



The Deloitte On Cloud Podcast

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Title: The next big thing for cloud may be the rise of space-based cloud platforms

Description: The space race is on, again, and it's creating tremendous business opportunities on Earth. In this episode, Deloitte's David Linthicum, Kelly Raskovich, and Raquel Buscaino discuss how deploying cloud platforms in space can provide advantages to businesses that leverage them. Reduced launch costs have already sent more satellites to space, which has led to an explosion in data and insights, especially for companies that put cloud infrastructure in space to analyze it at the point of origin.

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David Linthicum:

Welcome back to the On Cloud podcast. Today on the show I am joined by Raquel Buscaino and Kelly Raskovich. Welcome to the show.

Raquel Buscaino:

Thanks, Dave. Great to be here.

David Linthicum:

So, I work with these people day in and day out on the same team. I really enjoy working with a great team of very innovative people that are really kind of thinking about where the technology is moving to, and to where we should be placing our bets as to how the technology should work and how enterprises can benefit from it. Today on the show we're going to talk about cloud in space or space in general. So, give us your stories.

Raquel, you're first. What's your background, how you came to Deloitte, what you've been focusing on lately.

Raquel Buscaino:

Yeah. I'm happy to. Also, by way of a brief introduction, I'm our Emerging Technology Lead on our US Novel and Exponential Technologies Team at Deloitte or our NExT team, which is basically a way of saying that our team senses and makes sense of what's new and next in tech. I started off by working at Deloitte about 2017/2018 in our blockchain practice and became fascinated with understanding new technologies. Then about three years ago I started working on a team, our NExT team, that focuses on the intersection of multiple different technologies. So, even this podcast, space, tech, and cloud, what's the intersection there? Maybe AI and IOT. So, looking forward, we spent the last year or so working on the SpaceTech report that launched in June, and couldn't be more excited to share the findings from that report and talk all things cloud and space today.

David Linthicum:

Yeah. I'm looking forward to it. Kelly, how about yourself?

Kelly Raskovich:

I'm so grateful to be here, Dave. I'm Kelly Raskovich. I have been at Deloitte for the past 12 years. I joined right out of college as a business technology analyst, and spent the first eight years of my career here all up in everything data, serving clients across the board, but mainly focusing on the energy and industrial space. I have segued into serving many clients across the board with Raquel and yourself, and love all things emerging tech. As I think about this past year, I would have laughed when we talked about space a year ago, and how I thought it was really all about the fun movies that I've been watching or that really cute space print I got for my one-year-old.

It's been a journey to-date. I'm so grateful for all the wonderful learnings that we've had, because there is so much going on in space that it's applicable to the everyday person and everyday organizations beyond just government agencies and private space companies. So, it's been such a wonderful treat to be a part of this, especially since we're moving into kind of a new domain that we haven't focused on in the past.

David Linthicum:

Yeah. There's a lot of interest in moving out. Certainly, the evolution of technology over time, the ability to leverage satellites in a very strategic way, global coverage and connectivity are areas that we're looking to move to right now, the ability to take technology out to people who are able to consume it. The way you do that is via communications, and the best way to do communications and certainly have centralization of data storage and things like that is really to kind of look into space. So, what is xTech?

Kelly Raskovich:

That's a great question. We have really been focused on all things emerging tech for the past 14, 15 years. Our bread and butter is our flagship report that we produce annually called Tech Trends. As part of our research over the past year to year and a half, we actually noticed that, in the notion of focusing truly on information technology, there are so many tech-adjacent domains that are poised to make an impact in the future, that are spotlighting new and exponential technologies—beyond information technologies that are going to have those economic opportunities, ability to drive growth over the next decade.

While some of them might feel not applicable to you today, they are certainly going to prove to be table stakes in the future. So, xTech, meaning "x" is a variable. So, for now, we started our inaugural one around space tech, but we're going to focus on other domains and areas in the future as well, whether that's energy tech, robotic tech, biotech, you name it. There're so many ways in which we are going to be able to cultivate opportunities and advantage across areas that are tech-adjacent and core to information technology, but so much more than that too.

David Linthicum:

Yeah. It all comes back to your ability to utilize tech in a wise and strategic way. I think that's the theme of everything now, in terms of how information technology is evolving and everything else is kind of interrelated one to another. Suddenly, autonomous driving, and satellite communications, and IOT, and all this stuff really comes together. It's something that's being driven by the cloud, but this is really about different branches of technology and us kind of taking things to the next level. Raquel, why SpaceTech? Why now?

