

Center for Strategic and International Studies

TRANSCRIPT

Event

**“Enhancing the Regional Impact of the CHIPS and  
Science Act”**

***Building Regional Research Ecosystems***

DATE

**Wednesday, May 3, 2023 at 1:30 p.m. ET**

FEATURING

**Luc Van den hove**

*President and CEO, Imec*

**Dave Anderson**

*President, NY CREATES/Albany NanoTech Complex*

**Dorota Grejner-Brzezinska**

*Vice President for Knowledge Enterprise, The Ohio State University*

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Sree Ramaswamy: All right. Good afternoon, people. I hope everybody can hear me back there and especially online. Apparently, there's quite a number of you online. I do have a tendency to speak into my collar. So, hopefully, that doesn't happen.

Good afternoon. My name is Sree Ramaswamy. I am a senior advisor to Secretary Gina Raimondo at Commerce. I have been in my role for a little over two years now. Officially, I am driving technology and industrial policy for the secretary and for Commerce. Unofficially, as many of you know, over the last couple of years we've been focused on this thing called the CHIPS Act, which has really – you know, I think what has taken up most of my time has been helping the secretary drive the agenda for the CHIPS Act and for semiconductor policy, broadly, both with the industry in terms of understanding needs and trends, with the Hill, with Congress in terms of defining the policy and shaping the legislation, and then also working with various other stakeholders to make sure that we are correctly sizing and scoping this program.

It's a very ambitious program and so we're making sure that even within Commerce people understand the scope of the program and how to define success in the long run. One of the early questions that the secretary asked me to go think about was if you looked back at this program in 15 years how would we know that we have succeeded, and so a lot of the work that Commerce has been doing in the last two years has been to try to answer that question.

I am happy to report that, you know, we are now filling up the team. We've got some very capable leaders who are now driving the implementation. You met one of them just now, Eric Lin, who is driving the R&D program. Some of you also know Mike Schmidt, who is the director of the CHIPS program office and who is running the \$39 billion manufacturing incentives program and, as Eric said, we do see both the manufacturing and the R&D programs as two sides of the same coin. They're reinforcing each other, and the secretary has been very clear about that from the very beginning.

So, you know, one of the things that I've noticed in the last couple of years in my time at Commerce is that in the discussions and the framing of the CHIPS Act it is often framed as a federal incentive program to create incentives for the private sector to make R&D and manufacturing investments.

Now, that is a correct framing but it's not quite a complete framing, right, because it misses out this really important third party, this ecosystem of regional, state, and local actors who are sometimes

governments, sometimes nonprofits and universities, sometimes consortia of companies, and there's quite a rich network of that ecosystem.

And so we at Commerce have always from the very beginning thought of this as almost a three-party arrangement between the Commerce, CHIPS program, the private sector, and this network in the middle. And if you look at, for instance, one of the first papers that we issued back in September of 2022 right after the president had signed the CHIPS Act we issued a strategy paper that talked about some of these broad goals for CHIPS' implementation and in that paper we had a couple of remarks and I just wanted to call that out.

The law requires that applicants demonstrate they have secured incentives from state or local governments. The department expects to prioritize support for projects that include such state and local incentive packages that have the potential for large spillover benefits, that are based on performance, and that maximize regional and local competitiveness.

And so we called that out early on as our way of signaling to folks that that regional ecosystem really matters because – and we want to think about this from a competitiveness standpoint. We laid out a bunch of examples of how you could think about these sorts of initiatives. But, you know, the challenge with that is, particularly when it comes to innovation ecosystems, it is really hard to define up front what makes a regional innovation ecosystem successful, right?

We all know the stories of Silicon Valley and the Research Triangle Park in North Carolina and the Bell Labs Ecosystem and Route 128 in Boston. We all know those stories. But we also know that several of these initiatives have been tried and have failed. Some have succeeded but only to a point and never really caught fire. Some have succeeded and then eventually faded away and died.

And so one of the things that I'm hoping to get from this panel discussion is a sense from the folks who are going to be joining me how do you solve these problems, how do you identify up front some of the key ingredients that make a regional research ecosystem successful, and what does that mean for both the participants in that ecosystem and for folks in the private sector who will be engaging with that ecosystem and for folks at Commerce and the federal government who will be part of that arrangement to think about how to build these partnerships.

Now, the good news is that on this panel you have a set of folks who have been thinking and working on these issues for years; for decades, in fact. I did some quick math, and I will tell you – I have checked this – there's over a hundred years of collective experience on this panel, not counting me. If you added me, you'd probably still have barely more than a hundred.

And so part of it is the collective wisdom from this group. But part of it, I think, also is the fact that each of these individuals is unique in a certain way, both in terms of their individual expertise and their experience, and in terms of the organization that they lead or represent. And that organization is also unique in the role that it plays in this ecosystem, right?

And so, you know, certainly in my two years, when I think about these individuals and their organizations, it is really hard for me to go and find a peer organization or a peer individual and say, look, this organization is sort of, you know, the U.S. version of that organization or this state's version of that organization. There just doesn't seem to be a peer to any of these folks and their organizations on this panel.

And so I'm really excited to have this panel discussion with these folks. The way this is going to work is I'm going to call on my colleagues one by one to come and offer some thoughts about their experience, about the questions at hand, and about their organization. And once that's done, I'm going to call all four of them up to this panel and we'll have a discussion here with some Q&A. Certainly I have some questions of my own, but I will make sure that the audience, you know, gets enough of a chance to ask questions.

So I'll start with my first colleague. Luc Van den hove is president and CEO of Imec. Imec started as the Interuniversity Microelectronics Consortium back in 1984. And Luc has been there since the very beginning. He is one of the founders. He is now today CEO and president.

Imec is the world's largest R&D partnership in semiconductors. It counts among its members and its partners pretty much everybody in the semiconductor ecosystem. That includes people from the chip-manufacturing community, the supply chain, the tool companies, the software companies, the hyper-scalers, the auto companies. Luc has spent a lot of time in the recent past working on what he calls application-oriented research, so moving Imec's agenda into specific verticals and thinking about the research challenges for semiconductors from the perspective of those verticals in health care, in energy, in other sorts of verticals.

Like I said, Luc has – you know, he's been there since the very beginning. And under his stewardship, Imec has now today gone from that infant of 1984 to an organization that has over 5,500 people, close to a billion dollars in euros in annual operating budgets, and locations and research work going on all over the world, including two locations, I believe, here in the United States.

Luc, the floor is yours. (Applause.)

Luc Van den hove: Thank you, Sree.

So I was asked to kick off this panel and say a few words first about Imec. And then during the panel we will address some of the questions Sree has asked.

But after this wonderful introduction, basically you – (laughs) – you already mentioned most of the things I was going to mention in the introduction about Imec. So thank you for doing that.

But, OK, let me start with kind of focusing on what we believe are the key assets that made Imec to what it is today. And I believe the three key assets are, on the one hand, the infrastructure which we've built up over the four decades of our existence since 1984. And that kind of was brought together in two major cleanrooms of 12,000 square meter in which we have installed kind of leading-edge tools from basically all major manufacturers.

