

Speaker 1: ... Berzina, who are going to give you a little preview of what's to come.

Studdart: Thank you. Hi. I'm Amy Studdart. I've been leading technology programming at The German Marshall Fund for the last two years. Technology is increasingly impacting every element of the transatlantic relationship, from economics to security to even our individual well-being, culture, identity. At GMF, we believe that the transatlantic relationship should be at the center of how technology shapes the future. While the transatlantic technology policy relationship seems over the last decade to have been characterized more by distrust than it has by cooperation, whether it's over the Snowden revelations, distrust around taxation, data privacy, our contention is that transatlantic values can only survive and thrive if we work together to shape technology and the way that it develops our international norms, rules, democracy, et cetera.

Studdart: How do we do that at GMF? Our goal is really to help all of you, the people who care the most about the transatlantic relationship, to build and articulate a vision of technology in the future that can support those values. We do that through research and analysis, through convening, by bringing you all together like this but also in Brussels, in Washington, D.C., and in our Berlin office too. We also do it through leadership development. One of our biggest programs is a program called YTILI, which brings European entrepreneurs over to the United States to build the next generation of transatlanticists, who inherently combine technology and a deep understanding of technology with transatlantic values.

Studdart: As you have seen throughout the agenda of this forum and will continue to see, technology is also reflected in every element of GMF programming. Our Alliance for Securing Democracy is working on disinformation and the way in which foreign powers are able to use technological tools now to undermine our democracy. Our economics work, of course, increasingly looks at trade and tax issues and how technology is changing those questions. Our urban programming looks at smart cities and how urban leaders can use technology to support democracy at the grassroots level.

Studdart: We also have an incredible roster of in-house expertise, many of whom are here today and who you should seek out in the coffee breaks. Peter Chase, who's over there, who leads our economics work from Brussels, and I'm sure many of you already know him. Anthony Gardner is a non-resident fellow with us. He works on the technology relationship more broadly. Geraldine Gardner, I don't see her in the room but she is around. She leads our smart cities work, and then of course Kristine Berzina.

Berzina: Thank you very much, Amy. I'm Kristine Berzina. I'm a senior fellow here in Brussels, and my work deals with the digitalization of the energy sector, the opportunities and challenges that the intersection of digital technology and energy brings to industry, but also to policymakers and to citizens.

Berzina: Most of you probably haven't thought much about electricity. You plug something in, you turn a light on, it works. You get a bill from your power

company, you pay it. Most of the time and traditionally, that power was made in a power plant on the edge of town using fossil fuels. This is a simple, old system, and really most of us didn't spend that much time thinking about it.

Berzina: The world we're entering today is a little bit different. You can buy an electric car and plug it into your house. You can charge that car with solar panels on your roof or the wind turbine down the street. You can control all of this with your smartphone, when you charge, how you charge, what the temperature is in your house, when you turn it on, when you turn it off.

Berzina: You can also trade with your neighbors. Probably you still, and will for a long time, pay your power bill from some kind of traditional power company, but there are pilot projects ... Brooklyn is one example ... where neighbors trade with each other and use blockchain technology. Mostly we talk about that in terms of cryptocurrency, but you can use it in other ways, for example to buy and share energy within your neighborhood.

Berzina: This is the world we're entering, but this world brings lots of questions. What does it mean for a car to become a battery? What does it mean for a household to be an energy producer, and what does it mean for technology to be the lubricant that makes all of this happen? What will be the role of energy companies, of automotive companies and of tech companies and telecommunications in the future? GMF has brought together industry leaders, policymakers, from Europe and the United States over the past year to think through some of these questions, and we're writing a report to be released this summer to understand what all of this means.

Berzina: We think it's an important topic for Brussels Forum today, as we try to rebuild the transatlantic relationship and set it up for a good future, to think through challenges that are going to come. How do we ensure innovation takes place, but how do we protect cybersecurity, data privacy, and how do we make sure that all of this isn't simply about gadgets in your phone, but also contributes to the bigger political decisions we're trying to make? How does this have an impact on climate change, and not simply on how you spend your free time on the train?

Berzina: I want to hear from you and what you think. We'll have a fabulous panel here today to think about these issues, and we'll try to put that in the report at the end. With that, I'm going to turn the floor over to Jonathan Capehart, an editorial board member and columnist at the "Washington Post," to take to you the panel.

