Bell Labs Consulting

The 5G innovation dilemma – a grand challenge

A call to action for change

NOKIA BELL LABS

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Synopsis

Despite massive capital investment in network technologies over the last 10 years, the global telecommunications industry has witnessed the traditional business model become increasingly commoditized and subscribers' willingness to pay, remain flat. Consequently, CSPs are seeking growth strategies comprising added-value portfolio and alternative business models within a complex and emergent context of dynamic network architectures, the fourth industrial revolution, next generation internet and growing demand for environmental and social consciousness. To solve this grand challenge, CSPs must assemble superior systems of innovation activities well beyond their own capabilities and as such fully harness the potential lying in ecosystem capabilities. CSPs able and willing to embark on this new journey set themselves up for concurrent and sustainable revenue and EBIT growth, thus achieving dual competitive advantage.

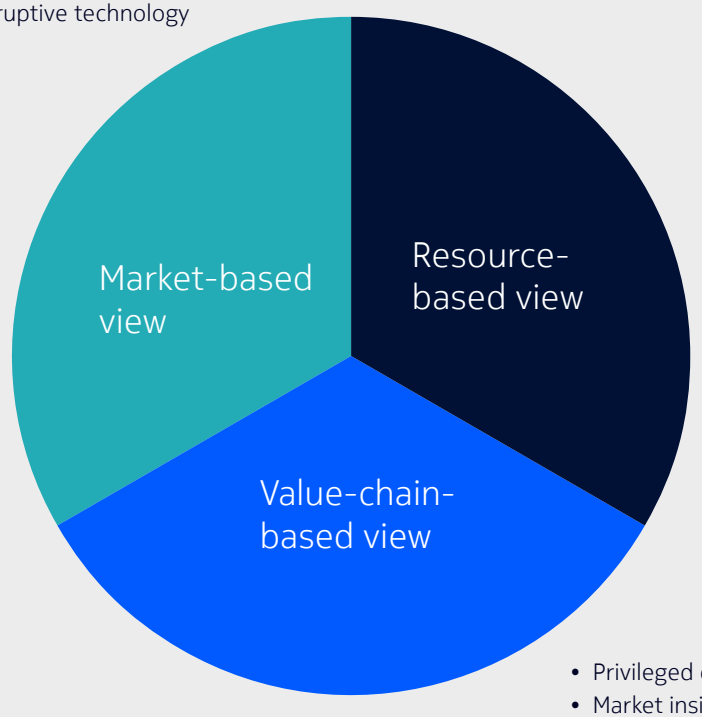
This whitepaper explores how CSPs can reorientate for sustainable dual competitive advantage — meaning 'consistent economic added-value over time in an ethically responsible manner'. We first examine why and how CSPs have historically organized and measured systems of activities to capture value. Thereafter, we examine a range of models and new CSP practices to prepare their organizations for growth in the 5G and 6G eras. Finally, the paper proposes a digital congruence[1] model and measurement system to enable CSPs to orchestrate market insights that inform dynamic innovation activities across the value chain to create valuable, rare and inimitable resources.

This document is a comprehensive study of why, what and how to sustainably monetize 5G and, because of this, has been written in two parts. We felt it necessary to offer a solution as to 'how' to pivot towards change, because while the industry has seen many whitepapers claiming the potential for CSPs to monetize 5G, little has been done to answer one profound question 'what must be true, for this to happen?'

1 - The digital congruence of an organization measures the degree of alignment of its culture, people, structures and activities with the business strategy, emergent opportunities and challenges of digital environments, which we will elaborate further below.

Figure 1. Interlinking strategies for dual competitive advantage (Zenger)

- Competitive dynamics
- Emergent customer needs
- Disruptive technology



- Network assets
- Human capital
- Cash
- Knowledge
- Insight and foresight

- Privileged data
- Market insight and foresight
- Rare and inimitable resources
- Innovations
- Customers and value chain

A look back at what telecom sector growth is elusive

Nowadays, it is almost impossible to find a movie theatre without at least one Marvel movie playing. Back in 1996 that was far from the case. That year, Marvel filed for bankruptcy after suffering a series of major setbacks during its initial foray into film. Its future was far from certain. Thanks to a merger with the toy company, Toy Biz, and the success of films like Spider-Man and X-Men, Marvel turned its business around, eventually being purchased by Disney for $4B in 2009. At the core of the turnaround, there were three strategic principles:

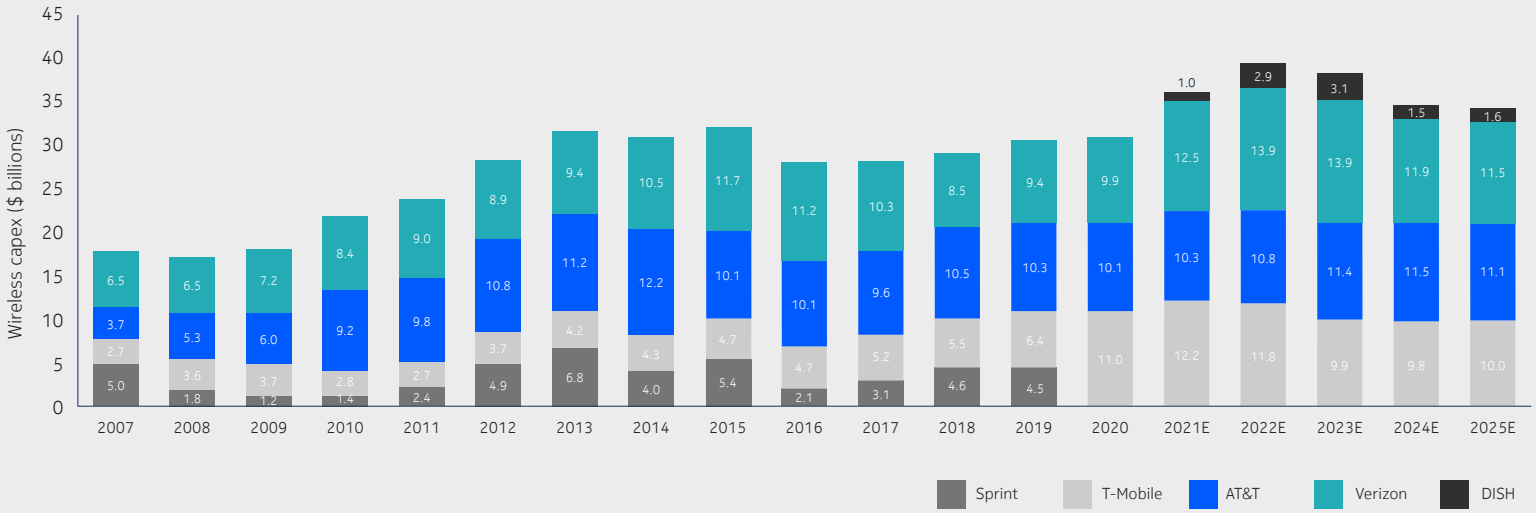
1. Leverage core assets
2. Develop long-term positioning and ruthless organizational core and context
3. Totally reinvigorate culture and talent to enable experimentation and innovation.

The telecom sector has a similar strategic problem to solve, as the industry heads full steam into deploying next-generation technologies and the next industrial revolution. Blends of business, technology, regulatory, organizational, portfolio and pricing strategies are being explored to capture 5G value and indeed, lay the foundations for the 6G experience. Bringing these strategies to bear in concert presents a host of emergent barriers and complex change, including the hardest change we all face – ourselves.

The impact of the telco industry structure on CSPs' ability to sustainably grow

Despite CSPs' continued and, indeed, record CAPEX investment and COVID having amplified the importance of telecom networks, subscribers' willingness to pay has remained flat since the 3G era. During 2022, the US market is forecast to invest $3B CAPEX in network technologies and $8B by 2025 (figure 2). Nonetheless CSPs

Figure 2. US telecom CAPEX spending 2007–2025 (Light Reading)



struggle to generate increased return on invested capital, because CSPs continue to acquiesce to their subscribers' demand for more value, including uncapped plans, which potentially forces 5G into yet another commoditized technology. As already witnessed, many of the 5G monetization strategies implemented to date in Asia and the US are trading all-you-can-eat tariffs (AYCE) for just a few extra dollars from each subscriber per month, and the popularity of these tariff plans is growing.

While this provides some early growth on the back of 5G investments, the question it begs is what CSPs can do next to generate more value, once this offer is prevalent in the market? As one Italian CTO recently said, "it's bizarre that in this country people are unwilling to pay more than €15 a month for an all you can eat tariff but will gladly pay the same amount for a pizza".

Understanding why the structure of the telecommunication industry makes it difficult for CSPs to find strategies for growth is key:

1. Each market is served by a few CSPs that compete intensely but with insufficiently differentiated value chains and services
2. For networks to interoperate, CSPs must agree to industry standards and timelines, which results in technological competitive parity between players
3. Differentiation through content ownership is often prohibitively expensive or is otherwise hyper-local.

Consequently, the industry structure propels CSPs into intense competitive rivalry and differentiation between players is low.

The price of differentiation

To respond to increased competitiveness, CSPs have made multiple attempts to innovate, license or acquire multimedia services and other portfolio assets to drive uniqueness and differentiation by offering more added value into connectivity services offerings. The problem this strategy presents is that unless the CSP has an epically large balance sheet and resides within a massive market, the margins for added-value services have been slim or, worse, loss-making. Recent examples include AT&T's restructure of media assets, BT paying circa $1.5M per game to license Premier League football, and as reported in 20minutos.es back in 2018, Vodafone Spain was quoted as saying, "In Spain, it is more profitable to lose all (football paying) customers, than to have to pay for football". While tactically it may make sense in some markets, bundling at these levels makes for very expensive customer acquisition and retention and is often strategically unsustainable.

Nevertheless, the industry has witnessed success in portfolio expansion through significant M&A activity. TELUS Canada, for instance, has made more than thirty acquisitions to uniquely address agriculture, health care, home security

2 Previously known as GAFAM (Google, Apple, Facebook, Amazon and Microsoft), GAMAM reflects Facebook's recent re-branding to Meta.

and other sectors. Clearly such M&A strategies have obvious limitations; hence, an alternative system of activities must be considered to develop growth paths.

Lessons from GAMAM players' ability to generate sustainable growth

Compounding the issue, CSPs' core and context strategies are often vertically integrated, which hampers their ability to generate a profound organizational theory for 5G value. Operating every operational activity from strategy, customer care, marketing and sales, down to a field engineer cleaning a filter in an air conditioning unit, generates internal distractions as leaders fight for resources and relevance, resulting in unintended consequences.

- Leaders over-compromise on the distribution of resources to ensure there is fairness and equitability across the organization
- Organizations cannot expertly innovate at the same scale and speed as organizations expert within specific disciplines
- The opportunity to leverage expertise and insight from the available value chain is missed or suppressed.

By contrast, when comparing the economic outcomes between CSPs and the GAMAM[2] players, we can see completely different financial performance despite operating within the same industry structure. A major part of the answer for the performance outcomes is derived from GAMAM players' commitment to a deep organizational theory that is able to create inimitable and rare resources, which they expertly and expediently convert into customer added value.

