

College of Science, Oregon State University

# Strategic Planning Process

Concept Paper: Research, Scholarship and Innovation

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## Sub-group Members

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# Executive Summary

We envision the College of Science as a diverse community dedicated to fundamental, use-inspired and transdisciplinary scientific research, scholarship and innovation. There are five strategic goals that we propose, including: 1) Support and expand the depth and breadth of science research and scholarship with a focus on inclusive excellence of our science community, 2) Promote strategies to increase a strong culture of science communication and positive science identities for a diverse faculty, staff and students, 3) Support and expand fundamental and applied areas of research distinction, while simultaneously building collaborative and transdisciplinary research opportunities and partnerships within and outside OSU, 4) Expand our growing innovation and entrepreneurship portfolio with an equity lens to leverage government, philanthropic and industry funding opportunities, and 5) Provide cutting-edge, meaningful, transformative and high-quality research experiences for a diverse group of university, K-12 and continuing learners.

## Oregon State University Strategic Plan 4.0

### Context

[Strategic Plan 4.0 Goal #1](#) Preeminence in Research, Scholarship and Innovation

We will establish Oregon State University as a leader in conducting research, producing knowledge and generating innovations that contribute to addressing global grand challenges, particularly in our signature areas; training the next generation of scholars; and contributing to the economic development and prosperity of Oregon and beyond. So that we are distinctive for our:

- Highly collaborative and globally focused research and innovation enterprise.
- Faculty who are actively engaged in public scholarship and outreach (In Outreach & Engagement Concept Paper)
- Graduate and professional education that leads to diverse, rewarding careers (In Education & Learning Concept Paper)
- Relevant and enduring partnerships with government, industry and other universities at home and abroad.
- Policies and systems supporting innovation and entrepreneurship.

# College of Science Context

## Background

The College of Science (COS) at Oregon State University (OSU) was formally established in 1932. OSU is one of only 3 universities with a land, sun, space and sea grant designation, and is one of only 40 public universities with the Carnegie Foundation Tier 1 very high research activity and community engagement designation. Home to the core life, statistical, physical and mathematical sciences within 7 departments (Biochemistry and Biophysics, Chemistry, Integrative Biology, Mathematics, Microbiology, Physics, Statistics), the College of Science supports 2,585 undergraduate students and 445 graduate students within 9 undergraduate, 8 M.S., and 7 Ph.D. degree programs. The COS takes pride in its 142 faculty, 16 AAAS Fellows, two National Academy of Science Fellows, one MacArthur Fellow, and 22 University Distinguished Professors.

## Strategic Plan 2015-2020 Goal #2<sup>1</sup>:

To be a global leader in scientific research and scholarship for a better world. Strategies include:

1. Cultivate distinction in research by enriching and growing specific programs through investment in cross disciplinary and international collaborations.
2. Deepen and enrich a leading-edge and responsive research portfolio by focusing early-career faculty investments in areas that advance knowledge to support human health, marine science and sustainable materials.
3. Position the College as a leader in cross-cutting data science and mathematical modeling research and educational programs.
4. Enhance research capacity and productivity by improving infrastructure.
5. Promote student curiosity, discovery and creativity by integrating undergraduate research and international opportunities across the curricula and strengthening and expanding graduate programs to match national and market needs.

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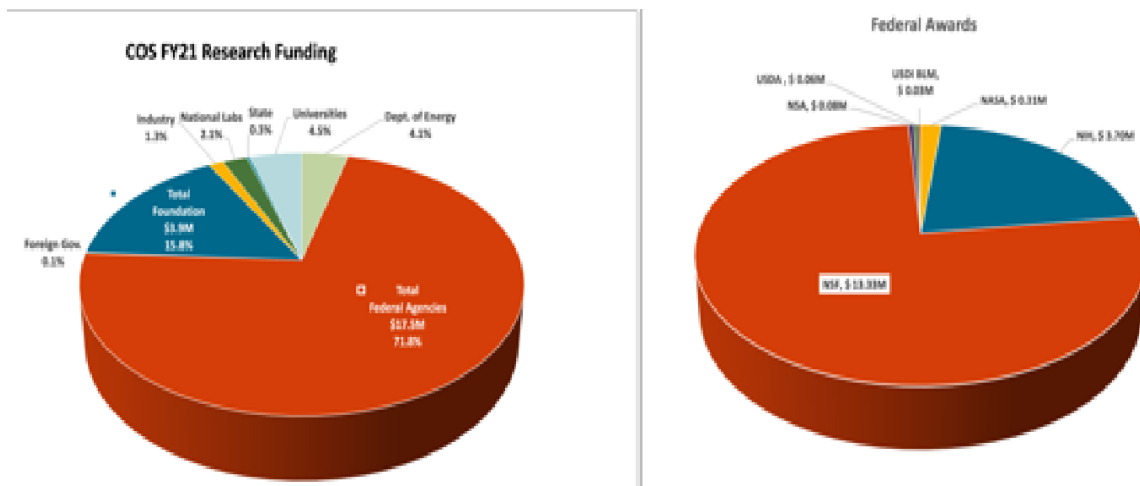
<sup>1</sup> [College of Science 2015-2020 Strategic Plan.](#)

# COS Research and Scholarship Activities and Opportunities

## Recent Activities

**Research Funding**—College of Science faculty were awarded \$24.4 million in new research grants and awards in fiscal year 2021<sup>2</sup>, a 55% increase over the average of the previous three years and one of the highest awards ever<sup>3</sup>. The awards are equally distributed between faculty in the School of Life Sciences—which includes integrative biology, microbiology and biochemistry and biophysics and those in the departments of physics, chemistry, statistics and mathematics. The previous year’s total was \$15.88 million. College of Science reported [\\$18.5M in research funding for FY22](#).