Capehart: Thank you very much, Kristine. Thank you, Kristine. You gave us a lot of questions that I hope the panel will be able to ... well, not hope ... the panel will be able to answer. I want to say up front that during the conversation, I would love it if you would go into the app, the SpotMe app, the Brussels Forum app, and whatever question you have, type it in. Then as the conversation goes on, I'll look at the screen and I'll ask the questions.

Capehart: The other thing that I would love for you to do, because it is a Friday afternoon, you seem a little less than energetic. If during the conversation there's a question that you have that you are burning, you're just dying to ask, feel free to jump up. Feel free to jump up, raise your hand, and I'll come over to you and ask you the question. I really want this to be a conversation, and to get this started, I want to introduce the panel.

Capehart: I have Member of the European Parliament Reinhard Butikofer. Please come up. Iain Conn, Group CEO for Centrica, and Congresswoman Suzan DelBene of the State of Washington. Congresswoman, you get to choose which chair you want.

DelBene: I'll take this one right here.

Capehart: As I said before, Kristine laid out a lot of questions that we're going to have to ... we, meaning as a society ... figure out, what's going to happen. She had a series of questions. What does it mean when vehicles are batteries, when households generate their own power, when technology allows us to manage all of these things? What does it mean for these particular sectors ... automotive, telecommunications, energy ... and I would love for you to answer from your particular vantage point. I want to start with you, Mr. Butikofer, your response to all of these questions.

Butikofer: Well, thanks for having me. First of all, I am working on the industrial policy committee of the European Parliament, so I will choose the industrial policy angle.

Butikofer: If you engage in a revolution, I think it could be compared to taking a bronco under your saddle. You know one thing. Somebody will probably bring the horse back to the corral, having broken its will, but you're not sure it's going to be yourself. You could be thrown off. If you start participating in the technological revolution, it's not much different. You can be very helpful promoting it like Europe has been, or in the particular case of the renewables industry, my own country, Germany. They're instrumental in getting it going, but then others take over.

Butikofer: The question that I will want to address just shortly is this. If all of these visions come true, if all of these philosophies prove right, is it going to be our revolution still at the end, or is it going to be somebody else's revolution? Are we going to be watching on while the Chinese own the revolution, or is there going to be a strong future for European industry? I believe the one most important issue is whether we are able to create the right framework conditions for promoting this transformation for industry.

Butikofer: If we look at the IT sector, you could say Europe could be compared to a baseball game in the bottom of the fifth inning. You've had a couple of hits, a few walks, no runs. The opposing team has had a couple of home runs, including a grand slam. You can still save the game, but you have to go for better pitching

and better hitting, meaning you have to create the conditions for an integrated European digital market.

Butikofer: That's where we're at, at the moment, and this year is going to be decisive. It's the year that has been designated to come up with the final answers to the package of issues that we have said we want to address like e-privacy, cybersecurity, a whole lot of other issues. If we can't deliver by the end of this year, well, chances are it will take much more delay, because then there's an electoral period that would follow.

Butikofer: I think this is what we have to look into. Are we up to promoting stuff with adequate speed? I would think there are some very positive examples, like learning from the U.S. DARPA has been looked at with a lot of interest around Europe. Now presently, the French government and the German government have agreed that they will do something similar, not under the realm of the military, not under the defense realm, but they still want to set up a common big institute to promote disruptive innovation. This is one thing that I think would be extremely helpful in harnessing the revolution that goes on.

Butikofer: Similar with regard to cybersecurity ... and maybe this is the last point I want to mention in the initial remarks ... cybersecurity is probably the one single most important issue that will decide whether European industry will catch on, because the backbone of our industry is the small and medium-sized enterprises. If small and medium-sized enterprises, with their strong IP in a small niche, which they lead on the global market, if they lose that IP, they're gone. If they can't rely on good cybersecurity, they will never be really convinced that they should join the revolution, and it will pass us by. This is what we're discussing, and I hope that Europe will not just be watching as others move on, but be a strong competitor also in the future.

Capehart: Thank you, Mr. Butikofer. Now, Mr. Conn, I want to come to you, because as Reinhard just talked about, disruptive innovation, one of the things your sector, the energy sector, has to deal with is the changing nature of things. There was a story on the BBC about the State of South Australia. I believe it was late last year. The entire state lost power, and so who did the state turn to? Not an energy company, a car company. Elon Musk saw what happened, said he would build a hundred-megawatt battery and he would deliver it in a hundred days, otherwise he would give it to the state for free. Not only did he deliver, he did it in 60 days, a car company. Talk about the challenge that you face with something like that.