How TCO obsession drives wrong behaviors and unintended consequences

Given the issues of commoditization and jaded growth, attempts to protect profit quality have biased industry players towards non-growth key performance indicators (KPIs), especially total cost of ownership (TCO). Inadvertently, obsessing on TCO can be strategically problematic, as it drives a suboptimal

Figure 3. A comparison between the largest global CSPs and the GAMAM companies between 2011–2020 (Statista, BLC analysis)

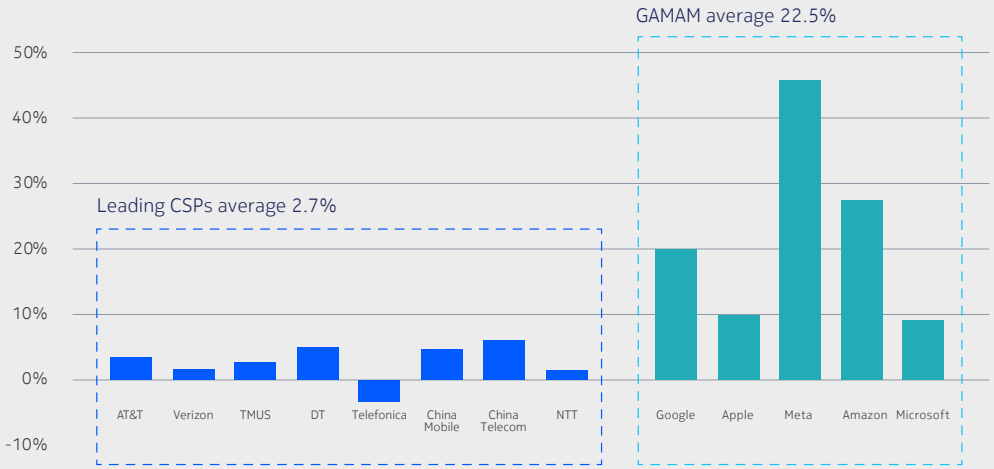
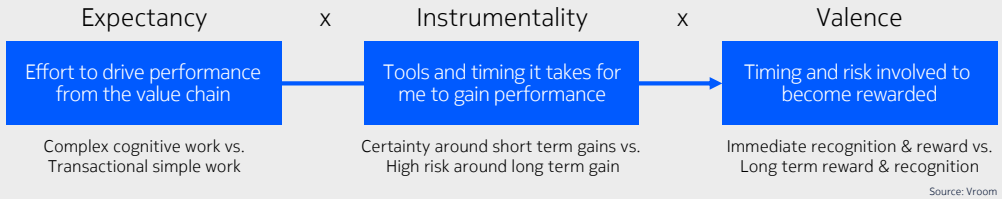


Figure 4. The bias towards short-term, transactional work vs. long-term, cognitive work



relationship dynamic and myopic focal point for both CSPs and their value chain partners to put their energies into optimizing for one's own profit.

Consequently, the enthusiasm to erode each party's potential for profit distracts from the relationship's potential to find new markets and revenue sources and does nothing to grow the pie. Despite being well-documented, the industry has done little to change its procurement-led approach, nicely framing the definition of the industry's collective insanity — continuing to do the same thing and expecting different results.

So, what does this mean in practice? In simple terms, every industry player, every function within each organization and every person within each function is measured on TCO. TCO-obsession drives a distinct corporate culture that infiltrates to the center of all leadership decision-making and mindset. Accordingly, key processes shift as much of the problem down the value chain as possible, which puts the value chain under constant pressure to deliver the same value (and more) at a lower TCO. The strategic consequence is that value chain partners obtain less profit, which limits R&D spend. This vicious circle has been a major contributor to OEM consolidation and, much worse, constrained innovation across the entire value chain.

To amplify the concerns, we must turn to social science and leadership research to consider what factors it takes to effect changes in human behavior. In her book, Act Like a Leader, Think Like a Leader, Herminia Ibarra talks about humans being 'narcissistic' and 'lazy' when it comes to networking and breaking away from legacy mindsets. Undoubtedly there is desire to do innovation work, but to do this well, CSP leaders must ensure their own teams and those of the value chain are intrinsically and extrinsically motivated and measured appropriately. As the model demonstrates below, most of us will avoid exposing ourselves to what we see as unnecessary risk, such as putting forward and driving ideas and innovation at personal and career risk, especially when not asked to and rarely rewarded. It is essential that the fit between the industry's desired outcomes for sustainable 5G growth and human performance measures be coupled as tightly as possible, if we are to see new behaviors and desired outcomes.

In summary, the structure of the telecommunications sector and emergent market forces has driven the sector to choose a mix of tactical outcomes to exploit the available resources. While some cost advantage has been gained, the focus and legacy strategies have put CSPs at a positional and economic disadvantage compared to competitors that are set up to pursue dual competitive advantage such as webscale players. Unless CSPs reorientate for future growth, the industry is certain of increased competitive rivalry and decreasing returns.

Reorienting to generate future added value at the digital inflection point

The next five years will see the continued launch and evolution of 5G networks that will enable multi-plicative growth in data rich services. Studies performed by Bell Labs Consulting, McKinsey and others forecast as much as 2X today's revenues, and potential value to vertical industries between $3T to $11T.

This technological inflection point provides CSPs a new opportunity to reorientate away from old revenue streams by exploring new business models and the value of increasing symbiosis between human, machine and software systems. Beyond growth, new architectures enable CSPs to capture efficiency gains and optimize profit quality through mass automation, thus achieving dual competitive advantage.

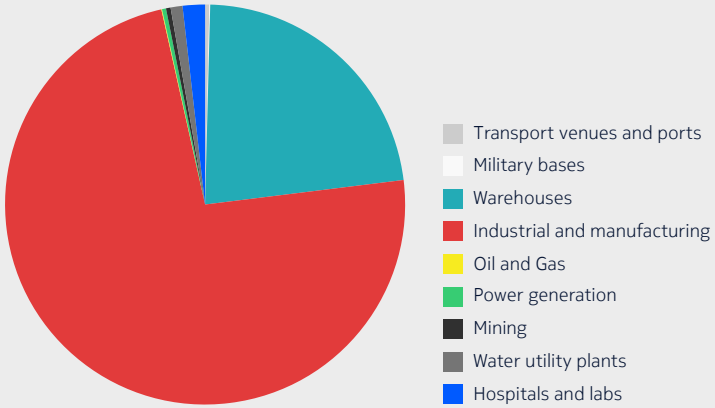
As CSPs explore this market potential, they are presented with three distinctly non-liner and uncertain problems – a grand challenge.

1. For CSPs to achieve their beyond-connectivity business strategy, the 5G value proposition will not be an 'off the shelf' solution; it will require significant invention activities to re-imagine services that drive increased willingness to pay by subscribers and result in future value for CSPs
2. Go-to-market and operational complexity grows exponentially with advanced subscriber demand and use cases, requiring complex coordination between interdependent systems across the value chain
3. Innovation ROI and competitive advantage cannot be confirmed until technologies and inventions have been developed and launched into the market, potentially burning retained profits.

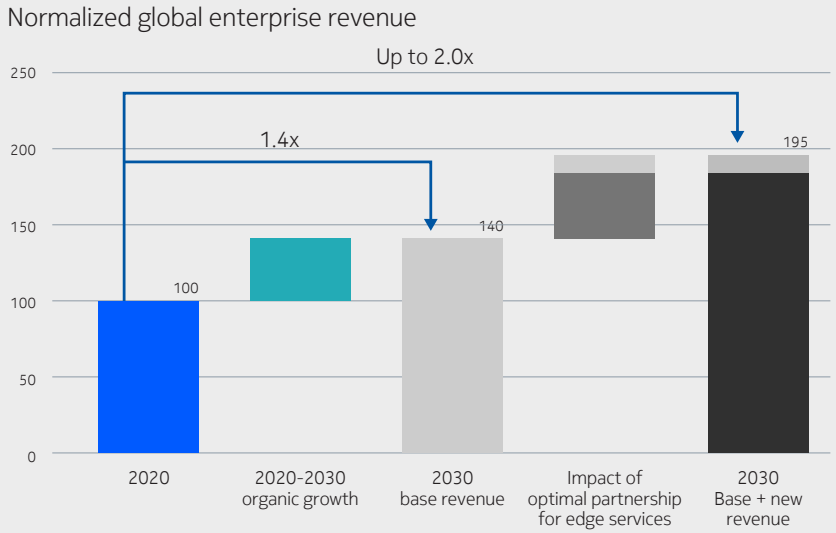
Therefore, to achieve dual competitive advantage, CSPs must abandon their TCO obsession and invent new systems of activities able to sustainably compete and recompete over time.

Figure 5. New addressable verticals have potential to double enterprise revenue

14M new private networks required for industry digitization



Potential to double enterprise revenues with a secure edge cloud



Source: Bell Labs Consulting

Building systems to enable dual competitive advantage

To properly examine the potential for dual competitive advantage, it is essential to examine a typical CSP value chain and identify why and how current financial and non-financial added value is generated. As CSPs embark on their 5G invention and innovation strategy, leaders must continuously assess the maximal value of the inimitable resources held by participants in the value chain. In other words, the value of any player in the value chain should be assessed relative to how easily it can be replaced. Webscalers have gone to assiduous lengths to build inimitable resources in the form of learning platforms, developer toolkits and fulfillment platforms, which when aggregated create enviable sustained competitive advantage.

This assessment method enables CSPs to measure their own competitive advantage precisely and objectively. The greater the inimitability and uniqueness in the system of activities, the higher the likelihood of developing a unique strategy and driving new willingness to pay.

The analysis above demonstrates how hard it is for CSPs to uniquely organize their value chain and, although access to the market is through the CSPs, especially for B2C connectivity, the strength of inimitability in the value chain puts the CSP in danger of hold-up positions.

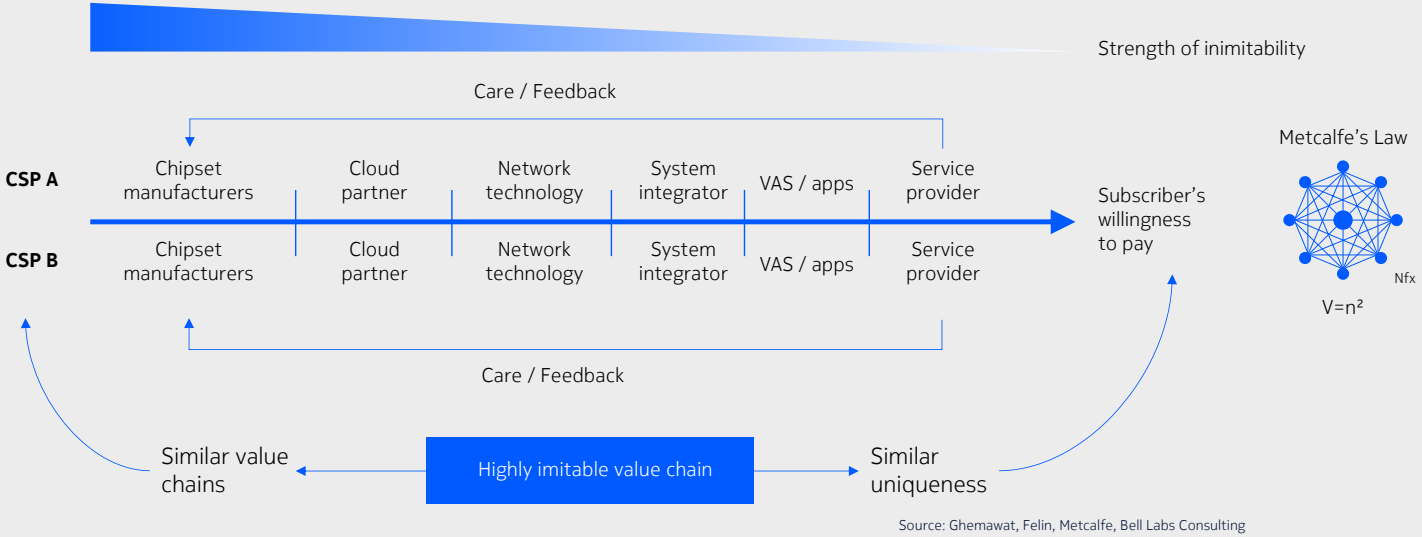
Similarly, while the total value chain benefits from an industry business model anchored in Metcalfe's law, i.e., the value of a communications network is proportional to the square of the number of its users, the value dynamic between players is heavily compartmentalized, which breeds sustained congenital problems that are antithetical to a CSP's innovation and growth.

