Analysis

Rapid grant programs are best suited for early stage, proof-of-concept research, and are most directly analogous to the development of a "seed stage" funding market in science philanthropy. They are not as well-suited for follow-on funding or "growth stage" research needs.

Again, "early stage" is not synonymous with basic research. Early stage simply means that an idea hasn't yet been de-risked. Several rapid grant programs, such as ROAR and Catalyst Science Fund, were explicitly designed to support applied research. One program administrator felt that exploratory research is "expensive," and given that their grant sizes were relatively small, they were more interested in producing prototypes and proof-of-concept applications, rather than funding grantees who were publishing papers.

Grant size was the biggest limitation mentioned by both grantees and operators. Rapid grant programs typically award less than $1 million per project, usually in the range of hundreds of thousands of dollars. They are useful for prototyping and de-risking new ideas – by supporting, say, one scientist's salary, for a year or two – but they are unlikely to replace the need for federal funding, the scale of which can provide for more resources on longer timelines required by research. And because federal funding has long application cycles that can take a year or more to complete, rapid grant recipients found themselves having to think about their next source of funding almost as soon as they had received their funds.

Program administrators, as well, expressed a desire to increase the size of these programs, both to be able to provide larger grants and follow-on funding, and also to be able to increase the number of awards they can make. For example, Impetus Grants' acceptance rate was 15%[36] and Fast Grants' was less than 10% in its first year, whereas the acceptance rate of NIH research project grants is around 20%.[37]

Despite these limitations, grantees were extremely enthusiastic about the value of rapid grant programs. Those I spoke to were unequivocally positive about the impact it had had on their research, using terms like "transformational," "awesome," and "delightful" to describe their experience. Several said that without rapid grants, their research would not have happened at all.

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[36] https://impetusgrants.org/news-and-updates/round-1

[37] https://report.nih.gov/nihdatabook/category/10

Finally, rapid grant programs can be an effective tool for building donor relationships. Two program administrators mentioned that because rapid grants are simple to understand and typically require smaller amounts of capital, they provide an opportunity to develop a relationship with new donors, who then might go on to support other activities at the organization with larger gifts.

Deep dive: Scout programs

Background

Scout programs take a page from venture capital, as well as other talent-driven industries, where firms recruit “scouts” – talented, well-connected individuals in a given field – to identify funding opportunities. Sequoia Capital, which launched its scout program in 2009, is widely credited with popularizing the concept among venture capital funds. Sequoia scouts are each given a budget of $100,000 to invest in technology companies. In the first ten years, Sequoia scouts funded 230 companies, including breakout successes like Uber, Stripe, and Faire, that collectively raised more than $6 billion in follow-on funding (excluding Uber).[38]

More recently, the scout mindset has crossed over to the philanthropic world. While not explicitly a scout program, **Emergent Ventures** launched in 2018 with $1 million from the Thiel Foundation and is managed by blogger and economist Tyler Cowen, who is responsible for selecting grantees and overseeing the application process.[39]

Cowen is not a traditional program officer; Emergent Ventures is not his full-time job. But he is widely recognized as an excellent curator of talent, who attracts interesting people as a byproduct of his work. In 2020, Emergent Ventures launched another program in India, EV India, which is managed by Shruti Rajagopalan, a senior research fellow at the Mercatus Center.

ACX Grants, which was previously referenced as a rapid grant program, is also an example of the scout model at work. Psychiatrist and blogger Scott Alexander announced the initiative in late 2021 with $250,000 of his own funds, but to his surprise, received another $1.3 million in matching funds from other donors. Like Cowen, Alexander has a reputation for attracting interesting people into his orbit, which makes him well-suited to find and fund new opportunities.

In early 2022, two philanthropic funds launched their own, dedicated scout programs, which can be understood as an expansion of these initial concepts: **Survival and Flourishing Fund (SFF)**, an initiative funded primarily by Skype co-founder Jaan Tallinn, which announced its **Speculation Grants** program; and **Future Fund**, a philanthropic initiative started by FTX cryptocurrency exchange founder Sam Bankman-Fried (note: no longer active).[40] Future Fund

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[38] https://techcrunch.com/2019/06/07/a-peek-inside-sequoia-capitals-low-flying-wide-reaching-scout-program/

[39] Disclosure: I received a grant from Emergent Ventures in 2022.

[40] In the time between when this report was researched and written, and when it was published, the Future Fund team and board resigned, following a liquidity crisis and subsequent filing of bankruptcy of its corporate funder, FTX, in November 2022. The team stated that they were “shocked and immensely saddened to learn of these events,” and that they were now “unable to perform our work or process grants,” as well as having “fundamental questions about the legitimacy and integrity of the business operations that were funding the FTX Foundation and the Future Fund.” It is unfortunate that the events

pledged to experiment with different funding models from the outset; their scout program (which they call a "*regrantor program*") was structured as a 6 month experiment, alongside a more traditional "open call" grant application process.

Within science, an early inspiration for scout programs can be found in a 2014 paper published by Johan Bollen, David Crandall, Damion Junk, Ying Ding, and Katy Börner, which proposed *"a highly decentralized funding model in which the wisdom of the entire scientific community is leveraged to determine a fair distribution of funding."* Instead of using peer review to make funding decisions, agencies would grant scientists a fixed amount of money every year, but require that they distribute a certain percentage of their funds to other scientists.[41] Bollen, a professor of informatics and cognitive science at Indiana University, calls this system Self-Organizing Funding Allocation (SOFA), and believes it would significantly reduce the administrative costs that are associated with peer review.

Bollen's attempts to work with government agencies to pilot SOFA have been largely unsuccessful. Stephen Griffin, a retired NSF program manager, expressed concerns about public accountability, among other issues, stating that, "Scientists aren't really equipped to be a funding agency."[42] A motion was passed by the Dutch parliament in 2016 calling for the Netherlands Organization for Scientific Research (NWO), its main science funding agency, to run a pilot program, but NWO has not yet taken action.[43]

While it may be difficult to convince government agencies to adopt experimental funding mechanisms due to public-facing concerns, this type of innovation is where philanthropy shines. Private funders can experiment with new ideas, which can later be adopted by government agencies if they show promise.

While all of the aforementioned scout programs have backed science research as part of their grantmaking, two additional scout programs launched in the past year that are exclusively science-focused: **Experiment Foundation**'s science angels, and **Hypothesis Fund**, which focuses exclusively on science scouts. Experiment Foundation gives scientists a budget of $50,000 to $100,000, which they can use to contribute to other scientists' projects on Experiment, a science crowdfunding platform.[44] Hypothesis Fund, which is backed by donors including Reid Hoffman and Bill Gates, gives scientists a budget of $300,000 each, which they can allocate to other, early stage research opportunities. Both programs give scientists one year to allocate their budgets.[45]

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surrounding Future Fund's corporate funder led to the subsequent, untimely cessation of their operations; I still believe their grantmaking strategies were innovative and worth learning from, and so this report's conclusions remain unchanged. (These views are solely my own.)
https://forum.effectivealtruism.org/posts/xafpj3on76uRDoBja/the-ftx-future-fund-team-has-resigned-1

[41] https://www.embopress.org/doi/full/10.1002/embr.201338068

[42] https://www.science.org/doi/10.1126/science.343.6171.598

[43] https://www.science.org/content/article/new-system-scientists-never-have-write-grant-application-again

[44] https://www.scibetter.com/backburner

[45] https://www.science.org/content/article/new-funding-effort-will-deploy-corps-scientist-scouts-spot-innovative-ideas

Characteristics

Scouts are ideally well-connected in a grantmaking organization’s intended field of impact. While they likely have a proven track record that contributes to their reputation among their peers, being a good scout isn’t necessarily the same as being, say, a good scientist. Rather, scouts are chosen based on the *strength of their networks*, as well as their *curation skills* and *conviction*, which means they are able to spot early opportunities before anyone else does.

