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Business unusual in ICT regulations

How regulating ICT should evolve in the digital era

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EXECUTIVE SUMMARY

Information and communications technology (ICT) regulators in the Gulf Cooperation Council (GCC)[1] countries would benefit from redefining their mandate in order to ensure they keep pace with the fast-changing regulatory environment. ICT regulators' aim is for their regulations and associated instruments to adapt quickly to the needs of ICT providers, consumers, investors, and national development plans while keeping up with rapid developments in industry subsectors.

There are many reasons for current regulatory challenges. One is increased market complexity as sector boundaries have become blurred by the way that digital services and ICT are woven into the fabric of all socioeconomic activity as drivers of economic growth. The market is also more complex as there are more market participants, new forms of competition, and because of the interest shown by hyperscale technology providers. Other reasons include a capabilities deficit in the workforce affecting ICT companies and regulators, and regulations in ICT subsectors that can be considered inconsistent and outdated.

Simultaneously, telecom operators, which are significant ICT players in the GCC, have limited growth prospects in their core markets because of shifting customer needs; increased competition, including from new digital service providers; and the migration of some services to digital platforms. These changes can stifle innovation and increase the need for regulations that allow access to new growth opportunities.

There is an opportunity for regulators to increase their impact if they adopt a new mindset. Regulators can incentivize innovation and investment, and enable sector ambitions by prioritizing digital infrastructure development, closing the digital skills gap, and accelerating digital adoption. Together, regulators and policymakers can:

- **Broaden regulators' mandate,** increase collaboration with regulators from other sectors to ensure adequate coverage, harmonize objectives and approaches, and prevent overregulation
- **Modernize regulatory instruments and approaches** by phasing out "rules-based" regulations, having fewer ex ante[2] interventions, and shifting to an ex post[3] philosophy and principles-based regulation
- **Redefine success metrics** by moving away from narrow indicators such as pricing and market share, toward holistic measures of economic value creation

ICT REGULATION NEEDS AN UPDATE

When we consider what greases the wheels of economic progress, regulation is generally not the first thing that comes to mind. Yet the regulatory certainty, fair competition, consumer protection, and remedial mechanisms that regulation provides are crucial for attracting and promoting business growth, as well as domestic or international investments. In GCC countries, the ICT sector will be a key contributor to economic growth. The ICT sector figures prominently in these countries' economic development plans. For example, Saudi Arabia's Vision 2030 aims to grow the private sector's contribution to GDP from 40 percent to 65 percent, to raise the share of non-oil exports in non-oil GDP from 16 percent to 50 percent, and to increase non-oil government revenue from SAR 163 billion (US$44 billion) to SAR 1 trillion (US$267 billion).[4] The Ministry of Communications and Information Technology has turned these into ICT-specific targets: Its ambition is for Saudi Arabia to become a top 20 digital country[5] and a leading regional digital hub.[6]

To exploit this opportunity, GCC countries need sound ICT regulation that will encourage the innovation and growth that fuels economic diversification and sustainability. Such an agenda is central to the ambitions of GCC countries, which want to do more than develop their digital economies[7]—they want to build their own tech champions.[8]

