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Thomas Kurian, CEO, Google Cloud at the RBC Capital Markets 2020 Technology, Internet, Media and Telecommunications Conference on November 17, 2020

Operator: Welcome to our afternoon keynote session featuring Thomas Kurian, Chief Executive Officer of Google Cloud and Dave McKay, Chief Executive Officer of Royal Bank of Canada. Some of the statements that Mr. Kurian may make today could be considered forward-looking. These statements involve a number of risks and uncertainties that could cause actual results to differ materially. Any forward-looking statements that Mr. Kurian makes are based on assumptions as of today, and Alphabet undertakes no obligation to update them. Please refer to Alphabet's Form 10-K and most recent 10-Q for a discussion of the risk factors that may affect its results. It is now my pleasure to introduce Thomas and Dave.

Dave McKay, President and CEO, RBC: Well, hello everyone and welcome to our keynote session this afternoon. I'm very excited today as I'm joined by Thomas Kurian, CEO of Google Cloud. And Thomas took over as CEO of Google Cloud almost exactly two years ago in November 2018. We're going to explore Thomas's strategy, we're going to explore some of the transformations that we're seeing in the world of technology particularly around Cloud and certainly incredible track record of success already in two years -- I'm really looking forward to talking about.

Thomas, you've been described as a strategist, a technologist and an operator all at once -- some of this by your competitors, by your peers, by the market. That's quite an achievement to do all three and certainly I'm sure one of the big drivers why you've been so successful in so many roles -- you were at Oracle for 22 years, heading up product development before you moved over to lead Google Cloud. You're a graduate of both Princeton in Engineering and Computer Science degree and an MBA from Stanford, so certainly enormous credentials to take on the lead of a technology that's transforming business, transforming our world, so welcome. We're so excited to have you here today.

Thomas Kurian, CEO, Google Cloud: Thank you for having me, Dave. It is a pleasure to join you for this discussion.

Dave McKay, President and CEO, RBC: We have lots of ground to cover, so I'm going to start maybe broaden it -- and we can explore different areas of your Cloud strategy, but maybe it would help the audience if we talked initially -- you talked initially about your strategy. You came to the job two years ago. You have a vision, you have a perspective certainly on where Cloud's going and where you're taking Google. Maybe you start kind of with a bigger description of your Google Cloud strategy.

Thomas Kurian, CEO, Google Cloud: Yes, we started with a simple understanding. What's driving the shift to Cloud? If you went back to early 2000 and looked at it, a lot of it was software-as-a-service and the value proposition was really around convenience -- get something done much more conveniently. And then the next phase was really data center-as-a-service -- put stuff in my data center -- and a lot of it was just around cost efficiency.

And when we looked at it and talked to customers, we saw the biggest shift that was driving the adoption of Cloud was around digitization. How do you use data? How do you serve customers in new ways digitally? And so our strategy is very simple. We wanted to enable the digitization of business processes, using data in a very different way, in different industries. We want to do that by offering high scale infrastructure, a platform for data and analytics, and solutions for specific industries because each industry had a different need. And we wanted to do that online for small and medium businesses to reach and use our capabilities online, as well as to build a world-class sales and customer service organization to support large customers and we have been super focused on that, on executing that strategy.

Dave McKay, President and CEO, RBC: You have and you've seen kind of as you disclose now to investors, revenues grown significantly 2019 over ‘18 -- very, very impressive. So as you start to dig into your strategy, building more capabilities for customers to use. Now, I know partners are a big part of that strategy as you try to bring more value and I think I've heard -- I've read that you talked about whoever creates more value and capabilities along the value chain for large enterprise and small enterprise is going to win at the end of the day. So you talked about how you brought partners into that whole concept of creating value and bringing more services to the Cloud.

