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## The International Intellectual Property Commercialization Council's 3rd Annual U.S. Conference: The State of Innovation in the Union

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## The International Intellectual Property Commercialization Council's 3rd Annual U.S. Conference: The State of Innovation in the Union

### Authors

Jeffery P. Langer, Neel Sukhatme, Paul R. Zielinski, G. Nagesh Rao, PJ Bellomo, Matthew Byers, Meghan Gaffney Buck, Everardo Ruiz, Andrei Iancu, Patrick Kilbride, Carl J. Schramm, Colman Ragan, Ami Patel Shah, and Randall R. Rader

THE INTERNATIONAL INTELLECTUAL PROPERTY  
COMMERCIALIZATION COUNCIL'S 3RD ANNUAL U.S.  
CONFERENCE

*THE STATE OF INNOVATION IN THE UNION*

12:00 to 5:00 PM  
Monday, May 6, 2019  
United States Capitol Visitor Center  
Washington, D.C.

*Opening Remarks:*  
JEFFERY P. LANGER,  
General Counsel, Zoeller Company; and  
Executive Member, IIPCC

*Panelists for Panel 1:*  
PROFESSOR NEEL SUKHATME,  
Georgetown University Law Center

PAUL R. ZIELINSKI,  
Executive Director, Federal Laboratory Consortium for Technology Transfer;  
and  
Former Director of the Technology Partnerships Office, National Institute of  
Standards and Technology

G. NAGESH RAO,  
Director, Business Technology Solutions (BiTS), U.S. Small Business  
Administration

PJ BELLOMO,  
Executive Chairman, Blue Sources

MATTHEW BYERS,  
Corporate Intellectual Property Manager, Zoeller Company

MEGHAN GAFFNEY BUCK,  
Founder and Chief Executive Officer, VEDA Data Solutions

*Moderator for Panel 1:*  
EVERARDO RUIZ,  
Managing Director, Intellectual Property Fund Investment and Intellectual  
Property Commercialization and Strategy, Energy Transition Partners; and  
Director, IIPCC Northwest

*Panelists for Panel 2:*

HONORABLE ANDREI IANCU,  
Under Secretary of Commerce for Intellectual Property; and  
Director, United States Patent and Trademark Office

PATRICK KILBRIDE,  
Senior Vice President, Global Innovation Policy Center, U.S. Chamber of  
Commerce

DR. CARL J. SCHRAMM,  
Professor, Syracuse University; and  
Former President of the Ewing Marion Kauffman Foundation

COLMAN RAGAN,  
Vice President and General Counsel, North America Intellectual Property  
Litigation, Teva Pharmaceuticals

*Moderator for Panel 2:*

AMI PATEL SHAH,  
Managing Director, Fortress Investment Group LLC

*Closing Remarks:*

HONORABLE RANDALL R. RADER,  
Former Chief Judge of the United States Court of Appeals for the Federal  
Circuit; and  
Founder, The Rader Group PLLC

JEFFERY P. LANGER: Well, good morning everyone. [T]hank you all for joining us at the IIPCC's third annual event here at our nation's capital. My name is Jeffery Langer, I am an executive member with the IIPCC. Let me start by thanking our sponsors, the gentlemen from TechInsights. Once again, TechInsights has offered us financial support for this and it really is the lifeblood for our work here in the nation's capital. This is the third year they have done it. Unfortunately, Art Monk, who is a close colleague of IIPCC, is unable to make it this year, but he sent this gentleman and his proxy so thank you very much. I really appreciate all the work that you guys do and all the support you have given us over the years. I would also like to recognize the Catholic University of America, the law school, this is the second year [that] we will be publishing transcripts of the proceedings that go on here today. Next, I would also like to thank PBEC, which is a long-term collaborator with us at the IIPCC. For those of you that do [not know] PBEC, this is the Pacific Basin Economic Council based out of Hong Kong. IIPCC actually started in Hong Kong and there has been long-term collaboration and work with that organization. So, we thank them. And finally, I would like to sincerely thank Senator Chris Coons and his staff, they have helped us every year we have come here for this program, with logistics and preparing rooms.

For those of you that are not familiar with the IIPCC, this is short for the International Intellectual Property Commercialization Council. It was founded in 2013 and it is a global, non-profit, non-partisan organization, really focused on driving conversations about innovation and commercialization of innovation. Of course, at the cornerstone of that is intellectual property, but we really try and look at this as a holistic system and seek to find ways for different parties that are involved in this to work together and develop and commercialize this innovation. The key of this is really human growth and development. Ideally, this commercialization and innovation takes place in a way to improve the living standard in societies worldwide.

So, just a couple of notes on IIPCC, since our founding in 2013, we have expanded rapidly. [While we have many] international offices, I would like to highlight some of our newest members: the people in Brisbane, they just started this year; [the people in] the Tokyo office, which was just recently established; [and the members in] Osaka. Continuing with our theme of innovation, [I would also like to recognize] the move by the previous IIPCC Hong Kong that is now going to be adopting the greater bay area chapter that will incorporate Southern China, Hong Kong, Macau and other countries in that area. If I could also note too, there are a number of IIPCC folks that have come in from international chapters today. We have representatives from Hong Kong, from the Toronto chapter, and in the U.S., we have folks here from New York, as well as San Jose. We also have somebody here from Korea. We also benefit from a fantastic board

and a number of people that work very hard behind the scenes to help guide the IPCC's mission. We are very fortunate to have a number of the people on our board [here] today including Professor Carl Schramm, who will be speaking on one of the later panels. [We also have] Judge Randall Rader, who many people in this room know, who will be giving the closing remarks, and Johnson Kong is here from Hong Kong. Unfortunately, David Capos was supposed to be here as well to give opening remarks, but he has been called away to something else so I will be taking over that role.

So, for some opening comments, I was really thinking about what we were thinking about when we were conceiving this conference. For those of you that have attended our conferences in the past, we have been much more focused on intellectual property laws specifically, and our panels have really focused on U.S. [laws and what they] look like in comparison to rules and regulations in other parts of the world. [There has] been much more of a legal focus. This year, we really wanted to take a step back and start to talk about innovation in a much more holistic manner, and while IP is a cornerstone for a lot of this, the innovation and commercialization of that innovation are other parts of the ecosystem that also require some attention. One of the things that drove this thinking for me was a conversation I recently had with a former classmate. We were talking about the speed of innovation and how that has really [been] altering what innovation looks like. As background, he is working for Governor Kasich's office in the workforce transformation office, where they are looking at what educational policy should look like for Ohio as we are moving through all these dramatic technical changes. You know, what is going to be the impact of autonomous vehicles as those start to ripple through the commercial ecosystem, and how are we going to train people in their K-12 years and then in their college years for these on-going and increasingly rapid transformations to technology?

I think as humans too, we are not particularly good at keeping in mind how fast some of these changes are taking place. If we think about—and I know this is two-year-old data—but if we talk about mass adoption of airlines, this was only really sixty-eight years ago; telephones, only fifty years ago; radio, thirty-eight years ago; television, twenty-two years ago. Then if we start looking at Pokémon GO and Angry Birds, which really involve only a two-year-old technology, these are very commercial, consumer-oriented things [that have been widely adopted very quickly]. So, as the panels are coming up today, I think it is critical that we think about innovation, the speed of it, and how that is going to change while we are considering the state we are in today. So, with that, let me introduce the first panel, and Everardo, I will let you introduce the panelists.

EVERARDO RUIZ: My name is Everardo Ruiz and I am actually in IIPCC Seattle, so I took a nice red-eye [flight] to get here. At the same time, the reason I did that was because it just seemed like it was important. There is a lot of discussion around innovation with almost zero facts presented, right? “Oh, it happens this way. It does not happen this way. It happens this way.” No data, right? Well it turns out, data does exist, and it is studied. So really, this panel is boots on the ground and it describes this kind of half-life of technology decreasing so rapidly and things just happening so quickly in this internet era that we live in. How do we actually innovate? How does it actually occur? Why does it happen in the United States? What works? What might be some challenges? How do you make it sustainable so that it is here, because it can happen all over the world, right? So [this idea and these questions are really] what drew me to this theme of boots on the ground.

I would say there are really three groups of speakers. One is focused on realities. What does the data say when questions are raised? We have a speaker who will be handling that from Georgetown. We will also be focusing on what the government is doing to promote innovation. What does the view look like if you are actually sitting inside the National Institute of Standards and Technology (“NIST”)? [NIST] is something which a lot of people do not really understand, but it has a huge reach; it is not just looking for magnetic monoparticles or something like that. I mean it really is important, as is the Small Business Administration (“SBA”). Finally, the other way to get the view of the war is to go talk to the soldiers, to the people who are actually fighting it. So, we have several speakers from their specific companies and [you will see the current world is] very interdisciplinary. It is a very different world than it was back when the airplane was invented. So, how does that change things, right? Again, [we will look at] what is working, what is not working. Then, we will have a [question and answer portion] at the end to take questions since time is short. This will allow [the questions] to be pooled and for us to maybe get some interaction between the speakers.

First, let us talk about innovation realities. From Georgetown University Law Center, we have Neel Sukhatme, who is an associate professor of law [with a] JD cum laude from Harvard Law, a PhD in economics from Princeton, [and who is a] Thomas Alva Edison Visiting Fellow at the U.S. Patent and Trademark Office. So, data, he has. Let us go ahead and invite him up to the platform for some third-party observations.

PROFESSOR NEEL SUKHATME: Thank you Everardo. It is a pleasure to be here. My name is Neel Sukhatme. As Everardo mentioned, I am a professor at Georgetown Law where I teach patent law, corporate finance, and law in economics, among other subjects. I have been interested in patents and innovation for a long time. I started off my career as a patent prosecutor right

after I earned my degree in computer engineering. After that, I went to law school and then practiced as a patent litigator and also as a federal court clerk. I was really interested in trying to do empirical analysis in this area, so then I decided to go back [to school] and [earn] my PhD in economics, where my dissertation research focused on the economics of innovation and patenting. I am also a co-founder of a music technology start-up company, Spindrop, so I have worked on patent issues on that end [as] an entrepreneur and I have just started at the U.S. Patent and Trademark Office (“USPTO”) as a Thomas Edison Fellow. So obviously my comments here are not in my capacity as a fellow at the USPTO, but I am planning on doing research related to the Patent Trial and Appeal Board (“PTAB”) over there. Finally, my wife is in the pharmaceutical industry, so I get a little bit of a sense of where the patent issues are in that [arena] as well.

I have been really fortunate to be able to look at patent policy and intellectual property rules in a lot of different settings, and I am fortunate to be at Georgetown, which is building the leading law and technology center and hiring some of the best people in the world on these topics. But today, I want to talk about something that is central to my research, and that is the role of data in patent policy analysis. So, when we talk about patents and innovation, regardless of your political stripes, there are a lot of common goals I think we all share. We all want to promote innovation, right? This is important for growth; we think that is important. All else being equal, we also want to increase access and affordability of technologies for consumers. We want more people to get access to technologies that are created because that is the whole goal.

But how do we get there? There are a lot of questions that have an empirical foundation but not so much [the] kind of facts as to what is actually going on. So, some questions might be: Do longer patent terms actually incentivize more innovation, or do they just create what we call dead weight loss<sup>1</sup> or monopoly cost?<sup>2</sup> Which industries care the most about patent protection? We have ideas as to who we think cares about patents, namely pharmaceuticals and biotech companies, but is our conventional wisdom accurate? Is there a way of actually testing this? What do consumers and the general public, think about patents? Do we have any sense of what it means to them when you show them that a product

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<sup>1</sup> *Deadweight Loss*, INVESTOPEDIA, <https://www.investopedia.com/terms/d/deadweightloss.asp> (last updated Sept. 24, 2019) (explaining that deadweight cost is “a cost to society created by market inefficiency, which occurs when supply and demand are out of equilibrium”).

<sup>2</sup> *See How Is Profit Maximized in a Monopolistic Market*, INVESTOPEDIA, <https://www.investopedia.com/ask/answers/041315/how-profit-maximized-monopolistic-market.asp> (last updated Apr. 2, 2019) (explaining how a monopolist controls the market through control of the price and quantity demanded).

is patented? How much does venue matter in patent litigation? So you litigators out there will appreciate that one, and it is a fraught issue. Does it matter where a lawsuit is filed, in terms of its outcome, when we are talking about patent litigation? And do patents contribute to rising drug costs and cause pharma companies to produce what we call “me-too drugs”?<sup>3</sup>

In different papers, I have touched on each of these different questions. [But] obviously we have a limited amount of time here, so I am just going to talk about a couple of my research papers that I have been working on to give you a flavor of how data can play an important role in designing optimal patent policy.

To begin, which industries care most about patent-term? This is a paper that is forthcoming in the *American Law and Economics Review* and as I said, our conventional wisdom is that patents matter the most in pharma and biotech. But is this necessarily true? How can we test this? In this paper, I take advantage of what we call in economics, a “natural experiment” approach.<sup>4</sup> Most of you are probably familiar with the Agreement on Trade-Related Aspects of Intellectual Property Rights (“TRIPS”), right? And what did it do? It changed patent term rules in the United States. Before TRIPS, you had a fixed seventeen-year term as of the date of patent *issuance*; after TRIPS, you had a potential twenty-year term, marked from the date of patent *filing*. So, I am going to take advantage of this change in rules to try and get at in which industries patents actually matter the most.

So, to lay this out for those of you who might not be familiar, patent prosecution is a back and forth process where you apply for a patent at the U.S. Patent and Trademark Office. Then the USPTO issues a response to you and as a patent applicant you file your response to them and then you go back and forth and eventually, the patent might issue. So, in this example, let us just say it took four years for the patent to issue. Under the old rules, how much patent term would you have? You would have a seventeen-year term from the date the patent issued. Under the new rules, what is your term going to be if you took four years to prosecute the patent? Well, now the twenty years is counted from the date you filed your application. So your effective patent duration is only sixteen years.

Now, why does this matter? Under the new rules, you have an incentive to speed up your patent prosecution, and there are ways in which you can actually

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<sup>3</sup> See Yaniv Heled et al., *Why Healthcare Companies Should Be(come) Benefit Corporations*, 60 B.C. L. REV. 74, 84 (2019) (describing “me-too drugs” as involving “an increasing number of pharmaceutical companies pursu[ing research and development] projects aimed at developing therapies for ‘lucrative’ medical conditions, many of which are not considered severe or which already have effective therapies available”).

<sup>4</sup> Malcolm B. Coate & Jeffrey H. Fischer, *Why Can’t We All Just Get Along? Structural Modelling and Natural Experiments in Merger Analysis*, 8 EUR. COMPETITION J. 41, 46 (2012) (comparing natural experiments in economics, where policies are observed over a period of time, to controlled experiments, where the conditions are set).

speed up your patent prosecution by being quicker in your responses to the Patent Office. And so, what might we predict? We might predict that in industries in which patent term is particularly important, you are going to speed up patent prosecution more than in industries in which patent term is less important.

So, the question is, who sped up the most in response to TRIPS? First of all, the usual suspects, such as drugs, genetics, organic compounds, certainly did, but they were not the only ones. It turns out, that [other areas, including] communications, computer hardware and software, electronic business methods and software, and semi-conductor devices, all sped up [in patent prosecution] in response to TRIPS.

So, what does this mean? It is not conclusive, but it is at least one data point that suggests areas that we think may not care so much about patent protection might be more sensitive than we think. Maybe patent duration matters more for software patents than we thought. Maybe, we used to think, well, software is going to be obsolete in seventeen to twenty years so we should not care. Maybe that is true, maybe it is not, but these areas did seem to respond to TRIPS in a way that was kind of surprising, whereas mechanical patentees did not respond much, so not everyone sped up. So, patent term might matter more to computer software patentees than we previously thought, and we are able to use data to try and look at that and challenge what the conventional wisdom actually might be. I should follow up, there is another paper that I am writing on this that takes advantage of the fact that this rule was retroactive, and we tie this to stock market events study data to look at the companies that benefited the most from the retroactive application of this rule. We look at what happens to their stock market prices and then we are able to use that to back out the dollar value of an additional year of patent protection. That is a work still in progress.

The second paper I am going to talk about [involves] what we call a field experiment. So, there is this big, basic question: Do consumers actually care about patents? When you see a product and it says patented on it, and you are a consumer, are you more likely to buy the product than if it did not say anything at all? So when I ask this question to patent attorneys, I say, how many of you think [this fact] makes people more likely to buy the product? About half the people raise their hands, the other half do not. So, it is not clear.

But are consumers more likely to buy a product when they find out it is patented? You might say, "Well, Neel, all you [have] to do is compare the sales of patented and comparable unpatented products and see which one sells more and you will have your answer." Well, the problem is, you cannot really make apples-to-apples comparisons like that very often. A patented product is different from an unpatented one. So, I cannot just look at raw sales data to make

that kind of analysis.

