TELCO FORGE

Structural Bottlenecks to Telco Innovation

Executive discussions on the gap between technology invention and commercial success in telecoms.

INTRODUCTION

TelcoForge gathers senior telecoms professionals under Chatham House Rules to debate key issues they see affecting the progress of the telecoms industry. This mini-report brings together information on one such discussion.

During the last few months the Leaders' Reports have highlighted some of the dissatisfaction and structural problems prevalent in the telecoms market. Repeatedly, executives expressed scepticism about the ability of the telecoms ecosystem to innovate its way out of some of the problems it faces.

As a result, we took a deep dive into the structural elements that either enable or hinder innovation within the telecoms industry.

- Is innovation desirable within telecoms?
- If yes, what prevents innovation from taking hold?
- How are there so many start-ups and new technologies if the industry isn't innovative?
- Are there pressures on the industry which should incentivise greater innovation?

This paper makes no pretense to be a complete survey of the problem of innovation in a complex industry. However, it highlights the perspective of senior executives and illuminates what is on their minds.

Some of the conclusions are complementary to our report "Are telco's big players ripe for disruption?"

EXECUTIVE SUMMARY

The telecommunications industry faces a fundamental paradox: while technology evolution proceeds rapidly, the sector's relationship with innovation remains deeply problematic. This report, based on insights from senior executives across the telecoms ecosystem, examines the structural bottlenecks preventing the industry from innovating its way out of persistent challenges.

- Conservative Culture Dominates: Telecoms providers operate in an environment where service failures have massive reputational and financial consequences. This creates psychological disincentives to innovation.

- Financial Incentives are Misaligned: The industry's structure as a financial delivery mechanism for shareholders rewards cost reduction over breakthrough innovation. This short-term focus has led to the divestment of critical R&D capabilities and infrastructure assets.

- Talent Pipeline Crisis: Academic programmes in telecoms engineering face severe student shortages. The talent bottleneck threatens the industry's innovation foundation.

- Start-up Ecosystem Dysfunction: The industry systematically undermines external innovation through its treatment of start-ups.

Critical threats to the status quo are emerging; not least:

- Unlike traditional competitive threats, the telecoms sector faces potential replacement, for example by hyperscaler-infrastructure partnerships.

- National security concerns and supply chain sovereignty requirements demand more radical innovation to reduce dependency on foreign suppliers.

Despite structural challenges, there are promising avenues for telecoms players to take a major role in emerging ecosystems. However, it would require an appetite for more radical business model innovation than we have seen in a long time.

Innovation bottlenecks ultimately stem from misaligned incentives throughout the value chain. Change requires persuading stakeholders—from shareholders to governments—that their objectives are better served by fostering cultures more amenable to innovation.

The following pages dive more deeply into the interrelated challenges identified by the professionals involved in the Leaders Meeting discussions. The full report includes discussion of how the changing dynamics of the telecoms industry are changing the urgency for centres of innovation to be changed, proposals for how to accomplish this and much more

IS INNOVATION DESIRABLE?

Telecoms service providers have an anomalous position compared to many other industries. This drives a somewhat problematic relationship to innovation. While technology evolution takes place rapidly - some might argue that it's too rapid to keep up with - the outcomes of it have so far not radically altered the fundamental nature of telecoms service providers or their offerings since the addition of data to voice.

In part we might say that telecoms' success at becoming a fundamental part of life and a key element of national infrastructure is to blame for this. Like utilities, any failure of service is impactful to people who depend on it. The negative outcomes of failures - in terms of publicity, reputation, financial loss and bureaucracy - are much greater than one might find if, for example, a car manufacturer shut down for a day. As one participant noted,

"Operators are measured on dropped calls, throughput etc. So you want to be conservative, you're not going to disrupt anything because you might break the network by 0.1%."

Moreover, this reliability of service is expected in an environment which, by its nature, tends to be highly dynamic. This creates some conservative thinking even with the best will in the world.

"For telcos most of the time the challenge is network stability. You don't know when your cable will be cut by developers; and then the power level, Db level, all these things are all some of the important challenges they are facing at any point of time. Now when we talk about some level of new innovation - of adopting open networking and other things coming in they think "OK, I have a team which is working closely with the Ciscos and the Junipers of the world. Even then I have to struggle meeting my SLAs and everything. Now you are bringing me something new. I know that it has a value, but how am i going to manage it?""

As a result, there are psychological disincentives to technology innovation. Added to that, the sheer longevity of people in the telecoms industry - where average ages are continually rising - leads to innate conservatism.

"Basically the guy who designed the network and laid the network many years back is still there saying "Things are working. Let it work as it is!" Nobody wants to change it, though new technologies or new services are getting added. It's gone through the rigorous testing process and everything."