Thomas Kurian, CEO, Google Cloud: Yes, our general view was the Cloud provider that's going to succeed in the end is the one that's differentiated, not just based on their solutions that they offer, but also the ecosystem of partners solutions that are on top of it. And so we've taken a very partner friendly and partner focused effort. We've got -- we identify specific places where we think partners complement us and we work closely with the partners to enable it. I’ll give you just a couple examples. We have every -- large companies typically need partners to help implement solutions. We are a products and solutions company, we’re not a services company, so we have great relationships with many of the largest services companies in the world, Accenture, Deloitte, TCS, with Wipro, Infosys and others. And it's taken a lot of work to train their teams, enable them to deliver solutions.

We've identified in many industries the best application providers for that industry. An example in your neck of the woods, Dave, is Shopify. Retail, we felt that retailers really were going to look at e-commerce as the centerpiece. We felt that Shopify was a great platform that many retailers were focused on. We work with them to provide the capabilities of the underlying platform and we've been very successful jointly with them. So we've been very thoughtful on the approach to enable a broad breadth of solutions and we win along with our partners.

Dave McKay, President and CEO, RBC: And when you think about the IP that you create together -- because there's a lot -- you start a partnership at a certain place, and as we all know they end up in very different places in a year, two years, three years since. How do you think about IP and what do you look for in a partner as you're co-developing many things and many client solutions?

Thomas Kurian, CEO, Google Cloud: We have three different models of IP that we work with. There are places where we build a solution, a partner will be an early adopter in that solution, but we retain the IP, but the customer gets -- for example, or the partner gets benefits for that as part of being the first to experience that solution. There's work we're doing at a large telecommunications company to modernize their contact center as an example, using our voice technology and artificial intelligence. That's a model we've done for them. A second way that we work is where the partner retains the IP exclusively, meaning we'll build a platform and what we are learning from that is we're learning about that industry or that solution or that domain, but that particular customer owns the IP. And the third thing we've done is in some cases, we've built a joint platform that we can take to market together. In the medical field, for example, we're working with the Mayo Clinic on a bunch of joint initiatives that we will take to the broader medical community together on digital health. So we have all three models and we're flexible depending on what industry, what the partner wants on working together on these.

Dave McKay, President and CEO, RBC: That makes complete sense. I guess your partner strategy would also and maybe you can touch on how it would change between trying to use a partner to attract an enterprise client versus medium-sized and small business client?

Thomas Kurian, CEO, Google Cloud: Yes, we have a very focused strategy by geography, by industry, and size of client. For example, there are specific partners who have great experience in Public Sector institutions serving governments. And so we have a set of partners there. There are different ones in Latin America versus North America versus Europe, for instance. And we have country-specific partners. For example, we have very strong presence in a particular country and then definitely we have differences between small and medium enterprise versus large enterprises -- their needs are quite different. The delivery models for solutions are quite different and we have a very focused approach on that.

Dave McKay, President and CEO, RBC: Something that drives so many core economies, whether it's the Canadian economy, the US economy -- small business drives the economy and one thing I've found through this pandemic and I'll pivot there next with you, but just a question on how do we bring small business with us? They don't have the resources to access AI capabilities or the data sets, but they need cloud-based services, they need them tailored. And how do you respond to that element of the market where there is an unmet need for sure?

Thomas Kurian, CEO, Google Cloud: We have a very, very significant business with small and medium enterprises. We want to make it super easy for a small and medium enterprise to go to our website, login with a username or credential and get access to our services and we've done a lot of work to continue to optimize the ease with which they can adopt it. Some of it for

example, we see a lot of people building their online presence, small retailers, small restaurant chains, small delivery companies because during the pandemic they are just as the large ones, are jostling for presence online. Even the small and medium businesses need online and our focus is on how quickly and easily can we give them the tool set to get online, to communicate with their customers to collaborate with one another and we've been incredibly pleased with the results we're seeing with the adoption of these tools.

Dave McKay, President and CEO, RBC: What are some of the biggest barriers to them taking advantage of these tools because I certainly see a movement to scale, a movement to brand scale, company size, yet so many -- so much of employment rests with small businesses. Is there one thing we can do together or we can think about in helping small business along? I know you're part of the solution is their Cloud and allowing them to access data and insights and capabilities that they can't afford themselves. Is there anything else that's stopping them from really competing and being successful in a more digital world?