Conn: Well, thank you, Jonathan, and good morning or good afternoon, ladies and gentlemen. The first thing to say, Elon Musk does have a bigger battery than me, but the reality is we are building a 49-megawatt battery in the UK, almost identical. This is part of what's happening everywhere. Elon Musk may capture more of the publicity, but this is becoming mainstream, not way out there.

- Conn: Now, over Christmas I was reading the book by Tom Friedman on thriving in an age of accelerations, and I'm very struck by the fact, as you were referring to at the beginning, Jonathan, that there are many accelerations happening at once. Actually one of the biggest problems, which I suspect we'll talk about, is the difficulty of mankind to cope with it.
- Conn: Let me turn to the revolutions in the energy industry. The energy system is changing, and that change is accelerating. It's not static, and there's more than one technological revolution coming together at the same time. The big trends that we believe in, that our company is following, is firstly the decentralization of the energy system. It's happening in response to technology development because of climate change. Power is shifting to the customer, because they have more choice, and digitization is accelerating the whole thing.
- Conn: As a result, there's huge growth in distributed power systems. In 2015, 2% of the world's power was generated by distributed systems. It'll be 12% in 2030. It doesn't sound like a huge change. It is a huge change. Lithium-ion battery costs have gone down by 57 percent from 2012 to 2016. There are distributed energy management platforms developing using blockchain.
- Conn: Local energy markets, demand response capability, the connected home, all of this means that there is a revolution in energy and the associated services to support it. There are other revolutions joining this, electrification of transport, electric vehicles. There were zero electric vehicles, really, in the world's stock in 2010. There's now two million, but we've got to be careful. That's two million of 1.3 billion. We've got quite a way to go.
- Conn: Car batteries are indeed going to become part of the distributed energy network. Artificial intelligence is going to introduce cognitive dimension to this, and then data and data analytics is going to create more insight and new propositions, so what are the issues and opportunities?
- Conn: The issues are pace of change, the learning curve, allowing technology learning curves to happen rather than forcing them in a particular way. We saw the impact in Germany as a result of the energy vendor. Infrastructure needs, the ability to decarbonize power ahead of all this electricity use, the grid instability. These are some of the issues on pace of change.
- Conn: Then we talk about data privacy and cybersecurity, and last but not least, employment. There's going to be a massive impact on employment. Online means fewer traditional roles. New competitors, an inability to reskill fast enough given the pace of change. These are some of the biggest issues.
- Conn: What are the opportunities? Giving customers what they want. New businesses. Lower energy per unit GDP. We've already reduced energy per unit GDP by two-thirds since 1980. Lower carbon per unit energy, and more competition and lower prices.

Conn: What's my company doing? We're moving towards the customer, because that's what's happening. It's at the edge, whether it's in B2B or B2C, where physical meets digital, and we're investing £1.2 billion in this and spent about £700 million so far.

Conn: So what? I conclude ... look, I've been in energy for 32 years ... there has never been a more exciting time as now. We should welcome the interaction of these technical revolutions. However, as I think Reinhard said, there will be winners and losers. It's moving too fast. It's revolution, not evolution. I do not believe they can be synchronized in a deliberate way.

Capehart: Right.

Conn: They will find each other. Market forces and loose coordination ...

Ian: ... Will find each other. Market forces in loose coordination is what's going to be required. I don't think a final package of measures will work. It's too static, but I am an optimist. This will net benefit mankind.

Speaker 2: Thank you very much Ian. So Congresswoman DelBene, I would love for you to pick up on what Reinhardt and Ian had to say. A lot of what Ian just pointed out, it made me think that, to use an American analogy, it sounds like the Wild West. There is so much happening, so much going on, and yet no one ... Even Ian has no idea what his industry is going to look like in five years, 10 years?

Ian: Maybe 10.

Speaker 2: Maybe 10? He's an energy executive and-

Ian: In five years you'll be CEO's so-

Speaker 2: Yeah some things never change. Talk about the Wild West nature of what we're talking about and from your perspective, particularly on this idea that you can't sort of manage this, what's going to happen, it has to happen on it's own, it has to find it's way. Give me your perspective, give us your perspective.

DelBene: Certainly. It's an incredible time. We used to talk about technology as it's own industry. A vertical industry. And you use technology and folks talked about technology as a nice to have, but it wasn't really critical. But technology is infrastructure now and it impacts every sector of our economy. So we talk about energy, but I think we could pick any subject area and talk about some more disruptions, like Ian was talking about. But disruptions and opportunities.

