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**Build 2019**

**Satya Nadella**

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**ANNOUNCER:** Please welcome Satya Nadella.

(Applause.)

**SATYA NADELLA:** Good morning. Good morning and welcome to Build 2019. It's fantastic to see you all in Seattle.

Build has always had a very special meaning for me. I remember very distinctly being in the audience in 1991 at our very first developer conference. And that's when I decided to join Microsoft. Ever since, I've marked the passage of time and life and tech paradigms. And so it's great to be back here at Build and talking about technology.

I want to first start by welcoming all of the young developers in attendance. In fact, for the first time we have children of Build attendees here. We have our student ambassadors, of course the Imagine Cup participants as well as students from local schools in Seattle. So a special welcome to all of you.

(Applause, cheers.)

You know, Build is all about imagining what's possible, but more importantly making it possible. And over the next couple of days you're going to be looking and seeing a lot of technology. But the real thing is how do we galvanize and come together as engineers, as developers to make that world possible? And when I think about the world today, as computing is getting embedded in the world where every place, whether it's our homes, our offices, factories, stadiums; every industry from oil and gas to retail to agriculture to financial services; everything from connected cars to connected refrigerators to smart surgical tools to smart coffee machines are all being driven by software.

That's the opportunity in front of us. The opportunity for developers and our colleagues from all other disciplines to come together to build this new world. And that's the sense of purpose mission that grounds us at Microsoft, to empower every person and every organization on the planet to achieve more. It starts by empowering all of you as developers to go after that moonshot in any industry, in any sphere or life or society.

Now, we'll talk a lot about this opportunity throughout this keynote and throughout this conference. But we also share a deep responsibility together. It starts with us as platform providers, but we have a collective responsibility. A few years ago when we started talking about it, it sounds a bit prosaic to talk about responsibility in tech conferences where it's all about the glitz of technology, but it's no longer the case.

To us, really thinking about the trust in everything that we build, in the technology we build, is so core. And as engineers, we need to truly incorporate this in the core design process, in the tooling around how we build things, so when we think about privacy and the fact that privacy is a human right is as much as an engineering design principle as an engineering process issue.

The same thing with cybersecurity, the same thing with AI ethics, how do you build systems without bias? These are core engineering challenges where we have to push the state of the art around the tooling, the process and the responsibility we take to what we build.

In fact, talking about cybersecurity, one of the most important things we have to ensure is our critical infrastructure remains secure. I'm really thrilled to announce an open source project which we have collaborated with a partner called Free and Fair, and this is ElectionGuard. One of the things that we want to ensure is real transparency and verifiability in election systems.

And so this is an open source project that will be alive on GitHub by the end of this month, which will even bring some new technology from Microsoft Research around homomorphic encryption so that you can have the software stack that can modernize all of the election infrastructure everywhere in the world. And it's fantastic to see this type of innovation really across all of the core areas of trust.

Now, I want to talk about four distinct platform opportunities. Throughout this conference we will really go into the details around these four opportunities. Now, the first one is the intelligent cloud and the intelligent edge platform that Azure enables. That's the thing that we'll spend a lot of time on today, as well as the rest of the conference. It provides the core hybrid infrastructure, but it also provides the data and AI runtimes for the world's applications.

We'll talk about business process automation as a first-class platform for the first time at our developer conference. It's so important. So, we'll talk about Dynamics 365 and Power Platform. We'll talk about Microsoft 365 and how this is the productivity and communication fabric that creates a scaffolding for all developers. We'll talk about gaming.

So, these are the four platforms that I wanted to really get into in some detail. So, let's start with Azure. We are building out Azure as the world's computer. We have 54 data center regions around the world. In fact, we are so thrilled to have the first public -- be the first public cloud with data center regions in the continent of Africa. (Cheers.) We started operating out of South Africa. (Applause.) Really, I can't wait to see all of the development that happens around that data center capability.

We also have more certifications than any other public cloud out there. We have over 90 compliance certifications, and why is that important? It's because we have to meet the real-world needs, regulated industries, data sovereignty needs, operational sovereignty needs. You need to be able to meet the world's complexity with what you build, so that it really enables all of you as developers to be able to build with less friction.

They're also building out Azure as an open platform. Windows Analytics is first-class. DotNet and Java are first class. SQL and Postgres are first class. We have Kubernetes workloads. We have RedHat. OpenShift workloads. We have workloads from VMware. We really want to make sure that every layer of the stack, again, meets the needs of developers.

We are not stopping there. We are extending the cloud to the edge. This is what we've always had as a vision for distributed computing, which is there's a cloud and an edge and distributed computing will remain distributed.

So, Azure to Azure Stack, to Azure Data Box Edge, to Azure Kinect, HoloLens 2, Azure IoT, Azure Sphere, in fact, in this conference I'm really thrilled about the Azure Database Edge. It brings the database engine to ARM processors in the edge. It has time series support, streaming support. You can bring AI compute to the edge. It's so great to see this distributed computing fabric come alive to help developers build the applications of the future.

Now, the thing when you talk about hybrid, what is important is to think about the consistency, the consistency between the cloud and the edge when it comes to the operating model. That is, the management and security, the development environment, how does the DevOps pipeline work across the two. And as importantly, the technology stack and this is where you can make simplistic assumptions of having some homogeneous infrastructure on the two sides. You have to meet the real-world needs.

So, that's what we've been hard at work at at Microsoft. When we talk about hybrid it's doing the hard work to bring this level of consistency between the cloud and the edge so that developers can move the code that they have today and build new code on top of this platform.

Now, in fact, right after my keynote you're going to hear from Scott (Guthrie), where he's going to talk in much more detail about all of the features, functionality coming to Azure. In fact, there are 25 major updates and new features right at this conference. So, really thrilling to see the progress being made.

And all this is leading to amazing momentum in Azure. The world's brands are building on Azure, 95 percent of the Fortune 500 already use Azure and it's great to see from retail, to healthcare, to manufacturing, to automotive.

So I thought I would just share some of the ambition. One of the things that really excites me is, right now as we speak, there are more software developers being hired outside of what is considered the tech industry and it's only going to grow. That's the proliferation of what is the power of software going forwards and you see that ambition.

So I want to tell you a little bit about these stories. First is Walgreens Boots Alliance. Now, Walgreens is one of the largest pharmacies out there and they're doing many things with us but one of the things that I'm really excited to see is they're also working with startups like Cooler Screens to completely change how the retail experience works. And Cooler Screens is using the latest and greatest AI from Azure to change the retail experience, in this case starting with these refrigerator units.

AB In Bev, largest beer manufacturer. They have this very nice phrase which is, from barley to bars, where they're completely revolutionizing how they think about their supply chain and the yield for barley and to tracking everything using IoT to also then using cognitive services to track social media. So it's end-to-end digital transformation.