As **Figure 1** below indicates, most of the College’s funding was awarded by federal agencies with the National Science Foundation (\$13M) and National Institutes of Health (\$4M) leading the list. Foundation and industry awards contributed \$4M and the remainder in other categories.



**Figure 1:** Federal awards received in FY21 include NSF, NASA, NIH, The National Security Agency (NSA), USDA, USDI Bureau of Land Management. NSF and NIH represented 76% and 21% of the total awards respectively.

<sup>2</sup> Note that the report denotes actual awards that arrive in a given fiscal year. The amount represents either the full award, or the increment, if the agency awards annually. [Report](#)

<sup>3</sup> See: [Science faculty research funding in fiscal year 2021 hits a high mark](#)

For Fiscal Year 2021, 130 research proposals were submitted by the College – down from 143 submitted in Fiscal Year 2020. The total requested funds from grant proposal submissions was \$65.3M, down from \$81.5M the previous year, but total awards were up \$24.4M from the previous year of \$16M. College of Science research expenditures for FY21 totaled \$12.2M – down from \$13.4M the previous year. Federally funded expenditures for the year were \$8.85M.

Many COS faculty received substantial research grants in 2021. **Appendix A** shows notable awards from 2021 with funding > \$300K that demonstrate the College's breadth of research in the life, physical, mathematical and computational sciences.

## New Opportunities

We include the research funding priorities from current strategic plans of four major national science funding agencies that have traditionally supported the research within the COS, including NSF, NIH, NASA and NOAA (see **Appendix B**). There are considerable opportunities between the funding priorities in **Appendix B** and our signature strengths in research, scholarship and innovation (see below).

# COS Innovation and Entrepreneurship Activities and Opportunities

## Recent Activities

The COS is at the heart of a flourishing new ecosystem of entrepreneurship and high-impact scientific and technological innovations. See **Appendix C** for examples of startup companies founded by COS faculty. **Appendix D** includes some highlights from IMPACT articles describing the COS's work in innovation and entrepreneurship.

We are actively partnering with Impact Studio, Advantage Accelerator, NSF I-Corps National Program and the Innovation Advocates program.

- [Impact Studio](#) uses proven methodologies to develop innovative solutions for Oregon State's needs. Its mission is to have teams of faculty, students and staff develop and launch bold initiatives that advance Oregon State's strategic plan and improve the university's financial strength.
- The OSU [Advantage Accelerator](#) was created in 2013 to help develop high-growth, innovative products and services by taking companies through all phases of the

startup process. This program assists faculty, staff, students and the broader community to commercialize research and concepts.

- Oregon State University is a National Science Foundation Innovation Corps Site. The I-Corps program is designed to accelerate commercialization of new technologies, products and processes that emerge from universities. The [NSF I-Corps National Program funds](#) provides tech-based teams the opportunity to participate in a cohort made up of researchers and entrepreneurs from around the country.
- The [Innovation Advocates program](#) arose from work to support SP 4.0, Action 15, Strengthen our support system for innovation and entrepreneurship for faculty, students and staff and has led to fourteen recommendations which are being acted on by the Innovation Advocates. Innovation Advocates represent every college, some centers and institutes, the Research Office, the OSU Foundation and the Alumni Association and are helping drive the adoption of fourteen recommendations.

## New Opportunities

An important new opportunity directly related to COS innovation and entrepreneurship is the [Collaborative Innovation Complex \(CIC\)](#). The CIC will be 150,000 sq ft located in the heart of campus. It is intended to host OSU's most advanced research infrastructure to support team-based interdisciplinary research in materials science, computation and artificial intelligence, climate and marine science solutions, engineering and robotics, and biohealth science.

We can also leverage opportunities from [TIP – Technology, Innovation and Partnerships](#), a new directorate in the U.S. National Science Foundation. In July 2022, Congress passed the [CHIPS Act of 2022](#) increasing semiconductor production to improve American competitiveness.

## COS Collaboration and Partnerships

### Internal collaborations

The COS has strong internal collaborations within and among departments (**Appendix A**). The College has sought to strengthen these ties through the [Science Research and Innovation Seed Program](#) (SciRIS). Between 2019 and 2021, SciRIS provided \$763K in seed funding for high impact collaborative proposals in basic and applied science and mathematics, that build teams, pursue fundamental discoveries, and create societal



impact. SciRIS funds have supported 43 individuals and 13 teams since its inception in 2018 (**Appendix E**).

