Thank you. It's an honor to be able to speak to you today about the opportunities and challenges facing science journalists in the modern media industry. It's a subject that I covered for eight years as a staff writer for *Columbia Journalism Review*, and during that time I came to understand how vitally important the science beat is to human health and welfare. Whether it's helping individuals understand the latest discoveries in medicine and physics, or helping communities make educated decision about managing their natural resources, the world needs discerning science reporters that can think critically, identify trusted experts, and explain complex information in ways that people can understand and act upon. But those eight years at CJR also gave me a front-row seat to the profound changes that were taking place within the media industry, and it wasn't pretty at first—far from it.

With a steep decline in advertising and subscription revenues, newsrooms across the U.S. and around the world were making massive cutbacks in their operations, and even though everyone suffered, specialists, including science reporters were hit especially hard. There was an aura of despair that hung over the profession, which was palpable at meetings much like this one. At science journalism conferences, all that people seemed to talk about was "the crisis" and the shoddy state of coverage, from sowing unreasonable doubts about climate change and vaccines safety to the lack of public debate about issues like space exploration. But as time went on, that started to change, and at those conferences, the tone began to slowly shift from pessimism to, if not optimism, than at least guarded hopefulness that journalists were trying to do better and, in some cases, succeeding. Which isn't not to say that all of sudden everyone was carefree and happy, but rather than talking incessantly about all that had been destroyed, people were once again talking about what was being created and what opportunities lay ahead. The profession, as I saw it, had turned a corner. We were back in the realm of the possible.

But I warn you that I may be viewing the situation through rose-colored glasses, and not everyone is as hopeful as I am. Last May, we saw the launch of a new science magazine in the United States called Nautilus. And I don't mean a webzine. I mean a real-life, ink-and-paper magazine. This is a little bit like watching a rhinoceros give birth in terms of how awesome and rare it is, but it reminded Dennis Overbye, a science reporter at The New York Times and one of the beat's most respected veterans, of a bygone era, and I'd like to read part of his review of Nautilus:

Many science writers at The New York Times, including me, he wrote, *hatched their careers working at a wave of glossy monthly science magazines that were started in the late 1970s and early '80s, fueled by the belief that curiosity about the universe was not only part of the good life, but a necessity in a democratic society facing decisions about nuclear energy, medicine, the space program and the arms race…*

A decade later most were gone or struggling for lack of advertising, despite circulations in the range of half a million, and despite the growing importance of science in an age of climate change, energy crises and AIDS. The lone survivor of that

golden era, Discover, has been sold four times. A more recent arrival, Seed, noted for its edginess, exists only online.

The audience has fragmented among stalwarts like National Geographic and Scientific American; blogs; and new-media adventures like the TED talks, the World Science Festival, Edge.org, the online salon, and Quanta Magazine, a new effort by the mathematician and philanthropist James H. Simons.

And, of course, there was Nautilus, after his brief reflection, Overbye went on to compliment its first issue. But there was something in his tone that let you know he wasn't totally convinced that this was the dawn of a better future for science journalism. Nautilus, as he saw it, was "living fossil." I, on the other hand, thought he was being a bit too gloomy, so I wrote a column saying that I thought the outlook was better than he gave it credit for.

Clearly, I should've knocked on wood, because the very next day, I was got a surprise phone call. CJR had fallen short of its fundraising targets and had to make some cutbacks, and I was among them. The management was very fair about it, and gave me the option of going to part time, and when I turned that down, they very graciously made me a contributing editor. Still, I walked was from the experience rather stunned, and it's funny, because right after the call, I remember that I wasn't really worrying about what to do next. I was just thinking, 'Oh, my God, did just I get laid off one day after musing about a new golden era in science journalism?' Somewhat embarrassed about his, I was forced to ask myself, "Did I still stand my optimism? Did I still think science journalism was finally headed up uphill again after a long, downward slide?"

To answer those questions I had to reflect on what I'd really seen during those eight years in my front-row seat at the media circus. How had the challenges and opportunities facing science journalists evolved?

I decided to consider mainstream, media outlets—The New York Times's and the CNN's of the world—first, and sadly, there really hasn't been a lot of positive news along that front. Traditional, general-interest outlets have been in a long, downward spiral for more than a decade, and it is within that realm that the obstacles facing science journalists are the most difficult and daunting.