Now St. Jude's and DNAnexus. DNAnexus is the ISV working with St. Jude's Hospital to really go after this fight against childhood cancer, which is an underserved research area. To be able to then use Azure Genomics to get the genomic data. But most importantly, how do you create a research cloud so that scientists from multiple organizations can all collaborate to go after this disease?

J.P. Morgan Chase has chosen to use the Azure Blockchain Service to bring the core, which is a variant of Ethereum, to market alongside us. So it's fantastic to see the innovation of new software products and projects coming from the financial services incumbents as well.

AT&T is rolling out 5G and they chose Azure Stack for their compute at the edge, and they're working with ISVs such as Vorpol, which is a drone safety tracker. So the idea that you need low latency edge compute in order to be able to really make sure that the air space for drones is safe is such a critical need, so therefore that's kind of a sample application of what is possible as 5G rolls out. And then you have this ubiquitous cloud and edge.

Now, I want to bring us home to another iconic brand that's right out of Seattle. In fact, it got started a few miles from here at Pike's Place, Starbucks. Starbucks has, of course, defined what our morning coffee experience is. And at this point, one of the things that's so exciting to see is the software engineers at Starbucks, their ambition, their collaboration with their colleagues on the business side and product managers and marketing, they're coming together to completely take what is that iconic experience of Starbucks and incorporate digital throughout, everything from what they're doing with blockchain and sustainability, IoT and the coffee machines, as well as AI. And to really give you a glimpse of this let me throw it to the show floor to our team to show you what the Starbucks engineers are dreaming up and making real.

**ANITA RAO:** Today we're going to show you three things Starbucks is doing to better connect with their customers and enable their personnel. Firstly, great more intelligent customer experiences with an internal AI platform called Deep Brew. Secondly, securely connecting their coffee equipment to Azure with Azure Sphere. And finally, providing transparency into how the cup of coffee you drank this morning made its way from the farm to your local Starbucks.

Starbucks has created a sophisticated, intelligent recommendation system based on reinforcement learning models that they call Deep Brew. Starbucks can use Deep Brew inside in many areas of their business including this new more intelligently responsive drive-through which is an early pilot. Here you can see store-recommended choices for a Starbucks in Santa Monica.

These aren't for fixed products or every Starbucks, rather it's selected by Deep Brew after weighing many factors, what is popular at this specific store at this time of day, time of year, what's currently available in the store, even current weather conditions and more.

After I asked the drive-through attendant for the Cloud Macchiato, the display shows me additional recommendations that Deep Brew knows are popular with those who made the same choice as me under similar conditions. Not all Starbucks local markets are the same. Let me show you what you might see on the same day in Alaska. Notice that the choices are different, reflecting the unique local preferences for this store, and the recommendations, if I choose the Sous Vide Egg Bites, will be tailored as well.

The refresher that's showing up on the display looks actually pretty tempting to me. The Starbucks award-winning mobile application leverages these Deep Brew insights as well as my own personal order history to make even more personal recommendations. Deep Brew is a new platform for Starbucks to innovate and experiment with rapidly scalable and cutting-edge machine learning. And it allows Starbucks to better meet the preferences of their diverse and worldwide customer base and empower their personnel.

Starbucks' digital transformation doesn't stop there. Olivia is going to show us how Starbucks is connecting their essential coffee equipment in their 30,000 stores globally.

**OLIVIA BURGESS:** Starbucks uses Azure to administer their connected coffee equipment. They're currently piloting Azure IoT Central, Microsoft's hosted platform for IoT solutions, to centralize some of this work. As you can see, this Azure IoT Central dashboard shows data from the local Starbucks stores. Think of this as mission control for your morning coffee. By connecting the equipment to Azure IoT Central, Starbucks can monitor water temperature, pressure, pour time and more to ensure their Flagship Mastrena 2 machines in stores are performing at their best to enable baristas to make the highest quality hand-crafted beverages every time.

Connecting the Mastrena 2 to Azure IoT Central also allows Starbucks to run predictive maintenance models to more efficiently operate their machines. This device telemetry and predictive maintenance allows Starbucks to remotely diagnose potential problems, reduce maintenance costs and cost, importantly achieve higher customer satisfaction by freeing up time to allow their partners to connect with their customers.

While Starbucks could use Azure with any IoT device to connect their equipment, they chose Azure Sphere, Microsoft's end-to-end solution for securely connect the devices, which comprises of an MCU embedded with Microsoft Secure Architecture, and a Linux-based custom OS and Cloud Security Service specifically because their coffee equipment is so vital to their business.

Starbucks can embed the Azure Sphere custom microcontroller into new equipment. They can also retrofit Azure Sphere into existing machines by plugging this external module into the device. No need to replace valuable existing equipment.

Multiple times a year Starbucks introduces new seasonal coffee. This requires software updates on the coffee machines. Previously this would have required tens of thousands of USB sticks to be diverted to stores. Now the recipes can be delivered securely over the air from the cloud to the Azure Sphere-enabled device at the click of a button which you can see in the Azure IoT Central pilot, accelerating Starbucks innovation process from months to days and making the pathway for new innovation.

**ANITA RAO:** Starbucks' digital transformation is expanding beyond their Seattle offices and coffee shops to its vast supply chain which started over 380,000 farms in nearly 30 countries. Starbucks recently previewed at its annual shareholder's meeting a new digital transparency feature for customers. With this feature, I can use my phone to scan a code on this bag of coffee to see an immutable record of the coffee's history stored on Azure Blockchain Service. With this, customers can see -- let me just get this up -- with this you can see where the coffee beans were grown, Starbucks support efforts for farmers in those regions, when and where the beans are roasted, tasting notes and more.

Starbucks' ambition is to use this technology to provide greater empowerment for coffee farmers as coffee drinkers better understand where the coffee comes from and who grows it. With Azure Blockchain Service, data can be real time and transparent.

**OLIVIA BURGESS:** As you've seen, so much of Starbucks' business is being transformed by digital technology and at Microsoft we're excited to see where we can go next together.

Back to you, Satya.

**SATYA NADELLA:** Thank you so much, Anita and Olivia, it's fantastic.

(Applause.)

You know, we in the tech industry have always been inspired by coffee for our brands. But I must say Deep Brew I think is going to really have more of an impact in our lives every morning. And I'm looking forward to it.

And now I want to switch to talking about AI, because one of the key things that Azure has been very focused on is how do we truly democratize access to AI. The breakthroughs are coming at amazing speed. In fact, just even this year Microsoft achieved human parity in conversational Q&A. But it's not just these breakthroughs. How do we translate these breakthroughs into services and infrastructure and framework to tools for developers? And that's really what we have really focused on.

In terms of infrastructure we have some very exciting announcements around inference capabilities with FPGA that are going to be available as GA. We're also making sure that we don't get locked into some insidious vertical integration. So, ONNX support, around inference, both with Intel and Nvidia is so important, because we don't want that play of having frameworks to silicon. We get to some vertical integration that allows it, that just creates lock in. So, we really want to make sure that this infrastructure remains open and open standards.