So, what do I do? I run an experiment. I go to a retail pharmacy chain that has agreed to let me do this, and I make more salient the patent status of all the patented goods there. So essentially you go in and you put a big “patented” label on the front of the product. Since I have multiple stores, what I do is in one store I use a patented label that says, “this product is patented.” In the other store, I do not put that patented label and so [I utilize] what we call in economics a difference in differences technique.<sup>5</sup> I can compare how the sales change in the treated store versus the control store over time, and that gets me the estimate of what happens when we make patent status more salient. In other words, once I sort of hit the consumer on the head with the fact that this product is patented, how does it affect their purchasing behavior? We can actually get at a causal impact through this mechanism.

Now, obviously, I cannot ask all the consumers in the store what they are thinking when they decide to purchase or not purchase a product. [The] only thing I can do is look at the retail scanner data after the fact. So how can we get at more detail with respect to what the consumers are actually thinking? Well, I also run this as an online, randomized experiment. [I show consumers pictures of products with] the only difference being whether a patented label is present or not. [Some] products actually say they are patented on the front, but [others] do not. When you do this treatment, people do notice it and they report that the product with the patented label is more innovative.

So, when you compare the responses of the people who received the treated, patented label, versus the people who did not, the people who received the patented label do respond and say it is more innovative. They do say the product is better made. However, they are not more likely to buy [the product]. They will say, “Yeah, yeah, it is more innovative, it is better made, but I am actually not more likely to purchase it.”

Now, you might think, this is an online experiment, so I am not actually asking them to spend their dollars, right? So, a person’s reported preference in the survey might be different than his or her actual purchasing; in economics we call this revealed preference. This is where the store experiment comes in. I could use the retail scanner data to look [at the following]: When I make the patent status more salient, what happens to sales? It turns out, at least so far, that the retail scanner data confirms the last result. In other words, once you make patent

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<sup>5</sup> *Difference-in-Difference Estimation*, COLUM. U., <https://www.mailman.columbia.edu/research/population-health-methods/difference-difference-estimation> (last visited May 29, 2020) (explaining the difference-in-difference technique as “a quasi-experimental design ... used to estimate the effect of a specific intervention or treatment ... by comparing the changes in outcomes over time between a population that is enrolled in a program (the intervention group) and a population that is not (the control group)”).

status more salient, people are not more likely to purchase the product. That might not be true for all products (maybe you need larger sample sizes) but at least this starts the conversation as to what consumers actually care about.

I should also mention, I did some background research on what people actually know about the patent system as part of the online survey, and I was actually heartened to see that people knew more than I thought. For example, in my survey of about 2,800 folks, about 83 percent knew [about how one obtains a patent; they knew that one obtains a patent] by getting approval from a government agency. In addition, 31 percent recognized [a patent] as a government-granted monopoly, and 21 percent recognized it as, “Okay, a product is using a new technology.” When ask[ed], what must one show to get a patent, the most common answer was [that] the product is different from existing products. [While] this is not a perfect answer, it is surprisingly good. So, people do seem to understand what patents are, which is another result. In conclusion, people believe patented products are more innovative, but that does not necessarily make them more likely to buy a patented product.

I can now briefly talk about a couple of other research projects, [including one that asks,] how much does patent venue matter to litigants? You litigators out there will remember that there is a case called *TC Heartland* that came out in 2017 that changed patent venue rules.<sup>6</sup> Essentially, it greatly restricted where patentees can file patent infringement suits.<sup>7</sup> They used to file them all in the Eastern District of Texas, and now, a lot of these cases are shifting to the District of Delaware, where a lot of companies are incorporated. So, what we do is we run a stock market events study, which means you look at the stock market price of companies before and after the *TC Heartland* decision and see how the market responded to the decision as a way of kind of measuring how investors feel about it. Who is optimistic about this decision? If your stock market price goes up, it suggests you are really optimistic about this decision. So, whose stock went up? If you are a Delaware-based company who previously was really likely to be sued by non-practicing patent entities, some folks refer to them as patent-trolls, you were optimistic; your stock market price went up a lot. So, this is a paper that, with Ofer Eldar over at Duke, we published in the *Cornell Law Review*.

Another paper asks, how can we reform patent law to encourage meaningful pharmaceutical innovation and lower health care costs? I do not have time to get into the details of this because obviously it is a complicated area, but one of our ideas is to try and encourage something we call value-based patenting. In the healthcare sphere, there is this whole thing about value-based pricing. We talk about this notion of value-based patenting. So, the idea here is, maybe we should

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<sup>6</sup> *TC Heartland L.L.C. v. Kraft Foods Grp. Brands L.L.C.*, 137 S. Ct. 1514 (2017).

<sup>7</sup> *Id.* at 1519–20.

have patent protection that is variable, that is dependent on the emerging value of the technology in the medical and drug device area. And so, we can actually go much farther than we could in the past because electronic medical records allow us to more accurately measure the value of new technologies as they emerge. [T]his is a paper in the *Minnesota Law Review* with my colleague Gregg Bloche.

So, the bottom line is, data is something that not only can help us answer existing policy questions, but [it can] tell us what questions we should ask in the first place. Every time you answer and say, “Consumers seem to care about patents, [or] consumers do not seem to care about patents [when it comes to] their purchasing behavior but they say it is more innovative,” that produces another question [of] “well why is that the case?” [So data] sets the stage for thinking about other questions we may not have even thought of looking at before. It provides a neutral way to test whether the conventional wisdom is correct, which relates to the TRIPS paper that I talked to you about [in which] we just assumed patents are important in some sectors and not others. This is a way of actually testing to see whether that is true. And the exciting thing is this is an unprecedented opportunity that we have today, to use data in patent policy. We have higher quality data than ever before, and we [also] have better empirical techniques and computational analysis than ever before. So, I hope that my research and the research of others in this field really pushes things forward and increases the use of data in patent policy. Thank you.

[Applause.]

EVERARDO RUIZ: [So far] we [have] talked about kind of the description of what is happening, you know, where the research is; then there is what is the government doing? There is obviously a lot of pro-innovation [type] policy. In the second portion here, boots on the ground, the U.S. government promoting innovation, I wanted to bring up Paul Zielinski, Director of the Technology Partnerships Office at NIST. [When] we think of NIST, we maybe think of something else, but [NIST is] involved with voting standards and technologies surrounding democracy [and] cybersecurity. [NIST can answer questions like,] what is being funded? What is working? So, let us go ahead and listen to that. Paul?

PAUL R. ZIELINSKI: Thank you. I really appreciate the opportunity to come and speak with you today. This is something that is very near and dear to my heart. I actually have the privilege and honor of doing two different kinds of things in my position over at NIST. Not only do we do a lot of research as a federal laboratory in various areas of standards and [into] some really high tech, interesting things, [but, in my role,] I [also] get to transfer those things out of the laboratory and to the marketplace directly.

The other thing we [do comes as a result of being] part of the U.S. Department

of Commerce. As part of the Department of Commerce, we actually have a lead role in coordinating this activity across all federal agencies, for the government. So, I want to talk mostly about that topic today and I think it is really relevant to this group, especially since we spend a lot of money on federal research throughout the United States every year. [It is] roughly in the neighborhood of about \$150 billion a year, so that is a lot of money that we are putting out there. But I always make the point, and I know this group is not really surprised by it, that we do not make anything. We do not manufacture, we do not distribute, you cannot buy consumer goods from the government; it is just not our role. So, intellectual property really serves as that key bridge that allows us to get things out of our laboratories and into the marketplace. If you look at the Department of Defense, they are not out there manufacturing these things, they are buying them. All this technology needs to find its way into the marketplace and that requires a lot of money. So, I talk about \$150 billion, but there is a lot more money on the private side. That is really where the intellectual property rights come in as a way to protect that investment and those dollars that are going to be put in from the private side and are going to support the development and the transfer of that technology to the marketplace.

So, this is a really high priority for the administration. President Trump even put in his President's Management Agenda what we call a cross-agency priority goal. [Therefore,] this is one of the highest priorities of his administration in terms of how we are going to manage things. So we have a part called lab to market, we have multiple agencies involved in this whole thing, we have a number of different workgroups over at the National Science and Technology Council ("NSTC"), [and] we have a group that supports that. Again, the whole concept is getting inventions and ideas out into the marketplace and getting the funding for those on the private side [in order] to create new products and services. So not a great big surprise. Well, one of the interesting things about this cross-agency priority goal is this is one of those few things that actually crossed over administrations. And so, although it is in President Trump's Management Agenda, you would also find this in President Obama's Management Agenda, which I think is one of those rare things that is really heartening to see. [It is heartening] that this is such a priority for the federal government. Again, it is because we spend so much money on doing research and how do you benefit the people in the United States from that research investment.

So, let us talk a little bit about how we are doing in these types of things. We just talked a bit about data, so let me share with you a little bit of data. Unfortunately, the best data we have is actually from 2016. In fact, my office actually produces the primary data sets on federal inventions that you get

out there. [There are] a couple of big points that you can see looking at the trends overall once you normalize everything. [For example,] we do great in doing partnerships; our cooperative research and development agreements are CRADAs. So, we work with other parties, and one of the most important parts of these agreements is actually the transfer of intellectual property rights. Some of the other primary things that you get out of these [agreements] are the abilities to work together, to create knowledge, and to create ideas and put them out there in the marketplace. So, you get an advantage out of working with the folks that we have in our laboratories.

The disappointing part [of all this] is that our invention disclosure is a bit down. Fortunately, licensing activity is up, but again, sort of the bottom line to all of this is that we are pretty much flat on funding. So, it is not a great big surprise, but if you are not funding new things, you are probably not seeing much return on that. But we are doing a better job at licensing those inventions out, and again, that is the most critical thing that we can do because nobody is getting the benefit of these inventions if they just sit there. So, just looking intramural, the \$150 billion [I mentioned before] is what we spend on all research and development. We will get [the money] roughly in thirds: about a third goes to universities, about a third goes to industry, and about a third of that is within our federal laboratories themselves. So, [we are] looking at roughly a third, only a mere fifty billion [dollars] or so.

So, where are we doing patents? Where are we seeing actual inventions coming out from our laboratories? Of course, you get the big other category, but it is pretty well distributed; we do a lot of different work. [When it comes to] sensors and measurement, of course, I am happy to see from NIST that measurement is such an important thing. [But] how we are doing sensors, [including] how we are actually picking up these things in the environment and how we are understanding our systems, that is incredibly important. Really, there is a pretty wide distribution of where these patents are coming from in terms of industrial sectors. To put a number to it, we pursue roughly 2,500 patents a year in our federal laboratories, which is not a huge number, per se, versus a lot of industries. The flip side of that is we only patent things where we really need to use [a patent] to raise capital, and we transfer it to the private sector for them to raise money. So that is where we are with what we are investing in. It is also a pretty good snapshot of how you would work with a federal laboratory and where you might find some of this information.

Now, we have many databases out there with different pieces of information. For example, if you want to find information about what we are doing under the President's Management Agenda, you can go to a website called [performance.gov](http://performance.gov). Specific information on patents that are available across agencies comes from our Federal Laboratory Consortium, and we actually have

another lovely website, [federallabs.org](http://federallabs.org), and you can find information there.

So, one of the things that we have done recently at NIST is put together what we call our green paper. What is a green paper? It is really just some ideas; it is a discussion paper. What we did is we went out last May and we asked: What can we do better in terms of supporting innovation within our federal programs? This includes the entire \$150 billion; how do we better transfer this to the private sector? How do we increase what we call return on investment? This does not necessarily mean dollars to the government, that is not the return we are looking at here. But, how do we get a better return in terms of jobs, increases in economic performance, all of these lovely other things, for taxpayer investment in research and development? That is the return that we are talking about here. And so, what we did is we went out, we did our request for information, and we got many, many responses; [the number of responses] was really quite voluminous. But we came up with this paper and we have roughly fifteen findings in different areas and the idea behind it is how do we increase innovation? So, I welcome you to look at this at [nist.gov/tpo/roi](http://nist.gov/tpo/roi). We really do not propose any changes to the bedrock Bayh-Dole Act through this, but there are regulatory changes that are envisioned here. Some of the questions that we discuss in this green paper include: How do you fund university research? Also, when you get to the end of the program, and you say, "Well, I have this great idea, but I do not have enough money to get a patent on this," how do you address that? We also talk about topics like software, how do we work with copyright versus patent, and how do you really do intellectual property protection? So, there are a number of great ideas in this [green paper] that we are trying to develop. And of course, the reason we call it a green paper is because it is simply a discussion piece that is meant to get people talking; it is meant to move things along. It is really not the document that makes the changes themselves. All of that will be coming and we do intend to move on this within the coming year. Now I will go all the way back to what I was talking about on the President's Management Agenda. That is really where we are executing these [ideas and changes] at this point. They all fit into the milestones and the agenda that we are working on across the government. With that, I will conclude and turn it back over.

[*Applause.*]

EVERARDO RUIZ: So that was one perspective. But it is interesting; it is funny. I can think of the Rockefeller [era] back when a billion [dollars] was a billion [dollars], you know, we are talking about huge sums of money. But using it efficiently is obviously what everybody wants. So, thank you [Paul].

It is with pleasure that I now invite G. Nagesh Rao from the SBA up to the platform. If you recognize the name, you may have read it in *Financial Times* or TechCrunch. He has been around on a lot of different platforms, but he has also

been involved with growth accelerators and Patents for Humanity, [working with] a really wide, diverse set of uses for intellectual property. So, I thought it would be perfect for him to come here and talk about innovation kind of as he sees it from the SBA.

G. NAGESH RAO: Thank you [Everardo] and thank you everyone. Again, it is nice to be in the same room with my friend Jeff Langer. I have known him for about fifteen to twenty years now, both of us are alumni of Rensselaer Polytechnic Institute (“RPI”). So, thank you all for having me here today. I also see some former colleagues of mine, [including] Paul [who has been] wonderful as always. He and I used to work on the Technology Transfer Lab-to-Market efforts [together]. So, I am looking at this from a couple of different lenses. I used to work on the Small Business Innovation Research (“SBIR”) program,<sup>8</sup> but I do not work on that anymore. I now engage in information technology (“IT”) modernization efforts for the agency because of the great job I did on sbir.gov. I asked Paul to help me out here with this because I think what is really important is understanding the different resources that are out there when it comes to innovation, intellectual property, and scaling up for startups and small business companies. You know it is funny, we have already talked about patents and that is the elephant in the room, but it is not just patents, it is trademarks and it is copyrights; it is the notion that intellectual property is an asset. The property right is an asset, an asset that you can leverage.

So, I worked for seven years at the Patent Office, then I went to the private sector for a while, and then the SBA reached out to me and said, “Hey, come on back and help us out with venture capital private equity” because I was doing a decent job out in the private sector. I was actually doing patent curation at that time out in Silicon Valley for a number of high-tech startups, some of which you may have heard of. What was really fascinating was talking to the people there. They would ask, “Why do I care about patents?” But, half the time, they were conflating the terms patents, trademarks, copyrights, and they did not even understand the value proposition.

When you look at the valuation of any startup or small business, the accounting equation is that assets must always equal the liabilities plus shareholder equity. That is a standard accounting equation. So, when you look at that value proposition, you need to understand that intellectual property is a valuable asset. It is an asset class that rises in value over time. And I think what has been critical here is that when we look at high tech research and development (“R&D”) perspectives, that asset of intellectual property actually has a really

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<sup>8</sup> *About SBIR*, SBIR, <https://www.sbir.gov/about/about-sbir> (last visited May 29, 2020) (explaining that the SBIR program is the Small Business Innovation Research program that helps small businesses to “explore their technological potential and provides the incentive to profit from its commercialization”).

strong return on investment down the road. I mean, the investments that we have made since the 1970s have really materialized to this day when it comes to R&D. That is why what the question comes down to is how much of that furthering of R&D, those investments, [can be attributed to] the private sector? [Is it attributable to] the private sector plus the public sector? What does this really look like? I know when I worked on the SBIR program, there were some economic studies done. In terms of data, the National Aeronautics and Space Administration (“NASA”) SBIR program produced a four to one dollar return on investment for every dollar that NASA SBIR contributed. For the Air Force, it was a fourteen to one dollar return on investment. For the Navy, it was a nineteen to one dollar return on investment.

Half the technologies we see in our lives today had some sort of federal R&D funding to it, whether it was SBIR or something affiliated with it. In fact, 80 percent of the components of [the cell phone], this device that we are addicted to, were [the result of] R&D funding from the federal government SBIR program. Actually, 100 percent [of these components] are [a result of] R&D funding from the federal government when you think about it. Ultra-Scan Corporation came up with the biometric touch, Photobit did the CMOS pixel, which was Eric Fossum’s work, and Qualcomm did the microprocessor. So, there is an important role that the government plays in de-risking technology development and spurring innovation forward. I know you all know that, but I think it is a fascinating thing when you look at it from the SBIR lens. Still, I think it goes beyond that, and Paul, if you do not mind, please step up for a second and talk with me about this. [Describe what it is like] when you look at it from phase zero to phase three and examine all those different bridges that are helping with the commercialization valley of death.

