After the Fact | The Power (and Peril?) of New Technologies

Originally aired Dec. 21, 2018

Total runtime: 00:14:31

TRANSCRIPT

Dan LeDuc, host: From The Pew Charitable Trusts, I'm Dan LeDuc, and this is "After the Fact."

Here's a question for you. What's made your life better? As you think about that, let's make you think a little harder: What's the biggest improvement to life in America over the past 50 years? The Pew Research Center asked that open-ended question, and 42 percent of people answered "technology." Technology even outranked peace, as in the end of wars. In fact, the next closest category of answers was health and medical advances, and only 14 percent of people mentioned that. Clearly, Americans like technology—that 42 percent is our data point for this episode. So to wrap up this year, we're going to look to the future and talk about the promise—and the peril—of technology.

[Music plays.]

Dan LeDuc: Arati Prabhakar knows a lot about the brave new world of technology, from artificial intelligence to advances in neurotechnology. She is the former director of the Defense Advanced Research Projects Agency. You've probably heard about it by its acronym, DARPA. It develops technology to enhance national security.

She's a board member at the Pew Research Center, and after her government service she's back working in Silicon Valley and joined us from Palo Alto, California.

Arati, thanks for being with us.

Arati Prabhakar, former director, Defense Advanced Research Projects Agency and board member, Pew Research Center: It's great to be here.

Dan LeDuc: So we began by noting that 4 in 10 Americans are crediting technology with improving life most in the last 50 years. How do you see the changes going on in the

world today, in this broad range of digital information, the information revolution, how it's led to all sorts of changes in big data and artificial intelligence? Where are we, as a society, these days, with all of these changes coming at us?

Arati Prabhakar: Those are some of the big, visible changes that are happening around us today. And I think they're so pervasive. They affect so many different parts of our lives—our work lives, the way we interact, even among ourselves as families and societies, our personal lives, entertainment. So I think it's very easy to see lots of changes happening simultaneously.

But I would add—today, when we say technology, we often just think information technology. But of course, technology continues to advance in many other domains, as well. And often it's because we can leverage information technology to make advances—for example, in areas like biology that are now, I think, moving in some extremely interesting new directions, as well. I think we're in a period—because technology change builds on everything that's come before—I think we all have a sense of acceleration and that the world around us is changing in many dimensions, but at a pace that we haven't really seen before.

Dan LeDuc: Some of the things that we see in headlines today, like driverless cars, were fanciful even only a decade ago. And it seems like people seem to think that robots are going to just take over the world. And people are worried about jobs and a lot of other concerns. What is actually happening with that technology now, and how should we view, sort of, robotic technology, its impact in the workplace, and where things are going?

Arati Prabhakar: We're living in a time in which a set of technologies, an artificial intelligence, are advancing at a pace that's startling. You know, to me, this is just the current wave of something we've seen over and over and over again with technology, which is new capabilities emerge from research, and they dazzle us with their possibilities. But they also bring with them some really thorny challenges. And that's really, ultimately, the most interesting question, to me, is how are we going to navigate through these questions that we face, so that we get the benefits of the technology without suffering too much of the pain that comes with it?

And so today, if you think about artificial intelligence, we all sort of got used to the old version of artificial intelligence, which was really just about capturing a bunch of rules so

that computers could follow these rules. If you use TurboTax to file your taxes, that's essentially what you've got.

We don't even call that artificial intelligence anymore because this new generation is about machines being able to learn patterns in all kinds of interesting data. So every day, we see another example of a machine that's better than humans at classifying images or doing other tasks that, until very recently, we thought only humans could do those things. And I think when that happens, first, there are huge possibilities and new opportunities that open to do tasks that aren't that interesting, but to do them now using machines, and to make people much more productive, and to give us access to information and understanding that we haven't had before. So all of that is fantastic.

As history shows, it also means sometimes that it's going to change the nature of work in ways that might, ultimately, be very good and very much more productive. But it's very challenging for the people whose immediate jobs are being threatened. And so I think those issues are very much on everyone's minds today, as they should be.

And then, finally, I think the other thing that happens when you're in a time of huge technological progress, is I think we just naturally have a tendency to just extrapolate and imagine that if machines are going to get this much better this quickly in areas like machine learning, that surely they're just going to keep getting better and better, and just have phenomenal sort of superpowers. And I think we need to be really careful about overextrapolating, because these are technologies that have power, but also limitations. And they're not magic pixie dust. And so I think we also just need to rein in a little bit on extrapolating out beyond where the technology actually is.

Dan LeDuc: So we're talking so much about all of the technological advances, and it happened so fast that there's probably stuff going on in people's lives that they don't even think about the advancement anymore, right? It's just become commonplace to them.

Arati Prabhakar: That actually happens to me all the time. I remember the first time I was searching for something that I thought was really obscure, and Google autocompleted it. And, I mean it was really eerie. It was creepy, right?

And then, the second or third time, I was like, "Oh, that's interesting." And about the fourth time, I found I was expecting it to autocomplete, and I was disappointed when it

didn't autocomplete. That's how quickly these new technologies, I think, seep into our day-to-day lives.

Dan LeDuc: And I think a lot of people have a tendency to think about sort of machines taking over tasks. Certainly, we've seen it in production lines. And that, of course, threatens jobs. But actually, isn't technology—a lot of the most important advances in technology are happening at a much higher level, like in the sciences, like radiology, and places where that may not be first of mind when we're thinking about the change that could be coming.

