Applying Research to Real-World Problems
PRODUCTS DEVELOPED through university research can save lives and produce other social benefits. The same results can be achieved by the knowledge discovered through research. But how can that scholarship be disseminated in ways that help society? At universities around the country, professors are trying to share their insights, even without the promise of financial return or academic rewards like tenure. Sometimes, as was demonstrated by a Virginia Tech professor who warned of the dangerous lead levels in the water in Flint, Mich., scientific knowledge can have a considerable impact on a community’s well-being.

Is University Research Missing What Matters Most?
To get the most out of research, the results can’t be marketable products alone.

What It Might Take to Tackle the Most Important Problems
Researchers suggest approaches that universities, governments, and journals could try.

How Data Could Help Scholars Master the Art of Persuasion
Companies offer researchers a model for using behavioral data to help shape attitudes.

On Climate Change, Are University Researchers Making a Difference?
Failure to get the public to see the dangers has stymied the development of policy solutions.

How Fresh Funding Structures Could Support Research With Impact
Government systems that support science are not necessarily built for optimal problem-solving.

Teaching Young Engineers to Find Problems, Not Just Solve Them
Campus programs urge undergraduates to respond to challenges broadly and aggressively.

To Curtail Violence, Researchers Say, Reduce Economic Inequality
Experience suggests that efforts to deter crime should be concentrated in small, high-need areas.

Zika Moves Quickly, and Scientists Fear That Journals Aren’t Keeping Pace
Researchers who work on fast-moving public-health threats worry about how to get data out quickly.

Professor Who Helped Expose Crisis in Flint Says Public Science Is Broken
A civil-engineering professor who spoke out reflects on all that he risked to do so.
Is University Research Missing What Matters Most?

By PAUL RASKEN

Eleni Linos, a dermatologist at the U. of California at San Francisco, has seen her research on the health risks of tanning salons published in big journals. But her efforts to take her findings to the real world with an awareness campaign have received little support from academe.

Money, of course, does matter. According to the latest National Science Foundation data, three fields — biological sciences, medical sciences, and engineering — accounted for about two-thirds of the $84 billion in total academic research and development spending in 2014. Various social sciences — fields that could play a huge role in turning research into policy — accounted for only about $2.2 billion, and psychology for $1.1 billion. But examine factors across academe, and you’ll find money is not the only barrier to university researchers’ bringing their findings into the real world. Often their attempts to do so are compromised by personal, professional, political, and institutional imperatives and traditions.

Some researchers feel that their job is in the lab, not outside it. Many universities still reward and promote based largely on publication rather than public accomplishment. Public and private funders of research rarely step back to comprehensively and scientifically ask which projects and approaches would make the biggest difference for the most people, without first having set some kind of constraint such as a field of study or type of disease.

In some instances, such as Dr. Young’s electronic “smart bandage,” the academic world seems increasingly enthused to help derive real-world benefit from the federal government’s $40 billion annual expenditure on university research. Electronic bandages could help prevent bedsores, which affect some 2.5 million people a year in the United States at an estimated cost of $11 billion. But in other instances, such as Dr. Linos’ campaign against tanning salons — which are believed responsible for 400,000 new cases of skin cancer each year in the United States — the academic structures seem decidedly less friendly.

It’s a result of not being truly attuned to what matters most in university research, said Sandro Galea, dean and professor of public health at Boston University. “We have veered away from keeping our eye on the prize,” Dr. Galea said. “And the prize is giving attention to why we’re doing what we’re doing.”

I t’s not hard to find researchers who share that view. There’s Eli Berman, a professor of economics at the University of California at San Diego, who spends his own time and money trekking to Washington in the hope of persuading congressmen on foreign aid and human trafficking to make use of insights compiled by the university’s Institute on Global Conflict and Cooperation. Or Utpal M. Bholaia, a professor of marketing at Rice University, who studies how measuring people’s capacity for self-control can be helpful in assessing the effects of public policies. He says he feels far more pressure from his institution to publish his findings than to figure out ways to implement them.

There’s Mary Flanagan, a professor of digital humanities at Dartmouth College who builds party games that subtly incorporate lessons on social biases and stereotypes. She has found university technology-transfer offices uninterested in helping her build connections to major companies and advertisers.

There’s even David H. Guston, a professor of politics and global studies at Arizona State University who studies the societal implications of nanoscale science. ASU is perhaps the nation’s most aggressively outcomes-oriented institution, and yet Mr. Guston still sees much inertia behind promotion systems that reward faculty for publishing rather than making progress toward a specific public benefit.

The 200 largest universities in the United States all have technology-transfer offices that promise financial returns for important, marketable discoveries. Mr. Guston said, “But there are a whole host of things that are important that may not have markets,” he said.

Universities and their researchers now face heavy and growing pressure to financially justify their decisions. And that can steer them away from choices that can’t be connected to definable profits, grants, or publications with known academic value. Universities and funders of science could respond to those expanded market pressures by re-warding scientists who work societal problems all the way through to a solution, said Alan Durning, executive director of the Sightline Institute, a nonprofit research center in Seattle that works on policy-implementing strategies. But too often, Mr. Durning said, they reinforce discipline-centered hierarchies that encourage researchers to specialize, not to embrace the “integrative problem-solving” that can make a difference in most real-world contexts. “It’s an enormous problem,” he said.

While some university leaders concede the point, they often can’t agree on who is responsible for breaking out of narrow discipline-based metrics. At a conference last year on academic engagement in public and political discourse, the presidents of two leading research institutions, Teresa A. Sullivan of the University of Virginia and Mark S. Schlissel of the University of Michigan, both said they had surprisingly little ability to leverage faculty reward structures to better emphasize cross-departmental problem-solving. “Departments have their own culture and customs,” said Ms. Sullivan.

“University presidents are less powerful than you think,” Mr. Schlissel added.

Without help from the top, even change-minded researchers can feel stuck. A few institutions, like Arizona State, now seek to reward an out-...
comes-based record of accomplishments, largely by placing professors in multidisciplinary institu-
tutes rather than departmental silos. But it’s still
risky to base a career on that approach when most
institutions still value more-traditional measures
like publications, said Braden R. Allenby, a pro-

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...that their peers aren’t going to recognize as aca-
demically valid,” Mr. Allenby said.

Mr. Levant studies male adherence to
promotions that are stereotypically associated
with lawmakers, foundations are often responsive
to project selection. Another large founda-
tion that emphasizes research, the Gordon and
Betty Moore Foundation, established by Intel’s
co-founder, Gordon H. Moore, lists its four pri-

tencies as science, conservation, patient care,
and the Bay Area. “We have to focus, and so we
do,” said Robert P. Kirshner, the foundation’s
chief program officer for science.

