

[00:00:01 The CSPS logo appears on screen.]

[00:00:07 Kara Beckles appears in a video chat panel.]

Kara Beckles, Privy Council Office: Good afternoon and welcome back to the 2022 Data Conference: Driving Data Value and Insights for All Canadians. We hope you enjoyed the first set of simultaneous sessions. I know I have some great takeaway notes from my first session this morning, and I hope you had equally great takeaways from the sessions that you were listening to. As a reminder, we're taking questions throughout this webcast interface. If you'd like to ask a question, please go to the top right-hand corner of your screen and click on the participate button and answer your question. We might not be able to get to all of your questions, but we'll get to as many as we possibly can.

Up next, I'll invite Taki Sarantakis president of the Canada School of Public Service to introduce our next guest, Melissa Hathaway, who will offer a keynote address on leveraging data as a competitive advantage and the role of the public sector. Over to you Taki.

[00:01:08 Three more panelists join the chat.]

Taki Sarantakis, Canada School of Public Service: Thank you very much. I said at the beginning that it was 5,000 people registered, it's almost 7,000 now. We're climbing during the course of the day. I was joking ahead of the time, we're kind of a little bit like a virus, but hopefully we're a good virus. And I really think that, again, that speaks to the testament of you as public servants. This is an issue that you're hungry to learn more about, and that makes me very happy because some people say data is the new oil. I actually like to say that data in the connected world is our new oxygen. And if you don't know about oxygen, you're not going to have a great life. Thank you for taking the time to carve a little block off to learn about something important.

Today we are so pleased and happy for the next hour to be in the presence of Melissa Hathaway. Melissa is the president of Hathaway Global Strategies. She was kind of in cyberspace before cyberspace was cool. She worked at the white house under two administrations, a Republican administration and a Democratic administration, kind of bipartisan. And she literally, truly, honestly, is one of the world's foremost authorities on cyberspace. And if you want to learn a little bit about cyber, go to our website. A few months ago, we had a great chat between Melissa and our very own Scott Jones, when he was the head of the Canadian Cyber Security Office, and now he's on to bigger and better things.

In addition to all the great stuff that Melissa does, I'm personally very grateful to Melissa for the following, she is a friend of Canada's Public Service. Every single time we call her she makes herself available. Every single time she says something interesting and insightful. And what else can you ask? Today Melissa's joining us from the wilds of New Jersey. Through the magic of the internet, we're all in different places,

and as are you. Melissa, I'm going to start with a big lob ball question, nice and simple, don't mess it up, because if you mess up the opening lob, it'll just go south from there.

But the reason why I want to ask you a big, simple, question isn't because we don't know the answer, isn't because you don't know the answer, but I'm really curious to see how you would define the issue. And here it comes. Melissa, what is data and why do at least 6,900 of us care about it at this point in time?

Melissa Hathaway, Hathaway Global Strategies LLC: Well Taki, it's great to be here with you, albeit virtually. I can't wait to cross the border again and look forward to seeing everybody in person. And it's a great question. Data has, I think, has taken on a whole new life in its definition over the last several years, or maybe the last decade. It's facts, it's figures, it's measurements, it's statistics, it's numbers, and it becomes information where you can create inferences or draw understandings and then help make decisions. And so, when I think about...There are a lot of inputs and data being created, whether it's an email that you send to, me asking me to participate in this meeting, or it's data that's coming from all of our cell phones, or any IP device that's actually tracking us geographically or where we're moving from and can pinpoint us so that we can receive our cell phone call. It is the Google search that you do on the internet that's actually tracking what websites you might have visited, what you might be clicking on for information for news. The latest news from the Ukrainian invasion. Or click things that you're thinking about buying. That profiling starts to begin because the inferences are saying, well, Melissa is reading the Globe and Mail because she wants to see the Canadian point of view of what's happening. Or Melissa is searching for some cleaning products, maybe she would like something else to go with that cleaning product. People who bought this, also bought this or looked at this.

And then I think what's most important is that we are embedding more and more internet connected devices into every part of our life. Every piece of that, whether it's your cell phone, your smart TV, your smart refrigerator, your house that's on the smart grid, all of these things are creating data about you. Your consumption habits, your travel habits, and the like. They can also then create interesting trends and information that we can start to make better decisions for government, public servants, of where we need to provide services, how we need to repair or build new roads, why we're going to collect more taxes from a certain area, and these are some of the things that I look at from a data perspective.

And as we're going into the internet of things, and the industrial internet of things, and we're connecting a new device every second to the internet, there's a lot of data out there that can be harvested, and created inferences, and make decisions. There's also a lot of data out there that we're not protecting, and that's why we need to talk about cybersecurity when we're talking about this data and the new economy.

Taki Sarantakis: Absolutely Melissa. And you'll be pleased to know that you didn't flub the opening, which is great.

Melissa Hathaway: Great. It's got to be hockey, not softball or baseball, come on.

Taki Sarantakis: But for the rest of kind of our time together I'm actually going to just pick your words and ask you to keep going.

Melissa Hathaway: Okay.