Raquel Buscaino:

That's a great question. One, there is a ton of public excitement around space that has increased in the last couple of years. Think about going back to the moon. It's been over 50 years since a human being last set foot on the moon, and now we have plans to return human beings to the moon in a little over two years. You look at programs like NASA's DART test—or Double Asteroid Redirection Test—or the James Webb telescope. So, there's been a public excitement in space that's been emerging.

But more so than that is that the business opportunities in space are really coming to fruition. We're truly entering a second space age, one in which government and commercial entities are working together, in tandem, fueling growth. We have unprecedented access to space for businesses. So, that could be any company on earth using satellite imagery data or SATCOM to reach new customers, or companies thinking about how they might experiment in microgravity to develop fiber optic cables or protein crystals with fewer impurities.

So, what I think is so exciting about the time we're in right now is that we are truly at an inflection point with so much activity in space, that every company right now should be thinking to themselves, "How can I play a meaningful role in space, either providing products and services to the space economy, receiving products and services from the space economy?" There is so much happening, and we are in the midst of the second space age right now.

David Linthicum:

Yeah. We just heard about the core driver, and that's the ability to get to a business advantage, in other words, the ability to return value back to business and that's going to drive the technology. It's interesting. Certainly we've invested in space and in looking at experimentations and looking at it as a science thing. Most businesses don't look at it as something they can do to increase their business, to make their business better, and the ability to bring goods and services to market using better technology, better understanding, things like that.

You just kind of hit the ability for satellite imagery to understand the hydration of a particular field and that study by an AI-based system, which was able to manipulate watering sequences for a particular field. So, it increases crop growth, increases our ability to get food. A lot of this stuff is dependent on this. So, Kelly, what are the trends right now in space? What are we looking to evolve to and where do you think we're going?

Kelly Raskovich:

There is so much untapped potential, especially as we think about how Raquel teed this up on decreasing launch costs, the rise of satellites. What that's really going to bring is an increase in the rise of data. If you break it down, there's so much tech that's going to be needed to support this as we continue to evolve and shift and leverage more capabilities in space, and I see cloud computing being at the core of a lot of this. So, as we explore opportunities, one of the other ways that we break it up to is sharing categories for how these business opportunities are segmented.

So, there're creators, companies that can build space infrastructure. There're purveyors, those that might help contribute parts to space infrastructure, but consumers. Those are going to be companies that businesses are going to be able to benefit from that space infrastructure. So, just as a dating app and a navigation app is also powered by data from satellites, we're seeing that consumer angle of opportunities rise as we go. So, Raquel, I don't know if you have anything to add on that, but there's just so much of an evolution around this and it's just really exciting to be a part of.

Raquel Buscaino:

No. I think that's spot-on, Kelly. The decrease in launch costs we're seeing and the increase in the number of satellites, I mean from 2019 to 2022 the number of satellites in orbit more than tripled. So, it's not just that we're minor increases year-over-year, but truly an exponential rate of growth and rise of the data that we have. So, I think it's important that now, more than ever, we have this conversation about the intersection between cloud and space, because we're truly in the midst of what I think is an exponential curve and the amount of data that we will be receiving from space.

David Linthicum:

Yeah. Certainly, private companies jumping in is kind of an instantiation of that. People are willing to make investments in there, because they feel there's a bunch of value that's going to be coming back from those investments. And also, it's decreasing launch costs, satellite costs, things like that, as we get more businesses into space. Ultimately, the prices end up coming down. That's I think something that's going to benefit everybody. If you think about computing and certainly cloud computing, we've been moving into a ubiquitous kind of state. In other words, we're moving to the edge and IOT and we're putting data everywhere.

Really, kind of the central theme of cloud computing was to put everything in a cloud, which even though it may be physically distributed, it's a centralized system. Now, with the advent of us being able to leverage storage and processing from many different platforms, many different physical platforms, we have the opportunity to do some of these things in space. So, as it's producing lots of data—you just mentioned imaging data and things like that—we may be able to process that data at the point where it's consumed, in the satellite, in the spacecraft, things like that. So, as data collection process changes, what changes, Kelly?

Kelly Raskovich:

I think the data that we're going to be getting is going to be better, faster, and more abundant. I think we're going to be able to have better insights into supply chain, if you're any type of company, any type of industry. Think about the opportunity to help even with latency issues. So, as you mentioned, integrating with cloud services on a spacecraft. For example, having the ability to do that real-time data processing in space enables us to do that decision-making closer to the source of data, and it creates an opportunity for continuous communication with Earth.