So we work very closely – in very close partnership with all major tool suppliers. A lot of them are U.S. A lot of them are Europeans, like ASML; also Japanese. And we have kind of made Imec as a kind of a hub where a lot of these suppliers are testing out a lot of their newest innovations, because they need access to this infrastructure to test out how their process module works in combination with the other modules.

The most important asset, though, I think is the team that we built out. Step by step, over 40 years, we built out a team that I believe is extremely experienced. About 5,500 people, including about 700 residents from the companies with whom we work, and also 850 Ph.D. students, who are obtaining their Ph.D. from one of the universities with whom we work, but they do their research program full time at Imec, leveraging our infrastructure. This is a very effective way to build very close interactions with – and partnerships with universities.

And a third key asset is clearly the ecosystem. Sree already referred to it. We're kind of working these days with virtually any company that is active in the semiconductor value chain. These are all the major IDMs, the foundries, the manufacturing companies, all of the top ones. But also the fabless companies, and the hyper-scalers, because more and more we see this need to kind of connect design and system know-how with technology know-how. It's not, like, one roadmap that defines the future. There's a lot of divergence in these roadmaps. And we have to optimize the technology to specific system requirements. And so we need to know the system – the system – we need to be experts also on the system side.

But we also work with, as I mentioned, with universities to feed a lot of new ideas, new innovation, fundamental understanding. We work with the suppliers to build up the infrastructure. And we also have built out a model that I think is very inclusive. We work with the biggest companies, but we also work with hundreds of startups and provide a low-barrier access to high-end technology, because for startups it's really hard to get access to this leading-edge technology. So we have to lower the barrier for access by providing them easy access to the ecosystem, but also by providing very cost effective access. And so we've built out quite a lot of models to work on that. So in this way, these are some of the key assets that made Imec to what it is today, I believe.

Sree referred already to our budget evolution. So we started in 1984. We grew to an organization with – we started with a team of 70 people. We grew to an organization 5,500 people. Budget of close to a billion dollars. Majority of that revenue comes from direct industry support. Seventy-five percent comes from industry directly, which I think is a testimony of the value we bring. About 25 percent comes from government support, either the local government or the European government – European Commission.

And I believe this – and what you can see here from this graph is also that this government support was also very sustained over the entire lifetime of Imec. In fact, it grew over the lifetime. And this is very important, because it allows us to invest in long-term R&D programs which today for industry are a little early, but are going to become important five to 10 years from now. And having that sustained commitment, long-term commitment also allows us to build up a long-term strategy. So I believe this is also a very important element for the NSTC's setup.

And as Sree mentioned, we kind of – the core of what we do is really on the semiconductor technology, the chip technology. That's the

enabler, and that's where our core competence is. But whereas the focus of the applications for chips in the past decades have mostly been the ICT world, we now see phenomenal opportunities in basically any industry. But as I mentioned before, the technology really needs to be tuned to a specific application. The solution for an application in health care will be very different from the automotive solutions. Of course, there's a lot of commonality in the basic technology, but you have to tune the technology towards these applications.

And this also requires an investment into understanding those application fields and areas. Which are, of course, very hot topics these days are the automotive sector. But we believe future areas – fields like health care – are going to be also extremely important.

So it is – this is the short introduction I wanted to give, and I'm looking forward to the panel session where we can talk more about how to connect what we're doing with the NSTC, what are the similarities, what are the differences? So thank you. (Applause.)

Mr. Ramaswamy: All right. Thank you, Luc.

I'd like to call on Dave Anderson next. Dave is the president of NY CREATES. I've known about NY CREATES obviously for a long time, but it was only two weeks ago that I realized NY CREATES is an acronym, and it stands for the New York Center for Research, Economic Advancement, Technology, Engineering, and Science. Correct? Yes. And the reason I called it out is because each of those words has a unique and distinct value, and sitting here at Commerce, sitting in the secretary's office, I will tell you, the Commerce leadership and the administration understands the value of each of those words; you will often see in the secretary's remarks, when she talks about R&D, that she makes a distinction between scientific R&D and engineering R&D because she understands, I think, the difference – you know, especially for an industry like semiconductors where there's such a long learning curve, and there's such a long process-engineering curve that requires a lot of engineering in the real world. There is a difference in commitment; there's a difference in capital; there's a difference in the incentive structures that you need to provide for the different types of R&D programs.

And so Dave runs, as I said, NY CREATES. NY CREATES is the home of Albany NanoTech. Albany NanoTech is really, you know, the hub for New York. It anchors a really diverse ecosystem that includes not just IBM and Tokyo Electron and Applied Materials in Albany; it extends to Global Foundries in Malta. He's going to talk a little bit about the

ecosystem; I'm sure it actually extends north of the border into Canada as well. Dave was – before his role at NY CREATES he was with SEMI Americas. SEMI, as many folks know, is the industry association that represents the equipment and material suppliers to the semiconductor industry.

Dave, all yours. (Applause.)

Dave Anderson: Thanks, Sree. It's a pleasure to be here and represent NY CREATES and all that we're doing but also to hear all the other speakers and panelists on what's going on and how we're supporting the overall CHIPS Act, most importantly from the perspective of what we're talking about today, the NSTC, the National Semiconductor Technology Center.

So I was pleased this morning when I came in to see a few copies of Chuck and Thomas's book, "Regional Renaissance," how New York capital region has become a nanotechnology powerhouse. It really talks about the clustering effect and the importance of that and how it evolved in Albany and how we've really become that center of technology for New York. So I thought if I get any difficult questions today, I can just look up the answer in this book.

But I want to talk a little bit about it. As Sree said, it is an acronym; it's the New York Center for Research, Economic Advancement, Technology, Engineering, and Science, and it really does embody what we do in Albany NanoTech but more broadly across the state of New York, as New York CREATES. We have three primary legs of our mission at New York CREATES, and it really is accelerating innovation, and that's the R&D infrastructure. The second is economic development, particularly for the state of New York but also the rest of the country. And the third is education and workforce development. So I have the advantage of having Taffy go earlier, so if you were here and saw her slide, she talked a lot about the innovation ecosystem that is engaged in Albany NanoTech, including our major industry partners of IBM, Applied Materials, Tokyo Electron, and all the other suppliers we engage with and many of the device companies, but also that cluster that's around us in Global Foundries, in Micron, in Wolfspeed, and even our engagements with Bromont north of the border, and so forth. So really driving that innovation economy, if you will, from the R&D perspective is the first part of our mission.

The second, then, is economic development. And New York CREATES actually operates about 10 sites across the state of New York. And the most relevant, of course, to NSTC is Albany NanoTech, the site in



Albany, as well as our assembly, test, and packaging facility for photonics in Rochester, and it's part of the AIM Photonics Institute.