PAUL R. ZIELINSKI: One of the things I get to do for NIST is probably run the smallest SBIR program in existence. It is pretty exciting to do because we do basic research in a lot of our laboratories. If you look at universities, they do a lot of basic research. The question really becomes where do you get the money to cross this valley of death? The research institutions typically are not able to bring things to the level of maturity and de-risking that a company needs in order to get into the marketplace. I just went through the whole thing about, “well, we rely on private capital,” of course, that is the reason why we have intellectual property; when we want some investment, we need to get money from the private side [since] we cannot fund everything from the government side with what we have available. However, we can actually try to spur innovation with something like an SBIR program and that is really the key. In fact, I know [the program’s] tagline is “America’s Seed Fund.” So, the idea is, this is our investment in small business and how we try to use that SBIR program to

basically kickstart some of these small businesses so they can grow up and become bigger businesses and, oftentimes, have an exit event. But that is great because that puts products into the hands of people, and that is really the goal of all of this; [the goal] is not just to develop things, it is to make a difference in people's lives.

G. NAGESH RAO: Agreed, and I think what is critical is that when you look at innovation in America there is this à la carte approach. Large companies play their role and small companies also play their role. I mean, Steve Sasson, who is a good friend of mine, he would say, back when he invented the digital camera for Kodak in the 1970s, "If I had known the SBIR [program] was around, I may have thought about that. I might have said, all right, I will leave Kodak and I will go start my own small business company." Now what is interesting is the fact that there is an opportunity like this, especially since many countries do not have this opportunity. [Here,] we are reinvesting in our society; we are reinvesting in our talent pool. You know, intellectual property is the result of a heterogeneous society. It is the result of a diverse society, a very culturally mixed one. I think that is what is so interesting about Silicon Valley. [Out there] I see this cadre of intellectual minds from a multidisciplinary perspective. That is what moves the engine; that is the fuel that drives the economic engine forward.

So, what you look at is what are the catalyst points? What are the little nuggets that come in, molecularize around, and then go up? I think you are looking at these different catalysts and federal funding, R&D funding, is the government's way of outsourcing R&D needs. Really all we are doing is catalyzing that movement and really the private sector moves it forward down the road for that mass scale, long-term commercialization, but you need to have someone to make that first bet. And it is a non-dilutive and you get to keep the intellectual property; that is a steal at \$2.5 billion per year. That is my quick observation to you all. The last thing I was going to say, [focuses on how] different technology is progressing. So, it took sixty-eight years for the airline industry to hit fifty million users and Pokémon GO just a couple of weeks; that is crazy. But that is also the sign of disruptive innovation and I think that is a dialogue we need to be having with ourselves; as you allow for this faster timeline to happen with disruptive innovation, how do we come to equilibrium with it?

[Applause.]

EVERARDO RUIZ: A good observation. Those are like shock waves at the end. They are not slow and steady waves. So, those were a couple of perspectives and we are talking about huge figures of fifty billion, or even a couple of billion [dollars]. Interestingly enough, you can say it is a Silicon Valley thing, but it is not like innovation does not happen worldwide, and it transitions everywhere in the world. I keep thinking about moving around Saudi Arabia and seeing people with iPhones with fifty thousand patents tied up in this phone when it comes to

digital rights management (“DRM”), memory control, software, and the processor. And yet, there it is, and it is more than we went to the moon on. It is incredible and worth protecting.

Next, let us pivot to [the concept of being] in the trenches. I alluded to asking people that are fighting the fight in the trenches, what is happening, what is working, what is not. So, let us pivot over to that view from the trenches. PJ Bellomo, Executive Chairman of Blue Sources, will start the discussion. Also, one thing I have noticed with all of these [presentations], is that it is no longer just one technology, it is all very interdisciplinary. So, we look forward to hearing [PJ’s] discussion.

PJ BELLOMO: I am PJ Bellomo, Executive Chairman of Blue Sources. Our patented water security technology detects toxic chemicals in water by combining artificial intelligence with a 24/7 real-time data feed from the world’s most advanced water quality sensors: live fish. So, here is the story. A few years ago, United States public water utility, Tuesday afternoon, all quiet on the western front, pH is fine, dissolved oxygen is fine, conductivity and all the other typical physical water measurements [are fine]. What you want in a water utility is you want the operators absolutely bored out of their minds because everything is working fine. First-generation Blue Sources device alarms, the fish, say, “Something is wrong with the water.” Therefore, something must be wrong with the Blue Sources device because everything else is fine. So, we go through a routine where we switch out the fish; it is a normal routine that happens every couple of weeks. We put in new fish, and they alarm as well. Well that is a little unusual, [since we used] two different sets of fish. The operators then take a water sample and it comes back from the lab. [They say,] we have a problem, this water is filled with diesel fuel. We do some investigation, and, keeping some things confidential, I will just say there is a barge out on the source waters with a massive problem: a leak from the diesel fuel tank is going into the water, and that water is going into the intake at this public water utility. Fish saved the day because none of that [water] went to the public.

Now let me tell you a little bit about a technology transfer story. The United States Army is worried about a problem. It is worried about accidents and negligence, but it is more worried about sabotage. So, problem number one that the Army is worried about is it is going to have troops deployed somewhere, maybe even at a base in the United States, and instead of some of the enemy putting explosives inside of a vehicle and trying to go through the front gate and do nefarious things, [the Army is worried that] the enemy might just poison the water supply. This is a problem that Blue Sources is working on [solving].

There is also a different problem, and this [problem] is not as obvious. While there are many places in Southeast Asia where they have water problems, there

is a place in particular where they had water problems and they spent the last fifteen to twenty years fixing those water problems. Therefore, today the answer for [accessing] drinking water [in this area] should be to open up your tap because on average you are going to have better water than if you got your water out of a city in the United States, which actually has very good drinking water. But that is not the answer, and [the people there] still use bottled water, which makes them spend a lot of money they do not need to spend. This then also creates a recycling issue with all the plastic. So those are problems that we can solve. To help do so, we have this patented device we can use. We actually access this [and similar] patents through a tech transfer program through the United States Army, and we have a cooperative research and development agreement [in place].

As far as how it all works, the secret is twofold. [First there are] the patents around the entire system. To take away the mystery, I will tell you that, and as it turns out researchers have known this for a while, when a fish is breathing, it gives off a localized electric field. Moreover, Mother Nature has been working on these fish for ten million years, so if you put bad things in their water, they breathe differently, and when they breathe differently, those electric fields change. In our device, we have eight fish and we are monitoring those electric fields, and [the fish] essentially vote with their breathing. We then send those signals, as well as physical signals about the water, into a neural network and the neural network determines whether or not there is a problem. So, that is what is going on. We are actually in the valley of death that [was just referenced]; we are actually trying to make our way through the valley of death. We have a market ready product, and we are trying to win some customers before we go out for funding and target markets, government facilities, drinking water, and then wastewater. [In fact,] the first-generation device is actually serving all of these markets.

Now I am moving really quickly but what I will tell you is I have been asked to talk about this state of innovation. Well, I am just a guy who is out there running startups, so I have a limited perspective and it stems from my personal experience. So, I thought I would explain my resume so that when you understand my perspective, there are these inherent limitations. I had a traditional career, and I was another RPI geek by the way. I worked as an engineer for many years, and then I was sort of a corporate suit doing consulting for Fortune 500 companies. Then, one of my clients hired me and I did e-commerce and supply chain work. Finally, in 2002, I found my home in the startup world. So, I will discuss the state of innovation but let me [first] take these last seventeen years and comment a bit. I have been an executive for six startups, I am currently the executive chair at Blue Sources, I have been the chief executive officer for [several] software startups, and I have also been the chief

operating officer at a startup. When you are at a startup, you look for exits, and I have only had one [exit], since [one of the startups] had the good fortune of being acquired for \$45 million by a public company. I have also invested [in startups] myself; I have taken my hard-earned money and I have invested in four startups.

There was also a period in that seventeen years during which I worked with the partner of a software design firm. So, I did the design work on two other pieces of startup software. I have also personally been in two different pitch competitions. Since 2010 I have been a member of Mindshare. I think about twenty years ago, the guys from AOL started this not-for-profit called Mindshare to help the next generation of entrepreneurs prepare to run companies, and at this point, I think Mindshare has brought 850 CEOs such as myself through the Mindshare program. And so, I am part of this 800-person CEO network. I have served on the board of directors at a startup accelerator. I have served on the board of advisors at techfrederick. I recently had the good fortune to be able to mentor at the New York Business Plan Competition a group of college students pitching startup ideas. I have been an occasional entrepreneurial guest lecturer and I was a finalist for a professorship, an endowed chair professorship in entrepreneurialism. I did not get that, but [this shows] that I also have an interest in the academic area. So, it is with all of that that I offer my perspective on the state of innovation.

Quite simply, my experience has [shown me] that intellectual property law has worked; it has worked in the world that I have lived in. However, there was one problem that I encountered while running a company and it had to do with what I refer to as a patent troll. But the Supreme Court handled that [issue] in a case that happened about five years ago. That case actually made the patent troll disappear.<sup>9</sup> [On another note,] one thing that does not get discussed is the call to refrain from changing bankruptcy law. There are places that cannot take the risks that we can take. I have never had to take a company through bankruptcy, but anybody who has invested widely in startups probably has done that. [Bankruptcy] does not come back on the individuals and that is the bedrock that allows the culture here to continue to work, and I think that works really well. Somehow, in the United States, at least in the world I live in, if you try hard and you fail, it is okay, and that cultural view is really important. I do not brag about my failures, I do not wear my failures, but I have certainly had some, and I think this [acceptance approach] works really well. So, those are all real pluses to the state of innovation, and while there are still some things that we can improve on, my read is that [the state of innovation] is alive, well, and thriving. Frankly, I

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<sup>9</sup> Octane Fitness, L.L.C. v. ICON Health & Fitness, Inc., 572 U.S. 545 (2014).

wish I was pursuing my engineering degree now because I am finally at home in the startup world, and back then it did not seem as accessible.

So, where do I think we can improve? Intellectual property protection costs are still very expensive. At Blue Sources, I have taken over a family of patents, and [these patents] have helped us get where we are today. But, just the maintenance costs on those patents [are substantial.] Now, I do not know how to fix that issue, and lawyers need to get paid, but maybe a startup will figure out how to lower [intellectual property protection costs]. That is one area I think we can improve in. For my last two problems, I do not know how to fix them, but I am not bashful about drawing attention to them. With the growth of entrepreneurialism around the United States, there are all these posers that are surfacing. I will not call out the specific schools, but I had the good fortune to be a finalist for an endowed chair [professorship] and there are all of these professor of entrepreneurship [positions] around the United States; it is like this new thing. And let me tell you, not only am I not qualified to apply, but, if Steve Jobs was still around, he would not be qualified. Elon Musk, Bill Gates, they are not qualified. They do not satisfy the job requirements for most professor of entrepreneurship [positions]. You need a PhD, you need years of teaching experience, and you need to be widely published to be able to teach students to be entrepreneurs.

*[Applause.]*

PJ BELLOMO: I mean, it is absolutely ridiculous; I do not know what else to say. The last thing I will say has to do with a very delicate topic. I believe the way we handle healthcare costs, but more specifically health insurance, is actually something that gets in the way of innovation in the United States. Now that sounds like a leap, [and you may be asking,] “What is the connection?” Well, I will tell you. I do not know about anyone at Kodak, but I have friends that were at Qualcomm, IBM, Apple, and Microsoft who have done well. [They are] engineers, maybe managers now, and product design people, [and they worked in these roles for] fifteen to twenty years. My 401(k), it is in good shape; I have made good money and I am ready to take a chance. But you know what? I have a four-year-old with juvenile diabetes and I just cannot [take that chance]. I am standing in front of you today as a man whose grandmother and grandfather died of cancer, father died of cancer, mother survived cancer, older sister survived cancer, cousin died of cancer, and who survived cancer. Making the decision to go into a startup world that might lead to failure and could leave me without a job in six months and with no healthcare insurance is absolutely terrifying. There are geniuses all around America ready to come out and help the innovative world, and they are stuck in jobs because they cannot take the risk of going out and someday finding themselves without health insurance. I have no idea how to solve that problem, but I have never heard anybody speak about it.

So, given that I had a microphone for ten minutes, I thought I would raise [the issue]. Now, let me end the way my partners always like me to end: You want safe, clean water? Trust the fish.

[*Applause.*]

EVERARDO RUIZ: Passion. I like it. Again, interdisciplinary. I mean at first I thought, “Fish? What?” That is because I am coming from the semi-conductor world and disciplines like telecommunications and electronics measurement. I thought, “You have to be kidding me.” But then I realized that [PJ offered] a good approach. Interesting.

By the way, as a side note, I remember looking at a deal in Poland, and that the laboratory that first figured out how to make silicon wafers had to pass. Why? Well, what does the bankruptcy law look like? They had not even tried [using] it. It had not been exercised. So, I am sort of in violent agreement with the point there.

We are now going to move to pumps. From Zoeller Pump, we are going to have Matthew Byers come up, who is the corporate intellectual property manager [at the company]. You know, there is a tendency when you think of pumps to think of water and oil and think it is this crusty, old business. But, despite [pumps] being mechanical, there are all kinds of electronics, software, and DSP involved, especially in a market that is a global market, and that is what we are going to hear about. So, take it away, Matthew.

MATTHEW BYERS: I met Jeffery Langer last summer at the USPTO Intellectual Property Chinese Roadshow where I was giving a talk, and we became friends. Then, during the past year, he asked me if I would continue that presentation here with you all.

So, I am going to talk about pumps. You may have heard of our company. Many people have basements and many people have sump pumps. We have succeeded over the course of eighty years in producing what we think—and I think that there is plenty of evidence to support this—is the best sump pump in America. We can claim that because we are also the most copied sump pump in America. Our design for our core product is actually utilized by many competitive products.

Our main location is in Louisville, Kentucky. We have been doing this for eighty years and we consider ourselves a legacy brand. We also own a company in northern Indiana called Flint & Walling. Back in the day, they built windmills. So, when you look on the prairie and see those windmills, they were [made by] Flint & Walling. That company has been in business for 150 years. So, I figure they are like a legacy times two. We have about 950 employees and we do about \$200 million per year in sales. We have an international presence. We are family and employee owned. We are community conscious and innovation minded.

So, we are talking about how pumps can be sexy and whatever. Well, we pump water. We pump sewage. We grind sewage up. We move it around. Pumps can be fractional horsepower, or they can be very big. They can be one hundred horsepower or larger. It is the engineering community that figures out what is needed. And then we build these things that are needed to move the water. They involve controls. They involve collection systems. There are environmental concerns.

Anyway, so you have Zoeller Pump and Flint & Walling linking industries. We have our own plastic injection molding company. Years ago, most of those went away. We have one in Indiana and it is a very interesting process. We own large submersible pumps. Wolf Pump is down in Texas, and so are these large submersible irrigation pumps. We have a Controls Division up in Canada. We have a pump company in Taiwan. We have an environmental business in China which is now serving as a place for us to distribute our pump products, and I spend a lot of time working on the China project. I made about forty-nine trips in and out of China, since this [business] is brick and mortar.

At Zoeller, innovation involves basically four areas. We have products, new products, product improvements, and manufacturing process. We build things and we do not want to share our processes, some of which are very old, but some of which are very new, with the outside world. So, we think about that, [when it comes to] sales and marketing processes and then business processes. I am now going to hit a few highlights of each of these.

So, on the new product side, we had a conversation last night. We were talking about idea capture and what people do. What we do, [is] we keep people out of our R&D areas. If you come to our company, you cannot tour there, and that is just the way it is. I work with our engineers. I work with the people that are our technicians, the people that are working on technical things all day, every day. In our business, that is where innovation comes from, those people. One day, I am out in the field and I get invited to go to a distributor's place. By the way, I am a technical guy; my area is decentralized wastewater. So, I can treat wastewater without giant sewer systems. Anyway, I go to this conference and it is a bunch of plumbers. They are in this distribution house up in Wisconsin. It is fantastic. It is wintertime. It is cheese curds. It is beer. It is local people sharing from their hearts exactly what their troubles are in their profession. It was wonderful. It was a great harvest. I bring that information back to the company [and] that shapes our next generation of basin systems.

For example, you go out in the world, and you deal with actual practitioners. They will share with you and they will teach you things if you are smart enough to listen. Anyway, our people at our place, I encourage them to record their thoughts in "idea books." I have gone around to all our divisions. I have distributed these books. They do not instantly write their ideas down. This is

something you have to say over and over and over. One of the things we teach these days is that communication does not really happen until the other side gets it. Well, do not expect them to get it the first time. So, you hammer away.

