ITIF | INFORMATION TECHNOLOGY & INNOVATION FOUNDATION

CENTER FOR LIFE SCIENCES INNOVATION

Making Medicines in America: How Congress Can Help America's AI, Biopharma, and Manufacturing Industries Make It Happen

DIRKSEN SENATE OFFICE BUILDING, WASHINGTON, DC | MAY 7, 2025

Co-hosted by the Information Technology and Innovation Foundation (ITIF), Purdue University, and the National Institute for Pharmaceutical Technology and Education (NIPTE).

CONTENTS

EVENT DESCRIPTION

The United States faces a crisis in its pharmaceutical supply chain. Over 70 percent of active pharmaceutical ingredients (APIs) are made overseas, with China dominating key supply chains and AI-driven manufacturing accelerating its lead. The consequences for Americans include record drug shortages, heightened national security risks, and soaring costs that threaten American patients and U.S. economic stability.

It's time to take action. America has the technology, talent, and urgency to lead in next-generation drug manufacturing, and must make a strategic pivot toward pharmaceutical independence through economic revitalization and modernizing regulation to unshackle AI-driven innovation.

ITIF, Purdue University, and NIPTE co-hosted a summit on Capitol Hill where top leaders in AI, pharmaceutical manufacturing, and public policy discussed what must be done before unveiling a Collaborative Accord pledging "A Shared Commitment to Onshoring Critical Medicine Manufacturing to Secure America's Health and Prosperity."[1]

SPEAKERS (IN ORDER OF APPEARANCE)

- **Stephen Ezell,** Vice President, Global Innovation Policy, and Director, ITIF Center for Life Sciences Innovation
- **Monique K. Mansoura, PhD, MBA,** Strategic Advisor, Global Health Security & Biotechnology
- **Mung Chiang,** President, Purdue University
- **Andrew Carpenter,** Chief Scientific Officer, Phlow
- **Manish Oza, MD,** Chief Medical Officer, Google Public Sector
- **Elizabeth M. Topp,** Director, William D. and Sherry L. Young Institute for the Advanced Manufacturing of Pharmaceuticals, Purdue University
- **William D. Young,** Senior Advisor, Blackstone Life Sciences
- **Todd Young,** U.S. Senator, Indiana
- **David A. Ricks,** Chair and Chief Executive Officer, Eli Lilly and Company
- **Alina Alexeenko,** Co-Director, William D. and Sherry L. Young Institute for the Advanced Manufacturing of Pharmaceuticals, Purdue University

[1] **Video of the summit:** "Making Medicines in America: How Congress Can Help America's AI, Biopharma, and Manufacturing Industries Make It Happen," ITIF, Purdue, and NIPTE, Dirksen Senate Office Building, Washington, DC, May 7, 2025, https://itif.org/events/2025/05/07/making-medicines-in-america-2025/.

Collaborative Accord: "A Shared Commitment to Onshoring Critical Medicine Manufacturing to Secure America's Health and Prosperity," William D. and Sherry L. Young Institute for the Advanced Manufacturing of Pharmaceuticals, Purdue University, https://younginstitute.research.purdue.edu/collaborative-accord/.

TRANSCRIPT

Opening Remarks by Stephen Ezell

Stephen Ezell:

Well, good afternoon and thank you for joining us today for this event on Making Medicines in America; How Congress Can Help America's AI, Biopharma, and Manufacturing Universities Make it Happen. The event is co-hosted in collaboration between the Information Technology and Innovation Foundation (ITIF), Purdue University, and NIPTE, the National Institute for Pharmaceutical Technology and Education. I'm Stephen Ezell, the Vice President for Global Innovation Policy at ITIF as well as the director for ITIF's Center for Life Sciences Innovation. And I'll be your MC for the day.

Well, it's a vital issue of both U.S. national and economic security that we begin to manufacture more medicines in the United States. And that includes everything from active pharmaceutical ingredients, APIs, the key ingredient in a drug that makes it work, to generic and innovative drugs alike. That's especially true given that over 70 percent of APIs are currently made overseas with China increasingly dominating key supply chains for these vital inputs and drug shortages of key medicines already becoming a major challenge America is having to grapple with, with over 320 drug shortages last year alone.

It is imperative that America tackles the challenge of making more medicines in the United States foremost and principally through technological innovation. Now, the good news is that a wave of digital innovations, such as artificial intelligence (AI), are enabling totally new approaches to manufacture APIs and drugs in the United States more sustainably and cost effectively. In particular, these new technologies could disrupt the historically dominant batch manufacturing processes used to make APIs with less-capital-intensive, more environmentally friendly continuous manufacturing processes based on flow chemistry and AI. But that's what people who are much smarter than I are going to be talking with you about today.

So our run of show is going to go like this; we are going to have an opening keynote from Dr. Monique Mansoura who will lay the intellectual and theoretical groundwork explaining why it's so critical that we make more medicines in America as a matter of U.S. health, national, and economic security. We will then turn the discussion over to an expert panel led and moderated by Purdue President, Mung Chiang. That will include Dr. Andrew Carpenter, Chief Scientific Officer of Phlow, Dr. Manish Oza, the Chief Medical Officer for Google Public Sector, Dr. Elizabeth Topp, the director of the William D. and Sherry Young Institute for the Advanced Manufacturing of Pharmaceuticals, and Bill Young, a Senior Advisor to Blackstone Life Sciences.

Following the panel discussion, we'll have a keynote address from Senator Todd Young and then one from David Ricks, the CEO of Eli Lilly. Following that, we'll ask the panelists and key audience members to sign a historic accord indicating a shared commitment among these sectors of AI, tech, and manufacturing to onshore critical medicine manufacturing in the United States of America as a matter of our health and prosperity. So with that, let me bring up to the stage Dr. Monique Mansoura. She is a globally renowned and well-respected strategic advisor on critical issues at the intersection of biotechnology and the US national economic and health security base with a focus on US competitiveness and sustainability of the biotechnology industrial base.

For the past eight years, she had served as the executive director for Global Health Security and biotechnology at the MITRE Corporation. Before that, as the global team leader for Novartis Vaccines. And before that, with the government at BARDA, the Biomedical Advanced Research and Development Agency. Monique earned her PhD in bioengineering and MS in human genetics both from Michigan University. So Monique, we welcome you to the stage. Thank you, Monique.