The Pew Research Center, a highly regarded, non-profit think tank based in Washington D.C. runs a program called the Project for Excellence in Journalism, which has been doing an annual content analysis of coverage at 50 mainstream American print, TV, radio and Internet news outlets since 2007, and these data make it painfully obviously that science gets short-changed. Science and technology have consistently accounted for only 1 to 2 percent of the entire news hole each year. Environment has accounted for another 1 to 2 percent. And health and medicine have accounted for 3 to 9 percent. Nowhere, has the decline of the science

beat been more apparent than in American newspapers, where the number of weekly science sections fell from 95 in 1989 to 19 in 2012.

We have to ask ourselves, why have science stories been relegated to a small, dark corner of the mainstream media? And I'm afraid to say that one reason is that publishers and newsroom managers don't think there's much demand for it.

According to the National Science Foundation, an independent agency that's part of the U.S. government, which was conducted public opinion polls on the subject for decades, "Relative to other topics, Americans' level of interest in science and technology is not particularly high," and the number of people who express interest in science has declined since 2001. That gibes with a Pew survey, which found that the fraction of people saying they followed science and technology news "very closely" declined from 33 percent in the 1980s to just 16 percent in the first decade of the new millennium. Yet I've always believed that these surveys are a somewhat misleading because if you look at more finely tuned public opinion polls, you'll see that topics like the weather, disasters, energy technology, pharmaceuticals, and infectious disease outbreaks often produce some of the biggest stories of the year. The problem, I think, is that publishers and newsrooms managers are often unable to recognize the public interest that's out there because most of them rose to the top through the politics and business desks, which have traditionally offered the best routes to better pay and more power in the mainstream media.

And it should come as no surprise that as the quantity of science coverage has declined, there's been a qualitative change as well, with many outlets shifting away from a more diversified form of science coverage toward one that focuses on consumer-oriented medicine and personal health coverage.

It makes sense, really. People care about their health, and they should. But they also crave simple answers and easy solutions when it comes to nutrition and fitness, and the media are all too often willing to pander to that craving. In fact, it is in the realm of health and medicine that I see the biggest problem with what's been called "single-study syndrome" by some and "the big paper of the week model of journalism" by others. This is what happens when outlets try too hard for breaking news in science. Reporters cover the latest papers in journals like *Science* and *Nature* simply because they were published, and they treat whatever conclusion was reached as gospel, without explaining where the paper fits in with the larger body or relevant and related research. It's how we get articles heralding the virtues and aspirin, red wine and multivitamins one week, and rejecting them the next. It's how we stuck in what's called the "new-hope-no-hope" cycle of reporting about disease and illness.

Single-study syndrome is a common problem in stories about climate change and other topics as well, of course, but I think it has the most power to cause the most harm when it turns up in health and medical reporting, because people are likely to act upon these stories in ways that can quickly affect their lives, whether it's eating

more of this or less of that, or deciding to try or to skip new drugs and treatments. And you can see how potentially dangerous that becomes when you consider that most of these studies will never be replicated. About a year ago, an analysis came out in *Public Library of Science*, an open access journal, which attested to the need for more journalistic skepticism. Researchers identified ten of the most widely covered scientific articles about Attention Deficit Hyperactivity Disorder, or ADHD, published during the 1990s, as well as all of the relevant follow-up studies until 2011.

What they found was that the conclusions in six of the 10 most widely covered publications "were either refuted or strongly attenuated" by the subsequent studies, and the main conclusions of a seventh appeared to be in serious doubt. The inability to replicate initial studies isn't unusual, of course, but here's the problem: The initial studies resulted in 223 news articles, while the 67 follow-up studies refuting them produced only 57. Moreover, when one of the follow-up studies did draw media attention, the reporter usually failed to mention that its findings refuted those of an earlier paper. Sadly, this isn't the only evidence of subpar coverage. In 2011, a review of nearly 1,500 articles over the last five years found that in stories about specific medical treatments, tests, products, or procedures, more than two-thirds did satisfactory job of explaining the availability and novelty of a treatment. Yet they often failed to adequately explain more important points, like the costs, benefits, and risks care, alternative treatments, and potential conflicts of interest.

So, why does this happen? First, we need to recognize, that in many ways, there is a fundamental disconnect between the news media, which moves very quickly, and science, which progresses rather slowly. Covering science well often means doing a lot research, talking to a lot of experts, and weaving that information into simple, yet accurate stories. And that's gotten a lot harder as what's been called "the tyranny of time and space" has become more oppressive. Despite the widespread cutbacks in newsrooms, the pace of news production has increased dramatically in the digital era, and surveys of journalists have found that they are being asked to do more work in less time and with fewer resources. Many reporters simply don't have the time and support they need to tackle these incredibly complex subjects. Others lack the training or the experience.