In this way, scout programs are another example of the *champion* versus *consensus* model, similarly to the review process for rapid grants. Instead of trying to reach a consensus on who to fund, program administrators identify and empower trustworthy individuals to make these decisions themselves.

Some programs offer incentive-based compensation for scouts, such as increasing the size of a scout’s budget based on their performance. “Performance” is left to the discretion of the grantmaking organization, but could be determined based on level of activity, as well as quality of grant proposals. One program administrator said they give scouts an honorarium, which is paid out at the end of their grantmaking period.

“Quality” appears to be subjectively determined by each program based on their goals and interests. SFF’s Speculation Grants program, for example, relies heavily on what they call the “S-process,” an internal process for measuring the marginal utility of giving additional funding to a cause area, using a combination of an algorithm and a meeting process. While this process is well-aligned with their organizational culture, other programs might seek different ways to identify what they mean by “quality”: for example, alignment between a scout’s choices and the program’s mission and goals, or how well the scout’s choices expand an organization’s reach beyond their existing networks.

Future Fund also compensated scouts “based on the quality and volume of their grantmaking,” but noted that the benefits to scouts are more than just monetary: *“We are getting encouraging feedback that the program is helping empower some regrantors and grantees to be more ambitious and action-oriented.”*[46]

The scouts I spoke to attested to the personal benefits of participation, saying that they were motivated by their own experiences to do a good job. Most scientists themselves have encountered the challenges of getting funding for their research. They see participating in a scout program as a way of giving back to their fellow scientists and seeding the next generation of ideas.

Like rapid grants, scout programs can be complementary to the rest of a grantmaking organization’s activities, serving as an experimental, “lead generating” source of capital to build relationships with potential donors and grantees, which might lead to other, bigger opportunities

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[46] https://ftxfuturefund.org/future-fund-june-2022-update/

down the line. They do not require enormous pools of capital to set up: ten scouts with a budget of $100,000 each, for example, could potentially amplify the work of a grantmaking organization.

To reduce administrative complexity, scouts typically make non-binding recommendations to the grantmaking organization, but do not manage funds themselves. Program administrators can overrule a scout's recommendations if needed. However, administrators emphasized the importance of exercising discretion with their veto power, even if they may not have personally made the same decision, in order to build trust with their scouts.

Analysis

Scout programs offer several potential advantages over traditional grantmaking, such as:

- Helping funders discover new opportunities they might not have seen otherwise
- Reducing the administrative costs of grantmaking
- Building connections between peers within a scientific field

Discovering new opportunities

Scout programs can help increase a grantmaking organization's reach and impact. Program administrators generally seemed to feel that scouts helped increase awareness of their grant programs by not only generating a higher volume of applications, but also uncovering opportunities that they wouldn't have seen otherwise. In his reflection on ACX Grants, Scott Alexander stated that, *"I talked to some of these big foundation people, and they were unexpectedly bullish on microgrants. They feel like their organizations are more limited by good opportunities than by money."*[47]

One of Future Fund's goals with their regrantor program was *"the idea that regrantors…could exploit local knowledge and diverse networks to make promising projects move forward that we might not have known about or had time to investigate ourselves."* In a June 2022 update on the program, they stated that this outcome was going "better than expected": "A majority of our regrants seem like opportunities that we wouldn't have been aware of by default."[48]

Reducing administrative burden

Traditional sources of science funding are time-consuming to allocate: not just for the staff at a grantmaking organization, but the entire scientific community. Academics must write grant recommendations for their peers; scientists are asked to volunteer as application reviewers. The NIH's study section process, for example, appoints a team of 10 to 30 volunteers to review grant applications within their domain.[49]

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[47] https://astralcodexten.substack.com/p/so-you-want-to-run-a-microgrants?s=r
[48] https://ftxfuturefund.org/future-fund-june-2022-update/
[49] https://newscience.org/nih/#how-study-sections-work

All this time spent on administrative tasks is time that is diverted away from research. While scout programs are still new, and may be less efficient at allocating large amounts of capital, their proliferation could help reduce inefficiencies in traditional grant processes for everyone involved.

Instead of hiring program officers or soliciting volunteer reviewers to find, evaluate, and select grant opportunities, scout programs leverage talent that is already in the field and encountering these opportunities as part of their work. When managed well, scout programs also reduce work for program administrators. Administrators need only focus on ensuring alignment between scouts and the grantmaking organization, as well as reviewing and approving a scout's recommendations.

In their June 2022 update, Future Fund's staff said that efficiency was one of the biggest benefits of their regrantor program thus far: "[I]t doesn't take that much of our team's time to make the grants." By contrast, their open calls process "was fine" but "took a lot of our team's time and attention…our sense is we're able to generate >2x more value per time with our other activities."[50]

Building connections between peers

Scout programs also have a natural advantage in helping facilitate connections between peers in a given field. This is especially useful in science, where early-career scientists lack mentorship, and scientists are often socialized to compete with their peers for zero-sum gains, such as limited federal funding or getting first author on a published paper.

Receiving a grant from a highly-respected scientist, then – not just a grantmaking organization – can be especially validating, and forge a path to closer relationships. David Lang, who runs Experiment Foundation's science angel program, cited these types of connections as an underrated benefit of the program.

Challenges with scout programs

Scout programs are a promising and still-underutilized funding mechanism that draw inspiration from successful outcomes in other industries. However, there are a few challenges to consider.

Firstly, it's possible that scouts won't make any grants at all. Future Fund noted that regrantors' activity varies widely: more than 50% of their regrantors have not made any grants in the first three months of their program, while others "have used up their entire discretionary budgets, made good grants, and gotten their regranting budgets re-upped." [51] It can be difficult to predict which scouts will or won't ultimately participate in the process, so administrators need to recruit enough scouts to avoid a lack of activity becoming a detriment to the impact of the program itself.

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[50] https://ftxfuturefund.org/future-fund-june-2022-update/
[51] https://ftxfuturefund.org/future-fund-june-2022-update/

Incentive-based compensation can also help encourage scouts to be more active and make grants. These incentives can be structured to reward the most effective scouts with higher budgets, commensurate with the work they put in. There is plenty of room for future research and experimentation here to understand which factors lead to better grantmaking, or what "good" grantmaking even means. For example, while Hypothesis Fund and Speculation Grants list their scouts on their websites, Sequoia Capital's aforementioned program keeps its scout list private; does publicity affect a scout's level of activity? Does a scout's career stage (junior versus senior scientists) affect the quality of their grants?

Secondly, grantmaking organizations should consider how to convey the value of scout programs to their donors. Donors may be concerned that they will have less control over their impact, as well as reputational risks, if funds are "redistributed" to an external scout network, rather than the organization's staff. They may want to understand who the scouts are and how they are chosen.

However, because scouts are chosen for the strength of their reputation, demonstrated track records, and good taste, a high quality bar should help mitigate donor concerns. It's also worth highlighting to donors that scout programs can help grantmaking organizations be more efficient with their resources and uncover opportunities they might not have seen otherwise, which helps increase impact. One program administrator mentioned that individual donors actually liked the idea of scout programs as a way to stay "closer to the ground" in their communities of interest and provide opportunities for mentorship.