Opening Remarks by Monique K. Mansoura

Monique K. Mansoura:

Good afternoon. Stephen, thank you for allowing me to be a part of this program on this historic day of signing the collaborative accord and thanks to ITIF, to Purdue University, and to NIPTE for your organization sponsoring this important event, and to all of you for being here. You'll see on my title slide, for those familiar with Greek mythology, Janus, the God, looking forward and looking backwards. And that's part of what we'll do today. I think in order to understand how we move forward, what I'm going to try to do very quickly in these 10 minutes is explain a bit of my long view over 25 years in this space of making medicines from multiple perspectives, from the government, my beginnings at NIH as a postdoctoral fellow working on drugs for cystic fibrosis, to post 9/11, working for the government's drug development arm at the Biomedical Advanced Research and Development Authority, BARDA, and how we make medicines to protect this nation and its people from high-consequence events. Then to my work then at Novartis.

And bringing all that together in a way that's meaningful and sheds some light, opportunities, but also cautionary tales as we move forward. One of the things I think about often: we think about critical minerals and all of those technologies critical to our national and economic security. Biotechnology and medicines has been fighting for a couple of decades now to position critical medicines on par with critical minerals as critical to our national and economic security. I think that's imperative at this point. And we'll talk about how we can all work together to get us there.

I also think it's important to think of this space in four dimensions. Obviously, the science and technology is key. And as a scientist and engineer, I get super excited about what we're going to hear about, the promises of biotechnology and AI and the convergence of those two platforms. Also critically important is the regulatory environment. Again, we heard some interesting and really important news from the White House this week and I'll talk a little bit about that. But also it's the policy. And I think again, when the White House is talking about this issue is critically important.. It puts it as a priority policy issue for this country. And finally, and what has really been challenging for much of this space has been the business model side, the financing side, the economic side. And we'll hear about the opportunities and challenges in that space today. So let's get into it with the next slide.

I want to take 10 minutes in answering sort of the questions in these five domains. Am I controlling this? The first question is why? And I just mentioned this a little bit. Why manufacturing medicines is a national security and economic security priority? Where do we stand? Again, where have we been? What have we learned in the cautionary tales that I and the ecosystem has encountered over the past two, three decades? How do we seize the opportunities and when do we need to act? The short answer is now. As I mentioned, one of the real genesis stories for me and understanding how important it is to make medicines and the convergence

with national security was in the wake of 9/11 and the anthrax attacks. And realizing that the manufacturing of medicines was going to be critical to the protection of our population.

The threats were real, we were vulnerable and we were not ready. And so lessons learned from being one of the first leaders in the biomedical research and development authority, BARDA, and what it took to develop and make available medicines. Again, much of that work then, all of us very familiar with the COVID pandemic. But that was two decades of work, of establishing a program and a priority in working with industry. Again, all of these products are made by industry. So we have to figure out what that model looks like.

The other point I want to make, when we're talking about making medicines is that there are two very distinct industries and it's really important within the ecosystem of making medicines. The first is the generic medicines. And what you see in the graphic there is a really stark differentiation. So 92 percent of prescription medicines are generic medicines. These are the off-patent, relatively low cost, or very low-cost medicines. 92 percent of prescription medicines. On the other hand, drug spending is consumed 90 percent or more by the branded medicines, which are less than 10 percent by volume. So it's important to keep those distinctions in mind. When I was at MITRE talking to a leader in the government about... They were talking about public-private partnerships. I said, "Why is it that we're talking about an HHS, public-private partnerships and the Department of Defense has an industrial base?" That has to be fit for mission and is viewed, certainly as partnerships, but it's an industrial base.

And that framing of the industrial base nature of how the government and the industry and academia and the public need to be a part of this ecosystem is a really important framework that I strongly advocate. All of the risk archetypes are the same in all of the defense industries as they are in biotechnology. The other key element, again, when you merge the worlds of health and the cultures of health with that of national security, what we found very often and was written really eloquently over a decade ago by Ken Bernard about the culture clashes. So what I've found in my space and my experience over the last 20 years is we tend to fall between the cracks of both of these ecosystems.

National security doesn't see medicines and biotechnology as a high priority. And the health ecosystem doesn't see national security as an easy fit or as a appropriate framework. So it's important to keep in mind these very different perspectives. There's almost a cognitive dissonance to think about strategic competition through the lens of health, where we are trained to provide medicines for all, to be the medicine cabinet of the world. To look at this industry through the lens of strategic competition is often uncomfortable. I think the other issue there is, how do you win a war that you don't even know you're in? When we're starting to talk about this competition in biotechnology, it's a non-kinetic war. And really engaging the community in a way that understands how important competing and winning in this critically important is. And that was a major theme of the groundbreaking report from the National Security Commission on Emerging Biotechnology, and we look forward to hearing from Senator Young this afternoon.

So when we talk about the generic medicines, there's a couple of key issues. As Stephen mentioned, the supply chains are largely dependent upon critical components, active pharmaceutical ingredients, key starting materials, excipients from China or India. And that creates a strategic vulnerability for this country. So I'll just cite some of the facts. The overdependence, again, is an enormous vulnerability. It's not one or two medicines, it's hundreds

of medicines. We saw a record number of shortages last year, 323. 72 percent of FDA-approved sites are outside the US. There are 11 drug shortage lists. That's not helpful. We need to prioritize. We really need to understand what are the most important drugs as we look to re-shore. The reimbursement policies create, and the intermediaries, create a race to the bottom driving prices below a market equilibrium. And drug makers lack the incentives for both regulatory, economic, and market factors. "There's a very high cost to low-price medicines," as Tony Sardella says.

There's proposed solutions. I don't have time to go into them there, but folks like the API Innovation Center in St. Louis led by Tony. NIPTE, the Association for Accessible Medicines. All of these organizations, Marta Wosinska, has studied this problem and well-documented both the issues and the proposed solutions. When we think about the branded medicines. Again, 90 percent of spend, but less than 10 percent of volume. Last year was a pivot point and a very uncomfortable wake-up call. Congress introduced the BIOSECURE Act, which would have prevented the U.S. government from spending money on entities including companies, contract manufacturers, that make medicines and are linked to the CCP or the PRC. When BIO, the industry organization, did a survey, they found that 79 percent of their members were dependent on this company. This is not a small number. 79 percent of BIO's membership was dependent upon companies that were owned or controlled by the Chinese Communist Party.

It's going to take a lot to pivot. It's not going to be fast, it will take time. I had the privilege of visiting an exciting new company in Oklahoma City, Wheeler Bio, this week about what leaders are trying to do to establish U.S. manufacturing and close that gap, replace these CCP-owned companies with U.S.-based operations. Again, I don't have time to go into it, but the moment is now, the story at JPM in January of this year was really the extraordinary trajectory of deal-making that is happening with assets coming out of China and with sort of the ecosystem of biopharma companies. Again, not a small number. The time is now. This change is happening in this moment in history.