We had a board of directors meeting the other day and our manager from the Taiwan facility came over, and he was thrilled to share with me their first idea. Now, they have had a bunch of ideas, but this is the one that is recorded in the “idea book.” It is really good. It is innovative. It is something that we will file a provisional patent application for in the United States, probably in the next ten days. It is a really great idea and it came from a bunch of young guys that were working together. It is a multi-disciplinary effort, but it is really, really something.

Anyway, it was great to see that. Many ideas instantly going into “idea books” might be ideas that people are routinely working on. But maybe after a little while, maybe annually, or every six months even, you have a group of skilled people come and look at the “idea book,” people that are really good in your business, and they can separate the wheat from the chaff. They then select the ideas that we want to move forward. Certain ideas are going to be very exciting to us because we can make money. We want to make money. We want to earn a profit. All those 950 people that work with us, they have families, and everybody needs to get paid. And so, we get excited when we see something that we think we can commercialize. We want to avoid that area where we have this great idea, but we cannot do anything with it.

So, we have “idea books,” we patent things, and we are teaching the folks in our business about diligence and what you have to do when you have an idea. Many people that have ideas, their ideas are born in a vacuum. They do not actually understand that there is another person on the planet that likely has the same idea, and then if they run into that, they get discouraged. Well, do not get discouraged. Move up one notch. You can do that. That is what we do with our people. If they have a good idea and they hit a roadblock, we tell them let us just take it to the next level. We ask, “what would be the next cool thing?” We encourage them to not let things die. Anyway, diligence is very important, and not just in the patent area. But if we build any product for sale, we have to do the diligence so we know we can sell it.

Working with outsiders on products, that is huge. Work with consultants. But to hire a consultant you need the proper paperwork. You need to make sure that people do not reveal what you are doing. And then if you pay somebody, some technical person to do work for you, you need to make sure, contractually, that the work is owned by you, because if you have not done that right, you are going to have a problem. Also, when you have people in your organization working on innovation and going above and beyond, you create a reward structure. So that

is a little bit about products.

[I will now move on to] manufacturing processes. In our factory, we have proprietary information [and] we have trade secrets. I have gone around to our various divisions and tried to help the managers understand that which can be shared and that which should not be shared. We do tours. We have factory tours. That is a big deal to us. Historically, we would show everybody everything. These days, my message is do not do that. In fact, I go to the people that want to show people things and I ask them, “What do you really want to show?” If a product is made in the USA, that is something we are proud of. You want to show that? Show that. Every one of our pump products is tested repeatedly. You want to show that? Okay, show that. [People may say] “I want to show quality. I want to show that we have this super high-level of quality.” Well, do you necessarily need to take the tourists into the quality laboratory and show them the instrumentation?

One day I took the tour and I am standing next to a man from Indonesia. He is a brilliant engineer and he is asking really great questions. Surprisingly, the employees are answering them. They answered everything that he asked, and I was shocked. If it was me, [I would not have allowed this to happen], and in fact, in our company these days I have been accused of being anti-tour. Well, I just wear that mantle now; I am anti-tour and I am the no-fun guy. I am the guy that demanded that we revise all our labeling for California’s Proposition 65. That was unpopular. But anyway, that is a different topic.

[*Laughter.*]

There is also manufacturing, and I did want to cite one example. We have a machine. We have a computer numerical control (“CNC”) machining center in Louisville.<sup>10</sup> When you buy a machine, the people are going to tell you the maximum that machine can put out given the parts you want to build. Well, what if you bring one hundred years of experience and direct it at that machining center? And all of a sudden, you start figuring out how to gang tool this thing and do some amazing things. Then the next thing you know, that machine is producing 125 percent of what the manufacturers said it would. As far as I am concerned, that is innovative. That is the sort of thing I do not necessarily want to teach the world. I do not know that I do not want to teach the world that, but I also do not know that I do. We have that type of thing going on all the time.

Now to marketing. I highlighted marketing videos. That was a big deal for us recently. Our marketing people want to show everybody everything. Our marketing people contract with outsiders to build, say, videos. If you do that, in

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<sup>10</sup> *What Is CNC Machining? An Overview of the CNC Machining Process*, ASTRO MACHINE WORKS INC. (May 22, 2017), <https://astromachineworks.com/what-is-cnc-machining/> (defining CNC machining as a “manufacturing process in which pre-programmed computer software dictates the movement of factory tools and machinery”).

the file folder for that project, you will have written on paper, evidence of licensing if there is music involved. Music is a big deal these days, and companies our size are just learning about all this, but proper licensing is huge.

Copyrights. In our business, we copyright many works. If it is original to us, we are going to copyright it. If our marketing people create a clever advertising campaign, you will see some copyright language associated with that, but our work may still be infringed. If there is infringement, we may not act, but at least we have a legal leg to stand on. Within marketing, these people come up with very creative works all the time. So, it is important for us to teach these people how to protect those works as best they can.

We also have a couple of trademarks. This is in the area of marketing as well. One of these trademarks has to do with the color of our Model 53 pump. The other has to do with the image of that pump. Remember I said that the pump has been copied? Well, the good news is that pump has been in the marketplace since about 1982 and it possesses something called “acquired distinctiveness.”<sup>11</sup> So, we were able to convince the USPTO to issue these trademarks, and we have successfully used these trademarks against several knockoffs. It is really great to have that ability.

Finally, there are business processes. In your business offices, you might have people using software. You might buy, if you are a manufacturer, enterprise resource planning software and work with people that are coming in, consulting, and providing you a code. But maybe that code is not exactly right for you, and you make a number of changes and adaptations. You need to think about that. Those adaptations could become desirable to the people that provided you that language. Also, all of that could be copyrighted, and you need to think about that on the front end. You also need to realize that if you are playing with these things, you may create something that is novel and that somebody else wants. This is an important consideration.

At Zoeller, within the business office, you have different kinds of innovations happening such as with the IT code. In manufacturing, when it comes to our processes, we are not doing brain surgery, we are not out there on the cutting edge, but we have people working on very up-to-date manufacturing processes that are interesting to us and outsiders. We have products in development, products under improvement, and patents. We also filed various provisional [licenses] this year, and as those things become dated, we will follow-up. With

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<sup>11</sup> *Acquired Distinctiveness (Trademark) Law and Legal Definition*, USLEGAL, <https://definitions.uslegal.com/a/acquired-distinctiveness-trademark/> (last visited May 29, 2020) (explaining that a mark acquires distinctiveness when, as a result of extensive advertising and widespread use, the mark becomes capable of serving as a trademark by associating the mind with a particular source of goods and services).

that, I will conclude my portion.

*[Applause.]*

EVERARDO RUIZ: Thank you. I have this specialized bicycle and on the seatpost it says, “Innovate or Die.” So, if you are competing successfully, the modesty was appreciated, but you are world-class. You have to be, or you are dead. Well done.

So, we have talked about [the view] from the trenches. Who knew about fish? Who would have thought? We also talked about pumping. Again, everybody thinks it is some crusty, old industry. But we saw it is not at all.

We recently had an internal discussion with the Patent Office about artificial intelligence (“AI”). We think about AI and how it is applied to a lot of things and not just used in isolation. It is employed in healthcare, astronomy, and a number of other fields. That is why our final speaker, Meghan, is here. She co-founded and now leads the company VEDA Data Solutions. So, let us go ahead and invite Meghan here to speak.

MEGHAN GAFFNEY BUCK: My name is Meghan Gaffney Buck. I am one of the two founders of VEDA Data Solutions. We are a data processing company in the healthcare space. We work primarily with Medicare and Medicaid plans. I wanted to talk a little bit about the state of innovation as it applies to AI, machine learning, and some of the newer technologies from both an intellectual property perspective and a general-competitiveness perspective.

Just to kind of set the stage for healthcare, the reason why we are so excited about the opportunity to innovate in this space is because of the crushing cost that folks in these parts like to discuss ways to solve. One out of every three healthcare dollars is spent on administrative overhead. So, when we talk about healthcare dollars, we are talking about your premiums. One out of every three dollars does not leave enough money in the system to adequately care for patients in the way that we need them to be cared for from the beginning of life all the way through the end of life. In addition to that, health plans alone are spending \$10 billion inefficiently due to data inaccuracy. Data inaccuracy includes everything from having to manually hand key-in information because it has come in through a fax or a PDF that cannot be properly ingested into a data system, to improperly entered claims. Then on top of that, there is the fraud, waste, and abuse that exists in the system that cannot really be attacked, because today, within our healthcare environment, whether it is Medicare or Medicaid or private payers, they cannot even tell you accurately where physicians work and see patients across the country. That is where VEDA starts to attack the problem. But we come at it from a unique perspective.

So, I come from a political background. I spent a dozen years in Washington, D.C. working with appropriators in the House of Representatives and Senate on the political side of the aisle, and healthcare costs were something that were a

constant topic of conversation. I had the chance about three and a half years ago to work with my co-founder, Bob Lindner. He is an astrophysicist and he was out of postdoc at the University of Wisconsin.

He built an AI system that is now used in forty research facilities across the world, including NASA, to process radio telescope data in an automated way. Now, what was unique here is that scientists that are coming out of the hard sciences, particularly in astrophysics, biology, and chemistry, are used to seeing data in the real world. What that means is that it is messy. It is full of holes. It is messed up by every iPhone and Hot Pocket being microwaved on planet earth, and you cannot get any more of it. That data looks a lot like the data that you see in the healthcare system, data coming in on electronic health records (“EHRs”).<sup>12</sup> If there is something that is miscoded, you cannot go back and say, “Dr. Smith, three days ago, you saw this patient. Did you really mean to code it that way?” So, data cleansing and dealing with imperfect data sets is something that is intrinsically valuable in healthcare.

When we initially started to tackle this problem, we focused on provider directories, which seem very simple but [they] are actually plaguing the industry by creating a lot of manual costs associated with not understanding where physicians are practicing and what kind of patients facilities are treating on a daily basis. But we did not have all the answers. Bob came from academia, and I was not ready to give up when we hit brick walls. So, what we found was that there were innovative techniques around data cleansing, processing, and imputation that were being developed in academic institutions across the country not within computer science programs, but within other disciplines that are not necessarily thought of as the places for AI and machine learning innovation.

We partnered with Dr. Lars Hernquist at Harvard. He founded the Harvard-Smithsonian Center for Astrophysics, and he works on the largest supercomputers in the world, modeling galaxy formation from the Big Bang forward. He also works on a budget that would be considered less than a shoestring in the capitol. So, they have had to innovate ways to process data quickly, accurately, and in a cost-efficient way. He helped us learn and look at research that was happening in the academic space and bring that innovation into industries so that we could deliver our products at a price point where customers would be successful.

We also partnered with other scientists. Dr. Sara Walker came out of the Beyond Center, and she also teaches at the Santa Fe Institute. She is a complex

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<sup>12</sup> *What Is an Electronic Health Record (EHR)?*, HEALTHIT.GOV (Sept. 10, 2019), <https://www.healthit.gov/faq/what-electronic-health-record-ehr> (defining “Electronic Health Record” as a digital version of a patient’s paper chart that provides a “real-time patient-centered record that makes information available instantly”).

systems physicist. She has dealt with the healthcare system personally but had no idea that her work could be applied to some of the problems we were facing. [Her work focused on] tracking institutional change within systems and how one organic change might affect other places within a living system. We applied those technologies to changes within the healthcare system to model when regulation might impact data. For example, when tax reform passed, there was a huge change of providers moving from C corporations to pass-through organizations to take advantage of tax reform. That created a data nightmare in claims systems across the insurance industry. We could project the most likely changes that would happen so that we could deliver better results for our customers, and it was based on work that had nothing to do with either computer science or healthcare.

So, we continue this investment in basic research, and it was a radical choice as a startup going to our early investors and saying, “We want to have an internal lab that funds some basic research and partners with our scientific advisors, but we do not want it to have to be tied to healthcare. We do not want it to have to be tied to the projects that we are doing. What we want to do is train scientists.” So, we see this investment in basic research both at our corporate level and in the country, generally, from a government level as a training ground for the future innovators, whether they are entrepreneurs or engineers that are building this technology. We have been successful. We are currently bringing on a Fulbright scholar over the summer that is coming to be a part of our lab. We also have one to two-year fellowships where we bring people in partnership with our academic institutions in to do research, expose our internal scientists to that type of rigor, and then send them back to the academic sector where they can create technologies and do research in their fields of origin. Or, we can even inspire them to enter industry.

One of the reasons why we really need them to enter industry is this \$3 billion paragraph. There is a piece of a regulatory guideline that came down in 2015 requiring insurance plans to do manual outreach to doctors and hospitals to ask them questions about who works there, what kind of patients they see, and about the insurance they take. It is an extraordinarily expensive way to curate data. It is also not at all effective. By every measure, including measures that come out annually from the Centers for Medicare & Medicaid Services (“CMS”), this methodology only produces about 50 percent data accuracy on healthcare providers across the country. It does not work. It is wildly expensive. But it is also stifling innovation. Because of this paragraph, in one legislative notification that came out from CMS in 2015, companies have been forced to create solutions that are manual.

We bucked the trend and took a chance. We were lucky that we had investors that were willing to back us going against this legislation because we were

asking our customers to invest in automated technology that increases their data accuracy from 50 percent to 95 percent in the course of a week. But they had to do it while still spending money on manual outreach that is ineffective and wasteful. And so, one of the challenges for innovators entering regulated industries are policies like these that are regulating and mandating methods rather than the outcomes that we are trying to achieve. So, one of the things that I wanted to bring to everyone here, whether it is from an intellectual property perspective or a policy perspective, is that pace of change that Jeffery talked about in the beginning, and the pace of adoption will continue to increase. But if we have policy and regulation that requires outdated methodology, we are going to stifle U.S. innovation while innovators move to other parts of the globe that do not have those similar regulations around methodology and that focus more on outcomes.

I have three recommendations that I will leave you with. In order, from an AI perspective, to enhance U.S. innovation to incentivize cost-savings, but also to create the kind of commercialization from regulated industries that can make the economy grow, focusing on results and not methodology is critically important. Removing the regulatory hurdles that we talked about and incentivizing cost-savings [is crucial]. From an intellectual property perspective, there is one thing that I would add after listening to everyone here today. So, I know a question that I am going to get around AI and intellectual properties will focus on algorithmic protections. Well, 80–90 percent of what we do is more traditional than that. There are systems that we set up, data processing, data cleansing, some hardware components, the way we architect our cloud architecture, all of that is very protectable. I do not think we have to have a race to change the intellectual property infrastructure to meet AI where it is today. However, I think looking at growing the industry as a whole is a good first place to start, because so much of what we already do is protectable. The things that are holding us back are workforce and regulation. So, if we can lift those barriers, I do not think we are going to have an intellectual property problem, I think we are going to have flourishing industries here in the U.S. Thank you.

*[Applause.]*

EVERARDO RUIZ: Nice. We had a saying at MIT, “Tell me how I am measured, and I will tell you how I will behave.” So, that was interesting commentary on something that at first seems like, “Oh it is simple. There is only one paragraph of policy [I need to follow].” Well, \$3 billion for 50 percent? I can flip a coin for free, right? Well done. We now have ten minutes left for various questions. So, I will kick it off before everyone else jumps in.

Everyone has some protectable technology, some of which is just held secrets, some of which is patented, it really depends on the industry we are talking about

here. There is more and more software and ideas and now, in theory, with the internet, it is able to just disappear instantly. Can you talk about trade secrets and what advice you would give other innovators for going forward? How do you protect trade secrets given that they are just so amorphous?

MATTHEW BYERS: In our business, it is not really amorphous. What I am teaching the different divisions in our company, is that the managers need to look around at the processes that they are engaged in, and they will decide what they do not want to share with the outside world. They just make a business decision. Then, since it is a trade secret, it must be maintained as a secret. If you do not maintain it as a secret, it is not a secret and it is not actionable. So again, in the manufacturing environment, you put up barriers, you put up signs. You just do these things that are practical, but it is a business decision in our world.

MEGHAN GAFFNEY BUCK: I would say, in our perspective, it is more about looking at what qualifies as protectable and what might not [qualify as protectable]. It is an investment decision of how we want to spend our dollars. I listen to my lawyers when they weigh what is likely to be protectable against what we should keep as a trade secret.

PAUL R. ZIELINSKI: From the federal side of things, we are not really able to keep per se a trade secret. I mean proprietary information we can protect, and in fact, in that green paper we talk about the ability to maybe extend the period of time during which we can protect that information in order for it to reach the intended market. But, in the long run, we want to make things available, so trade secrets are not really our area.

G. NAGESH RAO: From my days in the private sector, the rule of thumb I would always use with the engineers and our intellectual property counsel was if piece of technology could be reverse engineered, then go for the patent. But, if it can really be kept a secret, then keep the trade secret. There is a benefit to open innovation and there is a benefit to closed innovation. So [our goal was] to just understand what particular piece of technology we were working with so as to determine the right property right for it.