A few people I spoke to also expressed concerns about how to avoid scout "self-dealing," where scouts simply make grants based on their personal networks and interests, rather than trying to uncover the best opportunities. However, it's not clear that scout programs present a particular risk of self-dealing, versus anyone else who might find themselves in the position of making grants. If anything, because a scout's reputation is especially at stake among their peers, it seems they would be *more* motivated to do a thorough job and avoid perceptions of self-dealing. Publishing a list of grants could also help hold scouts publicly accountable for their decisions.

Finally, like rapid grants, scout programs tend to work best for early stage, proof-of-concept research, partly due to the smaller size of grants, and also because their lightweight, network-based process is better suited for identifying opportunities early on. Scouts can be excellent at spotting talent in the field, but they're less-equipped to handle the demands of growth stage funding, which can require more support from dedicated staff at a grantmaking organization.

Deep dive: Focused research organizations

Background

Focused research organizations (FROs) are a new type of special purpose organization that are designed to address scientific challenges that "require scale and coordination but…are not immediately profitable."[52] The first whitepaper about FROs was published in September 2020 by Adam Marblestone and Sam Rodriques, as part of the Day One Project, but the idea for FROs started many years prior, when Marblestone and Rodriques encountered these bottlenecks in their own research.

Marblestone first started thinking about FROs as part of his neuroscience research. He wanted a scalable, high-speed map of the brain, which would be a useful "meta" tool for researchers. However, it is also the type of project that would require a team of researchers and engineers to work on (because it is both a neuroscience and systems engineering problem), and that no one in academia would be incentivized to focus on exclusively (because it doesn't lead to producing papers).[53] As Marblestone and Rodriques put it, "the academic reward structure favors individual credit and discourages systematic teamwork."[54]

Realistically, problems like these become part-time work for scientists in academia, if someone is sufficiently motivated to take them on, but Marblestone argues that these types of problems deserve full-time attention. The Human Genome Project (HGP), for example, a successful international effort to sequence the human genome which took 13 years to complete, is a project that could have been developed as a FRO. It's also possible that the Human Genome Project could have been completed more quickly if it were structured and funded like a FRO, which would combine the benefits of HGP's centralized, privately funded competitor, Celera, with HGP's commitment to open access data.

Another example of a FRO-like opportunity comes from earlier in this report: Michael Todhunter's project for automating the testing of cell culture media, for which he received an ACX Grant. It is a tool that researchers want for themselves, but no one wants to spend time focusing on, because it is a "meta" problem that is auxiliary to their own research. Todhunter himself only ran into the problem as part of his postdoc research on cancer prevention: his lab grew mammary cells using a special medium that occasionally requires replacing everything and starting over, a tedious cycle that slows down their research.

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[52] https://uploads.dayoneproject.org/2020/09/09110249/Focused-Research-Organizations-to-Accelerate-Science-Technology-and-Medicine.pdf

[53] https://www.stitcher.com/show/idea-machines/episode/focusing-on-research-with-adam-marblestone-idea-machines-33-78860972

[54] https://uploads.dayoneproject.org/2020/09/09110249/Focused-Research-Organizations-to-Accelerate-Science-Technology-and-Medicine.pdf

The first set of FROs – **E11 Bio**, **Cultivarium**, and **Rejuvenome** – were launched in 2021, with more FROs currently in development. E11 Bio and Cultivarium are funded by Schmidt Futures, and Rejuvenome is funded by the Astera Institute, a philanthropic science initiative started by Jed McCaleb, who founded several early cryptocurrency projects. In addition, Marblestone, along with Anastasia Gamick, co-founded **Convergent Research** in 2021, as a support organization focused on incubating more FROs.

Focused Research Organization (FRO)	**What they're doing**
E11 Bio	Building a technology platform for full-stack brain architecture mapping, available to every neuroscientist
Cultivarium	Developing molecular, hardware and software tools to accelerate the adoption of wild microbes for beneficial biotechnologies
Rejuvenome	Producing an large, open and comprehensive dataset describing how key biomarkers are impacted by multiple interventions across the lifespan of mice

The first set of FROs.

Characteristics

FROs are designed to address scientific and technical challenges that are not well-suited for industry (because they cannot be commercialized in a reasonable timespan) or academia (because either researchers aren't incentivized to work on the problem, or because it requires skills, such as engineering, that are typically inaccessible to academia).

Just like rapid grants and scout programs, FROs fill an early stage funding gap; however, they usually involve the development of a tool, platform technology, dataset, process, or other type of "public infrastructure" for scientists that would greatly accelerate research if widely adopted, but – as is typical for public goods provisioning problems – no one is able to dedicate full time to. (The Chan Zuckerberg Initiative offers a precedent for this type of work: CZ Biohub's technology platform teams identify and build technologies for biomedical research, including analytical and bioinformatic tools and high-quality datasets.)

Those I spoke to were careful to clarify that most research problems are *not* meant to be solved by FROs. FROs are for "known unknowns," where their teams have a clear objective in mind; they are not intended for basic, exploratory research. The aforementioned Human Genome Project, for example, would have been suitable for an FRO because it is the type of research that has "predictable outcomes, although there is uncertainty concerning the time required to obtain them" (Chiara Franzoni, Paula Stephan, Reinhilde Veugelers).[55] Risk is largely confined to speed and execution, as well as how the project will be received or used, rather than whether the task can be accomplished at all.

On the other end of the spectrum, several people also emphasized that if it is possible to solve the problem with a commercial opportunity, they should pursue that option instead. FROs exist for problems that cannot be solved by either circumstance.

Structurally speaking, FROs share several key characteristics:

- **Time-bounded:** Every FRO operates on a finite timeline "in order to prevent mission creep and organizational aging."[56] Thus far, it appears that FROs operate in the range of 5 to 10 years.
- **Clear, specific goals:** The FRO timeline can be thought of as a sprint, where a team works closely together to achieve a specific goal, predetermined at the outset. They should be able to track their progress against these goals with quantitative metrics.
- **Working independently:** FROs are "university-adjacent," meaning they are not precluded from collaborating or interacting with researchers who are based at universities, or with universities themselves, but FROs themselves are not affiliated with an academic institution.
- **Solves "bottlenecks"** that have been identified by the research community, such as the need for a tool, platform technology, or dataset that would accelerate their work.

One person I spoke to compared the term "FRO" to "startups", in that neither concept is clearly defined, yet it fills a certain gap in their respective industries. Startups are, by the book, for-profit businesses, but it is commonly understood that startups operate differently from other businesses. Startups are designed for high-growth trajectories and outcomes; they are better suited for a certain type of funding that is risk-tolerant (venture capital, rather than, say, retail lenders); they are typically expected to have "exits" in the form of either an acquisition or IPO.

Similarly, while FROs may share similarities with research labs, they are fundamentally different. FROs are time-limited; they define their goals at the outset; they require tight coordination and a diversity of skills.

In both cases, the terms "FRO" and "startup" can also be applied towards solving many different types of problems. Just as there are fintech and healthcare startups, there can be FROs that solve problems in research fields as wide-ranging as neuroscience or climate technology.

Finally, FROs also resemble startups in terms of their organizational culture. Marblestone and Rodriques envisioned this aspect as a key part of FROs in their 2020 whitepaper: *"Each FRO*

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[55] https://www.nber.org/system/files/working_papers/w28905/w28905.pdf

[56] https://uploads.dayoneproject.org/2020/09/09110249/Focused-Research-Organizations-to-Accelerate-Science-Technology-and-Medicine.pdf

would be run by a CEO/CTO and staffed by a centralized, startup-like team of well-trained professionals sourced from both industry and academia. This personnel structure will enable tighter alignment of team incentives and focus."[57]

Like a startup, FRO teams are typically small- to mid-sized (10 to 30 employees or more), tightly coordinated, cross-disciplinary (drawing upon skill sets from scientists, engineers, and project managers), fast-moving (because they are time-bounded), and prioritize demonstrating traction and tangible outcomes (because they are usually creating a public good that requires adoption in order to be impactful).