Taki Sarantakis: You talked about data, you talked about kind of what we're kicking off. At this point, we're basically data exhaust machines, aren't we? You mentioned, every time we listen to a piece of music, every time we order something, every time we search something, every time we watch a movie, even just turning on your television, the act of turning on your television today, even if you're not watching anything, even just sitting in your car-

Melissa Hathaway: Right.

Taki Sarantakis: ... if your car isn't even turned on yet, if you have a certain kind of car, we're giving off data, we're giving off a constant stream of data. And so, one of the first words I circled when you were talking, or wrote down when you were talking, was tracking. Tell us a little bit about tracking.

Melissa Hathaway: I think that tracking is important because this is where companies like Google are monetizing the data that they're collecting on us. And there's a famous project that they have up in Canada, I think it's been recently shut down, but Sidewalk Labs. That was basically there so that they can track you based on your cell phone and the repeater stations through this smart city, and they would be able to collect all of this and profile us.

Track, trace, and predict what we're going to do next or what needs to be done. And I think that is what some of our colleagues would say is it's leading to a potentially a surveillance state. And I know from our- every IP device is a geolocation tracking device. The more devices that you have on you, right? I have my cell phone. I'm talking to you through my computer. I have at least three or four other connected devices with me. All of those are putting out data that's saying, oh, Melissa uses an iPhone, and Melissa's got a MacBook pro, and Melissa's at her parents' house on Verizon, and Melissa's all these different things. Well, Melissa doesn't normally work in New Jersey, so what's going on? And then you get this profiling that happens.

And I agree with you, it's data exhaust. We have more and more exhaust coming from all of these devices in our lives. And we need to be thinking about, you said it's the oxygen, some people it's the oil, there's a lot of exhaust out there and it could be soon seen as pollution. And that's why we need to start thinking about data, how long we're going to retain data, when do we retire it, how do we retire it? Because it's all of this information that's out there that is very good for profiling.

Taki Sarantakis: The second thing that I wrote down that you said was, it's not a word unfortunately, it's two words, you said, "thinking about." They're gathering data about things that we're thinking about. Why is that important?

Melissa Hathaway: Well, it's getting to the predict analytics, and artificial intelligence is really what it's driving. If I can make a statistically relevant decision or prediction based on Melissa's going to do this, or whatever, then I'm spending less money actually on my services or I'm creating new efficiencies. I have to come up with a good example, but again, this is how Amazon is making its money, right? It's the predictive analytics. Melissa, you're buying this book, you also might want to consider this book. Then I get this click bait, but I buy it and I actually like it, so then I give a good review and then somebody else does the same thing. Or again, the products... And that's how Amazon is monetizing it.

Facebook monetizes it very differently, it's sort of the friends and family end, that if you don't keep these things private then what they do is they take and they do the data mining of all of these different things and then they start to share that with your broader set of networks. And it's, what I would call, the one degree or the network effect, and that's how they're monetizing it. Now I'm using corporate examples because government is supposed to be doing it for providing more effective citizen services, for delivering more new infrastructures to our citizens who live in either very urban or rural territories, right? And being predictive about when is a something moving into being more urban, right? Then I've got to invest more in roads or into public services in those particular areas. And you start to see how other governments are using it right now, more effectively than anybody in the west, basically for the pandemic, right? And I'm tracking and tracing you by your cell phone, and determining by your cell phone, how many people you were exposed to so that I can then tell you, "you've been exposed to somebody, you have to quarantine," and I'm monitoring it by your IP devices to try to ensure for public health and safety. That was a long answer, maybe I should give shorter answers.

Taki Sarantakis: No, it's just a joy to listen to you. Let's stay on predictive analytics for a minute. In a way, governments have almost always done predictive analytics, right? We would do a census every four or five years, and we still do them. We would do surveying, and we would kind of say, you know, the population's growing, so we're going to need more schools. Or, the population's getting older, we're going to need more hospitals. Or we're going to need a third university in this area. Or we're going to close this daycare centre and open up an elder care facility. We've kind of always been doing that, but the big difference now, I think there's two big differences going on... Well, there's a lot more, but I want to maybe talk about two of them. The first is, private companies are now doing this, and they're doing it better than us by the way.

Melissa Hathaway: Right.

Taki Sarantakis: And then number two is, that government, in most areas, doesn't have access to real time information that private sector companies have. Maybe kind of give us a few thoughts in that area.

Melissa Hathaway: I think that when we started to get to more of that real time information, that was really...I think one of the countries that was a leader in that and getting to predictive analytics, which was the UK, and they did it for counter-terrorism right? We had IRA bombings, et cetera, so they got to more of the surveillance in the streets, the surveillance in the taxi cabs, and got to that predictive analytics of when they thought that there was going to be an event and everything. That was a long time ago, but that was the first of sort of that real time information to prevent something from happening. And that kicked off, actually, I think, the algorithms and the predictive analytics that then got re-assimilated back into the private sector, because they started to see different ways they could monetize the information, or the data, and Facebook or Google, or NSO group, or anybody, right? And they all have found different ways to monetize the algorithms for whatever system they're in.