We're also investing to make sure that the tooling is making developers around AI and ML more productive. One of the things that you'll see in Azure ML advances is the no-code ML tools. It's great to see that. But, it's also the pipeline, the Azure DevOps is being extended for ML ops, so machine learning ops. And so, it's fantastic to bring that same rigor of development and engineering and deployment to machine learning practices.

Now, when it comes to services, we continue to take the breakthroughs that we have across all of the various cognitive services and make them available to developers. There are advances throughout with vision, speech, language, translation and a new service around decisions. This is about reinforcement learning brought to anomaly detection, personalization. It's really exciting to see this.

We have many, many of these cognitive services. And the pattern of these cognitive services is to have them a variable in the cloud. You can customize them, especially the last layers, you can even put them in containers, take it to the edge devices, and of course use the rich ML tool chain around it. So that capability is what's driving productivity.

Now, one service I wanted to showcase today is the Azure Speech Service. Not only is the speech service getting better and better when it comes to speech recognition. In fact, what you'll see in this demo is even for commodity hardware to replace any complex microarray setup so that your speech recognition is world class.

But the most interesting thing is when you combine speech recognition with language models that are specific to your organizational data. You can start picking up all the jargon. So, imagine a transcript that gets created that has the ability to understand the local jargon that's specific to your organization, your industry, that way making the transcript that much more useful.

So, let's throw it to our team out on the gallery to show you speech translation and transcription.

**SONIA DARA:** …the prototype device connected to a cloud service that provides live transcription and translation. We are proud to announce today that we're making the conversation transcription capability within Azure Speech Services available as a preview release. Come on, let me show you.

You might also remember this hardware from last year, which we're also making available as a developer device kit. But today my colleagues and I are going to give you a demo of new research that we believe will make meeting transcription more easily available to everyone in the future.

**YOUSAF SAJID:** We are going to show you this demo using just the microphones built into this laptop and these two smart phones we have in front of us. With these we create a microphone array in the cloud that enables Azure Speech Services to provide accurate, in-person meeting transcription, even without all the special meeting devices.

Also, you'll notice that I didn't bring my phone. But the service can still recognize my voice and correctly identify me, because I've given it permission to use my voice print to transcribe what I say. Now, the second thing we're going to show you is that the language model of Azure speech service can be trained on the data in your company's Microsoft 365 tenant. So, it can learn the unique vocabulary of your industry or company. This is available in private preview.

**SONIA DARA:** OK. So, basically for the next two minutes we're going to have a rap battle of sorts, but for all of us geeks here in the room. So, Heiko is a principle PM on the Speech Team and he's going to give us an example of some dev speak. And Yousaf is in healthcare marketing and he's going to dazzle us with a little bit of healthcare tech jargon. So, while they speak, I encourage you to follow along with the transcript on the screen so you can see just how powerful this service is.

Heiko, take us away.

**HEIKO RAHMEL:** Azure Speech Services are built with VMs running on Azure hypervisors using Ubuntu-based Docker containers, that are orchestrated with the Azure Kubernetes Service. Azure Speech Services enable a variety of technical capabilities, including ASR, neural TTS, Microsoft Translator, and related custom services. You can access these using your favorite programming language, such as Java, JavaScript, NodeJS, C++ or C# and others.

**SONIA DARA:** The bar has been set. OK. Now, it's your turn to give us a bit of this healthcare jargon.

**YOUSAF SAJID:** Microsoft Teams can provide EHR integration through ISV vendors, including Infor Cloverleaf, Redox and others, via the HL7 FHIR standard. HL7 FHIR is HIPAA, MARS-E and GDPR compliant. And it's based on modern technology, including HTTPS, and RESTful protocols, as well as extensible APIs.

The FHIR open source community makes their source available on GitHub and the Microsoft Teams FHIR implementation is also aligned with Project Argonaut and follows the U.S. core profiles for all the FHIR resources is consumes.

**SONIA DARA:** Well, that was fun. I'm going to call that a draw. So, while we're going a bit overboard there, we understand that this is incredibly important, so that every company in every industry with their own specific jargon can have accurate transcriptions. We're really excited about where this work will take us and our future ambition is to enable conversation transcriptions for anyone, anywhere, at any time.

Thank you.

(Applause.)

**SATYA NADELLA:** Thank you, Heiko, Sonia, and Yousaf. It's fantastic to see that language models, which are tenant-specific, come to life with speech recognition that's high quality. And I think that's going to be a real game-changer.

Now, the other service that has really got tremendous momentum is these conversational interfaces that are being built using Bot Framework. In fact, 3,000 new bots, or conversational apps, are getting created using this framework each week.

And you'll see in this conference many new features, everything from how to make the multi-turn dialogue much better and more robust how to take, in fact, the Q&A Maker Toolkit, which takes any PDF document and turns it into a conversational canvas capability. So, lots and lots of new features. The language modeling capabilities itself that are embodied by Fluid inside of Bot Framework are becoming much richer.

Now, the most important thing, though, of the Bot Framework is the strategic importance for every business out there to build their own conversational canvas. Just like you build websites, just like you build mobile applications, it becomes very important for every business out there to be in control of their own destiny when it comes to this new platform of conversations.

The data that is the conversation is perhaps one of the most important pieces of data that all of you as developers, as well as organizations, have. So, you want to ensure that that data is helping you, in fact, be in touch with your customers, your employees, and make them richer. And that's what you see.

For example, BMW decided that they're going to own the personal assistant experience inside their cars. Their brand needed to shine. And they're building, using the Bot Framework, their personal assistant. Similarly, you have Jet building their customer service agent using the Bot Framework, because after all customer service is something that is so key for any business. And the conversations that you have through customer service is one of the most important knowledge repositories you want to have to improve your service and products over time.

And Coca-Cola is using it across a variety of functions internally with their employees from IT to HR to finance. So, this is what we think is so critical when you think about conversational assistants, it's really about your building that capability and then using the distribution of other personal assistants. It's so important to recognize that.

Now, we also have mixed reality services, which are, if you think about AI, HoloLens 2 is the quintessential AI device, which also happens to be the edge for Azure. In fact, if you look at the Unreal Engine and how it's implemented with streaming support, it's really amazing to see now how the combination of Azure plus this edge device can really push more polygons than ever before, to create completely immersive experiences. So, it's the cloud, plus edge coming together with even amazing work that the Epic Games and the Unreal Team have done in that case, to be able to enable the next generation of mixed reality experiences.

We also have now Azure Services, such as the spatial anchor service, which allow you to build cross-device mixed reality experiences. So, mixed reality to us is going to be something that's going to happen across Azure and Azure Edge, across HoloLens 2 and Azure, but also all the other devices and Azure, to enable, for example, next generation of training, next generation of architecture or design. And that's what you see.