I think a lot of the conversation tends to be about human versus machine. And where I think the biggest possibilities usually are lie with humans using machines in ways that allow us to do things that we couldn't do by ourselves, but the machines can't do by themselves either. And I think that's where a lot of the really creative new frontiers are going to be.

Arati Prabhakar: I think we're at a juncture right now in our progress in science and technology in which we are starting to be able to apply the scientific method to systems that are so complex that, until recently, we just didn't think we could make much progress on them. And the reason for that is because of our ability to analyze data that's been around for a while, our ability to generate new kinds of data that haven't been around before. Our ability to build, with our computers, very complex models to form new hypotheses, to do new kinds of experiments.

And that's a very general new capability. And so what kind of complex systems are we talking about? Well, one of the areas is about the complexity of biology. If you think about what's happening inside the human brain, with over 80 billion neurons, or if you think about what's happening inside of every one of our cells—all the metabolic pathways and the signaling pathways, and the chemistry that's going on at any moment in time—those are very, very complex systems. This is one area where we're starting to see significant advances, whether it's understanding how the brain works in deeper ways than we've had before. And starting now to have not just neuroscience understanding, but neurotechnology that allows us to repair brain function when it's as simple as losing the ability to control an arm, for example, because of an injury.

In recent years, we've seen research in which individuals have had small implants placed on their brains, on their motor cortex and on their sensory cortex. And amazingly now,

we can pick up those tiny electrical signals and, in that moment, translate what the brain is signaling and translate that into the instructions to drive a mechanical arm. And so what that means is that with some of these early examples, individuals are able to think and—simply with their thoughts—move a mechanical arm. And then, we know how to do it backwards, too. So when that mechanical hand touches something, we can figure out what signals to fire from that sensor in the fingertips so that the brain receives information the way we do with our natural fingers.

And these are sort of amazing early examples of something that I think is not tomorrow, but down the road, we can start to see that the understanding we have of the brain's functioning and our ability to interact with the brain in new ways. It opens a huge number of new possibilities. And with those will come, again, a whole new set of challenges.

Dan LeDuc: Let's put some data to that because we do that a lot in this podcast. The Pew Research Center has asked people about their worry and enthusiasm about things like human enhancements. That includes gene editing to give babies a reduced risk of disease, or maybe a brain chip that actually allows you to have improved cognitive abilities. And in each one of those instances, the public was like—two-thirds were worried that something could go wrong, that they'd had some concerns about those enhancements.

What's the role of the scientist in all of this to make sure that the technology is—and advances are—used properly?

Arati Prabhakar: During my time as director of DARPA, we wrestled with these kinds of questions all the time. Because in that agency, of course, our mission was to pursue breakthrough technologies for national security. Biology was an area that often presented us with these kinds of confounding questions about the same technologies that would help a wounded warrior be able to use a prosthetic limb with near-natural control by just thinking about it. That is the same technology that can open the door to things that are not just the restoration of function but enhancing function.

And quite routinely, we were asking ourselves, "Well, what is the best direction for the next research program?" Of course, we wanted to try to see where the most powerful technologies were. But we felt that it was also an integral part of our job to engage with people who were thinking about broader ethical and societal questions, to try to learn

from how people have implemented previous medical and biological technologies, and I think there's often a lot to be learned from history. And to take all of those notions into account as we charted our course. Again, we were just doing the research, but we knew that, even there, there were choices that were important for us to think through.

Dan LeDuc: We've also talked about the sort of just pure exponential speed at which these technological advances have come at us, and the ability to absorb just vast amounts of data so fast. Are you optimistic that the sort of value-driven questions, the ethical questions we've just been discussing, can move at that exponential speed, or catch up to where the technology is?

Arati Prabhakar: I think that is the challenge. And of course, technological capability moves at the pace of research and the pace of markets. And those can move pretty fast. Making decisions about how we're going to use these technologies—whether it's a formal decision through a law or a regulation, or the emergence of norms—there are many ways that we do that.

But you know inherently, those are consensus processes that are a reaction to the capability of technology. And while I firmly believe we can do better and be more adaptable—for example, in the way that we establish our regulations, and be more anticipatory of where technology is going—I think we have room for improvement. But I think it's just important to recognize that, inherently, these societal choices about how we're going to use the technology—they're not going to just move—they're not really as simple and as straightforward as what comes out of research or building businesses.

Dan LeDuc: So the same human questions we've been wrestling with for millennia are still with us, even as we've made all of these other amazing strides.

Arati Prabhakar: That is the interesting quandary, isn't it?

[Music fades in.]

Dan LeDuc: Thanks so much for spending time with us today, and we look forward to talking to you again.

Arati Prabhakar: Thanks so much for the chance to talk about these issues.

[Music continues.]

Dan LeDuc: You can read the Pew Research Center's survey on what Americans believe is the biggest improvement in their lives on our website, pewtrusts.org/afterthefact. You can also go there to watch a talk by Arati Prabhakar at the Aspen Ideas Festival about emerging technologies.

Happy New Year, everybody. We hope you'll join us a lot in the new year.

For The Pew Charitable Trusts, I'm Dan LeDuc, and this is "After the Fact."

[Closing "After the Fact" theme music plays.]