Financial institutions, it's for real time fraud detection, right? That, somebody stole my credit card, and Melissa we know is in New Jersey, so can't possibly being used in Virginia where she lives, so we're going to put a hold fraud, hold on that. That is real time information based on geolocation tracking of me. Pattern of life, that this is not in the normal, and that they know that I'm someplace else so stop the credit card. Financial institutions are doing a great job with that predictive analytics and those AI real time information sharing.

For governments right now, I think that real time information is still surveillance based. It's the video feeding into the algorithms. And I think that's you see that right now also with the sharing that's going on around the Ukraine crisis, is that there's real time information... That we have troop movements, but we're used to doing that. We've been doing that for 50 years, that type of surveillance. Now you have an online surveillance based on your data exhaust, and it's coming together of these disparate pieces of data that are putting together a picture of you or your patterns of life that then gets monetized by the private sector.

Taki Sarantakis: Yeah, and that's a really good point. I really like how you kind of introduced the London example, or the UK, example, because in the security realm we're far more advanced as governments than we are in the applying for an old age pension or applying for unemployment insurance realm. We do have experience with this because in interests- kind of where the state has a real interest, it takes data seriously. It takes real time feedback loops seriously.

There is a country, at least one, that's using predictive analytics now in terms of providing public services, and that's Estonia. And I was wondering, do you know about Estonia? I know you know about Estonia, but can you speak about the predictive analytics parts of starting to use data for public service provision and kind of flipping the

paradigm a little bit to be, instead of using it to monetize things, we're using data now to serve citizens?

Melissa Hathaway: Right. I'm not a deep expert on the specifics of how Estonia is doing that, but what Estonia did is that they have... They call themselves E-Estonia, right? They've got everything online. They have a small population, right? It's one and a half million people. It's easy to conduct experiments when you have what I would call a small group or a small set of numbers. And what they've given everybody is, everybody's got a national identity and cryptographic card that allows them to do financial transactions, pay their taxes, buy a house, go to the supermarket, and it's all tied to this one cryptographic national identity card, which gives you a constant in the equation. I can now start to track what's going on and I can start to provide more efficient, or more robust, services to my citizens.

The E-Estonia is a model for a lot of countries to, how do you get it right and how do you get it wrong? Because they also had a problem with the cryptographic card. The math got hacked and so they had to replace all of the cards, and it delayed the national election there, and so there's an upside and a downside. You got to get the math right. But they have been an example. And in other parts of Europe, you start to see France talking a lot about AI and public service, and how we want to make sure that the algorithm doesn't introduce bias so that... Because the algorithm is now going to make the decision whether or not you get the healthcare benefit, or whether you're eligible for parole or for retirement, or of these other things. And they want to make sure that there's no bias brought into the math, and so they're making it very difficult to bring in these predictive analytics, or the artificial intelligence, into key things. How you get a job, how you get a benefit, and those things. And I think those are important ethical standards that we need to have because there's always a human behind the math, and all humans have bias. And this question of, can you un-code the bias out of how you coded it?

Taki Sarantakis: Now you've used the big word a couple of times, you used the word algorithm. And I remember when I was in grade six, in grade seven, we learned about algorithms and I never thought that for the rest of my life, in my fifties, that algorithms would be becoming more and more important, not less and less important. Kind of, what is an algorithm a little bit? Because we talk about data and we talk about algorithms, but maybe talk to us a little bit about the relationship between the two.

Melissa Hathaway: Well, you have to translate the data into something that you can make sense of- sense, interpret. Usually this is where if anybody's working with complex databases, this is the basis of SQL. X and Y helps you get to Z. And so, it's really the math of coding all of these different data sets into something that helps you make a decision, makes sense out of it. That's the algorithm, it's math, it's a math equation.

If I think that variable X is more important than Y, that was me, my personal decision as the mathematician behind the algorithm, and I introduced, potentially, bias

because I decided that one variable was more important than another. Could it be geography? It could be gender, it could be race, it could be anything.

And so, when you're talking about predictive analytics, or you're talking about artificial intelligence, or you're talking about E-Estonia, it's all underpinned by math, maths, that is making sense of the data. And that's always got a person behind it, and that's why there's been so much concern that we might be introducing bias into some of this decision making, inadvertently, it's not deliberate. Although there could be countries that are doing it deliberately, because it's a means to help ensure the authoritarian state or state control over certain things.

Taki Sarantakis: And it could be though that the data not necessarily is biased, because the data is kind of a reflection of the past, because in one way that's kind of what data is, in some important ways. But it could be that the data, if you're just relying on the data looking in the rear-view mirror, that could also introduce bias, correct?

Melissa Hathaway: Yeah, it can, because then you're not thinking about the over the horizon opportunity or issues, right? You're not anticipating the next set of data that could actually inform the last set of data. And you're starting to see some of that experimentation, like with the driverless cars, Tesla. They're having to look over the horizon to the next set of data in order to make sure that you have a safe journey on the road, based on past data, on testing the of cars in what I would call sterile environments. And now when they get into non-sterile environments, they're really on the road, and you there's a hurricane or there's a sandstorm, or there's a snow storm, it confuses the way the math was generated because it's not a sterile environment anymore. That's future data, that's over the horizon sensory information that has to inform the decision for the car.