PJ BELLOMO: So likewise, a patent would be an exception to the rule: seventeen years, mostly software, keep it a trade secret. The reality is, for us startup folks, the hardest thing actually is not the engineering. In my experience, the hardest thing is sales and marketing and scaling the business. So, you could spend all your time trying to get a patent, and in the meantime, someone beats you to market. So, it is an exception.

PROFESSOR NEEL SUKHATME: I will speak from the perspective of my startup. We have five issued patents. So obviously, as a patent attorney, I recognize the importance of that. But I also recognize that patent law changes over time. What might be patentable now may not be patentable in the future. You have to diversify your risk, and so, we have been careful to make sure that

we have core technologies protected by patent law but also core components that are essential to making our business work, protected by a trade secret. So, I think there is a notion of diversifying that is important and having both patents and trade secrets is a way of dealing with that.

EVERARDO RUIZ: So we have Neel Sukhatme here from Georgetown, PJ Bellomo from Blue Sources, Paul Zielinski at NIST, G. Nagesh Rao over at the SBA, Matthew Byers from Zoeller Pump, and Meghan Gaffney Buck from VEDA Data Solutions. Please feel free to ask questions.

MISSIONARY RANGE: Thank you. Hello, I am Missionary Range and I am the intellectual property owner of “Black Lives Matter,” “All Lives Matter,” and “Blue Lives Matter”; all of that is my work and it was a sermon. So, I am asking this question, but it is not based upon my intellectual property. My question focuses on Blue Sources and Flint. How is Flint using your technology and have there been improvements in the water in Flint, Michigan?

PJ BELLOMO: Thank you for the question. They are not, but in their defense, I will say that the U.S. Army put the technology out years ago. It was the first-generation technology used in a limited range and our second-generation technology has only been available for sixty days. So, we are new to the market and no one knows about us. We are trying to land the first few customers and then expand either to Flint or any place else.

But first-generation technology is in use in other cities around the United States. As a security technology, it is interesting, [because] people typically do not like to tell you what they are using as a defensive mechanism. So, the cities that are using this technology, most of them are not advertising that they are using it. It is almost like cybersecurity; you do not tell the bad guys what you are doing to protect your IT assets.

MISSIONARY RANGE: Is it lawful for the water not to be clean in Flint?

PJ BELLOMO: I do not know enough about the Flint situation to speak in any type of detail. But, I would love to talk to them if they want to talk to us.

EVERARDO RUIZ: Other questions?

DR. CARL J. SCHRAMM: This is for Paul. I read the green paper from cover to cover. I have just one question: Has there ever been an honest to goodness study of the Innovation Corps (“I-Corps”)<sup>13</sup> and its effectiveness?

PAUL R. ZIELINSKI: I am not aware of one. I know we have questions about that ourselves and we have been talking a good bit. I talked about the different

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<sup>13</sup> *NSF Innovation Corps (I-Corps)*, NAT’L SCI. FOUND., [https://www.nsf.gov/news/special\\_reports/i-corps/](https://www.nsf.gov/news/special_reports/i-corps/) (last visited May 29, 2020) (explaining that the National Science Foundation Innovation Corps (I-Corps) exists to prepare “scientists and engineers to extend their focus beyond the university laboratory” to accelerate NSF-funded research projects to commercialization).

workgroups and some of the ideas behind putting together some level of evaluation. I mean the biggest thing that I see reported right now is how many teams have gone through the system? However, the real question is, how many of those teams have been effective? But I do not have any data like that.

DR. CARL J. SCHRAMM: Even the premise seems confused. I have heard [I-Corps] advertised several times as focused on getting people in the middle of their careers with PhDs or PhDs and MDs and taking the career scientist out of the laboratory, and apparently America will be better off if we teach them how to become entrepreneurs.

PAUL R. ZIELINSKI: Well, its original start is actually tied back to SBIR. So, the original start of I-Corps actually came out of a funding program for National Science Foundation (“NSF”), SBIR recipients in order to improve their level of success in reaching the marketplace. That is actually where it came from and what its origins in terms of funding by the NSF were. Now, it has changed a bit since then and there have been many teams.

G. NAGESH RAO: Yeah, so, there has not been an honest to goodness assessment on the I-Corps program yet. That is correct. But I think what is also interesting is that it has only been a few years. I-Corps is still in its nascent stages.

DR. CARL J. SCHRAMM: Well, actually, the green paper says it has been in place for almost a decade.

G. NAGESH RAO: Well, it depends. From an NSF perspective, yes. But remember, it is an à la carte approach. Every agency that has adopted some I-Corps-like program has approached it a bit differently, and I think that is one thing to keep in mind. Since it came out of the SBIR program and then a number of agencies were adopting it, there are a number of different mission needs to consider. So, like the SBIR program, there is an à la carte approach. You have granting agencies like the Department of Energy, National Science Foundation, Health and Human Services where the technology commercialization pathway to success is just to get the technology out to the market; that is their mission at the end of the day. They just want it out there for the good of the public. Whereas with agencies like the Department of Defense and NASA, they do not operate on a granting perspective for the SBIR; it is contracting. The reason why is because at the end of the day, Defense and NASA, they are looking to acquire that technology; it is an acquisition perspective. And so, it also creates a delineation with the small businesses. Do you wish to be a high-tech small business company? Maybe the contracting vehicle is the way to go. Do you wish to be a startup that actually scales up and grows? Maybe the granting [vehicle is more appropriate]. There is that delineation. Not every startup is going to be a small business, not every small business is going to be a startup. But having that à la carte, diverse approach and enabling that across the American economy

has proven to be pretty successful so far. Now, it is going to be interesting as we become more globalized economically and with the other countries' approaches to this effort. But the one way I think the U.S. has stayed on top from that perspective is by maintaining its non-dilutive stature and not taking equity. I see Singapore doing it, I see Taiwan doing it. I advised Sri Lanka and Vietnam on that perspective when I was an Eisenhower Fellow back in 2016. They both took my option, chose not to take an equity stake, and allowed the free market to play because, at the end of the day, the free market is democratic in nature.

EVERARDO RUIZ: I wish we had more time. We could go on for hours on these topics and as we can see it is all very nuanced. Let us thank the speakers for what we have established with respect to what is currently happening and then we will talk about the next five years with the next panel of speakers.

[*Applause.*]

AMI PATEL SHAH: Good afternoon everyone. We are going to get started with our afternoon panel. It is about the next five years and where we are going. For those of you that are here to learn about case law, 101, PTAB, you are at the wrong meeting. This is more about thinking at a macro-level about where our country is going and where it needs to go; it is not looking at the micro-level. I would like to focus our question and answer portion, our agenda, and where we want to go at the macro-level so that our country moves forward in the next five years and, hopefully, the people on this panel and those in the audience will then work at the micro-level to get us there. I hope to have a very fruitful dialogue amongst us.

The second panel is going to involve questions, comments, and disagreements on how we are going to move forward. I want to get started with how digital innovation is giving rise to new business models. However, as the previous panel has explained, regulations are not keeping up quickly enough with the technological changes that we are seeing in the industry. So, what we want to focus on in the next few hours is: what are policymakers and regulators to do, and how will we get there to ensure that our country moves forward in the next five years and keeps its lead in innovation?

I want to start with a *Forbes* article that recently talked about the new digital era, the post-digital era that talks about the new technologies that are coming to the forefront, including blockchain, AI, augmented reality, virtual reality, quantum computing and on and on. There are plenty of technologies. What are we doing based on patent law? How is patent law keeping up with this post-digital era? If you really deep dive and look at what those four technologies are, they are pretty much software, data, and computer-driven. So, what are we doing to keep up with that in the law and what are the companies doing? I want to start out with Patrick Kilbride. What is the Chamber of Commerce doing and what

does it see from an American standpoint?

PATRICK KILBRIDE: Thank you. It is great to be here and congratulations to IIPCC for the initiative. This is always a great conference every year. As we look at where our economy is heading, my division at the U.S. Chamber of Commerce is focused on intellectual property and innovation. I think the core work that we have done in the intellectual property area on patents, copyrights, trademarks, and trade secrets is really going to come to be seen as the tip of the iceberg in a twenty-first century knowledge economy. We are going to be much more focused in the future on other intellectual assets, know-how, information, and data. We are going to need to do a much better job of bringing the same discipline that we have brought to conventional intellectual property rights and applying that in creative ways, where necessary, to a much broader range of intellectual assets.

It starts by discreetly identifying those assets. By being able to account for them and finding ways to appropriately define ownership rights around them and how to enforce those rights. Then we need to create the markets for the know-how, the information, the data, the relationships that encompass that broader understanding of intellectual capital. This is going to be necessary because we have seen [a change] in the last thirty years. In 1986, 86 percent of all corporate assets were physical, plant equipment type assets. Today, it is exactly the opposite; 86 percent of corporate value is now invested in intellectual capital. But we still do not know how to take care of that, and in most of the world, they have not even got the basics right, such as patent and copyright protection. So, if we think of conventional intellectual property as addition and subtraction, we need to be ready for calculus.

AMI PATEL SHAH: Thank you. As a follow-up, on the previous panel a gentleman from NIST talked about how most of the current innovation that we have is government-funded, as well as intellectual property protection and what the government led to. But some of the data he pointed to showed that it is even keel, or it is even negative, and innovation is going down, and that government funding has stayed flat. So, to Professor Schramm, what does that mean in terms of economic competitiveness, and what are we going to do about that? I know you had asked a question previously.

DR. CARL J. SCHRAMM: My question was focused on if we had any objective understanding of the I-Corps program or if it was doing anything. I mean, the government seems to bring that out of the rigging like *deus ex machina* that will solve problems, that will, in that case of the NIST green paper, make federal employees more entrepreneurial, which is something to contemplate. I often joke that the last time we had entrepreneurial accounting it was Enron that turned out. Anyway, the point I get to is this: a long time ago, in the George W. Bush administration, I chaired the panel that measured entrepreneurship in the

United States in the twenty-first century to see how we were doing comparatively. We could not get to a finalized answer because we cannot even measure entrepreneurship in the United States, and you saw in the [previous] presentation that it is all surrogate measures. But what we could get to is that the hardest measure is headed downward. So, to get to where I think your question leads, [we should ask] what can we do about this? I now see this from two perspectives: one [perspective stems] from the research we did at Kauffman around innovation and entrepreneurship, and the other is a professor's perspective. And I think, in an odd way, we have made too much of intellectual property, at least in the eyes of proto-entrepreneurs. They are all thinking constantly about the idea, and the protection of the idea to the point where the quality of the idea is often lost. I will end my remarks by saying that one of the most tragic things I have experienced in my new professional career as a professor involved a student describing a great idea. He thought it was a great idea, but when he ended his presentation to me he said, "Do you think the government will let me do this?"

AMI PATEL SHAH: I will now move to Andrei Iancu. Will the government allow us to do this in the post-digital [era]?

DIRECTOR ANDREI IANCU: Obviously, the government does not stop people from doing something in that context. It would just protect them from others doing the same thing for a period of time. To address the NIST green paper, that effort is obviously focused on government-sponsored research and how to transfer that government-sponsored research either from government labs or university settings, where government has funded at least part of the research, into the private enterprise. Government-sponsored research in the United States is approximately half of all of the R&D in the United States. The other half, more or less, is provided by private enterprise. Historically, one of the greatest advantages this country has had is private enterprise and the fact that we have a free market system backed by a strong intellectual property system that can create independent, privately funded R&D. Think about Bell Labs as a very good example of that and many other institutions like it.

Unfortunately, I do think that over the past few decades, privately funded research has not increased at the rate that it should. Again, we have seen in the past few decades the demise of major research and development private institutions, less investment in private R&D by certain large entities, and less focus by small inventors to do their own [R&D]. That is problematic because, frankly, we cannot compete with China, for example, at the state level, and we do not want to compete with them at the state level with respect to investment in R&D. We want to do the best we can, but really, our forte is in the private side, and as the panel goes on, we can explore how we can incentivize more and

more private research. I do believe that strong intellectual property protections and reliable, predictable intellectual property systems are critically necessary ingredients to incentivizing private R&D. When your student comes to you, it is not a question of whether the government will let him do it. It is a question of whether the government will protect what he has done, since, without that protection, it is less likely that the student will focus his energy and effort on developing that project as opposed to some other project, or that he can attract investors to invest in the project. We want to make sure that we do what we can to incentivize private developments as much as possible.

AMI PATEL SHAH: I have a follow-up question, but [Mr. Ragan] I want to ask you, what is Teva Pharmaceuticals doing in the pharm and bio industries? Also, where do you see it going in this post-digital era?

COLMAN RAGAN: I guess where Teva would come in is that we are one of the private engines of R&D. We are a pharmaceutical company, so the R&D that we do is mostly funded by ourselves, by the sale of our products turned back into R&D. The amount of R&D in the biopharmaceutical space that comes from government funding probably is less. There is still some, but that is the smaller engine. You have the source coming from startups that companies will acquire and then they will take the next leap and there will be further innovation to deliver the product to the market. So, where we come from, what we are seeing right now in terms of innovation is less innovation at the startup stage. There are fewer assets for us to go and bring into our company to take to the finish line. So, that means that we are going to need more organic R&D and to spend our own money to grow the next products, the next therapies for patients. In our space, that is kind of what we are seeing; that is where we are in the cycle now.

AMI PATEL SHAH: I want to follow up. Director you talked about having predictability and reliability in intellectual property to have a great eco-startup system. You know, we have seen a lot of changes in the last five years and I do not know if as an investor in patents, where I believe patents are a property right, that they are an asset per se but that reliability and predictability has completely vanished. I just do not know if the asset that I invested in four years ago is still an asset four years later. If you see where the indications in markets are going or the new innovations, you see that it is reflected there. You have made great strides, Director, coming up with the Section 101 rules and changes, but yet the agencies that are implementing those rules are not implementing them, or, in the *ChargePoint* case,<sup>14</sup> completely disregarding them. And so, how does that work if they are going to disregard these changes? My big concern in this post-digital world is all the new technologies are going ahead, and people are not patenting them and therefore, they are not available. And I do want to get to the next

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<sup>14</sup> *ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759 (Fed. Cir. 2019).

section about when people decide to keep things as trade secrets as opposed to keeping them open so that we can grow on the technologies that they have patented. Most new technologies are software-based, yet software is not patentable or there is a perception that this is not allowable.

DIRECTOR ANDREI IANCU: Very good point. I will save some of that, especially in the second part of your question, for the next section and my discussion of the huge benefits of having a patent system as opposed to keeping things as trade secrets. In terms of reliability and predictability of intellectual property rights, it is absolutely necessary. Like any other instrument, you want them to be reliable. You want the dollar bill to be reliable. You want the financial systems in the United States to be reliable. Likewise, you want the intellectual property instruments to be reliable. And, obviously, as you have indicated, we have lost some of that in the past number of years, and we are trying to bring a measure of that back.

As it happens in the United States, we have a divided government. We have three independent branches, and that has significant advantages. However, a result of that is that the judiciary is fully independent. Again, on balance, I think that is a very good thing, but they do not have to follow our guidance. The Article III courts can look at what we do at the Patent Office, and they can agree with it, disagree with it, or ignore it completely. We will see what they do with the recent guidance we issued on Section 101. The fact of the matter is, it is fairly new right now. We, at least so far, have not seen the courts commenting on them directly, one way or the other, in any meaningful way, and at the same time, I have not seen any change in approach in their recent cases that have come down. You mentioned the *ChargePoint* case.<sup>15</sup> There have also been a number of other cases. The *Athena* case,<sup>16</sup> for example, on the bio side. They are on the same path, and they have been for a few years, and we will see what they do. I will say this though: I think our guidance that we issued in January of this year is working extremely well at the USPTO. Our examiners understand it, they get it, and it makes a lot of sense to them. It really has lifted a huge burden off of their shoulders. It does not solve the problem completely, but it certainly makes the analysis much more straightforward for them, much more consistent and predictable. That is a very, very good thing.

I will also say this: the status quo prior to our guidance is simply not tenable. I cannot imagine a world where we would have to go back at the USPTO to the situation we had prior to our guidance. It is simply no longer a tenable situation. We have 8,500 examiners; we see hundreds of thousands of patent applications

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<sup>15</sup> *Id.*

<sup>16</sup> *Athena Diagnostics, Inc. v. Mayo Collaborative Servs., L.L.C.*, 927 F.3d 1333 (Fed. Cir. 2019).

a year and probably over a million office actions a year. Decisions have to be made all the time, and the way Section 101 was before our guidance, there were no standards, and there was no particular framework to follow. It was not a predictable approach by our examiners in light of the case law or for our applicants. I think we have solved that, and I think the framework we have is a very good one. Hopefully, we can keep doing it. If the courts do not adjust, and again I see no evidence that they are on a path of adjustment, the only thing left is for Congress to step in, and I do know that there is a current effort to address that situation. But I am quite hopeful that we have finally turned the corner on Section 101.