But I don't want to pin this all on journalists, and there are forces at work outside the newsroom as well, especially the rapidly growing PR industry. According to the Pew Research Center, in the United States, the ratio of PR workers to journalists grew from 1.2 to 1 in 1980 to 3.6 to 1 in 2008. It often seem like the ratio is even more distorted on the science beat, and I've know many reporters, including some of the country's best, who moved into PR jobs because of the troubles in journalism.

That isn't necessarily a bad thing. A 2012 study published in the *British Medical Journal* found that "higher quality press releases issued by medial journals were associated with higher quality reporting in subsequent newspaper stories." But on the flip side, "poor quality press releases were worse than no press release" at all.

Now, an even more recent study traced "spin" in news article and press releases back to the presence of spin in the scientific paper itself, but whatever the case may be, what all of this suggests to me is that reporters are relying way too heavily on press releases. They're not thinking critically and analytically about the science they're covering, and worse still, the flaks from journals and academia are hardly the most intimidating characters that reporters have do deal with.

According to the Pew's latest State of the Media report, political & corporate entities are circumventing & overpowering journalists like never before. Despite American President Barack Obama's pledged to usher in an "unprecedented" era of government openness and transparency, but almost any science reporter in the United States today will tell you than federal is arguably more secretive now than it was under the George W. Bush administration, and science reporters on the environmental and health beats in particular are having a harder time than ever getting ahold of government experts and information.

The private sector is just as bad. Two reports from environmental advocacy groups in the past year have detailed how the press routinely quotes think tanks that criticize clean energy policies without mentioning that the groups receive significant funding from fossil-fuel interests. This includes influential, which have been cited thousands of times by dozens of news outlets in the last five years. More than half of the time, reporters use only an organization's name—no more, no less—and occasionally, they will describe the organization's political ideology with terms like "conservative" or "libertarian." But only rarely when one of these groups casts aspersions on something like solar power does the reporter mention that it receives money from a corporation like ExxonMobil. Now, I'd wager to say the exact same thing happens when reporters cite of think tanks on the other side of the energy debate. In fact, the journalists are confronted by spin-doctors on all sides, which isn't to say that they never get the upper hand. They do, and many mainstream news outlets continue to produce incisive work that is of direct and immediate public benefit. But we live in noisy communications environment where it's become increasingly difficult to judge the credibility of various claims and arguments, and nowhere, perhaps, is that more obvious that in coverage of climate change.

When I started working for CJR, there had been a major problem with false balance, or what one scholar has called "balance as bias" in climate coverage. This was, of course, the tendency of journalists—Americans in particular, I'm sorry to say—to quote scientists that doubted a human influence on the climate in equal proportion to those that didn't, even though the latter constituted what should have been an obvious majority. I'm sure all of you are familiar with this problem, which resulted largely from science reporters' attempts to adhere a journalistic norm called "fair comment" that grew out of politics and policy coverage. But what's not fully appreciated is false balance wasn't a very long-lived problem, and even though it's still alive at influential places like Fox News and The Wall Street Journal Opinion Pages, it largely subsided at other mainstream outlets by about 2006.

Now, that doesn't mean that coverage climate change has been perfect—far from it. In fact, media watchdogs have continued to debate journalists' performance in this realm every since, and there's probably not a single day that's gone by when reporters covering climate change have not faced a barrage of criticism from both sides—from environmentalists saying that they haven't done enough, to skeptics saying that they've gone too far. So, it's never been easy.

That was obvious after Hurricane Sandy struck New York City in 2012 and after Typhoon Haiyan struck the Philippines just a few weeks ago. The relationship between global warming and extreme weather events has probably been the most popular angle for climate change stories in the last few years. Indeed, it is now customary in newsrooms to ask about the climate connection after nearly every weather disaster. But explaining the relationship is a lot more difficult than explaining the basic principles of climate science because "attribution," as it's known, is much more complex and uncertain. A small group of the some the world's most respected climate scientists who have subtly shifted their message on extreme weather in the last few years.

The standard line used to be, "While you can't attribute any one storm to climate change, this storm is consistent with what we'd expect to see in a warming world." Now, the line is more simple and catchy: "Manmade climate change influences all weather." And there's data to back that up, but it belies an important and often asked question about *how much* we're influencing the weather. Indeed, scientific authorities such as the IPCC have pretty low confidence in any long-term trends related to hurricanes and typhoons. More importantly, any expert will tell you that disasters require two things, a hazard and exposure to the hazard, and that the latter is often a bigger factor in the risk of disaster.