Taki Sarantakis: Yeah. But there's also even kind of a bit more familiar biases that could creep in, there's a few times where people have kind of pointed an algorithm at a bunch of data and said, "Tell me over the last 30 years who my best astrophysicists have been, so I can keep hiring the best astrophysicists." And if you kind of look back and you go, well, your ideal astrophysicists looks like this, is educated here, is a man or is a woman, or is whatever, then it becomes kind of self-reinforcing.

Melissa Hathaway: Right. There's a really interesting, I think it's the AI Institute in New York, it's at NYU, and they have an international team. Actually, it's funny because most of the people there from Australia. They've been doing data sets, and analysis, like case studies, and one of the case studies they did was for hiring, just like as you said, I'm pretty sure it was Amazon. Amazon had looked at who are their top execs over the last 20 years and had created, this is the HR profile that we want to have.

Well, most of the top execs were all men and they were white men. And so, the algorithm, when you go to monster.com or you're uploading your resume, it actually automatically threw out any female candidates because the female names were thrown out, because there was no female names in that... They fixed it, but only after it was

made transparent how there was this bias in the way that they had done their algorithms or that historical data. And I think that's important.

We have to make sure that when we choose this was the ideal or the dream team, well, that may not have been multicultural, it may not have been geographically diverse, it may not have been gender diverse, all of these different things that the past may not be representative of what we want for the future.

Taki Sarantakis: Absolutely. Because then there becomes, I guess, the possibility of freezing the past and perpetuating the past into the future. One of the things that I like to talk about to public servants is this notion of algorithmic government, that we are now almost on the precipice of things that are done by human beings very soon will start being more and more done by algorithms. If you're applying for unemployment insurance or you're applying for a pension, or you're applying for a permit, there's a human being that kind of looks at the rules-

Melissa Hathaway: Yeah.

Taki Sarantakis: -Which is maybe the algorithm and looks at kind of the specifics of what you're applying for. Oh, you're 52, you can't apply for a pension. Oh, you live in this area, your unemployment is too low to get unemployment insurance without waiting for a month, or what have you, let's call that the data. And then those two things together become the decision.

Melissa Hathaway: Right.

Taki Sarantakis: If we're not there soon, I would be surprised, but we're moving more and more towards algorithmic government, especially in the provision of services. Because really these are, as I said, a formula, which is the algorithm, and some facts, which is the data, and you marry those two things together. What are some of the things we should be grateful for or worried about as we start moving into kind of algorithmic government?

Melissa Hathaway: Well, I think first, grateful for is it should lead to a faster decision time, right? It's going to save time, therefore it saves resources in theory, right? But it should deliver citizen services faster. I apply today, it goes through the computer, spits out tomorrow. Yeah, Melissa's qualified for the benefit. Melissa can cross the border, whatever, right? These different things. I think it's the efficiency, or the time, as one of the key metrics, and most likely money as one of the key metrics, right? And it should eliminate some of the fraud, should, eliminate some of the fraud. That, I think, is to be determined.

The things that we should be worried about, again, is kind of what France has been talking about. I think also the Toronto Accord talked about it, is that we're, again, this is now a computer or it's math that's making a decision and there could be an inadvertent bias there, and it could make a wrong decision, right? And deny somebody the benefits. So, then what is going to be the appeals process? That can't be a

computer also, right? Or an algorithm that makes the appeal. It's got to be something more broad than that, or a person's got to. We have to think through the adjudication and governance process around that.

We also need think about, are there certain things that we don't want it to be an algorithm making the decision? And that it still has to have a person in the loop. We should be very thoughtful about those things. And then the governance around it, because we're democratic countries. We want to have of the transparency, we believe in rule of law, and as we start to make these changes and we're, again for time and money, that we don't want to lose the transparency and fairness of society. And I think those are the questions we should be asking.

Taki Sarantakis: Now the last big thing that I had circled here that I wrote down from your opening remarks that I want to touch on is, the IOT the internet of things. And before we kind of get into the IOT, I've heard you before give a little bit of a wonderful little history of the internet in a couple of minutes, where it started, what the goal was, how it was supposed to be used. And then that'll, I think, lead us nicely into the IOT discussion. Maybe give us a little bit of a history of this thing that we call the internet today.

Melissa Hathaway: Sure. The internet started as a military project in the United States. In October of 1969 was the first successful transmission of data over the internet, and between universities in California. And so that that was it, the beginning of the internet. And it was still designed for assured communications, so command control of the military, a secondary communications channel, not over the plain old telephone system, right? Which is actually kind of funny. And in a time of either a nuclear crisis disaster, it was supposed to be a secondary form of coms.

By 1972, you had the internet, again through military-to-military cooperation, and through an education consortium, through like National Science Foundation and the equivalent of many countries. We had successfully had internet transmissions to Europe and over to Japan. And so, you now had a European, a trans-Atlantic, and you had a trans-Pacific communications line. There were a lot of things in the 1970's, deregulation of telecommunications, the advancement of micro electronics, so by 1980 you had your first real computer. It was a suitcase, if anybody remembers those, I had one of those IBM computers.

