

Cloud

A future
invented by you



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This is a composite of the comments made by noted futurist Kevin Kelly at the Huawei Cloud Congress, both in his keynote speech and in an interview with WinWin. Kelly covers the drivers of cloud; how it's disrupting business models; how it will result in ubiquitous AI; and how you're not late to the cloud party at all – you're early.

By Kevin Kelly

A shared ubiquity

The cloud will be a place that most of us will spend most of the day, but we won't even know that there is a cloud unless it turns off. It will be like air – something that we live in, but don't really pay too much attention to unless it's gone. That ubiquity has never really been present before, because it's a shared ubiquity.

Cloud's three drivers

The cloud is possible because of the convergence of three factors that are accelerating very rapidly – data, bandwidth, and intelligence.

Data

Data is the one thing that we're making more of than anything else. Expanding at the rate of 66 percent, it's literally an explosion. If we measure the surface area of all storage manufactured on this planet, it's actually increasing at the rate of an explosion. We are at the level of exabytes, yottabytes, zetabytes – actually, we're running out of terms. We don't even have a sense of the scale at which this is happening. We have no idea how to manufacture or manipulate data at this rate. I'd say there's a tremendous opportunity in this new mega scale for information and data science. Anything that can be measured will be measured, and anything that can be tracked will be

tracked. My prediction is that there's a massive opportunity in these sensors as they get smaller and we begin to track everything. No matter what your business is these days, you're in the data business. This is how the cloud happens.

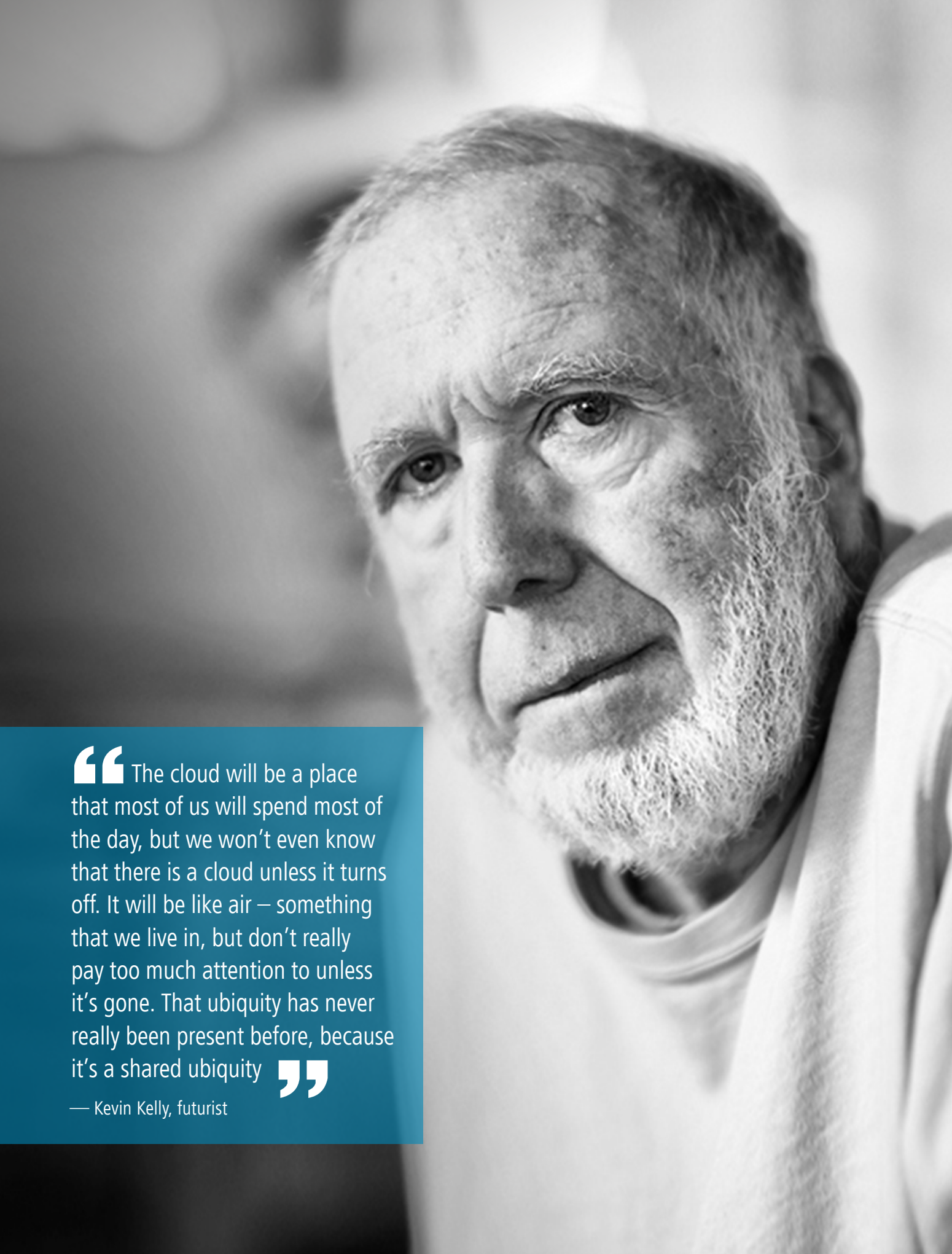
Bandwidth

Bandwidth is expanding rapidly as well, but the important thing is that it's going wireless. My prediction is that in a couple of years the total amount of traffic over wireless will exceed the total traffic over wires. Bandwidth is reaching everywhere, even cars, which will become our new offices. Therefore the total amount of bandwidth going to cars will exceed the main bandwidth going to your home. Bandwidth is the secret ingredient – as it expands, so does the cloud.