DelBene: As a policy maker, one of our challenges is it's not just about innovation. We also have policies that get in the way of innovation, that stifle innovation, that promote certain business models and make it harder for new opportunities to come into place. When you look at energy, it's very built into our infrastructure.

You can talk about smart meters and new technologies but if that doesn't actually run to someone's residence they may not have that opportunity and so how are we thinking through our infrastructure. If your car has a battery, are you even going to have a car in the future? Or are you just going to call one up and it is a resource that is shared, and how does that change the way you live or even how you design a place to live when you may not even have to have a garage or a parking space.

DelBene: How do we think through that? How does our infrastructure look? How would we design our networks, our roads if we knew that we were going to have autonomous vehicles going forward and we were going to plan for that now. We still are investing in yesterday in many cases. Investing in models spaced on the way things worked yesterday. And I know one of our challenges is catching up to yesterday, but let alone as a policy maker being forward looking and thinking about where do we need to be tomorrow? How are we going to provide the flexibility so that innovation can happen? Because one of the challenges in policy is you want enough stability to make sure you can plan around that but you want the flexibility to support innovation and change.

DelBene: And we have to think about what the impact is on the average person. Think about issues of privacy of civil rights and civil liberties. Issues of cyber security because we talk about all the innovation but we also know that if there's vulnerabilities the incredible impact they can have in a connected world where your thermostat and your home security system are all connected or a vehicle. And one other point I want to mention is inner operability. We talk about technologies, but we have a lot of new technologies coming but they don't necessarily work with each other.

DelBene: So, what if you're in a car, say we're in a world of autonomous vehicles, and you're going to cross a border. How will that work? Will there be infrastructure for that car from one country to be able to drive into another? Right now you can drive across the border and everything looks pretty similar and acts very similarly. But imagine if you have your system of networks etc. that are helping a car know where to go. Are there going to be standards and ways that moves forward? If you buy a thermostat, does it work with the energy company that you work with?

DelBene: Many folks are trying to vertically integrate to control their customers and make sure they ... They're very sticky, they keep them together. But don't you want to be able to pick the best product and be able to match things together and so how are we talking about inner operability and standards and all of those are going to be important places for industry to grapple with and also in the public policy sector for us to grapple with so we are making sure again that we are being forward looking. Making sure that we are protecting the populations that we serve and also allowing incredible opportunity that we've all talked about to come forward. And I think that is the great challenge that we face, but also an exciting time I think around the world as we grapple with this.

Speaker 2: So Congresswoman you raised a ton of questions, just like Ian and just like Reinhardt. And so all of you have been listening to these questions and I would love it if you would put some ... If you even have solutions to some of these questions to put them into the app so I can have something to read on the screen. But you said something a while back Congresswoman and just at the end of your remarks about how we need to be forward looking. You in the public sector, you who have positions of leadership. It made me think of President Eisenhower and the forward looking that he had with the interstate system in the United States. But in the era that we are in now, is it even possible for the public sector to be forward looking in terms of is that what the population wants? That kind of leadership? And also are government officials even courageous enough to make the tough decisions to be forward looking?

DelBene: Well I take the second part of your question first, I think that many folks are scared of technology. They ... And scared of innovation and where things are headed so they are afraid of approaching policy on these issues. So I'd say courage is important but also education of lawmakers. So they understand the possibilities in different industries and are thinking through those as they're putting together policy. But many of our policies, if I look at U.S. policy, they're decades old, they're ... You know just think of something, eCommerce, their built on someone driving down the street and going to a store, they're built on energy sector, on where you live, the energy company that serves you is kind of based on where you live. That's not this distributed, open kind of open choice model. So changing policies and allowing that kind of innovation also means they're winners and losers and there are people fighting hard to keep things as they are because that's in their interest and that's what we have to work on and that will take courage.

Speaker 2: I would love for either of you to jump in on this and thank you very much to those of you who have put questions up there. I'm going to come to them as soon as Ian and then Reinhardt.

Ian: Can I just comment on the sort of mindset flip that you need to do in this change. Regulation is currently holding back change in many ways. It's a slow follower if I may be so bold. And how we get regulators to be living with the technological opportunity but still being a break. Because I actually think it's a good thing that regulators are a break. But some of the other mindset flips, Susan you mentioned getting a smart thermostat from your energy company. So we are the leading smart thermostat provider in the U.K. and Western Europe. Not Nest by the way, Centrica is.

Speaker 2: Nice plug.