Thomas Kurian, CEO, Google Cloud: Some of them just don't have the physical resources to compete and I look at small retailers. For example, one of the big things they struggle with is supply chain, delivery capability, et cetera because large companies have scale. And part of what we're trying to do on our side by enabling a digital business model, the cost of scaling a digital business model is much lower than the cost of scaling a physical business model. So part of our effort to help small and medium enterprises is giving them access to technology -- that the same technology that large enterprises get access to, made easier for them to pick up and use. But it also gives them the ability to scale their digital business model, which is a big competitive advantage for them if they can do that successfully.

Dave McKay, President and CEO, RBC: Right, yes, great point. We started touching on obviously the pandemic that we're operating in and the changes and the challenges to different segments of our economy, different size organizations. Can you first talk about just as a leader, some of the challenges in operating in this world and technology side, how do you lead Google Cloud and all the different things coming at you? Obviously an increase in demand for your services, but how you're responding as a leader to these challenges?

Thomas Kurian, CEO, Google Cloud: I've seen that you have -- broad brush, there's -- I don't think we've been perfect in our response with being as moving as quickly as we can. I would say there are, we've learned a few things by observing and understanding how could we do better? The first one is being adaptive, there's lots of discussions that we've had as a leadership team at Alphabet on how do we manage our global workforce, our employees and the reality is, the pandemic has hit different countries at different times. So we've delegated a lot of decisions to the local country leaders or office leaders because a situation in New Zealand, for example, may look very different than here in the United States or even in Asia, in different parts of Asia. So one was doing that. The second, I think is keeping the employees engaged throughout. There's a variety of different things that we've done, but most importantly I think is giving them a sense of purpose. And our purpose is focused around our customers because that's what keeps people unified as we go forward.

We've had to, on the customer side, there's many new things we've introduced and we've been very, very focused on evolving the technology quickly. Our web conferencing technology for example, has had a huge, huge growth in users and minutes and we have to scale the technology to support that. We've had people in Financial Services, in Retail, in Gaming have huge spikes in traffic and are -- a big part of our work has been working side-by-side with them to enable them to be able to deal with that and support it. And we're very proud of the employees who have done that. We focused on making sure they understand how committed we are to their success as well. So a lot of different parameters, but generally being adaptive, looking ahead and planning ahead and then recognizing that purpose is what keeps employees even during this difficult time, focused on serving the customers. Those are some of the lessons we've taken away and I'm sure there are many more things that we need to do better at.

Dave McKay, President and CEO, RBC: Do you think we're better as leaders and humans at a hybrid world or in a purely physical -- or purely digital world? Do you have any insight to -- now, what I think today versus what I thought in April is very different and I'm sure I'll think very differently a year from now as we continue to learn. What have you learned about how we're innovative, how we work best as humans?

Thomas Kurian, CEO, Google Cloud: I think it's a combination of things that I've seen when we listen to our teams, for example, and -- engineers, for example, one of the things we've seen is there are certain things that we find that they are actually much more productive when they work at home because they have less disruption. At the same time, a lot of the, what people say, the design sessions and the sort of one-off ideas that they wanted to discuss with a colleague, that they used to grab them around a water cooler. We've talked about for example, with some of our teams this notion of what we call an on-site off-site. Because when everybody was in the office, we did an off-site -- in order to brainstorm they went to an off-site. And now with people at home, we've done an on-site off-site where we bring people together into a socially distanced office environment so that they can be a bit more cohesive. And I think everybody will learn as this continues that there are good things about working in an office setting, there are really good things about working in a home environment and blending the two will be the art of the future in my view.

Dave McKay, President and CEO, RBC: Yes, well said, absolutely. And it's an evolving -- and listening to our employees is going to be critical as we try to build the most engaged productive workforces for the future and it's a brave new world, that's for sure. Maybe we can pivot then to certainly, we're learning a lot about online business, online commerce, it’s accelerated the trends in so many areas. Can you talk about how you think about Cloud’s role in that future and even bigger opportunities for cloud-based capabilities and how your perspective changed over the coming -- over the past year?