Several people I spoke to described this startup-like environment as a major benefit of FROs. FROs offer a "best of both worlds" that is attractive to scientists with backgrounds in academia, who see FROs as a way to stay close to research, while also enjoying the fast-paced, results-driven environment of industry. FROs also typically offer compensation that is competitive with industry, which makes it easier to recruit talent. Those who work at FROs come from both academic and non-academic backgrounds – job candidates who work at FROs may have also considered everything from industry jobs to tenure track positions.

One person felt that team-building was one of the best aspects of an FRO. Teams are motivated by racing to solve a shared problem together, which makes for a collaborative, supportive environment. After an FRO winds down, they imagined, team members could go on to start companies or research labs together: the time-limited experience of an FRO could be viewed as the "seeding" of a new cohort of science talent, just as the alumni of successful startups might work together on new opportunities elsewhere.

Analysis

Unlike rapid grants or scout programs, each FRO requires significant upfront capital – tens of millions of dollars – to set up. On the other hand, because teams are focused on accomplishing a specific goal, the work of an FRO is significantly de-risked before they get started, compared to other types of research.

Because FROs are a new type of organization, their final trajectories are still unknown. While a number of people I spoke to expressed uncertainty about how to measure the impact of an FRO, this seems to be a function of their newness, rather than a structural challenge. If anything, it's easier to measure the impact of an FRO than rapid grants or scout programs, particularly because they are meant to have concrete deliverables. Those I spoke to seemed generally optimistic that we would better understand the impact of FROs in a few years.

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[57] https://uploads.dayoneproject.org/2020/09/09110249/Focused-Research-Organizations-to-Accelerate-Science-Technology-and-Medicine.pdf

In some ways, the impact of an FRO is straightforward. Did the team accomplish the goals they set out to achieve? Was the platform technology or dataset or tool developed, and are scientists using it?

On the other hand, as previously stated, there are still significant risks on the execution side. FROs operate on timescales that may not be long enough to accomplish these goals. Lessons learned from both public goods and startups suggest that gaining user adoption for a new platform, for example, can take years, and success is not always guaranteed. FROs also provide for the *creation* of public goods in science, but there aren't yet clear provisions for how these new tools will be *maintained*, beyond the duration of the FRO.

Finally, there are still unknowns related to what happens to FROs after they complete their mission and wind down. There are many possible paths a FRO could take, including commercialization, starting a nonprofit, or spinning up a research lab. Marblestone and Rodriques list a few ideas in their whitepaper:[58]

> *As a FRO sunsets, stakeholders...should be convened to maximize output deployment and uptake. Intellectual property should be out-licensed or released publicly for similar reasons. Transition support should be provided to outgoing FRO employees. Follow-on from FROs could include formation and/or incubation of new companies, larger public-sector projects, and/or creation of facilities designed to host and maintain FRO outputs (e.g., datasets or tools).*
>
> *[...] More frequently, we expect that an FRO might serve as proof of concept for a project or initiative that could then be separately pursued through an act of Congress or through a public-private partnership.*

The uncertainty surrounding "what happens after an FRO" also applies to employees' careers, which can present a challenge for talent recruitment. While FROs offer a number of material benefits over working in academia or industry, it can be difficult to demonstrate how FROs fit into a scientist's career, if candidates are not already open to the idea. There are opportunities here to build a hiring pipeline for FROs, finding and recruiting scientific and technical talent that is excited to pursue this type of path.

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[58] https://uploads.dayoneproject.org/2020/09/09110249/Focused-Research-Organizations-to-Accelerate-Science-Technology-and-Medicine.pdf

Impact & evaluation of early stage funding

The emergence of new funding mechanisms has naturally raised questions among established science funders about how to rigorously evaluate these opportunities, as well as measure the impact of their outcomes.

Impact measurement brings to the foreground, once again, the normative differences between early stage versus growth stage funding. Measuring the impact of an early stage project, where outcomes are uncertain, requires a different set of expectations compared to growth stage projects, where more information is available. Again, early stage funding is not merely defined by smaller check sizes, but also by a difference in grantmaking norms, as well as heuristics for impact and evaluation.

Qualitative, not quantitative measures

In venture capital, it is difficult to make quantitative assessments of a startup's performance until they are post-"product market fit," meaning they have transitioned to growing and scaling a product that has found traction in the market.

At the seed stage, however, venture capitalists don't have reliable metrics to go by. Even strong quantitative metrics aren't a guarantee of future performance and can quickly fizzle out as the company scales its operations. Instead, seed stage funders place a stronger emphasis on *qualitative* metrics, such as evaluating the team and market. Even a majority of failed investments are worth it if they get a few big winners, because those winners generate the lion's share of financial returns.

In early stage science funding, failure is also the assumed default state, because finding just a few winners can generate massive social returns. One program administrator, for example, told me that they don't measure success rates per project, but overall impact *across* opportunities (a *portfolio-level*, rather than *project-level*, approach). That could mean one extremely successful project, while all other projects fail – or even all failed projects, but their grantees go on to do impactful work elsewhere.

Open Philanthropy's Holden Karnofsky calls this practice *"hits-based giving,"* and notes that there is a "natural analogy here to certain kinds of for-profit investing," comparing his strategy to Paul Graham's – who founded startup incubator Y Combinator – framework of "black swan farming."[59]

Researchers Pierre Azoulay and Danielle Li cite the examples of Gleevec, a cancer therapeutic, and the RSA algorithm, a public-key cryptosystem, as projects that "eventually [led] to tremendous societal gains," but were supported by agencies (the NIH, DOD, and NSF) who funded "many other projects [that] either failed outright or only generated incremental benefits."

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[59] https://www.openphilanthropy.org/blog/hits-based-giving

[60] In order to find winners like Gleevec or the RSA algorithm, a grantmaking organization must be patient and accept that there will be many failed projects along the way.

Azoulay and Li note that a high failure rate is an innate characteristic of basic research, and also that its value is inherently difficult to quantify:[61]

> *[W]hile nascent ideas have the potential to have widespread and substantial impacts, it is very difficult to predict whether, when, or how. Moreover, even when the value of investments is clear…it is often difficult to quantify. Together, this lack of predictability and traceability has made grant funding politically vulnerable.*

Funding high-risk, high-reward research can be difficult for government agencies to justify, because grants are made with taxpayers' dollars, and federal budgets are thus beholden to public opinion and politics. On the other hand, private funders in science, especially those who come from industries like tech and cryptocurrency, are much more likely to be comfortable with these risk profiles. Fiona Murray, in her 2013 research on science philanthropy, suggests that this could be an ideal division of responsibilities: *"[P]erhaps philanthropists could fill that high risk/reward gap, leaving the Federal government to allocate their research portfolio across a broader range of universities and fields."*[62]

I was struck by how many people I interviewed spoke, unprompted, of their high tolerance for failure. Multiple administrators said that while they certainly hoped for successful outcomes for all the scientists they've backed, they explicitly embrace failure as well, because a failed outcome is still another data point about what *doesn't* work, which is a useful contribution to scientific knowledge.

Embracing failure is much more difficult in the growth stages of science funding, where scientific publishing, and the number of citations received, is a common measure of impact. It takes a long time to publish in a peer-reviewed journal, which means scientists are disincentivized to publish failed outcomes. Failed outcomes don't build scientists' careers, nor do they pave the way for more funding.