- Conflict over desired ends is replaced by conflict over means
- Leaders often become an integrative bottleneck to the innovation process
- Cooperation and potential growth from network effects are undermined by self-serving motivations.

Alternatively, we can analyze the potential for a CSP's system of activities to develop a new market by examining the working mode between the CSP and the value chain. Through this lens we often observe value chains working in much the same way teams in an Olympic relay race work together. This type of sequential interdependency is highly suitable for processing activities in a high state of maturity, however, it does not lend itself to galvanizing the value chain's resources to explore the potential for beyond-connectivity 5G.

It is essential that CSPs and their value chains invent new ways of collaborating that promote higher degrees of reciprocal interdependency across the value chain. Creating value together will enable the CSP to shift into a 'Reed's Law' dynamic, i.e., many-to-many group forming networks (GFNs). As CSPs build intimately working GFNs, the willingness to share risk, resources and benefits will grow in lockstep.

Figure 6. Comparison between two CSP value chains



Source: Ghemawat, Felin, Metcalfe, Bell Labs Consulting

Figure 7. The classical approach to procuring network technologies, demonstrating pooled interdependency

Defining desired outcomes for a new sociological and technological era

So far, we have established that value chain and organizational reorientation are must-do strategies for CSPs to monetize 5G, however, a strategy without measurement is highly likely to see CSPs prone to strategic drift. Moreover, what we measure is changing in a rapidly changing society. As part of his speech to matriculating students in 2017, the Dean of Oxford's Said Business School gave a sound piece of advice, "decent profits, decently". Such advice is highly pertinent to an industry with stringent regulatory oversight and increasing levels of social scrutiny.

As CSPs roll out increasingly dense networks, they will be faced with growing institutional complexity and the conflicting demands of different stakeholders on how to deploy 5G and future technologies. Hence, CSPs wishing to address this concern within environmental, social and governance (ESG) agendas must fully incorporate ESG targets into future performance measurement and target systems.

When coupling the network and institutional complexity to CSPs' desire to innovate with value-chain partners, CSPs require transparent measurements to answer three top concerns:

- Are our operations congruent to the strategic goal of sustainability (decently)?
- Do our resources provide unique advantage over time?
- Are we achieving the desired outcomes for subscribers and stakeholders and are they profitable?

Measurement systems for an always-on, always-available URLLC network

Beyond the need to deploy networks 'decently', there are significant opportunities to exploit and explore the potential in future network architectures

via industry- and service-specific SLAs, such as ultra-reliable low-latency connectivity (URLLC). However, if CSPs want to offer consumable networks that achieve a contracted customer experience (CX) metric, CSPs' organizations must evolve their measurement systems as accordingly.

New measurements will be a major shift away from today's KPIs, which are built from a network-centric perspective, thus fragmented, complex and hosted in multiple disconnected systems. On a positive note, many CSPs have adopted new operating models such as the services operations center (SOC) model where service levels and some measure of CX is integral. These management systems, however, exacerbate TCO obsession by biasing towards efficiency versus innovation work or differentiated service experience.

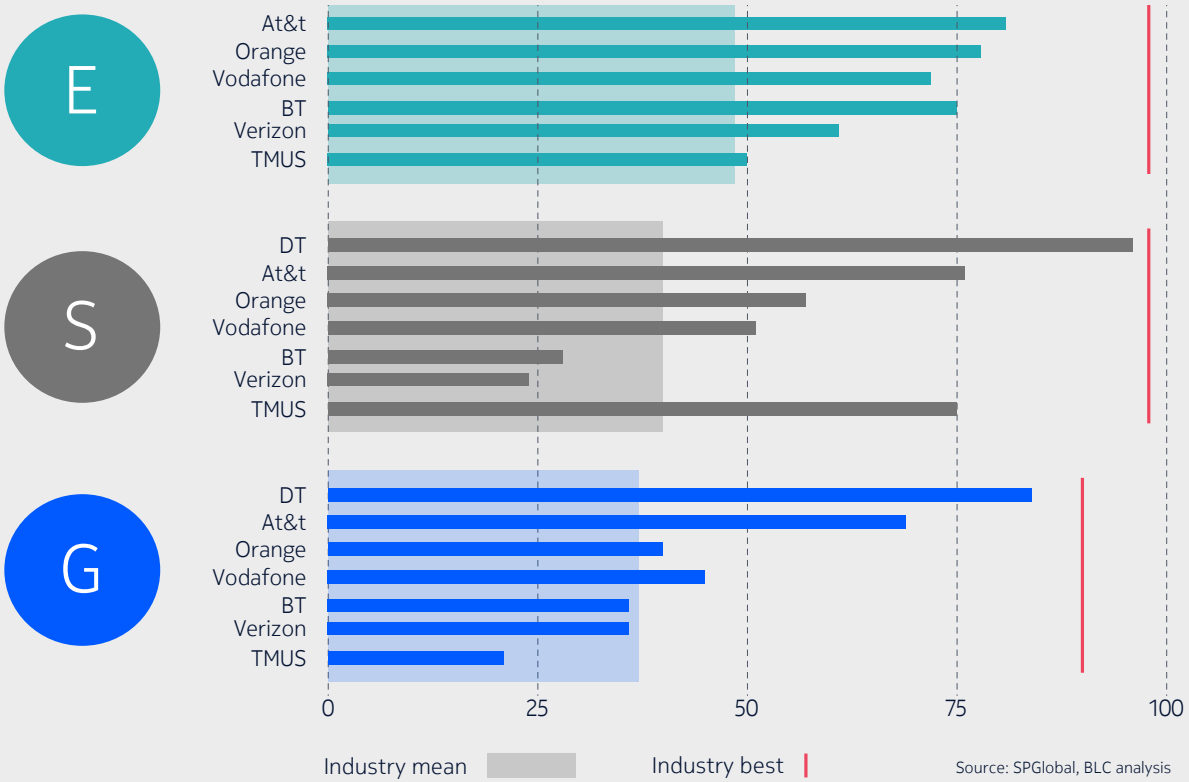
Incorporating ESG objectives into innovation and operations activities

In addition to the technical and service complexity as laid out above, CSPs must establish metrics within the context of ESG goals. Examples of this would be how to deploy network systems and devices in an eco-friendly fashion, which are estimated to already produce up to 2% of all global CO_2 emissions. Similar dilemmas exist for CSPs when inventing services with customer data and insights; how to ensure the security of personal information and assure subscribers that their personal and business data are respected? European CSPs have taken ESG strategy to heart with other markets keen to follow their example.

On the plus side, in a hybrid world — functioning with both video and in-person interactions — CSPs are already providing services, and could invent new ones, that lower environmental impact due to less commute-related pollution while promoting better social inclusion as families enjoy increased work-family balance. Being able to assess and measure the benefit against the negative impact of inventions will be central to the future positioning of CSPs.

By being in the driver's seat of this emergent technological age, CSPs have a unique opportunity to add value and prosper, but, to do so successfully, organizational and value chain congruence must be coupled to OKRs and KPIs that can regulate behavior and seek growth.

Figure 8. ESG comparison (SP Global, BLC)



The journey to digital congruence

The question of how to develop 5G strategy and monetization requires a multi-faceted yet elegant answer. Monetization is especially problematic for CSPs when the potential for technological disruption is so pervasive. Thus, the strategic objective of attaining and retaining sustainable competitive advantage over time is a CSP's ultimate grand challenge — an emergent uncertain[3] and often evaluative journey.

To solve this problem CSPs are assembling systems of activities highly tuned to sensing, shaping and seizing (3S) opportunities in the marketplace:

1. **Sensing** — a high-sensing capability across the value chain to identify threats and opportunities
2. **Shaping** — a resilient operating model that enables CSPs and value clusters to attain and maintain digital congruence to the 5G strategy while delivering dual competitive advantage outcomes
3. **Seizing** — a supportive governance structure and aligned OKRs and KPIs that enable the CSP and its value chain to pivot towards collaborative activities that generate sustainable financial and non-financial outcomes, while efficiently navigating institutional complexity.

Most critically, the 3S strategy shifts CSPs from creating advantage at a moment in time to sustaining their advantage over time.

Sensing

By way of best practice, we can turn to the insect world for inspiration. When bee and ant swarms need to find a new nest, they use scouts to identify candidate sites and then incrementally recruit others to accept the site until the hive agrees as a unit. This process is called 'quorum sensing' and is a process that can be used by CSPs if they build sophisticated sensing capabilities across the value chain. Ecosystems hold highly valuable

3 - As systems become more complex new uncertainties emerge that lead to increased risk. During these periods of emergent uncertainty systems can become unresponsive and no longer able meet their objectives without some form of reorientation.

insight and foresight well beyond the CSP's organization and can act as extended antennae for new opportunities and threats.

Also, by unlocking insight, foresight and cross-sight from the entire value chain, CSPs can rapidly identify opportunities as they emerge and, hence, pursue advantage within the harshness of the telco industry structure. This novel sensing approach significantly de-risks 5G and other investment strategies and ensures invention activities that avoid disconnecting from evolving customer demands and emergent threats.

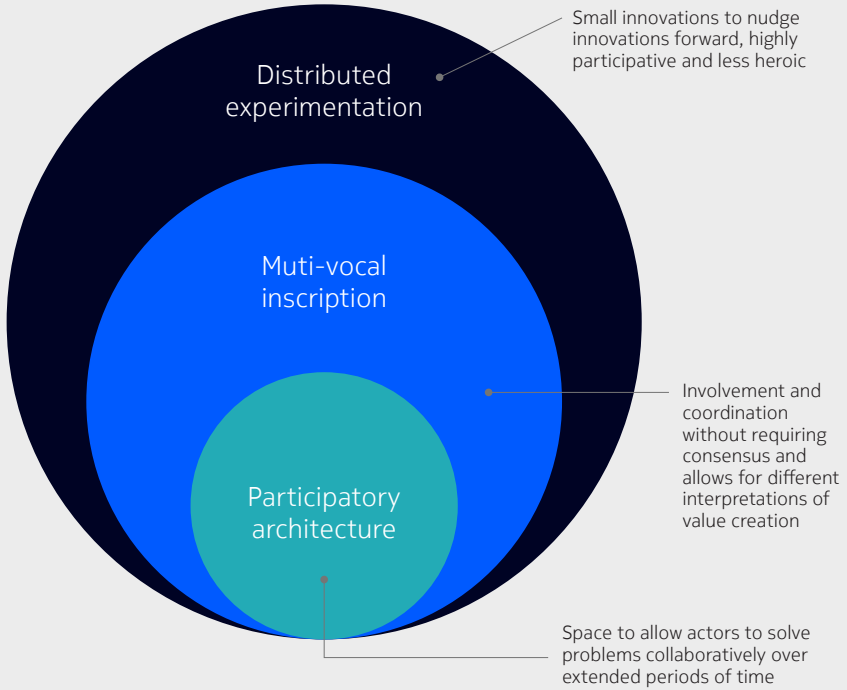
Shaping

The urgency for building systems that can evaluate and assess opportunities is amplified by the speed and complexity with which 5G, the metaverse, industrial operational technology and device/ecosystem software technologies are evolving. In this rapidly shifting environment, CSP leaders face multiple and complex organizational concerns as to how to build systems to solve future problems. Helpfully, there are models used by other sectors and firms well versed in solving grand challenges such as poverty alleviation and climate change. These sectors are expert at driving three interlinking strategies to explore and exploit the potential for value creation and problem solving.