COLMAN RAGAN: To follow up on the Director's remarks, first of all, thank you for trying to clarify the [Section] 101 issue at the Patent Office. I would agree that the courts are confused and maybe that Congress is going to consider what to do with what is or is not patentable, but in the biological sciences sector, to go back to your question of what is the value of my intellectual property in four years, I do not know. Now, I do not think that is an acceptable answer and it goes back to what I was saying [about] where we are in the cycle. When I look at the next generation of medicines that the folks in this room will take, it is not just the patents or the innovation on the pill or the product itself, it is the interface of potentially using artificial intelligence to get to more personalized medicine. If we are going to hit the Cancer Moonshot from former Vice President Biden, we will need more unique approaches to delivering medicine and we are going to need a robust, predictable Section 101 so we know what to invest in and that we can foster innovation in the next group of scientists coming out of universities and labs. While Congress is looking at Section 101, and I think is hopefully going to do good work there, [with respect to] some of the other patent legislation that is out there, we do need to make sure that we are not accidentally devaluing innovation in other ways, too. When we look at patents, we need to look at them as a whole.

PATRICK KILBRIDE: I will just add a couple of points. First of all, I think worst case, the Director and his colleagues at the USPTO have provided a backstop to the erosion that we have seen, thereby preventing it from becoming an avalanche in terms of reduction of reliability of the system. Best case, they have actually started to take back some ground, and that is because getting the rules right is one thing, but you also have to get the rhetoric. Reliability depends in large part on market psychology; the market needs to see that the political system believes in the patent system, and with strong leadership at the USPTO, we have a much better chance of doing that. I start all of these conversations with the reminder that money is fungible, and capital is a coward, and if the goal of our intellectual property system is to allocate scarce resources to innovative activities, then we need the means to provide a path to return on investment for

those resources. That is what we have done so well in the United States, not just in the intellectual property space, but throughout our economy, as we have taken private sector resources off the sidelines and put them into circulation for the benefit of economic growth. But in the intellectual property space, that is tougher, because possession does not have the same significance that it does in terms of physical assets. We have to be able to define property rights and assign those rights so that people can possess knowledge, data, and information in the same way that they can plant and equipment. That is what we are working toward. That is what gives me confidence, because long term we have such a great track record in the United States of getting this right.

So, what have we done well? First of all, we compete. Second, we enable failure. We empower risk, we provide rule of law, and then we make markets. One thing we have not done well yet is make markets for our intellectual property assets. That is why it is so discouraging sometimes to see these attacks on licensing models that prevent active markets for intellectual assets. As I said at the outset, I feel like we are just at the tip of the iceberg with this; if we cannot license and make markets for the patents and copyrights we have had for a long time, how are we going to do it for a set of much more intangible assets that are going to define corporate value in the future?

DR. CARL J. SCHRAMM: I do not have much to add to this except after having done a huge amount of study of this at the Kauffman Foundation, we came up with a view that was not uniformly embraced by universities, and it basically was the free agent idea of how a principal investigator could get intellectual property discoveries into commerce. I think our estimate is that just having the university tech transfer offices involved creates a choke point with respect to this; it may delay the transfer of intellectual property into its first commercial formations by as much as three years. This is really a central issue because, and I am not a patent attorney so I cannot speak to this, from the outside, it looks like there is confusion as to who actually owns the intellectual property, and this issue was not around when the Bayh-Dole Act was passed. I think it has become an aberration from what the public policy intent was in terms of who is the owner. Now, I travel to visit universities constantly and it is actually quite shocking to go into a university technology transfer office. I have Johns Hopkins Medicine in mind at the moment and I see phalanxes of people, almost, it appears, as many people managing paperwork there as are actually principal investigators upstairs in the wet labs. With respect to the question, what is I-Corps about, we do not have enough people upstairs in those wet labs, as I suspect you have a sense of based on your comments in the Teva situation.

AMI PATEL SHAH: We are now going segue into another area. So, the new currency seems to be data as we all know. Companies are making money hand

over fist from our data. It also does not seem like the old intellectual property protections of copyright, trademark, patents, or trade secrets are working. So, what is going to be the new form of protection? Do we need a new form of intellectual property protection in this current age where data seems to be the new currency? I want to address these questions to the Director first.

DIRECTOR ANDREI IANCU: Those are fantastic questions. First of all, folks are referring to this as the fourth industrial revolution, but whatever the name is, we are definitely on the cusp or the front-end of new technologies that are hugely transformative. AI, quantum computing, blockchain, biotechnology, and so on. I first want to observe that there is a lot of convergence going on in industry, and it goes in multiple different ways. You mentioned that in the biotech industry, there is huge convergence between the biology, the sciences themselves, and the computing industries. Much of the innovation there involves how you process with powerful computers interesting new statistical algorithms, for example, huge amounts of DNA data. There is a lot of convergence there. There is convergence between computing artificial intelligence and the automotive industries for self-driving vehicles, and on and on. As a side comment, there are folks who will say, "Well, do we not need two patent systems, for example, one for bio, one for tech?" I think there are many, many problems with that, one them being this huge convergence.

Another question is what about intellectual property vis-à-vis all these new things. I will first observe that some of the problems we are having right now, they go straight to the heart of these most modern of technologies, and we'd better get our act together quickly because it is one thing to be losing a race with respect to technologies of old, but it is an entirely different situation when we are faced with the proposition of potentially losing the race to the technologies that are going to be critically important in the next few decades or century. Section 101 is just one example of where we need clarity when it comes to software processing, data processing, bioprocessing, biotechnology, and the like. It is critically important that we get our act together on these technologies of the future. Second, we need to ask, what forms of protection are there? The traditional forms are still available and, theoretically, if we get our act together, they should work on these new technologies. By the way, it is an odd situation that we have some people questioning the patent system when it comes to the processing and analyzing of data but not when it comes to the patenting, processing, analyzing, or manipulating of any sort of other material. The data in today's world is the same as grain used to be in the agricultural world. It is the currency of today's technology and the future, so we have to make sure that our systems operate as they should vis-à-vis these new types of technologies.

Now, there are certain gaps that current intellectual property systems leave open. So, the data itself is not protectable by patents, copyrights, or trademarks,

but it is protectable through trade secret regulations, and a lot of companies are keeping their data sets proprietary and under heavy guards through trade secrets. That works for many of the data forms that are out there, but it is not necessarily a good thing because if you cannot share the data, it is very hard to train your artificial intelligence and machine learning programs. Other countries might have an easier path toward that. We also have to be very mindful of privacy protections and the like. There is a question as to whether, in addition to trade secrets, there is some other form of protection that might work here. Some folks are discussing data protection systems, the analogy being the data protection that exists in the biopharma area, where we have five years for small molecules, twelve years for biologic data and the like. It is not a perfect analogy, but it does raise a question as to whether we can develop some form of new data protection that incentivizes companies to share [data], potentially with some exclusivity, for a limited time with the benefit of getting additional protections. That would be something that Congress would have to act on, but we have to make sure that we address this issue because some countries, like China, do not have the same constraints that we have in the United States.

COLMAN RAGAN: So, what the Director was saying is in the pharmaceutical arena there is an exchange in terms of disclosure. For example, you have a patent which discloses how you make and use something, you get your protection and your negative right that people cannot practice your patent, but you have taught the world how to make your patent. We have something similar with the data that gets generated. For example, if Teva has a brand-new drug, we generate reams and reams of data on toxicology, how a molecule binds to receptors, how safe that molecule is in patients and what indications it is used for, and so on. That is tons and tons and tons of clinical data. The exchange is, I get my five-year regulatory exclusivity if it is a small molecule, twelve years if it is a biologic, to sell my product, make my money back, and recoup my investment. In exchange, the generic companies or the biosimilar companies, they get to rely on my data, such as my safety data and my toxicology data, and bring a new product to market. They may also find some insight; they can run AI and see whether or not there is a new correlation in that data and a new way to use a product. So, there is this exchange that if we disclose our safety data and make it available to the public and anyone who wants to file a new application, then we get a regulatory exclusivity. I think that is what the Director was talking about, that there is a system in pharmaceuticals to share data, such that others coming later on can use it. That is how we use data in our industry, and it has worked. We have had a robust pharmaceutical industry and a robust generic industry because of this sharing of data and the sharing of our patents as well.

PATRICK KILBRIDE: I actually think that is a great microcosm for the

broader discussion about trade secrets because what I see is an industry divide between those industries whose intellectual property lives in the product that reaches the market—the consumer-facing product—and those where the intellectual property lives inside the company within the platform but is not delivered to the consumer and so maybe it is not as vulnerable to disclosure or reverse engineering. So, you have seen that those companies whose intellectual property lives inside the house are more cavalier about patent protection, meanwhile, the other industries like biotech, pharma, the movies, music, they depend on actively enforced intellectual property rights. I think what we are going to see is more and more dependence on trade secrets as intellectual and knowledge assets form a bigger part of our corporate value and our productive assets because if people do not have to disclose, they really do not want to. I think we get ahead of ourselves a little bit when we talk about defining new rights before we have really done a good job of defining the assets. To me, that is the first thing. Let us define the different types of assets we want to protect and the categories that we put them in, then we can talk about what ownership means and what exclusivity means. Maybe then all we have to do in some cases is recognize that companies have these assets and allow them to capitalize them instead of expense them on their balance sheets so that they can leverage them to access financing, that might be enough. In the biotech case, of course, they are getting it two ways: they have to disclose their know-how in the patent disclosure and then they have to give away their trade secret and their company knowledge on the regulatory data side to prove their products are safe and effective. Meanwhile, the government wants to give it away. It would be akin to telling Google it has to submit its algorithm so that the government knows it is doing the right thing and then publishing it for everybody else to use.

AMI PATEL SHAH: There is an economic impact to sharing this data, right? We have a robust pharmaceutical industry because of that. Professor, I want to ask you, what would be the economic impact if we were able to have this as opposed to companies keeping trade secrets? What if the data was shared and we were able to protect it?

DR. CARL J. SCHRAMM: Well, it is a double-edged sword in a sense that we are constantly trying to push the volume of innovation forward, so every type of question like this has to be seen through the macroeconomic perspective of what are the incentives we are setting up for people? This is often missed by regulators. It is something we have been tangling with in Washington for thirty-five years, in terms of what are the signals we are sending into the macroeconomic system with this regulation. I think one of the other panelists touched on it in terms of the issues we have with China, for example. We are constantly trying to figure out what is in the best interest of the economy in a global competitive situation, and these are examples that we are talking about in

terms of the data inside the pharmaceutical industry, but in a sense, [Mr. Kilbride] raised the question about Google and its algorithms. That is a topic that we actually never probe because it is just off the charts, but it has huge implications from a macroeconomic perspective, as well as for global security issues.

AMI PATEL SHAH: I was not thinking of Google's algorithm; I guess for me, when I was thinking data, I was thinking about Facebook. I give permission to Facebook to collect my data. They are then aggregating that data and selling it to third parties. That is the data I am referencing. People are profiting from it and keeping it internal and that is being done algorithmically or however they want to contain it, but that is not a proprietary for them. That is all of us giving permission to these third parties and these companies aggregating it using AI tools, using these new tools and then selling it and profiting from it. So, how does that work? Would that be something that we could protect?

DR. CARL J. SCHRAMM: One of the places we are going to run into this that is going to be very cumbersome is around AI and healthcare. We all have an interest in having every clinical intervention get stronger and stronger and we have been talking about this for years. We have been talking about how we are going to do artificial intelligence overlays on population data. But as we get closer and closer to it, it does raise issues, enormously complex issues, about patient privacy, individual privacy, who gets to know all this information. We are trying to solve this because the government is pushing forward several incredible agendas. One is we are going to have price regulation on a population basis. A subset of that is we are trying to solve medical problems now for social exposure and social diseases, and that energizes these questions about all kinds of intellectual property around food and the microbiome, what the nexus is to human health, and how we do this on a population basis and on an individual therapeutic basis.

AMI PATEL SHAH: I have a follow-up on that; so, is the government staying ahead? Do you believe the government is staying ahead with all this movement that is happening within industry? Going back to my original question, I do not know if the regulators are staying one step ahead of what is happening within industry; I personally think they are miles behind.

PATRICK KILBRIDE: I will say that I believe we are all behind the curve on data. As individuals, we were very slow to realize the value of the data that we have been disclosing; we want to get every new app and access to things so badly that we give away that data. But we are coming to realize that it has tremendous value both to the people that want to aggregate it and to us in terms of our privacy and our rights down the road. So, I cannot blame government, since I think everybody, except the people who are out there actively collecting

the data and seeing it, has been slow to respond.

DR. CARL J. SCHRAMM: To touch on the question posed, I think the answer is very lumpy, and it has everything to do with industrial organization. For example, in the healthcare area, there are hundreds of thousands of startups that are trying to chew away a little bit at how you apply AI to specific data sets. So, there is this flurry of innovative AI in use there. We then move to other parts of the economy and there is already so much aggregation of data that there is no competition that is going to happen at all, take Google for example. So, I think the answer to your question is very lumpy, and it depends on a lot of the science inside these various industries and also their respective positions in the market already.

DIRECTOR ANDREI IANCU: That is a very good point; I agree with the lumpiness. As a general proposition, when you do not have intellectual property types of protection available and instead you rely on secrecy, such as with data sets or even the technology that people are now beginning to keep secret because they are afraid that it is not patentable under Section 101, for example, as a nation, you slowly begin to fall behind. This is because it drives toward a concentration of resources. It creates bigger and bigger lumps, to use [Professor Schramm's] words.

Take the data example. The way to train machine learning and artificial intelligence programs is to run huge data sets through them over and over and over again, so that they can learn. Well obviously, the bigger the company is now, the bigger the data set they have now, and the better they can train their algorithms. I use Google, and just the other day, while I was signing in, it wanted to make sure that I was not a robot, and, to make sure of this, it asked me to identify which of the nine squares it provided had vehicles in them. I click on the correct squares and Google collects that data set. I am being a guinea pig for them while they are verifying that I am not a robot. Obviously, Google can do that with millions upon millions of people, and it can collect a massive data set, which it can use to train its artificial intelligence programs and make improvements. Now, imagine a small startup. Where does the startup get that data from? That is just a tiny example. But this makes it much more difficult to democratize innovation. One of the things that this country was so great at in the past industrial revolutions was democratizing innovation and spreading it all around, and this created this flurry, this explosion of innovation. We have to be careful that we do not put ourselves in a situation where we revert back to secrecy that ultimately drives toward the concentration of resources. I do not have the answer for the intellectual property, other than trade secrets, that would be needed vis-à-vis data sets. It is a highly, highly complex issue, as the Professor mentioned, especially with privacy and the like. Having said that, industry and government really do need to start having that discussion in great

detail.

PATRICK KILBRIDE: If I may, the way to combat secrecy is to make a trade secret too valuable to hoard. When you create a right around an asset that allows its value to be transferred in the market, then there is a value to sharing it with others. Absent that ability to capture value and allow its transfer in the marketplace, the only answer is to hoard.

AMI PATEL SHAH: That is a great segue to my next topic, which is going to be entrepreneurship. As the Director mentioned in his last statement, Google has access to all of these data sets, but what is a small startup to do? Where are startups getting this data? How are they going to get into it? I am going to start with you Professor Schramm, is this the best of times or the worst of times for innovation in the U.S.? I look at the situation and think, you could get a software engineer in India, you could get manufacturing in China, you could get design in Silicon Valley, you could put it together and you can go, and everything is readily available. Is that not a great thing for us? If it is, why are we being stagnant when it comes to innovation?

DR. CARL J. SCHRAMM: The one thing we cannot quarrel with is it appears as if we are being stagnant. The good news is we are less stagnant than all of Europe and most of the rest of the world. Our great question mark is China. Also, when it comes to secrecy, we cannot really judge that. If you take all of that as a predicate, let us return to where we are in the United States. So, is this the best of times or the worst of times? We can get all this free programming, or almost free programming, in India. It is almost as if this is the best of times in the world, but what is the United States' job in this? In a sense, our advantage has been that we can steer all those resources to an enterprise system in the United States that is very, very good at making new businesses. But even there, the data is becoming very, very worrisome. That is to say, we now start thirty percent fewer businesses than we did twenty years ago. So, if we were to look at the advertising about America, the words enterprise and entrepreneurship have sort of become descriptors of American culture. But in fact, if you dig down into the data, this may be very, very misleading and I think one reason is because we have become very formalistic in how we think about entrepreneurship. Thirty-five years ago, the man or the woman down the street starting a business was never described by his or her neighbors as an entrepreneur. The word was not in the discussion of governments. It was a person who started a business, and there were many more of them. There are estimates that almost fifty percent of veterans returning to the United States after World War II started businesses. It was not a unique feature of a person's life, or our shared culture.