The kind of patchwork approach to funding can
pose a problem. Government agencies and founda-
tions support meaningful work, but they also leave
much potentially-vital research to slip through the
cracks. Could universities and their advocates join
with private donors and draft a plan for address-
ing the major societal problems that don’t or won’t
get addressed by Congress? It’s possible, said Mary
Woolley, president of Research!America, the na-
ton’s largest academic and industry partnership
for promoting scientific research funding. But that
does not appear likely to happen, said Ms. Wool-
ley, who has led Research!America for 25 years. “It is
a matter of convincing the folks that have deep
pockets and patience,” she said.

The idea of using science to measure one so-
cial goal against a range of others deserves of
research raises many major difficulties, said Mr.
Kirshner, a former professor of science and as-
trophysicist at Harvard. Obstacles cited by Mr.
Kirshner and others include the difficulty of
making feasibility comparisons across fields,
putting values on human life and the natu-
rnal world, and predicting variables that could
change priorities in the future.

The leadership of the U.S. House of Repre-
sentatives, in particular, has waged a dedicat-
ed campaign against the social sciences. More
broadly, lawmakers who exert influence over re-
search-funding priorities tend to respond to pres-
sure from patient advocates, who are naturally
more interested in cures than in societywide pre-
ventions.

Private foundations also have limitations. As
with lawmakers, foundations are often responsive
to patient-advocacy groups that emphasize cures
over prevention. And deep-pocketed foundations
usually come with defined missions. The
world’s largest private foundation, the
Bill & Melinda Gates Foundation, sets its fund-
ing priorities largely based on where it thinks it
could have the greatest effect, said a spokes-
man, Christopher Williams, but the personal
interests of the founders also play an important
role in project selection. Another large founda-
tion that emphasizes research, the Gordon and
Betty Moore Foundation, established by Intel’s
co-founder, Gordon H. Moore, lists its four pri-
ority areas as science, conservation, patient care,
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do,” said Robert P. Kirshner, the foundation’s
chief program officer for science.

“IT WOULD BE VERY HELPFUL TO HAVE AN EMPIRICAL WAY OF DETERMINING THE MAGNITUDE OF PROBLEMS.”

“I wouldn’t know where to turn,” Mr. Levant
said, “but I would love to do that.” But, he added,
“I don’t think anybody in my academic institution
would be receptive to it, because it’s not really de-

defined as part of our mission.”

Our prime target for blame is Congress. Uni-
versities and funders might want to be more aggressive in confronting the behav-
ioral factors behind so many social problems, but many academic
leaders say they’re deterred by the current political
climate.

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rnal world, and predicting variables that could
change priorities in the future.

The Grand Challenges concept is a loosely de-

cined framework that some universities are using
to tackle major scientific problems with potential-
ly broad applications. Indiana, for example, has
pledged to spend at least $300 million over five
years on as many as five projects that Mr. Cate and
his team will choose later this year. “It would be
very helpful to have an empirical way of determin-
ing the magnitude of problems that we could ad-

dress in the university research community,” Mr. Cate said.

Some lawmakers agree. “If the scientific com-

munity concludes via peer-reviewed research there is a process by which to determine what sci-
ence would be most valuable for the federal gov-
ernment/taxpayers to fund, Congress would be
obliged to consider,” said Zachary Kuzer, a spokes-
man for Rep. Lamar Smith, the Texas Republican
serving as chairman of the House science commit-
tee, in a written comment.

\textbf{T HE GOVERNMENT has shown it can be
creative in encouraging real-world ap-
lications of science, when it wants to be. One of the most ambitious such
efforts is the National Center for Ad-
Vancing Translational Sciences, a $860-million
division of the National Institutes of Health estab-
lished in 2011 largely to speed the development of phar-
macueticals from lab discoveries.

But the NIH has no comparable translational effort outside of drugs, and doesn’t feel one is nec-
essary. “In the many other spheres that NIH op-
erates, I think that goes on naturally,” said Law-
rence A. Tabak, the NIH’s principal deputy di-
rector, “and I’m not sure the one would need any additional catalysts, as NCATS has been.”

Another example is the Innovation Corps, a boot-camp-like program for teaching university
scientists to behave more like entrepreneurs that was adopted by the National Science Foundation in 2011 and has since spread to the NIH and other federal sponsors of research.

That project favors interventions that involve
products — one version of the I-Corps curriculum
helped Dr. Young and his team market their elec-
tronic bandage. The NSF, however, just awarded a grant to the University of Texas at Austin to figure out ways that it might adapt the I-Corps approach to help researchers pursue public-policy goals.

That kind of thinking is being encouraged across the Obama administration. The White House is
especially intrigued by a public-policy strategy
known as “nudging,” put forth by two university

experts — Richard H. Thaler of the University of
Chicago, and Cass R. Sunstein of Harvard, who led
White House oversight of federal regulation earlier in the Obama administration — and has been bus-
ily incorporating behavioral science insights into a
range of federal activities.

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\textbf{SCIENCE POLICY}

\textbf{SCIENCE POLICY}
What It Might Take to Tackle the Most Important Problems

What can universities, governments, journals, and private funders of research do to ensure they are making the greatest possible efforts toward solving society’s most pressing issues? The Chronicle asked experts for their suggestions. Here is a sampling of the steps they proposed:

Develop statistical approaches to identify the social problems that are most important and most worthy of intensive translational research.

Who could do it: universities and foundations

Reward “project-based solutions” that reduce the dominance of developmental structures that inhibit interdisciplinary work.

Who could do it: universities

Prioritize long-term preventative strategies over short-term cues, which are often favored by supporters who already have a disease or condition.

Who could do it: foundations and political leaders

Conduct more complicated experiments in the real world, while giving less attention to and reward to incremental discoveries in controlled lab settings.

Who could do it: universities, researchers, and foundations

Appoint more social scientists to review panels, increasing the likelihood that social considerations will be reflected in research and research-based solutions.

Who could do it: federal grant agencies

Emphasize curricula that develop and promote social-scientific expertise to help in interdisciplinary work.

Who could do it: universities

Revise the standard formatting for research papers — with sections for discussion, analysis, comment, and application — to add a section that describes strategies for acting on the article’s findings.

Who could do it: journals

Restructure government agencies to emphasize bottom-line solutions and translational work — a role that basic-science-first agencies such as the National Institutes of Health and the National Science Foundation are not fully equipped to handle.

Who could do it: federal government

Create government agencies to give lawmakers the best current research on issues they are considering.

Who could do it: state and federal governments

Integrate academics into the leadership of federal agencies to help the translational bridge go both ways.

Who could do it: federal agencies

Sponsor more “grand challenges” that involve research contributions beyond just one university.

Who could do it: universities and foundations

Establish “centers for responsible innovation” that consider the social value of research, much as institutional review boards help ensure human protections.

Who could do it: universities

Create a presidential “Council of Psychological Science Advisers,” modeled on the existing Council of Economic Advisers, to incorporate human behavioral realities into policy decisions.