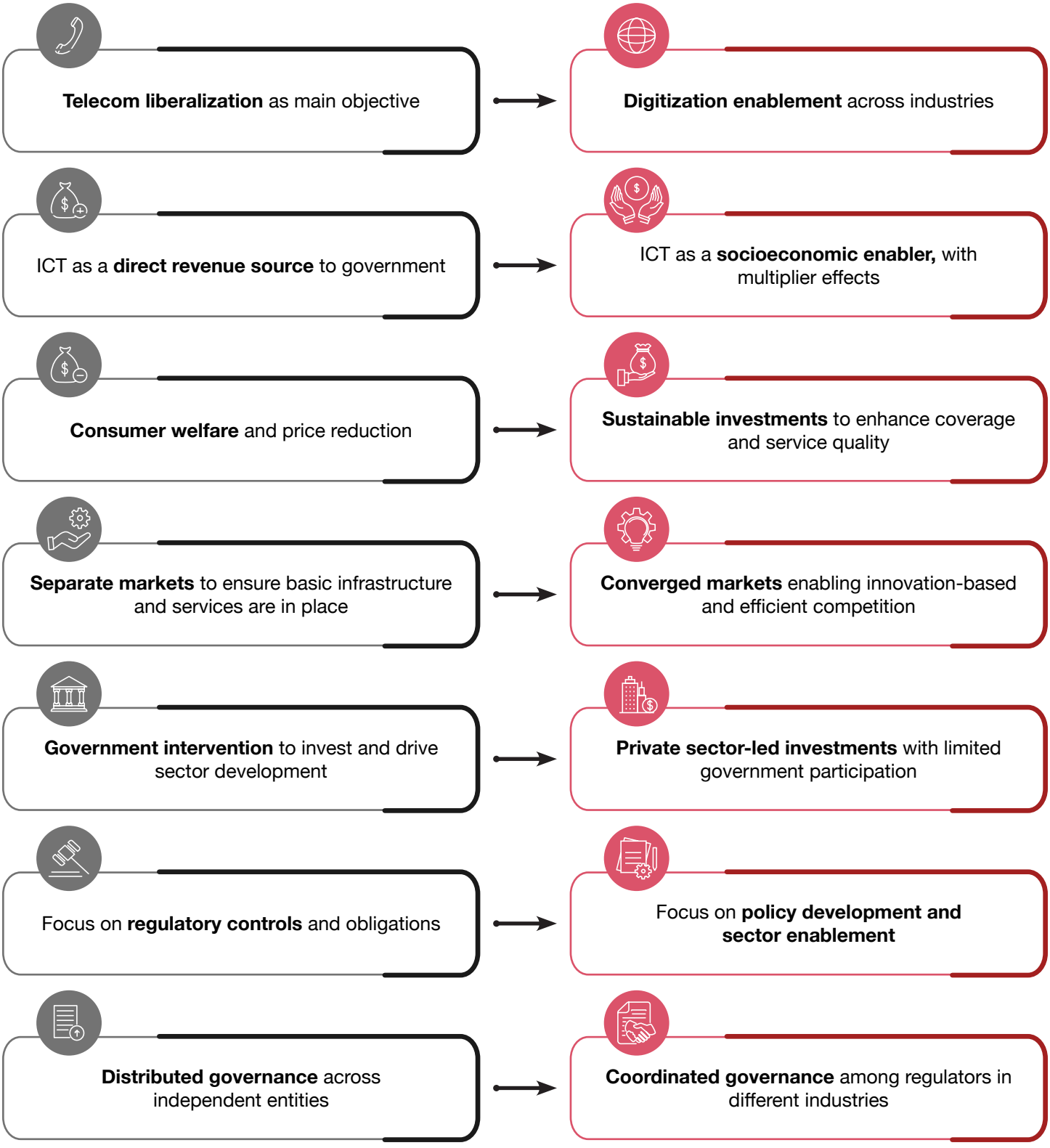
ICT regulators in the GCC have successfully modernized some markets. They have established new frameworks to regulate emerging technologies such as the internet of things (IOT, the network of connected devices), cloud computing,[9] cybersecurity, and artificial intelligence (AI). They have formulated active measures to increase the availability of digital infrastructure and to enhance the quality of service, such as the introduction of coverage obligations and minimum service levels within the criteria for awarding parts of the spectrum to telecom operators.[10] They have enacted protection policies for telecommunications consumers.[11] They have also established multiple entities to regulate the sectors adjacent to ICT. However, ICT regulators in the GCC, like their peers worldwide, are working to keep up with the rapid structural changes in the ICT ecosystem as well as consumers' and businesses' insatiable demand for ICT services. The static, predictable environment in which regulatory agencies were established is a thing of the past.

The perception that there is a gap between regulation and the daily changes in the ICT sector is problematic. GCC regulators want to close the gap and recognize the magnitude of their role in protecting and fostering a flourishing telecom environment—the linchpin of a modern digital economy. ICT regulators need to attend to multiple stakeholders, such as telecom operators, investors, adjacent regulators, and consumers. Among them, telecom operators are the largest ICT players and can fund the large-scale digital infrastructure development along with the research and development (R&D) that is required.

