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The Deloitte On Cloud Podcast

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Title: **The future of cloud: A deep dive on the next ten years of cloud evolution**

Description: What's the future of cloud? In this Knowledge Short, David Linthicum takes us ten years into the future. His predictions? Multi-cloud complexity increases, but so does the use of superclouds to rein it in. Skills change, specialize, and grow to meet demand. Artificial intelligence changes everything. Local, regional, and industry clouds will continue to rise. But, perhaps the most surprising prediction is that the cloud as we know it won't exist. It will be so ubiquitous, that we will just refer to it as computing.
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David Linthicum:
Welcome to this Deloitte On Cloud podcast Knowledge Short exploring a specific topic related to cloud computing. This is a short tutorial talking about the real-world concepts in the emerging world of cloud computing. I'm your host, David Linthicum, cloud computing subject matter expert, author, speaker, and managing director with Deloitte Consulting, and this is the evolution of cloud technology over the next ten years.

So, keep in mind, as we're predicting the future of any technology, it's always going to be a bit hit and miss, and I've been doing this kind of as a career over the last 30 years, my role as CTO and leading different companies and things like that. And you had to guess where the technology was going and where the investment should be made in order for the company to invest in the right places. In other words, looking at the rise of integration, the rise of the web, the rise of distributed computing, and now the rise of cloud computing and kind of understanding where things are going to go, but not only that, how they're going in a macro direction. In other words, things moving that are generally with the tide of technology, such as the rise of cloud, but also how they're going to emerge and evolve in a specific direction.

For example, in cloud computing, how we're going to build cloud computing applications, how we're going to deploy data, how we're going to operate the thing, and really getting into the nitpicky aspects of where the technology is looking to go, and then putting some lines in the sand as to what we think is going to happen and where the investment should be made. And that's kind of where the difficulty comes in because obviously, you're predicting the future and no one has a crystal ball, and you're going to have to, in essence, rely on your own instincts in terms of what the technology is doing.

So, you look at a couple of things. First, I look at pace of technology evolution, or how fast we typically move into new sectors within the technology space, and that's always, I think, slower than people think it's going to be. And then the things that are going to happen within that space, so it's one thing to say we're going to move toward artificially intelligent-based operations. Certainly, that's going to be in the future, but it's not only that but how quickly that's going to happen or how not quickly that's going to happen over the next five to ten years.

And, of course, if you are a company that's investing and building tools in AI-driven cloud operational technology, it's kind of good to know how quickly something's going to happen because you have to burn money to build the products and take them into the marketplace. And, if you predict too early, in other words, you're going to spend a lot of money without a market being there to buy the technology you're looking to build because it hasn't emerged yet.

That doesn't mean the technology's not good; it just hasn't emerged in the space where you're looking at to emerge and the time that you're looking to emerge. Or you wait too long and other companies are able to innovate—out-innovate you and speed things to market where you don't get the first move or advantage. So, that's kind of how we have to look at predicting the future, how quickly things are going to emerge, what's going to emerge, and how people are going to consume technology and how IT is going to change also over the next five to ten years. It's not just where the technology's going, but how are we going to change as consumers of the technology.

So, now that we understand that let's kind of get into where I think the technology is going to evolve, cloud technology specifically, over the next ten years. First would be continued rise of complex cloud deployments, and we've been talking about this in ad nauseum for the last five years. The fact of the matter is people are moving into multi-clouds. That's typically going to be plural public cloud providers, but the fact of the matter is that we're moving from single cloud deployments which were the primary focus of the initial push into cloud computing for most enterprises, maybe ten, fifteen years ago, into leveraging different cloud providers because of the best of breed technology they're able to provide.

So, the reason we're leveraging complex cloud deployments or multi-cloud deployments is because one cloud was limiting in the terms of the technology we could leverage. And, so, if we wanted to leverage a best-of-breed technology to support the applications that are going to take our business to the next level, then that's not always going to be within a single cloud provider. They may have better databases, they may have better storage systems, but this other cloud may have better AI systems, and this other cloud, public cloud provider, may have better analytical systems.

And, so, what we don't want to do is limit people who are building solutions in the organization to specific technology. In other words, you can only use the technology on this particular public cloud provider, and that's it because that's our partner and we're going to stick with that. You want to provide them with the ability to leverage whatever technology is going to provide the best value and the best innovation for the solutions you're looking to build, and that makes a core difference because if we're going to be valued, and it looks like we very much are, on our ability to create innovative solutions in the marketplace, innovative technology, better customer experience, the ability to sell products and services that other people aren't able to sell, you're going to be the first mover in the space, and we're leveraging some innovative approach to making that happen, then that's going to be a core value that we want to move.