Ian: Our products called Hive. But the point I'm making, we sell Hive to everybody's customer. We don't care if they're our customers. So we are selling it to everyone's customer in the U.K. We've just been invited to sell it to eight million customers in Italy. We don't even sell energy in Italy. These are some of the changes that people are going to have to get used to. And the market does need

to be free and open and I think the problem about regulation as you rightly say, it's 20 years behind. And I don't know Reinhardt how regulators are going to keep up with this change so that regulators are always a fast follower, and keeping a break on it, but not yet so far behind that there's a complete dislocation.

Reinhardt: Well I am grateful that you give me an opportunity to disagree. I've been talking to a lot of people from industry over the last year or so. Particularly from the [inaudible 00:27:28] industry. I hear what you say and I hear also the exact opposite. And I have had more calls from industry for meaningful regulation than I would have expected to hear. Because ... I mean it's easy to say get rid of regulation then we move on.

Ian: That's not what I said.

Reinhardt: But if we don't regulate, for instance the issue of whether we will allow China to come into our market and grab all the valuable high tech industries that we have been subsidizing with taxpayer's money. And they just want to take it over which they couldn't probably do under the present U.S. [inaudible 00:28:17] system but could still do in a lot of European countries where we don't have investment screening. I would say, we need some regulation. It's not the old kind of regulation, we have to adapt, of course. And it's about smart regulation not dumb regulation but I would not create ... Would not adopt or accept an argument that says regulation in itself is something we should [inaudible 00:28:44].

Ian: I agree with you.

Reinhardt: I repeat the argument about cyber security. If you want to build that into a selling argument of a nation's industry that believes there will be quests all around the globe for securities for businesses, you have to create some regulation. There are industries from digital Europe for instance that argue we shouldn't go there. We should just have mutual recognition of all the different standards that do exist. I don't think that makes a lot of sense because in the end the compartmentalization of the market will hem the development of small companies. And we know the monopolies are not necessarily the most innovative actors in a market. And I think one of the best arguments for some smart regulation would be that it helps preventing the nation's revolution from the oppressive weight of the big monopolist.

Ian: [crosstalk 00:29:47] If I may?

Speaker 2: Yes I was going to say, please respond.

Ian: What I'm calling for is dynamic regulation. I'm absolutely not suggesting regulation should disappear. It's crucial. It's just how do regulators keep up with

change but not allow themselves to get ahead of it. And I think that's really hard.

Reinhardt: Fine. Happy.

Speaker 2: Did you want to jump into this or -

DelBene: I was just going to say I'm a big fan of pilots and trying things just like you do as an entrepreneur. You try a new idea. I think in policy we can try things and we can do pilots and learn and have that inform the final policy that's put in place. And so how are we innovative in trying things from a policy perspective is important to really ... To really create that balance that both of you are talking about.

Speaker 2: And we have a question, sorry Ian, I'm right behind you.

Speaker 3: So it's exactly on this, whether the E.U. should take upon itself the role of being the global norm setter on many of the tech issues where it has the means to do so. On competition for example, on privacy, data protection and also civil liberties online. The E.U. has a slightly luxury position because it hasn't produced any global internet giants. They've tended to be gobbled up by Silicone Valley. And so the E.U. can work perhaps more in the public interest than U.S. regulation would be able to do. Is that a good role for the E.U.?

Reinhardt: [crosstalk 00:31:12] I would pick that up if I may. I would say the E.U. cannot play the role of global norm setter. But it could play the role of a strong advocate of global norm setting. Which is dearly needed. If you look at industrial norms, China for instance over the last 20 years has been very proactive in the context of the ISO system. Now more recently they developed a new strategy which you might call walking on two legs. They have still the ISO affiliation but they developed their own national norms that they don't introduce in the international system and in the context of their belt and road trade deals they enforce exclusively national Chinese norms. Where does that leave everybody else? So, global norm setting coherent multi-lateral based, that I think should be a role that the European Union should take on.

Speaker 2: Alright and we have a question here.

Speaker 4: Hi. [inaudible 00:32:17] from Turkey. I'm [inaudible 00:32:19] from 2009. And I'm founder of a needs map social entrepreneur from Istanbul. That reached former refugees in Turkey transaction 300,000 needs matching them. My question will be on compression of industry 40 versus society 50. Society 50 is a concept brought by Japanese friends, Japanese government. As super smart cities, as super smart systems facing with industry 40 evolutions. However, it's not that fast that masses, societies in all of our active world adopting to these technologies. Even if the technology advancements are critical. However the

societies get now fears that now we are talking about trade wars and then the societies and masses are in fear of adapting to these technologies.