There's a report this year, the annual threat assessment from the US Intelligence Community really noting the foreign dependency, China in particular, that we have on our medical supply chains as a critical and priority issue for the Intelligence Community. Some of the work I led when I was at MITRE really focused on this issue through the lens of strategic competition. Again, no time to go into it. The references will be available to you. But we really looked at the problem. We took a high-value technology and said, "What would happen if we didn't control this asset?" And came up with a 10-point action plan working with leaders from government, industry, academia. So I really encourage you to take a look at what the team came out with; policy objectives, program objectives, and the critically important financing objectives.

Very excited, as I mentioned, the report that came out just a few weeks ago from the National Security Commission on Emerging Biotechnology. Critically important, very much places a lens of strategic competition and the incredible importance of biotechnology as a platform that it is critically important that the U.S. retain its dominance. It was invented here, but maintaining it is going to be a real challenge.

Finally, I want to end with this executive order released from the White House and this statement by the president, "My administration will work to make the United States the most competitive

nation in the world for the manufacture of safe and effective pharmaceutical products." So I'll leave you with that. Let's make that happen. Thank you.

Stephen Ezell:

Well, thank you so much for that great presentation, Monique, and really helping us understand why this is so vitally critical as a matter of both US health, economic, and national security. So with that, why don't we ask our panel to come up to the floor. And I do want to note that my colleague, Sandra Barbosu, wrote an absolutely wonderful report asking the question, "How Innovative Is China in Biotechnology?" The answer is far more than we've generally assumed. China has seen its share of global manufacturing value added in the sector rise fourfold over the past 15 years to 25 percent. China is every bit as serious a competitor in biotech as it is in sectors like electric vehicles.

So this panel is going to be led by Dr. Mung Chiang. He is the President of Purdue University and a leading expert in engineering and technology policy. In 2020, he served as a science and technology advisor to the U.S. Secretary of State under the Trump administration where he launched several technology diplomacy initiatives. He has been widely recognized for advancing academic research and innovation ecosystems in the US and abroad. He holds PhD and MS degrees from Stanford University. Dr. Chiang, I'll turn the panel over to you. Thank you so much.

Expert Panel Discussion Moderated by Mung Chiang

Mung Chiang:

Delighted to be here. First of all, thank you very much to the co-organizers, to Purdue University, including ITIF and NIPTE. It takes a lot of teamwork. We've got a fantastic team here. And I also want to acknowledge many of my great colleagues from Purdue, including Alina, Liz here on the panel as well, for creating this outstanding proposal to become, I hope, a Manufacturing USA institute of AI-based making medicine in America here. And indeed, at the cross section of three things. Well, making medicine, making medicine in America, and using AI to make medicine in America. Perhaps there's something relatable between using AI and finally doing it again in our own country, between these two themes here. And it is the foundation of national and economic security.

Before I introduce the panelists here, I first need to do a quick commercial for Purdue. You cannot click through this. I'm paid to do that. But I'm proud to say that Purdue cares deeply about national economic security, excellence at scale and creating jobs and workforce innovation together, especially along America's hard tech corridor between Indianapolis and West Lafayette. And we work on all of the above with great industry partners. For example, just yesterday afternoon, Eli Lilly and Company and the CEO, Dave Ricks, will take podium momentarily unveiled, or did a ground breaking of their medicine foundry. And that's phase three of a total of already more than 13 and a half billion dollars of manufacturing of pharmaceutical products in the heartland. And with Bill Young Institute, and Bill is right here, a legendary figure in the industry. And with the Institute for Physical AI, we are looking at how health and AI can work together. And overall, with 58,000 students, top 10 public university, the list goes on. I'll pause here.

We've got a great panel here, including Andrew, who's going to tell us a bit more about your manufacturing insight, starting perhaps with a bit of the COVID-19 story, how you ramp up the

manufacturing, your company. Manish from Google, to tell us a bit more about Google as a tech giant, thinking about making medicine with AI. Our very own Liz Topp, who's also expert in curriculum coming out of NIBRT, and you spend some time as the Chief Science Officer over there in Ireland as well. And then back to a great boilermaker, Bill Young who has seen a lot of movies over many decades, from Eli Lilly to Genentech to now Blackstone, and tell us a bit more about why now is a bit different. And from there, we're going to continue diving into the key themes of the accord. Turn it over to Andrew.

Andrew Carpenter:

Thank you very much. So Phlow became an entity in 2020 when we were awarded a big contract from the Biomedical Advanced Research Development Authority, US government, to really provide a solution for drug shortages for essential medicines. And I think that was just one of the pieces, but one of the starts. And now five years later, we've seen a lot of momentum and a lot of things happening. We recognized early on if we're going to compete in the space of essential medicines that are largely low- to no-margin generics that you have to use advanced manufacturing technology. So we focused very heavily on flow chemistry, or continuous processing, automation, and now more recently, artificial intelligence. And I can give a couple of examples of what we're doing right now in development. We just kicked off a pilot project where we are combining a proprietary chemical reaction data mining with an AI algorithm to help speed process development. And then on the manufacturing floor, we're currently implementing a manufacturing execution system that's AI-powered that should really help us with flexibility, enhance productivity, as well as ensure quality and scalability.

Mung Chiang:

Thank you, Andrew. Manish, please.

Manish Oza:

I'm frequently asked what excites me the most about the intersection between AI and medicine and the manufacturing industry and the drug industry. And one of the reasons I joined Google was today, as many of you know, the process of developing a drug can take many years, if not 10 plus years. Now, with the advent of AI, we truly believe that we will be able to accelerate that process in partnership with many of the people you see on this panel. From some of the risks that we worry about as an AI company and Google are security and privacy. When you think about the information that the drug companies have, they've got PHI, personal health information, they've got information about the clinical trial, and obviously they've got information on the drug that they're manufacturing.

Now, it's our job to work with them as we harness the power of AI to keep that information very secure. Cyber threats are real. We read about them on a regular basis. Malware is real, ransomware is also real. So that's the job of a security company to make sure that we're accelerating everything we can do with AI, but also make sure that we keep things secure here in the homeland.

Mung Chiang:

Thank you, Manish. We'll come back to that theme indeed in a minute. Liz, please.

Elizabeth M. Topp:

Yeah, thanks everyone. And it's great to be here, President Chiang, and to serve on the panel. Sometimes I'm asked, "As the Young Institute, what is it that you are and what is it you want to do?" And you heard President Chiang talk about Bill Young, and I'll embarrass him by talking about him here. So you may not know, those of you who aren't in the pharma space, you may not know who this is. So in the pharmaceutical world, we have small molecule drugs and we have large molecule drugs that are the result of biotechnology. The biotechnology revolution goes back to early drugs in this space, and one of them was called Humulin, a recombinant human insulin. You may remember, your grandparents may remember, that before we had recombinant human insulin, diabetic patients got insulin from pigs and cows. That's how we treated diabetic patients.