So, this is an easy one. Continued rise of complex cloud deployments. We're going to see additional multi-clouds. We're going to see complexity become a major battleground for most enterprises out there, and the ability to approach complexity like we've talked in the past on the podcast, leveraging supercloud or metacloud capabilities where we're building this abstraction layer on top of the physical cloud providers which are able to provide us with the ability to manage these very complex deployments, but do so in a very simplistic way – normalizing the redundancy, normalizing the heterogeneity – so we're able to do so in a way that's going to allow our complex cloud deployments to scale, and that's going to be a key focus I think. We'll keep coming back to that. Over the next five to ten years is going to be the ability to manage complexity in a way that's going to provide more value back to the business.

So, continuing with that theme, the next would be refocus on cross-cloud systems. And so supercloud, metacloud, the ability to deal with operations, observability, governance, FinOps, data federation, all these things across clouds. So, where in the past—the recent past, we used to focus on these services within a single public cloud provider, in other words operations, observability, governance around one provider, one brand, we need to be able to take that across cloud providers, and we're doing that for a couple of reasons.

Number one, you talked about complexity being the biggest move moving forward, the rise of complex cloud deployments. But to manage and operationalize those systems, to govern those systems, if you try to do so within each cloud provider using whatever native technologies that they provide—operations, governance, things like that that—then it's going to breed more complexity because instead of dealing with one operations layer that's able to manage different cloud providers, we have to deal with separate operations layer that run on each specific provider in a native way, and obviously that's going to be more operation systems, different talent you need around to operate those systems, lots of more moving parts than we I think

originally thought we would have, and therefore it's going to lead to the challenges around complexity, performance issues, scalability issues, the ability to operate them in some sort of a reliable way because the more complex things are, the more people and human beings are going to make mistakes.

So, over the next five to ten years, there's going to be a huge focus on cross-cloud systems or things that work in-between systems. And by the way, these things could run on a particular cloud provider. That's really kind of not the point. They could run on-premise, but the idea is that they're going to provide the capabilities of running across different cloud brands and provide a single layer of service—operations, observability, governance, FinOps, what have you—across the different cloud brands. And, so, that's going to be the refocus moving forward. And if you're looking where we're going to go in say 2024, 2025, it's going to be building these services that don't necessarily run natively on a particular cloud provider that again that breeds complexity but are able to run across cloud providers in an abstract way. They're a logical layer that sits above the physical brands, the physical cloud brands that we're leveraging.

So, next when talking about the evolution of cloud technology over the next ten years, making some predictions, I think we're going to see changing skills that are going to be in demand within the marketplace, and of course you're like, “Hey Dave, that's an easy one because obviously technology's going to change and emerge and we're going to have different skill sets that are needed to run the new technology that's coming into the marketplace.” Absolutely right.

What we seem to be missing in the last few years are the generalists, in other words, people who can understand lots of things and are able to configure technology and solutions into strategic solutions that are going to allow you to take the business to the next level. And I think if we're seeing one of the core things in the marketplace is that we're not necessarily focused on that, and lots of organizations are thinking very tactically on how they're going to deploy something, so they're just focusing on a particular cloud brand, they're just focusing on a particular database. Nothing wrong with that, but overall someone has to have the larger picture as to where this technology is moving to and make sure you're configuring this technology in the right way to provide the most value to the business, and that's kind of it at the name of the game.

What we're seeing out there is lots of mistakes. People aren't investing in more strategic design and strategic strategies and meta-strategies, meta-architectures. They're not occurring. They're focusing on the specific technologies that people like to focus on because it's easier to talk about a database system running on a particular cloud provider than systems that are going to run across all different cloud providers, different distributed databases, federation of governance. All these sorts of things are going to be the larger challenge moving forward.

And that's kind of building off of the first couple of things we talked about: continued rise of cloud deployments and refocusing across cloud systems. We're going to have to have generalists who are able to design and deploy these systems, and that's going to be the biggest boom in terms of changing demand around skills that we're looking for in the marketplace. And by the way, if you have a specific certification, you can certainly become a generalist. You just move into the space and learn lots of stuff about other things, and that's going to be the challenge, but we're still going to need specialists as well, and I think it's going to be a combination of generalists, architects, and specialists, people who focus on a specific narrow technology that are going to take things to the next level. They have to team up and make it happen. Right now we don't have a lot of generalists, more specialists. We're going to need more generalists.