Now, it is completely different. In fact, we have programs in universities that are set up to encourage people to become entrepreneurs. They also have majors

in entrepreneurship, as if it was dentistry or accounting. I do not think we are doing very well there and there is no canon of knowledge. The last point I will make about this is, empirically, we focus on twenty-year-old college students. But many more people who start businesses have never gone to college, and that may actually be a cultural aspect of people who do not go to college; they may think that this is their way up. But to return to the age, the average entrepreneur in the United States is thirty-nine years old when he or she starts their first business. So, why are we selling this as a young person's prerogative?

AMI PATEL SHAH: The Executive Chairman of Blue Sources actually made a similar point in the earlier panel, that people who have started businesses are considered not qualified because they do not have a PhD. So, if that is the case, I will ask you Mr. Kilbride, what is the industry doing to curb this fail in startups?

PATRICK KILBRIDE: First of all, what industry is doing mostly is helping to create the preconditions for investment and economic activity. There is a certain degree of regulation that helps make functioning markets. There is a role of government in identifying, establishing, and enforcing property rights. Those are pro-economic government activities. Then there are others where government gets in the way, where government is setting up roadblocks to economic activity. And so, as a business community writ large, we are trying to help policymakers see the landscape from a business person's eyes and understand how these people can see a path to profitability from their small business, their innovation, whatever they may be involved in, or they can see insurmountable obstacles that will make them say, "It is better not to get into this in the first place." That is the real danger; it is stagnation where people are saying, "I am not going to take a risk." So, we want to create those paths for our small business owners or large business owners [that allow them] to take risks. Historically, we have done that in the United States better than anyone else, and we cannot forget how we got here.

DIRECTOR ANDREI IANCU: To put things in historical context, when the country was first founded at the end of the 1700s, we began with nothing other than an idea, some hard-working people, and amazing natural resources. But there was nothing in the beginning, and we were going up against a thriving world. The British Empire was at its peak. We were the new kids on the block. We have to be careful not to get complacent so that we end up in the position that Great Britain was in at the end of the 1700s; they thought they were at the top of the world and that they could stay there forever. We had hungrier people who came around, who were more motivated with a great need to get the country off the ground, and we did amazing things. Now, we have to be careful not to overregulate and not to have a system where we are twisting ourselves into a pretzel on every single intellectual property issue, and many other similar issues.

Especially since, in the meantime, you have countries like China and many, many others, including small countries that are going all-out to compete with us and to outdo what we are doing. My only point is that just because we have been and currently are at the top of the technological world, there is no guarantee that we will always be there. There are many examples in history where leaders relinquished their leadership positions, and we have to be fully conscious not to do that.

COLMAN RAGAN: I would like to highlight a statement that my football coach used to make: “When you are through improving, you are through.” We need to keep improving. And I also want to go back to one of the earlier statements questioning whether technology is getting caught up in the university tech transfer. I am not sure what the answer is, but in the biotechnology space, there used to be an ebb and flow between merger and acquisition and then out of the ashes of merger and acquisition would be many new startup companies. In this last round of innovation however, I was not seeing that as much. I do not know what is causing this and why this next round of innovation is not happening, but we do need to keep pushing forward if we want to stay on top, at least in biopharmaceuticals.

AMI PATEL SHAH: So, it sounds like we are not seeing these small companies come through, and it seems like in the last decade I have seen that large companies are not innovating. Their innovation involves buying small startups after they get to a certain point. In fact, I spent a decade at a large multinational company where we bought many companies. I know this is more prevalent in the bio and pharma areas, and not as much in tech. But, if we are not seeing that cycle that we are all so used to, then where are we in five years and what can we do to curb that? Also, what role will the government play in this? What role will the Patent Office play in protecting and helping these small companies so that they can grow instead of waiting to be acquired?

PATRICK KILBRIDE: I will go back to the return on investment initiative green paper that NIST helped lead on an interagency basis. The Chamber of Commerce’s comments into that process were that government funded research is good, private sector funded research is good. It also wanted to understand the different objectives from each and the different roles of each. The government has a role in pushing the economy in certain directions, such as by giving strategic nudges. We have economic, social, military, and broader strategic interests, and government funding helps channel academic research, pure science into those areas where they see a need and want an outcome. Private sector entities and universities generally pick up where governments tend to leave off, that is, at the applied science stage, R&D. They focus on how you take a basic discovery and turn it into a usable product. Where I see real value from

this initiative is in how it helps to define that process that comes after the government funding has left off, and before a product reaches the market. What are all the go/no-go decisions that have to take place between that university researcher who may want to leave and create the startup, the university that wants to get the revenue dollars and the recognition from having that tech transfer, the financier that might come in and wants to understand what the playing field looks like and whether they can make a return on investment, and so many others? We need to pull back the veil that makes innovation seem like an “aha!” moment and show it as a whole series of rational economic decisions where players like you and me will not say yes unless the conditions, the policy and economic conditions, support that decision. We need to pull back the veil and help all of our policymakers see innovation for what it is.

AMI PATEL SHAH: For me, for return on my investment, for my fund, if there is no patent protection, I do not loan money to the company. That happens in the diagnostic space as well as in the software, AI, and quantum computing [spaces]. I need that protection because I want to make sure that there is protection in this startup to keep them afloat. And so, it is a battle. This is why if in the next five years all the technologies are going to be in data and software and we do not have intellectual property protections, I am a bit concerned. When I was at a large company and I was looking to acquire [companies] while in-house, my whole approach was, “Well, if I buy it but there is no protection in that little module that I am going to then put into my overall big system, is it worthwhile for me to purchase it?”

PATRICK KILBRIDE: There was a terrific article in Intellectual Property Watch about a year ago. They interviewed David Hanson, the CEO of Hanson Robotics. He talked about his intellectual property portfolio in terms of the top 10 percent most valuable assets being protected by patents. But he also talked about a range of licensing deals, trade secrets, open source, and he even talked about open trade secrets where he said, “There are some things that I could publish a manual on, and other people still could not do it because the artistry, the experience that we have gained within our company over many years allows us to apply this knowledge in ways that other people simply are not capable of.” So, I think we have to extend our understanding of intellectual property to encompass that broader set of assets and portfolios. We should not always look down on trade secrets, but instead try to minimize the conditions under which a company would try to hoard their trade secrets.

DR. CARL J. SCHRAMM: So, the question we started out with was, “Where are we headed with all of this innovation or lack thereof?” Well, there is a key here that we do not understand at the macroeconomic level and it is that our economy has been reshuffling itself for twenty years. We have fewer publicly traded companies. We have much more concentration in big companies. As an

adjunct to this phenomena, this particular city has come to see itself as helping everything along. I live in America, so every time I approach the District of Columbia, I think, these are the folks who are going to change things. So, in fact, the reason I raise this is because in a previous panel we saw, I think in the green paper, this discussion about this is America's startup fund. Well, half of me smiles with that because I am an investor and the other half stops my blood because the government is picking winners. How has that gone? Not that well. What we are facing here is huge companies that actually enjoy great preservation of their respective competitive positions. The government and various administrations have done great deals to preserve those situations, especially in recent administrations, both Republican and Democrat. This is what Paul Ryan used to speak of as crony capitalism. To the extent we have that in place, that dampens innovation. We do not have a critical discussion going on in the United States about how we preserve our role in the world. As the Director rightly pointed out, we used to be incredibly vigorous in the face of enormous global resistance. We were the upstart. We had no money. We had no venture capital. Nobody was doing USAID to the United States. What do we do now? I think we need to have a national discussion that sounds something like an offensive enterprise strategy, where the country actually understands all these difficulties, that innovation is our future, and if we do not reshuffle, reorder, change the way our industrial organization is in place now, we are not going to triumph in the long run.

AMI PATEL SHAH: I want to now ask the Director some questions. The Patent Office has various programs to encourage entrepreneurs to file patents and to get their technology out there. Could you talk about some of the programs that you have and what you see coming? Also, what can the Patent Office do to encourage entrepreneurs to become more active with the USPTO?

DIRECTOR ANDREI IANCU: First of all, the vast majority of patents in the USPTO are being filed by large corporations. But we do have a program for small entities that is congressionally mandated, through which we give a 50% discount. For micro entities, which include very small entities, solo inventors, and the like, we offer another 50% from that. However, I do not think folks are making their investment decisions, their innovation decisions, or their decisions of how to spend their R&D dollars based on the filing fees at the Patent and Trademark Office. The much bigger questions revolve around the things that have already been discussed and whether the intellectual property that we do issue is something that they can rely on. Can they get the intellectual property, and can they rely on it once they get it? By the way, with respect to the question about where we are going in five years, it is not a big mystery. I believe patent filings are a leading indicator. We can see where the technologies of the future

are, where they are concentrated, and what countries are doing what.

I will give you some rough statistics. With technologies of the fourth industrial revolution, or the technologies that China identifies in their Made in China 2025 plan such as robotics, artificial intelligence, biotechnology, and the like, the rate of increase in patent applications in those technologies that matter, by American companies filing at the U.S. Patent Office over the past decade, has been 3% a year. This is not bad and is somewhat in line with the growth in gross domestic product and the like; it is not really all that surprising. In China, looking at Chinese companies filing at the Chinese Patent Office, the rate of increase in those same technologies is 24% a year, year over year, and we do not see any slowdown on their side. In addition to that, China is not the only country that is innovating at increasingly high rates. Medium countries, like Korea and Japan, and small countries, such as Singapore, Israel, and the like, are doing the same. The competition is truly global, and our 3% is not going to stand a chance if we do not up the ante. By looking at the filings today, we know where we will be in five years if we do not change the trajectory.

So what can the USPTO do? We must, first and foremost, steady the ship when it comes to intellectual property protections. Section 101 is just one example. But my view is we know the answer and what to do, so let us just get it done. Steadying this ship is not that complicated, and we have done it at the USPTO. Once we have a steady ship when it comes to the laws, investors will know where to invest and that they can rely on the system. Second, what we can and should do is broaden the innovation ecosystem. We cannot compete with China in terms of population. We need a higher percentage of our own population to innovate. Demographically, we must expand. For example, more women need to be brought into the system. Currently, only 12% of inventors in the United States are women, and that is way too low. We need to also broaden geographically. There are many areas within the United States that are not patenting much at all. Economically underprivileged communities are also not patenting much. We simply need more hands. In fact, we need all hands on deck. I think the USPTO and other entities can lead the discussion, but ultimately, it is industry. Industry and academia need to take the lead on this, and the government needs to get out of the way.

AMI PATEL SHAH: To the members of industry, how is the industry going to [accomplish this goal]?

COLMAN RAGAN: Well, I guess I will take it from the biopharmaceutical side. In the industry, I go back to the professor's statement from earlier about there being too many suits and not many people at the wet lab. I think back to when I was a researcher in the late 1980s and early 1990s, there were more people at the bench in the industry conducting research. So that means we need to be pulling more young scientists out of schools into the companies, not relying

on them finding funding. I think about this because I just did my high school's fundraiser, and we did a lot on getting more funding for science, technology, engineering, and mathematics ("STEM") classes and getting high school kids involved in innovating. As an industry, we probably do need to foster the next generation of scientists. Then, for the scientists that come into our companies, we need to foster that organic growth. We need to foster them to do the wet science at our companies rather than look to buy it somewhere because if we plant that seed, perhaps it will grow.

DIRECTOR ANDREI IANCU: The fostering of STEM innovation is the answer for the next generation. It needs to start at the youngest ages possible. It needs to start in fifth grade at least, and industry has a huge role to play here. There are schools across the country that are almost not participating at all, or very minimally, when it comes to science or engineering or mathematics curriculum and development. This happens for several reasons. First and foremost, lack of resources. Second, they do not have enough role models. Industry can participate in their local communities at the youngest ages with financial help, role models from their own ranks, and in combination with the academic institutions. I think if we have a national effort on this, we can move the needle.

AMI PATEL SHAH: Both of these issues are near and dear to my heart. I am a mentor in STEM, and I grew up in inner city, Detroit. The schools are not that great, so I have been an active participant in the Detroit school system and STEM. I am also the mother of three daughters. One is an engineer, another is in engineering school, and one works upstairs in policy. Both steps combined, I see the difference we can make. I can see the need. And if we leave out fifty percent of our population over the next five years, then we are never going to play catch up no matter who we compete with. Rather than comparing ourselves to other countries, I think we need to compare ourselves and realize we have fifty percent of the population that needs to be included. Not only that, but there was a report released yesterday detailing where most of the patent filings are happening by state. If you look at the states, it was directly correlated to where venture capital funding is going.<sup>17</sup> It is going to states on the coasts and to very few states in the middle of the country. It is going where the biotech and tech companies are located. But, you are telling me there is no innovation in the middle of the country, north and south, anywhere else, and that those states are not represented? Also, I do not know if those areas know you can patent certain

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<sup>17</sup> *What Is Venture Capital?*, INVESTOPEDIA (Oct. 13, 2019), <https://www.investopedia.com/terms/v/venturecapital.asp> (defining venture capital as a "form of private equity and a type of financing that investors provide to startup companies and small businesses that are believed to have long-term growth potential").

technologies. I do not know if the folks in the agricultural world know that you can get certain patents. So, I think we do need more education, but how do we get there? What role can the Patent Office play in this, and what role can the government play? Also, what role can industry play? I think the industry has the largest reach, so what can it do?

PATRICK KILBRIDE: In the past generation or two, half of our capabilities were left on the sidelines. We were not utilizing the knowledge, the know-how, the perspective that women bring to the workforce. But today, to a much greater degree, we are seeing women fully integrated into the workforce in a way that represents a competitive advantage for the United States because we are ahead of the curve. We have not yet seen that in our political system, but we will get there. I think at the same time that has happened, we have had a cultural shift that has not put as much value as we need to on those academic disciplines in the STEM areas that lead to innovative competitiveness. This is an area where I think our women have to say, “No, we are not going to follow men into the workforce. We are going to forge our own path. We are going to set a different set of objectives.” Let women define where innovation takes America in the twenty-first century.

AMI PATEL SHAH: I want to follow up on this; women could do this, but it is also an issue of funding, right? We need to look at the amount of funding that goes to women led companies. The funding to women led startups is 2.2 percent by the National Venture Capital Association. It is usually the venture capitalists and the investors that are asking folks to get the patent protection for their investment that they are making, but if these are the companies that are not getting it, then that is why we are seeing the lack of them from the women’s study that the Director initiated. There is a whole slew of issues there, but I know people have questions. I am going to open it up to some questions, and then I want to end with a last set.

AUDIENCE MEMBER 1: First, I have a comment. We were talking about the Bayh-Dole Act and saying that there [are] a lot of people in tech transfer offices and so forth. That is really the exception. For example, at Syracuse University, there are two people in the tech transfer office. That is much more common than what we see at Johns Hopkins where there [are] seventy-five people. So, I would be hesitant to want to change Bayh-Dole for that reason. Also, I think it is important that whenever Bayh-Dole comes up, that we also remember that it has really been the driving force of startup companies in the tech sector, including almost ten thousand startup companies with a hundred thousand people employed. It is one of the most successful pieces of business legislation ever passed since the end of World War II, and that is something to think about.

The question is to the Director. About this time last year, you were saying that

we all needed to be concerned about Section 101 and Congress needed to be concerned about Section 101. We all seem to have a part to play and now Congress is kind of doing their thing, but I have not heard you say anything about whether you support what Congress is doing or do not support what they are doing. I know there is no language there really to support, but do you still feel that there is a need for legislation? I know you said a little bit earlier, but then it sounded like you were still holding out some hope for the courts, and I do not know exactly where you fall on that.

DIRECTOR ANDREI IANCU: In the end, when it is all said and done, all three branches need to be rowing in the same direction on something like Section 101. The courts need to be part of this system for several reasons. Let us assume that there is legislation passed tomorrow redefining Section 101. It will immediately be challenged; it will immediately be subject to interpretation; and, in fact, years of litigation will ensue, and there will be a debate as to what each and every new word means in the new legislation. If the courts continue to think along the same direction, forget the words of any particular statute, but if they think policy-wise that it is their job, for example, to say that diagnostics are not patent-eligible in the United States and that we are not in the business of giving them patents, or to say that certain computer algorithms are not eligible, they can almost always find ways to interpret any word in a statute. Now, I suppose you could eliminate Section 101 completely or something, but I suspect that no matter what this new statute says, you are going to have a long period of debate as to what it means, and it is important for the courts to go, generally speaking, in the same direction, if possible. But that is only if a statute gets passed tomorrow or very soon, which, as we know, is not very likely. Who knows when it is going to come out? In the meantime, we have a patent system to run.

Every day, we see thousands of patent applications. Every day, we must make decisions at the Patent Office. Every day, inventors, patent owners, and the public need to make business decisions based on the patents and applications that are out there today, tomorrow, next week, next month, and so on. What are we supposed to do now and until this new statute passes, if it ever passes? The answer to that immediate problem is that we have an approach at the USPTO which is working, and it would be great if the courts let us do what we are doing. That addresses the problem now. That is not to say that legislation is not needed. It may very well be, and we need to work on all options. I was on a panel with Judge Michel a couple of weeks ago, and there was this back and forth over what is the best approach. Is it through the courts, or is it through Congress? At the end of the day, the judge said, and I agree, that we need an “all of the above approach.”

