

# Barclays Global Technology Conference

## Company Participants

- Colette Kress, EVP

## Other Participants

- Blayne Curtis, Analyst, Barclays
- Unidentified Participant, Analyst, Unknown

## Presentation

### Blayne Curtis {BIO 15302785 <GO>}

Very happy to have from NVIDIA Colette Kress, the CFO. Welcome, Colette.

### Colette Kress {BIO 18297352 <GO>}

Thank you. Thank you very much.

### Blayne Curtis {BIO 15302785 <GO>}

So I thought maybe a good place to start off, there's lots of moving pieces to the NVIDIA story, all in a good direction. So I thought maybe as you look out to next year maybe you can from a very high level talk about the different moving pieces.

Gaming has been a big driver for you but you also have some other areas. We did a bus tour to talk about the assisted driving, autonomous driving obviously a hot area as well. So maybe you could just touch on them and then we'll drill down.

### Colette Kress {BIO 18297352 <GO>}

That sounds great. To brief everybody in terms of where we are in our overall strategy and how we approach the market, we essentially take the best-of-breed technology that we build for visual computing and segment that to four different key markets.

The first market to talk about would be gaming. Gaming is our largest part of our business. It represents more than 50% of our overall revenue and it's grown quite nicely in the first part of this year.

So after three quarters our gaming business is actually growing about 42% year on year, largely influenced by the excitement about PC gaming, the production value of

the new games that are coming out, the underlying technology and just the entire social platform surrounding about PC gaming. We've been really, really pleased with the adoption of our platform, the full ecosystem surrounding gaming that we have spent a lot of time working to produce a better and better gaming experience for them. That's one of our key markets.

Our second key market is Pro visualization. So potentially taking what we do from gaming in terms of graphics and applying it to the key workloads that you have in the enterprise, workload such as design, what you have in terms of CAD drawing, building or any other type of prototyping that you may want to do. NVIDIA has established itself as a leadership position in terms of those enterprise graphics as well.

The business is really focused on the key applications in the market that use design, drawing and the rendering needs and we continue to see this as an opportunity for us to go forward to transform how prototyping and how building and design will occur in the future, connecting the overall libraries of the prototyping of materials and that industry such that you can see it just in time in terms of as you are building those overall products. That business is usually connected to our overall GDP enterprise type of growth that you see worldwide but again it's a very still healthy leadership position that we have in that business.

Our third key market is data center. We've talked about a lot of exciting things in the last month and a half regarding data center and you can really break down our data center business into three key areas. Both our work in terms of high-performance computing, supercomputing 2015 was just last month.

A lot of interest in terms of the role of acceleration in supercomputers as we go forward. A lot of discussion regarding Moore's Law when and should it come to an end, how are we going to increase the throughput. So necessary for these very large computers going forward.

Acceleration has become a key component. More than 100 of the top 500 supercomputers in the world now carry out acceleration and 70% of them and use GPUs. So we continue to lead out of the overall industry in terms of acceleration with the use of overall GPUs in this space.

Additionally we have seen an emergence of a new disruptive type of technology associated with artificial intelligence. So you see hyperscale providers, Internet service providers trying to produce a key set of applications and use such that they have trained the overall application to recognize your needs, your wants and provide new things to you. That overall training environment has been so key in the use of a GPU to speed up the time, to actually train the overall underlying applications through that overall server experience. So we have many web service providers all across the world that you would recognize using artificial intelligence in that training environment with GPUs to expand those.

We've also announced a new set of cars that will be able to take that training environment, also use it in terms of a production environment in true inference of that same type of work processing images, processing video, processing voice recognition, voice processing in all types and the use of a GPU in the right form factor, the right energy efficiency has been our concentration working with these providers. So those are two of our key areas.

The third part of data center is what we do for the cloud. What we've enabled is a virtualized GPU in the cloud experience allowing that future cloud computing and the applications that reside back in the data center to be streamed down for any visual needs and graphic intensive applications to the desktop. So essentially a one to many type of experience.