This approach to solving grand challenges can already be observed within the telco sector, especially participatory architectures and distributed experimentation. These strategies are used to facilitate newly formed innovation factories led by or actively sponsored by CSPs. Two examples are the 5G Open Innovation Lab (OIL) in Seattle, working with T-Mobile US, and the Bell Labs' Solutions Lab, which focuses heavily on industrial IoT use cases. These labs are using constellations of invention between ecosystem partners and CSPs, to explore new ways for exploiting radio, edge cloud, network and AI/ML capabilities.

In OIL's use of the grand challenges model, innovation work happens between ecosystem players and T-Mobile, with OIL facilitating the participatory architecture with the membership. Actors within the architecture initiate many-to-many group-forming networks (GFNs) across segments and technologies to perform distributed experimentation. As different actors across OIL's membership share insight and foresight, multivocal inscription[4] enables participants to reflect upon the evaluative perspectives of other members, without being prescriptive as to how to solve the problems of 5G monetization. This is critical given that market contexts are different and the industry is at the early-learning phase of mass 5G monetization.

Figure 9. Strategies for solving grand challenges (Ferraro et al)

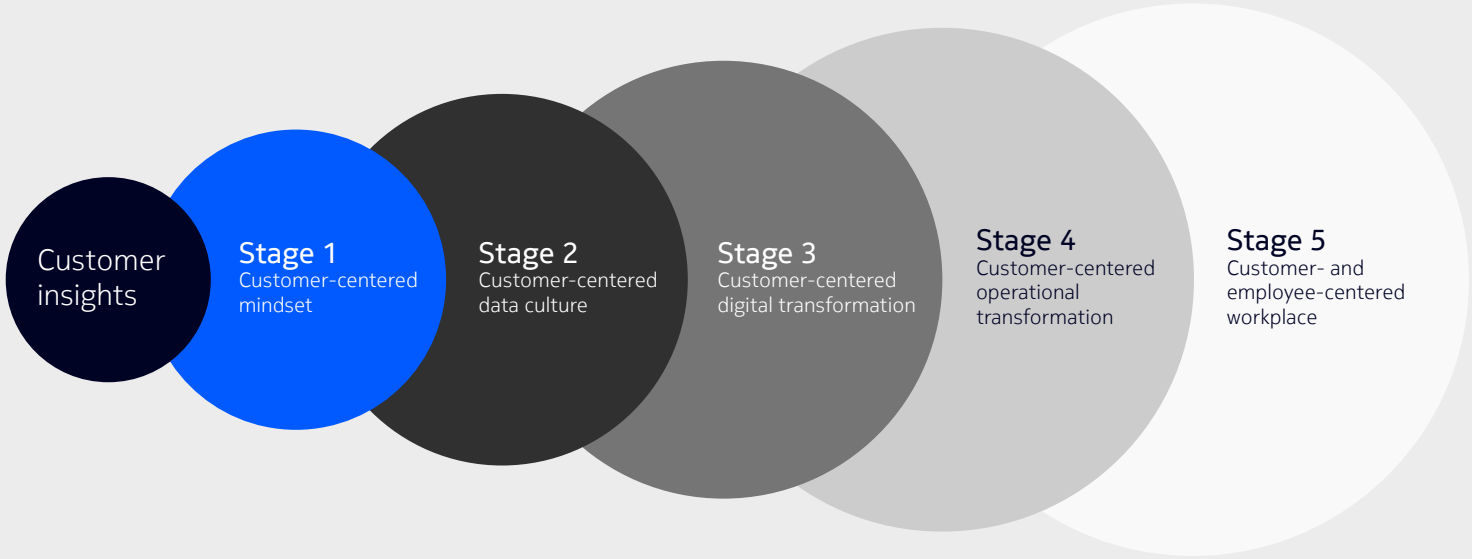


Furthermore, OIL's developer-centric approach is critical for experimenting on 5G monetization through ISVs (startups), exploring DSP-oriented services, and deepening collaboration between global platform partners such as Nokia, Microsoft, Dell, Intel, VMware, Palo Alto Networks and F5 Networks.

The challenge for CSPs is to bring these innovations into the main services portfolio. They often meet

4 Discursive and material activity that sustains different interpretations among various audiences with different evaluative criteria in a manner that promotes coordination without requiring explicit consensus (from the Open Source Ecology Wiki, https://wiki.opensourceecology.org/wiki/Multivocal_Inscription).

Figure 10. Five stages of building a digital-first customer-centered company (HBR)



classic legacy cultural inertia, 'not invented here' syndrome and the leadership's short-term expectations for ROI from invention activities. While adopting such frameworks has the potential to deliver significant benefits, the leaders must be prepared to stomach the potential for mistakes and failures against a backdrop of quarterly results and demands for short-term returns.

Seizing

To habitually transform inventions into sustainable value, it is essential that the CSP leadership build new practices and both formal and informal structures to develop digital and innovation maturity in the following ways:

- Implement systematic changes in how to organize and develop workforces, spur workplace innovation, and cultivate digitally minded cultures and experiences
- Play the long game to achieve desired long-term positioning and outcomes
- Scale small digital experiments into enterprise-wide initiatives that have business impact
- Become talent magnets
- Secure leaders with the vision

necessary to lead a digital strategy and a willingness to commit resources to achieve this vision.

As in the grand challenges model, experimentation is crucial for leaders to build an incremental understanding of the potential of innovative technologies. Two non-trivial issues are associated with driving institutional entrepreneurship and seizing opportunities to monetize 5G.

How to ensure that:

1. Resources available for experimentation and innovation align to the market's need
2. The work to be done is well organized for 5G value creation.

These significant leadership problems accelerate the need to understand the connections between the CSP's and value chain's organizational actions and their impact on subscribers. It is essential to hold a consistent systematic understanding of the mechanisms linking distributed action and the emergence of novel solutions to 5G-enabled industrial and other technologically enabled demands.

This requires frameworks to analyze how much congruence there is in the CSP's value chain and measure relevancy of 5G innovation to subscribers.

To strengthen the innovation model, CSPs must implement innovation processes, policies and frameworks to respond to or provoke market demand. They must, therefore, orientate the organization towards maximal customer-centricity by ensuring the GFN driving the service invention starts with the customer's perspective, namely, by including the customer.

- User involvement in service innovation is only successful when managed properly
- Basic working practices must be in place, e.g., face-to-face collaboration, tooling, physical and digital spaces, otherwise business cases are highly likely to fail
- Innovators must be trained to minimize cognitive bias.

Given the complex nature of 5G networks, which must interoperate with diverse network technologies across multiple industry sectors, CSPs must become adept at building customer-centric innovation systems, otherwise the likelihood of failure and missed opportunities is high.

Polyarchal structures and quorum sensing to enable customer-centric innovation

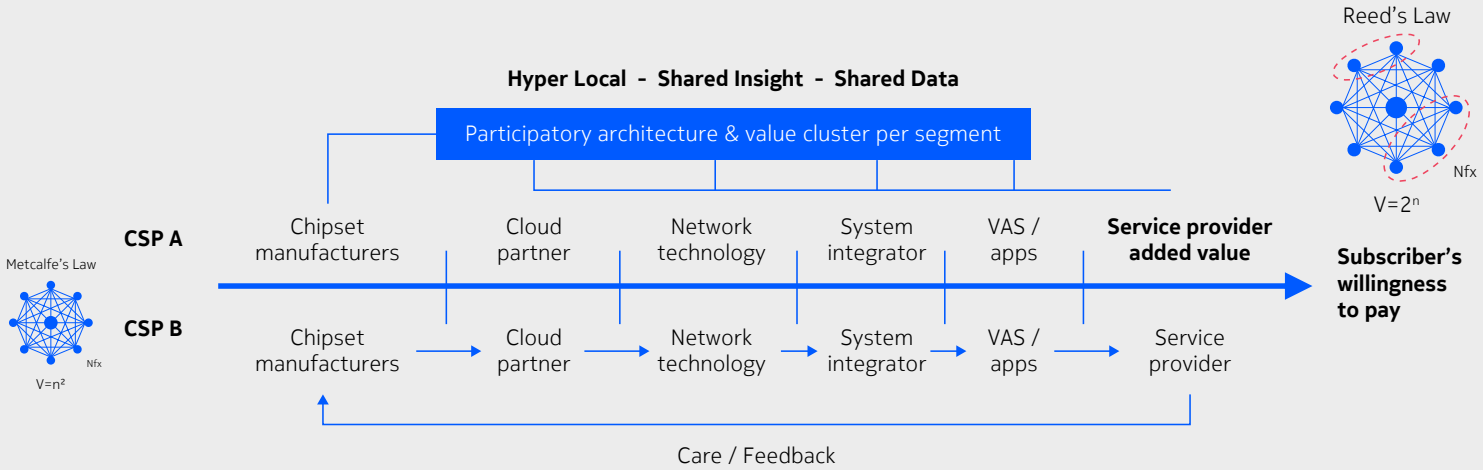
The predominant benefit of the 3S strategy is its ability to surface the knowledge, data and networks embedded in the ecosystem, bringing forward both local and international insight, providing CSPs with broad and deep perspectives on where opportunities lie, and, because they have established relationships, collectively addressing opportunities at speed.

This is especially important when addressing the enterprise sector, as trusted relationships will underpin the willingness of end customers to participate in co-invention exercises. Moreover, as CSPs evolve 3S capabilities, they can incorporate sophisticated mechanisms to develop strategy using polyarchal structures.

Polyarchal structures, which are to be contrasted with traditional telecom hierarchical structures, have potential because of their flat, many-to-many relationships (value clusters). Because the pulse of change is well anticipated by CSPs using the 3S system, they can use polyarchal structures to actively generate 'strategy from the bottom up'. This strategy development mechanism is well embraced by organizations versed in software development such as gaming companies where significant degrees of freedom are afforded to employees to self-organize, generate ideas and capture new value. Such firms include Valve Corporation, which works on a simple principle that if an employee can galvanize the support of two other employees to an idea, they are at license to pursue the idea.

In addition to the benefit of high-sensing and the potential for rapid innovation, the insight from value clusters can be used to deeply inform M&A strategy. As CSPs gain perspective from players within the value cluster, they can quickly assess the potential of M&A candidates, a method used by Rakuten, private equity firms and other innovative conglomerates to fortify their portfolios and competitiveness.