Who could do it: federal government

Quantify the value of the natural world in financial terms to build economics-based arguments for incorporating environmental concerns into policy decisions.

Who could do it: researchers and foundations

Schedule the release of reports with policy implications for times when the information is most likely to be acted upon by policymakers.

Who could do it: researchers and foundations

Recognize that exceptionally large problems require exceptionally large commitments of time and money.

Who could do it: universities and foundations

— PAUL BASKEN

The nudge concept blends research insights in areas such as psychology and behavioral science to create situations in which people are gently coaxed into making more-beneficial choices. Examples include painting targets inside men’s urinals to encourage cleaner floors and building rumble strips along highways to encourage inattentive drivers to stay in their lanes. And the new Behavioral and Science & Policy Association assembled more than 200 researchers and practitioners this past summer for its inaugural conference, sharing tips on the value of such nudge-like interventions as text-message homework reminders for students and truthful-ness affirmations placed at the beginning of tax returns rather than the end.

“We’re on the cusp of the transformation from behavioral economics, which is still young and rapidly developing, to the broader and more appropriate frame of behavioral public policy,” said one member of the association’s advisory board, Paul Slovic, a professor of psychology at the University of Oregon.

Just nudging, however, may not be enough for major societal challenges. “Nudges ain’t going to do it on big policy issues,” said Paul C. Light, a professor of public service at New York University. “Economists have been trying for years to figure out promising ways of regulating without regulating, but it’s mostly small beer.”

Again, politics—or at least the perception of politics—stands as a major obstacle to valuable translational research. When an issue reaches a certain level of public ferment, many researchers regard it as politically out of bounds. “There’s a line,” said Andrew J. Hoffman, a professor of public policy at the University of Michigan at Ann Arbor. “And you want to be careful not to cross it as an academic, or you move into the field of advocacy.”

Yet if politics is a line that shouldn’t be crossed, there’s little agreement on where to draw that line. Cancer is absolutely political, given that people may disagree over its probable causes or the best methods of fighting it. Few researchers, however, abstain from the war on cancer for political reasons.

It may end up taking a new generation of scientists and practitioners to redraw the lines of acceptability. That urge to have her research make an actual difference in people’s lives led Dr. Linos to eventually leave university research more focused on incremental discoveries in controlled lab settings.

Dr. Linos did not have that attitude. After her research findings more directly to those who needed to know about them. So she set up an account with Google, and began testing ads that would appear alongside the results for anyone searching for terms such as “tanning,” “tanning bed,” and “tanning salon.” In the space of a few weeks, the ads were shown 235,000 times and generated more than 2,000 user clicks—a success rate generally considered sufficient for commercial advertisements.

It was just an initial experiment, done without any outside grant support, she said. For her next step, Dr. Linos would like to find grants to support her putting together an application for the National Institutes of Health — and hire a marketing expert who knows how to write the ads. Eventually she’d like to work with more social-media platforms. But it’s not clear the NIH or anyone else would support such an interdisciplinary attempt to solving a medical problem, even if her research suggests it could be crucial to helping girls avoid skin cancer. The scientists reviewing these grants are used to seeing different types of grant proposals, Dr. Linos said, “But I’ll try it.”

Younger researchers willing to pursue similar attempts might ultimately make a major difference. Those scholars are part of a “sea change” that could eventually leave university research more focused on solving the world’s most important problems, said Mr. Smith, of the AAU. “These people don’t just want to go out and publish work in some arcane journal. They say, ‘They want to do something that matters.’

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— PAUL BASKEN

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Data Could Help Scholars Persuade, If Only They Were Willing to Use It

By PAUL BASKEN

THANKS TO WHAT THEY’VE LEARNED FROM UNIVERSITY research, consultants like Matthew Kalmans have become experts in modern political persuasion.

A co-founder of Applecart, a New York data firm, Mr. Kalmans specializes in shap-
ing societal attitudes by using advanced analytical techniques to discover and exploit personal con-

nections and friendships.

His is one of a fast-growing collection of similar companies now raising millions of dollars, fe-
taturing businesses, and aiding political cam-
paigns with computerized records of Facebook exchanges, high-school yearbooks, even neigh-
borhood gossip. Applecart uses that data to try to persuade people on a range of topics by find-
ing voices they trust to deliver endorsements.

“You can use this sort of technology to get peo-
ple to purchase insurance at higher rates, get peo-
ple to purchase a product, get people to do all sorts of other things that they might otherwise not be inclined to do,” said Mr. Kalmans, a 2004 graduate of the University of Pennsylvania.

And in building such a valuable service, he’s found that the intellectual underpinnings are of-
ten free. “We are constantly reading academic pa-
pers to get ideas on how to do things better,” Mr. Kalmans said.

That’s because scholars conduct the field exper-
iments and subsequent tests that Mr. Kalmans needs to build and refine his models. “They do a lot of the infrastructural work that, frankly, a lot of commercial companies don’t have the in-house ex-
pertise to do,” he said of university researchers.

Yet the story of Applecart stands in contrast to the dominant attitude and approach among uni-

versity researchers themselves. Universities are full of researchers who intensively study major
global problems such as environmental destruc-
tion and societal violence, then stop short when their conclusions point to the need for significant change in public behavior.

RESEARCHER RELUCTANCE

Some in academic consider that boundary a mat-

ter of principle rather than a systematic failure or oversight. “The one thing that we have to do is not be political,” Michael M. Crow, the usually para-
digm-breaking president of Arizona State Univer-
sity, said this summer at a conference on academic engagement in public discourse. “Politics is a pro-
cess that we are informing. We don’t have to be po-

tical to inform politicians or political actors.”

But other academics contemplate that stance and see a missed opportunity to help convert the

millions of taxpayer dollars spent on research into meaningful societal benefit. They include Dan M. Kahan, a professor of law and of psychology at Yale University who has been trying to help Florida of-
ci

ficials cope with climate change.

Mr. Kahan works with the four-county South-

east Florida Regional Climate Change Compact,

which wants to redesign roads, expand public transit, and build pumping stations to prepare for harsher weather. But Mr. Kahan says he and his Florida partners have had trouble getting enough police makers to seriously consider the scale of the problem and the necessary solutions.

It’s frustrating, Mr. Kahan said, to see so much university research devoted to work inside labora-
tories on problems like climate, and comparatively little spent on real-world needs such as sophisti-
cated messaging strategies. “There really is a kind of deficit in the research relating to actually oper-

ationalizing the kinds of insights that people have developed from research,” he said.

That deficit appears to stem from academic cul-
ture, said Utpal M. Dholakia, a professor of mar-

teting at Rice University whose work involves test-
ing people’s self-control in areas such as eating and shopping. He then draws conclusions about wheth-

er regulations or taxes aimed at changing behav-

iors will be effective.