But really, as we heard earlier about the silicon heartland and we heard a lot from Micron on why they selected New York, I think what we're finding from a clustering effect, it's not just in the Albany capital region but that Interstate 90 corridor has become a very attractive expansion of that cluster because of the likes of GlobalFoundries; Wolfspeed in Utica; Micron building in Syracuse; Intel in Columbus; the likes of analog devices, TI, on semiconductor further to the east. That I-90 corridor is very attractive for suppliers of both equipment and materials and other consumables and other engagements with the industry to build that cluster across that. They can only be a few hours away from any one of those companies. So the state of New York is uniquely located – the Upstate in particular – to service all of those companies at the same time. And that's really our economic development focus, is bringing jobs and the economy back to Upstate New York.

And then the third is education and workforce development. Our genesis is from the University of Albany. We have SUNY Polytechnic University onsite, which embodies the College of Nanoscale Science and Engineering, so CNSE. And that is actually being transferred back to the University of Albany. So we've over history gone by these names. So when you think of SUNY Poly, you think of CNSE, you think of U. Albany and New York CREATES, it's all that entity there in Albany.

But in addition to our engagement with university researchers not just from the SUNY system but other major research universities across the country, we also engage with community college and technology training programs not just for technicians, but also for the workforce and construction trades and so forth that are required to develop that further ecosystem. And we also have housed the New England Advanced Technology Education Center for technician training, and we've initiated what we call VET S.T.E.P., which is a program bringing returning veterans from the industry into the workforce. So really an engagement across all of those activities.

If you look to Albany NanoTech in particular, which is the most advanced public-private research center for semiconductors in the U.S., you find that, as you listened to Luc, we have very similar capabilities. We have a 20-year history of R&D partnerships. We have over \$15 billion of capital investment in this site with about 120,000 – 150,000 square feet of cleanroom. Very similar in size. And you know, lithocapabilities down through current leading edge in UV with full

300-millimeter flow. So we really have capabilities that others in the U.S. do not have.

We also have a successful history of managing consortia programs. The last programs of SEMATECH were embodied in our facilities. We are the home of the AIM Photonics Manufacturing Institute for the Manufacturing USA Program. And we have other academic partners and other research programs that are going on there. And in addition, we do have a long history of advancing and identifying industry breakthroughs.

So, really, what we have there is core capabilities that support many technologies. We have multiple partners onsite – taffy showed, I don't know, a couple of dozen of them, and there's even more – working on different technologies, but they're all leveraging a shared-access facility at the Albany NanoTech site. So we're very well-known for advanced logic processing thanks to IBM and other partners that are driving that, but we've developed next-generation memory technologies, neuromorphic computing and quantum computing technologies. We're working on bio devices. We have a full heterogeneous integration line, both in Albany and in Rochester, to support advanced packaging; integrated photonics through the AIM Photonics Institute; and also working on future technologies like quantum and other areas. In addition to that, we've supported power electronics for Wolfspeed and others. So really a broad array of technologies that we work there, but it's all done on a full-flow 300-millimeter line that is one of the largest facilities in the U.S. for R&D.

So as Luc talked and we get many questions all the time, well, how does NY CREATES compete or compare to Imec and that's a really interesting question and I thought I'd try to answer that, and thanks to Joe for helping with this.

But, you know, Imec's scope is really looking out 10-plus years, in many cases, N-plus four, five, seven nodes out. So they're doing a lot of unit process, a lot of research, core development, narrowing the field of potential possibilities, as Luc said, driven by end market application and what are the technologies that need to be developed to identify that.

You come to NY CREATES, we're working in the four- to six-year timeframe so end plus two, end plus three, where we're taking that narrowed scope of technologies and applying it to research that's going to be closer to manufacturing.

So, yes, we have some overlap. We, certainly, have capabilities that overlap but our direction and objectives are very synergistic, and so it's really interesting to be here with Luc today and talk about those synergies. I'll leave it at that and say thank you. (Applause.)

Mr. Ramaswamy: Thank you, Dave. I don't know about you guys but I'm getting my 10,000 steps in today. (Laughter.)

I'd like to introduce our next colleague, Dorota Grejner-Brzezinska. Dorota is a distinguished university professor at the Ohio State University. She has a – anybody who knows her will know she has a long and pioneering history of research in global positioning systems and global navigation systems.

She is also one of the leaders of OSU's Knowledge Enterprise, which is a program to develop the research capabilities of researchers and research teams at OSU and also expand OSU's research portfolio and expanded societal impact of that research portfolio.

She has been a member of the President's Council of Advisors on Science and Technology. President Biden recently appointed her to the National Science Board. But what makes it especially exciting for us to have her here today is because of a relatively new organization for which she is the driving force and it's called the Midwest Semiconductor Network.

This is a coalition of universities driven by OSU with the goal of setting up a wider ecosystem in the Midwest to focus on research, training, and capability building across the ecosystem. This is exactly the sort of coalition that Commerce envisions as seeing – as being quoted as this wider chips agenda of building regional ecosystems that has scale and sustainability over time.

Dorota? (Applause.)

Dorota Grejner-Brzezinska: All right. Thank you very much for this kind introduction, Sree.

As he just said, I come from the silicon heartland to be, and I would like to talk about a new organization. As Sree already, essentially, stole my thunder, but I would like to tell you a story how it's been formed and where we are right now and what we aspire to be in the future and, of course, the way we would like to engage with all of you and others who are not even in the room.

So let me begin by saying that the last 70 years of semiconductor innovation has been – have been extraordinary, right. We went from

just a few transistors in silicon to literally billions of them on a single wafer and those are really approaching atomic scale and are being now, essentially, put in three dimensions.

So the packaging process right now – the integration process, I should say – is becoming more and more complex. So the new materials, new design, and the manufacturing process can really – cannot be really separated, hence, the drive for those new ecosystems that all those components would be covered.

Now, extremely important part of this ecosystem is, of course, which has to be developed in parallel, is the workforce development and this is one academic institution like myself come into play. Better yet, entire pipeline of academic institutions when we try to cover community colleges, four-year colleges, R1s, R2s, and also a diversity including HBCUs and other minority-serving institutions. This gives us not just a pipeline for workforce but also diversity of perspectives and diversity of geographies.

So aside from the CHIPS Act, which we have been watching for about two years now in development, the tremendous motivator for Ohio State and the great state of Ohio, of course, was the announcement made last January – I'm sorry – January '22 by Intel of bringing \$20 billion and two fabs to Ohio, which essentially everyone take very enthusiastically. And frankly, even until now, probably no one in this audience is thinking of Midwest as the silicon heartland, but I would say not yet. Just watch us, and we'll see what we can do.

So the investment by Intel really shined a light at Ohio first, essentially telling us – or, telling the world about our capabilities and opportunities that we can create. I want to emphasize, number one, the centrality of geography. We are really very centrally located, very easily accessible. We have very diverse demographics. And, let's face it, the cost of living is still very affordable.

We have extremely broad and deep academic base across the state. We have legacy industries like mobility and aerospace, both of them very actively and quickly transitioning to electrification and autonomy. So here's a huge base of users. We also have a growing, which doesn't – which, of course, helps a lot – a growing venture capital environment across the at least major metropolitan areas in Ohio. And, of course, where we have Columbus, Ohio, where it's always sunny and 72.