To achieve these goals, regulators deserve a renewed mandate to modernize governance, collaborate more effectively with the regulators of other industries, and push for greater participation and investment from the private sector to enable national visions and economic goals. That means defining their role proactively as a strategic priority and seeking legislative changes to support the renewal of the mandate. All of this involves a shift in the ICT policymaking mindset (*see Exhibit 1*).

EXHIBIT 1

ICT sector policy shifts



Source: Strategy&

In the GCC, as elsewhere, the market boundaries that traditionally delineated the telecom, IT, and adjacent digital services sectors from one another continue to blur. Established measures of market concentration such as the Herfindahl-Hirschman Index (which applies to the mobile and fixed broadband sectors) do not consider more recent market entrants, namely over-the-top (OTT) media and other internet-based platforms. Current regulation may not reflect fully today's complex and overlapping ICT supply markets. Just think of the services people can use on their mobile phone: banking, applying for a passport, making purchases, and paying with their electronic wallet. Regulators could also examine the growing influence of non-licensed, cross-border competitors outside their jurisdiction. In Saudi Arabia and the United Arab Emirates (UAE), for example, only licensed telecom providers are subject to royalty fees (11 percent of revenues and 38 percent of net profits, respectively).[12] OTT providers pay minimal operating fees even as they capture a rapidly growing share of GCC markets.

“ In the GCC, as elsewhere, the market boundaries that traditionally delineated the telecom, IT, and adjacent digital services sectors from one another continue to blur.

CRITICAL MARKET GAPS REMAIN DESPITE PROGRESS

In recent years, there has been significant progress in ICT development and regulation. That progress has been notable in mobile internet and fixed broadband availability, expanded digital infrastructure capacity, policy development, and consumer protection.

Despite this notable progress across these vital dimensions, GCC countries continue to lag behind similar countries in terms of digital readiness and transformation. GCC countries do not rank in the top quartile of the Portulans Institute's Network Readiness Index[13] (NRI), which ranks 130 economies on the extent and impact of their digital transformations and their readiness to harness ICT-enabled opportunities (*see Exhibit 2*).

