

When the federal budget funds scientific research, it's the economy that benefits

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Credit: CC0 Public Domain

Emergency: You need more [disposable diapers](#), right away. You hop into

your car and trust your ride will be a safe one. Thanks to your phone's GPS and the [microchips that run it](#), you map out how to get to the store fast. Once there, the [barcode on the package](#) lets you accurately check out your purchase and run. Each step in this process owes a debt to the universities, researchers, students and the federal funding support that got these products and technologies rolling in the first place.

By some tallies, almost two-thirds of the technologies with the most far-reaching impact over the last 50 years [stemmed from federally funded R&D](#) at national laboratories and research universities.

The benefits from this investment have trickled down into countless [aspects of our everyday lives](#). Even the internet that allows you to read this article online has its roots in federal dollars: The U.S. Department of Defense supported installation of the first node of a [communications network called ARPANET](#) at UCLA back in 1969.

As Congress debates the upcoming budget, its members might remember the economic impacts and improved quality of life that past [congressional support of basic and applied research](#) has created.

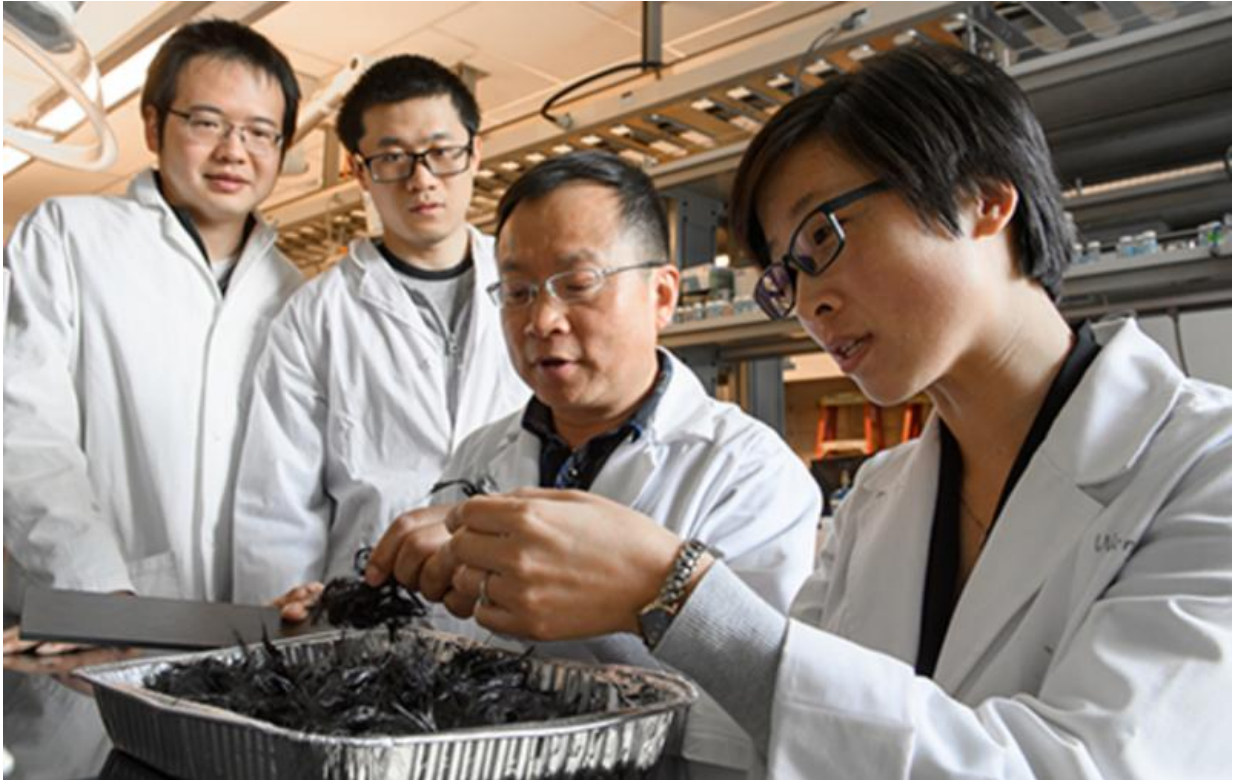
Federal dollars do more than fund labs

Here in the state of Washington, federally funded research at both my employer, Washington State University, and the University of Washington has led to transformational innovations. It's helped spawn not only new products that save and improve lives, but productivity growth through new businesses and services.

Just a few examples include new kinds of [composite-based lumber](#), [smart home technology for the aged](#), [kidney dialysis machines](#), [airport explosive detectors](#) and new varieties of wheat, [potatoes](#) and other [agricultural crops](#) that we enjoy at our tables and in numerous products.