So after the announcement coming from Intel, we took a good, close look at what Ohio State can do and, of course, started working across

the border. Well, not yet across the border. Across the county borders with the schools in the state of Ohio, trying to understand how collectively we can put together our expertise, our experience, our instructions, but also the training facilities.

And of course, those of you who work with academics, you know that most of the time the research institutions have just about – who focus on semiconductor – would have just about a good base for research and development, but not exactly for training, right? So the shortage across the state, and across the region, and across academia generally is the access to fabs. So, again, bringing Intel to Ohio and the region is a tremendous opportunity for not only state of Ohio, but also other universities in our – in neighboring states.

So after we took a closer look and determined that Ohio State has really great history of really doing research across the stack from physics, to materials, to design, we actually – and, of course, producing the very advanced workforce at the engineering to master's to Ph.D. levels. We realized that, of course, this is not what the industry wants immediately. The industry, particularly the new fabs, would really need about 3,000 or more technicians to start with, and maybe entry engineers. And over time, of course, the R&D environment is needed. And of course, the well-developed, advanced workforce would be needed.

So with that, like I said, we started discussions internally within the state of Ohio, academics, economic development, and the government. We assessed the capabilities. And then academics sit together and said, well, you know, if we want to have a silicon heartland, then we need to look beyond Ohio and see what we can do partnering with others. So we fully understand Intel is first, but not the last in the region. And not everything will go to Ohio. There will be also supply chains. There will be users. There will be other industries. We've heard this morning from industry partners, from Intel particularly, that a lot of companies are talking to them, and they want to move to the region, which is great news.

So with that, Ohio State has called for the – for the meeting of the minds. And last year in April, we called about 12 – actually, exactly 12 regional universities and colleges. We looked to the state up north we always fight with. I won't even use the name. And Indiana, plus Ohio. So three states came together. About 100 participants, academics and academic leaders. And the question was very simple, in a sense: What do we have collectively that can be leveraged? What are the gaps that we have that we can try to collectively fill? Can we work together?

And so, after a day and a half of deliberation and discussion about the workforce development, about various components of R&D, we came to the conclusion that we actually have a lot. Everyone was very excited, and our leaders were also very fired up to actually start making this happen.

So as a result, 12 colleges and universities signed an MOU, and essentially all of the schools in this partnership have created a standing council. Ohio State was voted a leader. And we started discussions across the board, looking – we are essentially a task-force-oriented first. So task force number one; workforce development, task force number two; governance, membership and extension of the partnership, task force number three; R&D opportunities and how we position universities collectively for success.

Now, having said that, I want to emphasize that I personally and many of my colleagues follow the mantra that collaboration is the new competition. And not, of course, everyone will agree with that. But we've raised that for patience and we've raised that for demonstrating that actually collaboration can bring much more value than competing all the time.

So anyway, with that, I want to follow. After signing the MOU, we have essentially started discussions, like I said earlier, what would be the platform when we can put together our assets in terms of curriculum, in terms of the infrastructure and in terms of the development. Of course, what helped state of Ohio and Ohio schools was the significant investment from Intel. And I want to recognize that almost \$80 million now invested in three years in eight large curriculum-development projects and some research projects. Eighty colleges and universities from the state of Ohio are involved in those projects.

So building on that and the budding partnerships, we actually called for the next workshop just past March 2023. And this time we really squarely decided to focus on workforce development as the lower-hanging fruit for all of us, because it probably requires less competition than usual R&D competition.

We all went to Lorain County Community College, which is the central location in the area. But this time I want to tell you we had 150 participants. And it was academia, economic development from a few states, and also a number of representatives from industry. Now, by that time I want to also emphasize we have had 20-plus members. And by today we have 31 members and we have grown to five states.

So let me show you – I think I have a geography now. This is the membership. This is the way for us to innovate at scale and speed. This is really through partnerships. And the geography is shown in the slide. You can see the names of the universities and colleges all across five states. We added Illinois. We added Kentucky, and also – I'm sorry – Illinois and Kentucky. We had three states at the beginning. I somehow want to say Michigan, but I – (laughs) – I did already.

Anyway, so you can see the pipeline is very clear there: community colleges, a number of HBCUs. They are four-year colleges. And all those organizations are eager to collaborate and eager to create. We're currently actually working on that collective platform when we can provide the curriculum that we have. Some of the universities already have some of those programs. Ohio State is one of them. We are launching a number of stackable certificates just this fall and working on a degree program.

So what is the structure? I want to emphasize that the MOU did not really put any money obligation on anyone. This is purely voluntary, and it's driven by academics right now. We have got to the conclusion very recently that, you know, based on volunteering is great, but we need to have permanent staff. And Ohio State is planning to hire permanent person, at least one or two to start with, to essentially breathe and – this MSN, and drive the development and partnership establishment over the next couple of years.

So I mentioned we have a standing council, but this is just an advisory body, now with 31 organizations. We needed a smaller, more agile organization which could actually be able to make decisions. So we have established governing board. This is a decision-making body. And again, Ohio State was voted to lead as the lead institution.

We just established the industry board in April. And essentially, the objective is to bring industry to help us jointly create a value proposition which is the best for industry. Our ongoing activities, as you can see in this slide, really is this development of the information-sharing platform I mentioned. We want to be the one-stop shop for industry, everything in one place.

You could see who we are, what assets we have, what courses we teach, and how you can stack the certificates towards degree programs, and how we also work across the institutions. We also have a, I mentioned earlier, taskforce which is looking into opportunities how the network as a whole could participate in large, federal opportunities. And we're right now working on the proposal to NSF,

which is essentially just crafted for an organization like ours. This is all about networking and semiconductors.

And I want to close by showing you the six logos. I want to also emphasize that just this morning Jim Evers called me, and he said Intel Corporation is no longer in process. They actually are a member of our advisory board. And, again, this is the example of how we started with a large academic network, now we are bringing industry, and we'll be working over the next couple of months on the value proposition and inviting other partners. Thank you very much. (Applause.)

Mr. Ramaswamy: I want to thank you, Dorota.

And finally, let me ask Phil Singerman to come up. Phil doesn't need any introductions for this group, but I'm going to introduce him anyway. He's been a trusted advisor on regional economic development to many policy institutes, to many technology initiatives. He has more than 35 years of technology-based economic development experience. He was the first CEO of the Ben Franklin Technology Partners of Southeastern Pennsylvania, also of the Maryland Technology Development Corporation, both of which, if you don't know, are two of the longest-lasting public-private partnerships in technology development and economic development in the U.S.

He was at Commerce for many years. He was the assistant secretary for economic development. He was also at NIST for many years. NIST, as you know, is the official home of the CHIPS Program here at Commerce. And while at NIST, he spearheaded the creation of the Manufacturing USA Network, also led the Manufacturing Extension Partnership, both of which are good examples of that federal, state, industry trilateral partnership that I talked about in my opening remarks.

Phil, why don't you come on up? And what I'd ask is once Phil is done with his remarks, if you can stay here on stage, Phil, and I'll ask my other colleagues to come up and take their seats, and we can get into the Q&A. (Applause.)