Bill graduated from Purdue and went to work for Eli Lilly for about 14 years and then took an offer from a startup company in California called Genentech. It was a startup then, it's not a startup anymore. And he and his team at Genentech developed the manufacturing process for Humulin that launched the biotech revolution in the pharmaceutical industry. And it's why we have biotech drugs today. They're about half of the pharmaceutical market and we're super excited to have them. Some of the most innovative and effective medicines we have are in that space. So when people say, "Liz, what is it that the young institute wants to do?" Well, we want to do that. No, we don't want to do the revolution that Bill did because that revolution has already been done. What we want is the next revolution in pharmaceutical manufacturing that will create the next series of innovations that we can only barely imagine now. We are here today because we think AI may be that revolution, that we may be on the edge of the next revolution in pharmaceutical manufacturing, and AI may be a really big part of that.

Mung Chiang:

Well, thank you, Liz. Now, Bill, do you want to refute anything that people said?

William D. Young:

No, that was a lovely description of what went on. And also the fact that the institute we created at Purdue is going to carry that mission on. I think that's going to be fabulous. Just to take you back for a second to the early days of biotech, we didn't actually know how to make anything. The molecules were all new, the technology was new, and what we had to do at Genentech was pull together all the various disciplines that we were going to need, we tried to get them from experienced engineers, biochemists, molecular biologists, microbiologists, to be able to put those processes together. And it was largely a pretty trial and error process. We would do it at small scale, then we'd take it into the plant, do it at large scale, figure out what was wrong, take it back into the lab again. But none of these processes existed. We only had them at lab scale. We didn't have them at full scale.

So that process went on for a number of years at Genentech, not only developing products from bacteria, which insulin was, and human growth hormone was one of them, but then moved into mammalian cell products, much larger, more complicated molecules like TBA and a number of products for oncology that Genentech eventually developed. But that whole process took a tremendous team of people to do, and the facility's support to be there. One of the things I worry about in this new iteration of bringing products back. We take antibiotics as an example, when I was at Lilly, they made penicillin after World War II. They made cephalosporins, basically

invented those. They had amino glycoside antibiotics. And all of my colleagues there knew all about how to make those. Most people are all gone, they're retired. There's some antibiotic production in the US, but most of it is ex-US. We want to bring that back, we need AI, we need manufacturing, we also need the expertise that we've lost. And so we're going to have to find a way to recreate that.

Mung Chiang:

Well, thank you. About AI helping medicine. So I want to be provocative because I was told by the organizers that, "Well, ask them tough questions." So I want to ask you, do you think that, are we just jumping on the bandwagon here and everything is AI this, AI that, or do you think that AI can indeed transform the viability of on-shoring manufacturing in this particular space to the United States again? And usually, it's either going to be cost efficiency and reduction to make it viable, or it's going to be about opening new high-margin innovation that makes you want to do it here because you are closer to the workforce and innovation sources. Maybe both, the cost equation and the revenue equation. So the question is, if you had to predict which particular segment or product market segmentation wise in the pharmaceutical manufacturing space, is it going to be among the first to benefit from either cost or revenue side by AI?

Andrew Carpenter:

That is a good question. I'm going to say the cost side. As we're moving from essentially paper to digital and we can start to integrate systems and learn from those and be just more efficient, I think we'll be able to reduce our operating cost faster than we'll see on the revenue side.

Mung Chiang:

Manish.

Manish Oza:

I would agree with Andrew. We've got a very complicated process. You've got multidisciplinary teams, you've got biologists, chemists, pharmacists, clinicians, multidisciplinary engineers. I think AI can accelerate the process. Again, we spoke about the process taking many, many years, 10 plus years, producing drugs with potentially a high failure rate that have the potential to not make it to clinical trials or even potentially to fail in clinical trials. I believe AI has the ability to predict over time which drugs and the rate-limiting steps in the manufacturing process so that we can lower that failure rate, we can decrease that R&D time, which is many, many years. And then ultimately, from a clinical perspective and as a physician, one day have a disease-free society.

Elizabeth M. Topp:

I'll take a turn. So I think it's a really interesting question and I'd like to put the point on really why we're here. So the answer to that is: what is it AI can do for pharma? Right now, AI is extensively used in the discovery space and is really helping the industry more rapidly identify new types of molecules and new kinds of things that we maybe wouldn't even have expected from our best medicinal chemists. Well, then the question is, well, why aren't we already using AI in pharmaceutical manufacturing? Why aren't we already using AI in development further downstream from the discovery space? And the answer to that question is that we need to engage government in those things, so we won't be able to have AI methods in pharmaceutical

manufacturing unless those AI methods are approvable from a regulatory perspective. So unless the FDA and other regulators are able to say, "We accept this as a way for you to manage your manufacturing process," then it's game over.

And my colleagues and I, we're nerd science folks. We like nothing better than the idea of going back to the lab to do new stuff, but we recognize the critical importance of the government interface in anything we might try to do to advance AI, and that's why we're here today.

William D. Young:

I agree with that. I think FDA is working on an AI policy, but there's a little bit of chaos over there these days and I'm worried that they'll actually get that policy done. Also, that they'll look to industry to help input what's in that so that at the end of the day we get a very useful policy, and it's upon all of us to be sure that we interact with them to the degree that we can to make sure that happens. And it can't take 10 years because AI is on us. I think I'd turn the question around a little bit. I think AI is going to be useful in manufacturing is probably absolutely critical to bring products back [by] using it. If we can't be cost-effective, we can't compete with low-cost countries. So we've got to be a lot smarter and we have to have a lot more automation. We have to have robotics and we have to have plentiful use of AI. So we have to do that.

Mung Chiang:

Well, speaking of agility and government policies, before we welcome Senator Todd Young here momentarily. Well, what's your evaluation and assessment of the president's EO from two days ago in terms of FDA and EPA deregulation?

Andrew Carpenter:

Well, from a regulatory standpoint, that certainly will help to have alignment within the government agency and those companies that are bringing forward processes because without that, we can't get things approved, we can't make medicines to serve the population. So I think that's key. I'm not sure how I would answer the second part.

Mung Chiang:

Yeah, I'm going to have to shift so that we don't always start with Andrew here. Just by the mere fact of physical proximity, you always get the first draw here. So I'd love to hear the other panelists view on in particular the realignment of the FDA and some of the EPA policies and procedures to speed up, to accelerate, manufacturing of medicine in America.