Companies find advanced personal behavioral data highly useful, said Mr. Dholakia, who works on the side to help retailers devise sales strategies. But

his university, he said, appears more interested in seeing him publish his findings than take the time to help policy makers make real-world use of them. “My dean gets very worried if I don’t publish a lot.”

Because universities have been reluctant to push big data and analytics into public-policy realms, it’s hard to assess exactly how useful those tech-
niques could be — and where the ethical lines should be.

Behavioral data-crunching “absolutely” could be used to reshape entrenched attitudes in areas of societal challenge, said Mr. Kalmans, whose com-
pa

ny has been working for the Republican presi-
dential candidate John Kasich but is seeking more work with advocacy organizations.

It’s not a stretch to suggest that university re-

searchers could become adept at using tactics like Mr. Kalmans’s, either to influence public behaviors or to show others how to do it, said Lynda Tran, a founding partner at 270 Strategies, a Democrat-
ic-leaning version of Applecart whose customers include the Obama presidential campaigns.

The basic components of the practice should be famil-

iar to many researchers, Ms. Tran said: “At its core, it’s basically multivariate regression analysis.”

Whether that’s worth doing is another question. In areas like global warming, researchers have al-

ready tried “very, very hard” to influence public behavior, said Michael B. Gerrard, a professor of professional practice at Columbia University and
director of the Sabin Center for Climate Change

“We don’t solve these problems by crawling in a hole, and massaging a whole bunch of data.”

Law. “I don’t think most of this is susceptible to most of the sorts of solutions that are developed in academia.”

DEFINING WHAT’S ALLOWED

Even within Google, one of the giants of big data, there are conflicting views. The company re-

cently recruited Thomas R. Insel, longtime direc-
tor of the National Institute of Mental Health, to

"We don't solve these problems by crawling in a hole, and massaging a whole bunch of data."
head a project that would apply algorithms to data in the hope of detecting early signs of psychoses. Yet one of the company’s intellectual paragons, Vinton G. Cerf, is dubious about the broad ability of big data to solve society’s major challenges. In the real world, people need tangible incentives to make meaningful change, said Mr. Cerf, the web pioneer who holds the titles of vice president and chief Internet evangelist at Google. “We don’t solve these problems by crawling in a hole, and massaging a whole bunch of data, and getting an analytic result,” he said.

Then there are matters of propriety and legality. The Republican Ted Cruz has moved into the upper ranks of his party’s crowded presidential contest with the assistance of statisticians and behavioral psychologists who help his campaign set personalized tones and topics for emails, phone calls, and even at-home visits. The increasingly aggressive nature of such data collection has left companies like Facebook and government regulators struggling to define what is allowed, both for research purposes and for private uses.

Even stricter limits are involved when the government is legally responsible for the messaging. The nonpartisan Government Accountability Office ruled in December that the U.S. Environmental Protection Agency had illegally sought political support for a clean-water regulation when it asked people to post positive comments on social media.

With those and many other potential pitfalls in mind, some data experts in academe are urging restraint toward corporate, governmental, and political clients. At an international cryptograph ic conference in December, Phillip Rogaway, a professor of computer science at the University of California at Davis, pleaded with his colleagues to think hard about the possible human effects of their work before they agree to help any particular project. “The problem occurs,” Mr. Rogaway said, “when our community, as a whole, systematically devalues utility or social worth.”

But other scholars argue that society faces greater risks from scientists abstaining while others around them rush to deploy all available technologies in ways that aren’t always positive and constructive.

Coming generations face two fundamental shifts that researchers aren’t adequately addressing, said Braden R. Allenby, a professor of engineering and ethics at Arizona State. One is the reality that the planet is undeniably being shaped by human activity, Mr. Allenby said. The other is that genomic sciences are redesigning our understanding of a human life. “So the human becomes a design space, the planet is terraformed, and the complexity and the moral and ethical implications of those two fundamental shifts are ones that we haven’t begun to deal with,” Mr. Allenby said. “Not in universities, certainly not in government, and not in granting organizations.”

On Climate Change, Are University Researchers Making a Difference?

They’ve studied it and written about it, but some experts say scientists haven’t done enough to shape public opinion on what may be the most important issue of our time.

By PAUL BASKEN

Tobacco executives are sworn in before testifying on Capitol Hill in 1998. Some scholars point to that year’s federal settlement with tobacco companies as a possible model for how scientists might push energy companies to take action on climate change.
University scientists have a formidable record of accomplishment in the field of climate-change research. Fueled by billions of dollars in financial support, they’ve used modeling to project temperature and carbon concentrations from centuries ago. They’ve figured how to grow crops under unusual heat conditions. They’re predicting how warmer climates will speed the spread of diseases.

What they haven’t done with climate change is figure out how to stop it.

For that, one of the best hopes might be the work of a small nonprofit trade publication, InsideClimate News. A three-member team there took less than a year to compile evidence that the world’s biggest oil company, ExxonMobil, spent millions of dollars publicly casting doubt on climate science that it knew internally to be true.

That’s helped spark government fraud investigations of ExxonMobil and other oil companies. The investigations might one day become a tipping point similar to the 1990 legal settlement that forced the tobacco industry to spend more than $200 billion reversing false claims about the safety of cigarette smoking.

As with cigarettes years ago, public failure to understand the dangers of climate change has been a key obstacle to policy solutions, said Matthew L. Hale, an associate professor of political science at Duke University. “Having billions of dollars to tell that story through advertising and media is certainly one way that things are going to fly,” Mr. Hale said.

Of course there’s a long way to go before the legal pursuit of ExxonMobil — one investigation initiated by the New York attorney general, Eric T. Schneiderman, and another by his California counterpart, Kamala D. Harris — forces the industry to finance an ad campaign admitting a deception of the American public. But given decades of industrial resistance to change policy public, it’s hard to find a more plausible near-term threat to those promoting public skepticism of climate-change science.

That raises the question of whether the basic science generated by InsideClimate News — a direct assault on companies seen as financing the public misunderstandings — should have been announced by the media or at least advocated by university researchers struggling to solve climate change. And, more broadly, why have research universities become really good places for analyzing the world’s major problems, but perhaps not the best places for solving them?

‘A VERY HEAVY LIFT’

There’s no single answer. Some researchers say they should steer clear of politics. Some say they don’t have the right incentives. Or adequate tools. Or the necessary sophistication.

Others in and around the university research community, however, see evidence of just the opposite. “As the mother of all externalities,” climate is perhaps the clearest case where academics concerned about societal impact of their work should be involved in comprehensive problem-solving strategies, said Daniel M. Kammen, a professor of energy at the University of California at Berkeley. “That’s a completely fair criticism” of university research, Mr. Kammen said.