Paccar is using it to change training applications inside the organization, make it much more possible for people to ramp up quickly. Phillips is using it for non-invasive surgery. PTC is using it for industrial design. So, these are all applications that are getting built using mixed reality and we are very excited to see what happens at this Build and this next coming year, in terms of really the exploitation of both Azure, as well as HoloLens 2.

A new area for us is autonomous systems. Now autonomy comes in two forms. One is you watch things move or you enable things to move and both of these are important. And so the set of services that we're launching are really the combination of simulation tools, because one of the keys for building autonomous systems is your ability to have great simulation capability, as well as we're bringing a new technique around machine teaching. So how do you take domain experts, take their expertise and help teach these machines to be able to calibrate so that you can create autonomy. And those are the two sets of things that we're doing beyond what is available obviously with Cognitive Services.

And you already see these early examples. Toyota Material Handling is a great example where you have these pallets that are autonomous and what they have done is to use AirSim and our simulation capability to create that autonomy.

Shell is using our new machine teaching services as well as reinforcement learning in order to do precision drilling. So how do you take what is a very complex task and really industrialize it by creating this brain out of basically reinforcement learning and machine teaching?

The same thing with Schneider Electric. In this case it's about managing the temperature of rooms by sensing people in the space or not. So these are the control systems. But now you have an autonomous control system loop which is really being driven by this machine teaching with reinforcement learning.

So we are very excited about the types of apps and the possibilities of what happens with these simulation capabilities as well as machine teaching.

Now that's a quick rundown of Azure and, as I said, Scott is going to talk a lot more this afternoon about it. But I want to move to this next platform area, which is Dynamics 365 and Power Platform. Business applications to me is such an important category, because whenever I go to anywhere in the United States or anywhere in the world, the one thing that I have the real privilege of is to meet with developers, independent software developers, who are building business applications.

This category is the life's blood of digital skills and software jobs all over the world. It's just not -- it really sort of shines the light that there is a lot of innovation happening beyond the West Coast of the United States and the East Coast of China when you think about the business applications category in particular.

And that's why thinking about the productivity and leverage for this community is so important. Dynamics 365 has been completely rewritten to be an Azure cloud native app. In fact, there will be a lot of sessions at this conference where we're going to talk about how it's been built for micro-services, completely ground up, how it's natively built for the Azure database, as well as Cosmos DB.

Everything about the architecture of Dynamics 365 itself is an amazing template for all of those who have built SQL Server applications in the past, and are now becoming multitenant SaaS applications.  It's a unified solution.  It's got AI built-in.  But most importantly is its extensibility framework through Power Platform.

One of the hardest challenges for business applications has always been -- because there's no such thing as a canonical business process, it always changes by industry, and more importantly it changes in time, because the businesses are not constant.

So, how do you deal with the customization? How do you deal with IP from multiple ISVs in a particular instance? It's that customization with upgradeability, and those are some of the things that really Power Platform along with Dynamics 365 solves.

Now, what that means is there's a tremendous amount of traction for Dynamics today, there's 90 percent of the Fortune 500 are using Dynamics or Power Platform. But the most interesting thing is the number of ISVs who are building on top of both Power Platform and Dynamics all over the world.

And, now, the stack I think is the most important thing here, which is you not only have access as developers to the richness of Azure, everything in Azure infrastructure, data, AI, but now you can rely on the common data model, which is a bootstrap for all of the business process automation.

To that, you can add your own entities, your own data. On top of that, you have the Power Platform that you can embed inside your own application. That means it's the workflow engine, it's the PowerApps, Forms Engine, as well as Power BI, which is the analytics engine. So, any SaaS application can use the same extensibility framework and then use Dynamics 365's modular architecture as you need.

So, that's why we see ISVs who build all the way to the top or all the way to the bottom of the stack. And, in fact, most ISVs will use the combination of all these layers to be able to build their application.

So, this is what we see as scale. In fact, just to give you a couple of examples, Advvy is a media buying solution out of Australia. They have built on top of Dynamics and Power Platform. Annata is building a solution for automotive, and this is for fleet management and equipment rental companies inside of the automotive industry. They've built on top of Dynamics 365 and they're using, again, Power BI, Cognitive Services, and integrating with Dynamics.

We also have Indegene, which is a life sciences solution. That's built on top of Dynamics 365. And Adobe is incorporating Power BI and the rest of Power Platform as part of their SaaS application. So, it shows the combination of techniques being used by ISVs to incorporate business process automation as part of their application.

One of the other things that we're also doing is the Open Data Initiative in combination -- in partnership with Adobe and SAP, because one of the challenges organizations have as they adopt more SaaS apps is sometimes they create new silos. It's your data, it's your organizational data, whether it's customers or suppliers or your own employee information, but when it goes to a SaaS application or, in fact, worse yet, if it goes into some marketing campaign in some channel, they become very opaque to you.

So, the goal is to be able to make sure that all this data is in control by you, and that's what the Open Data Initiative is all about. Open Data Initiative starts with the data model that allows you to take data from these SaaS applications, enrich them using things like Azure Data Lake and all of the AI techniques, and then put the data back inside of these SaaS applications.

But what that does is it allows you to break free of any one silo. An AI-first company is one where you can take data from one system and make the outcomes of the other system better. It's not about just optimizing that one system and its data, it's about being able to relate the insights, the reasoning from one to improve the outcomes in the other. And that's what the architecture of ODI enables.

And, in fact, you see this with what Unilever was able to do. It's a great example where they took some of the sustainability work they were doing, digitized it, used in this case SAP transactional information as well as all the things that Azure provides from an Azure Data Lake side, but the most interesting thing is they said, OK, if you're going to do all this around sustainability, what if we translated that into a campaign on the front end using Adobe so that we can even help educate and market to people on their audience who care about sustainability?

So, the combination of that is what was really amazing to see with Unilever, where they broke free of any one silo and were able to bring all of the data to bear to improve what their business outcome is.

Now, that's about Dynamics 365 and Power Platform. As I said, it's great to think about this as another first-class part of our stack as you think about your application development. Because business process automation is so key and part of every application.

Now, switching to Microsoft 365, Microsoft 365 is the world's productivity cloud across work and life. It's that core communications collaboration productivity scaffolding that spans work and life. It also acts as the scaffolding for business process workflow, because it creates the opportunity for your business applications to drive so much more engagement by really using this UI that's in front of you all day long for their communication needs.

It also is the security endpoint and device as well as application. And so it's a very comprehensive solution, and it's got -- the main thing about Microsoft 365 is it's about starting by putting people at the center. And then thinking about all of their activities across applications, across devices. That's the real change in how we think about the end user computing going forward, not starting from the device and then working forward, but really thinking about the person and all the applications and all the devices in their life. That's the paradigm for Microsoft 365.

And you see -- the way it manifests in terms of developer opportunity is with Microsoft Graph, so as things move to things like Office 365, what happens is a very rich database gets created, a database that is about people, the relationships with other people, their artifacts, whether it's their schedules, documents, projects -- all of that is available as a first-class database structure for you.