Figure 11. Using polyarchal structures to build rapid innovation across networks (Felin, Bell Labs)



Source: Ghemawat, Felin, Metcalfe, Bell Labs Consulting

The digital congruence model

We now turn to the second half of the paper which proposes 'how' to assemble and measure systems of innovation and optimization to capture 5G added value. The objective of the digital congruence (DC) model is to translate the CSP's strategic inputs and desired outcomes into interactive domains, which we refer to as pillars, that drive robust change and innovation action across the value chain. The framework is used to enable CSPs to galvanize and rapidly act on feedback and insight and use tangible measures to assess progress towards assembling systems for competitive advantage.

Defining digital congruence and being able to measure current and future states is essential to:

- Enable expansive sensing of opportunities and threats
- Generate expansive and inclusive thought and enhance customer centricity
- Reduce and share financial risk during the invention phase
- Increase development speed and speed to market
- Comprehensively address institutional complexity
- Avoid bias and navigate ethical dilemmas.

The DC model has four pillars: data/analytics, network technology, service innovation and digital organization. It is adapted from the congruence model, a general management and business diagnostic tool developed by theorists Nadler and Tushman. It has been explicitly adapted to the needs of the telecommunications sector.

While the capabilities and maturity of individual pillars are important, it is most important to be able to assess, measure and understand how the pillars depend, influence and amplify each other. Achieving synchronicity between the pillars at any given point in time is the key to digital congruence.

The DC model above uses strategic inputs and desired outcomes as the north star for assembling systems of activities within the pillars. Therefore, it is important to start with a baseline of the extent to which pillars and the associated ecosystem are congruent to strategy. Once the baseline is established, new strategies for each pillar can be implemented to effect changes to better design, deliver and capture value. The CSP then embarks on an iterative process of continuous feedback that enables business and sub-strategies to pivot with emergent insight as the aggregate effectiveness of the pillar strategies is determined.

The significant difference between Nadler and Tushman's congruence model and our digital congruence model is that each pillar can be considered as a value cluster, consisting of organizational units and resources of both CSP and ecosystem partners. This creates a meshed, three-dimensional space of resources, insight, intelligence and invention. Building this 3D capability fuels and fosters collaboration between technology, strategy, marketing, procurement and other third-party functions, and it shapes resources for progressive inimitability.

Linkage between DC model components

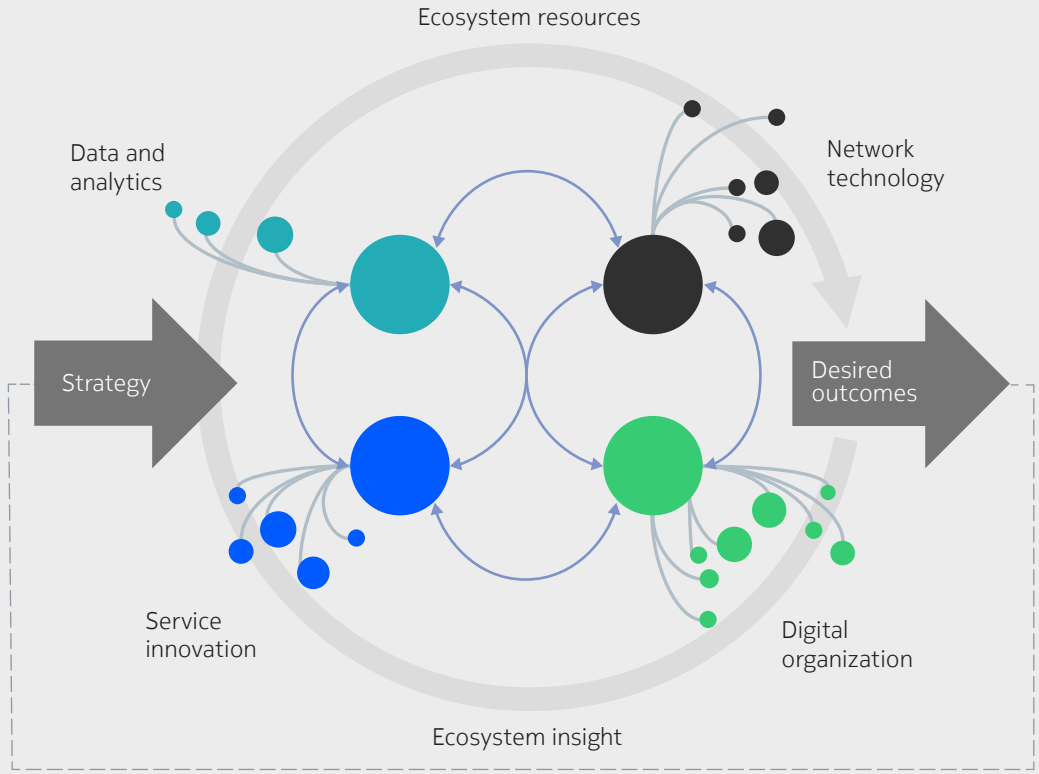
The four pillars of the DC model have been identified so that, when leveraged in concert, CSPs have access to rare and inimitable resources held by themselves and the value chain. When brought to bear, CSPs can use insight to address customers with hyper-contextual services and concurrently drive inimitability and organizational theories for value creation. As CSPs understand the local needs and desires of local markets, they can serve customers in unique ways that compel their subscribers' willingness to pay and, hence, solve the original problem of service commoditization.

Data and analytics

Advanced services firms such as insurance and banking have made huge gains in optimizing their business models with data and analytics at the center of their business strategy. CSPs and their ecosystems have access to a wealth of data from network, ERP, operational and other systems that can be used to enable value creation.

- Use combinations of macro and hyperlocal insight and intelligence to determine customer behavior, anticipate demand and inform innovation work

Figure 12. The digital congruence model (adapted from Nadler & Tushman)



- Maximize network utilization and dynamically fulfill customer experience and unique SLAs
- Monetize network capabilities using advanced business models such as NaaS
- Monitor and steer performance of co-innovation and revenue sharing models

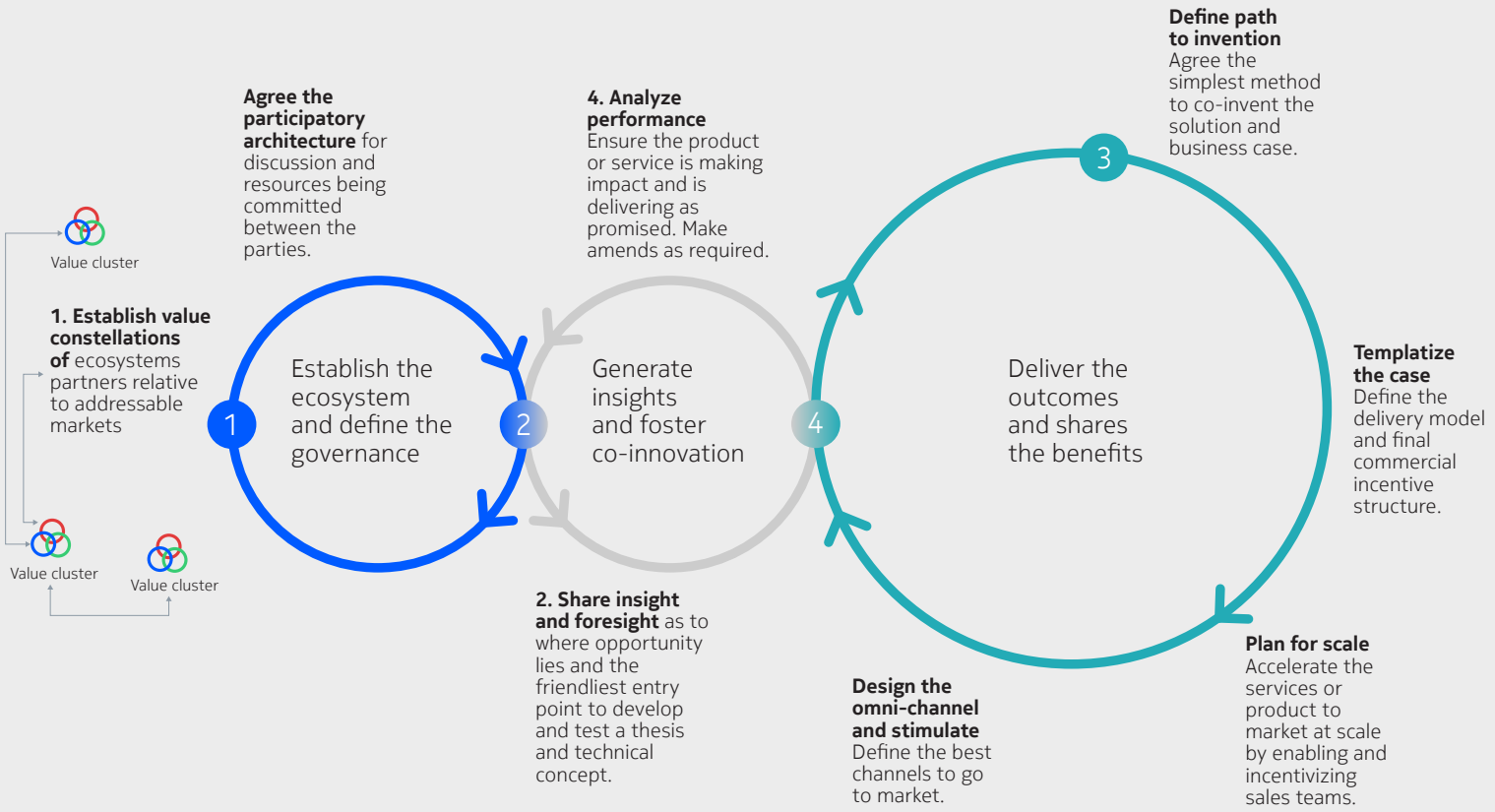
- Automate and build inference systems to take out procedural and analytical waste, thus optimizing efficiency across the value chain.

Network technologies

The shift to meet the unique demands of enterprises and B2C means that network technologies will interact with diverse industries' operational technologies, private networks, AR/VR and a range of IoT systems.

With each generation of standards evolution and technology, a new wave of problems and possibilities emerge for CSPs as to how they evolve organizational design, core and context, and innovate and sunset services to address them. Higher states of digital congruence will enable CSPs to generate and consider multiple well-informed network technology strategies and support leaders to nudge teams to reach agreement on a dominant architectural strategy from which to iterate.

Figure 13. Implementing distributed experimentation and participatory architectures (McKinsey, Bell Labs Consulting)



Digital organization and service innovation

The organizational system of activities must be rearranged to take advantage of the capabilities of each pillar to increase operational cycles and accelerate time to value. As CSPs embrace decentralized innovation, establish value clusters and use hyperlocal insight, processes and policies must shift to support polyarchal forms of interworking. In practice, this means establishing small teams that can intimately work with friendly customers willing to go through the co-invention process. Given that CSPs will gain an emergent understanding of 5G use case monetization, rapid feedback loops within and across the organization become an essential strategy to gaining and maintaining ongoing competitiveness.

In theory this sounds simple, but in practice there are several fundamental shifts in leadership and day-to-day working reality that must be agreed to across the CSP and its value chain:

- Policies that set forth employees' degree of freedom for invention work
- Calibrate decision points and ranges of autonomy
- Data sharing, storage and security policies
- Leader's comfort with new levels of autonomy
- Governance and leadership development to identify and remove cognitive bias throughout the innovation lifecycle
- Alignment with support organizations to foster relationships and financial outcomes.