This is our GRID platform and you can see our GRID platform both in enterprise use in terms of expanding the overall collaboration of the global workforce but also what you see in terms of streaming gaming as we go forward. If you go up to many of the key public service providers right now you can get the use of a GPU both for the streaming applications but also you see quite a bit of machine learning also being used in that streaming environment.

Then lastly automotive. We tend to talk about automotive business our fourth market right after our data center understanding because it really is the combination of both our key graphics understanding and taking our graphics capability for gaming and leveraging that within the center console as well as the future digital clusters that you see in many of the high-end to midrange cars. We have a unique offering, offering the best types of graphics, pretty much removing any dial button or any part in terms of the cars as we go forward but also our focus has been on a center compute for the overall car as we go forward.

As we are hearing more and more about autonomous driving as we go forward, autonomous driving and self driving cars, that underlying compute is essentially just a data center problem very similar to the problems we face already today with many of the key industries. Putting together an ability to train the overall computer, to recognize all the things outside of the car, process the information coming in from what we have from cameras, sensor, lidar, radar into a central computer to serve the needs of that self driving car is what our key focus is. So those are our four markets.

## **Blayne Curtis** {BIO 15302785 <GO>}

There's a lot going on. Maybe just starting on the PC market, gaming, you talked about the growth rate and you broke the gaming versus OEM out at Analyst Day, you've updated it for several quarters since. We have a good picture of what the growth rate has been.

Can you talk about what is really driving this? And if you can talk about what the right long-term growth rate is?

And it's interesting at Computex you go to some of these PTAMs and they are struggling, half their business is gaming laptops now as well. So how big is laptops as part of the overall gaming pie for you today which I think people would traditionally think about as a graphics card and maybe some hard-core gamers, how has that developed over the last couple of years?

**Colette Kress** {BIO 18297352 <GO>}

Yes. So let me break down, when we think about our overall gaming results and our gaming market it is both an adding card market that you see today where people are not necessarily purchasing an end-to-end PC to take part in the overall gaming. They have a PC.

They are updating their experience in gaming by just producing a better GPU for the games that they want to play. That's been fueling a good percentage of our overall growth.

You highlighted a key interesting piece which was also notebooks. Gamers they want to game everywhere. They want to not only be with their PCs but take that to friends to be in a mobile space and they need a solid GPU for those experience.

So OEM manufacturers working with us have also did models that are truly just for gaming and are marketed for that gaming population. It has been growing quite well. In several quarters past it was nearly doubling as a size of the business but it's still coming from a very small base.

They see this as a focus because so much of the interest regarding those notebooks. But it got a ways to go to keep up with the overall size of the adding card market in terms that we have for the data center. Excuse me that we have for all the gamers.

Other pieces that we have there, any type of device where gaming is going to be we're going to make sure that we're focused on that. Whether that be a tablet. And we have key devices for that as well, as well as the streaming part of cloud you're going to see that in terms of our overall gaming results.

**Blayne Curtis** {BIO 15302785 <GO>}

When you look at the discrete card market and driving that customer to buy the next generation more powerful, can you talk about whether it's moving in terms of the DirectX upgrades or physics processors, there's been a lot going on in terms of the gaming which now looks like movies almost in terms of their production value. What's the right way to think about the cadence of upgrades and has that changed?

**Colette Kress** {BIO 18297352 <GO>}

When you think about why we have surrounded this overall industry we've surrounded it because we see a full ecosystem around the gaming platform that has

continued to evolve. Those production value of games, our work has been continuous with software developers in those games to make them more realistic.

When a gamer receives or goes out and purchase an add-in card that experience comes to life the minute they plug it in, the minute they open up the back of their computer and start that overall game. We continue to have a relationship with the underlying gamer, providing them new drivers, new upgrades for all the new games that are coming out.

We also have a good understanding of what types of games influence them. They can improve their experience with the exact same game with just a better GPU.

We have a set of what we call GameWorks which are key designs focused on some of the harder parts of graphics whether that be fire, hair, smoke, water, very key things that you see in some of these high-end games that really come to life in work that we have done exclusively with those game developers to put into place. These are the things that influence our gamers to continue to come back to our platform and allow us to continue to have that leadership share in the overall gaming market.

