Innovation is vital to a U.S. economy desperately in need of job creation. University researchers are making breakthroughs across a range of subject areas, like renewable energy, material science, medical technologies, and Big Data. To ensure these innovations grow into job-creating commercial products and services, government, industry, and academia must collaborate throughout the innovation process. Doing so will be a game changer for the country.

The federal government has a central role in funding basic research and aligning it with the public need, while universities and private industry share primary responsibility for delivering on the federal investment. For universities, moving the discoveries and ideas germinating on our campuses into the real world where they can do real good is critical to fulfilling our mission.
At the University of Washington (UW), it is our obligation as a public university to serve the community. Among the many important ways that we do this is by bringing to market innovations that can improve lives and change our communities for the better. Therefore, we set a goal a year ago to double the number of startup companies spun out from UW research over the next three years. We met our goal in one year. Achieving this goal brings economic benefits, to be sure, but much more important is the impact it has on the lives of real people—an impact that would only grow with improved collaboration among innovation stakeholders.

Late last year, two provocative reports examining the industry-university-government partnership in supporting U.S. research showed that, factored for inflation, the budgets for basic research through federal agencies (such as the National Institutes of Health and the National Science Foundation) have fallen by 25% over the past 20 years, relative to the U.S. GDP. These reports—the President’s Council of Advisors on Science and Technology released Transformation and Opportunity: the Future of the U.S. Research Enterprise and the National Research Council published Research Universities and the Future of America—also revealed that industry has increasingly concentrated its research on late-stage technology development and incremental improvement. The vanguard of game-changing research and innovation rests with the universities that can succeed in navigating the complex challenges of collaboration with industry and government.

In an innovation-driven economy, our economic vitality requires a significant increase in research and development. Here are primary considerations for the government, university, and industry collaboration that can make this possible.

**FEDERAL GOVERNMENT**

**INCREASE INVESTMENT IN BASIC RESEARCH:**

If we did not understand the nature of the electron, we would not have been able to create the transistor. Investments that spawn new industries, products, and services are among the smartest and, ultimately, most frugal uses of our tax dollars. Moreover, investment in basic research should not only be through NIH and NSF funding, but also through the Department of Energy and the Department of Defense.

**Investments that spawn new industries, products, and services are among the smartest and, ultimately, most frugal uses of our tax dollars.**
INCREASE INVESTMENT IN TRANSLATIONAL RESEARCH:

The government must work with industry to better understand the scientific and technical gates to next-generation solutions, and fund research that directly relates to solving America’s most essential needs.

Academics must work harder to demystify for industry how to work with universities.

INVEST IN AFFORDABLE EDUCATION BY STRENGTHENING FEDERAL INVESTMENT IN FINANCIAL AID:

Innovation comes from people. The student component of university research programs is essential. At the UW, we have nearly 6,000 undergraduates who participate in a significant amount of research each year, translating to a million hours of creating knowledge and learning to create. A unique strength of research universities is our graduates who understand the innovations of today so well that they will continue developing the innovations of tomorrow.

INVEST IN COMMERCIALIZATION:

The government’s Small Business Innovation Research and Small Business Technology Transfer programs are a start, but they are underfunded. Federal grants don’t cover patent costs, nor do they provide support for university tech transfer operations and programs that foster nascent spin-out companies. In the absence of some allocation toward
technology commercialization, universities have to find alternative funding sources. Consequently, we often see a large disparity in tech transfer budgets between well-endowed private universities and state-supplemented public ones, as well as the universities that have had a big hit in their licensing portfolio and those that have not.

UNIVERSITIES

STANDARDIZE TERMS IN SPONSORED RESEARCH AND LICENSING AGREEMENTS:
Academics must work harder to demystify for industry how to work with universities. Wherever possible we must standardize and publicize sponsored research terms that include well-defined options to any resulting discoveries. We must do the same with licensing terms. For universities to best contribute to the public good, we need a model of IP management that addresses the needs of industry for clarity, certainty, and expeditiousness.

National efforts to standardize elements of the many interactions between U.S. universities and industry are an important step in reducing transaction costs for commercializing innovations. A good example is the University Industry Demonstration Project, which supports mutually beneficial collaborations, encouraging U.S. competitiveness.