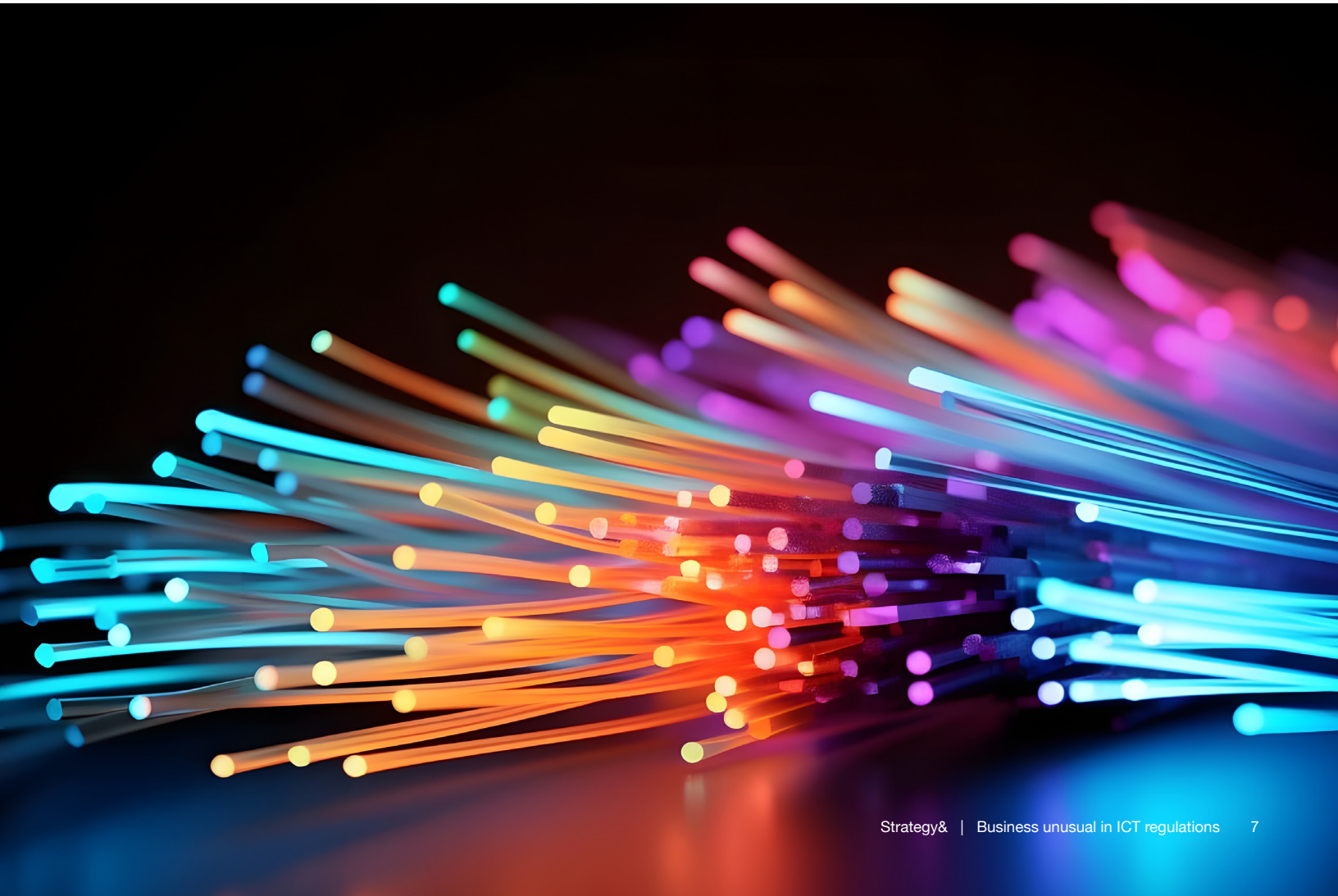


EXHIBIT 2

ICT indicators dashboard

#	Category	Indicator	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	Global Benchmark
1	Macro level	ICT contribution to GDP (% of GDP, 2022/23)	5.1%	3.7%	3.5%	3%	4.1%	5.1%	5.8%
2	Macro level	Human Capital and Research Index (index value, 2022)	28.1	34.9	38.9	34.5	45.6	55.8	66.4
3	Macro level	Global Cybersecurity Index (index value, 2020)	77.9	75.1	96.0	94.5	99.5	98.1	100.0
4	Macro level	Network Readiness Index (index value, 2022)	52.3	48.4	52.1	54.2	56.1	62.4	76.9
5	Telecom	Telecom market size (% of GDP, 2021)	2.9%	3.0%	2.1%	1.3%	2.2%	1.9%	3.1%
6	Telecom	Mobile broadband penetration (mobile subscriptions to population, 2021)	139%	159%	137%	166%	150%	203%	203%
7	Telecom	Broadband penetration (% of households with internet access at home, 2022)	100%	99%	94%	95%	100%	100%	100%
8	Telecom	Price of mobile data and voice pack (high use) (% of GNI, 2021)	1.7%	0.7%	2.0%	0.3%	1.3%	1.1%	0.2%
9	Telecom	Mobile broadband speeds (Mbps, September 2023)	90.5	161.7	60.1	187.6	95.1	211.6	211.6
10	Telecom	Fixed broadband speeds (Mbps, September 2023)	80.6	149.3	66.8	145	97.1	232	265.2
11	Telecom	Mobile broadband usage per mobile subscription per month (GB, 2022)	26.3	55.4	6.1	11.5	35.1	8.3	55.4
12	Tech	IT spending (% of GDP, 2022/23)	2.2%	1.2%	1.4%	1.7%	1.6%	2.7%	4.4%
13	Tech	Global Innovation Index (index value, 2022)	28	29.2	26.8	32.9	33.4	42.1	64.6
14	Tech	Economic Freedom Index (index value, 2023)	N/A	56.7	58.5	68.6	58.3	70.9	83.9
15	Tech	Patents by origin (per billion purchasing power parity GDP, latest available year)	0.1	0.1	0.2	0.3	1.3	0.1	12.9
16	Tech	Start Up Ecosystem ranking (2023)	N/A	N/A	N/A	90	66	28	1

Note: UAE = United Arab Emirates.
Source: See Appendix.