Among early stage funders, however, failed outcomes don't have to carry the same negative repercussions. One grant recipient I spoke to said that they plan to release their failed experiments on bioRxiv. Impetus Grants is working with the science journal GeroScience to create a dedicated issue for their grantees. They hope it will relieve the pressure of scientific publishing, and especially the fear of getting a negative result. Impetus founder Martin Borch Jensen explained that *"we both wanted to empower researchers to take risks and go for their boldest ideas…and at the same time take a step towards more sharing of negative results so that the whole field can learn from every project."*[63]

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[60] https://www.nber.org/system/files/working_papers/w26889/w26889.pdf
[61] https://www.nber.org/system/files/working_papers/w26889/w26889.pdf
[62] https://www.journals.uchicago.edu/doi/full/10.1086/668238
[63] https://www.dayoneproject.org/martinborchjensen/

Another common theme I heard among those focused on translational or applied research was the importance of *traction*: demonstrating tangible outcomes. Funders hoped to see a concrete tool or "product" being developed, evidence that other scientists were using these tools, or a path towards commercialization. For FROs especially, it is possible to set project milestones that are centered around user adoption, then measure one's progress towards those goals.

Several funders also expressed an interest in evaluating the impact of grants on scientists' careers, which aligns with an increased focus on funding people over organizations. They see grant funding as a way to discover and grow a network of talented scientists. Even if a project failed, did it help advance a scientist's career? In the case of scout programs, did they help create new relationships between scouts and grantees?

Measuring impact in the short term

Science operates on long time horizons, whereas most of the programs profiled in this report are less than two to three years old. Despite their recency, we've already seen some positive results. Fast Grants, for example, funded a clinical trial that demonstrated that fluvoxamine was a promising form of COVID-19 treatment. Impetus Grants funded 19 projects in its first cohort that "will go on to challenge the current assumptions the field has about aging."[64]

In most cases, however, the newness of these grants makes it difficult to make definitive statements about their impact – we don't yet know, from our current vantage point, which of the projects or scientists being funded today will have a lasting impact in ten, twenty, or thirty years. That being said, there are still shorter-term measures of impact that we can start to look at, even today.

One measure of impact lies in the counterfactual: these new programs provide capital for ideas that, in many cases, wouldn't have been funded otherwise. I asked program administrators and grantees where they would apply for funding if these programs didn't exist; in most cases, especially for rapid grant programs, the answer was simple: "They wouldn't."

Fast Grants surveyed its grantees and found that *"64% of respondents told us that the work in question wouldn't have happened without receiving a Fast Grant."*[65] Impetus Grants states that one of their program goals is to "support bold research that wouldn't have happened otherwise," and estimates that roughly 27% of funded projects from their first round *"would not have received funding through traditional sources, either because the idea didn't have any literature traction or had a high upside risk in implementation."*[66] Future Fund, as well, found that their regrantor program helped them find opportunities they wouldn't have known about otherwise.[67]

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[64] https://impetusgrants.org/news-and-updates/round-1
[65] https://future.com/what-we-learned-doing-fast-grants/
[66] https://impetusgrants.org/news-and-updates/round-1
[67] https://ftxfuturefund.org/future-fund-june-2022-update/

Secondly, it appears that some programs have had a positive impact on helping scientists form connections with their peers and find mentors in their field. These connections came from fellow grantees, program administrators and expert reviewers who worked closely with grantees, as well as the communities that these programs are embedded in, which in some cases, helped scientists reach people they might not have through their existing networks.

A major benefit of ACX Grants, for example – and an intrinsic advantage of scout programs – is that it was run by a blogger who attracts a community of exceptionally thoughtful, talented, and technical readers. The grantees I spoke to said that being featured on Scott Alexander's blog served as excellent marketing for their work, attracting potential funders, collaborators, and high-quality feedback.

One grantee said that having their project featured as part of ACX Grants was more useful than presenting their work at a conference, in terms of the publicity and feedback they received. For scientists seeking cross-disciplinary skills for their projects, such as software developers or policy experts, ACX Grants helped them reach people that they otherwise wouldn't have had access to, in some cases generating dozens of inquiries.

Similarly, one of the benefits of Unitary Fund is that it has deep ties to the quantum computing community, as part of the work it does outside of grantmaking. In addition to a grant program, Unitary Fund also conducts its own research and maintains an active quantum technology community. That means they can help grantees gain traction in their own careers: for example, by helping them find a community where they are based geographically, or connecting them to peers they can learn from.

Finally, just like early stage startups that can't yet measure impact based on revenue or traction, the ability to raise additional grant funding is another short-term heuristic that can be used to measure early stage science impact. For example, one funder asks themselves when reading applications, *"If this works, will it open the door to an NSF proposal?"* Similarly, Martin Borch Jensen explains that because Impetus Grants has 4-7% of the NIA's budget for basic aging biology, their goal was to fund ideas *"where sufficient proof of concept data could be collected so that the NIH would be willing to provide additional funding."*[68]

The downside of looking at follow-on funding is that it can orient early stage funders towards "safer" bets that are more likely to be able to win grants from government agencies. On the other hand, interest from follow-on funders can be a useful social signal – and the reality is that the pool of early stage funding is still small relative to what scientists need long-term.

Potential downstream effects

If early stage funders are successful, how else might they influence how science is funded, beyond the impact of the grants themselves?

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[68] https://www.dayoneproject.org/martinborchjensen/

Expansion of the early stage science funding market

The first wave of early stage science funders share a density of interpersonal connections and co-funding efforts, but in order to build a truly sustainable landscape, more funders and capital are needed to sustain their activities and impact. If these programs are successful, they may attract not just established funders, who want to direct capital towards these new mechanisms, but also new funders, who may not have been philanthropically active previously, but resonate with their approach. Several people I spoke to thought these new funding approaches could resonate with, for example, early employees at successful tech companies, who tend to prefer high-risk, high-reward opportunities.

Development of an "entrepreneurial" career path for scientists

The emergence of new funding mechanisms – rapid grants, scout programs, FROs – comes at a time when more PhD graduates are looking for exactly the opportunities that early stage funding provides. If the timing is right (i.e. more capital flows towards an early stage science market, *and* more scientists are interested in pursuing these options), we could see the development of robust alternatives to traditional academic career paths: for example, skipping a postdoc, development of tools that improve how science is done, shorter paths to commercialization, changing norms around IP ownership, and improvements to scientific publishing that favor open access. More work needs to be done to ensure that there are continued opportunities along this path at later stages of a scientist's career, but getting buy-in from early-career scientists is an encouraging start.

Influencing the grantmaking norms of other funders

If early stage funders can demonstrate that their grantmaking methods are viable, or even more effective than current practices, they could encourage other established funders, such as government agencies, to adapt these learnings for their own programs. These learnings could occur on multiple levels, whether influencing the speed and direction of grant application and review processes, or the adoption of new funding mechanisms themselves. The question of *how* this might happen is still uncertain, and will be discussed in the following section.

Building a new market for science funding

The new mechanisms profiled in this report address a gap in science funding by making more capital available to scientists at earlier stages, and by doing so with the speed, mentorship, and risk tolerance that is required. The creation of these mechanisms has also prompted more dialogue about how science funding can be deployed more quickly, both within philanthropy and at government agencies. What unknowns still need to be addressed in order for this vision to succeed? What could go wrong, and what still needs work?

The biggest challenge that I heard from both grantees and program administrators is that the size of these grants are still small, compared to what is actually needed to fund their research in the long term – hundreds of thousands of dollars, rather than millions or tens of millions. Private science funders can support research in its early and intermediate stages, but eventually, most research feeds into the public markets (i.e., federal funding agencies).