SHARE EXPENSIVE CORE FACILITIES:
Universities and industry can lower the overall cost of innovation and product development by sharing high-tech research facilities. Universities and national labs provide stewardship for sustaining high-quality operations, for maintaining and upgrading equipment, and for providing training.

Shared core facilities are of greatest benefit to small and mid-sized companies, but we have many examples of the economics making sense for larger companies as well. U.S. facilities for nanotechnology research are at top universities and national labs, funded jointly by government, universities, and
Everyone sees that innovation is one of the economic currencies for the next century.

industry. They are open to industry users seeking access to this emerging technology, and over time, this and other cutting-edge equipment can mature into standard resources for the industry.

RECRUIT TOP-NOTCH ENTREPRENEURS-IN-RESIDENCE:

Entrepreneurs-in-residence identify opportunities and introduce valuable application targets that may not be considered by university innovators. The Entrepreneurs-in-Residence (EIR) program started by the UW Center for Commercialization (C4C) played a critical role in our university doubling the number of startups spun out annually. Each of our EIRs is committed to spinning out at least one company based on UW research. As they identify opportunities, this experienced leadership contributes directly to the growth of start-up companies in attracting funding, increasing efficiency, and improving the odds of success.

PROVIDE COMMERCIALIZATION POSTDOCTORAL OPPORTUNITIES:

In the effort to move innovative discoveries to market, universities should find ways to retain the essential entrepreneurial contributions of graduate students after they complete their degree. New “post-docs” can help take technology the last-mile, to the point where it can be transferred. Retaining these new graduates is often essential to sustaining the momentum of an emerging start-up. One way to do this is through such programs as the one launched last year by UW C4C. This program provides fellowships to graduates of advance degree programs so that they can remain at the University for a year in order to devote their expertise and energies to commercializing research developed in their faculty advisors’ labs.

INDUSTRY

INVEST IN EARLY-STAGE FUNDS:

Needed are fiscally prudent funding models that make smart money available to early-stage companies. Early-stage venture funds are one example, as are private funds or public-private partnerships with a mission to invest in technology start-ups within a state. Another example is the W Fund, a $20 million fund established in 2012 in Washington State with an investment focus on spin-out companies from any research institution in the state. The funds are a combination of State Small Business Credit Initiative federal block grants and private investments. The W Fund’s investment committee is composed of volunteers or “talent philanthropists” who are among the most experienced venture capitalists and business leaders in the Seattle area.
ADVISE ON INDUSTRY NEEDS:

As Donald Stokes explained in his book, Pasteur's Quadrant, even in the case of basic research rooted in a quest for fundamental understanding, research may be “use-inspired.” We cannot leave awareness of the challenges faced by industry to those focused on purely applied research. Industry must work harder to see that federal agencies funding research and university researchers designing experiments and research programs are informed about the hurdles in next-generation product design and development.

JOIN INDUSTRY CONSORTIA:

It is important to work with industry to revitalize the consortium model. Industry consortia that will share non-exclusively in innovation can justify investment in basic research alongside federal agencies, to take on grand challenges and to ask the perennial question: what technologies will be game-changers for our industry in five to ten years? When done well, consortia can sustain focused engagement between industry, universities, and government to pursue these open-ended questions. The National Science Foundation (NSF) offers guidance on best practices in establishing and administering effective industry consortia.

Substantial, nonexclusive engagement around basic research develops the collegiality that makes the transition from research to development easier. Companies that want to prepare for these emerging markets will develop working relationships with the research groups, and thereby share a working familiarity with each other's needs, organizations, and people.

It is critical that we welcome the federal government’s renewed emphasis on technology development. This is where the American public will see the return on their investment in basic research. Yet, if we are to sustain an expansion of our innovation-based economy, industry and universities need to also cooperate in making the R&D system more seamless and efficient. This is an opportunity for all stakeholders in the innovation process to collaborate on developing the next big game-changing ideas, technologies, and other products that the country desperately needs.

Everyone sees that innovation is one of the economic currencies for the next century. This is not a secret. It is an open competition. The United States has long been a leader in this competition, but it will take industry, academia, and government working together for our country to stay there.

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