The rate of upgrades, it's a little hard to determine. I am sure there are absolutely the enthusiast types of gamers that are coming back every single time but we have put out a new architecture and new platform.

But it's still a little bit early to see how fast that movement in terms of a refresh cycle is doing. But we have had tremendous success with our current architecture.

**Blayne Curtis** {BIO 15302785 <GO>}

I do want to ask you, it's not necessarily applications are broader than gaming but VR is almost an add-on to this gaming experience and I feel you've been going to CES for now three or four years with not much to look at, maybe drones but now VR is actually going to have something else to focus on. Still early days. I'm just curious your thoughts and how does this play into getting your gaming base to upgrade their capabilities?

**Colette Kress** {BIO 18297352 <GO>}

Yes. It's a good question. I think the next exciting evolution in PC gaming is absolutely virtual reality. We're at the forefront in terms of those new games, the new devices that will enable that VR experience.

Virtual reality is now becoming an experience based on the underlying technology a great experience. Really is solving some of the really hard problems of the latency in order to put you into an encapsulated position so that you can have a great experience has been very key.

Now there are many different types and forms of VR that you'll probably see coming out in 2016. But the key ones that we're concentrated on are those that would be needing a set of glasses with a very, very high-end PC. The high-end PC enables the keyframe rate that is necessary for a great overall position.

So our work with Oculus as well as also HTC, their recommendations that they're coming out regarding what type of PC would best enable their hardware that is coming out is probably one of our top three GPUs that we currently sell from an overall retail value price. That is a great opportunity for us.

We are probably assured that some have already started that movement and getting into the excitement of these upcoming releases in 2016. But it is a great opportunity for us for the upsell and the refresh.

**Blayne Curtis** {BIO 15302785 <GO>}

It's obviously hard to forecast how big this market could be or the trajectory and I'm not going to put you on the spot with it. But in terms of those requirements for that generation obviously they're going to have future generations that probably even up the ante. But in terms of your installed base today, if you were going to buy that Oculus Rift how much of your installed base could actually even support that today obviously in rough terms?

**Colette Kress** {BIO 18297352 <GO>}

Yes, I think upgrading our installed base is a key part of our focus. With our strong growth rate today we still have a ways to go in terms of upgrading our installed base and that will be something that we can see. You're correct.

I can't make any predictions in the next year or how many units, what kind of upgrades we'll see. I think it's just too early to tell in terms of what supply will be available. But it is the beginning of I think continuous both content for the VR and improving the VR experience as we go forward.

It even has the capability of moving beyond gaming as we can see it in many use cases and prototyping and different scenarios in the enterprise as well. So we look forward to that but it's still a little bit early to tell in terms of how big it will get.

**Blayne Curtis** {BIO 15302785 <GO>}

And I do want to change gears, obviously a lot to talk about here. Auto is probably easier to handicap you know your wins, you know how big the platforms could be, maybe timing could move around.

Today the bulk of your revenue is consoles dash applications. Obviously the interest is in the autonomous applications. Can you talk about how to think about the ramps

of those wins and then talk maybe competitively where you see the opportunities to gain some more share?

**Colette Kress** {BIO 18297352 <GO>}

Sure. Currently our business on automotive right now is about \$80 million a quarter. It has also risen about 80% growth over this last year on average.

We'll continue to see growth in this platform. We have 8 million cars on the road today that have the infotainment systems backed by NVIDIA. And we probably have a pipeline of more than 25 million more cars that need to hit the road.

So it's safe to say yes, we do see growth. Exactly when and quarter by quarter it's not a perfect crystal ball in terms of there. But yes, we do have some strong growth for our automotive business that we can count on.

When we think about our work in terms of autonomous driving and the platform we seeded our platform with more than 50 different OEM manufacturers, researchers and startups around the world. And the interest was quite high on this platform of that central compute for autonomous driving. You will hear us talk more about automotive at CES outside of the virtual reality.

We'll also have a great presentation and talks about our next steps in terms of automotive in terms of there. But it has seeded that development platform with them and we continue to work with them on what you will probably see next is just development services with those individual providers.