Although there have been significant investments in digital infrastructure, GCC countries can do more in critical areas such as cloud services, content localization, R&D investment, patent applications, and a sufficient pool of ICT talent. This being the case, telecom operators incur higher international bandwidth costs, while users suffer longer loading times and high latency (i.e., a longer response time), such as for gaming applications. For example, major cities in the GCC have access to an average of 24.4 megawatts of capacity per 1 million people, compared with 62.2 megawatts in major European cities and 146.9 megawatts in major Asia-Pacific region cities.[14] What that means is that most online content (such as media, gaming, and cloud data) is still stored outside the region, making GCC countries net importers of content despite having the world's highest monthly data traffic per smartphone.[15]

The announcement of major investments is easing these problems, to an extent. For example, Saudi Arabia's center3 announced a US$1 billion investment in data centers, undersea cables, and internet exchange points.[16] Khazna in the UAE, which has 12 data centers with a planned capacity of 300 megawatts by end of 2023, recently announced its plan to open a $250 million data center in Egypt, adding 25 megawatts to its capacity.[17] Despite these positive developments, enabling policies and investment-friendly regulations are needed to unblock additional investments to close the region's underserved digital infrastructure supply gap.

Obstacles thwarting progress and confounding regulation

In any industry, regulation should allow fair and robust competition, enable investment and innovation, protect consumers' interests, and promote the sector's long-term vitality. However, doing so involves regulators reconciling competing priorities and natural market tensions (*see Exhibit 3*). Striking that balance is especially challenging in rapidly changing tech-based sectors such as ICT. Intensifying competition can constrain or even reverse growth if market participants engage in a race to the bottom on prices. That can destroy value and undermine the very benefits that lively markets provide. Multiple studies have shown that unfettered competition in capital-intensive industries such as ICT can damage innovation and the sustainability of the sector, because it takes a certain level of market power to fuel investment and innovation.[18]

Another challenge is that telecom operators need to accelerate growth into new areas, but find innovation difficult. That lack of innovation by telecom operators affects ICT development overall, as these companies are significant players in the market.

EXHIBIT 3
ICT regulator tensions

Source: Strategy&

In GCC countries, three factors also combine to hamper ICT development:

1. Increased market complexity

ICT is no longer confined to the telecom and IT markets, which makes developing regulation and policies more difficult. In the digital era, ICT is central to all economic and social activity, whether in retail, through e-commerce; in finance, through fintech; or in healthcare, education, and transportation. Increasingly, these sectors depend on ICT services to function. Even traditional ICT players, such as telecom operators, are expanding their service offerings into these other industries. The increasing breadth and scale of interconnected businesses and the blurring of sector boundaries add further complexity. Similarly, a new breed of cross-border ICT supplier is emerging that can fall outside the existing jurisdictions of national regulatory authorities, and thus gain unfair advantage over incumbents that must abide by national regulations. Adding to the complexity is the interest that hyperscale technology providers are showing in GCC markets.[19]

2. A capabilities deficit

The shortage of domestic IT and digitally skilled workers hampers industry growth and innovation, while similarly slowing development of the regulatory community. The GCC talent shortage slows regulatory bodies' ability to develop internal capabilities. It makes it more challenging for them to develop detailed knowledge of the digital ecosystem, which they need to formulate forward-looking regulations, such as those covering emerging technologies—including AI. These regulations are necessary to attract investment and create grounds for innovation. For regulators it is important to possess internal capabilities so that they can grasp the commercial imperatives for ICT players and how these imperatives interact with regulations.

3. Inconsistent and outdated regulations across subsectors

Regulation could be seen as inadequate in key ICT areas, including AI, blockchain, the cloud, cybersecurity, and the IOT, in part because these areas are new, and because of the deficit of capabilities discussed above. That hampers growth. Companies are reluctant to risk investing in areas of regulatory uncertainty. Moreover, the perceived lack of clear coordination between regulatory bodies can cause inefficient or inconsistent national regulation, as with data privacy, and inconsistent classifications. There are also cross-border imbalances; some countries are more attractive to investors than others. In part, such issues are a result of the delay in implementing tax-free transit zones so that companies are not taxed on services for foreign markets. On top of these issues, the lagging effort to harmonize regulations creates loopholes and an uneven playing field between domestic and international players.