After Hurricane Sandy struck New York, I was frustrated by the fact that many articles cited a report by the insurance company Munich Re. Proclaiming that it presented "new evidence for the emerging impact of climate change" in the rising toll of severe weather in North America, very few of them mentioned another part of the report, which emphasized that "socio-economic factors, such as population growth, urban sprawl and increasing wealth," continued to be the primary loss drivers behind the growing cost of extreme weather events.

That doesn't mean journalists should stop covering the connections between extreme weather and climate change, which are very real in some cases, but by overlooking such information, journalists inhibit people's ability to make educated decisions about development, public safety, and ultimately, where to live. When the magazine *Bloomberg Businessweek* came out with a bold, red cover featuring a picture of a flooded New York City street with the words, "It's Global Warming, Stupid," in big, black letters, people applauded it's boldness, and it was hard to disagree. The cover made a big splash and all of sudden, after a presidential campaign in which journalists with access to the candidates didn't ask a single question about climate change—a democratic failing of the highest order—global

warming was a big thing again. And I think news outlets do have to be audacious sometimes to get the point across. Yet I couldn't help but feel that this type of coverage would benefit future generations only at the expense of current ones.

New York and New Jersey had building in flood zones for decades, and very few articles pointed out that might have been a more immediate factor than climate change. I was happier with coverage after Typhoon Haiyan struck the Philippines. Although, I think many journalists still looked for the climate connection first, in the end, most ended up producing stories that emphasized the role that poverty, overcrowding, and substandard construction played in the disaster.

So, the press continues to its good days and bad days, but there reasons to believe there are more of the good days ahead. In its annual State of the Media report this year, the Pew Research Center, noted that while traditional newsrooms have shrunk, a variety of new outlets, based primarily online, are producing content that advances citizens' knowledge about important public issues. Moreover, they tend to cover subject areas such as health and science that would have once been covered more regularly and deeply by beat reporters at traditional news outlets.

Two events this year illustrated this trend perfectly. First, in January, news broke that *The New York Times* was dismantling its environmental reporting group.

The decision prompted an outcry from critics who accused it of abandoning its responsibility to a vital beat. The *Times'* leadership said that the move had nothing to do with budgetary concerns despite the fact the *Times* was in the middle of yet another round of cutbacks. It was "purely a structural matter" and the paper was devoting "more [resources] than ever" to coverage of the environment, editors said. But two months later, the other shoe dropped when the *Times* announced that it had cancelled its Green blog. A second outcry followed, and the editor promised readers that he was simply following a strategy of integration whereby items that would have appeared on the blog would be threaded into other parts of the paper and website, where casual readers would be more likely to see them. The logic makes sense, and integrating environmental coverage into other subject areas is a noble goal, but even the paper's well-respected public editor sided with critics. "Here's my take… I'm not convinced that the *Times*'s environmental coverage will be as strong without the blog. Something real has been lost on a topic of growing importance."

Elsewhere, fortunately, the industry was making gains. In April, InsideClimate News—a four-year-old online startup dedicated to covering stories about climate and energy—won a Pulitzer Prize for National Reporting for a series called, "The Dilbit Disaster: Inside the Biggest Oil Spill You've Never Heard Of." The investigation revealed the inept response of industry and government to an oil spill that had occurred in Michigan's Kalamazoo River in 2010. It was the most costly onshore spill in U.S. history, but when it occurred, the media's attention was focused on an even larger calamity—the ongoing oil spill in the Gulf of Mexico following the explosion of the Deepwater Horizon drilling platform.

Thankfully, InsideClimate was paying attention, and it revealed that the Michigan spill had special significance because it involved bitumen—a thick, dirty oil from Canada's tar sands region that has to be thinned with chemicals in order to flow through oil pipelines. It was the same type of oil slated to the run through the controversial Keystone XL pipeline, and it proved particularly difficult to clean up. When the diluted bitumen, or "dilbit," was released into the environment, the chemicals used to thin it vaporized, creating a local air pollution hazard, and unlike normal "sweet" crude, which floats, the tarry bitumen that was left over sank to the river bottom, where it could be neither skimmed nor contained by booms. When authorities showed up, they had no idea what they were dealing with, InsideClimate News later revealed, because the U.S. doesn't require oil companies to disclose the types of crude coursing through their pipes at any given moment.