Thomas Kurian, CEO, Google Cloud: It's interesting, when we look at what we're seeing in different industries, almost every place of work has been digitized. So if you look at it, the way that people went to a hospital to meet a doctor, now they do telemedicine; people used to go to

a bank branch to do certain things, now they want to do it online; people used to go to a store to buy things, now they're buying things online. So the first phase of change that we saw was this notion of a digital front door in every industry -- the way that governments distribute unemployment insurance and small business loans and benefits have also gone online. So that was the first phase.

The second phase was, help me use my data and understand how to serve these customers better -- what products and services to put in front of them, how do I manage my inventory better if I'm a retailer, how do you optimize my supply chain? And the third was now that you have that, how do you take a lot of your physical processes and make them more efficient? If you're in manufacturing, how do you do quality assurance better because people cannot stand next to one another at the end of a manufacturing line to inspect products and services? And so we've seen sort of every phase of this has accelerated significantly because of the pandemic and we're seeing that being a long-term shift in the use of technology to solve some of these problems.

Dave McKay, President and CEO, RBC: Every time I think about the potential of technology, and moving, using data for knowledge and for value, we always stumble over the quality of data first -- getting data to a place where it can create knowledge and then value. How big of a barrier and what are you trying to do to help large enterprise firms improve the quality of data so it can lead to -- use the tools that you've built to really harness that power?

Thomas Kurian, CEO, Google Cloud: Our approach is -- quality of data, you're right on, is probably the biggest impediment to being able to use some of the new technology and so our focus has been -- make it easier for the software to understand the data at a fundamental level. And so some of the things that we have done, understanding, for instance, looking at documents. There's still a lot of paper floating in the world. How do you really be able to understand the text on these -- on this paper at a really fundamental level? Historically, people used to talk about natural language processing and they really thought it's about understanding sentences or words. In reality, human beings expect you to understand conversations and when they have a conversation, they leave off a lot of things because they assumed implicitly that you remembered it. And so we are pushing the boundaries constantly on being able to understand data at a fundamental level, both structured data and unstructured, to be able to describe it, and to provide tools to be able to analyze and process that in a much more easy way than people could do before.

Dave McKay, President and CEO, RBC: To me -- and a massive amount our data organization manages from the Capital Markets side through to the Consumer side. Those are truly differentiating capabilities. If you can, whether you're large enterprise or small enterprise, if you can or seamlessly extract value from data, derive different data points, and then apply tools that you've built to that and the capabilities in the Cloud, there's a huge differentiating capability there. And that to me, that plays to as -- Google Cloud as an enterprise solution product capability is different than Google advertising, Google Mail type capabilities. But that's where

you bring to me the two worlds together and leverage that incredible horsepower in the original Google capability.

Thomas Kurian, CEO, Google Cloud: Yes. And that's a lot of what we're trying to do is apply some of the technology to solve some fundamental problems. I'll give you just two examples, one is in Retail. A problem that retailers face a lot today is that when people went to the store to buy things, demand was very easy to forecast on a store by store basis. Now, as people now buy online, but want to pick up in the store, they buy in the store, but want the things shipped to their home, it becomes extremely difficult to forecast and manage inventory and inventory is a big part of the capital that's tied up in retailers. So we worked on a set of tools to help people really forecast inventory much more accurately using some of the expertise we have in artificial intelligence and it allows retailers to plan for example inventory in a very differentiated way.

A similar example, we do in Financial Services, everybody is worried about fraud and things like anti-money laundering and one of the things we've seen is that when you look at anti-money laundering, there are many different tools that are used today. They have a tendency to generate a lot of false positives. And when we look at it, it's because they're largely using older technology that was based on rules rather than some of the newer tools and technology. So we're applying some of our expertise in artificial intelligence in large-scale data processing to help solve some of these business problems that are central in Retail, in Financial Services, in Manufacturing and other things and to assist people on some of these problems that they couldn't solve very elegantly before.

