

INTERVIEW

“Universities are
the invisible hand.”

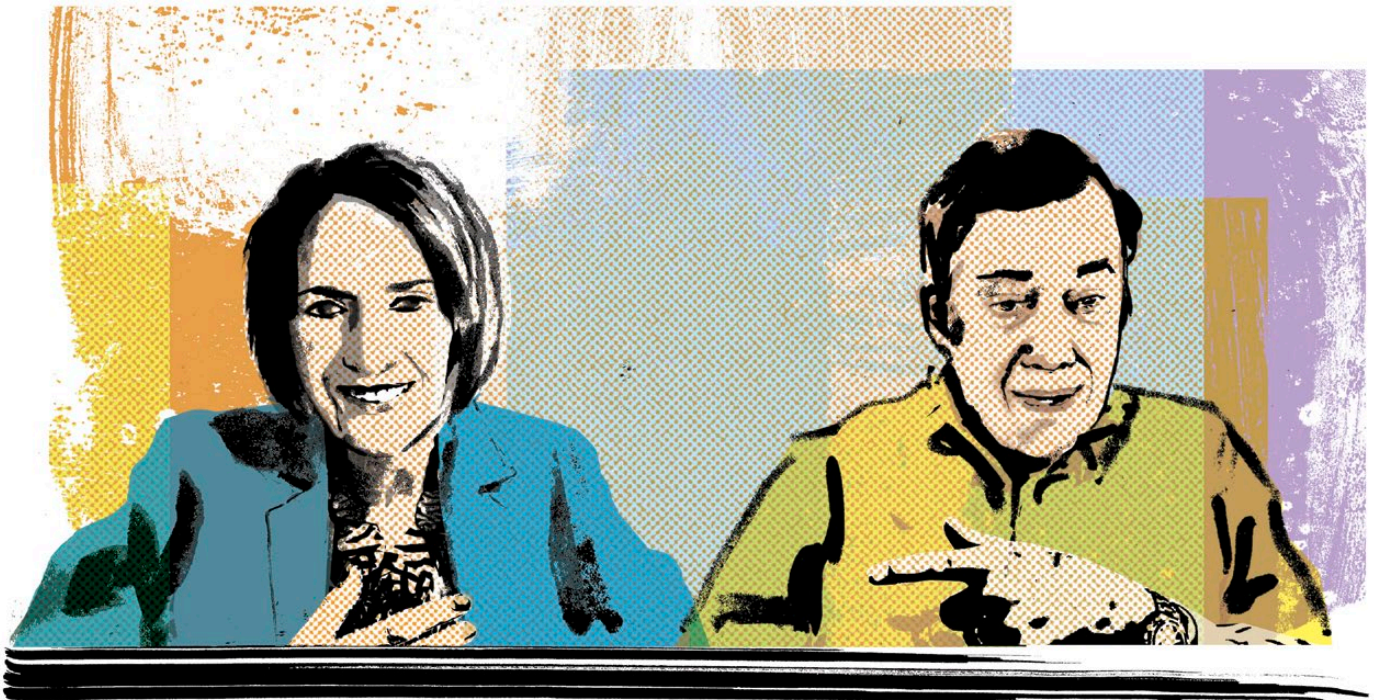


Illustration by Shonagh Rae

Marcia McNutt and Michael M. Crow talk about the role of science in nation-building, why uncertainty can be as damaging as budget cuts, and how the scientific enterprise can become more efficient and effective.

On March 12, 2025, the leaders of the *Issues* editorial board—Marcia McNutt, president of the National Academy of Sciences, and Michael M. Crow, president of Arizona State University—met on Zoom to offer their thoughts on the challenges facing the scientific enterprise in the early days of the second Trump administration, and how the institutions of science should respond. Their conversation responded to prompts offered by editor-in-chief Lisa Margonelli and editor William Kearney.

How worried are you at this moment? Do you see this as a major reset? And where do you see avenues for change?

McNutt: We are both seeing such challenges with our organizations unlike anything before in all my years of being part of the science enterprise. The situation is a fairly major reset. If we just look at the number of federal agencies that are being decimated, many of them are science-based agencies. I'm very concerned because I see a conflict between reducing the people in these agencies and the ability of the agencies to accomplish their missions and maintain expertise. I think it's going to be chaos for quite a long time, and I don't honestly know how it's going to smooth out in the end.

Crow: It's unprecedented. American culture is, as the political philosopher Alexis de Tocqueville described it, very practical. And if you can't see the correlation between science and practicality, you lose understanding.