"The Dilbit Disaster" was not only public service journalism at its best; it was new media at its best, and the Pulitzer victory brought InsideClimate well-deserved recognition. It wasn't the first web-native outlet to win the vaunted prize. There was ProPublica in 2010 and The Huffington Post in 2012, but those were large operations from the get-go, and InsideClimate was the smallest start-up ever to be presented with journalism's highest honor. In fact, it doesn't even have an office in which to hang its award. Spread out across the country, most its small staff works from home. This nimble organizational structure is one of the reasons why InsideClimate is so agile and has been able to achieve so much.

I met InsideClimate's publisher, David Sassoon, who's based in New York, in 2007 shortly after he helped to create it. Back then, it was called *Solve*Climate News and the team was doing what Sassoon calls "derivative journalism"—basically aggregating and commenting on the work of other outlets in order to boost web traffic. But a year later, he and his team made a strategic decision to begin producing only original reporting. It was a "watershed moment" for the site, and over the following two years, Sassoon continued to expand the staff, hiring both veteran and rookie journalists. In 2011, he changed the name from SolveClimate News to InsideClimate News in order to counter the perception that it was an environmental advocacy organization, but the Pulitzer was the real validation, not just for InsideClimate, but also for the entire media. Sig Gissler, the administrator of the prizes, told a *The New York Times* reporter that the victory was indication that "the way journalism as we've always known it and loved it is being reconfigured."

Of course, the operational blueprint for InsideClimate isn't exactly new. The Center for Investigative Reporting, based in California, has been around since 1977 and it, too, relies on the non-profit model and grants from charitable foundations, and like InsideClimate, it posts most of its content on the Web for free, and partners with traditional, for-profit news outlets on major investigations. As those traditional newsrooms have faltered, however, non-profit, investigative outlets have become more common. Some, like ProPublica, are large, but most are small. In 2009, 27 of them, new and old, gathered on the former Hudson Valley estate of oil tycoon John

D. Rockefeller and founded the Investigative News Network, an organization dedicated to promoting the non-profit model of journalism in an effort to address the ongoing crisis in the field. Today, that organization has almost 100 members, many of which were founded by former newspaper journalists who had lost their jobs. The proliferation of these lean, mean newsrooms is, I believe, our two best hopes for the future of specialized reporting in the mainstream media.

The other one is the Cambrian-like explosion of science blogs and websites online, which don't tend to produce as much hard-hitting news as the non-profits, but which cover a much wider range of current events in science. In fact, I'd imagine that some of you are probably surprised I haven't brought up blogs and other websites up sooner, given the prevailing winds in media consumption.

In the Untied States, for news about current events in general, television is the primary source of information for 45% of Americans, according to the National Science Foundation, while the Internet is the primary source for 24% and newspapers are the primary source for 16%. But when Americans are looking for news about science in particular, they are about equally likely to rely on the Internet as on television, and the number that cites the Internet as their primary source has grown steadily since 2001 while the number that cites television has declined. Furthermore, when Americans are seeking specific information about science, as opposed to science news in general, the Internet becomes far and away the most popular source, with almost 60% citing it as their top choice, compared to just 15% who cite TV. So, what does this tell us? First of all, it tells us that the better an idea people have of what they're looking for, the more they'll rely on the Internet, which makes perfect sense, given that search functions are the most common activity—and really only possible—online. But it also tells us that people who aren't looking for science news still rely heavily on the information sources where the chance of encountering it has become less common.

That's a shame, because while the crisis in those once hallowed halls of journalism continues, what are often called "special interest" or "niche" topics, like science, have faired remarkably well online, if not thrived. The Internet is, if nothing else, an exquisite matchmaking service between producers and consumers, and science fans now have a truly mind-blowing amount news and information right at their fingertips. The democratization of the communications environment—for both consumers *and* producers of news—is largely why traditional news outlets are struggling. But many of them, science magazines, in particular, have adapted very well to their new digital environment. And there is still a place for professional journalists in cyberspace.

For instance, while there are many independent science blogs out there, bloggers have always tended to gather together in online communities. I think this has to do with a natural human instinct to form groups. A lot of people turn to blogging as much to seek out social connections as to write or report. It's about engaging with a community of like-minded peers, and because science-news fans—or stamp

collectors, for that matter—may have typically felt cut off from one another before the days of the Internet, they've taken to this medium with special vigor. But large media companies quickly got into the business of playing host to these communities.