Dave McKay, President and CEO, RBC: Maybe I'll just pivot there as you've taken us right to the next key element, I think, of your strategy, as I remember. It is certainly around industry verticals as you've talked about -- and you talked a bit about more broadly and then you mentioned Retail and Financial Services, specifically. I'd like to jump into Financial Services because it's most relevant to us. But certainly, can you talk about vertical strategies, how you chose them, the range of them and how you're building them out and how they compete?

Thomas Kurian, CEO, Google Cloud: Yes, we -- our technology applies to all industries but we see different industries focused on different needs and we're trying to deliver solutions for those industries. Our primary industries are Public Sector, Financial Services, Retail, Healthcare, Manufacturing, and Communications and Media. If you look at Financial Services, we break Financial Services into Consumer and Institutional Banking, Wealth Management, Capital Markets and Insurance and there are different requirements in each of them. Just to give you an illustration, our goal is to use large-scale data processing to streamline business processes within an organization to transform the customer interface and to allow people to build new products and sources of revenue.

So when we look at for example, Insurance, we're working with a number of the leading insurance companies around the world around some of the important processes. One example is how do you change underwriting? How do you streamline how claims are processed and the third is how do you put a digital agent in front of the consumer because they may not feel

comfortable going to an insurance agent office still. And so these are examples of how we're taking our base technology and then applying it to different domains and different industries and we're seeing -- because of that -- enterprise customers always want the problem solved. The more applied you can make it, the easier it is for them to adopt it and we're very focused on that kind of an approach.

Dave McKay, President and CEO, RBC: How big of a challenge to say when you're working with an enterprise client to say, “Yes, thanks for helping me re-engineer this process. It's saved time and money, but you're not allowed to sell it to the next competitor out there?” Is that something that's more and more a part of agreements with enterprise clients or your core operating premise is the Cloud is going to be available to all industry participants and our IP will be separated out and kind of repackaged?

Thomas Kurian, CEO, Google Cloud: The vast majority of clients recognize that if we maintain the IP and are able to enhance it, it'll move faster than if it was for just for them. So the vast majority of cases, people say as long as you work and give me an advantage by starting with me, and I'm part of your early adopter programs and other things, they recognize the value that comes from having shared innovation with other people and they find the benefits of that. So we've been generally pleased with how we’re able to solve our major customer problems while at the same time maintaining an overall curve of innovation that helps all the players in that industry.

Dave McKay, President and CEO, RBC: And if I jump to Financial Services, and obviously a heavily regulated industry. How are you thinking about dealing with regulators as you move more and more banks or insurance companies onto Google Cloud services? The regulator will look at greater and greater systemic risk, which is their job off those operations. How do you manage this growth in this ecosystem with the regulatory systemic risk?

Thomas Kurian, CEO, Google Cloud: It’s a great question. We completed regulatory audits in 39 countries and so we’re very familiar with them because we work with many leading financial institutions. It boil -- our approach is -- boils down to three important elements. One is evolving a platform to address some of the requirements that regulators have. A lot of the work that we've done on this notion of multi-cloud, being able to use Google’s technology on other cloud platforms and in a data center of a customer, has provided a significant benefit in financial services around this notion of concentration risk, which regulators are very concerned about.

The second is we put in place operational practices and policies. For example, many European financial institutions want their data to be maintained in Europe. Many financial institutions have certain access requirements to who has access to their data and we put in place lots of operational practices to govern the use of data, particularly financial services data. And then lastly, we go through regular audits with regulators, both financial regulators in a country or in the case of Europe also with the European Central Bank, and we have people in our policy organization that works super closely with them to understand where they want regulation to go and then evolving our technology to be able to support those regulatory requirements. In

general, as Cloud becomes a more and more important part of the IT landscape in industries and in different countries, we expect to get more requirements of this kind and we are very committed to meeting them.