Taki Sarantakis: I had a Commodore PET.

Melissa Hathaway: Yeah. We had mobility, mobile computers now, with an internet. That was a huge advancement by 1980, right? And had the 8086 chip, the Intel chip behind it, right? You kind of think about the semiconductors wars that we're in today, those had its birthplace in the late 1970's, around 1980. In 1985 was the seminal year for the internet and what it means to us today, and because that was when we opened up the .com domain.

Taki Sarantakis: You said '85 or '95?

Melissa Hathaway: '85.

Taki Sarantakis: '85.

Melissa Hathaway: '85. And so, 1985 is when we opened the .com domain. It was an experiment for commerce and at the time we didn't think it was going to be a big commercial, what it has become today, we only allowed 15% of the address space for .com. Then there was another set of export control relaxation to allow for commerce and to enable trusted transactions on the internet. And you also had your first major theft in the bank system in 1986, so you started to see the necessity for having encrypted communications, encrypted transactions, to have trusted transactions on the internet.

Then the next major innovation was 1990 out of Switzerland, out of CERN, and we got the worldwide web. You could click, connect, and search any information all around the world. And that was then now libraries started to upload information. It led to the birth of Wikipedia and all of these different things around the year 2000. Also, around the year 2000, right? From 1990 to 2000, we started to connect all of our critical infrastructures to the internet for efficiency, costs, right? All these cost savings that would allow us to reduce some of our infrastructure footprint. And that was when we had the year 2000, the Y2K bug.

Taki Sarantakis: I'm just going to pause you here. You don't mean computer infrastructure, you mean like nuclear power plants, you mean water treatment plants.

Melissa Hathaway: Electric power.

Taki Sarantakis: Pipelines.

Melissa Hathaway: Pipelines.

Taki Sarantakis: Yeah.

Melissa Hathaway: All of those things. That was the critical infrastructure. Y2K was like, okay, oh my gosh, we've coded this all for two years, not four years, so we might have a computer meltdown because it doesn't know what to do with the zero, zero over again. And we were really worried about critical infrastructures going offline.

And so, I worked Y2K floors, I'm sure you did, and a lot of people who are listening to us, and through a whole lot of investment by all of our countries to re-code everything, we made it through without a lot of problems. But then we started to talk about, oh my gosh, we need critical infrastructure protection. And it kicked off a whole, I would argue now since 2000 to today, we're still talking about critical infrastructure

protection, or critical infrastructure resilience, which we don't have anywhere, because we've connected everything to the internet, and we don't have a plain old telephone system anymore. The telephone system is also an IP network, it's running over the internet, so we've actually bled resiliency out. We don't have a redundant or a new platform that we could fall back to, and therefore it's made us a lot more vulnerable, and the like. I could go further into our history, but I'll stop there.

Taki Sarantakis: I'm going to do my grade two summation, because my brain isn't as big as yours, even though my head is much bigger than yours, from what I can see in front of me. But basically, we had this thing, bunch of wires, we started connecting computers to each other all around the world. Very decentralized, not a lot of "top down" thou shall, thou shall not, kind of cheap, get connections, get everything done. Then we started seeing the utility of this thing. We started seeing the utility of connection and then people, not surprisingly, started connecting.

Melissa Hathaway: Right.

Taki Sarantakis: And as we started connecting, one of the things we forgot about was, we're migrating these important things onto this, let's call it a platform... We're migrating all of these important things onto a platform, but we're kind of migrating them into an area where we would've never kind of opened a water treatment plant without having a lock. We would've never opened a wastewater treatment plant without giving somebody a key.

Melissa Hathaway: Right.

Taki Sarantakis: Did we make a big mistake?

Melissa Hathaway: Well, I think we were not thoughtful on its... I'll start with the safety measures around these decisions, because I think it's a safety issue now. We didn't think through the resilience of these infrastructures, because they now almost all have a single point of failure, the internet. Or a single point of entry, the internet. And I think it's going to get worse with the internet of things and the industrial internet of things. And then we didn't think about security.

Now, a lot of people think about, we should have said security first, but in a lot of other parts of our critical infrastructures, it's really about citizen safety, and it's safety first. And if you get to safety- and safety would've built in the security and resilience, most likely, it would've brought in some of these aspects of how we think about the metrics. And then resilience, we need to have continuity of government, we need to have business continuity. I have to ensure I have water, power, telecom, and infrastructures that my citizens have been used to for well over a hundred years, right? And it's sort of like, okay, now it's possible they won't have those services because of the way that we've architected it.

We've bought into this for more than two decades, right? It was just even 22 years or 25 years. It will take us 20 to 25 years to buy down that risk and to do the risk reduction measures and put in safety controls and resilience measures. It'll give us I think new opportunities and it'll give us security by definition, but it's going to have to be thoughtful and dedicated, and not just a one term president or prime minister, and the deputy ministers that you have, it's going to have to be a continuity of government of a 25 year plan to undo what we've done over the last... For efficiencies, for modernization, for these things.