It also reduces our dependency for those Earth-based datacenters. Two years ago, if you might have asked me if cloud services in space would be legit, I might have laughed, but I really, truly believe it now. I think we need to have an opportunity to manage locally, and really share what's truly needed and process back to Earth in a way that creates improvement opportunities across the board, and we can't do that without cloud.

David Linthicum:

Yeah. If you look at it, the ability to process it at the point of consumption really makes sense. Certainly putting AI engines and learning models in space as a cloud service, and the ability to deal with these large amounts of data, probably petabytes of information, and not having to transmit it back to Earth to be processed—that's where the data is collected. So, process it where it is. Come up with your conclusions about what you see within the data, and just push those results back to the Earth station, which normally is a small fraction of all the information that you're analyzing. What are your thoughts here, Raquel?

Raquel Buscaino:

The question is, "How much data is coming down from space?" I think a better question is, "How much do we want to come back from space?" So, what I think about in space data processing consumption, I think about the two different markets. One is that data being brought down, the data and insights being brought down for Earth, consumption on Earth. The second is for use in space. The value props of those two things are very different. So, with Earth, it's all about a lot of the things that Kelly mentioned, where we're trying to, yes, reduce latency, but also it's data transmission costs.

If we can process onboard satellites, what does that mean in terms of the actual transmission costs of bringing those insights back down to Earth? You can also use an energy cost framework, too, for bringing insights back down to Earth, because if you have a satellite that has untapped potential to solar power, well that eases the energy constraints, rather than having a datacenter and the electricity needs with that. So, I think when we're thinking about consumption and Earth, it's different than in space.

There's a huge value proposition there, where if you're talking about enabling autonomous satellite collision avoidance or even the future of human space travel to the moon, Mars, and beyond, the reduction of latency in real-time automation there for in-space data processing becomes not just a nice to have, but a need to have. So, for me, those are the two different ways I think about segmenting the market, is where the consumption is happening. I think the value props in those two areas are different, but meaningful in their own ways.

David Linthicum:

When I think of cloud applications using a space-based system, it really is adding this to your arsenal of technologies. In other words, we're not just looking at space as a place to collect information, where imagery comes from, things like that, but a place to actually do a good deal of the processing. It can process it onsite. So, the number of applications are just huge. We already mentioned the agricultural application, the ability to look at water saturation for particular fields, but the ability to automate an intelligent supply chain that's able to deal with weather information in real-time, to figure out different ways of doing logistics, rerouting different goods and services via a different way just kind of based on weather conditions, maybe in heating conditions over time. There are an endless number of things that I can think of using this. Kelly, can you think about other things and other applications we can do?

Kelly Raskovich:

I think there are so many more applications, but what I think about too as you kind of teed all those up, is think about the accuracy and the better decisions we'll be able to make as a result of this increased data, this quicker data from a latency perspective too. I just think that there are going to be opportunities for better decision-making, quicker, faster, and we're really going to enable organizations to get to that value sooner than they may have historically in the past and really allow for a successful future, not only now, but in the years to come. So, space being not only the next frontier, but really the next big market and offering those business opportunities. It's bigger than tourism, media, and agriculture. It's really tapping into every industry in between.

David Linthicum:

Yeah. It just provides a set of possibilities. We now have space-based cloud platforms, just to coin that term right now, which really kind of is an option that I don't think many cloud architects really consider, and the ability to leverage this, not for everything, but the ability to find good use cases in how to make it more worthwhile for the business. Again, we're doing something. We're augmenting existing technology. There is some net new technology in here, but, in essence, we're just taking this stack to another layer, in this case, a layer that happens to sit in a spacecraft or a satellite above our heads. So, what are the trends in space, Raquel?

Raquel Buscaino:

The trends broadly, as Kelly kind of mentioned, is we're seeing a lot more data because of the reduction of launch costs and the increase in the number of satellites. I think one of the trends that we'll expect to see, as it relates on the data front here, is you're going to have so much data and so much insight into what's happening on Earth that it will become more a game of consolidation, aggregation, and sense making rather than a game of sensing. So, what I expect to see, and we've already seen this in part, but the ecosystem's partnerships and alliances for how different companies consolidate that sensing data, that Earth observation and satellite data together, I think that's going to be an emerging trend that we'll continue seeing as it relates to data and insights.

I mean, broadly, when it comes to space, there's a ton of trends that we're seeing, and of course we'll encourage folks to read the Space Tech report, where we talk about everything from manufacturing and microgravity to in-space servicing assembly and manufacturing, where you have 3D printing structure in space. There is a lot out there, but I think the important thing is that data sits at the heart of all of it. So, if you're not looking at data as the enabling roads and highways of what's happening in space, you're missing the mark.