And now not only is there Microsoft Graph, but it's these rich canvases, whether it's Windows, Office, Edge and Teams. So, it's that combination platform opportunity that I want to talk about.

Now, later this afternoon, Rajesh Jha will also be talking about all of the new capabilities across Windows, Office, Teams, Edge, and many of these capabilities, but I want to highlight a few things starting, in fact -- that's what's leading to all this customer momentum. The world's brands are using Microsoft 365 today, and it's exciting to see, even, how some ISVs are using the Microsoft Graph.

One of the announcements at this conference is how Microsoft Graph is now available through Azure Data Connect for ISVs using the permission granted by organizations so that you can add value. Talentsoft is an HR application provider out of France, and they are working with Christian Dior to fill out their teams and skill profiles by using the Microsoft Graph data that is Christian Dior's data.

So, that's a good, canonical example of how Graph data can enable, even, business application vendors. And we think of this as a very rich ecosystem that's developing.

Now, in fact, you see this even inside of Microsoft 365's own first-party apps. Microsoft Search, which brings universal search capability, is built on the Graph structure.

MyAnalytics, which really keeps track of my own focus and guides me to make sure that my time is being spent on things that matter the most, that's another example of a productivity tool, but it's a tool that's built using the Graph data.

Cortana is another example of that, where we're really building out Cortana as a conversational interface for Microsoft 365 by really reasoning on top of the Graph data.

Talking about Cortana, we've now focused Cortana to really continuously keep improving on features like time to leave in Outlook is driven by Cortana, gives you heads-up commitment every morning. Whenever I make commitments in email and I forget about it, I'm reminded by Cortana about it each day so that I can keep track of the commitments I'm making. It even has suggested tasks, it's even doing suggested replies. So, Cortana will continue to be that assistant that spans all of the end points of Microsoft 365.

It's also been wired to Bot Framework as the extensibility framework. So, that means if you want to write a skill, you want to be able to then wire that skill into Cortana using Bot Framework. And, by the way, the same skill building using Bot Framework, you can wire it into Alexa and any other assistant as well. So, that's a way for you to think about your skills.

Now, this is great, this is really progressing, but one of the things we are also hard at work at is to say, OK, if this is the first inning of what is conversational canvases, what's going to come next?

Now, in spite of all the progress, you've got to remember, today, most of the conversations that we have are still very brittle. They're truly not multi-turn. The context from turn to turn gets lost -- especially human language is complex, where the context sometimes is subtle. So, therefore, how do you make sure that the natural language capabilities inside of these personal assistants is capable of having that shared context across a long dialogue versus just a few turns?

Second real challenge is today, most of these assistants are command assistants, where you have to invoke these skills one at a time. What if we can imagine a future where you can cross domains without having to invoke each skill by name? So, what is a true multi-domain assistant?

And, of course, lastly, most importantly, we need a multi-agent world. The idea that you're always going to start with one wake word and one assistant is just not like how we start on the web, for example. Just imagine, what does an open assistant future look like? Similar to an open web, that's what we want to really ensure happens when it comes to the personal assistant.

So, to showcase -- in fact, last year we bought a company called Semantic Machines, that had fantastic natural language researchers and experts. They, along with the rest of Microsoft Research community and folks in the Microsoft 365 team, are hard at work in envisioning this future.

In fact, later on, at the show floor, you'll be able to see some of the demos that manifest this. But I wanted to roll a video to showcase what is possible. Let's roll the video.

(Video segment.)

(Applause.)

**SATYA NADELLA:** We're very excited to continue to push towards this future with Cortana and Bot Framework, true multi-turn, multi-domain, multi-agent world.

Now, switching to talk about the canvas, starting with Windows and Office. Now, one of the great opportunities that is in front of us with over 800 million Windows 10 devices as well as a billion Office 365 and Microsoft 365 end points across devices is the opportunity for developers who have written applications for these platforms to extend their reach.

Every app, whether it's a Win32 app, whether it's a WPF app, a UWP app -- any app can be annotated with Graph data. And all of these applications can also now incorporate natural user interface, whether it's speech, Windows Hello, ink -- and that's what we see with developers.

So, for example, with Windows developers, Fluid Math has built a fantastic educational app with great inking support to teach math.

Concepts, which is a drawing application, in fact, using both inking as well as the Surface Dial to bring their applications to life. And when it comes to Office extensibility, for example, Survey Monkey now in situ in an Outlook email even on a phone can do the survey because of these action cards that are built into Outlook.

Bloomberg's taken all of their rich services and data and incorporated it into Excel using the Excel add-ins and custom functions capability. So, that just shows you how Office end point scaffolding or application development in Windows gets richer across all of the frameworks that you may have used because of the Graph as well as natural user interface. So, that's how we think about the future of Windows and Office development.

Now, I want to talk about Edge and what we're doing with web. You know, one of the things, for us, is really a set of commitments we're making to the web and web development. It starts with open source. In fact, Edge is built on Chromium. We are fully participating in the OS community there. We've already made contributions around ARM64 support, we're also bringing accessibility support to the code base so that all browsers built on the Chromium Project can benefit from it.

We've brought touch capabilities, so we're going to contribute back to the open-source community so that all browsers built on that code base can improve and get better.

It also starts with a commitment to be truly cross-platform. We're going to have Edge on Windows 10, we're going to have Edge on Windows 7, Edge on iOS and Android, and so we're going -- and the Mac. And we're going to have support for all platforms.

That means end users are going to be able to use one browser across their work and life. This is great for both developers as well as IT professionals. So that's the support and commitment for cross-platform.

But we're also committed to innovating on the web. One of the things that we're very excited about is -- oh, so before I go to innovation, let me talk about privacy and security, because we're very committed to ensuring that the transparency and choice is there for anyone browsing, because the most important thing is to make sure that all the data that's been tracked and collected on the web is something that is first very much transparent to the end user and the end user is in control about their own privacy and security. And so we want to make sure that we're pushing the envelope on that.

And on top of that, we also want to make sure we're innovating on the web. When it comes to innovation, the first area we're focused on is collaboration. We believe we can, in fact, bring the next generation of real-time collab to the web. These distributed data structures that are client side with a cloud relay, we believe we can bring collaboration that truly enhances productivity of the web, and it will work across all browsers, and that's something that I want to really, really see us push forward with with great developer support, both inside of M365 and the developer community.

And to show you all of this set of demos, let me throw it out to our team on the floor.

(Cheers, applause.)

**DIVYA KUMAR:** Thank you, Satya. Hi, everyone. I'm Divya Kumar from the Microsoft Edge team. I know most of you are already trying out the early previews and have started giving us feedback, so thank you.

Today, I'm going to show experiences we're working on in three areas: How Edge will offer a seamless web experience for enterprises, how we're thinking about approaching privacy, and how we can help improve productivity on the web.