COLMAN RAGAN: I would just like to echo some of the Director’s remarks.

As a patent litigator, he is right. If a new statute gets passed that is a fair employment act for someone like me, we will absolutely be litigating every word in it. But to circle back on some of the other issues, through litigating patents I get the chance to interact with a lot of the federal judges and I do sense some confusion right now. I think every time a judge gets more confused he or she makes the Director's job to try and implement that new piece of case law into the way people at the Patent Office review the patents even harder. I do thank the Director for all the hard work he is trying to do to make it a little bit more certain for us. I also would agree that it is going to take the courts grappling with the issue along with the administration trying to get the right guidance, and it may end up in legislation.

DIRECTOR ANDREI IANCU: I do want to emphasize that as I have said before, I do not see any indication right now from the courts that they are about to change course. It is basically status quo for them, the way it has been for the past few years. But, again, if that is the case, then legislation becomes necessary and not just optional.

AUDIENCE MEMBER 1: Since you were once in our seat not too long ago, what do you think people like us should be doing in this uncertain time?

DIRECTOR ANDREI IANCU: Do you mean as practitioners or as advocates?

AUDIENCE MEMBER 1: I was leaving it open so you could answer the version of that question you might want to talk about; you could answer it from the perspective of practitioners seeking patents or litigators litigating patents.

DIRECTOR ANDREI IANCU: As practitioners, I believe our guidance is fully compliant with the case law to date. What does that mean? If our guidance is followed correctly by the examiner and the applicant in the Patent Office, I believe a patent will issue that should be sustained by a court applying the court cases to date. I think practitioners have to be fully aware of all the case law just like they have been until now. Make sure you follow the case law and you can apply our framework, which is basically a synthesis of the law but in a more clear and systematic way to achieve more consistency and practicability. When you are in the Patent Office, follow the guidelines, and if you follow the guidelines you will end up with the correct results. Always keep your eye on the cases though, and I think you will end up in the right place.

As advocates in the policy debate, which is a very different question, I think you should stay involved. I think it is critically important for everybody to hear how significant this issue is. It is important to industry, and it is critically important to inventors and patent owners, but it is also important to the public in trying to understand what patents are out there so that they can invest in or invent around them. In my opinion, this does remain the most important substantive issue of patent law, and we need all voices to be heard and to be

made known so that the legislators understand that this is an important topic to resolve and that the courts hear us out. And I do not think this is a mystery. I mean, it is not just me saying it as the current Director—you have past Directors at the Patent Office saying it, you have past Judges of the federal circuit, past Chief Judges of the federal circuit, leading practitioners, everybody in the industry, saying generally the same thing. Now, not every everybody agrees with the exact outcome of each particular case, and that is fine, but everyone knows that the situation that we have from the case law right now is untenable, and it needs to be resolved.

AUDIENCE MEMBER 2: This is for anyone on the panel, but I think it is probably more directed to Mr. Colman Ragan. Tomorrow there is a hearing on the Senate side dealing with drug pricing and I am sure you are aware of that. I have been told by people on both sides of the aisle that if anything on patent issues passes this year, it may be something along those lines. I do not quite understand the implications with respect to patents, and I am steeped in patents, but I have been reading articles where there seems to be aspersions cast on the fact that Humira had over a hundred [patents] associated with it, sort of allegations of a thicket. There have also been aspersions cast on protecting patentable improvements over original drugs and I want to know what you think is going on and what you are all are thinking about this particular issue?

COLMAN RAGAN: When you say this particular issue, I am going to take that as sort of the basket of various legislation in the pharmaceutical arena aimed at patents and pricing. When I look at all of them including this hearing on thickets, I worry that there is this underlying current that, at least in the biopharmaceutical industry, patents are bad. Whether you look at the patent settlement legislation proposals that seem to say patents are bad, or certain types of patents should not be granted in the pharmaceutical industry, or you should not use the mechanism, or you should not get a patent thicket, I worry that in proposing some of these pieces of legislation, you will have the opposite effect on drug prices and they will be drive up. Especially, if people cannot settle cases or if you mess with the mechanisms of the Hatch-Waxman Act,<sup>18</sup> which is how generic drugs come to market. But in particular, with respect to this hearing, I guess I would say I am not sure what a patent thicket is. I know that there are a lot of patents associated with Humira and I worry about the situation where we tell people in the biopharmaceutical industry, “You cannot get a patent after your first one, so do not innovate anymore. It is anti-competitive, do not innovate,

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<sup>18</sup> *Hatch-Waxman Letters*, U.S. FOOD & DRUG ADMIN. (July 19, 2018), <https://www.fda.gov/drugs/abbreviated-new-drug-application-anda/hatch-waxman-letters> (explaining that the Hatch Waxman Amendments establish the pathway to approval for generic drug products, allowing entities to submit an abbreviated new drug application).

because if you get another patent, we are not going to let you have it.” I worry if we go that far, and I do not think it will help drug pricing. My answer to a patent thicket, assuming that it exists, is we have a robust system of courts and one can go through the courts and settle his or her patent litigation and license the patents. That will bring the next generation of products to market and that will allow the innovator to move on to the next disease state. So, when we look at pharmaceutical legislation as a whole, I worry that we devalue patents and devalue innovation. I understand that drug pricing is a really hot issue right now. I just think patents are not necessarily the thing that drives drug prices and if we attack patents in the pharmaceutical sector, we might end up really hurting innovation over the next four to five years.

MISSIONARY RANGE: I am the intellectual property owner, the copyright author of “All Lives Matter,” which was a sermon. I am a missionary. My intellectual property is a copyright and just as we spoke about devaluing patents, devaluing copyrights is occurring at this moment. As we all know, many people have seen “Black Lives Matter”; they have seen the protests, the trademarks, and all of the different organizations and people calling themselves leaders. I do not know any of those people, and so I want it to be clear that when I move forward with my building on my property, I have a clear space, meaning that there are no counterfeits out there devaluing the brand. I am a missionary and my work is actually holy. My work is “All Lives Matter” and “Black Lives Matter,” together. Meaning that “All Lives Matter,” the name of the sermon it came from, and “Black Lives Matter,” “White Lives Matter,” “Blue Lives Matter,” etcetera are examples in that sermon. They all come from the same work, so how do I stop Wikipedia from publishing and defaming the work? How do I stop Facebook from letting people have “Black Lives Matter” organizations that have no people in it that are collecting money? How do I stop people from saying, “We have a trademark on your work”? How do I stop people from saying, “I am a co-founder because I put a hashtag on your copyrighted work”? And so, because my work was pre-verdict, meaning before the Trayvon Martin verdict, how do I enforce [my rights] without the help of intellectual property organizations, the copyright office, and the USPTO? I stopped by there, I told them to cancel all the trademarks as a copyright directive, and I showed them my identification, my copyright, and everything. So that is my question: How do we protect the brand, before we have actually started building upon it, from other people who are building on the work and running away with the idea but taking it in a moral direction that we are not sending it in?

AMI PATEL SHAH: Let me see if I can help address this. So, you are saying you have a copyright or a trademark on a particular asset and you are trying to protect that?

MISSIONARY RANGE: I have the copyright, yes.

COLMAN RAGAN: I guess I will start with the fact that I do not think I can give legal advice in this setting because I have an ethical duty to Teva Pharmaceuticals. I want to make that clear. And you have asked this big question about policing your intellectual property and how you do it. I mean there are various ways and I do not know if any of the other panelists want to address that.

PATRICK KILBRIDE: At the Global Innovation Policy Center (“GIPC”) we have a mantra: innovation happens everywhere. But the fact is it is based on the idea that some of the most innovative people in the world are children playing in the street. They will always come up with a new, creative way to entertain themselves. The fact is innovation does not happen on a transformative scale everywhere in the world. The reason is that those intellectual property principles are not enforced in the same way everywhere in the world. We have a research set at the GIPC that looks at fifty of the world’s major economies and compares across forty-five different indicators the ways intellectual property is protected from one country to another, and they are vastly different. If you go to another market, you cannot necessarily rely on the same protections that you can get here in the United States and vice-versa. That is equally true when it comes to the creative space rather than the innovative. One of the benefits of our system is that it has allowed authors like you to invest in themselves so that they can make livelihoods from their creative works. It is not just a hobby; it is not something they do in addition to their day jobs because they love it. There were singers and there were writers and there were poets long before anybody coined the term intellectual property, but they were not able to dedicate themselves to their works and earn livelihoods or the respect of their communities in the same way that they can today because today we protect intellectual property. And there is a mindset out there today that the digital economy is different and that different rules should apply. Well, we should reject that. When we sent a man to the moon, when we put planes in the air, it was not because the laws of physics stopped applying, it was because we learned to use those laws to our advantage, and the same is true in the economic space. Just because we have created this opportunity to have digital products and digital exchanges does not mean that the rules of supply and demand suddenly changed. They still apply today, and we have to be able to reward creators like yourself if we are going to encourage you to be creative. So, this is a huge problem. There was a White House Roundtable that I had the privilege of participating in along with Director Iancu a week ago where they were very focused on finding solutions to this issue, but it is not a problem that has been solved yet. All I can do is encourage you to be outspoken, to speak up for your rights where they are implicated, and to contribute to conversations like this one so that we can make sure that your future as a creator is protected.

AUDIENCE MEMBER 3: Hello, my question is about standard-essential patent (“SEP”) licensing. Given that we just had the Apple-Qualcomm settlement, I wanted to get your thoughts on whether in the next five years you expect to see some sort of fight similar to that. Do you think the way that case ended has really changed the landscape for licensors and licensees of SEPs in the United States?

DIRECTOR ANDREI IANCU: Thank you for that easy closing question.

[*Laughter.*]

DIRECTOR ANDREI IANCU: I do think standard-essential patents<sup>19</sup> are important and that they are going to play an increasingly important role as we move forward. In general, standards are increasingly more important if you look at 5G, for example. It is a huge area of new technology, with many standards being developed. With all the new areas of technology, including autonomous vehicles needing to communicate with each other and so many others, we are going to see an increasingly important role of standards-based technology and, as a result, standards-based intellectual property. Whatever impact the Apple-Qualcomm settlement has, I do not know that, in particular, it is going to drive the debate one way or another, but in the end, the bottom line is that standards-based technology was part of that major matter. It was a global dispute, and it ended on a voluntary basis. We will see how it progresses overall. All I can say is that we have to make sure that whatever policies we have in this country, whether they come from the standard side of things, antitrust and the like, or the intellectual property side of things, we need to have a balanced system that does not incentivize “bad behavior” one way or another. We want to make sure that if we have policies in these areas, we have policies that drive toward good faith negotiations so that we can increase the amount of innovation in this country that goes toward standard technologies and the amount of implementation of the standards that are being developed, hopefully, in this country. The policies that we have need to be balanced and fair to both patent owners and implementors.

AUDIENCE MEMBER 3: Just a follow-up then, the Department of Justice (“DOJ”) has sort of changed its stance based on the SEPs injunction policy. Do you see eye to eye with that or perhaps you can talk a bit more about the U.S. perspective on the SEP policy changes at the DOJ?

DIRECTOR ANDREI IANCU: You are talking about the 2013 policy statement between the DOJ and the USPTO on fair, reasonable, and non-

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<sup>19</sup> Gene Quinn, *Standard Essential Patents: The Myths and Realities of Standard Implementation*, IPWATCHDOG (Feb. 4, 2019), <https://www.ipwatchdog.com/2019/02/04/standard-essential-patents-myth-realities-standard-implementation/id=105940/> (describing standard essential patents as those patents which are necessary for the implementation of a standardized technology and which exist to protect innovation that takes extraordinary effort to achieve).

discriminatory (“FRAND”) encumbered standard-essential patents. The DOJ withdrew from that in December. The USPTO and the Department of Commerce are looking at that right now, and, hopefully, we will have something to say in the coming months.

AMI PATEL SHAH: We have time for one more question.

AUDIENCE MEMBER 4: This question is for anyone on the panel. Do you think that the current interpretation of the *eBay* decision<sup>20</sup> by the federal circuit and the injunction rules are working for patent owners these days or not?

PATRICK KILBRIDE: I will make a very brief comment and let the technical experts speak. I will simply say that to me, damages are to injunctive relief what a mop is to being able to repair a hole.

[*Laughter.*]

COLMAN RAGAN: I would say that for my sector, which is operating under the Hatch-Waxman Act where the injunction is automatic under the way it happens, it is an injunction against approval, we do not really deal with *eBay* all that much. It is really not much of a driving factor in our sector.

AMI PATEL SHAH: As a closing, professor, from an economic perspective, what is the good, the bad, and the ugly for the next five years in entrepreneurship, the digital era, patents, everything we have discussed today. What are we doing right, and what are we doing wrong?

DR. CARL J. SCHRAMM: Well, I am particularly optimistic, largely because the underlying economy is surging and that will change things. For example, I have just been looking at a lot of data here. There is actually starting to be a decrease in the number of incubators in place. I think that is great. I have looked at incubators as basically a staging area for people who could not enter into the job market. I think that as a labor economist, that is the way I have seen it, and I think it actually operates that way. If you look at the statistics in terms of what comes out of those places, almost nothing comes out. So, what that means is that we have a whole group of kids, because they are principally youngsters who go stall their labor market entry, starting to go into the labor market; that is one thing. Second, the demand in big companies is really surging for smart kids, and I am sure you see that. That is great because it is big companies that are really the incubators. Our most productive entrepreneurs come by accident, in mid-career, out of big companies where they were schooled in everything that you need to get an MBA, but more importantly where they were schooled in all the techniques, the know-how that was spoken of before. And they see the edges of where the innovation has to go; that is our innovator class. Somebody in the first panel talked about it in terms of line extension. Line extension is central to this

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<sup>20</sup> *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006).

because it is line extension that creates the companies where the innovation is begged for, and the scientists then follow-along. And so, I am particularly optimistic about it. The cloud that hangs over all this is where we stand with China relative to all these questions. As the administrator said, we have a 2020 deadline, 2025 declaration, and 2041 is the centenary of Mao's takeover by which China hopes to be the world's hegemon without a war. That is a simple way to say we will have an innovation contest with the Chinese, and they aim to displace us. That is a big, big issue.

AMI PATEL SHAH: It is a big issue in patent law as well, especially since they are patenting all the technologies that we cannot patent under Section 101, but I will leave it at that. Thank you, everyone. For our closing remarks, to my good friend, Judge Rader.

[*Applause.*]

JUDGE RANDALL R. RADER: I have enjoyed an excellent presentation today from two panels. I would like to invite us to make two comparisons. In the early 1980s, in the legislative arena within a few years we had the Hatch-Waxman Act, the Bayh-Dole Act, and the creation of the federal circuit, all with a mind to increasing innovation policy. In the judicial arena, the Supreme Court, perhaps responding to the political dimensions of what Congress was doing, had the *Chakrabarty*<sup>21</sup> and *Diehr*<sup>22</sup> decisions which opened up technology to software and biotechnology. Now, compare that with the last decade or so where in the legislative arena the thing we have to focus on most is the creation of the PTAB, which prides itself in eliminating between 60 and 80 percent of the patents now important enough to be in litigation. In the judicial arena you have the *eBay*,<sup>23</sup> *Lexmark*,<sup>24</sup> *Alice*,<sup>25</sup> *Mayo*,<sup>26</sup> and *Myriad*<sup>27</sup> decisions, all of which have severely handicapped the innovative capacity of the United States. That is one comparison, the 1980s to our current era.

Now, I would like you to compare our current era to the great challenge which we face according to our second panel, in particular our esteemed economist on that panel. In China, in just the last three weeks to a month, you have seen the creation of a central appellate court like the federal circuit. You have seen the announcement by the Standing Committee of the National People's Congress of the revision of their trade secret law to enhance civil penalties and ensure that it is used more effectively. You have seen a revision of their trademark law to eliminate the cybersquatting problems and strengthen that dimension of

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<sup>21</sup> *Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

<sup>22</sup> *Diamond v. Diehr*, 450 U.S. 175 (1981).

<sup>23</sup> *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006).

<sup>24</sup> *Impression Prods. v. Lexmark Int'l, Inc.*, 137 S. Ct. 1523 (2017).

<sup>25</sup> *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208 (2014).

<sup>26</sup> *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66 (2012).

<sup>27</sup> *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576 (2013).

intellectual property to focus it on actual use. You have seen in their judicial arena that statistics show the nation in the world where you have the best chance of winning as an alien litigator is China, not the United States. Looking at those two comparisons, do we not have an even greater imperative to take some of the advice we have been given here today in both the legislative and the judicial arenas and see if we cannot revive the spirit of the 1980s? Thank you very much.

*[Applause.]*

JEFFERY P. LANGER: Thank you all for coming. That concludes the program.