All these inventions relied on federal investment combined with university research lab expertise. The important final step was commercialization. Together it all led to positive economic impacts.

We see this pattern again and again.



The Zhang lab at WSU works on recycling carbon composite fiber materials.
Credit: Robert Hubner, WSU, CC BY-ND

For instance, next time you're on Google, remember it was founded by two Stanford University doctoral students who were funded in part by [National Science Foundation Graduate Fellowships](#). Fast forward 20 years and here in my backyard, the company is busy building a new

campus in downtown Seattle that may house [3,000-4,000 workers](#) by 2019. Many of those hired will likely be [graduates from both WSU and UW](#).

The fact is that [thousands of companies](#) can trace their roots to federally funded university research. And since the majority of federally funded research takes place [at America's research universities](#) – often in concert with federal labs and private research partners – these spinoff companies are often located in their local communities all across the country.

Just one of these firms, headquartered in Broomfield, Colorado, employs over 2,800 workers and started with researchers at the University of Colorado who create instruments, data exploitation solutions and technologies for civil, commercial, [aerospace and defense applications](#). Another in Audubon, Pennsylvania develops rapid, noninvasive ["liquid biopsy" tests](#) for cancer screening and early detection based on research from the University of Pennsylvania. And another company with 85 employees in Madison develops high-density [DNA microarrays](#) for pharmaceutical research based on research from the University of Wisconsin.

The list goes on and on.

A Washington state case study

Focusing federal research funding on research universities who enjoy strong corporate and business partners has [strategic value](#). There is little doubt that the state of [Washington's recent economic successes](#), for example, comes down to a cycle of innovation and discovery that feeds additional economic growth and private-public-university relationships. Federal R&D funding is a key ingredient.

Our two public research universities have strong relationships with

federal funding agencies. Together Washington State University and the University of Washington – the largest recipient of federal research funding in the nation among public universities – form the technological and intellectual pillar around which many of our state's successful businesses are built and sustained. Both universities graduate thousands of undergraduate and graduate students who provide a constant supply of educated, trained workers. In turn, the universities and federal R&D investment benefit from the active engagement and monetary support of business leaders and professionals. Innovative ideas and knowledge percolate back and forth between federally funded research and the private sector.

A recent milestone provides an example.

Federal research dollars helped solidify a collaboration aimed at solving a big problem: the high carbon emissions from air travel, a contributor to climate change. WSU worked together with the UW and a host of other regional public research institutions, the U.S. Department of Agriculture, Alaska Airlines, Weyerhaeuser Corp., Gevo, Inc. and a large alliance of private industry to develop a [renewable, affordable source of jet fuel](#).



Gassing up with renewable, affordable jet fuel – thanks to a public/private research collaboration. Credit: Robert Hubner, WSU, CC BY-ND

Each collaborator brought unique expertise to the innovation table. USDA provided the funding and the policy commitment to the development of biofuels that spurred matching investment from private partners. Alaska Airlines brought the need to reduce its carbon emissions and its leadership in applying clean technologies to improve its environmental performance. WSU contributed decades of pertinent experience in both basic science and applied research. UW researchers demonstrated the fuel's potential reduction in life cycle greenhouse gas emissions. And, Gevo, Inc. brought its private-sector skills and patented technology in developing bio-based alternatives to petroleum-based products. The sum of these parts created a strong, successful partnership

that took a big step toward sustainable aviation.

Individual researchers with their deep expertise remain the bedrock of the research enterprise. But teams of scientists – drawn from research universities, government and the private sector – all [working on multidisciplinary problems](#) are having an increasing impact.

Recipe for amplifying R&D investment

Importantly, this phenomenon is not unique to the state of Washington. The [nation's most active innovation hubs](#) and successful regional economies have similar factors that drive economic growth and resiliency, including:

- Top-tier research institutions supported by federal, state and private funding;
- A concentration of talented and diverse workers;
- An ecosystem of firms, entrepreneurs and intermediaries;
- Accessible pools of risk capital;
- A global orientation; and

Communities that take advantage of the area's unique assets and advantages in creating a desirable quality of life.

We see these conditions [coming together around the country](#): in Silicon Valley, the Raleigh-Durham Research Triangle Park, Boston's metro area and other innovation hubs in cities like Boulder, Colorado; Madison, Wisconsin; Austin, Texas; and Gainesville, Florida.

It's this [cooperative model](#) and leveraging of federal R&D dollars that have long been this [nation's competitive advantage](#). With fewer federal dollars allocated to scientific R&D, the next Silicon Valley – with its potential for an economic renaissance for a new area not even on our

innovation map yet – may not emerge as quickly.

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