AN ACTION PLAN

Given these challenges and rapid market developments, regulators throughout the GCC are vying among themselves to foster a vibrant ICT sector so that they can serve their own domestic businesses and consumers. GCC countries are looking to establish themselves as regional hubs to attract hyperscalers and global tech giants that want to build a domestic presence in these markets. Regulators are also under pressure to enable national aspirations. They are being asked to transform their way of working to meet these development goals.

Regulators therefore can adopt a new mindset that will drive sustainable growth and should embark on transformation to modernize their regulatory regimes and promote the development of the digital economy (*see Exhibit 4*). They can broaden their mandate to cover adjacent industries and sector development, modernize their regulatory instruments and approaches, and redefine their success metrics.

> Regulators therefore can adopt a new mindset that will drive sustainable growth and should embark on transformation to modernize their regulatory regimes and promote the development of the digital economy.

EXHIBIT 4
Plan of action

1 Broaden the mandate

- **1.1** Expand mandate into adjacent industries to cover gaps if native regulators are not present or governance is ineffective
- **1.2** Expand mandate vertically into ICT sector development and enhance collaboration with adjacent regulators where available

2 Modernize regulatory instruments and approaches

- **2.1** Update market definitions, taking into consideration the dissolved boundaries and new forms of competition
- **2.2** Phase out rules-based regulations and reduce reliance on ex ante remedies
- **2.3** Shift toward ex post instruments and principles-based and adaptive approaches
- **2.4** Choose symmetrical remedies to address local imbalances
- **2.5** Incentivize infrastructure sharing through wholesale interconnection and local access
- **2.6** Liberalize pricing to encourage investment and enable innovative commercial models
- **2.7** Innovate in licensing to boost experiments through temporary licenses, special innovation licenses, etc.
- **2.8** Stimulate demand through targeted literacy programs, subsidies, voucher schemes, etc.
- **2.9** Expand adoption of regulatory technology to increase automation and reliance on data, streamline violations management, etc.

3 Redefine success metrics

- **3.1** Service availability and uptake (e.g., 5G, fiber broadband)
- **3.2** Service quality, customer experience, and satisfaction indices
- **3.3** Data privacy and security effectiveness (e.g., global cybersecurity index)
- **3.4** Innovation index (e.g., number of patents, sandboxes)
- **3.5** Investment friendliness (e.g., FDI levels, ROCE of listed ICT players)
- **3.6** Digital transformation (e.g., percentage of digitized government services, usage rates)
- **3.7** ICT sector size, growth, and contribution to GDP
- **3.8** Increased cross-collaboration (e.g., hyperscalers' investment, localization levels, partnerships with local players)
- **3.9** Broader economic indicators (e.g., workforce localization, digital literacy)

Note: FDI = Foreign Direct Investment, ICT = Information and Communications Technology, ROCE = Return On Capital Employed
Source: Strategy&

Broaden the mandate

There needs to be a proactive expansion of regulators' mandate, a vital first step in the transformation of regulation, a change through collaboration between policymakers and regulators. The mandate needs to be widened to cover the poorly regulated areas that emerge because of ICT sector expansion, blurred lines between adjacent industries, and the sometimes overlapping missions of government entities tasked with promoting ICT development.

This development in the mandate can occur along two dimensions (*see Exhibit 5*):

- The first dimension relates to sectoral coverage, which means coverage of core telecom markets and adjacent markets. Core telecom markets include new technologies and services that telecom operators traditionally provided but that are now increasingly coming from new technologies such as non-terrestrial networks with high-altitude platform stations or low earth orbiting satellites. Adjacent markets include emerging ICT market participants such as OTT service providers as well as IOT, AI, cloud computing, big data, and specialty players within related industry verticals, such as fintech, EdTech, and e-commerce.

- The second dimension relates to the move away from traditional regulation to ICT sector enablement. Traditional regulation focuses on preserving service quality, protecting consumers, and ensuring healthy competition. ICT sector enablement focuses on human capital development and innovation, demand stimulation, and service uptake, seeking to drive investment and attract foreign direct investment.

Regulators can undertake a careful analysis of national market conditions and the roles of other regulatory bodies that affect ICT, assessing their effectiveness and maturity.