Speaker 2: Your question?

Speaker 4: My question is how as TransAtlantic stakeholders or technology advancer how have you helped societies to adopt industry 4.0 and smart cities?

Speaker 2: Thank you. Who wants to grab that?

Ian: I can have a go.

Speaker 2: Okay you have a go and then Congresswoman -

Ian: I mean just very briefly. I think it's a great question because the biggest problem I see is that society cannot adapt fast enough to these changes. And as a result there's all sorts of threats to peoples feeling of security. Which is a question up on the screen. Technology kills jobs not trade, do you agree? Well, in this next revolution it is going to kill jobs. We just announced four thousand job losses, quite a lot of them down to digitalization of customer urinerous. And customers want to go online now and we don't need a lot of people on the phone. So, what is going to happen if people can't adapt fast enough? And if you can't re-skill fast enough? I think it's a really big issue.

Ian: I don't have the answer for it but one of the things I would put on the table business has to form a different relationship with society and government. And right now we're at a low point in my view, even though globalization's helped a bunch of people, business and the institutional framework that we've depended upon since 1950 is not trusted. And we're going to have to find a way to be trusted. Business, government and help. Help our people feel that they can cope with this change at the level of the individual. Because the reality is otherwise we're going to get trade wars. And the other alternative is that you get protection for society without protectionism. But this is going to require a very different level of cooperation.

Speaker 2: Congresswoman did you want to jump in?

DelBene: Yeah I wanted to add that right now we also have huge desparities in terms of access to technology. I represent a region, just outside of Seattle, so you've got huge technology and you can drive an hour and a half away and be in a place where you can't get a cell signal and you don't have access to broadband. And so when you think about technology and being a great equalizer, it's not a great equalizer if you are not able to get an education and have the same access that other students might have. You may not even aspire to some of the possibilities that are out there. The future careers that may be coming. So one of the things that I think we have to do is make sure we are making investments to make sure

we provide that ability in the United States, rural broadband and access there across the country-

Cong. Delbene: In the United States we're all broadband in access there across the country, so we aren't just having areas that are moving ahead quickly, and economically are doing well because of new technologies and innovation and then folks are being left behind.

Cong. Delbene: I mean technology can transform agriculture and have a big impact on our farmers in a helpful way, solve problems that people are struggling with, address healthcare issues.

Cong. Delbene: We have huge opportunities here, but right now I think that disparity is part of the challenge. It's not just the fear of the technology itself, but it's also access and equality in access.

Reinhardt: I would like to pick up on the issue of injustice and skills and the relationship between, as you said Ian, business and society.

Reinhardt: I believe this is probably one of the core issues and if the revolution is just a technological revolution and not also a revolution in how we address these issues, we'll fail.

Reinhardt: There are different perspectives being debated, and I think, we're lame and not fast enough in coming to conclusions.

Reinhardt: For instance, in the German tradition, the Austrian, the Swiss and the Danish tradition, there is a model, that stands out in Europe, The Dual Vocational Training system.

Reinhardt: It brings together government responsibility, your own efforts as a person who wants to learn, and the responsibility of business.

Reinhardt: They all share in the effort, and this is the system that is being acclaimed around Europe as extremely positive, even President Obama mentioned it once in his State Of The Union addresses.

Reinhardt: Can we build a system of skilling, up skilling, relearning for those who might lose their jobs as she said, for the digital economy that follows in the same footsteps. A shared responsibility.

Reinhardt: Or will we say, the political economy of skills and human capital will be focusing on individualizing the responsibility for the employability of a worker?

Reinhardt: This is a tremendous choice that we have to make and I think, that's something where we could learn from each other.