What history tells us is that without scientific and technological advance, we will be battered by calamity. We will not be successful in maintaining our food supply. We will not be able to defend against our enemies. We will not be able to be the leading economy on the planet. History is quite clear. So, what we have now is a lapse of memory—a fundamental failing to understand how we got to where we are.

McNutt: I would say that if we want America to be great, we need great science. In the past, budgets have only modestly been adjusted from the year before. And if some new exciting field emerges, then our government enterprise looks for new money to help bolster this breakthrough area. Very rarely do we reallocate money from a place where there's not much happening and move it over to another field where the science is rapidly advancing. I think at a time when there's so much concern about inflation and other matters, it does make sense to pull together scientists and select priorities.

But that's not what we're doing. Cutting certain areas of inquiry based on ideology is not going to make America great.

Crow: Yes. Following on Marcia's points, the United States has been outperforming all other economies. This is an essential point in arguing against taking a meat cleaver to the American scientific enterprise.

Since 1945, 75% of all global economic growth is derivative of technological advance. And since 1990, 90% of that technical advance is derivative of fundamental scientific understanding, which was never the case before.

The opportunity for making America great lies in the foundation it has created for global economic growth—giving us trading partners and opportunities to generate American wealth and build our nation. Many people have missed the significance of this transformation into a knowledge-driven, scientifically grounded, technology-advancing economy.

McNutt: You know, another way to say this is if we look around the world at which countries are prosperous, there are two classes of them. There are those nations that have invested in science and technology, and they are doing well. They are creating entire new industries, new disciplines, new ways to advance the welfare of humans on this planet. The other kind of country that is doing well economically is the kind with a lot of natural resources to exploit—but that source of wealth is not sustainable. Science is still the endless frontier of knowledge and advancement.

Crow: It's funny—the same is true for our country's states. The states that have the greatest concentration of scientific work are, it turns out, the richest states that are making the most economic progress. If we had more research and more knowledge-driven economic activity in all our states, then our country would be even more successful.

Take Texas, which is richly endowed with universities and science and is the leading US state for green technologies and renewable energy technologies. The Texas economy is larger than the Russian economy and has more scientific output than all of Russia combined. People might think Texas's wealth is in oil. Much of it is, but that's not what built its economy. Texas distinguishes itself through unbelievable fundamental scientific research and technological development organizations.

As leaders of institutions, you both have gone through all kinds of headwinds. What can be done to reshape this conversation in this moment? Where do you see opportunities?

McNutt: I would say the number one thing we need to do is to convey the importance of investment in research and the building of the research enterprise, using terms that are relatable to this administration. They're very

interested in the United States being a leader in certain areas. So in communicating the importance of science, we need to relate it to the objectives that this administration cares about. There are many justifications for science that just aren't going to generate much enthusiasm from this administration. They're not interested, for example, in combating climate change. But they do care about jobs and the economy, artificial intelligence and national security. That is why the statistics that Michael just recited are so important.

Crow: Look at the People's Republic of China. Why did China decide 30 years ago to build a hundred new research universities? Why do they have massive research centers in artificial intelligence now? Certainly there are military reasons, but also economic-competition reasons. China thinks: If we can beat the Americans in science and technology, we win.

Our nation has become confused by the fact that universities are very complex places. Many people are mad at schools about social, political, or freedom of speech issues, and those have to be dealt with. But now our great

that the students are going to be discouraged from going to school. We've had, of course, a huge benefit to this country by attracting the best and brightest from all over the world.

Crow: When we first began building research universities, we sent everyone to Europe to earn their PhDs and to be trained to return to help build universities. It has always been the case that the one who attracts the talent, wins the game.

McNutt: And I think it actually could go the other way, that top people from America will be recruited elsewhere because of all of the uncertainty and all of the curtailing of financial resources, etc. We will regret that.

Crow: As leaders, we must find a way to change the dialogue. Universities must work together to support not only research and researchers, but also the Pell grant recipients and others who are important to our mission and our future. We must work with Congress to secure support for the continued excellence of our R&D system.

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universities, which are critical to America's economic competitiveness, are being thwarted in the research space as punishment for perceived misbehavior in those other spaces. Those two things should be separate. They are not the same. You're going to throw the baby out with the bathwater, wound the country, allow others to gain scientific and technological dominance, and lose our economic momentum.

These changes are falling heavily on early-career researchers, on grad students who are watching their PhD programs get canceled. What can the institutions of science do to support them and keep science moving forward?