David Linthicum:

Yeah. If you think about it, we can see movement of vehicles, the ability to look at stuff in real-time. People think of imagery. If you look at stuff, it may have three or four months different latency in looking at the stuff, but we do have the ability to see things in real time. The thing is we can't process that information. We can't send all the information down to Earth, and do so in a way that's going to be useful. So, again, the ability to process it at point of consumption, the ability to kind of look and analyze these images, and just push the answers down to people who need the answers, that's kind of the real power here. In other words, we truly are adding this to our arsenal of technology that we can leverage, and how we can do so in ways that are just a number of different applications moving forward. What are your thoughts here, Kelly?

Kelly Raskovich:

I think that it is going to be quite an evolution as we go because, if you think about it, a few ago it might have felt like too early to act. But, really, there's an opportunity to act now, when that exponential technology in this emerging market feels too early. So, allowing for that data consumption, the data quality, the data awareness, the data governance to be something at the forefront of everyone's thinking is essential.

I also think there is a notion towards trust and transparency. So, having that explainability, that transparency towards what data is collected, how it's collected, and then being able to route it back to that source, so that people are trusting in the data. They have more ownership of that data, and it will continue to be used and create that value and make a meaningful impact across the board.

David Linthicum:

Yeah. That always has to be a consideration. Raquel, where can people prepare for this? Where can they get information? What should they be reading now in terms of how this technology is emerging? Where would you point to somebody who is looking for the best information and source for understanding space tech?

Raquel Buscaino:

I think there's a lot of information out there. I think it might start with, first, the internal reflection, which is, "If I had the data that I wanted, where could I get that with satellites?" So, thinking about satellites and opportunities that exist in the sky as complements and tools in the chest for your data and insights, I think that's the first identification process. "How could I use satellite data, data in space, to help aid my business" In terms of learning more, of course you can reach out to Deloitte. That's always on the table, but I would say just familiarizing yourself with the opportunities, as we mentioned on this podcast, for all the different ways that imagery could be used, hyperspectral imagery. So, it's not just still images. You're talking about temperature. The possibilities are truly endless for how we can use space data. So, I think it's just dip your toes in the water and start with the internal reflection of, "Hey, if I had a global view of what our world could do, what would those data points be that I would want to extract?"

David Linthicum:

I think in many cases, just companies considering that this is available to them. I think in many instances they may not have understood that until they heard this podcast. A lot of cloud architects and cloud engineers and people who are in the cloud world listen to this. Certainly, we've heard about satellite connections and things like that, but now we're looking at ways to actually consume these technologies becoming available. So, what are you going to do to prepare yourself for making this happen? And make sure you don't miss the boat, because there are some good opportunities and some good applications that you can build in this stuff that really should be considered. Kelly, where can we find your Space Tech report?

Kelly Raskovich:

You can find it on the [Deloitte.com/us/spacetech](https://www.deloitte.com/us/spacetech). The report itself is broken up into three dimensions. The first is "Here on Earth," and that's where we explore how launch innovation is revolutionizing the space market and making it accessible, like we just covered. The "Near" section is really talking about in Earth's orbit, and examining how satellites, space stations, and services are already existing and are going to create opportunities for commercialization. Then the third section is all around "There" in deep space, so considering deep space human exploration from the moon to Mars, and eventually even asteroids, along with economic opportunities. So, it's really a wonderful read. We have beautiful imagery associated with it. Then throughout, we've sprinkled in some "ah-has" or considerations as it relates to ethical considerations, sustainability considerations, legal considerations that really get the reader thinking about how this might apply to them, and how this could change in the future.

David Linthicum:

Yeah. I urge you to look it up and read the report. There's a lot of good information out there and that's a great place to start, and what your jumping off point should be for understanding and leveraging this technology, and also the fact that it's included in what you need to understand about technology moving forward. If it were an architect, we have to consider all potential solutions, and we have to figure out ways in which we can configure those solutions that are fully optimized to the needs of the business and the needs of the application and the use case. This is part of it.

So, you have to consider the ability to utilize space, and you would hate to build something and figure out, "I could have done a whole lot better if I would have had this technology, space-based technology into my portfolio." So, again, this is about understanding where you need to go. Thank you both for being on the podcast. If you enjoyed this podcast, make sure to like us, rate us, and subscribe. You can also check out our past episodes, including those hosted by my good friend, Mike Kavis. Find out more at [DeloitteCloudPodcast.com](https://www.deloittecloudpodcast.com), all one word. If you'd like to contact me directly, you can e-mail me at dlinthicum@deloitte.com. So, until next time, best of luck on your cloud journey. Stay safe. Cheers.

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