**Blayne Curtis** {BIO 15302785 <GO>}

And when you look at your console business, your in-dash business, you had Tesla put a big screen out and then a lot of people have chased it. When you look at the performance requirements now they're talking about driving digital dash and it seems when you go in a car with that it seems to make sense that that's what you should have. Can you talk about that 8 million going to 25 million, is that based business you have say of 8 million a quarter do you still see sufficient growth over a longer horizon for that before you start to layer in the autonomous driving?

**Colette Kress** {BIO 18297352 <GO>}

Yes, I think it will continue to evolve. Our position is really being the best end graphics that will be necessary for these digital clusters as we go forward. In Frankfurt at the International Car Show the next piece is essentially a virtual dashboard. No buttons, nothing. And key companies demonstrating what they see as their future concept cars.

So we'll continue to stay in the high-end parts of those overall graphics. But what we're able to benefit right now when we think about those additional cars and

design wins is landing at a really luxury lines in the really high-end cars, they are able to take that same platform and now move it into many of their mainstreams.

And we're benefiting from that, maybe even keeping up with competition that they know that this is a very key selling point the overall technology within the car and that digital displays are being very well received. So you will see us go into more and more models as that expands as well is probably that next gen of what infotainment systems will be going forward.

**Blayne Curtis** {BIO 15302785 <GO>}

We had -- I just had Xonex on stage and there's many semi companies that are pursuing ADAS or driver assisted, it's one of the only real growing areas in semis for many. Your solution would be more programmable in terms of being a GPU base versus maybe a PLD or even on ASSP, maybe you could see a Mobileye it's just fixed algorithms.

Could you talk about how this. And there's also different types. You can have a Google Plus driving car that may not be what a major OEM deploys. There is still a lot of moving pieces in terms of --

**Colette Kress** {BIO 18297352 <GO>}

That's correct.

**Blayne Curtis** {BIO 15302785 <GO>}

What is self driving, is it assisted driving. I think Dan talked about one platform where it will just turn off after 45 miles an hour. There's obviously illegal and notifications as well.

How does the GPU fit in? Is it going to be the early stage and then as it moves to volume or do you think it maybe moves to a more fixed solution or do you see these OEMs actually dynamically changing and learning and which would benefit you?

**Colette Kress** {BIO 18297352 <GO>}

Yes, I think it's correct to assume there's a lot of different semiconductor companies inside of the car. There's probably more than 50 different microprocessors, whether they be single function, two function type service things going on and a lot of focus on ADAS.

But our focus is the center compute for all of those different types of needs and technology to assist ADAS but really talking about the underlying supercomputer inside of the car, not necessarily focused on a single function or focused on eliminating any of those. Those are also going to be necessary car.



Our strategy is really providing the underlying platform that all of these things can coexist such that if you remove the driver who do you replace the driver with? That supercomputer would be that key point. So I think it's a different angle than many of our other peers that we have seen and our approach is really focused on the overall platform there.

**Blayne Curtis** {BIO 15302785 <GO>}

I did want to ask you, we talked about the growth businesses. You mentioned the data center and the workstation business also being directed. So obviously it was a more muted year for everybody this year.

Can you talk about why maybe those businesses were flat or down respectively? And as you look into next year what type of visibility do you have for those returning to parity?

**Colette Kress** {BIO 18297352 <GO>}

Yes, our enterprise business focused on Pro visualization. If we recall in the first part of the calendar year quite a bit of volatility in terms of macro conditions particularly around the FX rates. It influenced in terms of a lot of the channel, the overall thoughts in terms of pricing worldwide where we saw many different changes in terms of when they would purchase the overall capital that they needed to both refresh and expand some of that.

So that did take some of the growth out of the overall business as we saw in the first part of the year. We've seen a lot more stabilization of the FX rates, not necessarily a change to them but the stabilization did produce a little bit better results than we had thought in our Q3 as well. And we'll stay focused on this but again it is still a question in terms of will it get back in terms of growth and when that will be.

I can't make any predictions right now going forward into the next year because we generally just look out one quarter. But that's where we see it's been about flattish or down a little bit but we'll stay focused on it.