Phillip Singerman: Thank you, Sree, for actually introducing me. I appreciate that. I always like a little shoutout. And but seriously, thank you for your leadership and dedication to this program, these extraordinarily important national issues. And thanks to CSIS for organizing this panel.



I'm not a physical scientist. I'm a social scientist. So I'm going to bring a slightly different perspective to this discussion. And if I had to frame it, I would call it regional research ecosystems within the framework of industrial policy. And if my remarks were to have a title, it would be, Laboratories of Democracy: American-Style Industrial Policy. Although we sometimes question whether the United States, and in particular the national government, has pursued industrial policy, specifically the anointing of individual companies as champions and then providing special privileges, Taiwan's development of TSMC as an example, it is true that since the inception of the republic states have aggressively pursued such policies.

You don't have to go back to Alexander Hamilton to ask about industrial policy. Just ask the governors of New York, Ohio, Texas, and Arizona. They all practice it. What the panels have described today is industrial policy, American style. And in this context, it is useful to remember that the 10th Amendment of the U.S. Constitution states: The powers not delegated to the United States by the Constitution, nor prohibited by it to the states, are reserved to the state respectively, or to the people. The phrase, "laboratories of democracy" was popularized by Supreme Court Justice Louis Brandeis in his 1932 dissenting opinion in the *New State Ice Company versus Liebmann*. You can look it up if you'd like. It's very interesting.

Brandeis wrote, "there must be power in the states in the nation to remold through experimentation our economic practices and institutions to meet changing social and economic needs. It is one of the happy incidents of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory and try novel social and economic experiments without risk to the rest of the country." For over 50 years, a handful of states have been the drivers behind the locations of semiconductor fabrications. These happy incidents of courageous states fundamentally limit the locations where the federal government will be able to support the fabrication of new fabs with CHIPS funding.

The leading role of states is actually – of states in determining locations is actually written into the CHIPS legislation. Eligibility for financial assistance from the Commerce Department requires an applicant to have been offered a covered incentive, a subsidy from a governmental agency. Already, Ohio has committed to Intel 2.3 billion dollars, and counting. New York has committed 6.1 billion dollars to Micron. Arizona has long provided tax breaks, infrastructure investments, and workforce advancements to Intel and TSMC. We've heard about these initiatives – these positive initiatives today.

Now, it is certainly true that there are probably more regions that have assets that can support regional research ecosystems. But it is also true that prior decisions by states to locate fabs have enabled them to create and strengthen their assets. We heard about it in this panel. We heard about it in the industry panel. Universities, supply chains, workforce development programs that comprise what we commonly think of as the components of a research ecosystem. Senator Kelly this morning described the Arizona impact. And as I mentioned, the prior panels have also talked about it.

What does this all mean for a federal policy that intends to promote regional research ecosystems, and for the regions or states that want to participate? An example, for the federal government, it means that states and local governments need to be fully embraced, indeed encouraged, to bring forth their ideas and become full partners in policy planning. The lack of front-end engagement by states is reflected in the low number of state responses to the numerous RFIs, requests for information, that the Commerce Department has published requesting input on federal policy and programs. The Commerce Department has been very proactive in reaching out to the broader stakeholder community. And universities, corporations, and industrial associations have responded.

But states and other local governmental entities are largely absent. I know the federal government has met with the Semiconductor Industry Association, the Semiconductor Research Corporation, SEMI, the manufacturing association, the American Society for – sorry – the American Semiconductor Innovation Coalition. I don't know if the federal government has also met with the National Governor's Association, the National Association of Counties, and the National League of Cities. If not, it should do so.

For the states, it is important to proactively engage in the mechanisms that are made available for stakeholder input. As Eric Lin discussed in his keynote, last week NIST's CHIP R&D Office published a vision and strategy for the National Semiconductor Technology Center, NSTC, a public-private consortium that is the centerpiece of the CHIPS \$11 billion R&D program. I encourage everyone to carefully read this document. As Eric noted, a key step in the establishment of the NSTC is the creation of a board of trustees that will run the NSTC. And last week NIST issues a request for nominations for an independent selection committee to choose members of the board of trustees. The deadline for nominations is May 10th. Here is an opportunity for states to have influence. They should take advantage of it.

States also have a leading role in the implementation of the CHIPS Act, both in the fabrication incentives and their relationship and impact to the regional research ecosystems. That will be a subject for the discussion of our panel as we move forward. Thank you very much. (Applause.)

Mr. Ramaswamy: All right, in the interest of time – so thank you all for those remarks. In the interest of time, I'm actually going to throw it open to the audience first. I do have a bunch of questions, but I think we have a break right after this so I'm going to make sure that I keep these guys here to ask my questions.

But any questions in the audience first? And if you have any, please introduce yourself and your organization first and then ask your question.

All right, I'm going to start. I'm going to start with Dave. You talked about the three pillars that define NY CREATES. Could you talk a little bit more about how you think about success for you, around those three pillars, right? How do you define success? How successful have you been? And what in the creation of NY CREATES has allowed you to define that kind of success?

Mr. Anderson: Sure. Thank you. Well, you know, I think New York CREATES is actually a true partnership of industry, academia, and government, and those three elements really help define our success, in particular relying on our industry partners. They are kind of the foundation of our financial stability over time. They have large programs. Some of them are focused specific on their own needs but some are done collaboratively that has a broader industry impact, but over time, they provide the bulk of the financial support that enables the entity to continue. Academia provides long-term vision into new technologies and new research, so starting with the local universities, that fed into some of the technologies that were developed early on, but today we work with universities across the country and indeed across the world, in some cases, in identifying new technologies for development. And then the state and government in particular but the state – you know, I look to – over five or six different governors over the course of the 20 years of our existence, every single one of them has supported the infrastructure and investment in the development of the Albany NanoTech facility, and the industry itself as an objective for economic growth in upstate New York. So today Senator Schumer, Governor Hochul with the Green CHIPS Act and investment in the industry has attracted Wolfspeed, has attracted Micron, and we see that continue to grow, and that's really the measure of success are those companies coming in. But it's that continual patient influx of

government help and of course with the federal programs like AIM and other programs that help sustain some new areas as well.

Mr. Ramaswamy: So that continual influx of public support, in a sense, right? That's reflective, Luc, of Imec as well, where you have – you know, the government has been playing a role for a while.

Let me ask you – so you've talked about the coordination of the overlap or, in some sense, the complementarity of Imec and NSTC, but if I were to ask you from a regional ecosystem standpoint, you know, when we think about a regional innovation ecosystem, you think about, you know, research hub facilities, startup support, training programs for workers, maybe venture capital hubs, in some sense Imec has all of the above within the organization, right? And so if you think about the U.S. innovation ecosystem is, let's say, four or five different regional innovation hubs, how do you see Imec interacting with each of those hubs, given its kind of unique position in that ecosystem?

Mr. Van den hove: Well, I believe that – overall I think these CHIPS Acts are a phenomenal opportunity. I think it's very important that we reach the goal and that is to accelerate the technology leadership and to strengthen technology leadership in I would say the Western world, because I think we have to look at it at the broader scale. And that's why I think we have to bring together the brightest possible minds, the best strengths that we have, and, as I said, I think we have to look at it in a transatlantic scope because, I mean, to be honest, we do more business with U.S. companies than even with European companies.

