BIG IDEA CHALLENGE 2.0

Why the Big Picture Matters: The Systems-Level Approach to Address Global Challenges

To address Grand Challenges, unorthodox approaches that integrate breakthrough science and engineering ideas with a comprehensive understanding of the underlying social and policy dynamics are critically needed. These innovative approaches call for truly new methodologies that merge perspectives from science, engineering, social sciences, arts, and humanities. The convergence of STEM disciplines and big-data-based approaches has already been shown to hold a great promise in providing unique solutions to global problems that our society face.

As a world-class institution that is keenly focused on societal impact, Purdue University is uniquely positioned to bring Science, Engineering, Humanities, Social Sciences and Arts together to foster creative, comprehensive solutions to global challenges. Discovery Park at Purdue University is an open innovation laboratory for highly interdisciplinary collaboration focused on the grand challenges in global health, global conflict and security, and sustainability. At Discovery Park, we answer the call to solve global challenges by focusing on disruptive innovation. Researchers move beyond and across traditional boundaries, collaborating across disciplines and with policy makers, economists and business leaders to create solutions for a better world. We bring all of Purdue's institutional strengths together to tackle global challenges and accelerate the delivery of practical solutions that impact society in direct and tangible ways.

Building upon the success of the first round of "The Discovery Park Big Idea Challenge" program that has kick-started several outstanding, highly interdisciplinary research programs focusing on addressing global challenges, we are launching a second round of the program on **"The Discovery Park Big Idea Challenge 2.0".** The program will provide resources to META-disciplinary teams of Purdue faculty and students pursuing bold proposals that go well beyond traditional inter- and multidisciplinary efforts. These projects will position the university as a leader in generating new insights and game-changing, disruptive contributions to solving global challenges in health, security and sustainability, as well as in the enabling science and technology of the quantum, digital and nano revolutions.

The Program:
Discovery Park Big Idea Challenge 2.0 will focus on bringing teams together that will pursue **system-level** projects that integrate revolutionary science and engineering ideas with crucially important social, political, and ethical impacts. These efforts should focus on the "**BIG PICTURE**" and go deeply both into the scientific discovery, design and engineering as well as **social impact** and synergistically integrate disciplines by cross-pollinating scientific approaches and methodologies in developing the next generation science and technology. Integrating science and engineering with the deepest analysis of societal impacts and risks and keeping the "big picture" in mind will ensure that the great idea your team will bring to life will be truly transformative.

The program will fund three to five teams for up to two years (depending on scope of the proposal) with a pool of strategic investment resources. It will not provide the full resources required to create the ultimate solution to a global challenge. It serves another purpose. This program is designed to nucleate ideas and create opportunities for new and significant external funding—both public and private. At the same time, it will chart new pathways to discoveries, innovations, and social and policy solutions, while training the next generation of future interdisciplinary talent.

The themes for the Big Ideas Challenge 2.0 align with Discovery Park's strategic framework. In addressing these themes, successful proposals will be multi-faceted, involving both **liberal arts and STEM** faculty, outlining the **equal-foot contribution** of each to the overall project. Topics include, but not limited to:

- Health: The science of animal and human disease, and the future of healthcare and personalized medicine, including the social, political, and ethical questions surrounding these issues.
- Sustainability: The interconnected themes of energy, climate change, food security, water, infrastructure and resiliency, and the environment.
- Global security and defense innovation, including autonomy, robotics, cognitive systems, hypersonics, policy studies, energetics and propulsion, cybersecurity, rapid prototyping and manufacturing, and related themes.
- Digital/Quantum/Nano:
    - All aspects of quantum information science and technology as well as emerging quantum economy;
    - The future of nanoelectronics, photonics, and computing, both architectures and algorithms;
    - All aspects of nano, and particularly the convergence of nano-bio-data technologies in the Life Sciences;
    - Data Science and social-technical approaches that may impact the future of organizational and agriculture, energy, manufacturing, transportation, healthcare, Cicic collaboration, equitable participation in public life, political depolarization and other fields;;
    - The future of man-machine collaboration supported by artificial intelligence, including methods and frameworks applicable across disciplines;
    - Internet of Things development and applications;
    - Ethical and policy implications for individual and collective equity, inclusivity, security, and freedom brought about by data science and digital technology applications.

The Proposal Process: Pre-proposals, Presentations and Budget

Proposals should outline how the team will work with at least two Purdue Colleges and two Discovery Park Centers/Institutes. The teams are encouraged to connect to their respective Associate Deans for Research for advice and help with forming a competitive team. Endorsements should be sent via email to Nicole Finley at kingman@purdue.edu. Center/Institute Directors and Purdue Colleges may support as many proposals as they wish. Proposals should incorporate elements related to entrepreneurship and policy dimensions of the global challenge, as appropriate. It is also encouraged that the team partner with local or global partners on the societal impact aspect such as a city council, local schools, policy makers, industrial partners and others.