Alan Durning, the founder and executive director of a Seattle-based think tank, has tried to bridge university scientists with public-service projects. Consistently, he said, he has encountered institutional barriers. Mr. Durning got a taste of that resistance when his organization, the Sightline Institute, tried to get researchers at the University of Washington to help him with a project to make clear the risks of climate change by calculating impacts specific to various interest groups. It’s a common communications strategy: defining an audience segment and tailoring a message to it. In this case, the Sightline Institute wanted to home messages to seniors, children, Asian-Americans, and Hispanic Americans. To reach Hispanics, Sightline suggested calculating the potentially deleterious effects of warmer temperatures on some of their most commonly held jobs. But the university scientists, Mr. Durning recalled, said they prefer to assess heat exposure and its effects on construction and agricultural workers. Predictions about job losses are more uncertain than data on their likely heat exposure for making a strong case about climate change, Mr. Durning said. But, he learned, numbers with wider uncertainty measures — even if the bottom-line message is scientifically valid — tend to be ignored for academics in defending for peer review.

“To get a fundable proposal,” in the peer-board system of federal grants, Mr. Durning said of the researchers, “they would need to have a methodology that was pretty watertight.” Protecting the taxpayer dollars that support research politically lose power. But he also says he can’t imagine professors of environmental science seeing a historical precedent such as the downfall of the tobacco industry and responding by filing open-records requests to prove that ExxonMobil really did have its own scientific understanding of the dangers of climate change.

“There’s no upside for a professor to do that,” he said. “There’s no publications involved in it, there’s no university support for that.”

That reluctance needs to be changed, said Howard Frumkin, dean of public health at the University of Washington. “Putting pressure on ExxonMobil’s political dominance, Dr. Frumkin said, is at least as important a role for scientists fighting climate change as more-conventional projects like developing heat-resistant crops or improving solar-energy technology.

“It’s fair to ask, Is academia paying enough attention to practical and real-world solutions, especially when they’re political?” he asked. “I think the answer is no.” But many others strongly disagree, he said, “especially in the sciences, and that’s one of the reasons why you don’t see academia doing more.”

The view that science and politics should not mix has influential proponents. They include Daniel Kahneman, an emeritus professor of psychology and public affairs at Princeton University whose study of behavioral economics and flaws in human judgment led to his sharing the 2002 Nobel in economic science. Mr. Kahneman said researchers should scrupulously avoid politics and set a broad definition for that. If it is a matter “that anybody in Congress is going to be offended by, then it’s political,” he said.

Others see room in the middle. University researchers looking to be more solutions-oriented wouldn’t have to go as far as suing Exxon themselves, said Andrew J. Hoffman, a professor of sustainable enterprise at the University of Michigan at Ann Arbor. Scientists concerned about climate change could have just done a form of the type done by InsideClimate News (and a similar probe published a few weeks later by the Los Angeles Times), Mr. Hoffman said, and then handing off their findings to a group that would make use of it. A new generation of problem-solving researchers is more likely to try that, he said: “Young people are coming into this field thinking they can make a difference, and they don’t want to just have citation counts as the measure of their success.”

For now, Mr. Hoffman finds many universities’ approaches seem like a “huge cop-out.” In his view, academic’s reluctance to develop a more outcome-based strategy to climate change sends a message to the outside world: “Don’t have us change anything we do, don’t have a professor of sustainability ask the questions we ask, or the methods we use, or the outcomes we use — let’s just get someone to come along and translate our work for us.”

Originally published on January 27, 2016
How Fresh Funding Structures Could Support Research With Impact

By PAUL BASKEN

Elli Berman, a professor of economics at the University of California at Santa Diego, does work that many would see as vitally important: He analyzes global trouble spots in the hopes of keeping the country out of wars. But he has struggled to get the money he needs to finance his research.

Yes, that’s a woefully familiar lament these days. Yet Mr. Berman’s problem is far more fundamental than just a shrinking federal budget. While his work may have broad implications, it’s not clear that any single agency is responsible for supporting it.

That’s because Mr. Berman, research director on international security studies at the UC Institute on Global Conflict and Cooperation, is filling a need that government structures seem not to have anticipated. He flies to war zones, then to meetings with State Department and Pentagon officials, trying to keep them up to date on world crises and scientific insights that might help in dealing with them.

The job, basically, is to “explain to the federal government what to do with the research that they spend money” on, Mr. Berman said. But, he said of his mission, “it’s dark and cold and lonely, because it really falls between the cracks.”

That appears to be an increasingly common problem, not just in national security, but across the research spectrum. Government structures for financing science may make sense for reasons of problem-solving, but they’ve not necessarily built for optimal problem-solving.

The National Institutes of Health is the largest provider of basic research money to universities. Like the National Science Foundation and other providers of basic research money to universities. But more valuable, Dr. Galea said, would be structures designed from the start to identify and pursue society’s biggest problems, says Sandro Galea, dean of public health at Boston U., rather than focus only on discipline-based segments of those problems.

The structures that support university science should be designed from the start to identify and pursue society’s biggest problems, says Sandro Galea, dean of public health at Boston U., rather than focus only on discipline-based segments of those problems. It spends another $200 million on major new initiatives in neuroscience and individualized medicine. Benefits undoubtedly will flow from such efforts, says Sandro Galea, dean of public health at Boston University. But more valuable, Dr. Galea said, would be structures designed from the start to identify and pursue society’s biggest problems, rather than tackle discipline-based segments of those issues. "When you start asking what matters most, it really changes how you look at things, and it changes what you take on," he said.

Common calculations
The interest in government structures comes, in part, because private funders may be little better. Alzheimer’s disease, as one major and growing example, is estimated to cost the nation more than $200 billion a year, making it one of the most expensive chronic diseases. Research so far shows that exercise can help prevent Alzheimer’s better than any known medication. Yet out of about a dozen grand programs offered annually by the Alzheimer’s Association, the largest nonprofit funder of Alzheimer’s research, just one focuses on non-pharmacological strategies.

Meanwhile, some of the most ambitious research universities have embraced a “grand challenges” format, in which they pick a formidable problem or two and then assemble research teams to tackle them. One of the biggest programs, at the University of California at Los Angeles, aims to make the city fully self-sustainable on energy and water by 2050, and eliminate the burden of depression by 2030.

But even a grand challenge has its limits. While scientific projections suggest that much of the city might be underwater by 2040, climate didn’t show up on UCLAs two choices reflect not just the importance of the challenges, but also the university’s ability to grow existing research strengths, said Michelle Popowitz, assistant vice-chancellor for research and executive director of UCLA Grand Challenges program. “We could see there’s funding in these areas,” she explained.

Those types of calculations are common, said Benjamin G. Bishin, a professor of political science at the University of California at Riverside. “We essentially have a system where problems are prioritized based on economic impact for the people who are going to do the studies,” Mr. Bishin said.