Let's start with enterprise. Organizations are looking for ways to better connect their employees with resources. The new tab page on Microsoft Edge that's customizable by IT shows me my most-recently used documents and other corporate resources that are just a click away.

And with Microsoft Search, which is an enterprise search offering, using Bing technology and Microsoft Graph, Edge can show me contextually relevant search results from my organization.

Let's say I'm looking for my vacation-tracking tool. You can see that it's the first result, and even includes a snapshot. But what we're excited to announce today is that Edge will offer built-in support for Internet Explorer. Over 60 percent of enterprises worldwide use IE because they have internal sites that require legacy compatibility. Today, if I were to open this site in an older version of the browser, a separate IE window would open. I'd be forced to switch back and forth between two browsers, one has my favorites and history and the other doesn't. It's disruptive. So, we've fixed it.

Now, when I click this link, the site opens in the same window and in the same tab with IE mode. So, no more jarring experiences when you hit an internal site that needs Internet Explorer.

The combination of compatibility, customizability and legacy support makes this a fantastic choice for enterprises.

Now, let's talk about privacy. We get a range of reactions from customers when talking about how their browsing data is used across the web. Let's take targeted ads, for example. Some find it valuable, some find it creepy, and some just don't care. We're exploring simple tools that let you control who can see what you browse. Here's a feature we're working on.

In the privacy and security settings, I have three options. Depending on which option I pick, Edge adjusts how third parties can track me across the web.

Unrestricted is a great option if you're fine with how things work today. Strict is a good option for those who would prefer to block all third-party trackers, even if that means some limitations. The balance setting blocks trackers from sites you haven't visited or don't give you the right level of transparency or control of your data.

Regardless of which you choose, Edge will block malicious trackers. While browsing on the site, I can click on the lock icon and it tells me exactly what setting I'm on, and you can see that I'm balanced. And I can see the number of trackers that are allowed and number of trackers that are blocked.

Privacy is a sensitive issue, and we think it's meaningful to empower you through transparency and a few added controls.

Now, let's move on to productivity. When I research on the web, it can be a really manual process. I can have dozens of tabs open, I've got multiple windows all arranged carefully so I can compare things. I can take screenshots for sharing, I'm copying and pasting content into documents; it can be pretty tedious. We're working on a feature called Collections. It helps me gather, organize and share content more efficiently. I can launch collections by clicking on the icon on the top right. You can see that I've already created a few collections.

But what I personally love about Collections, besides the ability to collect different types of content as I'm browsing the web, is that I can email my collections directly from Edge. I can copy and paste an entire collection into other apps, I can even export to Word and Excel. And Edge does all the formatting for me.

I'll start a new collection so you can see how it works. I'm actually looking for a camera for my niece and trying to collect some photography tips. Here I am on a page as I look. I can start to drag and drop content and I can also switch tabs and I can drag and drop text as well. And once I'm done, look at the content that I have, I can choose from one of the options that I've got. So, you can see I can email, copy to clipboard, but I'm going to go with Export to Word and show you how it works.

Edge creates a clean document, even automatically includes citations. How cool is that? Now, let me open another collection I've started earlier so you can see how export to Excel works.

These are some of the cameras I've been saving up to compare earlier, going back into share, I'm going to click on "export to Excel." Collections does all the copy and pasting for me and categorizes for me into a table that lets me do quick side-by-side comparison.

It does this using the metadata that accompanies the site or content I collected. This shows how serious we are about innovating on the web beyond just delivering on compatibility. We think these experiences are valuable to how we use the web today and we look forward to evolving them with your feedback on the PC and on the phone.

And now, Mike Morton from the Office Engineering Team is going to introduce you to something we're called Fluid Framework, that works cross-browser. Over to you, Mike. (Cheers, applause.)

**MIKE MORTON:** Thanks, Divya. Today, it is my honor to represent the Microsoft 365 team and introduce the Fluid Framework. The Fluid Framework is a new set of technologies that developers can use to build experiences for any browser that break down barriers between people and barriers between apps. It allows people to work in fundamentally new ways.

We're excited to share with you a sneak preview of how Fluid may change the way you work with Microsoft 365 apps like Word, Teams and Outlook. This will include hyper-fast coauthoring, AI and bots that collaborate with you, and components that make it easy to reuse content across tools.

I'll start with a very simple scenario, coauthoring a document. Let me type just a little bit of text.

Great. When Fluid powers coauthoring, collaboration feels immersive, natural and smooth. My colleague Chika here is typing on a machine backstage, but her session is going through a data center in the central United States. Chika's working in one of these four browsers. You'll notice Edge and Chromebook on the screen. But it is so fast, you might not actually be able to tell which one. She's actually using the Edge browser in the upper left.

I'm going to go and bring a pen here. Inking is even more latency-sensitive. I'm going to do some quick drawing. Each of my key drawings takes up quite a bit more data than regular plain text. We put Chika's screen side by side with mine, but the latency is so low, it's hard to see the difference as we draw.

Fluid's architecture allows Chika and I to collaborate as if we were on the same device, even in higher-bandwidth scenarios.

But collaboration is not just about people working together, but a combination of people working together with AI. I'm going to do a little bit more text typing here.

Great. As I was typing that text, hopefully you noticed that it was being translated into nine different languages, one of the screens that you have above. This is just one example of bots participating as collaborators in Fluid. So, we'll enable scenarios where we have tens of even hundreds of agents helping users in areas such as proofing, data insights, design ideas, security scanning and much, much more.

I'd now like to show you Fluid Components. Here, I have a document, and I want to go ahead and copy a table and get some input from the team members. I can go and paste it into a conversation here. Because it's a Fluid component, we can continue to collaborate on it, even across apps.

I can even go ahead and filter it down to just what's relevant for the conversation.

You'll see that Chika's actually backstage editing data. Of course, I can edit data right here in the main document. And what's happening, one of us is working in Teams, Chika backstage, I'm working in Word, and together we're collaborating on the same data on the same underlying table.

All right, let's go back to the document here and I'll go ahead and insert a chart. When I insert a chart, you'll see a set of recommended charts. This is an example of a collaborative bot, analyzing the data and providing intelligence on what visualization would work out best.

I'll go ahead and choose this chart here, and I can even add a formula inline in my document. I'll go ahead and summarize or do a sum of the number of units being delivered. Then I'll click Enter and kind of scroll up. And, again, I can continue to change numbers, Chika can change numbers backstage, and you'll see the chart, the formula, and the underlying table all being updated in real time.

You may have noticed that I got a little email notification from Chika while we were working. The Fluid Framework isn't just about new apps like Teams, but can be integrated into almost any application experience. I'll go ahead and click on this message here. And you'll see, this is not just an ordinary table. This is a Fluid component that's collaborative, and it's updating in real time. The scenario with Word, Teams and Outlook shows Fluid aiding productivity by providing low-latency collaboration, AI coauthors and embeddable components.

