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5 Innovations That Could Shape the Future

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There's a scene in Noah Baumbach's film *While We're Young* in which a group of friends, in conversation, is trying to recall the name of the almond-based "candy that they sometimes make into pigs or little fruits."

After a few seconds of thinking and a few failed attempts at recalling the word ("I want to say baklava, but that's a Greek dessert…"), one character, played by Ben Stiller, reaches for his phone to look it up.

But that move is thwarted by his conversation mates, a couple of idealistic young hipsters who suggest they try to remember it on their own, insisting that looking it up is too easy. And when that fails, the young man played by Adam Driver suggests an alternative to Googling. "Let's just not know what it is."

This attitude takes its place alongside the couple's other deliberately anachronistic quirks—eschewing laptops in favor of typewriters, watching movies on a small-screen tube TV with a built-in VCR, choosing secondhand clothes and old ten-speeds and vinyl records—to display their preference for impractical quaintness over modern efficiency.

But for a couple of 25-year-old urban Americans, the idea that information isn't immediately accessible online is as stylishly vintage as a mid-century hi-fi or a forty-year-old Bowie t-shirt. And that film was made in 2014. I, for one, had only had a smartphone for four or five years. But in that time, the notion of just not knowing–of not reaching for instantly available information—had become so anachronistic as to be charming.

That twee slice of life can be a reminder that such a banal act—searching for "marzipan"—relies on innovations and infrastructures that only reached maturity a decade or two ago and that are now so ubiquitous that the idea of not using them is played for laughs.

Today's innovation is tomorrow's ubiquity. And it's technology that gets us there.

Here are five technologies that are still in early days (at least when it comes to widespread adoption) that may prove integral to the business models of tomorrow's CSP.

Industrial IoT

When we talk about the Internet of Things, there's an instinct to visualize connected refrigerators and smart parking meters. These are the sorts of use cases that were trotted out when IoT first started to gather momentum, and they still leap readily to mind. But there's a heavy-duty world out there where IoT is making big, big waves.

A recent Forrester survey, as reported in Forbes, shows that industrial products lead all industries in IoT adoption rate at 45 percent, with another 22 percent planning to adopt IoT in the next 12 months. In a report on the topic, Capgemini notes that motorcycle manufacturer Harley Davidson invested in a fully IoT-enabled plant and saw success by several metrics: OPEX dropped by $200 million, downtime was reduced, build-to-order cycle was reduced by a factor of 36, and profitability rose by 3-4 percent. Forbes also reports a Statista prediction that Discrete Manufacturing, Transportation and Logistics, and Utilities will each spend $40 billion on IoT by 2020.

This is a massive area of growth, and it's clear that assembly line robots and autonomous bulldozers and utilities need a level of reliability and security that your toaster doesn't. Everything powered may someday be connected, but the big machines are among the most mission-critical.

Artificial Intelligence (AI)

Per Gartner, AI hit peak hype last year, but those familiar with the annual Hype Cycle know that the peak precedes a valley of deflated expectation and then, crucially, a period of workmanlike productivity when the real work gets done. AI is broad, so I'll clarify that it was machine learning and deep learning—as well as such related technologies as virtual assistants and autonomous vehicles—that peaked. Other technologies such as artificial general intelligence are still off in the distance.

But the investment in all things under the AI umbrella is happening now. Just in recent weeks, IBM unveiled a new line of servers that can handle AI workloads, SK Telecom announced that it is developing an AI accelerator, and Microsoft acquired AI startup Bonsai.

A **study by Huawei released at the end of May** said that AI could double the value of the digital economy by 2025, from $12.9 trillion in 2017 to $23 trillion just seven years from now.

There is no way to tell where the AI train will take us, and any discussion of the subject tends to segue into weighty topics like universal basic income or malicious machines. But there's no denying that, here and now, various forms of AI are gaining steam—with deeper applications on the horizon.

Liquid infrastructure

The idea here isn't new. Networks are increasingly virtualized, and enterprises have global footprints that require rapid provisioning and a great deal of flexible connectivity, scaling bandwidth up and down as necessary to support massive cloud environments. Enterprises shouldn't have to worry about provisioning, and the rise of technologies like intent-based networking help to ensure that, even at the CSP level, many of those processes are automated.

However, as Dieter Gerdemann recently laid out in TechCrunch, there are new challenges and opportunities for CSPs in an era of the on-demand mindset. Enterprises and a variety of other subscribers aren't always happy with their service. He cites startups such as Waltz Networks (which emerged from stealth a few days later as Mode) and Redtea Mobile, envisioning a world in which CSPs are an expensive middleman that moves too slowly and can be cut out of the interaction. This scenario is something he calls "Uberization of telcos."

"Today's hybrid businesses bear the burden of managing multiple networks, because no single network offers the right combination of reliability, cloud flexibility, and internet affordability," said Mode co-founder Dr. Nithin Michael in a statement as the company exited stealth. "Our breakthrough in routing efficiency allows Mode Core to deliver all three benefits in a single network. Mode Core intelligently shifts traffic in milliseconds, dynamically adjusting to network changes and traffic flows."

Gerdemann concedes that the telcos own assets that are difficult or impossible to replicate in most markets, but he insists that they still run the risk of being marginalized if they don't find a way to extend the innovations of companies like Mode out to their subs rather than directly competing.

This is certainly not the first time CSPs have faced that kind of "embrace the future—even if it means death by a thousand cuts—or go down in flames" message, but if companies like Mode continue to gather speed, it could be a warning worth considering.

Augmented and Virtual Reality (AR/VR)

I came of age at a time when virtual reality seemed to be just around the corner. I remember when *The Lawnmower Man* was released, and let's just say I had a fair number of classmates who were concerned about where this technology was headed. We'd lose ourselves in the machines, man! And from there the technology crept further and further into a certain brand of pop culture: *Johnny Mnemonic, Strange Days, Virtuosity, The Matrix.* On and on it went. This was our future: never knowing the real from the artificial, losing ourselves in computer-simulated dream worlds.

But I also remember trying out a Nintendo Virtual Boy at a Service Merchandise department store right after its release and being… underwhelmed. This is what was going to take over the world? I thought to experience virtual reality you needed to be strapped into a human-sized gyroscope in a neon bodysuit.

The hype cycle has been oh-so-long, but we really do seem to be getting somewhere. AR/VR/XR startups raised $3.6 billion in funding in the last year or so. Analysts CCS Insight predict 22 million VR headsets will be sold this year, pushing the AR/VR device market to $1.8 billion. Deloitte predicts that direct AR revenue will reach $1 billion by 2020 [PDF].

The tech is really solid, and becoming more affordable all the time. And CSPs really need to prepare for the bandwidth influx, as well as the many impacts widespread AR/VR adoption could have on the smartphone market, home-based entertainment, and a variety of other offerings.

In many ways, the success of this innovation relies on the success of another:

5G

Yeah. It's coming. It's probably overhyped. But if it lives up to a fraction of its potential, it could make everything else on this list shine that much brighter. For more on 5G, read pretty much any article about innovation in any publication anywhere, and we've certainly covered it extensively in *Pipeline*.

While 5G seems a bit of a loss-leader itself, the innovation and use cases built on top of it stand to change the future. It's the low-to-no latency, speeds, and reliability that lay the foundations for self-driving cars and other mission-critical applications.

Will any of these innovations be as transformative as they have been set up to be? We have no idea—yet. But rather than delightfully choosing to just not know, we can do our best to stay primed for what's next.