In addition, the College established the [Disease Mechanism and Prevention Fund](#) (DMPF) to assist COS faculty to establish research relationships with external partners in health sciences and the Industry Partnership Award to provide resources for projects that take a new direction, utilize a new technology or are in the proof-of-concept phase.

## External collaborations

Faculty across the COS have biohealth research interests and expertise that are complementary to research in other colleges at OSU (e.g., Public Health, Veterinary Science, Pharmacy) and at Oregon Health and Science University (OHSU), and many collaborations are currently in place to promote mutual interests. Areas of collaborations include COVID-19, cancer research, microbiome research and the development of imaging and analytical tools for material and biomedical applications (see e.g., **Appendix A**).

Other areas of collaboration include climate and marine sciences, mechanistic modeling and analysis, quantum systems (including quantum materials, quantum computing and quantum information science), neuroscience, physics of movement and robotics, microbial dynamics and infection and planetary sciences and astrophysics (**Appendix A** and see below).

## Signature Strengths in the Research and Innovation Enterprise

The last COS Strategic Plan (2015-2020) focused on four signature strengths that included:

- **Marine Science**—the plan emphasized leveraging top ranked programs and internationally recognized faculty to be a leader in OSU’s Marine Studies Initiative. The goal was to position ourselves to address problems ranging from climate change to ocean acidification to diseases to sustain healthy, productive and resilient marine systems.
- **Sustainable Materials**—the plan was to build on our leadership in materials science to discover sustainable materials for next-generation electronics and to develop techniques for clean energy generation and conservation. The goal was to advance

sustainability science by creating new technologies and building new companies while training the next generation of environmentally conscious innovators.

- **Biohealth Science**—the plan was to use fundamental, quantitative and translational research to fight disease and promote health.
- **Data Science**—the plan was to promote big data analyses that lead to breakthroughs in areas from personalized medicine to precision agriculture, marketing to security, environment to education, and astronomy to information-based industries. The goal was to be a key resource for data-enabled research, analysis and visualization at OSU, in Oregon and across the country.

Our engagement sessions provided us with key insights into our current signature strengths in research, scholarship and innovation. These strengths include:

- **Commitment to Collaborative, Interdisciplinary and Transdisciplinary Research**

Feedback both internally, and from our external partners, was that the COS has a strong reputation for collaborative interdisciplinary and transdisciplinary research, scholarship and innovation. Our faculty, staff and students play key roles in collaborative projects both within the college, outside the college, and outside of OSU (**Appendix A**). Some recent examples of our collaborative strengths both internally and externally include [TRACE-COVID-19](#) (Packard Foundation), [NANOGrav Physics Frontiers Center](#) (NSF), [The GCE4All Center: Unleashing the Potential of Genetic Code Expansion for Biomedical Research](#) (NIH), and [Large scale CoPe: The Cascadia Coastlines and People Hazards Research Hub](#) (NSF).

- **Diverse Portfolio of Signature Research, Scholarship and Innovation Strengths**

The College of Science has a diverse portfolio of signature research, scholarship and innovation activities that will allow our college to make fundamental and applied discoveries. We will promote our entire scientific community including the disciplines of biology, biochemistry and biophysics, chemistry, mathematics, microbiology, physics and statistics. We will continue to support and expand our diverse research portfolio, which includes federally funded centers and scientific expertise in signature areas of



- o **BioHealth Sciences**—We have interdisciplinary strengths in disease science (e.g., [TRACE-COVID-19](#), microbiomes, protein engineering ([GCE4ALL](#)), drug development and aging, molecular NMR, including OSU's [Linus Pauling Institute](#) and strong links to [Oregon Health and Science University](#).
- o **Sustainable Material Sciences**—We have research and innovation strengths in [sustainable materials development](#) for next-generation electronics (batteries, metal organic framework, semiconductors, others) and clean energy solutions.
- o **Climate Change, Marine and Coastal Sciences**—We have interdisciplinary strengths, from genes to ecosystems, in climate change and marine and coastal sciences, including deep ties to OSU's [Marine Science Initiative](#), [College of Earth, Ocean, and Atmospheric Sciences](#), and [Hatfield Marine Science Center](#).
- o **Genomics and Quantitative Sciences**—We have research strengths in genome-enabled and data-driven research in life and environmental sciences, including the [Center for Quantitative Life Sciences](#).
- o **Quantitative, Computational and Data Sciences**—Expertise in quantitative and computational sciences that are essential components of many of the other areas of research and innovation listed above.
- o **STEM Education Research**—We have a growing group of faculty, staff and graduate students who are using new and innovative teaching practices and conducting pedagogical research to increase equity, access and inclusion, including the [STEM Research Center](#).
- o **Curiosity-Driven Sciences**—We have new strengths in astrophysics ([NANOGrav Physics Frontiers Center](#)).