So, the next one, and still within the skills category, looking how that's emerging and changing over the next five to ten years. We're going to see less code and more design. Again, not difficult to predict because we're seeing AI systems and we're seeing AI systems that are able to finally generate very good code, and we don't necessarily need to have heavy-duty coders as much anymore because a lot of the details can be carried out by these AI-based systems. You look at generative AI stuff and the ability to program, and they can't do everything. They can't do a lot of the design and the strategy of the system, but they can generate code around a particular activity or service or behavior that needs to be carried out. So we can ask generative AI systems, “Write me some code that'll update this database with this schema and do so in a way that governed by this,” and all these sorts of dependencies can come in that can carry that out.

So, as humans, less code, which I think is good because people make mistakes, not that generative AI systems and their AI coding environments and code generators don't make mistakes, but human beings make more mistakes. So, the focus again is going to be on the generalists, on the design of the systems, your ability to assemble all these things together and design a business system that's able to carry out the functions and features that are asked for by the business, and the ability to focus on that is going to be a good thing because human beings are really good about being creative and innovative in the space. We can define what the system needs to do, and also learn how to communicate with these AI-based coders, and they can go off and carry out the coding in the background.

Finally, under skills and skill demands growth over time over the next ten years, we're going to see architectural optimization as being the focus, and this hasn't been the focus until recently. And, so, the idea is not just to get something that works but get something that's optimized to bring the most value back to the business, and those are two different things typically. I'm always taken back by people who design and deploy systems and they're very happy with the fact that the system works and may live up or meet some of the expectations of the business. When you look at the optimization of the system, the ability to leverage storage systems, the compute systems in an optimized and cost-efficient way, it may be burning five times the resources as it really needs to burn. And, so, if you put a focus on architectural optimization and value that's brought back to the business versus on stuff just working, that's going to be a step in the right direction.

That's going to be a big focus, I think, over the next five to ten years. It's going to be evolving practice over time. We're going to have to train people, to learn how to focus on that, get better tools and technology to make sure that we're optimizing systems, put in next generation technologies such as FinOps systems to look at the cost optimizations of the programs we're running, have better cost optimization within the DevOps tool chain so we're building better optimized applications, deploying better optimized applications and more sustainable, they burn less power. All these things are a step in the right direction, basically tuning our ability to leverage technology which is going to be much more value to the business than just getting something working.

Now we can get into a few of the trends and predictions that we're making here that are probably not as obvious, but I'm seeing them emerge as well and there's data to back this up. You can look in the surveys that are done, things like that. One would be cloud computing becoming more local or regional. So,

you've had the emergence over the last few years of sovereign clouds or clouds that run in particular countries that are designed for the specific laws and regulations of that particular country, and they function just like other public cloud providers providing storage services and database services, things like that, not typically the same rich set of services because they can't make the same investment, but they're running services that are built—purpose built for the laws and regulations and the needs of specific countries. And, so, in many instances, we're going to find businesses who are based in those countries—could be a global business, they're just building an application for that particular domain—they're going to want to leverage those systems. And those things are going to be local to the particular country that you're in.

We're also going to see regional clouds start to emerge. In other words, there's industry clouds – and we'll talk about that next – start to become more important, we're going to see a lot of micro-clouds start to emerge, and they're really not looking to replace the big, larger hyperscalers, but they're looking to provide some sort of a niche technology that's able to address a specific industry, a specific type of company, a specific database, all these sorts of things. So, we kind of went through a bit of change over time.

You go back in time 15 years ago, we had maybe 30 cloud providers. Every telecom company had a cloud that they were selling in the space. We normalized that down to about three to five major players, and that's kind of where we are right now. And now we're seeing an expansion into the micro-cloud area. Certainly the growth of industry clouds are really kind of driving that, and the growth of sovereign clouds. So, as there's regional needs, in other words we're looking to reduce network latency, use our data closer to where it's going to be consumed and leveraged, the regional clouds are going to start to emerge, the country-based sovereign clouds are going to start to emerge, and then the clouds that are built for a particular industry, which we're going to talk about next.