Motivating systems of activities and people

This whitepaper does not go into depth on the topic of human performance management, motivation and innovation; however, it is vitally important to align these systems, hence, this facet of an innovation system requires some discussion. Studies at Google over 10 years proved that soft skills, not technical skills, enabled the innovation growth it experienced. Given the need for shifts in structure and policy, CSP leaders must be adept at managing the balance between ecosystem and human performance, which will require structured methods to measure potential for aligned motivation and performance. Two formulas can be used to support the implementation of customer-centric innovation:

1. (Skills diversity + task identity + impact)/3 x autonomy x feedback
2. Autonomy x motivation x opportunity

The combined formulae enable leaders to explore and exploit the human capital potential available from within their own organization and beyond and drive polyarchal behavior. Furthermore, the formulae help leaders to assess and optimize ecosystem partnerships, boundary partners and employees to ensure the organizational model is the tightest fit to business strategy and desired outcomes.

Summary

In summary, the four pillars have been carefully selected as the main success factors for digital change ahead of the next industrial wave. Individually each pillar is crucial for increasing digital maturity and agility, but conjointly the pillars leverage massive intellectual and resource power. Correspondingly, by adopting the customer-centric innovation framework and DC model, CSPs can significantly de-risk the chances of avoidable invention failure and ensure inventions get to market faster than the competition.

Measuring digital congruence with the DC index

One of the best practices established by digitally native firms such as webscale players is hyper-transparent performance, which is an indispensable facet of achieving consistently high congruence. These firms typically demonstrate faster innovation, shorter time to market and a rapid ability to pivot to changing market dynamics.

As CSPs implement the more complex systems of activities needed to achieve digital congruence (DC), they must equally be able to assess the effectiveness of strategy and action quickly and transparently. To do this involves specifying their objectives and key results and ensure hard ties exist between them and the value chain's KPIs.

Calculating congruence to strategy

To establish a baselined calculation and future scores for DC, Bell Labs Consulting (BLC) has aggregated this into a digital congruence index (Δ). The index combines a weighted model that measures each pillar's individual congruence and the strength of the links between each pillar. The index is designed to converge towards an ideal state. As strategies and OKRs evolve, the calculation is reiterated to assess congruence.

To plot the effectiveness of the model, leaders can also assign a score for inimitability to constituent players in the value chain to determine their contribution to value. In the example below, we see a CSP's congruence compared to the congruence of other stakeholders in its value chain.

As CSPs grow on the DC index scale (x-axis) using blends of unique innovation, they can deduce and anticipate the potential for subscriber's higher willingness to pay (y-axis). As inimitability strengthens across the entire value chain, all players within the chain can expect to increase profitable outcomes. Ideally, every player grows on the index, which nourishes the value chain's willingness to explore and exploit resources.

How KPIs and OKRs evolve with 5G monetization

Future KPIs should measure and guide how the four pillars relate to each other, and performance should be seen via measures that take balance (congruence) and interaction into consideration. To overcome the shortfalls with traditional KPIs (outlined above), the solution lies in understanding how to measure the level of congruence and hence success in areas that are heavily interdependent.

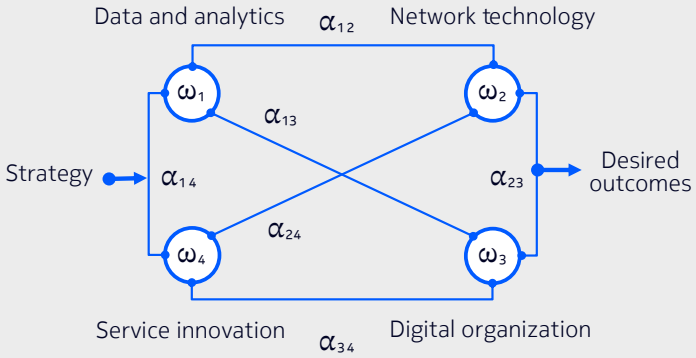
The model proposes to evolve KPIs to two new formats: 'bonded KPIs' and 'linked KPIs'. Using this combination to create OKRs, it is possible to drill down and find the root causes for top-level OKRs deviating from desired outcomes. The figure below shows some of the main relationships between strategic objectives (as a subset of strategy) and pillar activities fundamental to congruence.

Clearly there are multiple options to evolve and interlink KPIs to better guide progress towards the desired outcomes. Below, we list examples on linking and grouping modern KPIs in a way that provides the right insight to measure and operate the outcomes in figure 16.

To define, relate, and measure KPIs as OKRs in accordance with the digital congruence model, figure 17 outlines how bonded KPIs combine into maturity and capabilities indices (ω). It also shows how KPIs are linked (α) to create the OKR measures. The word 'bonded' indicates a tight relationship between the different KPIs within each of the four pillars. The word 'linked' indicates an interdependent and bi-directional relationship between the pillars.

To support progress towards desired outcomes, CSPs must define and calculate contributory KPIs. Figure 18 proposes a refined set of KPIs that fits to the model and covers the full spectrum of success factors for dual competitive advantage in the 5G era: customer experience, speed of growth and ESG considerations. It outlines specific examples of KPIs that can be bonded and linked to create meaningful OKRs, to capture growth and indicate specific areas for improvement.

Figure 14. Calculation of the digital congruence index (BLC)

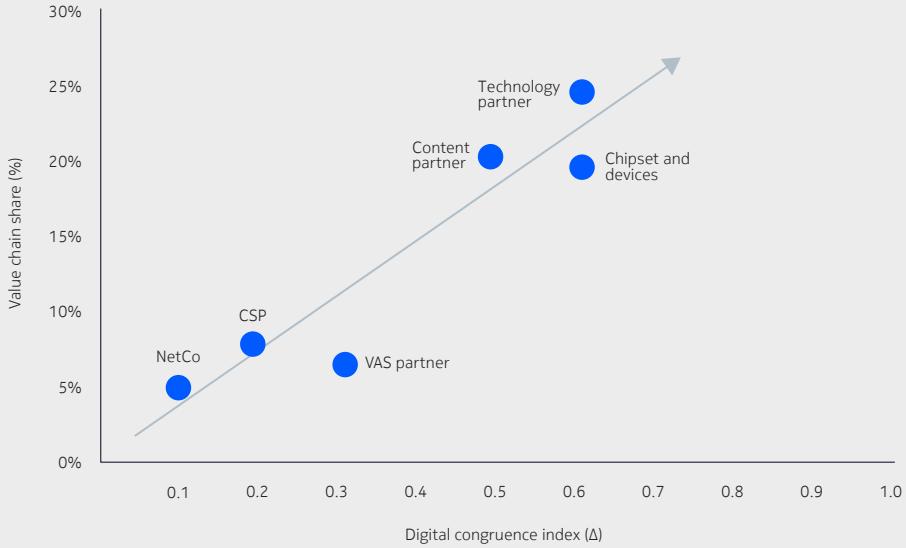


Capability measure — Congruence measure

$$\Delta = \frac{\left(\sum_i \omega_i + \sum_i \sum_j \omega_i \alpha_{ij}\right)}{4 + \sum_i \sum_j \alpha_{ij}^{m}}$$

Ideal state

Figure 15. Example from one specific CSP's value chain and the relation to other value chain shareholders' digital congruence (BLC)



The last step is to clearly define how capabilities (ω) and links (α) are defined and quantified. In most cases, this will be explored via interviews with different CSPs. Some examples for each of the four pillars of the congruence model include:

Bonding KPIs: quantifying maturity and capability measures (ω)
There are several well-established frameworks to assess the maturity of certain capabilities and, hence, quantifying the ω part. Organizational capabilities (current and future) can be assessed using BLC's xCROM framework or other frameworks such as ITIL, eTOM and TAM. Which framework is best suited for each pillar will depend on the CSP's current preferences, objectives and history.

Linking KPIs: quantifying congruence links between KPIs (α)
The α weights can be somewhat more subjective and difficult to quantify, but they will often revolve around specific questions like the dependency, availability and accessibility of data and performance. As above, the specific questions to test and score

Figure 16. 20 key enablers needed to achieve congruence between objectives and outcomes (BLC)

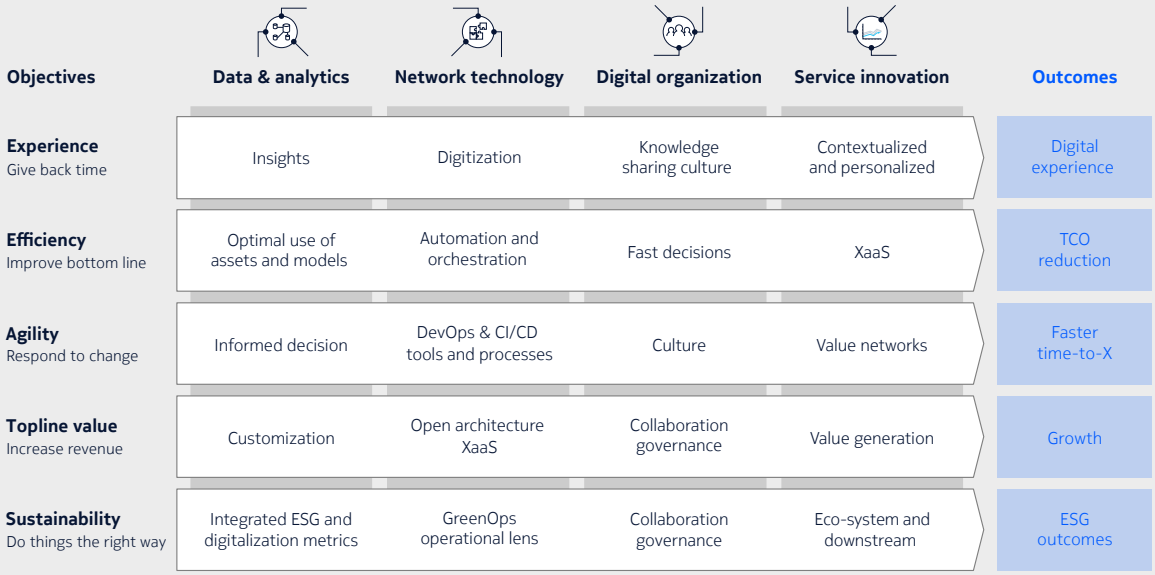
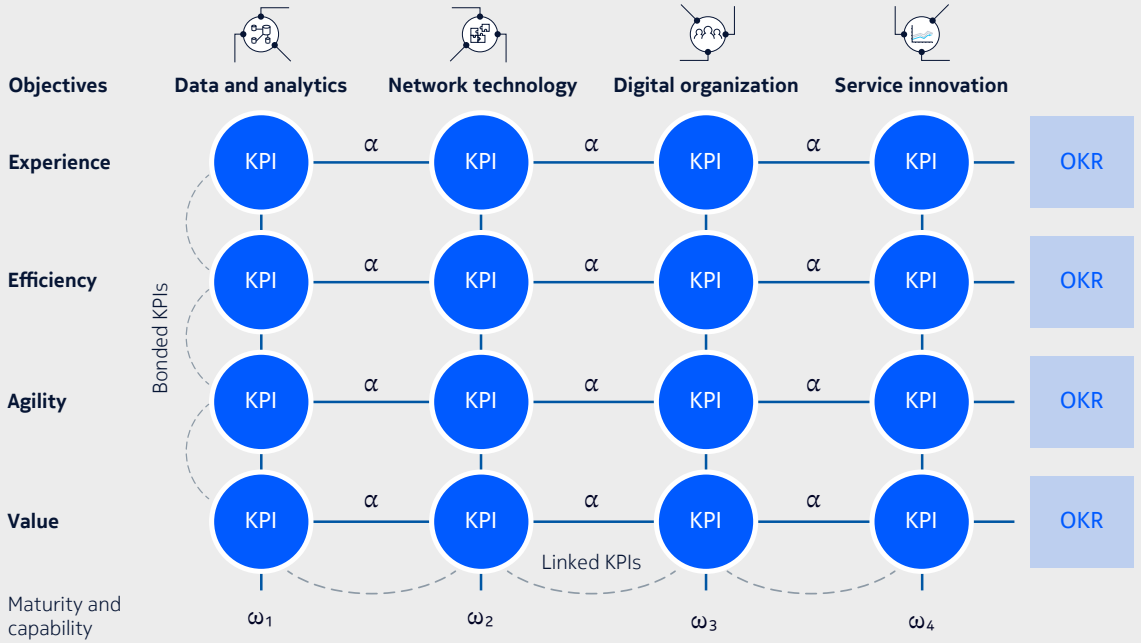


Figure 17. Bonded and linked KPI needed to generate OKR views (BLC)



will largely depend on the CSP's setup, objectives and history. A more detailed set of KPIs can be seen in table 1. The final level of detailed KPIs and how they are calculated depend on the specific operator's desired outcomes and context.