## Integration of Research in Education

The COS participates in the several [interdisciplinary graduate programs](#) offered by OSU. Interdisciplinary graduate programs provide comprehensive education and training for career-driven students. The programs cross traditional college and department lines encouraging a multi-disciplinary approach to solving problems. The Graduate School recently selected an interdisciplinary graduate program in Translational Data Sciences. This

program, once developed, will be hosted by the COS and will include the Biological Data Science Graduate Minor.

The College manages the [Summer Undergraduate Research Experience \(SURE\)](#) program which offers scholarship support so students gain a stimulating research experience that enhances their academic experience. Recipients of the SURE Science award are paid for 11 weeks of full-time research during the summer at \$13/hr (maximum of 440 hours). Awardees also receive an additional \$500 for research expenses to support their project. There are [several opportunities](#) for students to do research through coursework, working in a lab, capstone projects and Honors research among others.

## Integration of Equity, Access and Inclusion in Research and Innovation

In Goal 4 of COS's DAP, "Embedding Equity, Access & Inclusion", we aim to innovate in research, education, outreach and engagement to create multiple pathways for success for our underrepresented community members. Some actions in our DAP that can be mapped to our strategic themes in Research, Scholarship and Innovation are:

- **DAP Action 4.1.** Establish partnerships and pipelines for minoritized communities. Strengthening and augmenting partnerships with industry and government agencies to provide increased access for our underrepresented students, faculty and staff to cutting edge research, innovation and entrepreneurial opportunities.
- **DAP Action 4.2.** Enhance undergraduate and graduate education. Promote collaborative, transdisciplinary and convergence research opportunities.
- **DAP Action 4.3** Promote research, innovation and educational activities that have public impact. Create opportunities for science communication events and citizen science projects that showcase the public impact of education, research and innovation in the college. These include opportunities for outreach to K-12 to address gender equity in science, creating pipelines to K-12 to increase enrollment of students in our college from minority communities in Oregon.
- **DAP Action 4.4.** Enhance global perspectives and experiences. Aligning with the goals of SP4.0, create and expand opportunities for students to acquire global educational experiences including international research, education, or internship experiences.

# Research and Innovation Trends in Higher Education

We read and reported on papers about the future of academic research and innovation. One article, *Imagining the Role of the Research University Anew*<sup>4</sup> used the COVID-19 crisis, global climate change and other crises as inspiration to reimagine the mission of research universities. Four key takeaways emerged from this study.

1. **Organize around complex missions:** We must innovate in how research organizations are organized to execute their missions. Possibly the two largest challenges that cut across all research universities are (1) creating effective approaches for organizing and rewarding transdisciplinary work and (2) developing approaches for apportioning resources and credit across the many contributing partners.
2. **Embrace arbitration over advocacy:** An important lesson often lost on the research community is that *improved expert knowledge often does not clarify the path that seemingly rational people should take on a complex topic*. Consequently, universities must institutionalize the cultures and processes to increasingly serve as, and *be perceived as*, honest brokers. Academics should be extremely careful about engaging in advocacy—no matter how well intentioned—it can be dismissed by opponents as simply the voice of another special interest.
3. **Form holistic, trusted partnerships:** Research universities should envision themselves as conveners and partnership builders for local communities, government, industry and other NGOs. A key conclusion from the study was the need for universities to define and better understand the social and economic ecosystems in which they operate when framing partnership opportunities.
4. **Organically incorporate equity and inclusion:** Equity and inclusion cut across the research university in multiple dimensions and are key strategies for enabling more innovative approaches and better solutions. It is neither appropriate nor beneficial to focus only on challenges defined exclusively by university researchers. Instead, such researchers must engage those affected by the answers to help frame the research questions.

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<sup>4</sup> [Discussion of the Next 75 Years of Science and Technology article within Issues in Science and Technology, September 28, 2021 By T. Lieuwen, Seth Marder, and Chaouki Abdallah](#)

Another report from the National Academy of Sciences entitled “Science, The Endless Frontier<sup>5</sup>” had the following 4 key take-aways.

1. **Inspire & Include:** Science needs more exciting new projects to attract young people to research. It also needs to prepare and reach out to everyone, not just to the members of particular groups. Creating a diverse workforce requires changing the “indentured servitude model” of graduate school education so that more students remain in science rather than leaving for other fields.
2. **Communicate & Engage:** Scientists need to do much more to engage fully with the public. Communication also needs to go in both directions, so scientists learn what members of the public think and need and what it takes to earn the public’s trust.
3. **Diversify & Optimize:** Deciding on a research portfolio is related to the issue of whether to fund projects or fund people. Funding projects through a sort of lottery system to ensure that the same people are not funded all of the time inevitably reduces the continuity of research careers, research dollars also need to be spent in the most effective way, which requires a diversified research portfolio.
4. **Distribute & Reward:** Science is a positive-sum game, not a zero-sum game. Science needs to be much more inclusive, distributed and participatory. We need a reward system in science, whether for high-risk research, mentoring and training, or public engagement.

## Strategic Themes for the Future

### Research, Scholarship and Innovation Mission

We envision the College of Science as a diverse community dedicated to fundamental, use-inspired, and transdisciplinary scientific research, scholarship, and innovation.