Thank you so much for letting us share an early preview of the Fluid Framework. Later this year, this technology will come to Microsoft 365 Experiences and be exposed to developers through an SDK. Back to you, Satya.

(Cheers, applause.)

**SATYA NADELLA:** Thank you, Divya and Mike. I think the world is ready for another choice when it comes to web and innovation. We're very, very excited about both Edge as well as the Fluid Framework and what developers can do with it.

Now, I want to move to Teams. Teams, by far, in my own experience at Microsoft, is the fastest-growing application that I've seen. It's tremendous to see its growth, but one of the most interesting things is the opportunity it creates for developers.

When you think about Teams, it's a scaffolding that has four capabilities built into it. It has messaging, it has video conferencing and meetings. It has collaboration as well as the ability to integrate any business process workflow, all these four things are possible using the Teams scaffolding.

And we're seeing tremendous adoption across customers. And one of the things that really Teams for the first time has shown is that the Microsoft 365 tool chain is not just for the knowledge workers. In fact, some of the fastest-growing use cases in Microsoft 365 is what we describe as first-line usage. So, this is retail specialists, people on the factory floor, in the hospitals using Teams.

Some examples: Hendricks Sports is using it for their NASCAR training, Marks & Spencer is using it for their retail specialists in the stores. NHS is using it to bring care coordination in their hospitals. So, these are amazing examples of how Teams and the four capabilities all light up to enable this.

And to show you all of the new capabilities and features in Teams as well as the rich hardware ecosystem opportunity and how that is developing around Teams and some of the new innovation, I wanted to invite up on stage Raanah Amjadi from our Teams organization. Come on up.

(Cheers, applause.)

**RAANAH AMJADI:** Thanks, Satya. Thank you. Microsoft Teams was designed to foster an inclusive work culture for every worker, from the C-suite to the first line. This first-line area of the workforce, like retail associates or factory technicians, has traditionally been underserved by technology, but we're working hard to change that.

Earlier this year, we introduced the Teams mobile first-line experience. You can see here, first-line workers, they're often usually the first to respond when something goes awry. Now, they can take a picture of the situation using the smart camera, annotate it, add some context.

And then this situation is the clean-up, but it could be a factory chemical spill. They can mark these messages as urgent or important, make sure the right people see them right time.

They can also share the location, making it easier to keep track of deliveries or meet up with the team. And with the new shift experience in Teams, they can easily see their shift schedule, sign up for, or swap shifts with coworkers all right from the phone.

Now, you may remember last year at Build we showed you our vision for modern meetings. Let's take a look at how we're bringing that to life in Teams.

We focus on making the meetings experience more inclusive and hassle free with live captions and make it easier for everyone to engage in the conversation. We have customized backgrounds that help you minimize the distractions behind you, pretend you're on the beach, or pretend you're in the office if you're actually on the beach.

Teams will also help you find meeting rooms based on your proximity, making it easier for you and your team to just hop into a quick huddle. And you'll have the full, immersive meeting experience with multiple video streams like Brady Bunch style.

What would a keynote be without a little bit of magic? People joining the meeting remotely should feel as included in the discussion, even if the team is brainstorming on a whiteboard. So, by simply connecting a USB webcam to the Teams room, using AI, the room will find the whiteboard image and straighten it to make it more legible. It also detects people and makes them transparent.

So, if someone walks in front of the whiteboard to write something, the team online will be able to see right through them, like, literally right through them. (Cheers, applause.)

Pretty cool. And all of these features have been designed to work best with our ecosystem of Teams devices, making meetings and calling experiences better in conference rooms, at your desk and on the go.

It's been so incredible to see what you've been building with our apps across so many categories and industries. Whether you're using Office 365 apps, any of our hundreds of partner apps, or building your own, Teams unifies all of these experiences into one hub. And it's up to you to choose how to bring that to life for your organization. Whether that's through developing your own solutions and using PowerApps to integrate workflows or surfacing actional canvases to meet your users where you are.

Now, Rajesh will go much deeper into how to build custom apps for teams in the Microsoft 365 keynote, but all of these points draw on the Microsoft Graph, opening up a wide range of possibilities for empowering your people and your organization.

This is the power of the Teams platform, and we're so excited to see what you build next. Now, let's check out how one of our partners, Spatial, has teamed up with Mattel to build custom solutions using HoloLens and Microsoft 365 to make collaboration a more immersive experience. Let's head to the showcase floor, thanks.

**ANAND AGARAWALA:** Thank you, Raanah. I'm excited to show you, our fellow developers, how we at Spatial have been able to enrich our existing holographic collaboration app with HoloLens 2, Azure Spatial Anchors, the Microsoft Graph and Teams.

We were really blown away by how quick and easy it was to use these simple APIs to make Spatial even more useful for our customers by leveraging the power of the Microsoft Graph that they are already running their businesses on.

For example, we're going to show you how our customer Mattel ideates, designs and collaborates across global borders on multiple brands that we all know and love like Hot Wheels, Barbie and Fisher-Price. Let's take a look.

So, I'm going to jump onto my PC here, and I'm already in a Teams channel. And I can see Amanda's posted some cool new content. But why don't we upgrade this to a live Spatial meeting to get everyone on the same page? I'm actually just going to click over to the Spatial tab in teams. And I get this really cool 3D dollhouse view. I'm going to click into the room where I can see everybody, but since I have a HoloLens 2 here, why don't I take this off a 2D screen into a 3D meeting?

All I have to do is scan the QR code in the corner, put on the device, scan the code, here we go. Hey, Amanda, what's up? It looks like you're already in here.

**AMANDA FINNEY:** Yeah. I'm here in my office, also wearing a HoloLens 2. So, you'll see me in the room show up as an avatar. And all of our content that you just saw from that Teams channel is already up here on the wall. You can even see some of the comments, thanks to the Microsoft Graph API.

**ANAND AGARAWALA:** Cool.

**AMANDA FINNEY:** And with the new finger- and hand-tracking in HoloLens 2, it's so easy to quickly triage content. So, I can quickly just grab a document off the wall and toss it right up there on our shared workspace so we can all take a look.

**ANAND AGARAWALA:** And if wanted to manage to check out something, I can just pull it off the wall and toss it to her. What do you think of that one, Amanda?

**AMANDA FINNEY:** Wow. That looks great.

**ANAND AGARAWALA:** And just to recap what happened here, I grabbed a holographic image on the wall as a real person in this room and threw it to an avatar who could be anywhere in the world.

**AMANDA FINNEY:** Wow, this is awesome.

**ANAND AGARAWALA:** Now, with the new hand-tracking capabilities in the Mixed Reality Toolkit, I can also have this cool new hand dock. I'll just pull it up and it lets me pull content from a variety of locations like my OneDrive. I'm just going to scroll the 3D models that are stored on it and select Sky Justice.