Most scientists cannot fund their work for a decade or more on $200,000 checks alone. If their work shows promise, where do they go next?

In venture capital, the growth of a seed stage market inevitably led to a “Series A crunch,” where many more companies raised early stage funding, but the amount of follow-on funding didn’t grow commensurately. According to Crunchbase data, while the number of companies that raised seed funding grew 5.5x from 2006-2010 versus 2011-2015, the number of companies that raised Series A funding (the next stage of funding) only grew 1.4x.[69]

One takeaway from the “Series A crunch” is that the follow-on funding market still grew, even if not to the extent of the seed stage market. Raising Series A funding became more competitive due to more companies raising seed funding, but the availability of early stage funding still gave more founders a chance to test their ideas, which led to a greater diversity and quality of companies that went on to successfully raise subsequent stages of funding.

A number of people I interviewed expressed hope that the practices being modeled by early stage funders could eventually influence federal funding agencies, but when I asked *how* this might be accomplished, nobody had a clear answer. While this lack of clarity is expected, given the nascency of these initiatives, if influencing downstream practices is an eventual goal of early stage funders, further exploration is needed to understand how this will be accomplished. It is likely that a multitude of skills will be required, from conducting research that demonstrates the impact of these new programs, to advocating for federal policies that support new approaches to science funding.

The pattern of private philanthropies modeling new grantmaking practices is not without precedent. The Rockefeller Foundation, for example, is credited with pioneering the fixed-term project grant for medical research in the 1930s, as well as the research fellowship model, which

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[69] https://news.crunchbase.com/venture/seed-funding-startups-top-vc-firms-a16z-nea-khosla/

was later adopted by governments and other institutions. Along the way, they experimented with a number of other funding mechanisms, such as block grants (which they called “fluid research”) and intramural research institutes at universities.[70] We can imagine that the multitude of experiments in science funding today, including the invention and expansion of new mechanisms, might yield similarly lasting results.

Ironically, it was the Rockefeller Foundation’s use of fixed-term project grants in the 1930s that primed scientists at American universities for the NIH’s grantmaking norms in the 1940s, many of which still persist today. William Schneider notes, however, that while their practices were “sequential,” *“the NIH did not simply adopt the Rockefeller's procedures. Nor did the two programs develop in isolation from one another. They were the product of significant overlap, with ongoing interaction between their personnel, and a shared need to respond to the contextual influences."* [71]

Those who sit between private and public funding, then, and are capable of navigating the relationships between them, will have a role to play in influencing both science policy and grantmaking norms on the federal funding level. Several people I spoke to mentioned the need for policy work to bring innovative ideas to market more quickly, especially for research that might, for example, require approval from government agencies or running clinical trials. One can imagine a “policy crunch” if there is a growth in innovative, promising ideas at the early stages, but they get stuck in the translational phase from idea to practice, due to delays in approval or funding for clinical trials.

There is also, again, the question of finding follow-on funders that are compatible with the types of innovation being supported at these stages. For example, RaDVaC, which is developing accessible vaccines, received nearly $3 million in initial funding from several philanthropic funders, including Balvi, a philanthropic initiative from Vitalik Buterin, a co-founder of Ethereum, that supports COVID-19 research. However, running a clinical trial for their vaccines will likely require an order of magnitude more of funding. Clinical trials are usually sponsored by industry (e.g. biotech or pharmaceutical companies), but because RaDVaC’s vaccines are open source, there is no potential for IP ownership, making them less attractive to corporate funders.

Funders and program administrators also need to continue attracting more donors – in terms of dollars raised, and the number of funders involved – beyond their initial cohort, in order to sustain their activities. As a number of program administrators in this space are still new to philanthropy, there is an opportunity to build a development pipeline for early stage science funders. Early stage funding also offers an easy entry point for new science funders to get involved and test their theories of change in a relatively low-stakes environment before doubling down on larger bets.

Finally, there is the other side of the market to consider: that of scientists themselves. While no one I interviewed seemed concerned that there was a shortage of opportunities to fund, several

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[70] https://www.jstor.org/stable/24631743

[71] https://www.jstor.org/stable/24631743

people expressed a desire to make these options more visible to scientists who are just beginning their careers.

One could imagine dedicated recruiting efforts, targeted at early-career scientists, to increase awareness of these programs and encourage scientists to apply for funding for their most innovative ideas. The ability to attract science talent is also a function of success in other areas – attracting more donors, demonstrating impact with these programs – but overall awareness of these new science initiatives is still low. Most of the administrators I spoke to hadn't done any sort of dedicated outreach at all; investing time and resources into these efforts could help uncover even more opportunities to fund scientists. (This is also an example of where scout programs can serve the double-duty task of both increasing awareness and uncovering new opportunities.)

Despite these unknowns, everyone I spoke to seemed generally optimistic that emerging science grantmaking norms would become more widely adopted by funders in the years to come, especially as there are more success stories to point to. Most had already noticed growing interest in these mechanisms from science funders; the refrain I heard repeatedly was *"It just takes time."* This optimism was noticeable among both new and established science funders, as well as across funders, administrators, and grantees.

The new wave of early stage funding should be understood as more than a niche subset of science philanthropy. Changes in macro conditions – increased urgency due to the COVID pandemic; growth in the number of, and available capital from, science funders; changing needs from early-career scientists – suggest that an evolution in science funding is inevitable.

We are only a couple of years into these new funding experiments. Given the long timescales of science, this is only the very beginning. However, if these programs continue to demonstrate their value among science grantmakers, we can expect to see more funders that utilize these new grant mechanisms, more scientists who pursue these sources of funding, and, most importantly, more innovative research being done, with positive implications for humanity.

Appendix

Suggested reading

If you're interested in learning more about early stage science funding and the emerging grant mechanisms covered in this report, the following list is a slice of media – interviews, blog posts, tweets, reports, journal articles – to help you gain further context.

"An interview with Martin Borch Jensen, Co-founder of Gordian Biotechnology." Tom Kalil and Martin Borch Jensen. Day One Project: https://www.dayoneproject.org/martinborchjensen/.

"ACX Grants Results." Scott Alexander. Astral Codex Ten (2021): https://astralcodexten.substack.com/p/acx-grants-results.

"Apply For An ACX Grant." Scott Alexander. Astral Codex Ten (2021): https://astralcodexten.substack.com/p/apply-for-an-acx-grant.

"Evaluating the Role of Science Philanthropy in American Research Universities." Fiona Murray. Innovation Policy and the Economy (2013): https://www.journals.uchicago.edu/doi/full/10.1086/668238.

"Evidence and the design and reform of scientific institutions." José Luis Ricón. Nintil (2022): https://nintil.com/science-funding-evidence.

"Focused Research Organizations to Accelerate Science, Technology, and Medicine." Samuel G. Rodriques, Adam H. Marblestone (2020): https://uploads.dayoneproject.org/2020/09/09110249/Focused-Research-Organizations-to-Accelerate-Science-Technology-and-Medicine.pdf.

"Focusing on Research with Adam Marblestone [Idea Machines #33]." Benjamin Reinhardt, Adam Marblestone (2020): https://www.stitcher.com/show/idea-machines/episode/focusing-on-research-with-adam-marblestone-idea-machines-33-78860972.

"From funding agencies to scientific agency." Johan Bollen, David Crandall, Damion Junk, Ying Ding, Katy Börner. EMBO Reports (2014): https://www.embopress.org/doi/full/10.1002/embr.201338068.