Notice that phrase: "though new technologies or new services are getting added". This sums up the reason behind telecoms' habit of layering systems and technologies rather than replacing them. Deploying something and having it work fine first time is rare, as anyone who uses the phrase "in beta" will attest. In an environment that rewards stability, this is a thoroughly rational response. The only downside is that we end up with massively complex systems of systems accreted over time, rather than streamlining based on the best available capabilities.

MARKET PSYCHOLOGY

Risk aversion is a natural response to some pressures, and there are times when it is rewarded by the markets.

"Most large telcos started off as government entities where they were monopolies, and that mindset still is heavily embedded. As per Adam Smith, they'd much rather be rent-seekers than innovators. So they constantly seek to get a point where they *don't have to* innovate."

Indeed, monopolies or oligopolies tend towards rent-seeking behaviour. While it might not be in the best long-term interests of customers, it may well suit the shareholders. One example of such behaviour from the UK might be found in the scandals over privatised water supplies, which has delivered a decline in water quality and a reduction in infrastructure investment alongside higher bills.

This begs the question of whether we should view telecoms services are inherently monopolies or oligopolies. If there are pressures to reduce a monopoly position, this bottleneck to innovation may be reduced or eliminated.

The sheer cost and time involved with innovating at the network level creates some barriers to implementing technology innovation. Again, much of this is to do with creating a long-term reward for investors.

"On the operator side, they definitely have a mentality of sweating their assets. I was involved heavily in fibre and DSL in the 90, and I remember Ivan Seidenberg (Verizon CEO at the time) saying "Your DSL is a great interim technology for the next 25 years.""

However, there is also a certain psychology owing to the fact that the telecoms industry these days is very much the domain of people in middle age and upwards. Many senior executives have been through a series of battles already to get where we are today, with networks that by and large work.

As a result, there is a certain degree of inertia. Not only can we see that play out with network designers who don't want to undo their hard-won successes in building things that function, but there is also - whether explicit or implicit - more awareness in many professionals that whatever telecoms looks like in the mid-2030s, they are not going to be involved. Individuals will respond to this truth in different ways, but not all are constructive to the long-term health of an increasingly complex and fast-paced industry:

"I've heard a CISO of a major telco telling me. "I'm not dealing with that quantum stuff because it all sounds like science fiction. And even if you're right and this will be a danger for us, I will be retired at that time, so I don't care." Now this is a real quote, I tell you. And it's incredible. I mean, it's a completely reckless way of thinking."

While that is an extreme example, there are going to be more people who have a few years left to work through and just want a quiet life in the meanwhile. It predisposes some people towards inertia, quite understandably, because they won't reap the rewards of action.

OPERATIONAL BOTTLENECKS

Unsurprisingly, some of these constraints set by the wider market become reflected in business' processes and priorities. Their design can also help or hinder the creation of opportunity for commercial innovation.

In some cases this is a strategic play to prevent innovative rivals from taking hold in the market:

"The most recent disappointment – mobile unlicensed spectrum. CBRS was intended to be Wi-Fi for telco; fully unlicensed, available to everybody. Then they immediately carved out some priority spectrum, some licenced spectrum, and even now they're trying to kill it.

If you look at the Wi-Fi world compared to mobile, we really should have some degree of truly unlicensed spectrum that will drive a lot of innovation. We can never innovate in mobile because you have to have spectrum; spectrum is owned by the operator; and there are only three operators in the country. So you have to convince one of these three guys to do something."

While this observation harks back to earlier comments about rent-seeking behaviour, it is arguably a normal part of the cut and thrust of twenty-first century capitalism.

Rather more worrying are the internal operational bottlenecks which can prevent companies from taking advantage of opportunities which come their way.

Image by Anita S from Pixabay

"A real life example. A major bank in this country goes to the largest telecom operator, saying "We need to be quantum safe, we need to test or to start installing quantum communication between two of our datasets. Can you help us with that?"

Their answer? "Yeah, that's interesting. We have looked into this, but before we start investing in this area, testing equipment and so on to provide the service, we need at least 5 or 10 customers who would be interested in that service, otherwise the investment would not pay off."

So after a couple of months' back and forth, the bank decided to go directly to a company providing quantum equipment. And they worked together with Google to provide the service. And what is left over for the telecom operator? To sell them fibre."

INVESTMENT PRESSURES

“A telco is much more of a financial vehicle that goes in and out of private equity. It goes in and out of investors and there's definitely a “sweat the assets” mentality.”

As has been previously observed, the nature of telecoms providers - not as companies but as financial delivery mechanisms for shareholders - can often create incentives which work contrary to the long-term benefit of the company.

“I do think the telco industry itself is a little short-term with some of the decisions it's making For example, who pays for cell towers? Selling off all your towers to a third party, giving up a fairly core part of your network, don't be surprised when that body later turns around and sells your towers to one of your competitors. Now you've enabled the over-the-top guys to just come buy radio capacity direct.

