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Frame the Future Thought Pieces

When Framing the Future, Open the Aperture for Innovation

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Many governments, councils, and other organizations are crafting new competitiveness policies and strategies for the post-pandemic economy. Policymakers also remain focused on solving global challenges, such as the need for more sustainable systems of production and consumption. In a global economy driven by multiple technology revolutions, many are placing innovation at the center of these strategies and, as we design and implement them, we must open the aperture for innovation with new approaches, tools, and teams.

Solve for X

R&D carried out by universities and governments are often "push" in nature. They uncover new knowledge and develop new technology, and then others work to apply them. However, it often takes significant time and money to bring these research results and immature technologies to a readiness for application. At a time when there are urgent problems to solve, markets change rapidly, and technology life-cycles are collapsing, we cannot wait for a technology transfer, application, and commercialization cycle that takes decades. For example, it can take 30 years for new materials to move through this cycle.

In contrast, goal-driven models of innovation focus directly on solving a problem, and take into consideration issues such as context for use, manufacturability, and cost from the very beginning. For example, developing a water purification system for underdeveloped countries must consider the socio-economic system in which it will be deployed, such as the cost required, available skills to guide its complexity of operation, and available power sources, if any. In this approach, the time and cost of tech transfer and maturing the technology for application are reduced, if not eliminated. In addition, different disciplines can cluster around a challenge, integrate their diverse knowledge and skills, and innovate systemic solutions.

"The world is entering a new era. We are facing a rapidly expanding technological frontier to explore and exploit, a fundamentally changed competitive landscape, the potential for significant market and technological disruptions, and a range of new societal challenges that cry out for attention."

Challenges are one such model. In 2004, the U.S. Defense Advanced Research Projects Agency (DARPA) took a risk and issued a groundbreaking Grand Challenge — a first-of-its-kind race to foster the development of self-driving vehicles. It put up a $1 million prize for a team that could build an autonomous vehicle that could navigate a 142-mile course that ran across the Mojave desert. No team claimed the prize, but the Challenge showed great possibility. Eighteen months later, they ran the challenge again, and 195 teams entered the contest! Those teams brought fresh thinking that drove major advancements in the development of autonomous vehicle technology in the subsequent years. DARPA went on to run other challenges on robotics, cyber security, infectious disease forecasting, and navigating and searching underground environments such as tunnels, caves, and urban underground infrastructure.

Today, many U.S. government agencies post challenges on www.challenge.gov with cash prizes that can reach millions. Many of these challenges seek to solve global and social problems, such as the need for low-cost food safety traceability, geothermal lithium extraction, lighter and more portable oxygen systems for outpatients, small desalination systems powered by ocean waves, rust abatement for water infrastructure, and innovations to make artisanal and small-scale gold mining in the Amazon more environmentally responsible and socially equitable.

Compared to traditional grants, challenges ignite the imagination and social conscience, encourage out-of-the-box thinking, set goals without preconceived notions of how they may be met, and open the door to novel approaches that may seem too risky to pursue.

Work Across Boundaries

Many of the problems we must solve are multi-faceted. Yet, siloed specialized departments, government agencies, and committees may lack the scope of knowledge and vision to deal with cross-discipline problems. Complex challenges often transcend the boundaries of traditional, single-discipline R&D models. One discipline does not talk much to other disciplines and rarely explores them for solutions. No matter how excellent they may be, the small, single-discipline R&D projects that proliferate in government and university R&D portfolios often are too small in scale or scope to capture opportunities for innovation or solve global problems with major economic or societal impact. Moreover, innovation is rising at the intersection of disciplines such as nano-medicine and nano-electronics, agro-energy biotechnology, biomaterials, biomimetics, ecological economics, and the computational-X fields.

For example, developing AI-infused machines that can operate safely in the real world needs contributions from the fields of robotics, machine learning, computational models, and developmental psychology. Fields involved in the challenges of an aging society are as diverse as gerontology, nutrition, psychology, physical therapy, architecture, and home design. Smart, energy efficient transportation systems that include autonomous vehicles will involve automotive companies, digital hardware and software developers, infrastructure builders, utilities, urban planners, systems integrators, sociologists, and behavioral scientists, to name a few. Most corporations have already moved to multidisciplinary R&D and innovation teams because the problems faced by their customers and opportunities in the marketplace require it.

Cast the Net Widely

There are many potential innovators and problem-solvers who are not engaged in the innovation ecosystem. There is tremendous untapped potential out there. Twenty years ago, NASA ran a novel experiment showing that public volunteers they called Clickworkers, some working a few minutes here and there and others working longer, could classify craters on Mars from images taken by the Mars Reconnaissance Orbiter, routine science analysis that would normally be done by a scientist or graduate student working for months. Over about a year, 101,000 Clickworkers volunteered 14,000 work hours making 2,378,820 entries! In 2012, the U.S. Department of Energy's Advanced Research Projects Agency—Energy called for short concept papers in a request for proposals open to the full spectrum of energy-related technologies. It received more than 4,000 papers, creating a rich pool of potential. The 2015 open competition drew more than 2,300 new concepts.