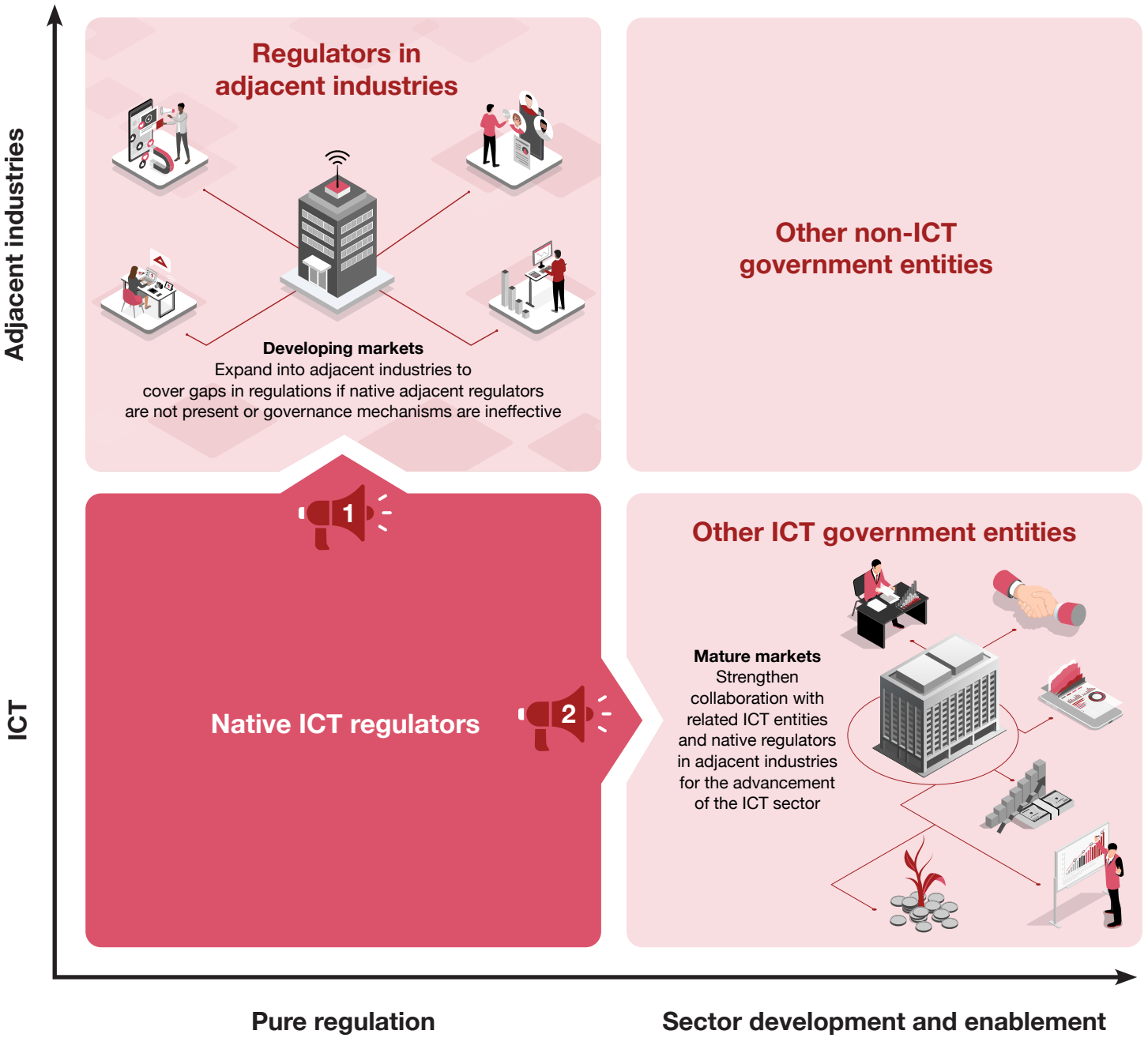
Much depends on the nature of these particular areas, which differs among the GCC countries. If these areas are mainly within ICT, then regulators should focus on enabling their sector first. In instances in which ICT regulation is mature, regulators can set the "best in class" regulations for other verticals, thereby acting as incubators for these other verticals until they develop their own specific regulations. Where regulatory coverage for adjacent sectors is mature, ICT regulators can focus on developing their mandate beyond traditional regulation in markets. They can seek to cover overall ICT sector enablement and to strengthen collaboration with other ICT and non-ICT government entities.