**Strategic Theme #1:** Support and expand the depth and breadth of science research and scholarship with a focus on inclusive excellence of our science community.

**Objective 1:** Provide mechanisms for the College of Science faculty and students to diversify and advance their research portfolio.

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<sup>5</sup> [National Academy of Sciences in partnership with The Kavli Foundation and the Alfred P. Sloan Foundation](#)

**Objective 2:** Promote an equity, access and inclusion attitude in new faculty and staff hires.

**Objective 3:** Encourage faculty and staff excellence in the College of Science by increasing the number of endowed faculty positions, especially for our underrepresented community members.

**Objective 4:** Expand the number of College of Science faculty and staff who are members of the National Academies, Fellows in the American Association for the Advancement of Science, and Fellows in the professional organization(s) of each department and for our underrepresented community members.

**Objective 5:** Increase the number of College of Science faculty and staff serving on National Academies and equivalent panels, and conducting similar high-visibility, high-impact national and international service.

**Strategic Theme #2:** Promote strategies to increase a strong culture of science communication and positive science identities for a diverse faculty, staff and students.

**Objective 1:** Continue to invest in, expand and encourage professional development training in science communication (such as our [OMSI Science Communication Fellow Program](#)), especially as it relates to promoting EAI.

**Objective 2:** Invest in and encourage professional development training in positive science identities, especially as it relates to promoting EAI for students.

**Strategic Theme #3:** Support and expand fundamental and applied areas of research distinction, while simultaneously building collaborative and transdisciplinary research opportunities and partnerships within and outside OSU.

**Objective 1:** Convene a multi-departmental committee that explores, through deep engagement, current and emerging areas of opportunity within the COS that will be targeted for selective investments and fund raising.

**Objective 2:** Work more intentionally to explore research funding opportunities and proposal preparation.

**Objective 3:** Establish an interdisciplinary committee within the COS that facilitates collaboration within the COS and among OSU's colleges that will be targeted for research funding opportunities and proposal preparation.

**Strategic Theme #4:** Expand our growing innovation and entrepreneurship portfolio with an equity focus to leverage government, university and private funding opportunities.

**Objective 1:** Strengthen our support system for innovation & entrepreneurship. Continue to deepen partnership with OSU's Advantage Accelerator, Impact Studio and Innovation Advocates program

**Objective 2:** Engage alumni and donors who are interested in engaging faculty and students in industry partnerships. Continue to expand and strengthen partnerships with our external Innovation & Industry Council.

**Objective 3:** Provide opportunities to our students for internships with industry partnerships, training in understanding the innovation ecosystem (example our SCI/CH Innovation courses).

**Strategic Theme #5:** Provide cutting-edge, meaningful, transformative and high-quality research experiences for a diverse group of university, K-12, & continuing education students.

**Objective 1:** Promote and expand internal COS-funded undergraduate research opportunities such as URSA and SURE. Work to involve more undergraduates in research earlier in their college experience and seek resources to facilitate faculty participation.

**Objective 2:** Increase industry and non-industry sponsored projects and internship opportunities. These are mechanisms for faculty to diversify their research portfolio and immerse students in real-world research projects.

**Objective 3:** Work with the college EAI committee to accelerate efforts to increase participation of underrepresented minority students in research programs across the college.

**Objective 4:** Support the development of a program in Translational Data Science to be hosted by the College of Science.



## Appendix A - Selected funding awards from 2021

**TABLE 1 - Awards between \$300K - \$1M.**

Project	COS PIs	Funding Agency	Funding Amount	Area of Research	Collaborative?
Research on SARS-CoV-2 coronavirus that causes Covid-19	Barbar (BB) Hendrix (BB) Cooley (BB)	EAGER grant NSF	\$300K	Biohealth Sciences, Disease	Yes
Tipping points in coral reefs and their associated microbiomes:	Rebecca Vega-Thurber (MB)	NSF	\$800K	Marine Sciences, Climate Change, Genomics	Yes
Decoding the mechano-regulation of breast tumor organoid invasion – one cell at a time.	Bo Sun (PH)	DOD	\$528K	BioHealth Sciences, Disease	No
Assembly of multivalent regulatory complexes in hippo signaling	Afua Nyarko (BB)	NSF	\$820K	BioHealth Sciences	No
Impacts of Benzo[a]pyrene on microbiome development across lifespan and generations and the behavioral consequences	Tom Sharpton (MB, ST)	NIH	\$396K	BioHealth Sciences, Microbiomes, Genomics	No
The essence of Cannabaceae: Comparative genomics and metabolomics to unravel the complexities of aroma and flavor	David Hendrix (BB, CS)	USDA-NIF A	\$638K	BioHealth Sciences, Genomics	Yes
Biomaterials to address age-related macular degeneration & train the next generation of scientists	Marilyn Mackiewicz' (CH)	NSF CAREER	\$558K	BioHealth Sciences, Materials, Equity, Access & Inclusion	No