So, I mean, this industry is characterized by a lot of global partnerships and global collaborations, and I think in that context, coming to your question then on how we can connect these regional hubs, is I think we have to connect the strengths and identify the various strengths and then make sure that we build on this complementarity to create the best possible engine to make progress as fast as possible.

And I think built-on complementarity is very important because if each region, region globally in terms of continents but even regions locally are going to try to do the same thing and just copy and repeat the initiatives then it's going to be very inefficient. It's actually going to reduce, in fact, the efficiency in the system from where we are today even and then the CHIPS Act would result in kind of the opposite effect. It would even slow down innovation.

So I think it's extremely important that we connect the strengths, identify the strengths of the various regions, and that's what we also want to contribute and complement with where we think we are strength and where we can kind of amplify the strengths of some of the regions by combining what we do best, what the various regions do best and, in that sense, we are establishing several contacts and initiatives.

We just signed an MOU with Purdue University earlier today because I believe that, as you mentioned, in the Midwest there is, I think, a very nice cluster of top excellent universities and I think it's very important that we leverage those strengths and connect, and also by connecting what we are doing, bring some of the assets we have into scope and make sure that we by doing that can kind of elevate also some of the unique strengths that are available in the various regions, same way as what Dave referred to in terms of the complementarity between what NY CREATES does and what do we do. Well, by creating that formal link we can become stronger on all sides and move as fast as possible because we have to realize the challenges are phenomenal.

The semiconductor industry has made phenomenal progress over the last 50 years. But it's getting so much harder to continue that exponential growth in the future and it's also – it's not only harder to just extend more slow, but it's also becoming so much more complex because we have all these different needs from all the various industries.

So we have to do this in the most efficient way and we have to avoid duplication among the regions, among the continents, and that's what – why we are trying to kind of contribute in this, identifying the strengths and then linking all of that.

Mr. Ramaswamy: And as you do that across these different emerging regions, so let's say New York or the Midwest or Texas or Arizona, do you see a natural – a university – you mentioned Purdue. Do you think a university is the natural partner, or could it just change depending on the – on the –

Mr. Van den hove: I think it could change. But, of course, the U.S. has some phenomenal universities that are doing a lot of fantastic work in this domain. So I think we should leverage those strengths.

But at the same time, as we were discussing with New York we are also having discussions there with Albany, too, because I think it's very important in the CHIPS Act if you want – I mean, speed is going

to be very important so existing infrastructure has to be leveraged to the maximum and that's where New York, of course, comes in and that's why I think making sure that the agendas of New York and what we do and what the universities do, the regional centers do, we have to make sure that they are fully complimentary and kind of bootstrap each other.

Mr. Ramaswamy: Dorota, let me ask you on the workforce piece, so a couple of questions that we're thinking through here. One is from a – when you think about a workforce agenda often the conversation with the industry tends to be some form of yes, we have workforce needs that are significant, workforce gaps across the spectrum, and we are working with the following half a dozen universities and community colleges. That's usually the flavor of the conversations we have with industry.

So the path to scaling some of those, you know, what works and figuring out how to scale is not always clear from a workforce-development standpoint. In your capacity with the Midwest Semiconductor Network, how are you thinking about scaling or finding the best programs and scaling them? And also, related to that, the workforce-development agenda, to what extent do we think of that as a regional agenda versus a national agenda?

Ms. Grejner-Brzezinska: That's an excellent question. So let me maybe build upon the few points that you made; the importance of collaboration, the importance of bootstrapping, the importance of not repeating what's just, you know, around the corner.

So I think the whole motivation for Midwest Semiconductor Network was really, A, to understand that this is not just Ohio; number two, it's not even the region that we have defined right now by these five states. It's essentially a nationwide problem, right, a challenge that we are trying to solve. And it's not going away in five years.

If we are to reassure the semiconductor industry, we need to beef up our R&D to take over again U.S. leadership as we used to lead, and then, at the same time, of course, have the workforce for today and tomorrow. And that requires not just a simple pipeline. It requires the broader aspect of what skills are needed by industry and at what level. And it's not just semiconductor industry. It would be more. This would be also supply chain. And there would be users, right. So we are thinking more globally, so to speak, in terms of who we need to train.

So again, going to the pipeline, which is necessary, but it has to be coordinated, and this network is an attempt to coordinate, right, how – what do we teach, and what skills have to be acquired at the community-college level? Some of those students would continue to four-year college also need to understand that a specific set of skills and qualities need to come from the workforce that would be educated by this network.

I also want to mention – someone mentioned earlier standards, right; standards of education as well. You cannot just have every different region, every different school, teach something different, right? We need to understand what skill set is required and then consequently implement this within the region and potentially elevate to national level by the central organization, such as NSTC.

Mr. Ramaswamy: So there's a point that actually brings up, you know, a conversation that we are now trying to have with the industry to say, look, you know, yes, we understand that there are needs. We also know that industries do their own – different companies do their own training. It would be useful for us to try to understand, in the industry's experience, what has worked, what is not working, what are the most efficient ways to train workers, what training programs yield the most productive workers.

So, you know, our hope is, at least, that that information starts to become available. Even if it's not publicly available, it's at least available in some kind of aggregated fashion so we can identify the best programs out there and then figure out how to scale them. But you do see a difference between Ohio State going this alone versus Ohio State going as part of the Midwest Semiconductor Network. What's the difference?

Ms. Grejner-Brzezinska: Oh, absolutely. I mean, Ohio State, as great as we are, right, we can't right now produce technicians, right. We are really, really good in – like I said earlier, essentially we cover the whole stack. We start from physics to materials through design and integration, right? And we are strengthening those capabilities and grow the capacity now because, again, of the opportunity.

But at the same time, we are thinking broader. We are thinking nationally. And this really has to do with working across not just R1 institutions, because we are always those big 900-pound gorillas in the room. We need to enable. We need to work with institutions who actually have a tremendous value right now for the industry. And it's very important that we coordinate and we understand how the education flows.

So by working together and listening to industry and working in sync, I think we can be successful. And we will be successful this way.

Mr. Ramaswamy: Phil, your comments about the states and the extent to which they have participated in the Commerce – I'm not going to comment on that. That information is publicly available, so folks can make their own judgments. Obviously, we have been talking to the states on a one-one basis, and to the NGA and a bunch of those organizations.

What advice – as you think about, you know, the overall theme of today, the role that states and localities, either through the government or through regional consortia or universities, the role that they play, the important role that they need to be playing between the federal government and the industry?

As you think about that role, what advice do you have for the Commerce Department in how we continue to engage that audience? Because, as I see it, you know, one hope that we have – and you mentioned it – is in the statute, where companies that come asking for incentives have to show that they have a state and local incentive. That's certainly one hook. And we can use that hook to set a bar, hopefully, of the kinds of incentives we want to see. And that's kind of what we tried to do with that first Commerce paper that we issued saying here's the types of incentives we want to see.

What else could we be doing to encourage this sort of collaboration at the state and local level?