The DC framework provides a comprehensive approach for CSPs to become DSPs. Implementation of the DC framework should be considered in the context of the organization's current maturity and requires significant buy-in across the leadership. It is, therefore, recommended to build the system incrementally as one would approach any grand challenge — small innovations to galvanize commitment to the larger strategy over time.

Figure 18. Specific examples of KPIs that can be bonded and linked to create meaningful OKR (BLC)

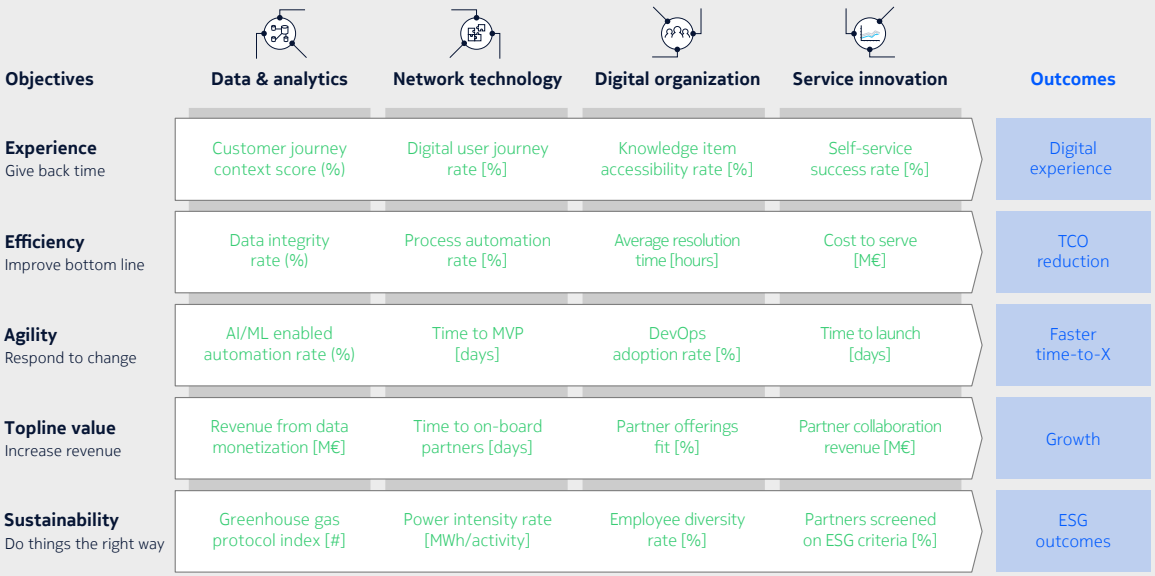


Table 1. Table of KPIs for sustained competitive advantage (BLC)

Objective	Dim	KPI	Description	Examples
	DA	Customer journey context score [%]	Measures the alignment level of customer engagements with the customer journey step successes, customer profile and behavior.	Customer sentiment across journey steps. Customer perception lifecycle.
	NT	Digital journey rate [%]	Measures the proportion of party journeys that can be carried out over digital channels without human interaction.	Percentage of account queries that can be completed through the web portal.
Experience	DO	Data accessibility rate [%]	Measures the accessibility of data for the different parties to allow them to perform their role efficiently with privacy and security constraints.	Number of clicks to access a knowledge article for the customer helpdesk agent.
	SI	Self-service success rate [%]	Measures the relative number of party service requests that are successfully completed over self-service channels without the need for direct human support.	Percentage of completed web portal account queries.
	DA	Data integrity rate [%]	Measures the relative number of data types that are fit for purpose, valid and accurate.	Percentage of bills issued without errors when first presented.
	NT	Process automation rate [%]	Measures the relative number of processes that are automated.	Percentage of enterprise service activation steps that are automated.
Efficiency	DO	Average resolution time [hours]	Measures the amount of time required to provide a resolution to a request from a party.	Time it takes to provide a satisfactory resolution to billing dispute inquiries.
	SI	Cost to serve [M€]	Measures the total cost of servicing customers and users.	Total cost for on-boarding an SME for the connectivity-as-a-service offering.
	DA	AI/ML-enabled automation rate [%]	Measures the relative number of processes that are automated using AI and ML.	Percentage of customer care process steps guided by AI/ML.
	NT	Time to MVP [days]	Measures the time between ideation and the availability of a minimum viable product (MVP).	Time it takes to develop a virtual office MVP offering.
Agility	DO	DevOps adoption rate [%]	Measures the adoption level of DevOps CI/CD operations across the organization.	Percentage of projects delivered using DevOps methodology. Percentage of successful software drops.
	SI	Time to launch [days]	Measures the time it takes between ideation and product launch.	Days taken to launch a virtual office offering.
	DA	Data monetization revenue [M€]	Measures the revenue related to monetizing data.	Revenue from the tourist movement insight product offering.
	NT	Partner on-boarding time [days]	Measures the time it takes to on-board a partner as well as its product offerings.	Days taken to on-board a content partner on the broadcasting platform.
Business value	DO	Partner offerings fit [%]	Measures the relative contribution of partner offerings to the overall revenue.	Percentage of enterprise business revenue linked to product offerings from partners, per service and per partner
	SI	Partner collaboration revenue [M€]	Measures the revenue resulting from collaborations with partners.	Revenue resulting from collaboration with content partners.
	DA	Greenhouse gas protocol score [#]	Measures the organization's greenhouse gas emissions related to products and services it purchases, its own operations and the disposal of the products it sells.	Greenhouse gas emissions for operating remote antenna sites.
Sustainability	NT	Power intensity rate [MWh/activity]	Measures the organization's power usage per activity.	Yearly electricity consumption for powering remote sites.
	DO	Employee diversity rate [%]	Measures the level of equality in the employment policy.	Number and percentage of employee hires per age group, gender, minority or underrepresented.
	SI	Partners screened on ESG criteria [%]	Measures the due diligence level in selecting partners related to social justice, environmental laws and antitrust and data regulations.	Percentage of partners screened successfully for anti-trust and data regulation compliance.

Discussion and conclusions

Achieving digital congruence is a journey and not for the faint hearted. If you've read this far, you clearly have the stomach for the opportunity! As we conclude the paper, we draw your attention to critical success factors and final considerations.

Linking innovation to strategy and the customer

Relationships are key and DC implementation success depends on teams being able to bond on a daily, personal basis, strengthening and growing trusted networks. This includes ideating with customers to overcome barriers, such as gaining access to privileged data, and building the customer's willingness to trial services, as many customer problems that 5G networks must navigate will be unique, context-specific and highly localized.

Gaining access to customer data will not only be an issue of technical feasibility, a lack of relationship and customer trust as to how data will be used and stored will also be an issue. Given the high dependency on local data to enable invention work, heavily centralized and templated services organizations will struggle to co-innovate without trusted relationships in place.

The benefit of working cross-functional ecosystem networks and accessing new skills

Successfully incorporating expertise from ecosystem partners and other parts of the value chain will enable CSPs to gain dynamic access to specialist resources to which they do not ordinarily have access or cannot afford to commit to in early-stage development. The timely access to skills from across value clusters accelerates time to market and limits over-commitment on expensive resources.

The criticality of 'formal congruence' and organizational structure

It is essential for CSPs to define how the future structure will enable innovation and to develop governance and new roles to facilitate the invention and innovation work, especially as CSPs transition from sequential to reciprocal interdependent workflows. Focus

should be on decision matrices, policies that promote employee degrees of freedom and leaders' ability to drive vision and collaboration.

Individual fit and motivation to new OKRs and KPIs

CSPs seeking to promote fundamentally new behaviors, such as improved customer-centric innovation and polyarchal structures, must equip leaders and employees with new skillsets and real-time insights on performance. Equally important is striking a balance between extrinsic and intrinsic motivations to underpin the 'fit' of the four pillars of the digital congruence model.

Tying functions and employees across the value chain to the same reward structure will align them to common goals.

Closing comments

The white paper highlights the criticality of organizational congruence and the difficulties leaders face when embarking on 5G monetization strategies. The research has not considered in-depth use of incubators as an option and, hence, is limited in this regard. Similarly, the depth of organizational analysis, especially culture, options for structural design, and leadership are also limited and should be further explored.

The research strongly suggests the equal importance of culture and structure, however, without the basics of structure and systems being in place, innovation culture alone cannot close the gap. Ultimately, firms are made of humans and despite the collective power of firms and technology, substituting sociability with procedure and technology is limiting. Therefore, unless leaders continuously find equilibrium between individuals, work, formal and informal structures, the path to optimal 5G growth will remain elusive. Ahead of the fourth industrial revolution, mastery in building this equilibrium is the new frontier for CSPs and other telecom leaders.

Appendix – Pillar attributes

Digital experience

The primary objective of a digital consumer is experience, measured in terms of time gained. Digital transformation ensures that consumer experiences are customized, personalized, immediate, secure and require minimal effort. Each dimension of the digital congruence model contributes to this digital experience in its own unique way:

- The data and analytics dimension ensures that key insights are available that will both minimize consumer effort and enrich consumer experience
- The network technology provides the tools and automation to digitalize consumer experience and is characterized by both objective attributes such as quality, security, flexibility and control and subjective attributes such as coolness, excitement and fulfillment
- A knowledge sharing and collaborative culture across the organization and ecosystem leverages shared internal digital experiences to enrich the digital experience outcome
- The business model dimension helps drive contextualization and personalization towards the experience outcome, which is predicated on the relevant business model (e.g., an e-health model experience focuses on patient welfare whereas an automated factory model experience places a premium on safety and security).

TCO reduction

TCO is influenced and improved by a large number of factors. The four pillars play a key role in being able to track improvements as well as steer key investments. The industry is going through a very intense automation transformation, but missing is the ability to establish the priorities of automation and orchestration and measure their real impacts on TCO. The digital congruence model provides a better view of what to automate and in which order, as it measures the TCO impacts of different links and their interaction in the system of activities.

Faster time-to-x

To be on-par with the business performance of webscalers, one of the major shifts that CSPs have identified as a must-have is improved agility in all parts of the business. Agility allows an organization to quickly respond to changes and reduce risk. In contrast to the traditional waterfall release practice, agility uses a succession of smaller iterations and corrective actions that take place early in the iterations cycle.