Our data center business, a very strong pipeline of a lot of key areas that we have seen. Our results both a year ago and early in this year has been influenced by very large projects.

The large projects are here. There's the next new large project next year.

It gets to be a little bit lumpy in terms of how that can look. We are confident that the data center business will continue to add in terms of strong growth as we go forward. But these large projects have probably produced a little bit of lumpiness right now.

**Blayne Curtis** {BIO 15302785 <GO>}

I did want to ask you on the gross margins as you look into next year lots of moving pieces as well. PC OEM was a drag but now it's very small. Gaming is growing and should deliver a good gross margin.

Can you talk about the moving pieces? Maybe autos, volume could mean lower margins but I think you're adding a lot of value, over time that could be accretive as well. Can you talk about the moving pieces?

**Colette Kress** {BIO 18297352 <GO>}

Yes. So we talked about our four markets. We refer to them as our four growth markets and strategic markets as we go forward. So far year to date in fiscal year 2016 our overall revenue growth of approximately 5% so far.

If we just look at our growth markets they are growing more than 25% so far year to date, even though the overall Company is growing 5%. We still had a piece in the PC OEM business and the Tegra OEM business. As those become more commodity-based with not necessarily grow-ish aspects we haven't seen that particularly growing.

But as you are correct it has become a relatively small part of our business now and in this last quarter represented less than 10% of our business. We'll continue to watch it. We'll continue to compete in that business with the right economics for the PC OEM.

But you will see us concentrate on our four key markets because I think those have tremendous TAM opportunities in front of us and also have great leadership position that we have in those four different ones. I can't make any predictions in terms of the next year. We really look about one quarter out.

But again these are great TAM, very exciting markets. Whether that be artificial intelligence, virtual reality, or autonomous driving there are many three key disruptive markets that you see being talked about. And we have an underlying platform that's able to enable all three of those.

**Blayne Curtis** {BIO 15302785 <GO>}

This is my last question. So we're asking everybody actually what they see as the disruptive trends and I think you just answered it. As you look into next year you're actually involved in many disruptive trends.

**Colette Kress** {BIO 18297352 <GO>}

That's correct.

**Blayne Curtis** {BIO 15302785 <GO>}

I did want to leave a little time for questions in the audience. There's a couple more minutes if anybody had any.

## Questions And Answers

### Q - Unidentified Participant

Do you think that accelerated headsets you can have in accelerated GPU in addition to the PC or the gaming console or whatever device would be?

### A - Colette Kress {BIO 18297352 <GO>}

Okay, I didn't hear the first part of that.

### Q - Blayne Curtis {BIO 15302785 <GO>}

Would you put a GPU in the headset physically?

### A - Colette Kress {BIO 18297352 <GO>}

You know, it's still early in terms of how to solve the VR, is the overall performance better if it was actually in the glasses. Right now in the near future I see the glasses with the overall PC as probably the key focus and I'm sure they'll continue to improve the overall technology as the VR becomes more of a desire of the gamers.

### Q - Unidentified Participant

I just wanted to ask having like two supercomputers in the car, if I take my supercomputer which will get stronger over time and I have years. So I personally feel that you only need one and this one I have with me all the time. So why do you have two powerful chips in a car?

### A - Colette Kress {BIO 18297352 <GO>}

Okay. So I think you are referencing in our platform that we put together for DRIVE PX it actually enables two overall SOCs that have incorporated right now. The question is is two only enough or will it actually get you need even more. Given all the functionality that we will need to occur, all the parallel processing and the dual support for it being within the car and the need for possible fail over capabilities the performance actually may get stronger. Not just one, two, there could be multiple in terms of that underlying computer that generates a self driving car.

Removing the human from the car is a pretty big task of the amount of compute capability the human being has and the years and years of driving that we have. So I think you look at it more as that's a very hard amount of thing to replicate. Not necessarily replicated with one simple little microprocessor, that's a significant supercomputer that's probably necessary.

### Q - Blayne Curtis {BIO 15302785 <GO>}

The clock says zero. I appreciate the time, Colette.

**A - Colette Kress** {BIO 18297352 <GO>}

Great, thank you.

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