One of the earliest and most successful examples was Scienceblogs.com, an invitation-only network founded in 2006 by Seed Media Group, which used to publish a popular, but now defunct magazine called Seed. At its height, the Sciencblogs.com community included almost 100 journalists and scientists. Some were already very well known, and some were novices. And some of those novices became very well known. And some scientists that got involved eventually became full-time journalists. In fact, the network is still around today, but it started to unravel in 2009 when other science magazines finally started to catch on to the popularity of blogging. *Discover* was probably the first to begin luring away the most popular writers from Scienceblogs.com, but others, including *Wired*, *Scientific American*, *Popular Science*, and *National Geographic* eventually followed suit, launching blog networks of their own. And there are other signs that this is becoming big business.

In the last seven years, a once-obscure bloggers conference called Science Online, which happens every year in North Carolina, has grown into one of the hottest science media events of year, attracting a diverse collection of researchers, journalists, artists, engineers and educators. In addition, the organizers of the conference publish an annual anthology called, The Best Science Writing Online, and after five years of self-publishing the book with LuLu.com, the sixth edition, which came out last year, was co-published by *Scientific American* and Farrar, Straus, and Giroux, one of the world's great publishing house.

So, there's been a certain "professionalization" of the medium, even if blogs linked to journalists or journalism outlets still account for only a small fraction of all the blogs out there, and in their online communities and conferences, news outlets have created forums for a richer and more diverse discussions about science that the world has ever known. Moreover, science magazines have been joined by host of new publishers, including universities and non-profit organizations, which feature the work of journalists and non-journalists alike.

Truly, there's never so much high-quality science news available to so many on subjects from astronomy to zoology. Yet people express many of the same concerns about science news online that they once expressed about newspaper science sections. In particular, people continue to worry about what's often called the science "ghetto," which is the idea that science blogs, much like the science sections old, are segregated from the mainstream news hole where they are easily ignored or discarded. As I mentioned a moment ago, people who know what they're looking for are the most likely to rely on the Internet for news. So we have to ask ourselves, how many people end up at science blog that don't go looking for it? Are the new sources of information reaching as wide audience or a narrow one?

Some research suggest that the serendipity factor—the likelihood of a chance encounter—is actually fairly high online, I tend to agree. The problem is not so much that you won't stumble on good science coverage if you go online. The problem is that you're at least equally likely to stumble on some bad coverage first, and it's hard to tell the difference. Whether people go looking for science information online, or just happen to stumble upon randomly, the new media ecosystem is a jungle compared to the well-maintained gardens of the old world – a bewildering place where there is greater need to differentiate between "journalism" and "media" and where the principal of *caveat emptor* is more important than ever.

In areas of highly politicized science — from climate change, to genetically modified foods, to vaccine safety — there is a lot of misinformation masquerading as fact. Journalists must work harder than ever to tip the balance between professional journalism and amateur reporting. Between impartiality and advocacy. Between news and entertainment. Thankfully, science journalism organizations such as the National Association of Science Writers in the U.S. and the World Federation of Science Journalists on the international level are also working harder than ever, trying to help their members cope with the challenges of the modern media. In addition, yet another specialty—media criticism—has also found new life online. When I started critiquing science news at CJR, I was practically alone in the field, but since then large web of news outlets and blogs have joined the effort, trying to correct the record and encourage the higher standards.

And even though it's hard to tell exactly how much progress has been made sometimes, I think one thing is certain – the era of digital mass communications has made professional journalists more necessary, not less.

We need honest brokers that make it their full-time responsibility to produce reliable information about current events and act as trusted sources in an ever more chaotic news environment. Science journalists continue to struggle to live up to their obligations in this regard. They need to be more proactive in their reporting, and less reactive in order to break away from "single-study syndrome." They need to be more skeptical of scientific claims and sources. And they need to inform coverage of wider variety of topics, like gun violence and automobile safety, than they do now. There's a lot to do and the public is counting on them.

Yet I also see signs that science journalists are stepping up to meet the challenges before them, and to return to the question I posed earlier—do I still believe that that we've turned a corner, from decline into growth—the answer is, yes. Yes, we've lost a lot more in the last 20 years than we've so far been able to recover, but I believe the recovery process has begun, even if in small steps, largely thanks small, non-profit newsrooms and blogs and websites with an interest in science. These outlets are better adapted to the new environment and many show potential for growth. For the first time in a long time, we have a bit of momentum on our side, and with hard work and creativity, we can, I believe, live up to our responsibilities as science journalists. Thank you.