And we should learn from our mistakes, because as we move to the internet of things and the industrial internet of things, and things like edge compute, and my car is computing for your car for safety on the highway, it has a whole new meaning for data and data protection, and data privacy, and how we have data governance rules, in order to enable safety, resilience, and modernization or digital transformation of our societies.

Taki Sarantakis: Yeah. And I love that distinction you make between safety and security, because I think it's one that we don't make often enough. Because I think if we talked more in terms of safety than security, which is what we do do, which is security. I think more of us would just kind of get it intuitively that this is, oh, this is important to me.

Melissa Hathaway: Right.

Taki Sarantakis: Where kind of you think about security as almost somebody else's responsibility, and this really got hammered home to me when I worked at transport Canada.

Melissa Hathaway: Right.

Taki Sarantakis: They had a division called safety and a division called security, and I was kind of like, what's the difference? And it was like, well, safety means the plane's not going to fall out of the sky. Security means, the plane's not going to fall out of the sky because a bad person did it.

Melissa Hathaway: Right.

Taki Sarantakis: You still get to the point where the plane's not falling out of the sky, but you think about it differently if it's a safety issue versus a security issue. That's kind of... Oh, do you want to say something?

Melissa Hathaway: Yeah. I think the nuclear industry has always been trained for safety.

Taki Sarantakis: Yeah.

Melissa Hathaway: Water, also, always safety, right? We put chlorine in the water to make our teeth stronger or to kill the bugs and stuff like that. We have to be thinking

about that in the future, because we are in a middle of a digital transformation where it's touching everything in our lives, so we really need to think about that safety first.

Taki Sarantakis: That's the history of the internet 101. Now, we're about to move into the IOT, which is kind of another phase of the internet. But before we do the IOT, what percentage of our economy right now is online, Melissa? Grosso modo. I know it varies by the minute, by the day, by the country, but roughly, what percentage of our economy is online?

Melissa Hathaway: Roughly, I would say a global economy, it's between 15 and 20%. For Canada and the United States, it's between 8 and 10 maybe. We're behind Northern Europe for sure, or Estonia.

Taki Sarantakis: We're more analogue than other-

Melissa Hathaway: Oh, that can't be surprising.

Taki Sarantakis: By a factor of half?

Melissa Hathaway: Yes. According to our bureau of statistics and Europe bureau of statistics.

Taki Sarantakis: All right. Public policy wonks out there kind of swallow hard at that one. We're about 50% less digital than some of our fellow planetary inhabitants. About 15% are in Canada and the United States, 10% of the economy is online. That's obviously very important to protect online for the purposes of the economy, because we know that online economy is growing, I think I've read, anywhere between 7 and 12 times the rate of the non-online economy.

Melissa Hathaway: Right.

Taki Sarantakis: If we were to have this conversation a couple of years from now, everybody would be much higher. But now we've got this thing called internet of things where we're not just putting the economy online, we're putting our toasters online, we're putting our garage door openers, we're putting our pacemakers, we're putting almost anything you can think about online. Maybe talk to us a little bit about that.

Melissa Hathaway: Yeah. The internet of the things, we're connecting 120 some odd devices every second to the internet, and we're doing it for different reasons. Largely to gather this data to create new efficiencies. I can save money, save time. And I'll just give you a couple of examples, the agriculture is one of the leading sectors that is embedding the internet of things into it, agriculture and livestock.

From an agriculture perspective, I can put an IP device, and multiple, in my fields, and I can determine whether or not they need water or fertilizer, what my crop yield is going to be based on the data that those devices in the agriculture are putting

out. And I can be then, again, predictive. I'm going to have a better yield this year because of the following conditions, the facts and the numbers.

I'm also putting IP device is on my cattle or sheep, or pigs, right? Hogs. And I'm selling this as farm to table. I can tell you the supply chain of that from the birth, where it grazed, what water holes it was in, and then to slaughter, to table, of the whole supply chain of the livestock. And it's competitive enhancing thing, right? Because I might pay more if you can prove the provenance of all of that. And it saves me, if I'm the company like a Tyson or, you know. I can actually say, I need to recall X number of chickens, or this poultry that hit the market, because I know that water source or that food source was contaminated, and it allows for a faster product recall. That would be one vertical that's using it.

Another vertical that's using it differently around the world is transportation. And so all of our cars have IP devices in them, so when you're driving on the highway, depending upon which country you're in, it'll track you from waypoint to waypoint, toll roads here in the United States. But in the UK, they're really monitoring speed. If you get to waypoint A and then to waypoint B, and they know that you got there too fast based on [indistinct 00:45:25], you will get an automatic ticket in the mail. And so that's interesting, and that's happening in Hong Kong, UK, and elsewhere. Germany, they're using those IP devices to not only understand traffic patterns, but also to prioritize road repair, and where the investments need to be, or how to adjust traffic signals, et cetera, to keep traffic flowing.

And from another sort of transportation, they're using IP devices on big cargo to track important shipments and make sure they're not stolen or manipulated, or whatever. And that's for the big container boxes and stuff that are on our big ships, or that then go on the road. Those would be a few examples, I could give one for pretty much any vertical, but those would be examples of how IP, or the internet of things, is actually touching every part of our life now and how it's going to expand.