- Cong. Delbene: And can I just add that it's got to be about life long learning now. When I graduated from college, had my degree, if I were just relying on the skills I had then, especially if you're a computer programmer for example, you probably wouldn't have a job today. And I think more and more with the pace of innovation, people may have credentials but really what they're going to need is the ability to continue to be learning, to be life long learners so they can adapt to the changes as the come forward.
- Cong. Delbene: That, I think, fundamentally when we think about education, and we think about jobs and the changes of the future, we've got to think through how we continue to keep people up to date, continue to provide those skills, not just entry level but throughout someones career.
- Speaker 5: You know what's interesting, is that this whole conversation was supposed to be about technology, and energy, and automation and how ... almost sort of like from a business perspective.
- Speaker 5: But when I ask for questions from all of you here in the room, and even as the conversation has moved, it has moved away from what we thought we were going to talk about to people, to the work force. When you look at these questions here, most of them ... although there are a couple that have popped up recently, most of them have been about people, have been about the workforce, have been about the disruption all of this has on ... the one question here about ... to what extent does technology increase social injustice.
- Speaker 5: Do we as free societies have a responsibility to work against the use of new technologies to oppress people in foreign countries especially, by the Chines government, that's from my colleague Josh Rogan.
- Speaker 5: I just throw that out there that can we have ... is it possible to have these conversations about the disruptions that are happening in your industry without at the same time, talking about the enormous impacts they will have on people.
- Ian: We cannot separate the two. We mustn't forget the positives of the revolution as well. As I mentioned earlier, energy used per unit GDP in 1980 was .56 tons of oi equivalent for \$1,000 of GDP, sorry for the weird units. And, now it's .17 tons of oil equivalent.
- Ian: So it's come down by two thirds. The carbon intensity of energy has come down. This has helped with globalization lift billions of people out of poverty, so we mustn't forget the positives of the technological revolution [crosstalk 00:41:29] but what we are seeing is in the pace of change I believe is the single biggest challenge.
- Ian: The issue I worry about the most, is the leadership challenge. Because this is becoming so complex, that I don't know whether political leaders or business leaders can easily handle it. That is the single biggest challenge I think we've got.

Speaker 5: And there was a question over here early on, I wonder if the person still has it, I can't remember who it was. So then I am going to move to the person I saw next, and then sir, I know you have a question, and you also have a question. But you, have been waiting patiently.

Hiro Akita: Thank you very much, Hiro Akita from Nikei newspaper, Tokyo, from Tokyo. My question is about the potential impact of the AI revolution on the nature of the conflict of our war. So I wonder if AI technology will escalate or de-escalate the war. Maybe it will de-escalate in a way that it can reduce the casualty, human casualty, but maybe it will escalate maybe because other country will be more tempted to act preemptively, because time means a lot in AI war. So that is my question, thank you.

Speaker 5: Who wants to take that?

Reinhardt: Well I think it's extremely difficult question, and I take a very small shot at answering it. We have a discussion going on in the European parliament about a new defense package. More common effort to take care of our own security around Europe. In that context, we talk about subsidizing defense procurement from the European budget.

Reinhardt: One of the issues that popped up was, which kind of armed drones would we want to subsidize? And there comes an ethical question. And it was a couple of legislators from the very conservative side, and ours from the green side, agreeing that there should be an ethical limits that the fatal decisions should be taken by humans, and not by technology.

Reinhardt: There were other legislators who took the other side of the argument. So I think this is about ethical questions, that we have to answer in the context of the kind of society that we've grown to become.

Reinhardt: And I think that all these ethical questions play a role a part from technology apart from how people are impacted socially.

Reinhardt: There was a question of there also that looked at an ethical dimension from Josh Rogan I think, about how we deal authoritarian or even fascist potential of some of the technologies, if they're used by the wrong kind of people.

Reinhardt: And I think we do have a responsibility Josh. We look at some of the big IT giants from the US knuckling under to the Chinese government, but also around Europe we have the case of Cambridge University Press, we the case of Springer Publishing House from Germany. Cambridge University Press should be lauded for reversing themselves, Springer didn't.

Reinhardt: So, I think this is also about the kind of society we want to be. This is not an objective answer, it's a subjective ethical answer.

Speaker 5: Thank you Reinhardt. You had a question early on then you will be next.

Speaker 6: Sorry, I do have a question. I mean there are these three elements in this technological change. One is we're getting a bunch of new stuff.

Speaker 5: Can you talk ... speak into the microphone.

Speaker 6: Yeah the first is we're getting a bunch of new stuff. The second is, we're getting new uses of existing information which is out there, and the answers that all of you have given is well, if we just do this smartly enough we'll get an optimal outcome.

Speaker 6: There's a third problem which, seems to me deeper where I'm not sure you can get a best possible outcome, which is that, the availability of information is empowered individuals, monitors and editors are gone, what happens under those circumstances? I mean we've seen this especially in the US. People have their own views and technology allows them to do things which they would not have been able to do before, without having trusted networks or editors or monitors dealing with the information that's available.

Speaker 5: Okay, you still have your question?

Speaker 7: It seems to me that disruptive technology is not disruptive in itself. What is really disruptive, is how we use it. And the real revolution we're having today is new ways of producing, of consuming, of communicating, that is replacing the old ways of the 20th century of mass production, mass consumption, mass communications.