A more agile CSP business can achieve better outcomes faster such as:

- Shorter time to revenue
- Shorter time to deploy solutions
- Shorter time to onboard partners.

Agility in the digital congruence model is influenced by the following dimensions:

- The data and analytics dimension helps the CSP quickly and regularly make informed decisions through successive iterations by leveraging small and big data
- The network technology dimension leverages DevOps pipelines that are integrated with testing and production environments as well as with digital stores. The pipelines are an essential part of the overall automation solution and provide feedback data leading to valuable insights
- Digital organization enables an agile culture where the need for stability and an appetite for change and innovation can coexist
- New business models leverage ecosystem agility to help create value networks.

Growth

Digital transformation offers the potential for new value generation through the exploration of new business and value network models. Data is the new currency, and the network effect is the new driver for scaling growth. The different dimensions of the digital congruence model are contributing as follows:

- Data-driven and dynamic customization provides contextual and personalized units of value
- Open architectures expose business capabilities as a service, enable seamless integration of partners and create sensing opportunities, all of which generates additional value
- Collaboration with other partners in a supportive digital innovation culture creates further value
- New business models and participation in value clusters unleash new market opportunities.

ESG outcomes

Focus on ESG outcomes for operators has quickly become a key area to measure and address for several reasons: to fulfill sustainability goals, meet compliance requirements set by different authorities and to demonstrate actual results achieved to enterprise customers, partners and ESG-oriented indexes, funds and investors.

Acronyms

3S	Sensing, shaping, seizing
API	Application programming interface
AR	Augmented reality
AYCE	All you can eat (applied to mobile subscription tariffs)
B2B	Business to business
B2C	Business to consumer
BLC	Bell Labs Consulting
CAPEX	Capital expenditure
CSP	Communications service provider
CTO	Chief technical officer
CX	Customer experience
DC	Digital congruence
DSP	Digital service provider
EBIT	Earnings before interest and tax
ESG	Environmental, social and governance
eTOM	Extended telecom operation map
EU	European Union
GAMAM	Google, Apple, Meta, Amazon and Microsoft (formerly GAFAM)
GFN	Group-forming network
GSMA	Global system for mobile communications
IoT	Internet of things
ISV	Independent software vendor
IT	Information technology
ITIL	Information technology infrastructure library
KPI	Key performance indicator
M&A	Mergers and acquisitions
MVP	Minimum viable product
NaaS	Network as a service
OEM	Original equipment manufacturer
OIL	5G Open Innovation Lab
OKR	Objectives and Key Results
QS	Quorum sensing
R&D	Research and development
ROI	Return on investment
S&P	Standard and Poor's
SLA	Service level agreement
SME	Small and medium enterprise
SOC	Services operation center
TAM	Total addressable market
TCO	Total cost of ownership
URLLC	Ultra-reliable, low-latency connectivity
VR	Virtual reality
XaaS	Anything as a service
xCROM	Capability reference operating model (Future X Network)
YOY	Year over year

References

20 minutos (2018). “Vodafone: ‘En España es más rentable perder a todos los clientes que pagar por tener el fútbol’”. 20 minutos. Feb 2008. https://www.20minutos.es/deportes/noticia/vodafone-no-salen-cuentas-futbol-3272604/0/

Adams, J. S. (1963). Towards an understanding of inequity. The Journal of Abnormal and Social Psychology, 67(5), pp. 422-436. https://psycnet.apa.org/record/1964-04111-001

Ancona, D. (2007). X-teams: How to Build Teams That Lead, Innovate and Succeed. Harvard Business School Publishing Corporation, Brighton, MA, USA, pp. 195-216.

Bamberger, S. et al (2020). The Last Decade Was Great but What About the Next, Boston Consulting Group, Feb 2020. https://www.bcg.com/publications/2020/tmt-value-creators-last-decade-was-great-what-about-next?

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. Journal of Management,
Mar 1991, pp. 99-120. https://journals.sagepub.com/doi/10.1177/014920639101700108

Barney, J. and Hesterly, W. (2006). Strategic Management and Competitive Advantage Concepts, 2nd ed. Pearson, Prentice Hall, NJ, USA, pp. 70-111.

Beshears, J. and Gino, F. (2015). Leaders as Decision Architects. Harvard Business Review, May 2015, pp. 51-62. https://hbr.org/2015/05/leaders-as-decision-architects

Bettencourt, L. and Ulwick, A. (2008). The Customer-Centered Innovation Map. Harvard Business Review, May 2008. https://hbr.org/2008/05/the-customer-centered-innovation-map

Boleman, L. and Deal, T. (2013). Reframing Organizations: Artistry, Choice and Leadership, 5th ed. Jossey-Bass, San Francisco, CA, USA, pp. 183-270.

Christensen, C. (2016). The Innovator’s Dilemma: When New Technologies Cause Great Firms to Fail. Chapter “Management of Innovation and Change”. Harvard Business Review Press, Brighton, MA, USA, pp. 79-85.

Dorner, K. and Meffert, J. (2015). Nine Questions to Help Get Your Digital Transformation Right. McKinsey & Co., Oct 2015. https://www.mckinsey.com/business-functions/organization/our-insights/nine-questions-to-help-you-get-your-digital-transformation-right

Felin, T. and Powell, T. (2016). Designing Organizations for Dynamic Capabilities. California Management Review. University of California, Berkley, USA. Volume 58, No. 4, Summer 2016.

Ferraro, F. and Etzion, D. and Gehman, J. (2015). Tackling Grand Challenges Pragmatically: Robust Action Revisited. Organization Studies, vol. 36(3), pp. 363-390.

Gaibi, Z., Jones, G. and Vaidya, M. (2021) A Blueprint for Telecom’s Critical Reinvention. McKinsey & Co, Apr 2021. https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/a-blueprint-for-telecoms-critical-reinvention

Granovetter, M. (1973). The Strength of Weak Ties. American Journal of Sociology 78, No. 6., pp. 1360-1380.

Griffiths, S. (2020). “Why your internet habits are not as clean as you think”. BBC, Smart guide to climate change. Mar 2020. https://www.bbc.com/future/article/20200305-why-your-internet-habits-are-not-as-clean-as-you-think

Ibarra, H. (2015). Act Like a Leader, Think Like a Leader. Harvard Business School Press, Brighton, MA, USA.

Kahneman, D., Lovallo, D. and Sibony, O. (2011). The Big Idea: Before You Make That Big Decision. Harvard Business Review, Jun 2021. https://hbr.org/2011/06/the-big-idea-before-you-make-that-big-decision

Kane, C. and Palmer, D. and Phillips, A. N., and Kiron, D. and Buckley, N (2017). Achieving Digital Maturity: Adapting Your Company to a Changing World, MIT Sloan Management Review, Jul 2017. https://sloanreview.mit.edu/projects/achieving-digital-maturityDeloitte www. deloitte.com/insights/us/en/focus/digital-maturity/digital-mindset

Kane, G. (2017). Don't Forget the Basics in Digital Transformation. MIT Sloan Management Review,
Feb 2017. https://sloanreview.mit.edu/article/dont-forget-the-basics-in-digital-transformation

Kaplan, R. and Kaiser, R. (20013). Developing Versatile Leadership. MIT Sloan Management Review,
Jul 2003. https://sloanreview.mit.edu/article/developing-versatile-leadership/.

Kotter, J. (1995). Leading Change: Why Transformation Efforts Fail". Harvard Business Review, May-Jun 1995. https://hbr.org/1995/05/leading-change-why-transformation-efforts-fail-2

Kotter, J. (2001). What Leaders Really Do. Harvard Business Review, Dec 2001. https://hbr.org/2001/12/what-leaders-really-do

Lawrence, T., Malhotra, N. and Morris, T. (2012). Episodic and Systemic Power in the Transformation
of Professional Service Firms. Journal of Management Studies, 49(1), Jan 2012.

Magnusson, P., Matthing, J. and Kristensson, P. (2003). Managing User Involvement in Services Innovation: Experimenting with Innovating End Users. Journal of Service Research, 6(2), Nov 2003. https://journals.sagepub.com/doi/10.1177/1094670503257028

Maslow, A. H. (1943). "A Theory of Human Motivation". Psychological Review, 50(4), pp. 370-396. https://doi.org/10.1037/h0054346

Nadler, D. and Tushman, M. (1989). Organizational Frame Bending: Principles for Managing Reorientation. Academy of Management Perspectives, 3(3), Aug 1989, pp. 194-204.

Normann, R. and Ramirez, R. (1993). "From Value Chain to Value Constellation: Designing Interactive Strategy". Harvard Business Review, Jul-Aug 1993. https://hbr.org/1993/07/designing-interactive-strategy

Porter, M. (1980). Competitive Strategy. Free Press, New York, NY, USA, pp. 34-46, pp. 215-236.

Porter, M. (2007). Understanding Industry Structure. Harvard Business School Background Note,
Aug 2007, pp. 1-16.

Reed, D., (2001). "The Law of the Pack". Harvard Business Review, Feb 2001. https://hbr.org/2001/02/the-law-of-the-pack

Salter, A. and Tether, B. (2006). Innovation in Services: Through the Looking Glass of Innovation Studies. Background paper for Advanced Institute of Management (AIM) Research's Grand Challenge on Service Science, Apr 2006. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.103.7928&rep=rep1&type=pdf

Senge, P. (1990). The Fifth Discipline: The Art and Practice of the Learning Organization. Doubleday, New York, NY.

Senge, P. (2007). The Practice of Innovation. Leader to Leader, 1998(9), pp. 16-22.
https://doi.org/10.1002/ltl.40619980907

Solis, B., (2021). "A 5-Step Roadmap for Becoming a More Customer-Centric Company".
Harvard Business Review, Aug 2021. https://hbr.org/sponsored/2021/08/a-5-step-roadmap-for-becoming-a-more-customer-centric-company

Strauss, V. (2017). “The surprising thing Google learned about its employees — and what it means for today’s students.” The Washington Post. Dec 2017. https://www.washingtonpost.com/news/answer-sheet/wp/2017/12/20/the-surprising-thing-google-learned-about-its-employees-and-what-it-means-for-todays-students/

Sweeney, M., (2019). BT Sport keeps Champions League rights in £1.2bn deal for 2021-24. The Guardian, Nov 2019. https://www.theguardian.com/football/2019/nov/15/bt-sport-keeps-champions-league-rights-12bn-deal-2021-24

Tanguy, C. and Scanlan, J. and Willmott, P. (2015). Raising Your Digital Quotient. McKinsey & Co., Jun 2015. https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/raising-your-digital-quotient

Telus (2020), Leading the world when the world needs us most: Annual Report 2020. https://assets.ctfassets.net/rz9m1rynx8pv/RhDeVJUMvjqrFwVycTU5L/9465279e0154bccef0d00c926b3794bf/TELUS_2020_annual_report-acc.pdf

Teral, S. (2018). Market Insight. IHS Markit. https://technology.ihs.com/600864/global-mobile-infrastructure-market-down-14-percent-from-a-year-ago

Valve corporation (2012). Handbook for new employees: a fearless adventure in knowing what to do when no one’s there telling you what to do.” Valve Press, Bellevue, WA, USA.

Vroom, V. (1964). Expectancy Theory of Work and Motivation. Wiley and Sons, New York, NY, USA.

Zenger, T. (2016). Beyond Competitive Advantage: How to Solve the Puzzle of Sustaining Growth While Creating Value. Harvard Business Review Press, Brighton, MA, USA.

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