Dave McKay, President and CEO, RBC: So you've obviously thought that through. That's really good because I can see the questions coming in from our regulators as we start to move these services over. So you started to pivot then again to another key component, as I understand it, of Google's strategy around multi-cloud and you kind of rebranded and relaunched Anthos, which I believe is the Latin derivation "to flower." It was the multi-cloud kind of management capability. Can you talk a little bit about your multi-cloud strategy and how that differentiates you from maybe some of the uni-cloud competitors as they would maybe self-describe out there?

Thomas Kurian, CEO, Google Cloud: I use this example. Imagine if you were back in 1997 and the Internet was happening. And you said certain web pages were only available in Microsoft's browser and other web pages were only available in Netscape's browser and other web pages were only available in Firefox browser. The Internet would not have succeeded because it would have been fragmented. So our approach has been if you want to enable organizations, the primary barrier to adoption of Cloud in organizations is skillset. And a big part of it, I don't think organizations say I want to have three different Cloud teams - one for Google, one for Amazon, one from Microsoft. Why not hire one team and learn and give them the choice of where they want to deploy?

So our approach to multi-cloud is there should be no complexity in providing customers the ability to use the Cloud provider of the choice, but to have them do it without being locked into that provider. And the way to do it is to build an open programming model for how people can build, deploy, manage, and secure workloads. And that's a lot of the work we've done. We've even taken our data and analytics technology that many, many people find very differentiated, our machine learning tools, and made them available on other platforms. And the reason is people said, "Can I use -- I've chosen someone else to put my data in. Can you bring your data processing to my data as opposed to the other way around?" And we feel that if you do right by customers and give them the choice, it'll eventually, get you more success as the regulatory landscape has evolved and the notion of sovereignty comes up, the notion of -- hey, I want to have a regional presence. Even for example in the Public Sector depending on changes in the classification of certain kinds of information, people have to use different Clouds. The use of multi-cloud gives them choice and flexibility and we've seen really strong interest from customers to this approach we've taken.

Dave McKay, President and CEO, RBC: Can you talk a little more about some of the partners you've chosen to execute a multi-cloud containerization partners, containerization strategy, because obviously I think about those things here as we choose our Cloud partners.

Thomas Kurian, CEO, Google Cloud: We have a broad set of partners. They fall in four buckets. The tools and developer tools that developers use to both deploy, but also package

applications. Second, tools that allow them to run workloads. Third, tools to migrate data is a common requirement that people have and they want to move data around. And lastly, tools around security. How do you secure this environment? And we have partners in a number of these. An example, if you look at the security space, there's common requirements on how do I lock down my container? How do I provide container security? We have a very good partnership with Palo Alto Networks in that area. So there's quite a few things that -- we've been always clear on what do we want to enable, what tools do we provide of our own and what's the partner ecosystem that we want to bring to solve these problems?

Dave McKay, President and CEO, RBC: I'm going beyond my technical ability, but can a uni-cloud competitor kind of block that strategy or is it you have the ability to run this multi-cloud environment independently?

Thomas Kurian, CEO, Google Cloud: We can run the multi-cloud environment independently. It abstracts out the underlying Cloud providers' ability to block you.

Dave McKay, President and CEO, RBC: Right, right. I'm sure you've thought of that. So that's great because I think as you talk about regulatory, corporate strategy, small business strategy, the need to manage short and long-term risks, right? Risks of porting and not being beholden to one developmental capability is something that we certainly think about and managing operational risk at the same time. So, I think that -- it's a fantastic strategy. You touched on another theme that I wanted to discuss and as we -- and that's Cybersecurity -- something certainly that's omnipresent but heightened during this pandemic. As we see this movement towards public cloud services and more processing capability, more data residing. As we see a world with more endpoints in a world of 5G, which we'll touch on after. Can you talk about your security strategy and how you're protecting data, protecting partners, customers, in this omnipresent cyberworld?