The proposal, not to exceed three pages (single spaced, 12-point font, Times Roman), should be submitted for the first round. The written proposals will be used to down select projects for an oral presentation. The written proposal should include:

- A brief executive summary that articulates the proposal's Big Idea, and the intellectual value or contribution represented by the idea.
- A brief description of the need that the Big Idea tackles.
- What is the un-met need that the Big Idea addresses?
- What are the goals and expected outcomes, and impact of the project?
- Why now?
- A brief description of the team's approach to meeting the goals, including an articulation of the path to sustained external funding, and how the approach leverages Purdue resources.
- A brief description of the benefits of the proposed solution to Purdue and the world.
- Why Purdue? Including a description of the competition in the field and possible partnerships.
- A set of milestones that will be met over the period of performance (not to exceed 24 months).

Other considerations include the following:

- The proposal must clearly identify **a team leader** and at least **one additional key co-PI** from a different Discovery Park Center/Institute or Purdue College who must be experienced faculty members.
- If possible, the proposal should identify **a partner** from a local or global community to strengthen the system approach and societal impact.
- The milestones should set a clear **path towards federal, private or industrial funding** after the program end.
- The milestones should set targets for **tangible progress** to be achieved and will be reviewed every six months for continuing funding.
- It is expected that Big Idea Challenge 1.0 concepts will have advanced to a stage at which no further internal seed grant funding is necessary for progress and preparation for external funding. These "graduated" projects will not be considered for Big Idea Challenge 2.0 funding and the submission of these projects is discouraged.

A fourth page including a detailed budget outline/justification that aligns with the milestones should also be included, but will not count toward the three-page limit. It is expected that a typical project will have a budget of up to $300,000 per year. However, final budget determinations will be made after selection based on final scope and schedule. Budget resources will be provided by Discovery Park. There is no need to show cost-share in the proposals. However, it is desirable to acquire additional resources for your proposal in order to demonstrate commitment from your college/department. Budgets do <u>NOT</u> need to go through Sponsored Programs for the first round.

Proposals will be evaluated by a team of selected Discovery Park Center Directors, Associate Deans for Research, and other academic leaders and external advisors representing the broad interests and capabilities of the campus. Care will be exercised to ensure that there is no conflict of interest in the proposal evaluation process. The same evaluation team will be tasked with the milestone reviews. The proposals will be scored based on the following weighed criteria:

- 30% - How compelling is the Value Proposition? What intellectual value or contribution is represented by the idea? How strong is the scholarship/research base for the proposal? What will be the value of this proposed research beyond enriching the research program of the lead PI? Will it catalyze or enable new areas of research or new collaborations?
- 50% - How likely is it that the big idea challenge funding will result in new federal, corporate, donor and/or foundation funding at significant scale? Identify likely funding sources as specifically as possible. Why is this team, and why is Purdue, the right place to lead this effort?
- 20% - How strong is the track record of the team in successfully tackling complex problems and working collaboratively over the long term? Is the team interdisciplinary?

Teams whose proposals are selected for oral presentation will be invited to pitch their Big Idea to the evaluation committee. The teams will compete in a public process akin to an entrepreneur's pitch to venture capitalists. Presentations will be strictly limited to 8 minutes, with 7 minutes for questions, and are expected to succinctly, but clearly address all elements of the project, as well as describe the project team leadership qualifications, milestones and the budget. Details on presentation framework will be shared with the selected teams.

Timeline:
- March 18: Value Proposition Workshop with Agile Strategy Lab, 1:30-2:30 pm, Burton D. Morgan Center, room 129
- March 19: Value Proposition Workshop with Agile Strategy Lab, 8:30-9:30 am, Grissom Hall, room 134
- March 28: Question & Answer Session with Sasha Boltasseva, 2:30-3:30 pm, Burton D. Morgan Center, room 129
- April 15: Submission deadline, proposals due by close of business, 5:00 pm ET. Please submit all materials in one PDF to Nicole Finley at kingman@purdue.edu.
- April 29: Notification for selection to present oral presentation
- May 9 and 10: Oral presentations for selected proposals
- May 13: Notification of selected proposals for awards
- May 28: Project kickoff

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Resources Available Through Discovery Park:

Full budget allocation to the project will be contingent on satisfactory progress in meeting the bi-annual milestones. The Discovery Park business office will be available to help with budget determination and structure. Budget questions should be directed to Donna Brown, brown746@purdue.edu, Assistant Director of Financial Affairs in the Discovery Park business office.

Agile Strategy Laboratory will hold two Value Proposition Workshops to assist teams in developing their proposal's value proposition. Workshops will be held on March 18 from 1:30-2:30 pm at Discovery Park's MRGN 129 and on March 19 from 8:30-9:30 am Grissom Hall, room GRIS 134.

Additionally, winning teams will have access to Lewis-Burke Associates LLC. Lewis-Burke is a consulting team out of Washington, DC that will assist teams with finding funding opportunities and make connections to appropriate federal agencies.

Research teams with additional questions can contact:
- Sasha Boltasseva, Professor, College of Engineering; Inaugural Discovery Park Fellow: aed@purdue.edu
- Cliff Wojtalewicz, Assistant Director of Discovery Park: cliffw@purdue.edu

For questions related to the Agile Strategy Laboratory, please contact:
- Scott Hutcheson, Associate Director, Purdue Agile Strategy Lab: hutcheson@purdue.edu

Information on Discovery Park's first Big Idea Challenge, frequently asked questions and winning teams can be found here.

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