Mr. Singerman: Well, I think that's a really fundamental question, because the relationship between the federal government and the states is structural. And underlying many of the ecosystem assets, such as universities, are really creatures of the state. They're sponsored by the states; the Ohio State University. They are funded by the states. They are land-grant institutions. And certainly, in my experience at the federal level, states were always considered as, in a sense, a source of dumb money, right? You put out a program and you want the states to come to the table and provide some matching funds so that you could leverage other people's money.

I think the CHIPS Program is different because of the history of the state engagement with the CHIPS industry. It's really been a bottoms-up that the federal government – a bottoms-up approach that the federal government has now, you know, wisely decided to build upon and leverage.



If you're talking to the states on a regular basis, I think that's really critical. I know when we tried to establish a manufacturing-institute program, it was very hard to get – we were unable to get the states into the policy-development process, for both political reasons and other reasons. So if you were more successful in that – and this is a dynamic process – you're going to face the problem, as you know, in the implementation of the facilities that was mentioned by Bruce Andrews in terms of the application of federal environmental policy that layers on – it layers on the state environmental policy regulations.

So I don't think there's a magic – you know, like a silver bullet, a magic wand. I think if you – and I wasn't being critical. I was being, you know, provocative. I think if you're talking to –

Mr. Ramaswamy: Factual.

Mr. Singerman: What's that?

Mr. Ramaswamy: Factual.

Mr. Singerman: Factual. If you're talking to the states, I think that's – but you really – I think the – if you look at the attendance online that was made available, I think there's still an absence of local-government – state-and local-government participation in these discussions. And I think there needs to be, you know, an intentional effort to bring the states into the dialogue as early as possible, which I know you're thinking about.

Mr. Ramaswamy: Yeah. And I think one of the things that's driving us to engage with the states is not just the CHIPS Program but the fact that, you know – and this is not limited to innovation; it also – you know, the broader infrastructure and the energy infrastructure, all the other things that go into these big facilities, right. And there are federal programs through all of those. And for all of those programs, the state is really the convener of those different programs.

So we'd love to see, at the state level, that coordination of federal dollars from different programs coming in to build out new energy infrastructure to, you know, make the grids more reliable and more energy-efficient, to support the semiconductor fabs and make that a wider competitive advantage.

I recognize we're out of time, technically, but I do want to open it up one more time for the audience. Any other questions? Yes.

Q: Yes. Tom Guevara, director of the IU Public Policy Institute.

One of the things we heard earlier from our panelists this morning was the notion of inclusion in bringing participation and opportunity, really, to places that haven't always had that, whether they're urban or rural, but particularly as we think about university systems, state-sponsored collaboratives, governmental collaboratives, or even not for profit. What can we do/what should we be doing to bring greater opportunity to more people?

Mr. Ramaswamy: Is that directed at any particular person?

Q: Any.

Mr. Ramaswamy: Anybody want to take that?

Ms. Grejner-Brzezinska: If I may just comment, because you touched upon an extremely important aspect, which essentially is also a fabric of MSN. I very quickly show you the slide, but if you look at the composition of the organization that we have, we have large states, we have private organization, four-year institutions, or two-, or ones. We also have community colleges and HBCUs. So, we actually are trying to bring everyone to the table and bringing the voices, which probably wouldn't be at those opportunities that the network can create. Are we a finished product? No. But we are working really hard to make sure that we bring in the intellectual capacity across the board. And then we know that it's important for industry as well. And like I said and showed earlier, we just established industry board, and we're going to continue along those lines.

Mr. Anderson: I might add to that from a state perspective in New York, if you look at what New York has done for Upstate, which was, you know, part of the textile industry, you know, a couple hundred years ago, you know, the Erie Canal and all that brought to the region, now it's really considered part of the rustbelt. And so bringing a company like Micron to Syracuse area is truly going to be a reinvigoration of that region. And that was not an overnight success. That was 20 years of planning and investment, not just by the state, but by the local economic development groups, the counties and so forth, preparing shovel-ready sites for companies to come in and have the available water, electricity, workforce, and so forth. So really, it doesn't happen overnight. It really takes some strategic investment to reinvigorate the region and prepare it for those companies to come in, and in the case of upstate, having a focus industry that the – that they're trying to attract, which creates high-paying jobs over the long term. So, I think it really takes the local communities, the local community

colleges, the university systems, and the state and now with the, you know, federal investment, it should accelerate that.

Mr. Singerman: And I can certainly tell you, I think adding to that, from the federal standpoint, from the CHIPS office standpoint, you know, there's many ways you can think about expanding the participation of in CHIPS to a wider network of underserved communities or underrepresented regions. One way is through the workforce pipeline, as Dorota was talking about. Another way is through the supply chain. And so, you know, yes, there are instances where the suppliers tend to locate in a cluster near the big facilities. But there are many instances where the suppliers don't do that. You have chemical suppliers on the Gulf Coast, right? You have material suppliers in the Northeast, who are all looking to participate in the CHIPS program. So that's the other avenue of bringing in these regions.

And then finally, I think the third one that we're looking at is from a construction standpoint. It would be, I think, silly on our part to expect that, you know, if you've got fabs being built out in Arizona, that all the workers for construction are coming from Arizona, while there's also demand for building EB facilities out there and a bunch of other battery facilities out there. And so we are looking at things like, you know, prefab construction, for instance, as a way to say can you build some of these things in other places and bring them there, or bring workers from other places, because we know that, you know, construction worker shortages is a serious problem that we have to deal with.

Mr. Van den hove: And I believe that actions on democratizing the access to this capability, I think, is very important. I mean, your activities on design – I think has a similarity with what we have been doing in Europe, kind of make sure that any university basically can set up programs to kind of design chips and advanced technology, but that the university on its own can never get the access to leading-edge foundries. So, we built our programs, which make it very cheap for university, but we also provide all the tools. And actually, through cloud access, this can be made in a very, very approachable way. And those are the programs that also, I think, lower the barriers, will democratize access to this.

Mr. Ramaswamy: It's a great – from an outcome standpoint, it's a great plan. In fact, NSTC white paper that Eric talked about actually does talk about the fact that one of the goals is to bring down the cost of research and innovation significantly, exactly, to lower the barriers and get more participation.

Mr. Anderson: So, Tom, I think the – as you know from your experience with EDA, I think the federal government has a particular responsibility and role and opportunity to engage what Senator Young called the flyover states with underserved communities and populations. And Secretary Castillo talked about capacity building. Frankly, the – most of the local communities' economic development organizations are overwhelmed by the variety of programs we heard about today, not to mention all the other ones, NSF has hubs, DOE has hubs, DOD has hubs. The CHIPS program will have some sorts of hubs. EDA has hubs.

And in order for traditionally underserved communities to participate in these programs, there needs to be an injection of upfront planning resources so that they have the capability to respond to what are going to be very rigorous requirements for participation in these programs. And that I think is something that I know Sree and his colleagues are thinking about.

Mr. Ramaswamy: There's a question there, please.

Q: Richard Hudson, a journalist from Science|Business.