So, industry clouds are going to become more important. This has been a long time coming. If you remember back in the early days of cloud computing, people talked about industry or vertical-specific services that the cloud providers needed to provide, and that's because of in the finance industry, I want to have them focus on security issues and governance issues and regulatory issues that are localized to the finance industry versus me having to reinvent the wheel every time I use a cloud-based system and have schemas and databases that are designed specifically for an industry. It could be retail, healthcare, insurance, finance.

And the ability to kind of provide these things out of the box gets businesses a lot further down the path to building these systems and having to reinvent the wheel. One of the things if you've built systems in the past—and I have, I'm sure some people who are listening to this podcast have as well—that we have to in essence build a big portion of the system which is based on things that probably hundreds, perhaps thousands of other people have built already. We can't use their code, so we have to kind of reinvent the wheel and do our best to put in these regulatory compliance things, the ability to put in metadata management, the ability to put in databases that deal with privacy concerns and privacy regulations, and that's kind of the overhead it took to build these things.

Well, industry clouds are starting to emerge, and again sometimes they're going to be micro-clouds or regional clouds. We just talked about that. So, very small cloud that does a specific niche activity around sovereign system that runs within a particular country, but in this case we're talking about verticalized services or specialized services that are not designed for a specific industry and the ability for developers to leverage those services so they don't have to reinvent the wheel, so they can get regulatory compliance and governance systems into the environment, deal with privacy and how you're dealing with data, how you're dealing with data encryption standards, things that are enforced within a particular industry, dealing with metadata that instead of rebuilding something that stays specific to the retail industry, we can get the metadata, we can get the data design, we can get the structures directly from the cloud providers because it's purpose built for that particular industry.

So, that's going to come in two directions. I think it's going to come from the larger cloud providers. They're certainly working in industry-specific clouds these days. That's going to have a huge advantage in the marketplace. People are going to see that as a key differentiator, and in many instances are picking cloud providers because they have these industry-specific capabilities. And, so, that's happening now. We're going to see a lot more in the next five years, and it's going to be pretty pervasive, I think, in the next ten.

So, obviously the few predictions we had here, lots of other stuff is going to happen, and in essence, future innovation or where things are going that's going to be difficult to predict, as we said at the beginning of the podcast, but it's something that we're looking forward to moving forward because everything gets incrementally better. And obviously the rise of AI and generative systems are going to be a huge change in the way in which we do things, not only building applications in the cloud but also how we operate the cloud and secure the cloud and govern the cloud and all those sorts of things are going to be automated by AI capabilities that are going to remove a lot of the complexity and automate things that probably weren't automated prior to that. I think I'm looking forward to that because the more we can take humans out of the mundane tasks of operating these systems, the more we can put humans on what humans do well, to be creative and innovative in the space, and obviously we need lots of humans that are focused on that.

I do think we're going to see some reemergence of different platforms; we're going to see the rise of edge computing start to re-emerge. It's been rising for ten years, we've been focusing on it for the last five years, but the ability to put some processing down on the edge of clouds and leveraging edge computing-based systems to do that. If you look at the major cloud providers, they all have edge development environments where they have digital twins, able to have—do things on a factory robot or the thermostat on your wall, and all these things that are really great because we're not limited by putting all the processing and all the data in a centralized cloud system that can move them down to the edge-based systems, the IoT-based systems, put them on our phone and our car, things like that, which is something we need to do.

Also I think that one of the things we're going to see over the next five to ten years is the term cloud just kind of falls away. I mean, if everything's in the cloud, then we don't have to call it something separately anymore. It's going to be computing. And, so, we're always going to assume that when you leverage computing, it's going to be typically in a cloud provider environment. We may say we're running it locally; we're running in the cloud. Many of the different systems are going to provide more portability, so we're able to build applications in one place, say on the cloud provider, move them on premise, move them to our IoT edge-based systems, and do so at the speed that we need to move them. So, we'll have services and applications that are going to be relocatable and they're going to be autonomous unto themselves, become more portable, are able to balance the innovation across the different platforms.

Anyway, lots of things to talk about over the next five to ten years. I'm really looking forward to it. I love this business because I like change and I like innovation, and we're going to see a ton of it over the next five to ten years, and I'm looking forward to living in that world, and I'll probably be podcasting here and come back here and I'll give you my updates and opinions or my guests will give you their updates and opinions on what the technology is, the value it's going to have, and how to leverage it.

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