Taki Sarantakis: Absolutely. As you were talking, it sounded a little bit analogous to what you were saying earlier about Amazon and, oh, you bought this book, you might want to try this book, [click here](#). The internet of things also, through the traffic examples that you gave, it's also kind of a little bit about our behaviour. It's kind of making us say, you want to speed? Okay, it's going to cost you. Don't take this road, take this other road, because I have real time data that says that's jammed. One of the books back there has this very provocative title, and it's written by one of your colleagues who lectures at Harvard with you, and it's called, [Click Here to Kill Everyone](#).

Melissa Hathaway: Is that Peter Singer? Who is that? Who is that?

Taki Sarantakis: I think it was Bruce.

Melissa Hathaway: Bruce Schneier?

Taki Sarantakis: Yeah, Bruce Schneier, Click Here to Kill Everyone. Talk to us a little bit about that.

Melissa Hathaway: Well, Bruce's premise, and I agree with him, is that, again, we're fielding all of these devices quickly. They're poorly engineered. They're very vulnerable. This is where it's algorithmic warfare, if I can identify X number of very vulnerable devices and I click there, I could destroy all those devices or I could lock them up and make them not work.

One of the biggest examples of that was in 2017 when we saw Russia launch a wiper virus called "notpetya" against an accounting company in Ukraine, but it was really against the Microsoft Operating System. And it just wiped active directory. It wiped a lot of computers and everything, and it went all around the world affecting just every sector. Rail went down in Spain, we had pharmaceutical companies going down here in the United States, almost all the transportation logistics companies went down, from FedEx to DHL, et cetera. And it shows that you can click, one click, and you can take out a lot. And that should really worry us that we have an unstable amount of vulnerability, a strategic vulnerability, in the core of all of our critical infrastructures.

Taki Sarantakis: And let's bring that kind of to a more personal realm, if you or I, or anybody in the audience, has a connected home and kind of all of our stuff is online, whether it's our toaster, are our garage door opener, our light bulbs. And we bought a light bulb six years ago and it was state of the art back then, but the manufacturer went bankrupt. And it's a smart light bulb and it's connected to my Wi-Fi, and it's connected to everything else, can somebody get into kind of my life vis-a-vis that unprotected light bulb?

Melissa Hathaway: For sure. Absolutely. There is a software program that's for free on the internet called show Shodan.io.

Taki Sarantakis: Well don't tell them how to get it.

Melissa Hathaway: Well, it's good that informed people who are trying to protect our countries should know just as much as the informed people who are trying to harm our countries. Shodan.io.

Taki Sarantakis: Remember, if you go there, go there for good.

Melissa Hathaway: Yeah, go there for good. You can go see how vulnerable you are, and it'll show you. These are how many un-patched devices that you've got running and here are the pathways into your home, or to your business, or to your government

institution. And that can change on a daily or hourly base, depending upon what's going on. And I use this all the time.

I'm not one of those people who loves the connectivity. I would never buy a smart TV. There's a lot of things I would not buy anymore. I'll be analogue or I won't use it, because I don't want to have my TV to be able to be turned on remotely, to listen to the conversation in my room, or your Alexa or your Google Assist. All of these things that we're putting into our lives to make our lives more efficient, or we think that it's improving our lives, there's also a lot of things that are coming in that could allow somebody to have access into what you would've considered private, or you would've locked your door, you need to lock your internet like you lock your door or lock your car.

Taki Sarantakis: For me, my kind of sanctuary since I was 16 was my car. And my car is now getting to the point where it's time to buy the new car, and I really am kind of swallowing hard exactly for the reasons of you say, which is like, my sanctuary will now become a monitoring machine.

Melissa Hathaway: Right.

Taki Sarantakis: My car will have a digital twin. People will know how many kilometres I've driven, when, where, just sitting in my car thinking before I pick up my daughter, somebody will be trying to get data from me.

Melissa Hathaway: Right. And your car might actually tell you're not a good driver and auto-correct you.

Taki Sarantakis: Exactly.

Melissa Hathaway: Right? And that's terrifying, because the computer or does not exactly know that there's a black ice up there, which is why I'm veering out of my lane, right? We're not there yet with the algorithms. And so, the auto-correct and these other things, it's scary what's going on.

Taki Sarantakis: Yeah. That leads us actually into a wonderful question from the audience, and bang on point, so I'll just read it verbatim. Could you talk to us about how data privacy, for instance, what legislations give big companies like Google, Facebook and Amazon, the right to collect our data? And obviously you don't have to talk about the Canadian context, but tell us kind of maybe why do these companies take, maybe what I would call our data, and make it their data?

Melissa Hathaway: Yeah. The challenge that we have certainly here in North America, in particular, is that we really love the free service. We love the free Gmail. We love the- they're all free. If the service is free, then you are the product and they have to monetize it somehow, right? And so, when you agree to that service level agreement, or you agree to download and use Gmail or Google's cloud, or these other things, you have also technically agreed to give over all your data and allow them to data mine or profile it. And that allows them to monetize your data in order to pay for the free service you obtain.