**TABLE 2 - Awards > \$1M**

Project	COS PIs	Funding Agency	Funding Amount	Area of Research	Collaborative?
Maximizing Investigators' Research Award (MIRA)	Molly Burke (IB)	NIH	\$1.7M	BioHealth Sciences, Aging and Infertility	No ( <a href="#">supports early-stage investigators</a> by providing a flexible umbrella of support, increasing productivity and the chance for significant discoveries.)
Mathematics GTA Professional Development: Implementation of Evidence-based Teaching Practices	Mary Beisiegel (MTH)	NSF	\$2.1M (OSU portion \$855K)	Science Education Research	Yes (external)
TRACE	Ben Dalziel (IB)  Katie McLaughlin (ST)	Packard Foundation, PacificSource Health Plan, Oregon Health Authority	\$2.8M, \$800k, \$1.07M	BioHealth Sciences, Disease, Outreach & Engagement	Yes
Defining the ecological and genomic properties that underlie microbiome sensitivity and resilience	Rebecca Vega Thurber (MB) Thomas Sharpton (MB, ST), Ryan Mueller (MB), Maude David (MB)	NSF, Rules of Life	\$3M	Marine Sciences, Climate Change, Genomics, BioHealth Sciences, Microbiome	Yes
Essential computing and	Heidi	DOE	\$3M	Basic	Yes

software development for the DUNE experiment.	Schellman (PH)			Experimental & Computational Sciences	
Understanding the interfaces for high-energy batteries using anions as charge carriers	David Ji (CH)	DOE	\$3M (OSU portion \$840K)	Sustainable Materials	<a href="#">Yes</a> (collaborators from Howard University, the University of Maryland and Vanderbilt University.)
Passive and enhanced capture and conversion of CO2 by d/f0 molecules and materials	May Nyman and Tim Zuehlsdorff (CH)	DOE	\$6.6M	Materials, Climate Change	Yes
The GCE4All Center: Unleashing the potential of genetic code expansion for biomedical research	Ryan Mehl & Team (BB)	NIH	\$5.6M possibility for two five-year renewal.	BioHealth Sciences, Disease, Drug Development (BioMaterials)	Yes
NANOGrav Physics Frontiers Center	Xavier Siemens (PH)	NSF	\$17M (OSU portion \$3.5M)	Basic Experimental & computational Sciences, Astrophysics	Yes <a href="#">(external)</a>
Large scale CoPe: The Cascadia Coastlines and People Hazards Research Hub	Peter Ruggiero (CEOAS, PI), Sally Hacker (IB, Co-PI) and others at OSU and UW	NSF, Coasts and People Large Scale Hub	\$18.9M 5 year grant (COS: \$300,00)	Climate Change, Marine Science, Equity, Access & Inclusion	Yes (internal and external)

# Appendix B Funding Agencies Strategic Plans

List of NSF Strategic Goals and Objectives 2022 – 2026

Strategic Goals	<b>Empower:</b> Empower STEM talent to fully participate in science and engineering	<b>Discover:</b> Create new knowledge about our universe, the world and ourselves	<b>Impact:</b> Benefit society by translating knowledge into solutions	<b>Excel:</b> Excel at NSF operations and management
Strategic Objectives	<b>Ensure accessibility and inclusivity</b> Increase the involvement of communities underrepresented in STEM and enhance capacity throughout the nation	<b>Advance the frontiers of research</b> Accelerate discovery through strategic investments in ideas, people and infrastructure	<b>Deliver benefits from research</b> Advance research and accelerate innovation that addresses societal challenges	<b>Strengthen at speed and scale</b> Pursue innovative strategies to strengthen and expand the agency's capacity and capabilities
<b>Unleash STEM talent for America</b> Grow a diverse STEM workforce to advance the progress of science and technology	<b>Enhance research capability</b> Advance the state of the art in research practice	<b>Lead globally</b> Cultivate a global S&E community based on shared values and strategic cooperation	<b>Invest in people</b> Attract, empower and retain a talented and diverse NSF workforce	
<b>Foundations: People, Ideas, Partnerships</b>				

## National Science Foundation

**2022–2026 Strategic Plan** [Leading the World in Discovery; and Innovation; STEM Talent Development; Delivery of Benefits from Research - NSF Strategic Plan](#)

