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

Neel U. Sukhatme
Georgetown University Law Center, nus6@georgetown.edu

Paul R. Zielinski
G. Nagesh Rao
PJ Bellomo
Matthew Byers

See next page for additional authors

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Authors
Neel U. Sukhatme, Paul R. Zielinski, G. Nagesh Rao, PJ Bellomo, Matthew Byers, Meghan Gaffney Buck, and Everardo Ruiz
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 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 IIPCC’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\(^1\) or monopoly cost?\(^2\) 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

\(^1\) 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”).

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”? 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. 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 is 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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3 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”).

4 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. 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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5 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 asked, 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.\textsuperscript{6} Essentially, it greatly restricted where patentees can file patent infringement suits.\textsuperscript{7} 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

\textsuperscript{7} 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. Specific information on patents that are available across agencies comes from our Federal Laboratory Consortium, and we actually have
another lovely website, 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. 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, 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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8 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 have 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.9 [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

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
community.

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.\(^\text{10}\) 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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\(^{10}\) *What Is CNC Machining? An Overview of the CNC Machining Process*, ASTROMACHINE 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.” 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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11 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”). 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

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”)

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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13 NSF Innovation Corps (I-Corps), Nat’l. Sci. Found., 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