"Funding Risky Research." Chiara Franzoni, Paula Stephan, Reinhilde Veugelers. National Bureau of Economic Research, working paper (2021): https://www.nber.org/papers/w28905.

“Future Fund June 2022 Update.” Future Fund (2022): https://ftxfuturefund.org/future-fund-june-2022-update/.

“Hits-based Giving.” Holden Karnofsky. Open Philanthropy (2016): https://www.openphilanthropy.org/blog/hits-based-giving.

“I've cofounded a new org (Balvi) to direct these funds…” Vitalik Buterin. Twitter (2022): https://twitter.com/vitalikbuterin/status/1487073875808583682.

“New funding effort will deploy a corps of scientist ‘scouts’ to spot innovative ideas.” Jocelyn Kaiser. Science (2022): https://www.science.org/content/article/new-funding-effort-will-deploy-corps-scientist-scouts-spot-innovative-ideas.

“New Science's Report on the NIH.” Matt Faherty. New Science (2022): https://newscience.org/nih/.

“Results of round 1.” Impetus Grants (2021): https://impetusgrants.org/news-and-updates/round-1.

“Robert Downey Jr.: Here’s how to accelerate discoveries to help the planet.” Robert Downey Jr., David Lang. Fast Company (2021): https://www.fastcompany.com/90706338/robert-downey-jr-why-were-launching-science-fast-grants.

“Scientific Grant Funding.” Pierre Azoulay, Danielle Li. National Bureau of Economic Research, working paper (2020, revised 2021): https://www.nber.org/system/files/working_papers/w26889/w26889.pdf.

“So You Want To Run A Microgrants Program.” Scott Alexander. Astral Codex Ten (2022): https://astralcodexten.substack.com/p/so-you-want-to-run-a-microgrants.

“The levers of NIH: Paths to reform.” José Luis Ricón. Nintil (2021): https://nintil.com/nih-levers.

“Uncertainty and Risk-Taking in Science: Meaning, Measurement and Management in Peer Review of Research Proposals.” Chiara Franzoni, Paula Stephan, Reinhilde Veugelers. National Bureau of Economic Research, working paper (2021, revised 2022): https://www.nber.org/system/files/working_papers/w28905/w28905.pdf.

“Understanding science funding in tech, 2011-2021.” Nadia Asparouhova (2022): https://nadia.xyz/science-funding.

“Update from Balvi!” Vitalik Buterin. Twitter (2022): https://twitter.com/vitalikbuterin/status/1522017142320685057, “What We Learned Doing Fast Grants.” Patrick Collison, Tyler Cowen, Patrick Hsu. Future (2021): https://future.com/what-we-learned-doing-fast-grants/.

“Why scale the personal grantmaking sector?” Molly Mielke (2022): https://www.mollymielke.com/grants.

“Zvi’s Thoughts on the Survival and Flourishing Fund (SFF).” Zvi Mowshowitz (2021): https://www.lesswrong.com/posts/kuDKtwwbsksAW4BG2/zvi-s-thoughts-on-the-survival-and-flourishing-fund-sff.

Dossier: Organization profiles

The following is a list of initiatives – both grantmaking and operating organizations – that were researched for this report. (Not all of these initiatives are new; some were profiled to better understand the history and context of emerging grant mechanisms.)

ACX Grants

Launched: 2021
Category: Rapid grant, scout program
Focus: Biosecurity, global health, mental health, animal welfare, climate change, among others

URL: https://astralcodexten.substack.com/p/apply-for-an-acx-grant
Key people: Scott Alexander
Major funders: Scott Alexander, Vitalik Buterin, Misha Gurevich, and other anonymous donors

Grant size: $1,000 to $150,000
Examples of projects supported: Rapid Deployment Vaccine Collaborative (RaDVaC); Allison Berke (Stanford) to build a West Coast biosecurity hub

Psychiatrist and blogger Scott Alexander announced on his blog, Astral Codex Ten, that after receiving some unexpected surplus funding, he wanted to *“give grants to good research and good projects with a minimum of paperwork. Like an NIH grant or something, only a lot less money and prestige.”* While he initially pledged $250,000 of his own funds, Alexander received another $1.3 million in unsolicited grants from other donors.

(Note: Alexander announced ACX Grants as a one-time grant program; while he has indicated interest in doing another round, funding is not currently open for additional proposals.)

Balvi

Launched: 2021
Category: Rapid grant
Focus: COVID-19 research

URL: https://twitter.com/vitalikbuterin/status/1487073875808583682
Key people: Vitalik Buterin
Major funders: Vitalik Buterin

Grant size: Up to $4 million
Examples of projects supported: EPIWATCH (UNSW Kirby Institute), Patient-Led Research Collaborative for Long COVID

Ethereum creator Vitalik Buterin cofounded Balvi with part of a $1 billion gift that was initially made to CryptoRelief, a COVID-19 relief organization based in India. Both parties decided to redirect $100 million of those funds towards supporting high-risk, high-reward COVID research projects.

Balvi is particularly focused on supporting decentralized, collaborative solutions that can eventually scale beyond the direct efforts of their grantees. They announced their first set of grantees two months after launching the fund.

Convergent Research

Launched: 2021
Category: Focused research organization
Focus: Incubating and supporting FROs

URL: https://www.convergentresearch.org/
Key people: Adam Marblestone, Anastasia Gamick, Milan Cvitkovic
Major funders: Schmidt Futures

Examples of projects supported: E11 Bio, Cultivarium

Convergent Research is an incubator and support organization for focused research organizations (FROs), just as Y Combinator is an incubator for startups. They help FRO founding teams raise funding and hire talent, as well as manage the back office aspects of an organization, such as legal and accounting. If they are successful, Convergent Research could help propagate norms around the creation, funding, and operations of FROs, such as setting standards for fundraising terms, tech transfer, or employee compensation.

Cultivarium

Launched: 2021
Category: Focused research organization
Focus: Biotechnology

URL: https://www.cultivarium.org/
Key people: Henry Lee, Nili Ostrov
Major funders: Schmidt Futures

Cultivarium is a focused research organization, incubated by Convergent Research. They build molecular, hardware and software tools that make it easier to find new bacteria and organisms that can be used for biotechnology. Cofounders Henry Lee and Nili Ostrov first came across the idea for Cultivarium during their postdocs; they later decided to pursue it as an FRO because the model seemed well-suited for building foundational technology.

E11 Bio

Launched: 2021

Category: Focused research organization
Focus: Neuroscience

URL: https://e11.bio/
Key people: Todd Huffman, Andrew Payne
Major funders: Schmidt Futures

E11 Bio is a focused research organization, incubated by Convergent Research. They are building platform technology for full-stack brain architecture mapping, which, if successful, would accelerate neuroscience research.

Experiment Foundation

Launched: 2021
Category: Rapid grant, scout program
Focus: Environmental science, conservation biology, public health

URL: https://www.experiment.foundation/
Key people: David Lang
Major funders: FootPrint Coalition, Schmidt Futures, others

Grant size: $5,000 (average)
Examples of projects supported: Mapping the Humpback whale genome, Affordable oceanographic sensors

Experiment Foundation is the philanthropic counterpart to Experiment, a crowdfunding platform for science. The foundation oversees a number of grant experiments, including Challenge Grants (funding competitions centered around a theme) and a Science Angels scout program. They embrace a “platform philanthropy” approach, which leverages the Experiment platform to vet project opportunities, as well as open grant proposals – meaning that scientists publish proposals in order to solicit funding, rather than answering a funder’s call for proposals.