Thomas Kurian, CEO, Google Cloud: Our philosophy around security is -- boils down to some very basic tenets. Number one, make sure that security is easy to operationalize. Second, provide the tools to detect threats and risks. Third, make it easy to automatically remediate some of these problems because historically that's also been challenging. And lastly, allow people to choose how to configure their systems to minimize all the way from the endpoint to the Cloud. And so I'll give you just a couple of examples. One of the common things we felt was people would really like to encrypt data. And if it's encrypted it's much more difficult for malicious people to get access to it. Historically, there's been two difficult things. One is, making encryption possible was hard. You had to manage keys. There was a lot of complexity with that. The second is, data was encrypted only at rest or in transit. While it's being processed, it was left wide open. So somebody could always open the front door and get access to it. So we came up with the solution to encrypt data all the time. At rest, in motion, and while it's been processed. And we also made it super simple for people to do, so it's not complicated for them to manage.

A second example of something we felt very strongly about, was making it easy to detect if you're in compliance with security practices. So we've taken security and converted through

configuration so that an operator can just look at your system and say is it secure or not? Historically, you had to use lots of tools. It was super difficult for a CISO to get a sense “Am I secure or not?” And so we made it much simpler through our threat detection capability to identify -- are you running in a secure environment? For instance, if you are in a Healthcare system and loading Healthcare data, are you maintaining HIPAA compliance? Because that today is very difficult to do. And lastly, we’re working on some advanced solutions around cyber protection, even for external attacks, as you can imagine we have lots of technology at Google that we're applying to this domain because we think that is a significant area of further work that needs to be done as part of the industry itself.

Dave McKay, President and CEO, RBC: It's really impressive that you built out a capability not only -- we do expect you to protect data at rest, as you say, and in motion, but also while being processed within the machine, and I think that's really, really important. So you've obviously thought that through. Will you talk about kind of 5G and how that's going to change where we're processing data, where we're making decisions? And how does that impact kind of the cloud-based and how you think about security, how you think about capabilities in the world of 5G?

Thomas Kurian, CEO, Google Cloud: 5G, given the investments telecommunications companies are making in 5G in the network itself, 5G networks provide not just lower latency, but also more bandwidth. And so given that it's lower latency, we -- what we're doing is integrating what we call our Mobile Edge Computing solution with many different carriers around the world into the network. So in the carrier network, you can actually have computation that runs in the network and it allows applications, new kinds of applications, that have very low latency to be available right in the network. So we see a lot of different solutions and what we're doing is providing not just a technology platform with Mobile Edge. We’re also providing a catalog of solutions for specific industries with a partner ecosystem to make it easy for customers to adopt it.

I'll give you just a practical example, we’re working -- we have a large manufacturing company that runs a manufacturing shop floor. The robots that run the shop floor have to have a clean room environment. The control systems and the computers that talk to these robots, therefore, need to be close to the robots. But if they're in the factory floor, one of the challenges you have is technicians have to go in to repair the disks and replace the disks and other things so they wanted us to put that into the network itself. So working with the telecommunications partner, we built that into the network. It's very close to the factory, so you get low latency, but you don't have the disruption of people walking in and repairing things in the factory floor and allows them to get the combination of better value to the carrier because a carrier is now becoming -- the network is becoming a locus for application delivery and a better solution for the customer.

Dave McKay, President and CEO, RBC: Right, right. That's a great example and an exciting usage model. Can I just jump a little bit to artificial intelligence? I know we're running out of time here and I got a couple of topics I might try to squeeze in the last few minutes. AI has so much promise, so much capability. Can you talk about both some of the exciting applications you've

seen in AI. Google has invested heavily outside of Cloud in AI capability, reinforcement learning. Obviously, you'd think that some of that capability is going to be brought into the Cloud. And what are some of the barriers you see to really leveraging this incredible technology? We talked about data earlier. And then a third question. I'll probably remind you of the third question. A little bit about ethical AI and how we have to think as a society about using these tools. So there's a lot there but we'll step you through them.