McNutt: Well, it's hard to imagine we can quickly turn this around with the current situation, where uncertainty is just as damaging as budget cuts. I worry that we're going to go through a period of great chaos for the next year, at least, and maybe beyond that. I'm so very concerned

Twelve years from now, the United States has the most vibrant, science-based economy it's ever had. What does that look like? And how did we get there?

Crow: Twelve years from now, success will come from taking this moment of reevaluation and political argument to invest in scientific and technological assets that will help prepare the most educated, STEM-capable, and driven set of humans ever, working throughout all 50 states in ways that benefit all 50 states.

At Arizona State University, we decided to make engineering an attainable degree pathway for any hardworking student. They don't need a 750 math SAT score to get into an engineering program. We grew engineering to 33,000 students and are now graduating over 7,000 per year. We're looking around to form a coalition of universities to amplify this growth. The arguments that Americans aren't interested in STEM are false. Arguments that Americans can't be great scientists or engineers are clearly false.

We have the means to provide more opportunities to more learners with new educational technologies. To be where we want 12 years from now, this needs to be the moment when we realize that science and technology are central to our success and double down.

McNutt: I agree with Michael—that would be lovely if it actually happened. But my concern is, over the next two to four years, are we going to have a *contracting* scientific enterprise? And I won't blame this entirely on the policies of the new administration. I think we also have to look within at what we have been doing as a research enterprise.

Just to give you an example, I have three very bright daughters. I would've loved for one or all of them to go into scientific research. They had the talent, but they looked at the fact that if they were going to become scientists, they were going to spend four years in college, then five or more years getting a PhD, and then a number of years as postdocs with low salaries. So instead, they all went into law or business.

You both seem to have a vision of the STEM enterprise using this time to rethink what STEM careers look like. Is that what you're talking about?

Crow: Yes, I was just in meetings about licensing to operate part of our engineering school in the United Kingdom, where we can give three-year degrees. We're learning to speed up undergraduate degrees and use advanced technologies to speed entry into STEM. We need to change PhD programs—make them shorter, faster, and more variable in terms of outcomes.

McNutt: I couldn't agree more, because I think the problem with most of science education in America, particularly at the graduate level, is that too many researchers are trying to train students in their own image at a time when the vast majority are going into industry.

We have put insufficient effort into understanding how we need to change graduate education to produce well-rounded students who are going to be able to learn new things and contribute across the spectrum of science throughout their careers. Training people just to be researchers on government grants is not the way to go.

The opportunity in the current crisis is that it can motivate us to look at how we're going about education and make it more efficient, more effective, and better connected to the long-term goals for these students.

We feel the same way at the National Academies. We recognize that business-as-usual is not what's going to happen. We are going to have to be a leaner organization. And we really want to make sure that we use this crisis as

an opportunity to rethink how the Academy operates—to be more nimble, quick, and to contribute far more across the whole spectrum of the national economy and way of life.

Crow: If you look at history, it's unbelievably clear. During the Civil War, President Lincoln asked the major academics to convene and think about how to create more scientific and technological progress. That system has worked for agriculture, aviation, space, and medicine, but it needs to be honed and made more efficient and effective. In my view, it needs to be more focused on American success.

McNutt: Yes. Many of our federal agencies were set up back in the 1800s—so there's a lot of siloing of different disciplines in different agencies. This might be a good time to think about how we, as a nation, can make sure that how we're investing in science is well suited to the modern age. There is so much interdisciplinary work happening across biology and engineering and chemistry and physics and environmental sciences right now. We really need organizations that can take a far more interdisciplinary approach to scientific study and applications.

Crow: Our competitors are not reducing their investments in science and technology. Our competitors are not reducing their investments in universities. It's just the opposite. They're building entire clusters of universities built on the American model.

The United States was the first country that gave general rank-and-file citizens the ability to own intellectual property. Beginning with President Jefferson, exploration became a core national activity. Then we built agriculture as a core national activity, then nuclear power, then science itself, and now all things digital. In every one of these cases, the only way that we've made any progress is through empowerment of the universities. Universities are the invisible hand.

Taking a narrow view of universities ignores their historical contribution. Pick something as simple as American agriculture. We've had no famines. We have unbelievable food in every grocery store. We have access to everything at relatively low cost. We have 2% of the population feeding the entire country and much of the world through technological advancements. And it all goes on silently, connected to these land-grant colleges and universities in each and every state, to the county extension officers who are working on scientific transfer and scientific understanding. You don't know where all this bounty came from when you go to the grocery store, because it's invisible.

All of that is in jeopardy. All of that can be put at risk if we don't look at the cement pilings of foundational knowledge on which the entire economy is built. This is a critical strategic error being made right now.