William D. Young:

I think it's a positive step. We'll have to see how it plays out. But regulations can add many years to constructing the new facility. You have to build it, but then you have to go through all the qualification, then you have to get it approved, and when you add up all the regulations involved, that can take a long time. One of your questions was, "Would success be here by 2030?" Probably not if we operate under our normal timeline. So this has got to help the process, I think.

Mung Chiang:

Anyone else?

Manish Oza:

I would say the policies have to be in place and the FDA has to continue to do what it has been doing, but we have to accelerate the process. I don't want to be repetitive, but we can't wait 10 years for the next blockbuster drug. And we can't just fall into a class of drugs being a blockbuster. We've got to be proactive. We've got problems in the clinical space. We have multi-drug resistant bacteria that as an ER physician and a clinician, we worry about that because when does the day show up where a bacteria is no longer responsive? Those threats are real. So whatever we can do to accelerate the process, again, embracing AI to predict how mutations in viruses and bacteria will cause resistance and propagation, these are the types of things that you can harness AI for. AI also can give us 3D dimensional structures, which is new. In the past, we were highly reliant on chemists. So again, AI is the future. It's important for us to embrace it. And I think I'll stop there.

Elizabeth M. Topp:

I'll just add a little educational bit for those who might be listening who aren't familiar with the pharma space. And I think all of us who are citizens in the US know that our medicines are regulated and that we get medicines that have been approved and have been checked. What I think many of us don't realize, or many of my family members don't realize, is that it's not just the final product that's regulated. It's every step of the manufacturing process. And so changing anything, changing how we regulate them, streamlining how we regulate them, and how those manufacturing steps might be able to be scrutinized while maintaining safe medicines is super important because we're not just looking at the end thing. All the steps along the way are also regulated.

Mung Chiang:

Well, I'm going to ask two more questions. This one actually can be much better asked by real experts such as my colleagues, Alina and Liz. When they, in a few moments time talk about the six accord elements that were generated and approved by more than 100 industry partners of this consortium. But the question is, two of the accord elements talk about a geographically distributed network of manufacturing capacity in the United States for resilience. Another one talks about a further element of agility in the different timescale here, the real-time quality control and adaptation, which can be also one of the unique benefits of AI. So I'd love to pick one or both of these two elements, hear from the panelists your view on the resilience and the agility due to geographic distribution and real time control elements.

Elizabeth M. Topp:

I'll take a stab at the geographic distribution part of it. So one of the things that I think is really very interesting about pharmaceuticals and pharmaceutical manufacturing and that also I think many of us don't realize is that there aren't little pill factories that live in one place that chunk out the medicines that you get. That the manufacturing of pharmaceuticals, the ones that we take all the time, is a very highly geographically distributed thing. So it's manufactured in multiple different steps and those steps take place all over the world. And so it's not as if the simple idea that we can onshore pharmaceutical manufacturing by moving the pill plant from India to Indiana is a little bit naive because there's so many different pieces that go into that. It's like moving a spider web. You're going to move one node of the spiderweb and it's not going

to be quite that easy. So I just offer that as a little moment of understanding how is it that pharmaceuticals are manufactured.

I also, from all my years in the College of Pharmacy want to point out there's another interesting interface and there's an interface between manufacturing and dispensing. So the ultimate distribution of many of our prescription medications happens not at the end of manufacturing, but in our pharmacies. And so we can start to think about that part of the network as the end of the train. And in many cases, like for radiopharmaceuticals, the very last step of manufacturing really is something that happens at the point of administration, at the point of distribution, very close to the patient. So we can start to rethink how those things happen too.

William D. Young:

I think in the new field of cell therapy and gene therapy, a lot of the similarities to the logistics of radiopharma are also present there. You have to get cells from the patient, you have to get them processed, you have to get them back. There's a big logistical hurdle to do that, and that's still a developing field. Some people may wonder why biotech started in Boston and San Francisco. I think it's because we had academics there. We had a very high quality of life, good business climate back in those days, and really everything in the venture capital world was there. And so you could finance companies, you could get them started, and you could build a business there. Nowadays, I think they can be anywhere. As long as you have a good business climate, you have a workforce that you can hire and train, and you have a good quality of life for those people, it can be pretty much anywhere in the United States. It doesn't have to be in those locations.

Andrew Carpenter:

Yeah, I'll say for the distributed networks, I think they have a great advantage. These point-of-care systems can really react very quickly, at a hospital, at a pharmacy. But it's all predicated on having control of the entire supply chain. So we can't forget that. We have to go all the way back to the building blocks because as we saw from Monique, most of that is not manufactured here in the United States. It's really mostly in China. And I kind of have to turn this a little bit on its head, that question, about distributed networks, because while Phlow believes that's very important, we also believe that you need to stockpile the more stable form of the medicine, the API. We've created the first strategic API reserve, so we could do that, and ensure that we have a buffer or safety stock of API that we can rapidly convert in case of a public health emergency. So there's probably a lot of both of these systems that you want to use to ensure that you have adequate supply.

And then lastly, with respect to your question, we have to move more toward real-time release during manufacturing. It just speeds the process up. If you can do that, it demonstrates that you have control and quality of your process. So in many ways it demonstrates that you're being successful and you've achieved something versus the traditional having to test and test and test everything and then claim quality. That's really testing after the fact and not during the process.

Manish Oza:

So I would add we have a decentralized process today. And the question becomes do we centralize everything? And do you make everything here from soup to nuts? I don't know the answer, but here's where AI can start to help guide manufacturers. Are there elements that it's okay to be made offshore and then at some point you bring it here? Or is it more efficacious to

bring everything from soup to nuts? I don't know the answer, but here's where AI can start to guide the manufacturing process and then hopefully accelerate the process over time.

Mung Chiang:

Well, thank you. And you all mentioned the supply chain. One of the key supply chains is that of human talent and the workforce needed, for example, recently in conversation with Dave Ricks, CEO of Eli Lilly and Company. So Dave, Eli Lilly and company is now the largest by market cap medicine company in the world. And you've got a glorious history, even more glorious future here. You're investing tens of billions of dollars to make medicine in America, probably with AI. But who are you going to hire? You have all kinds of positions from technicians all the way, and are we producing enough in American universities those who can help with different stages of making medicine in America again?

So I'm going to throw this last question here to the panelists and ask, what do you think about the workforce needs? I heard a statistic that says a hundred thousand new engineers and technicians are needed in the space in the next five to ten years for this to work out. You may have heard different numbers. What kind of talents are you looking for? Why don't we start with Bill this time as promised and work our way back then.