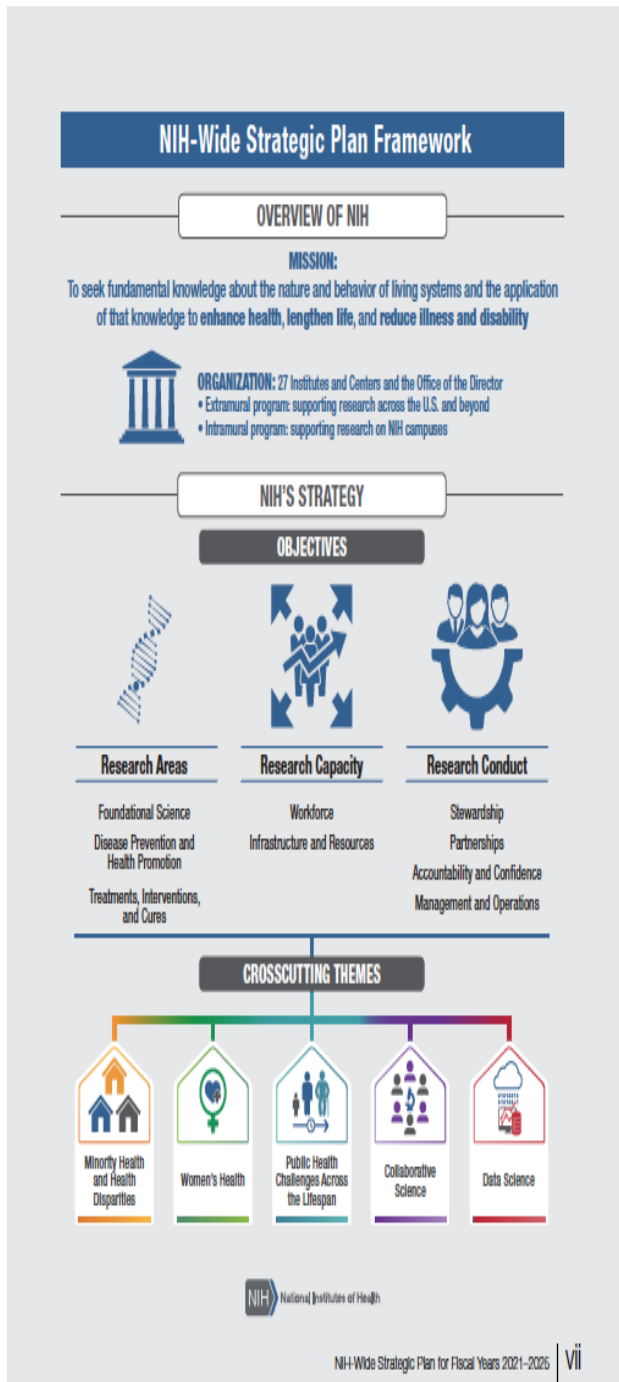
List of NSF's 10 big ideas

- Future of Work
- Growing Convergence Research
- Harnessing the Data Revolution
- Mid-Scale Research Infrastructure
- Navigating the New Arctic

- NSF 2026
- NSF INCLUDES
- Quantum Leap
- Understanding the Rules of Life
- Windows on the Universe

## National Institutes of Health

### 2021-2025 Strategic Plan [NIH-Wide Strategic Plan, Fiscal Years 2021-2025](#)



# National Aeronautics and Space Administration

## 2022 Strategic Plan

[2022 NASA Strategic Plan](#)

### Strategic Goals and Strategic Objectives

Theme	Goal Statement	Objective Statement
<b>Discover</b>	Expand human knowledge through new scientific discoveries	1.1: Understand the Earth system and its climate
		1.2: Understand the Sun, solar system, and universe
		1.3: Ensure NASA's science data are accessible to all and produce practical benefits to society
<b>Explore</b>	Extend human presence to the Moon and on towards Mars for sustainable long-term exploration, development, and utilization	2.1: Explore the surface of the Moon and deep space
		2.2: Develop a human spaceflight economy enabled by a commercial market
		2.3: Develop capabilities and perform research to safeguard explorers
		2.4: Enhance space access and services
<b>Innovate</b>	Catalyze economic growth and drive innovation to address national challenges	3.1: Innovate and advance transformational space technologies
		3.2: Drive efficient and sustainable aviation
<b>Advance</b>	Enhance capabilities and operations to catalyze current and future mission success	4.1: Attract and develop a talented and diverse workforce
		4.2: Transform mission support capabilities for the next era of aerospace
		4.3: Build the next generation of explorers



# National Oceanic and Atmospheric Administration–National Centers for Coastal Ocean Science

## [2022–2026 Strategic Plan](#)

### APPENDIX – STRATEGIC PLAN PRIORITY OUTLINE

#### 1. Advancing Ecosystem Science for Conservation and Sustainable Use

- a. Marine Spatial Planning
- b. Habitat Mapping
- c. Biogeographic/Ecological Assessments and Research
- d. Monitoring and Research in Coral Reef Ecosystems

#### 2. Developing and Implementing Advanced Observation Technologies and Ecological Forecasts

- a. HABs and Hypoxia
- b. Pathogens
- c. Coastal Habitat Changes
- d. Observation technologies

#### 3. Facilitating Resilience and Adaptation to Inundation and Climate Impacts

- a. Ecosystem Change
- b. Community and Ecosystem Vulnerability
- c. Restoration and Natural and Nature-based Features

#### 4. Detecting, Monitoring, and Mitigating Impacts of Chemical and Biological Stressors

- a. Priority Chemicals, Ocean Acidification, and Hypoxia
- b. Disease Agents on Corals
- c. Climate and Environmental Factors
- d. HAB and Toxin Analytical Methods and Reference Materials
- e. HAB Prevention and Control