Thomas Kurian, CEO, Google Cloud: We see AI being applied to support and augment humans in a variety of different industries and fields. As an example, we've done work using our image recognition to let radiologists have better tools to diagnose tumors because our image processing is so accurate, it can identify tumor cells. We've helped many manufacturing companies have image processing on top of their shop floor so that we can do quality inspection without human beings standing next to one another. It reduces the risk to the humans having to be on the shop floor. It also speeds up the manufacturing line. There are many, many such examples of places where artificial intelligence, whether that's image processing, understanding data, helping people understand conversations, are all going to change the way that organizations function and use the value of the data in different ways.

Now at the same time, we've also been very careful that the same technology that can be very powerful in one context, can also potentially have negative consequences. So as an example, we do work on object detection. Object detection is, for instance, if you've got a human being who is, in distress in the water, for example, can you detect that so you can help the Coast Guard rescue them more easily? That's an example of a project we're doing in one part of the world. At the same time the very same technology can be used to identify whether that person is a specific individual and that technology of human identification is -- has a number of potentially negative consequences. For instance, it could lead to diversity and inclusion bias. So we've been very careful on putting forward an ethical AI framework because we feel that when you have a very powerful technology, you have to have some principles that govern the use of that technology and Google adopted something called Ethical AI. We have put forward a set of principles that are meant to govern how we use AI in our products, how we expect people who are using our AI to use it, but also meant to be a foundation for discussion with other technology companies and policymakers on what's the right way that AI can be used in the world.

Dave McKay, President and CEO, RBC: That's a great example. Wow, it's fascinating. Double -- both sides of that equation, trying to help, but also trying to protect confidentiality and the ethical side. It's amazing. I'd like to just ask one more question. I know we have just a couple minutes left and one of the most important issues that we've all dealt with in our society and as leaders is building a fairer, more inclusive society going forward. You touched on it just now, and can you just talk a little bit about kind of your thoughts on building a fair inclusive society and how you're leading within Google through this.

Thomas Kurian, CEO, Google Cloud: Our general view is technology is -- is still something that does not distinguish which person and what race and what nationality has unique advantage to create the next technology. And so our view is we need to be representative and

provide opportunities for people of all backgrounds to be able to create new technology and innovate at Google. For us, it boils down to four things. Are we recruiting a diverse and inclusive population? Are we helping develop people of diverse backgrounds? Are we promoting and rewarding them and are we retaining them? And we have very specific work going on in every one of those areas, working with our People Operations team, our employees, and it's a matter of great importance to us because we want to be a place that represents -- that builds representative technology as well as it has a very representative organization.

Some of the things we've had to change, for example, people often think about and we have to educate our managers that you don't hire for cultural fit. You hire to evolve the culture of the organization and so don't just hire people who make you feel comfortable but hire something that makes our organization stronger because it's more representative of the broader community in which we live and work. And so there's a lot of work that we're doing, we constantly are paying attention to it to see if there are ways that we can improve further as an organization and we're learning also by discussing with many universities with different organizations and this is a matter of great importance to us.

Dave McKay, President and CEO, RBC: Well said, I think that's the very definition of diversity, right? And different perspectives and not hiring in our likeness and challenging ourselves to think differently. It's such an important point. Thomas we could go on for another hour. I know we've taken a lot of your time and we so appreciate the time you spent with us today. And I think we've covered a lot of topics, but I hope everyone can feel the power of the technology you're building. How you're going about it is different, from multi-cloud and the verticals, and the partners you've built will differentiate your capability. The future is going to transform small and large enterprises -- bringing the power of AI, bringing the power of our processing data, reengineering processes within verticals to put into your capability. It's transformational technology. We're so excited that you were able to talk to the conference today about some of the things you're building and feel the future that's at your fingertips and that you're building. On behalf of everyone, a sincere thank you for a great conversation today.

Thomas Kurian, CEO, Google Cloud: Thank you so much for having me Dave, it's a pleasure to join you.

Dave McKay, President and CEO, RBC: Be well and I'm sure we will see you soon. And on behalf of the entire audience, a sincere thank you.

Thomas Kurian, CEO, Google Cloud: Thank you very much.