Universities increasingly engage in “cluster hiring,” through which they strategically recruit for select departments with an eye toward revenues and future fund raising, Mr. Holt said. “If you’re actually trying to take some technology or some social-science finding or some medical-science finding and drive it out there to help people, immediately you’ll be accused of picking winners and losers,” he said. “They’d rather let the market pick the winners and the losers, and of course what that means sometimes is some of these technologies don’t get to people who need them, or particularly they don’t get to the neediest of people.”

Perhaps one of the hottest hot-button issues in American society is gun violence. Congress has largely forbidden the NIH and CDC from studying the problem. Those restrictions wouldn’t be of paying researchers to count how many blueberries per day may cut the risk of heart attacks, Dr. Galea said, universities and their funders could more systematically identify and tackle the root causes of social problems — such as tolerance of violent attitudes, indifference to environmental concerns, and large and persistent gaps in wealth, education, and economic opportunity.

“Picking winners and losers”
Some federal support for science does reflect that ambition. Robert C. Bailey, a professor of epidemiology at the University of Illinois at Chicago, gets money from the U.S. Centers for Disease Control and Prevention to prevent male circumcision in Kenya as a way of reducing AIDS infections. His team works directly with Kenyan villagers to discuss their concerns on matters including the pain and cost of the process and cultural and religious mores. He also tells them about the benefits he sees, such as improved hygiene, protection from disease, and enhanced sexual performance.

Mr. Bailey said his team was about halfway to its goal of 23 million circumcisions, which would be expected to spare Kenyans millions of new infections and save them billions of dollars.

The NIH has one division, the Fogarty Interna- tional Center, that is especially concerned with re- al-world implementations of research, said its di- rector, Roger I. Glass. Its projects include reducing farm injuries in China, khat addiction in Yemen, and fetal alcohol syndrome in Russia. Putting re- search into practice is a tough learning experience for scholars, Dr. Glass acknowledged. “We know a lot about science here, but we don’t know how to implement the science that we discover,” he said.

Those efforts are harder for problems with- in the United States, where NIHs investment in re- al-world outcomes is largely a matter of assisting drug development. “Their translational push is much more at the lab bench than it is society at large,” Rush D. Holt Jr., chief executive of the American Association for the Advancement of Science, said of NIH.

NIH and other government agencies are acting out of fear of Congress, which手 on re- al-world outcomes is largely a matter of assisting drug development. “Their translational push is much more at the lab bench than it is society at large,” Rush D. Holt Jr., chief executive of the American Association for the Advancement of Science, said of NIH.

Funding is often a way of ensuring that one project or another is prioritized based on economic impact for the people who are going to do the studies. But that may not be enough. “If you’re actually trying to take some technology or some social-science finding or some medical-science finding and drive it out there to help people, immediately you’ll be accused of picking winners and losers,” he said. “They’d rather let the market pick the winners and the losers, and of course what that means sometimes is some of these technologies don’t get to people who need them, or particularly they don’t get to the neediest of people.”

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Robert Bailey, a professor of epidemiology at the U. of Illinois at Chicago, discusses plans for clinical trials on male circumcision with a research coordinator in Kisumu, Kenya. Mr. Bailey’s work focuses on reducing AIDS infections.

such a concern, said Garen J. Wintemute, who researches gun violence at the University of California at Davis, if more government-sponsored science was aimed at larger-scale solutions, such as confronting macho attitudes and promoting mental calm and empathy.

“There are more than 300 million firearms in the U.S., and they’re not going away,” said Dr. Wintemute, a professor of emergency medicine. “We need strategies that work with those firearms present.”

Change may be coming. Despite his frustrations in getting national-security research into the hands of policy makers, Mr. Berman said the Pentagon now has one of the government’s better models for making effective use of science because it hires enough experts to give it a significant capability to conduct its own research in-house. “Because they do research, they’re connoisseurs of research,” he said. “They know good research when they see it.”

And the NSF has just embarked on a project that could give a huge boost to putting research in the real world. In 2011 the agency created a program known as the Innovation Corps, which teaches researchers to think like entrepreneurs and create businesses based on their product ideas. The program has since spread to NIH and other federal agencies. And now the NSF has awarded a grant to Angela M. Evans, dean of public affairs at the University of Texas at Austin, to create a new version of I-Corps for researchers working on public policy and nonprofit endeavors.

Armed with some of the key I-Corps skills — how to define and find customers, for example — university researchers could make real-world implementation a more standard component of their grant-financed work, Ms. Evans said. With time, she said, government support might also help overcome the fact that universities’ tenure-and-promotion systems tend to reward scientific outreach that generates patents and licenses rather than broad social benefit.

“If you prove what you can do, and you prove it makes an impact,” she said, “it would be very hard for people to say it doesn’t matter.”

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A new wave of campus programs encourages undergraduates to think broadly, aggressively, and across disciplines about how they can help with real-world challenges.

Teaching Young Engineers to Find Problems, Not Just Solve Them

By PAUL BASKEN

A new wave of campus programs encourages undergraduates to think broadly, aggressively, and across disciplines about how they can help with real-world challenges.

The most important thing Amos Meeks learned in engineering school was not engineering. It was to talk to people, and to listen to them.

Now, just a year after graduating from the Franklin W. Olin College of Engineering, Mr. Meeks is the co-founder and chief technology officer at a company that produces low-cost scales designed for wheelchair users.

That idea came from a standard class at Olin that focuses not on designing a product, but on simply asking people about their lives and learning from their answers to identify unmet needs.

“At almost no point do you actually do any kind of what people would normally think of as engineering,” Mr. Meeks said. “But I think that is a really important part of engineering.”

The program at Olin is among a series of attempts at universities nationwide to teach undergraduates to think more broadly and aggressively about how they can help solve real-world problems.

The strategy is proving popular, helping institutions boost enrollment and helping students find jobs.

It can be seen at other career-focused campuses, such as the Rose-Hulman Institute of Technology, where one class invented a cheap roofing material for poor villagers in Haiti. And it can be seen at liberal-arts institutions like Agnes Scott College, which has just begun a first-year program emphasizing interdisciplinary problem-solving skills.

For too long, “engineering and technology has been divorced from other disciplines,” said Elaine Meyer-Lee, associate vice president for global learning and leadership at Agnes Scott. Research “needs to be moving the world ahead and making the world a better place in some way,” said Richard E. Stamper, interim vice president for academic affairs at Rose-Hulman.

Yet that’s still a relatively rare concept. “At most academic institutions — though certainly not all — students receive no or very little training in how to translate their work, either to a larger audience or to actionable policy steps,” said Bethany A. Teachman, a professor of psychology at the University of Virginia. Ms. Teachman helped compile a special section of the journal Perspectives on Psychological Science looking at ways that behavioral science could be used to deliver social benefits.