Fast Grants

Launched: 2020
Category: Rapid grant
Focus: COVID-19 research

URL: https://fastgrants.org/
Key people: Patrick Collison, Patrick Hsu, Tyler Cowen
Major funders: Arnold Ventures, The Audacious Project, The Chan Zuckerberg Initiative, John Collison, Patrick Collison, Crankstart, Jack Dorsey, Kim and Scott Farquhar, Paul Graham, Reid Hoffman, Fiona McKean and Tobias Lütke, Yuri and Julia Milner, Elon Musk, Chris and Crystal Sacca, Schmidt Futures, and others

Grant size: $10,000 to $500,000
Examples of projects supported: Effect of early treatment with fluvoxamine on risk of emergency care and hospitalization (Edward Mills, McMaster University)

Fast Grants launched in April 2020 as a way to quickly fund COVID-19 research projects. Applicants must be affiliated with an academic institution and already working on a project that could positively impact the COVID-19 pandemic within the next six months. Award decisions are made within 14 days.

Future Fund – Regrantor program

Launched: 2022
Category: Scout program
Focus: Artificial intelligence, biosecurity, talent discovery

URL: https://ftxfuturefund.org/
Key people: Nick Beckstead, William MacAskill
Major funders: Sam Bankman-Fried, Caroline Ellison, Gary Wang, Nishad Singh

Grant size: $1,000 to $15 million
Examples of projects supported: HelixNano, Sherlock Biosciences

Future Fund was a project of the FTX Foundation, the philanthropic counterpart to FTX, a cryptocurrency exchange that is no longer operational. They made both grants and investments to “ambitious projects to improve humanity’s long-term projects,” which includes interests such as mitigating the harmful risks of artificial intelligence and pandemic preparedness. Their approach was notable for making grants through a “regrantor program” (scout program), as well as an open call application process.

(Note: In the time between when this report was researched and written, and when it was published, FTX filed for bankruptcy. Future Fund’s team resigned, and the organization is no longer operationally active. See footnote 40 for more details.)

Hypothesis Fund

Launched: 2022
Category: Scout program
Focus: Biology

URL: https://www.hypothesisfund.org/
Key people: David Sanford
Major funders: Reid Hoffman, Bill Gates

Grant size: $300,000 budget per scout

Hypothesis Fund is a scout network for science, focused on basic research. Scouts are scientists who are primarily biology-focused. Hypothesis Fund gives a $300,000 budget to each scout, to be allocated over 12 months.

Impetus Grants

Launched: 2021
Category: Rapid grant
Focus: Longevity

URL: https://impetusgrants.org/
Key people: Martin Borch Jensen, Lada Nuzhna
Major funders: Juan Benet, Vitalik Buterin, James Fickel, Jed McCaleb, Karl Pfleger, Fred Ehrsam, Molly Mackinlay, Feruell, Michael Antonov

Grant size: $10,000 to $500,000
Examples of projects supported: Kapil Ramachandran (Ramachandran Lab), Raghav Sehgal

Impetus Grants is a rapid grant program for longevity research, inspired by the success of Fast Grants. Their goal is to impact the field more broadly, and they particularly encourage research that challenges assumptions about aging biology. Award decisions are made within three weeks.

Rejuvenome

Launched: 2021
Category: Focused research organization
Focus: Aging biology

URL: https://astera.org/rejuvenome/
Key people: Nicholas Schaum, José Luis Ricón, Simon Melov
Major funders: Astera Institute

Rejuvenome is a focused research organization with a $70 million budget, structured as a collaboration between the Astera Institute and the Buck Institute for Research on Aging. They are conducting a large-scale study of the biological effects of anti-aging interventions in mice, with the goal of producing a dataset that describes how key biomarkers are impacted by various interventions.

Revive & Restore – Catalyst Science Fund

Launched: 2018
Category: Rapid grant
Focus: Biotechnology, conservation biology

URL: https://reviverestore.org/what-we-do/catalyst-science-fund/
Key people: Bridget Baumgartner
Major funders: Promega

Grant size: Up to $1 million
Examples of projects supported: Black-footed ferret cloning project

The Catalyst Science Fund is an $8 million fund from Revive & Restore, an organization focused on the genetic rescue of endangered and extinct species. Their goal is to support proof-of-concept projects that translate biotechnologies to wildlife conservation applications.

Foundation for Food and Agriculture Research – Rapid Outcomes from Agricultural Research (ROAR)

Launched: 2014
Category: Rapid grant
Focus: Agriculture

URL:
https://foundationfar.org/grants-funding/opportunities/rapid-outcomes-from-agricultural-research/
Key people: Tim Kurt, LaKisha Odom
Major funders: USDA, private funders

Grant size: Up to $150,000 per year
Examples of projects supported: Development of a disease prevention and preparedness tool for poultry farming, Investigation of bacterial leaf streak

ROAR is a grant program of the Foundation for Food and Agriculture Research, which launched as a public-private partnership in 2014. Funding is provided by the USDA, which is matched by private donors; all ROAR grantees must provide matching funds from a non-federal source. The rapid grant program helps FFAR respond quickly to unanticipated threats to the United States' food supply or agricultural systems.

Survival and Flourishing Fund – Speculation Grants

Launched: 2022
Category: Scout program
Focus: Artificial intelligence, biosecurity

URL: https://survivalandflourishing.fund/speculation-grants
Key people: Andrew Critch, Oliver Habryka
Major funders: Jaan Tallinn

Grant size: $200,000 budget per scout (typically)

Examples of projects supported: Language Model Safety Fund, 1Day Sooner

Speculation Grants are a project of the Survival and Flourishing Fund (SFF), which supports "organizations concerned with the long-term survival and flourishing of sentient life." Scouts (called "speculation grantors") receive a $200,000 budget to make funding recommendations. While Speculation Grants help SFF disburse funds more quickly, SFF sees its primary innovation as the "S-process," a method for assessing the marginal utility of giving to a cause area or organization, which they also use to assess the performance of speculation grantors.

Unitary Fund

Launched: 2018
Category: Rapid grant
Focus: Quantum technology

URL: https://unitary.fund/grants.html
Key people: Will Zeng

Grant size: $4,000
Examples of projects supported: Marta CT (a Julia software package for medical diagnostics), pyALF (Python interface for ALF)

Unitary Fund is a nonprofit organization that supports the development of the quantum technology ecosystem. In addition to hosting a quantum community and doing research, Unitary Fund operates a microgrant program that funds work on quantum technologies, with a particular focus on "public infrastructure" (e.g. standards, toolkits, compilers). Their grantmaking reflects a particularly people-centric approach, weighing the impact of project funding on the trajectory of grantees' careers, rather than just the outcomes themselves.

Woodwell Climate Research Center – Fund for Climate Solutions

Launched: 2018
Category: Rapid grant
Focus: Climate science

URL: https://www.woodwellclimate.org/donate/fund-for-climate-solutions/
Key people: Robert Max Holmes, Jennifer Francis, Leslie Kolterman

Grant size: Up to $300,000
Examples of projects supported: Scaling forest carbon markets, Carbon monitoring platform for rangelands

The Fund for Climate Solutions is an internal-facing fund for staff researchers at the Woodwell Climate Research Center. The program provides support for time-sensitive opportunities and innovative ideas that fall outside of the long wait times associated with federal grant cycles. Award decisions are made within three months.

About

Nadia Asparouhova (https://nadia.xyz/) is a writer and researcher whose work includes exploring trends in tech and crypto philanthropy in support of scientific progress. Nadia is the author of *Working in Public: The Making and Maintenance of Open Source Software* (Stripe Press), and *Roads and Bridges: The Unseen Labor Behind Our Digital Infrastructure* (Ford Foundation).

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