Intelligence

The third factor is intelligence – AI. I think this is the most important one. There are little bits of AI embedded into computers and robots, but the AI that I think will be most important will come from the cloud. The robots will even get their AI from the cloud.

Right now, the companies producing the best AI are not selling it as a service. Google, Baidu, Microsoft, and Facebook actually have very large cloud-based AI, but they are private clouds. I think within four years we'll see companies like Amazon offer IQ and AI as a cloud service in the same way that you would offer web services or web hosting. It will be for data crunching, image recognition, things like that.



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We don't really realize how fast AI is increasing these days. AI is better than most doctors at diagnosing x-rays, better than most legal experts at looking at evidence, better than pilots, who only really fly their craft for about eight minutes a flight.

In the last couple of years, AI has really, really taken off. Baidu, Google and Microsoft operate AI that is able to take a photograph, look at it, and tell exactly what's in it. Google taught AI how to learn, how to play video games, and how to play strategically. And then they taught it how to learn how to play, which is a very profound difference. These AIs are getting very smart very fast. All are served on the cloud – it's IQ as a service. You're going to just plug it in, and purchase as much IQ as you want. The more people that use AI, the smarter it will get. The smarter it gets, the more people will use it.

AI is the killer app. I think that people will want to be on the cloud because it's selling and giving smartness. Even more importantly, AI is necessary for the cloud and its huge data to make any sense. So AI is necessary to make it work on the cloud, and then the main product of the cloud is AI. So it's at both ends. I think that AI is so important that it'll be the main driver for the next 20 years.

X + AI = Service

We can take X, whatever it is, and try to imagine how you make it a service on the cloud. And that's going to be the real agenda in these coming decades. Is there anything that can't be turned into a service? Probably only a few things. There are about 9,000 different cloud-based services trying things like food as a service, furniture as a service, and toys as a service. They're trying everything. Most will probably fail, but some will work.

The next 10,000 startups will be taking something and

adding AI to it and making it smarter. That's the formula, and all this AI is not being generated by the startups, it's served on the cloud. I don't think that physical things will go away; it's just that the business model of how you get them will change because the value will often be in their smartness, in their customization, and in their suitability to your home or environment. We're going to do the same things with physical objects as we do with software. All hardware will behave as if it were software. Take a furnace, and you make it really smart, and it starts to obey the same principles as software. All these things are moving to the cloud. I would suggest that 50 percent of apps, even in the next five years, are going to be cloud-based.

The cloud offers so many new advantages. It's built for scaling – scalability, low capital, instant startups, easy prototyping, location independence, and device independence. Your phone, laptop, tablet, even a big theater, will all be looking into the same cloud, and they're shared because there's an ecosystem. And the scope and scale of this is much larger than just having our phones connected. It makes our environment very adaptable and much more organic, more like an ecosystem than a machine. Ecosystem is a good word, because it's like a biological entity, creating a better image for adding all these physical things to the cloud. We have something that resembles a rainforest more than a clock.

Mesh networking

The structure that we normally think of for a cloud is a device, and information that goes up to the cloud and comes back down. At the center of this is a big data farm, and there's equipment by Huawei and others powering this. But in fact, there's an alternative structure.



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The one I want to suggest is a mesh – a mesh version of the cloud. With mesh, communications happen peer to peer. So your phone, instead of going to the cell tower, is actually going from phone to phone, peer to peer. The idea is that you have the communication in the cloud happening at the edges. You have different kinds of things communicating directly with each other – a phone talking to a satellite, a satellite talking to a tractor, a tractor talking to a moisture sensor, with all these things operating in a completely distributed way. This whole thing is what we call the Internet of things (IoT), and it's a different way of doing things, a way we actually don't really know how to do yet. But I think this is the way we're going to go, and I would suggest that by 2025, 50 percent of cloud computing is going to happen at the edges, not on server farms.

Distributed everything


It's very hard to imagine this cloud that distributes services, because how do we do something like distributed security? How can you do security if you don't have somewhere that stores passwords safely? How do you do security if there's no firewall? Everything is just on the edge. How do we do identity in a distributed way if there is no place that's guarding a password? How do you do identity if there's no central agency to say that this is validated and this is not? How do you do authority if there's no central guardian? It seems impossible, but in fact we have already an example in Bitcoin, the peer-to-peer currency where security is guaranteed not by a bank, but by the distributed accounting of the technology behind the core block chain. A block chain is a very clever way to distribute in a cloud manner, because the security, authority, and identity of individuals do not reside in any

one place. That's why a lot of Silicon Valley startups and Wall Street are now investing a lot of money into block chain technology. It's an example of how we can do a distributed service on the cloud. Healthcare, education, and making predictions and forecasts are all things that could be done in a very different way on the cloud, in a way we don't actually know how to do yet, which is why it's a great opportunity.

Truly global society

So, we have one very, very large planetary cloud, which basically presents lots of challenges for nations, states, corporations and individuals. How do we run this, because we don't have experience at this level? In fact, the cloud is expanding so fast that it's going to exceed even the total computational resources of all humans on this planet very soon. So the future is arriving very fast.

You're not late

It's very often difficult to believe the future. If I was to go back and talk to someone 20 years ago about what we have today, they would find it very difficult to believe. Wikipedia? Impossible. I think we have to believe in the impossible more often. We have to kind of loosen our minds up a little bit. The other thing that we know about the future is that we're just at the beginning – day one of this cloud. I can be pretty sure that the greatest products of the next 20 years have not been invented yet. In 20 years, we'll be talking about things that don't exist today. And so that means that you get to invent those greatest products. And that means that you're not late. 

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