Speaker 7: So I was very much impact by two surveys in Germany recently, that say that 25% of Mittelstand companies were saying that new technology was an existential threat to their businesses. And nearly 50% of companies in Germany, think of technology only as a cost reduction way of doing things.

Speaker 7: So that means that we are in vested interests problem. When you say regulation, yes regulations, they don't regulate tech, they regulate the balance between vested interests in different societies. And when you do that, is very complicated to say, well let's do a kind of universal thing because, in every society, you have vested interests that don't want to be in that kind of regulation or other kinds of regulation.

Speaker 7: So, I would finish saying that it's not like Bill Clinton used to say it's the economy stupid, it's the political economy stupid when you talk about these things.

Speaker 5: Reinhardt is already out of his seat. Go ahead.

Reinhardt: I agree with your conclusion, and I mentioned the issue of SME's in Germany. But I know other polls ... I know polls that indicate that there would be a strong

willingness from SME's to join the digital revolution if they could be assured that it [crosstalk 00:48:13], no, not that they will win but that they might have a fair shot at winning. That's a difference.

Reinhardt: And if there is no ... I repeat the argument, if there is no cyber security or no chance for having adequate cyber security, how can't you lose if you're an SME. Either you don't join then you lose, or you join and get dropped, then you lose also.

Reinhardt: So I think you're right with the argument that we have to look at the interest but, then, again, the question is, which kind of interest do we value? And I would argue in the European context, that as SME's are the backbone of our economy, more than 20 million SME's around Europe, create jobs, create employment, create education, contribute to education and so on and so on, creates stability in society, we should probably take their point of view into account.

Speaker 5: I just want to apologize to the gentleman who had a question. We have less than five minutes left, so my apologies. But I want to give both Ian and Congressman DelBene an opportunity to give final thoughts. Go ahead.

Cong. Delbene: Your question over here, I don't think that these are simple problems. I think they're very complicated problems, and so to your point that we'll just work it all out and it's going to be perfect, I think there's a ton of work that we have to do to realize the opportunities, and to do what we can to mitigate the disruptions and the challenges that we face.

Cong. Delbene: And there are things that aren't going to be about policy and they're not going to be about technology, they're about culture, and our society, and how we're going to kind of all agree to use technology, and what our norms will be. I think in many cases we're struggling with that.

Cong. Delbene: We even question and challenge the US, what's a fact and what is science things that we used to think of as at least in existence that there was data that we could all agree with. We might disagree on how to interpret it or how to use it, but we at least agree on those basic data points.

Cong. Delbene: Now, you have people debating that, and so is that because of technology? I'm not sure that's because of technology, I think there are other things going on that we also have to bring into the fold and realize that that's going to be part of our challenge that we face internationally, and that's going to be something each and every one of us will play a role in.

Speaker 5: Thank you Congresswoman DelBene. Ian.

Ian: So sorry [inaudible 00:50:57] first of all these are a couple of really great questions. There's this point about individual expression without checks and

balances, is a massive problem. I don't have the solution to it. I suspect we're going to get used to fake news and then we'll figure out a way of separating fake news from other stuff.

Ian: But one of the things that is really challenging right now in my view, is ideas do not belong to institutions or political parties anymore. Ideas cut across political parties. Ideas drive society in different ways today, that's why we've got Donald Trump. It's why we've had the referendum in the UK, with the outcome that we did. I don't have the answer to that.

Ian: My final point just on this pace of change thing, I'd like to come back to something Susan said which is about pilots. We've got to be careful not to make the pilots that we experiment with in different countries and in different sectors, not make the pilots too big. Because we've got to learn to adjust all the time as we learn and try new things. And I do believe that's a sure way within an envelope of regulation, to prosper more than fail.

Ian: In the energy sector, the biggest single pilot that failed was the Energiewende in Germany, not in terms of [crosstalk 00:52:19]

Reinhardt: Disagree.

Ian: Not in terms of the amount of carbon it started to drive, although you've now got unintended consequences with Germany using more lignite rather than less.

Ian: The issue was, it was a massive experiment with no steering wheel or brakes. And the cost of it to society was massive, and there was no way of adjusting.

Ian: I think we need to learn to set experiments and pilots of a scale that we can institutionalize, do learn do, adjustment. And that goes for politicians, business people and society. Thank you.

Speaker 5: Ian Conn, Reinhardt Butikofer, Congresswoman Susan DelBene, thank you very much for this really fascinating discussion. Oh, the most important thing, it's time for lunch. See you after the lunch.