William D. Young:

I think it's a broad group of people. We're obviously going to need people facile with computers and with the AI technologies, we'll need engineers, we'll need basic science people to do all of this and staff those facilities. And people that are used to working together as teams, because a lot of this is a team sport, to be able to put these processes and plants together. So Purdue will, I think, play a big role in providing a lot of those people.

Mung Chiang:

Well, I have to agree with you on that, Bill, yes. Maybe some other universities too. Yeah. Liz, please.

Elizabeth M. Topp:

Yeah, I'll weigh in. So we're not in the business of hiring those people, but in helping to train them. And in the Young Institute and elsewhere on the campus, we're having lots of conversations about how we might do that and how we might do it better and faster. I work with NIBRT, National Institute for Bioprocessing Research and Training in Ireland, and they've done a phenomenal job of bringing the biotech workforce in Ireland up to speed. There's a lot we can learn from them. And, Mung, I have to say that just over the last couple of days, President Chiang has an initiative on the Purdue campus to have us write more books. And so in the spirit of faculty everywhere, we've had a conversation, Garth and I just yesterday, over lunch, what is a book? And so perhaps we can have AI-enabled books that have a faster entry of the student into deep technology by just re-imagining what a book is.

Mung Chiang:

Thank you. Manish.

Manish Oza:

President Chang, you and I, before we were talking about how do we accelerate the next generation of physicians, chemists, biologists, engineers, and I think we talked a lot about AI and manufacturing. But there's a big role for AI in education so that we can produce more physicians, more biologists, there's a shortage of talent, and we need to accelerate the next generation of physicians and clinicians and chemists and biologists so that they can help us with, again, the ultimate goal to have a disease-free society.

Mung Chiang:

Thank you. Andrew, you can have the last word.

Andrew Carpenter:

Thank you. Yeah, so at Phlow, we are growing, so we're looking for these types of professionals. And it's just not the traditional engineers and chemists, now it's data scientists, computer scientists, data analytics, folks who have an entrepreneurial spirit. And so it's just not the traditional professional anymore, and we need those folks trained and we need the high professionals, but we also need the folks who have technical skills to be able to operate high-tech equipment as well.

Mung Chiang:

Well, this has been a fantastic panel. And I know we've got two keynotes coming up, starting with Senator Todd Young from the great state of Indiana, a fabulous leader for the country, and a dear friend. But I would like to thank all the panelists here for this outstanding conversation. Thank you so much.

Andrew Carpenter:

Thank you.

Stephen Ezell:

And I just would like to add, thanks to the panel, and to Senator Young for being a tireless champion for US science and technology. Of course, being a leading architect of the CHIPS and Science Act. Has also been a tireless advocate for restoring pharmaceutical manufacturing, especially being the chair of the National Security Commission on Emergent Biotechnology, which released a report last month I understand. Three time in the House representatives and a former Marine. Senator Young, thanks so much for being here today.

Remarks by Senator Todd Young (R-IN)

Todd Young:

Thank you. Yeah, thanks for having me. Well, it's so good to be with all of you. It's nice to learn that President Chiang has been encouraging members of the Purdue faculty to write more books. I've been encouraging members of Congress to read more, so perhaps we can connect the groups together. The last two years of my life I've been, among other things, chairing a commission. It was referenced in my introduction, the National Security Commission on Emerging Biotechnology (NSCEB). And we have, through the course of our many meetings and hearings and site visits, received all sorts of input from experts in AI, biopharma and manufacturing, and provided some

recommendations to members of Congress based on our findings. But for a number of years as US Senator for the state of Indiana, which is home to one of the nation's leading life sciences makers, I've heard frequently from some real experts in the field that we need to up our game in pharmaceutical manufacturing in this country.

They see what I now see [that] in the near future, the power of medicines profoundly transforming our society and our life prospects. They see a future in which doctors don't just treat disease, but in some cases wipe it out entirely. Where medicines are created, developed and produced with greater speed, improved efficacy, and fewer side effects. It's useful to remember just how far medical science has come over the last 100 years. Technological advancements and biological discoveries, particularly during the middle of last century, have yielded medicines that cure previously untreatable diseases and help people live longer, healthier lives. Some proof of this is found in the fact that each year over 60 percent of Americans fill prescriptions, but many of the active pharmaceutical ingredients in these medications are made overseas, particularly in India, but increasingly in China.

Reliance on other nations for critical components of life-saving medicines can be risky. As we witnessed during the COVID pandemic, our supply chain is very vulnerable, not just as it relates to APIs, but numerous other areas. Our minds are now focused. In the event of a full-blown trade war or military conflict with China, conceivably, manufacturers would be unable to produce and millions of Americans would be without medicines. This is the reason presidential administrations of both political parties have sought to encourage the re-shoring of pharmaceutical manufacturing with a range of strategies from federal investments to tariffs. The rise of AI and biotech gives us yet another means of re-shoring pharmaceutical production. You know well the costly and lengthy process by which new therapies are produced and the small number of them that reach the market. The improved efficiency possible with machine learning algorithms opens the possibility of reduced costs in a streamlined development process, streamlined production and increased savings create opportunities for manufacturers to re-shore development. In some cases, the means for doing so already exist and only need to be tapped. We're seeing much of that already.

There are, however, numerous underused or idle plants, which we are told could be used to produce an additional 30 billion doses of medicine. The happy news is we're making progress. In fact, this week I was very encouraged and it caught interest here in Washington DC and well beyond, that Eli Lilly broke ground on a new foundry in central Indiana that will use AI platforms. I see Dave Ricks in the front row finally having graduated to a leadership position at Purdue University. This is part, Dave, of a $13 billion investment in the LEAP Research and Innovation District, the single greatest investment in API production in American history. We are so grateful for that, Dave.

Of course, the United States isn't the only country that's making significant investments. China has made biotech a strategic priority for over 20 years. Under President Xi, the Chinese Communist Party has led an aggressive campaign to develop the most cutting-edge biotechnologies and to translate those gains into military and economic power in various ways. That strategy is now paying off in various ways. China is making breakthrough after breakthrough, and now dominates the biopharma supply chain. Just this year, they created the first fully AI-generated prescription drug. China is investing heavily in gene editing, bionic robots, human-

machine teaming, and biomanufacturing. And it's targeting those technologies for defense applications, which is really the primary focus of the National Security Commission on Emerging Biotech.