Now, I would argue they're making a lot more money than the service that you are getting, but we like to get something free. But there's no such thing as a free lunch. You are the product, and your data is how they're going to monetize it and profile, and those other things. The same with Facebook, that's how they sell their ads. They're selling ads, that's how they're monetizing it. Because they're selling these profiles, that we've got this demographic, they're talking about these things, they sell ads to whatever, Coca-Cola, I don't even know, and that's how they're making their money, is, again, the data that they're collecting on us.

Now, how does this come in into a data protection or data privacy regime? Well, right now you can observe, there's some really important rulings that are happening now in Europe, around Schrems, which is legal court case, multiple under the uh...and the European court of justice. And it's saying that the collection and the analytics using this is against GDPR, the general data protection regulation. And so, there's been recent rulings against Google analytics, and a few other companies, that they can't use this to profile European citizens.

The California consumer protection act has also made a similar ruling, that you cannot collect the geolocation data of people using platforms, and so to try to stop this profiling and other things. But the challenge that we have to the person who asked the question is that we have a real problem now with this multi-jurisdictional data protection, data privacy, regimes. Because a lot of countries look at this as, well, this is important for citizen privacy, but also, I'm going to make some of these rulings for my own competitiveness. I'm going to force you, Americans or others, to store your data in Europe. Well, that means I have to build a data centre, hire Europeans, I've got to keep it there, and it starts to generate that ecosystem. You're seeing that in China, you're seeing it in a lot of places, the data protection and privacy regimes are off -center. We're not aligned, so that's inhibiting cross-border data flows. It's becoming a trade barrier or attacks on our trade. It's making us inefficient, and it's actually putting us in conflict in some ways, because we're like, wow, we have this trade and Atlantic partnership or we have the North America USMCA, right? Mexico, Canada, U.S., and we need to ensure these cross-border data flows in order to make North America strong in our trade partnership, which we have done. It has the gold standard of the data protection.

But we don't have this any longer trans-atlantically, that's a problem. And it's a problem for our companies, it's a problem for us as governments, that we have to start to get our head in the game around cross-border data flows, data protection and privacy, how data is actually enhancing our competitiveness or detracting from our competitiveness, because our laws are either behind or our laws are impediments, and we need to have much more thoughtful conversation with that across government and across industry.

Taki Sarantakis: Yeah. And so, what I hear from you, Melissa, actually gives me hope, because I think what you're saying, one way of interpreting what you're saying is, public policy is finally starting to get that this is an issue and it's not just about the click here and sign away all your rights and click here and somebody else owns you. That's too much of kind of a burden to put on users, that's too much of kind of a transaction cost that shouldn't be associated with the consumer, so to speak.

Now that's really something that kind of demands regulation, which isn't a great word, but it demands some kind of public policy intervention, because these are issues, as you say that impact on trade, they impact on competitiveness, they impact on quality of life. It would be the analogue equivalent of buying a ticket to a movie theatre and the movie theatre says, "By buying this ticket, you agree to set yourself on fire when we so want you to do." And maybe not a fair trade, so to speak.

In the analogue world, we have laws and regulations, and procedures and practises, to make that stuff work. And one of the things that I think we should all kind of take away from here, is even though a lot of us have kind of grown up with the internet and with data, that these in the long context of things, they're relatively new. It took a long time for public policy to figure out what to do with the telephone, or with the television, or with the radio, or with electricity. And these are things that are not only right up there with all of those, in many ways they're more important than all of those. In a way, it's not surprising that Europe, North America, Canada, we're all kind of fumbling towards this right now. I think the important thing is that we keep fumbling, because through our fumbles we will get to the right place one day.

Melissa, I want to thank you so very much for spending another informative hour with Canada's Public Service. Off the charts as always, I love talking to people who I learn from, and every single time I talk to you, I learn more. Thank you so much.

Melissa Hathaway: Thank you, Taki.

Taki Sarantakis: Tom, I'm throwing it back to you. Thanks Melissa.

Melissa Hathaway: Thank you. Have a great day.

Tom Dufour, Statistics Canada: Thank you, Taki. It's too bad that I'm on the screen now, because I didn't want this conversation to end it. It was such a fascinating, thought provoking, and riveting session. A huge thank you, Melissa and Taki, we're very grateful

that you made the time to be with us today to share these important and rich insights, and to really kind of bring that global perspective to our conference this afternoon. Merci beaucoup for that, that was fantastic.

We'll now take a health break. When you return at 2:30 p.m. EST, please choose your next station via V Expo. Please leave the V Expo page open at all times. This hub will allow you to navigate through the different portions of the conference, and there's also going to be your portal and your way through to be able to use GC Message, to access the partner kiosks, networking opportunities, and most importantly, the conference sessions. The next breakout sessions will be followed by yet another health break, which means that we'll see you all back here at 3:50 PM, eastern time. Have a good break, have a good session and see you later. Thanks.

[01:00:58 The video chat fades to CSPS logo and “canada.ca/school-ecole”.]

[01:01:06 The Government of Canada logo appears and fades to black.]