“A BLANK SHEET OF PAPER”

Mr. Meeks’s company, Lilypad Scales, is an example of both the potential and the challenges of teaching students to apply research. The idea for Lilypad grew out of a 2012 project in a mandatory sophomore course at Olin called “User Oriented Collaborative Design.”
Rather than being told what to design, or even just to design something, the students are asked to start by identifying a group of people whose lives they want to change. It’s the difference between “design-based projects” and the more common “project-based learning,” said Olin’s president, Richard K. Miller. “A design-based project starts with a blank sheet of paper, not a paint-by-numbers diagram.”

The students in Mr. Meek’s class chose to concentrate on elderly people, and then spent a couple of hours interviewing residents of an assisted-living facility near the campus. From that, the students learned that being dependent on wheelchairs makes it tougher to avoid weight gain. It’s tougher even to measure body weight — a widespread problem for wheelchair users often not recognized by those who walk.

That’s where the engineering finally came in. The students set about designing an electronic carpet that could separate out the weight of the wheelchair and wirelessly transmit the reading to a phone. “And now,” Mr. Miller said, “they’re on fire to learn what pressure sensors are, how radio transmitters work, and how you write software for the iPhone.”

Rose-Hulman’s approach has some key similarities. There, in a “grand challenges” course, the students are given a specific place in the world and asked to research the local population and figure out what’s most important to them individually? Might researchers find more success studying them collectively than by continuing to treat them individually?

“The human dimension

Even in the more-advanced programs, it’s tough to do everything in four years. Rose-Hulman lets its students continue a single project across different courses and academic years, sometimes all the way into their senior “cap-stone” presentations. Still, Mr. Schenck and his classmates never made it to Haiti to test their idea in the field. Instead they are leaving that to some collaborators at Clemson University to hopefully try out.

Tackling society’s most important problems, said Anneliese Watt, a professor of English at Rose-Hulman, is not the priority at the undergraduate level. “We’re ultimately educators, and so what’s most important to us is what the students learn in the course,” she said. “Really honestly, solving the problems, I think, is secondary to us.”

Job preparation is also a priority. Jacob N. Hiday, a senior biomedical-engineering student at Rose-Hulman, led a project in which students measured paper-towel use in campus bathrooms and tested out various strategies for reducing waste. The work was part of a class in Six Sigma, a widely used business strategy for making systems and processes more efficient.

After each group in the class made its presentation, Mr. Hiday said, the teacher encouraged the students to copy-and-paste the best elements into a single document. “That way, we could have our very own very professional-looking document in the end,” he said. “We would have something very presentable for potential employers.”

The concept of social value remains the most difficult aspect of problem-solving, said Mr. Miller, of Olin. It’s relatively easy to teach students to consider the feasibility and the viability of a project idea, he said. Adding the human dimension — that is, determining whether a solution will be seen as acceptable and desirable — takes much more work.

The best answer is to consider all three elements as part of problem-solving, and “to repeat that framework over and over and over again in every semester, so that they start projects by just thinking of the world that way,” Mr. Miller said.

“Science has leaped way ahead, and what we know about ethics and about human behavior has not,” he said. “It’s stuck back a long ways back in the past.”

The most successful antiviolence programs identify problems down to the level of individuals and direct intensive resources at them, said Thomas Abt, a senior research fellow at Harvard’s Kennedy School of Government.

By PAUL BASKEN

MASS MURDER. Child abuse. Spousal battery. International conflict. Schoolyard bullying. Aggressive driving. Sexual assault. Police misconduct. Suicide. They’re all forms of violent behavior, and they’ve all been the subject of study by university researchers trying to figure out how to reduce their incidence.

But do they have other significant traits in common? Might researchers find more success studying them collectively than by continuing to treat them individually?

The answer, according to some experts in the field, is a resounding “Yes, but.” That’s because reducing economic inequality, a widely recognized key to deterring various forms of violence, is largely outside the purview of researchers in the field. "If we are looking for long-term, more or less permanent, solutions to the violence problem in the United States," said Richard B. Rosenfeld, a professor of criminology and criminal justice at the University of Missouri at St. Louis, "then we have to be thinking about greatly expanded economic opportunities.”

And if a coherent antiviolence strategy exists beyond the reduction of inequality, it’s the idea of thinking small: concentrating resources in limited areas, where the potential gains are most promising.
The big problem there, however, is that effective programs are costly and appear to make it tough to maintain funding for them, even when they show success.

"Sustainability is a real challenge," said Thomas Abt, a senior research fellow and adjunct lecturer in public policy at the Center for International Development at Harvard University's Kennedy School of Government. "I don't think there is any place that has been practicing focused deterrence without any interruption for 20 years."

Boston is a chief example. After tallying 150 homicides a year in the early 1990s, the city used findings from federally funded research to create a program called Operation Ceasefire. It hired young adults to meet with gang members in violence-plagued neighborhoods to get them to the services they needed to turn their lives around.

The effort was a success, giving Boston an 18-month period without a single youth killed.

Even so, the program was then whittled, as organizers moved on and attention waned. Homicides again rose. So in 2010 the city created a new program, this time called StreetSafe Boston, largely as an attempt to replicate the up-close-and-personal approach of Operation Ceasefire. Again violence rates fell.

**CONCENTRATED ATTENTION**

While frustrating, the experience nevertheless affirms that research does produce usable answers for reducing violence, and that those solutions require concentrated attention in specific high-need areas, Mr. Abt said.

Boston, in his view, he said, stemmed from two key recognitions by researchers. First, 1 percent of许可证 holders 15 to 24 were responsible for more than 50 percent of all shootings across the city. Second, 70 percent of total shootings over a two-year span took place in an area covering about 5 percent of the city.

Helping those people and areas -- jobs, education, health services -- is expensive but clearly works, Mr. Abt said. Yet programs that do that can quickly become victims of their own success, he said, as violence ebbs and others in the city begin questioning the financial outlays.

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Pioneering efforts include arXiv.org and bioRxiv.org (pronounced "archive" and "bio-archive"), where researchers can freely post findings. But the lack of peer review on such sites can leave readers uncertain about quality while exposing researchers to the prospect — albeit now dwindling — that major peer-reviewed journals will reject the work as no longer novel.

Journals in the PLOS Currents series are specifically designed to handle reviews quickly, though they do not maintain the strong reputation of a top medical journal. Meanwhile, the more widely acknowledged top journals, including Science and Nature, have created their own fast-track processes for selected articles.

“Fast” at such top journals can mean as little as 48 hours to online publication, said Lone Simonson, a research professor in the Department of Global Health at George Washington University and an editor at PLOS Currents Outbreaks. For that kind of treatment, however, “you have to have something that's spectacular,” she said.

Quicker also doesn’t mean “easier” peer review, said Steven J. Cooke, a professor of environmental science and biology at Carleton University who has studied journals’ efforts to speed their publication processes. Instead, editors seeking outside reviewers work even more aggressively to find them, sending multiple emails and following them with phone calls, or using their own editorial teams, Mr. Cooke said.

“There are ways to move really key pieces forward with more speed, while maintaining the same rigor,” he said.