Solve for X

Challenge: The U.S. Navy seeks novel designs for an unmanned surface vehicle that can be shipped in a standard 20-foot shipping container, rapidly produced or assembled on site within two hours, and capable of carrying or towing a variety of functional payloads.

Fighting a Global Pandemic

- Biomedical and genetic researchers, virologists, and biologists
- Vaccine producers
- PPE producers
- Medical providers and public health professionals
- Logistics professionals and operations researchers
- Occupational safety specialists
- Statisticians and data managers
- IT experts
- Economists
- Insurance companies
- Social scientists, psychologists, and people who understand various kinds of networks and human behavior
- Educators and communicators
- Policy-makers across all of these disciplines

DARPA's Autonomous Ground Vehicle Challenge aimed to reach beyond the traditional defense performer base and tap into the ingenuity of a wider community. That competition brought together a community of innovators, engineers, students, programmers, off-road racers, backyard mechanics, and inventors to try to solve a tough technical problem.

Some companies have also cast a wide net. For example, any innovator can present solutions through P&G's Connect + Develop portal. Some of its most successful products were brought to market through the portal, including Olay Regenerist, Swiffer Dusters, ForceFlex trash bags, and Mr. Clean Magic Eraser.

Open innovation platforms can expand the search for solutions to our global problems. Innocentive taps a community of a half-million problem-solvers around the world. Some of the needs being tackled include closing the financing gap for clean water, sanitation, and hygiene for remote and vulnerable communities; biologically-based water toxicity sensors; affordable water harvesting solutions; improving the environmental sustainability and biodiversity preservation of solar and wind power installations; low-cost chlorine monitoring for rural piped water systems in sub-Sahara Africa; and affordable rural single-family sanitation solutions. Each of these challenges has between 100-500 solvers working on the problem.

Open-up Big Data Sets

Big data is driving a rapid and profound transformation in research and gaining insight for innovation. It is a rare and unique opportunity to revolutionize how discovery takes place, pursue fields of inquiry that otherwise would be impossible, and conduct studies at a scale that could never be achieved in the laboratory. Many governments have large data sets they could open to inquisitive problem-solvers and innovators.

Build Infrastructure to Support New Approaches to Innovation

To open the aperture for innovation, we need new types of platforms and tools:

- Digital platforms, work venues, and processes to support global teams, multidisciplinary teams, and mass creativity
- Multidisciplinary R&D programs
- Tools for collaboration and group co-creation
- Platforms and places to connect problem-solvers with solution seekers
- Hubs where basic and applied researchers, technology developers, industry, entrepreneurs, regulators, and policymakers can come together to blend technology development, design and engineering, and economic, regulatory, and policy-related issues that need to be addressed to accelerate innovation
- Tools for widespread access to and use of big data sets

Take a Risk

Policymakers and governments, even some company leaders, often have a low tolerance for risk, even when presented with the potential for substantial reward. Many are uncomfortable with new-to-the-world technologies because a baseline of knowledge and experience has not been built. For example, despite the dire need, venture capitalists and firms have shown little interest in climate change-mitigating technology, due to the scale and risk of the investments — for example, in the areas of hydrogen energy technologies, off-grid renewable energy systems for the developing world, and automated electric vehicles for the transit of goods.

But the world is entering a new era. We are facing a rapidly expanding technological frontier to explore and exploit, a fundamentally changed competitive landscape, the potential for significant market and technological disruptions, and a range of new societal challenges that cry out for attention. We must find new pathways to the future, take risks, and try new things. In the midst of leapfrog technologies, if we push the outside of the envelop for economic and societal gains, there will be big successes, but also failures. However, if we will not take risks, we cannot progress.

> Sun Microsystems Founder Bill Joy's Law: "No matter who you are, most of the smartest people work for somebody else."

Solve for X

To lower disease transmission, significantly reduce the number of mosquito bites inside the home by reducing the number of mosquitoes that enter the home and/or affect the behavior of mosquitoes while inside the home so they can't or don't bite residents.

The Global Federation of Competitiveness Councils

The GFCC is a global multi-stakeholder membership organization that has universities, corporations, government agencies and private sector industry organizations and councils as members. Combining its members and fellows, the GFCC has a footprint in more than 30 countries. Leaders and organizations in our network strive to advance innovation, productivity and prosperity in their nations, regions and cities.

To know more about the GFCC, visit our website or contact info@thegfcc.org.

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