“There are certain assets you need to own if you want to monetise and be vertical. If you purely want to be a virtual operator then you don't need to own any assets at all. Maybe that's where the telco industry heads down the road in two decades’ time, where infrastructure is procurable as a service - network as a service, radio as a service, AI as a service, fibre as a service - and you just construct a marketing-focused company based on that.”

Indeed, pressure from shareholders for regular dividends tends to reward very specific types of innovation. Principally, deploying innovations that reduce costs structures will be welcomed. This is particularly the case when vendors offer sales models dependent upon cost reductions, which essentially offload the risk to the supplier.

By contrast, commercial innovations and new growth tend to require investment which will not pay off for several years, if at all. In other words, as one participant noted:

“Telcos’ organisation structures and reward structures do not necessarily pay you or reward you for making the next big breakthrough.”

Another concurred:

“There are loads of innovative things in the standards. But operators say “Well, what's in it for us? Why do we want to do this?” Or, “We just don't have enough margin.””

Image by Ivca on Pixabay

ACADEMIA: TALENT BOTTLENECK

The foundations of the telecoms industry have always been rooted in academic research, from the days of Nikola Tesla onwards. Participants were emphatic about this being an essential driver for further innovation in the industry.

"I'm strongly convinced all the little seeds we put in pay off. It's where we got to this whole talk about edge compute, by investing in the Carnegie Mellon labs about 10 years ago."

However, there is a fundamental risk to the health of the telecoms industry at present.

"Let me tell you what's *not* the answer to your problem, and that is reducing government funding on academic research. A lot of innovation gets percolated through universities or, at the very least, when those PhD researchers graduate and end up in industry. They need to have the basis of their university research history in order to be effective in those spaces."

Indeed, many countries do continue to announce substantial investments in telecoms R&D funding. Countries across the EU, North America and elsewhere. This should suggest a vibrant environment with no bottleneck, but it masks a more fundamental challenge with the numbers of students feeding in at the bottom of the funnel.

It is not hard to find reports on Google about shortages in student numbers for telecoms careers, especially in engineering subjects. India, North America, Europe are all affected. However, behind the scenes educators are highly concerned by the shortage of uptake for graduate positions in particular.

One European leader in the field noted that since the COVID-19 pandemic the decline in numbers has been severe at their university; this year they might have one-third as many students on their graduate programme as in 2019, despite being well funded and well reputed.

The reason also seems quite clear; the supply of graduates who would once have studied radio engineering or other aspects of telecoms have seen that there are more opportunities in other careers; notably AI today.

Addressing this bottleneck would require serious work in itself (and it's something which TelcoForge is planning for the future). However, the ramifications are both short-term and long-term in nature.

"In general, if we don't have a bunch of researchers with fairly stable funding to train the next generation and doing the next generation of innovations, test labs, pilot studies, reference architectures - all the stuff that comes out of those units – then we're losing the channel of innovation and that would be a real mistake."

FIRST-MOVER PROBLEMS

"My first recommendation to anybody is never, ever do a telco startup."

While there are many innovators in the industry, there are often concerns not just about being one, but also with working with them. Adopting an unproven technology or service adds risk which - as previously noted - is not rewarded by investors. That resistance to change scales based on the size of the changes required to make it work; and not only in technical terms:

"When you when you have something which needs a complete transformation of the customer mindset, transformation of everything, it's a long journey. And this is where we are seeing a lot of challenges."

Far safer for potential customers to to watch what a different first-mover company does before taking the plunge themselves..

"People used to always complain about "Oh, satellites can't do this. It will always be expensive. It's such a complex job. When you launch a satellite, it has to remain up for 25 years, etc etc." And then suddenly, as soon as Starlink was launched, the whole thing changed. Suddenly people realised there are a lot of things we can do with satellites. We are no longer worried about that 600 millisecond round trip time."

Not every company can be a Starlink with their scale of backing - and this is a problem.

The industry is designed to abuse and make startups fail. I put this on the operators.

Recently we went through the Open RAN experience. I tell you that for every early proof of concept, no matter how small - 30 units, 50 units - the operators expected it to be fully funded by the vendors.

At the end of the day, the operators are the ones that are going to benefit from the innovation; they have to put some skin in the game. At least pay the startups for the equipment they use.

This is why there are no startups left by the time they get to the point where the technology is mature enough to deploy - they've burned through all their money. The operators have dragged it out for multiple years, and then the big players sweep in now that it's all standardised and working and implemented.

ACKNOWLEDGEMENTS

The TelcoForge team would like to thank the senior executives for their time and insights making this report possible.

We look forward to many other constructive insights.

Leaders' Meetings take place monthly on an invitation-only basis. Executives on the invitation list have no obligation to attend but may propose an alternate participant if they are unable to join.

Please contact TelcoForge below if you would like to:

- *Nominate a colleague or be nominated to* ***join the invitation list*** *for monthly Leaders' Meetings.*
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