That attitude has become an every-day priority at the Journal of Infectious Diseases, said one of its associate editors, William Schaffner, a professor of preventive medicine and infectious diseases at Vanderbilt University. The editor in chief, Martin S. Hirsch, regularly grades the associate editors on how quickly they move manuscripts through the review process, Dr. Schaffner said.

In many cases, Mr. Schaffner said, the journals move so fast that the limiting factor is the speed with which the authors can respond to reviewer questions. But there are limits to increasing both speed and volume, Dr. Hotz said. After all, peer reviewers are fellow researchers who are already being asked to take time to read and assess papers without compensation.

Many journals also have revised policies that ban the consideration of manuscripts that have already appeared on publicly available sites such as arXiv.org and bioRxiv.org. The World Health Organization helped push that change by creating its own online space for such manuscripts, called Zika Open, and asking leading journals not to treat such submissions as ineligible for publication.

‘HABITS OF ACADEMIA’

Sites like bioRxiv can complicate life for public-health officials as much as it helps them, Mr. Cooke said. In some cases, he said, the quick release of working papers could create public pressure for a response that policy makers might not yet see as justified.

Mr. Vespignani discussed his findings separately with experts from the CDC and other agencies to get feedback and help them understand his work. Such agencies typically have their own ways to evaluate science, Mr. Cooke said, with an eye on potential applications that a journal peer-review process might not include.

The paper from Mr. Vespignani’s group is a good example of the challenges confronting researchers and journals facing public-health emergencies, said Stephen S. Morse, a professor of epidemiology at Columbia University. The work appears to be valuable, Mr. Morse said, yet it’s not a simple matter to assess whether it could or should have waited for peer-review treatment.

Among the questions the Vespignani team has helped highlight, Mr. Morse said, is whether researchers and universities are placing appropriate emphasis on journal publication as a measurement of career success. Mr. Vespignani, for his part, feels journals need to work harder to balance oversight with timeliness. “We should get out of the habits of academia,” in which peer review has become too much of a struggle for perfection, he said.

For Dr. Hotz, a chief concern is accuracy. He said he’s troubled by repeated references in the media to the idea that some 80 percent of people with Zika are asymptomatic, because there’s little scientific basis for such an estimate, and because people on the ground in South America warn him against believing that. Giving more researchers better options to report their findings quickly might help counter such misimpressions, Dr. Hotz said.

Either way, he said, the struggle of the scientific community to respond to Zika is “yet another wake-up call that business as usual is not adequately keeping the scientific community informed.”

Originally published on August 10, 2016
When Marc Edwards opens his mouth, dangerous things come out. In 2003 the Virginia Tech civil-engineering professor said that there was lead in the Washington, D.C., water supply, and that the city had been poisoning its residents. He was right.

Last fall he said there was lead in the water in Flint, Mich., despite the reassurances of state and local authorities that the water was safe. He was right about that, too.

Working with residents of Flint, Mr. Edwards led a study that revealed that the elevated lead levels in people’s homes were not isolated incidents but a result of a systemic problem that had been ignored by state scientists. He has since been appointed to a task force to help fix those problems in Flint. In a vote of confidence, residents last month tagged a local landmark with a note to the powers that be: “You want our trust?? We want Va Tech!!”

But being right in these cases has not made Mr. Edwards happy. Vindicated or not, the professor says his trials over the last decade and a half have cost him friends, professional networks, and thousands of dollars of his own money.

The infrastructural problems go beyond the public utilities of certain American cities, he says. In an interview with The Chronicle, Mr. Edwards said that the systems built to support scientists do not reward moral courage and that the university pipeline contains toxins of its own — which, if ignored, will corrode public faith in science.

The following interview has been edited and condensed.

Q. I just came back from Flint, and it may not have been easy for you to tell people that you’re something of a folk hero there. What do you think about that?

A. I think that’s a natural byproduct of science conducted as a public good. Normal people really appreciate good science that’s done in their interest. They see the value of the system to continue working.

Q. Now that your hypothesis has been vindicated, and the government has its tail between its legs, is a lot of researchers interested?

A. And I hope that they’re interested for the right reasons. But there’s now money — a lot of money — on the table.

Q. Not as much as some of them would like. I heard a lot of people say they thought there was a zero might have been missing from the grant money that the University of Michigan made available.

A. Right. But the expectation is that there’s tens if not hundreds of millions of dollars that are going to be made available by those agencies. And some part of that will be directed toward research, so we now have a financial incentive to get involved. I hate to sound cynical about it. I know these folks have good intentions. But it doesn’t change the fact that, Where were we as academics for all this time before it became financially in our interest to help?

Q. Where were we?

A. Now, of course, when you walk around Flint and ask people about the reassurances they’re hearing now, they don’t believe any of the pursuits fame, pursuing h-index — and the idea of science as a public good is being lost.

Q. Is there an example?

A. This is something that I’m upset about deeply. I’ve kind of dedicated my career to try to raise awareness about this. I’m losing a lot of friends. People don’t want to hear this. But we have to get this fixed, and fast, or else we are going to lose this symbiotic relationship with the public. They will stop supporting us.

Scientific studies by university-affiliated researchers, namely you and Mona Hanna-Attia, were a big part of what broke this case open. On the other hand, it took a Flint resident writing to a professor in Virginia to start the process of finding out that there was lead in the drinking water. Do you see this as an academic success story or a cautionary tale?

A. I am very concerned about the culture of academia in this country and the perverse incentives that are given to young faculty. The pressures to get funding are just extraordinary. We’re all on this hedonistic treadmill — pursuing funding, pursuing h-index — and the idea of science as a public good is being lost.

Q. In what sense?

A. This is something that I’m upset about deeply. I’ve kind of dedicated my career to try to raise awareness about this. I’m losing a lot of friends. People don’t want to hear this. But we have to get this fixed, and fast, or else we are going to lose this symbiotic relationship with the public. They will stop supporting us.

If an environmental injustice is occurring, someone in a government agency is not doing their job. Everyone wanted to partner said, Well, this sounds really cool, but we want to work with the government. We want to work with the city. And I’m like, you’re living in a fantasy land, because these people are the problem.

Q. What are they?

A. In my wildest dreams I never thought scientists would behave this way. The only way I can construct a worldview that accommodates this is to say, These people are unscientific. Science should be about pursuing the truth and helping people. If you’re doing it for any other reason, you really ought to question your motives.

Unfortunately, in general, academic research and scientists in this country are no longer deserving of the public trust. We’re not.

Q. I think of that rock with the spray paint on it that says, “You want our trust??? We want Va Tech!!” That’s a vote of confidence in you at the very agencies paid to protect them is so profoundly disturbing. That’s why this is striking such a chord.

Q. And you sort of warn them that you’re preparing them for a life of possible sadness and alienation?

A. Well, yeah. There’s a price to be paid.