#### 5. Advancing Social, Economic, and Behavioral Approaches to Coastal Stewardship

- a. Ecosystem Service Valuation
- b. Resilience and Vulnerability Assessments
- c. Assessing Human Uses

#### 6. Investing in our People and Achieving Organizational Excellence

- a. Cultivating Innovative Organizational Culture
- b. Aligning and Managing Resources Tied to our Scientific Priorities
- c. Leveraging Diversity and Inclusion for Mission Effectiveness
- d. Building and Strengthening Productive Partnerships and Engaging Stakeholders

## Appendix C - Examples of startup companies founded by COS faculty

Start-UP	Faculty & Department	Description	Resources
<a href="#">e-MSion Inc.</a> Founded 2015	Joe Beckman Biochemistry & Biophysics	Advance mass spectrometry-based life sciences research by offering accessible electron capture dissociation (ECD) fragmentation.	OSU Advantage Accelerator <a href="#">News</a> <a href="#">IMPACT</a>
<a href="#">Valliscor</a> Founded in 2012	Rich Carter Chemistry	Exploit synergy between industrial know-how and academic innovation & provide access to high-value organic building blocks for the pharmaceutical, biotech and agrochemical industries.	<a href="#">OSU Advantage Accelerator</a> <a href="#">ONAMI</a>
<a href="#">Microbiome Engineering</a> Founded 2019?	Maude David Microbiology	Biosensor provides instantaneous, continuous, qualitative, and quantitative data about contamination in aquatic environments online, wirelessly and in real time.	<a href="#">Business Oregon &amp; Oregon Innovation Council</a>
<a href="#">nexTC</a> Founded 2018	Doug Keszler Chemistry	State-of-the-art processes for manufacturing thin film coatings.	NSF - CSMC
<a href="#">Inpria</a> Founded 2007	Doug Keszler Chemistry	Production of semiconductor microchips through photolithography. <a href="#">OSU startup Inpria nets \$514M acquisition for trailblazing chemical manufacturing</a>	OSU Venture Development funds, NSF-CSMC

# Appendix D - Highlights on COS faculty's innovation and entrepreneurship from IMPACT articles

Research innovation and entrepreneurship combine to address critical global challenges | College of Science | Oregon State University (Doug Keszler, Maude David, Ryan Mehl, Matt Graham)

Oregon State Science, an innovation ecosystem (Joe Beckman, David Ji, Chris Beaudry, Bo Sun)

Here are major highlights:

- A **\$1.1 million award from the Department of Energy's (DOE) Small Business Innovation** Research will help University Distinguished Chemistry Professor Douglas Keszler 's company nexTC Corporation pioneer innovations for a clean energy future. The funds will enable nexTC to develop new technologies to improve solar module performance and lower materials cost.
- A startup was founded by Maude David, an OSU assistant professor of microbiology, whose research focuses on the gut-brain axis and the impact of gut microbes on behavior, specifically in autism spectrum disorder (ASD) and anxiety. With substantial momentum gained from a **2019 SBIR phase II \$1.94 million grant**, David and her team are exploring potential therapeutics for ASD by identifying differentiating factors within the microbiome of neurotypical children and those with ASD.
- A pivotal Oregon State chemistry project – funded by a \$493K grant from the M.J. Murdock Charitable Trust – will create a distinctive collaboration center for academic and industrial researchers that will bring synthetic chemistry into the digital age and prepare OSU graduates to address the grand challenges of sustainable chemical manufacturing. [Murdock grant to advance innovations in digital chemical discovery and manufacturing.](#)
- Led by principal investigator Rich G. Carter, professor of chemistry in the College of Science, the PTIE coalition's efforts were supported by a grant awarded to Oregon State from the National Science Foundation in 2019, with additional support from VentureWell and the Lemelson Foundation. [Oregon State-led coalition pushes to increase universities' societal impacts, inclusivity.](#) A higher rate of institutional innovation surfaced as a high priority through the Vision 2030 conversations, as were the needs for net revenue growth and diversification. Here are some innovation and entrepreneurship opportunities that the COS are positioned to take advantage of.

## Appendix E - COS SciRIS funds have supported 43 individuals and 13 teams since its inception in 2018

Program	Number of Proposals funded	Amount Awarded	Research Areas	Funding Source
SciRIS-ii (Individual Investigator)	17	\$170K	Basic & applied research (MTH, ST, PH, CH, MB, BB)	Disease Mechanism & Prevention Fund Robert Lundeen Fund Whiteley Materials Fund Education & General Funds
SciRIS-Stage 1	9	\$100K	Biohealth, materials, climate change, data science, genomics (IB, MB, BB, CH, ST)	Education & General Funds
SciRIS-Stage 2	3	\$225K	Biohealth, disease, microbiome, drug development (BB, MB, CH, PH)	Education & General Funds
SciRIS-Stage 3	1	\$125K	Biohealth, disease (cancer), drug development (BB, CH)	Education & General Funds
Industry Partnership Award	1	\$10K	Materials, clean energy (PH)	Venture Fund