There we go. And let's make this life size. Zoom this up a little bigger. And, you know, Amanda, I'm thinking -- why don't we show off the new freehand annotation capabilities and give her some accessories?

**AMANDA FINNEY:** Absolutely. I think she really could use a bracelet and, of course, the finishing touch, a HoloLens. Everyone needs a HoloLens.

**ANAND AGARAWALA:** Awesome. Oh, hey, Lynne, it looks like Lynne just joined.

**LYNNE:** Hey, everyone. I love this. Joining from my PC, I'm still able to participate in the experience, even without a HoloLens. So, are you ready to see what I've been working on?

**ANAND AGARAWALA:** Yeah, let's check it out.

**LYNNE:** Since I've joined from my laptop via the Spatial tab in Teams you saw earlier, I can easily browse and upload content directly from my PC and upload it to the meeting. Check out this 3D model of a hover pack.

**ANAND AGARAWALA:** Sweet. This is cool. You know, Amanda, since this is mixed reality, why don't you jump in and give it a spin?

**AMANDA FINNEY:** Of course. Let's try it out. Wow. It's even cooler on the inside.

**ANAND AGARAWALA:** Now, Spatial is a hardware-agnostic platform. You don't need just a headset to join the experience. Let me invite Jacob onto the stage now, who's going to show you how you can join from the device in your pocket.

**JACOB:** Oh, this is so dope. I love it. Great work, Lynne. With Azure Spatial Anchors, this mixed reality experience shares a map across HoloLens and ARKit and ARCore. This means that I can have the most immersive experience on a HoloLens or I can use this Android phone here to not only see what everyone else is seeing, but actively participate and modify the content as well.

**ANAND AGARAWALA:** Nice. Thanks, guys. Solid meeting, and really looking forward to showing this to the rest of the team tomorrow.

Now, if you haven't done so already, I would really encourage you to integrate your app with the Microsoft Graph. All we had to do to make this whole experience a reality for our customers like Mattel was connect with one simple unified API that leverages all the power of Microsoft 365. And, developers, if you've been waiting to jump aboard the mixed reality train, now is the time because the HoloLens 2 is sweet. You can now reach out and touch holograms for the first time, and it is so cool.

Add on the power of Azure Spatial Anchors and you get the ability to extend your experience to any device. So, AR developers can embrace AR regardless of the device they choose, whether it's HoloLens, mobile, or anything in between.

All right, well, thank you for having us and come experience this all first hand at the Spatial booth in Hall 4E and back to you, Satya. (Cheers, applause.)

**SATYA NADELLA:** Thank you so much. Thank you so much, Raanah, Amanda, Anand, Jacob and Lynne. It's fantastic to see the entirety of the stack come to life. Just to sort of quickly recap. You have Azure and all of the rich runtime services, including the new mixed reality services in Azure. You have the common data model and the Microsoft Graph to help bootstrap with data. Of course, you can bring all of your own data. Power Platform on top of it can be the extensibility framework. In fact, Power Platform is the extensibility framework for both Microsoft 365 and Dynamics 365 as well as your SaaS applications.

And then on top of it, you have Microsoft 365 as well as Dynamics 365. So, the ability for a developer to take the full stack, whatever layer that makes sense for you, that's the type of application development that we envision going forward.

Now, this last platform has got, you know, a real special place inside of Microsoft, it's gaming. You know, we could trace gaming all the way back to the very origins of Microsoft. In fact, this is a program that Bill wrote, very famous, one night when he -- I think this is just before the first IBM PC DOS operating system came out and he had worked, obviously, on the BASIC runtime and somebody said, "Hey, you need to build a sample app." And so he decided to build DONKEY.BAS that night.

And you know, it's up on GitHub. I don't know what the pull request status is. I'm sure it'll improve after today. (Laughter.) But it is -- so, for us, gaming has always been very important. And we are very committed to creating a tremendous opportunity going forward with gaming, and it starts with the same metaphor that we used for Microsoft 365. That is, by putting the gamer at the center and ensuring that they can play their games, of course, on the console, on the PC, as well as on mobile.

That's what all of our innovation is centered on, whether it is what we're doing with the Xbox, what we're doing with PC gaming, what we're doing with Game Pass, Mixer -- it's to enable that future for gaming.

Now, what that means is even for the game developer, we want to put the game developer at the center. And bring the entirety of the Microsoft Games stack so that developers can build amazing games. In fact, right on Azure, we have tremendous traction towards game development. You have people like Rare, Ubisoft -- building these amazing game experiences using the power of the cloud. But there are two examples I just wanted to call out as part of Game Stack. The first one is Xbox Live. Now, Xbox Live has got 63 million users, it's the most vibrant gaming social network out there, and now it's available on iOS and Android; that means game developers on iOS and Android can incorporate the network into their game play and help really drive engagement. And it's really exciting to see Game Loft, the creators of very big hit games from Order and Chaos and Modern Combat, all incorporating now Xbox Live as part of their gaming. So, we think of basically Xbox Live being brought to mobile platform as being super helpful for game developers.

Another service that I want to highlight is Azure PlayFab. Azure PlayFab really captures I think the essence of what game development is all about because game development doesn't stop with the game being launched. In some sense, you could even say it starts after the game is launched because you want to be able to experiment, learn through analytics, and continuously change game play. And that's what is described as live ops. Just like we have DevOps, with game development, you have something called live ops, which I think, increasingly, is going to be true in many of the other application development categories as well, but for sure in gaming. And that's whatever Azure PlayFab enables, which is it's a rich PaaS service. It's already got a billion accounts in it because of the gamers because all the developers using it are really using these accounts to help drive game play in a personalized basis.

And it's really exciting to see Roblox partner up with Azure PlayFab to bring this to their community of developers. So, we're very, very excited to see how this really enables all of the community of developers building on Roblox to be able to use PlayFab and really enhance the experience. So gaming, again, is really rich opportunity and I just wanted to roll a video of Game Stack for you.

(Video segment.)

(Cheers, applause.)

**SATYA NADELLA:** It's really exciting to see the developer opportunity in front of us. What you saw today is how we're building the best modern technology stack for applications, data and AI, business process automation, communications and productivity, as well as gaming.

These platforms are rich canvases for you in this era of the cloud and the edge to enable you to turn the dreams that you all have into reality. Not just imagine the future, but to create it, to build these magical experiences. Magical experiences that empower people to be more productive and collaborative, magical experiences that help organizations to grow, evolve, thrive. Magical experiences that address the most pressing challenges out there, whether in education, healthcare, magical experiences that help people connect, relax, have fun.

It's this community here that has the power to create that future. And most importantly, to build a world that we all want to live in. I can't wait to see the magic you build, but first, I want to leave you with a sneak peek to some magic our team is creating right outside this convention center.

Thank you all very, very much, and have a fantastic Build.

(Cheers, applause.)

(Video segment.)

END