But the biotech race is not over, even though our window to act is shrinking. NSCEB has offered our primary recommendation that the US government should dedicate targeted resources over the next few years to unleash private capital into the industry and win the biotech race. We want to enable America to innovate faster. And to do so, we need to harness America's tremendous strengths. Our private sector is, and will remain, the envy of the world. And our capital markets are four times larger than China's. But we must make it easier to get innovations out of the labs and into the factories and create a regulatory and business environment that enables us to commercialize and scale the best ideas. So the US government needs to prioritize biotech as a holistic field, including by mobilizing the private sector to unleash the power of American innovators. And this, I am confident, will help in the much-needed on-shoring of pharmaceutical manufacturing. Thank you so much for allowing me to say some words today, and I hope that you enjoy the rest of your time here. All the best.

Stephen Ezell:

Thanks so much, Senator Young. We appreciate you leading the charge on Capitol Hill to make these investments. All right, we'll now have a keynote presentation from David A. Ricks, who is the chair and CEO of Eli Lilly. He has led the pharmaceutical firm since 2017 through a period of significant R&D expansion and innovation in areas such as oncology, diabetes, and neuroscience. A 25-year veteran of the company, Ricks previously served as president of Lilly Biomedicines and led international operations across the world in countries such as Canada, China, and the US, giving him a uniquely global perspective on pharmaceutical policy and marketplaces. He has been a tireless champion for re-shoring drug and manufacturing to the United States. Thank you so much, David, for being with us today.

Remarks by David A. Ricks

David A. Ricks:

Thank you. Thank you so much. And to all my Purdue colleagues here, thanks for having me. It's great to have Purdue host a forum like this. Of course, we have Senator Young from Indiana who's a great champion for technology in our country and its importance for economic growth, but also for national security.

Maybe we don't always think of Indiana as the home of biotechnology and the pharmaceutical sector, but we should. As Mung mentioned, the largest drug company by market cap, soon by revenue, in the world is based there. Purdue is based there with a world-class pharmacy school, chemical engineering, and many other attributes with supply workforce. And actually, the project Bill worked on making human insulin from the cells of bacteria was the first approved biotechnology product in the world. Where was that made? In Indiana. So really it's an important topic for our local economy, but also the heartland is where medicines are made and also invented.

I'd like to maybe just frame my comments today by going back to the first presenter because there's kind of four topics that get intermingled here. One is the innovation that will be our future in medicine. And that's a very important topic. AI plays a big role in that. Who will invent

those medicines and where will they be made? I think that's an important question. Then we have the innovative medicines of today, Keytruda for cancer, or Lilly's Mounjaro for weight management and diabetes. And the national security implication that comes up is often, what if we didn't control that and what kind of national crisis would there be if suddenly the flow of those medicines were stopped? Fortunately, we have more control over that than maybe we might believe.

It was also mentioned about the generic business. Which is these are the medicines of yesterday. Almost all of them invented by America's biopharmaceutical companies, but have lost their patent life and become commodities in the healthcare system. And to my eye, [they] are the best deal going in all of healthcare; they're really cheap and quite abundant. They're not made in our country, primarily. They're made in other countries. India is the largest supplier, friendly-ish. China is a growing supplier. There's a fourth topic which needs maybe a separate symposium, which is the inputs to those things physically, which are precursors and basic chemicals. And these are not just for our industry, they also serve crop protection, animal health products, other such industries. And those are almost entirely dominated by China. And it moved there over 40 years with our EPA policies here, and they got good at making those. That's important as well because without the bricks, we cannot make a house. And China makes the bricks of medicine. So maybe a future symposium can focus on that. It's not the pharmaceutical industry, it's actually the fine chemistry industry that we need in the audience for that.

So as was mentioned, yesterday was a big day for us. We launched the Lilly Medicine Foundry. This is a building that will both make medicines for clinical trials, but most importantly develop the processes for tomorrow's medicines, turning test tube scale into factory scale. And we are excited to work with partners at Purdue and in other academic settings to really invent new IP, to create new types of medicines and make the current medicine types we have even more efficient and scalable here in the US. So a lot going on in the space. We're in the midst of a $50 billion capital expansion. I think our sector has, in the last 100 hundred days, no coincidence there, announced something like a quarter trillion dollars in new CapEx in the US. So I'll come back to that in a minute, and to tariffs. But the re-shoring is already happening for the medicines of today and the medicines of tomorrow. We still need to attend to the generic problem and the precursor problem, which are not necessarily being solved right now.

So I do believe, on those topics of innovative medicines today and tomorrow we're, at an important point as well, even though there is good momentum. One key question of course is, are we even in a competition here? Or are we still in the world of global cooperation? While it is true, I think Liz said, that supply chains are distributed, many, many companies, multinational companies moved production, really optimizing on efficiency. Is that the right variable or is resilience and security more important? I think we need to have clarity on that question and we can invest accordingly. Of course, if there is a competition with China, there's a broader question about how much state involvement do we need versus free enterprise? I think the happy answer in our sector may be different than the answer that was arrived at in CHIPS and science is, we don't really need a lot of state money, but we need an environment that supports our own investment and self-investment in this industry. Our industry is established.

We mostly invest in our own R&D to generate tomorrow's medicines, and we mostly invest in our own capital. We have access to capital markets and do extremely well in that regard. So it's really

about the rules of the road here. And of course we're here today with Purdue, there's a question amongst company peers, I'm sure amongst university peers. What is the role of our institutions? Do we have a national imperative along with an institutional imperative? I'm here because I think we do. And it is the surroundings of our country, whether it be the legal system based on the constitution or the talent and culture of innovation that we have here that allows us to succeed. So it's in our own interest to reinvest in that, but that is a debate that also needs to be settled, particularly in an era of economic competition.

Maybe a final question is, why are we talking about biotechnology? What are the critical technologies? And maybe if we're in a cooperation setting, we don't have to worry about that. But when we enter a competition, we best pay attention to this. Fortunately, China has been very clear about the areas they choose to compete with us, where they've moved from cooperation to competition. Hu Jintao gave a famous speech about 20 years ago, defining several areas. Those have been actually tightened up. And more recently in the Made in China plan, defined. And of course, number one is artificial intelligence, a topic today, semiconductors, EVs, renewable energy, telecom systems. Number six? Biotechnology. And you could ask, "Well, are they actually doing this? I don't often go to CVS and buy a medicine that says, 'Made in China,' on it." In fact, there's 2,000 approved drugs from the FDA that are innovative novel drugs. There's only four ever invented in China. And those have been approved over in the last three years.