This is a question for Dr. Van den hove. You talk about the importance of international collaboration. Fine. It's a little difficult because of competitive fears. So, is there anything specific that you think the U.S. government, or the European Commission, or the G7, ought to be doing to make that kind of coordination and collaboration happen? Or is it just kind of a wish that it would happen?

Mr. Van den hove: I think it is – it is a necessity to make – to make efficient programs, and that's why at the level of European Commission and U.S. government, there should be serious discussions. And I think TTC is one of the fora where this can happen to make sure that the boundary conditions are set such that we can have very effective cooperation and avoidance of duplication of initiatives, because that would result in inefficiencies. The industry is strong – is a strong demanding force for that, because the industry also works at the global level. The supply chains are global. So, I think it's very important that also on the R&D and innovation side, we promote this efficiency in the system.

And I don't think – I don't see fundamental barriers for that. And I also see a strong willingness in Europe and in all our discussions here to enable this as much as possible.

Mr. Singerman: Yeah, and I think certainly from a – from a federal government standpoint, yes. I mean, the TTC is one platform where these issues

are discussed. There are other discussions between the U.S. and EU governments. Also, with the Government of Japan, for instance, you know, there are discussions going on there as well, right, and also with the Koreans to trying to figure out R&D collaboration. So yes, I think there is a lot of that kind of contact.

It's still TBD. And exactly, you know, do you need an official framework or an official agreement of some sort? Or is it better just have government-to-government enabling of conversations throughout the – throughout the value chain?

Mr. Ramaswamy: Yes.

Q: Hi, Matt Preston with Deloitte supporting the design of the NSTC.

So, my question is actually for all of you, for your respective regional clusters that you've built, and especially, for example, with the MSN, who is also in the sort of design phase. How – in the design of your various organizations, how have you been thinking about collaborating outside of, you know – so for example, NY CREATES working with Imec, or Imec working with MSN, how do you – and then all the Manufacturing USA institutes – like how do they – how do they, I guess, collaborate outside of their various spheres?

Mr. Anderson: I can start with that because, you know, we have the AIM Photonics Manufacturing USA institute, and it truly is a national collaboration. And there are some international participants in the Manufacturing Institutes as well. But we coordinate with universities all the way from MIT to Santa Barbara, and everywhere in between. And so it truly is a national collaboration for both companies as well as universities and other member organizations that are participating in that. I think as we look forward in NSTC, certainly New York CREATES is working with universities across countries. Our members, our industry partners are global. From all regions we've had discussions with Imec, Leti, the Korean Institute of Advanced Technology, the Japanese companies about collaborations there.

So I think, you know, moving forward, we really need to focus on cooperating across regions, not just across the nation, but internationally as well. We need to take most advantage of existing capabilities and drive those to get a quick start and engagement on the NSTC and not try to recreate duplicate capabilities. And I think we have to be prepared to be engaged for the long haul, you know, from an investment standpoint, both from industry and government as well.

Mr. Van den hove: If I can add to that, I think it's a very important question and I think it's something that deserves much more time and debate, but I believe that cooperation is much more, should be much more than just talking together. It should be real collaboration, and with that we mean having locations where we put people together, where we mix teams, where we really work towards joint research agendas. So it's more than just talking. It is forming real joint initiatives, and I think that's what should be the ambition when we say, well, we need true global collaboration. And we certainly have the ambition to enable that and are prepared to work together. That's what we're discussing with some of these initiatives.

Mr. Ramaswamy: So perhaps the last question: In putting together an NSTC, leadership is going to be important; since we have some very experienced people on the panel, can you tell us a little bit about what that entails and what – you know, what sort of managerial acumen and wisdom can you impart on anyone who is fortunate enough to lead the future NSTC? Thank you.

I'm definitely not going to be the first one to answer that one.  
(Laughter.)

Luc, why don't we start with you?

Mr. Van den hove: (Laughs.) I think the most important thing is to have a person with an open mind and to have a person to kind of sponsor those collaborations, foster, enable those collaborations because it is – I mean, it is impossible to have – I think it's not impossible but I think it would be unwise to set up NSTC as one integrated activity at one location with a greenfield and start from scratch; that would be very inefficient. So I think in essence, I mean in practice, is going to be a network with multiple people and teams involved, so I think a leadership that embraces that, that is open-minded, open collaboration, and does not have the attitude, oh, I know everything and I will do it my way or no way – that attitude I think is extremely important.

Mr. Anderson: I would agree completely with Luc, and yeah, the person has to have a collaborative background and history, has to have relationships across industry, academia, and even with governments both locally and internationally, and you know, I think has – you know, it can't be strictly an academic focus or strictly a government focus; it really has to be focused on, you know, what's the long-term goal and where does the industry need to go? What resources need to be combined? Being able to have, you know, some ability to negotiate so that we don't duplicate resources and we bring people together to collaborate on

driving next-generation technology, so it really is that kind of a person that's very open-minded and collaborative.

Ms. Grejner-Brzezinska:

If I may just add one more comment with what was just said. I think it has to be a person who understands we are playing a long game. This is not a five-year program; this is something which has to be sustainable, right? So of all the components, the characteristic we already named, I just want to add this.

Mr. Singerman:

I have a personal opinion about this. You know, the Congress and NIST have clearly described the National Semiconductor Technology Center as a public-private partnership, so it pursues public goals with a private orientation, private managerial, but it's not – this is not a private sector corporation that will have everything within its four walls, which will be a top-down organization. The comments that the panel have just made about the prospective collaboration, engagement with stakeholders, with others, that reflects the public side of the enterprise and I think it's critical. And whoever she or he is who is selected to run the organization will have to assemble a team that reflects those capabilities and that perspective.

Mr. Ramaswamy:

So there is a tension between, you know, is it an organization that pursues public goals with private partnership, or private goals with public support? (Laughter.) And there's always – you know, when you hear people describing what a private-public partnership is, there's always a little bit of that nuance. And there is a tension there and I'm glad you articulated it the way you did. And so you need somebody who knows how to bridge that tension, I think. And you know, it is striking, though, as you ask the question, if you look back in history at these successful initiatives, you know, all the way going back to the Second World War, how much of it is driven by the individuals, right? Who drives this thing? And sometimes it's serendipity, where you certainly hope that I think we find the right person, but it's a good question and it's something I'm going to have to mull over for a bit as well.

Chuck, last word.

Q:

Don't you need public resources to achieve private goals which solve or provide public objectives? And on the selection process, shouldn't we draw from the ranks of people who are already doing this?

Mr. Ramaswamy:

You'd certainly hope so, yes.

Q:

(Off mic) – the private sector. And I'm fearful Phil's point is a good one. You bring in a hard-driving corporate type, then he will be a

hard-driving corporate type and that may not be what you need. If you bring in someone who has no corporate experience and hasn't worked – (off mic).

Mr. Singerman: So that's why the board of trustees is really important, so everybody should send in their recommendations for who's going to be on the – who's going to advise Sree on who's going to be appointed to the board of trustees.

Mr. Ramaswamy: Yes. And on that note, we will wrap up. Thank you very much to my colleagues for an excellent panel discussion. (Applause.)

(END)