So you'd say, "Is this really a problem?" Our industry moves slowly though, and we need to pay attention to the marginal inputs that are happening. And that paints quite a different picture. One marginal input is publication of new targets, new biologic insights, that lead to a molecule that could interfere with it. Well, in 2019, China published more new targets than the United States in biotechnology. 2019 [that was over] 5 years ago. And that was only the publications in English. Think about that. Last year, China filed more patents in the United States on new molecular matter for innovative pharmaceuticals than US companies. And this year there's a step called IND, Initial Drug Application, where you start a Phase 1 trial. China filed 30 percent of the US INDs. US companies like Lilly, Merck, and Pfizer, 35 percent. So at the margin, it's almost an equal race, if not already a major problem.

So that means in six or seven years, one-third of the medicines we buy will say, "Made in China." And these are not the copies, these are the essential new medicines we need to survive and live through cancers and other important conditions. Today, my company's famous for making a widely used weight loss medication, and it's booming. That's why we're building all these factories. Imagine if we were relying on China for that and the social disruption that could be caused? Or what about if we have a cure for Alzheimer's or certain cancers? This a national imperative. That's our point of view. And winning this race isn't just about new plants, it's about an ecosystem that supports R&D investment in this country.

So that turns me to the next topic, which is, what are those policy choices that need to be examined? If the goal is to win the competition and invest in, at least for today's innovation and tomorrow's, in a way that allows us to flourish and win? Well, one topic is healthcare itself. The market we sell into. And does it have favor on innovation and the things we need for the future? Unfortunately, the last decade and a half, really since the ACA passed, this has been dominated by a discussion about expanding insurance coverage, not really improving technology adoption.

And I think that's something that really needs to change. Not just drug technology, biotechnology, but AI technology as a service provider.

The history of efficiency is really one of productizing human services. We don't go home and wash all our dishes by hand anymore, and thank God. We have other examples where information technology has taken work out of the system. Yet, look at healthcare. Most of the service delivery is human. And most of the place we go to, we get in our car and we drive and get out of our car and go in a building. And that is the least efficient mode of service delivery in any part of our economy. We need to change that. More technology, more biotechnology is an answer. Another shift we need to make in healthcare is paying for prevention. Today it's roughly 2 percent of our national healthcare economy. And our healthcare economy, by the way, is the fourth-largest economy by itself in the world, just passed by China and Japan. So this is an economy. But what kind of choice is that? That doesn't make any sense. We should be paying for preventative therapies and vaccines for technologies and advice that keeps people well.

Taxes is in the air today. We're debating a reconciliation bill on tax. Why did production move overseas? It was primarily because of the tax code actually. When, in our industry, things are very difficult to invent, but pretty cheap to make that kind of industry quickly takes advantage of differential tax rates. And that's what our industry did, we moved to small islands like Ireland and Puerto Rico and small states like Singapore who lured us with 10 or 15 percent tax rate against a US rate of 35. It was basically economic malpractice to not move your production to these places because of the difference to your shareholders who you have an obligation to produce returns to. So now it's 21, it's pretty much okay now. I think you see things coming back to the US. There's talk of going as low as 15 for US production of our industry. I think that would really accelerate the repatriation.

What about tariffs? It's another kind of tax. Of course, and I think I was quoted in the [Wall Street] Journal today talking about this. We are much more carrots than sticks. Can sticks work in selective circumstances? Sure. But in the case of innovative medicines, it's not that there's idle capacity actually. Many of the technologies we need, which are more advanced, siRNAs, genetic therapies, conjugated medicines, these are factories not yet built. And so moving them to the US is not really a possibility. We have to build them in the US. And that is a three or four year undertaking. It strikes me as a little bit insane to say, "We'll tariff you next month so that you build a plant that's finished in four years." That's a difficult proposition. Rather, let's use the tax code to induce the right behaviors from the private sector.

And of course, there's also discussion about price controls. As a nation, we probably think of the drug industry more as a problem than a national treasure, but maybe it's a little bit of both. I think we need to do a better job of making medicines affordable to people, but that's about the healthcare delivery system than it is as much about how we price things. Of course, we invest heavily in R&D, 25 cents on the dollar that we sell goes back into tomorrow's cures. Which may not help you but will help someone else. We probably need to sell that value proposition a little better. But if we reduce the cost of medicines, we'll reduce our ability to respond to the national competition. We'll reduce our ability to invest in tomorrow's cures. And I think those are both difficult choices in a vacuum. Of course, we should collaborate to find ways to make insurance work better, make the right medicines the most valuable ones, the most cheap. And the least valuable ones, the least cheap. And we'd love to engage with policymakers on all those topics.

Again, I want to thank Purdue for putting on this forum. It's a critical moment in our industry and an exciting time at the same time, we're in a golden era of drug discovery and of the engineering process of making medicines. And I'm optimistic about the future because we're having meetings like this. Thanks for having me.

Stephen Ezell:

David. Thank you so much for that fantastic keynote address. All right, now I want to welcome Alina Alexeenko up to the stage. She is the co-director of the Young Institute at Purdue University and she will walk us briefly through the historic accord, which we're about to sign.

Concluding Remarks by Alina Alexeenko

Alina Alexeenko:

Thank you, Stephen. So we will conclude with a very brief overview of the collaborative accord on making medicines in America. This is a shared commitment to ensuring critical medicine manufacturing to secure America's health and prosperity. This is a result of collaborative technology road mapping that started with the National Institute of Standards and Technology Award to Purdue University. That enabled us to bring a very large network of both pharmaceutical industry, both on the pharma innovator side, generic manufacturers, equipment manufacturers, suppliers of various critical materials, and as well as a vast network of educators and researchers. And I acknowledge James and Vadim as the leaders of National Institute of Pharmaceutical Technology and Education, NIPTE.

And so this collaborative accord and the six objectives, six shared objectives, that are expressed by this accord. So these are the six shared objectives that have been developed as the result of this technology roadmap and recognizing the critical area of opportunity that has been enabled by artificial intelligence.

So the first one is developing new and AI-enabled drug manufacturing platforms. The second one is creating flexible distributed drug manufacturing networks across America. Then implementing real-time agile supply chain management systems in the US. Establishing programs to prepare over a hundred thousand Americans for advanced medicine manufacturing careers. And then accelerating US regulatory pathways for innovative manufacturing technologies. And finally, enhancing America's environment through clean chemistry innovations, reducing waste, and all the innovations that are needed to bring API manufacturing back to shores. So now I will invite our panelists to sign the accord.

Stephen Ezell:

Yes, that is correct. For those watching online, this concludes the event. I want to thank our panelists for their excellent presentations and I want to thank Purdue University and NIPTE for this really wonderful collaboration today. So feel free to sign off for those online. But for those in the room, we now invite you to sign the accord. Thank you all.