However, if the analysis finds either that there are no regulators in adjacent sectors, or that there are ineffective cross-sectoral governance mechanisms, then ICT regulators can engage policymakers to obtain permission to expand their mandate and cover these areas.

Developing the mandate takes time. While most GCC regulators are still in the early stages of this journey, some are proactively adapting their mandate to market changes. For example, Saudi Arabia's communications, space and technology commission recently announced a revamp of its mandate to emphasize emerging technologies and the space economy.[20]

EXHIBIT 5

Evolution of ICT regulators' mandate



Source: Strategy&

Modernize regulatory instruments and approaches

Regulators can modernize how they regulate. They should adopt an ex post philosophy and principles-based regulation, which is a more adaptive approach that also reduces the scope of ex ante interventions. The old rules-based approach is impractical in a world in which technology and markets change rapidly, in which technology is disruptive and constantly challenging existing rules. By contrast, principles-based regulation involves:

- Targeted and proportional measures
- Soft-law instruments
- Modern capabilities, technologies, and processes
- Regulatory pilots and sandboxes

Targeted and proportional measures

Regulators can adopt targeted and proportional measures to reflect new market realities and address known issues. Among these issues are imbalances between domestic service providers, whether related to the power these companies exert in the market or how regulators treat them, and new forms of competition among domestic and international entities. For example, it is possible for regulators to confine a steep price-cutting measure to just a product that has a pricing issue, rather than stifling innovation and value creation by imposing the burdensome requirement of rapid and steep price cuts on an entire product range.

Soft-law instruments

Regulators can move to soft-law instruments such as recommendations, guidelines, and self-regulated or co-regulated codes of conduct. For example, almost a decade ago, the European Union reclassified retail telecom markets as being fully competitive. That ushered in a light-touch regulatory approach that removed barriers to new market development while providing oversight. Another benefit of this reclassification is that regulators rely far less on ex ante instruments.

Modern capabilities, technologies, and processes

Modern capabilities, technologies, and processes allow regulatory mechanism to be adaptable, thereby guaranteeing their continued relevance to the changing market landscape. For example, regulatory technology (RegTech) can increase automation in such areas as reporting, risk management, compliance, and monitoring, while making data-driven approaches simpler. Singapore's Infocomm Media Development Authority (IMDA), for instance, relies on data from a proprietary mobile application that voluntarily crowdsources anonymized network information such as broadband speed and coverage to assess mobile network operators' performance and take active measures to improve it.[21]

Regulatory pilots and sandboxes

Regulators can use pilots and sandboxes[22] to foster innovation and make fact-based responses informed by the results of live experiments. The metaverse and digital twins, for example, can enhance and accelerate regulatory experimentation. France's regulator Autorité de Régulation des Communications Électroniques, des Postes et de la Distribution de la Presse (Arcep) has deployed a regulatory sandbox that allows participants to experiment with innovations supported by 5G technology. Specifically, Arcep temporarily relaxed its regulatory framework for up to three years for frequency bands it allocated in exchange for participants making their infrastructure available to third parties.[23] Similarly, regulators can adopt new mechanisms such as authorization waivers, temporary licenses to new technologies, and special innovation licensing, to free up business expansion, product development, infrastructure, and equipment installation. These measures can also enable other activities that fuel market development and fulfill customer needs.

Redefine success metrics

Success for ICT regulators is demonstrated by a thriving ICT sector, the digital enablement of adjacent sectors, and effective governance, transparency, and cooperation among stakeholders.

Success metrics should therefore support regulators' broader mandate to regulate and enable the ICT sector while promoting digital transformation throughout the economy. Current indicators of success, however, such as pricing and market share, offer a narrow picture of the market and commercial opportunities. Regulators can instead adopt holistic metrics that reflect the industry's value creation across the wider economy, such as sector growth, job creation, digital services adoption and quality, data privacy and security effectiveness, and innovation (*see Exhibit 4, page 14*). The point of these measures is to ensure that the regulator is striking the optimal balance: creating an environment favorable to investment and innovation over the long term, ensuring that regulations are adaptive and remain relevant to market dynamics, and generating a consumer surplus in the short term.[24] The latter can benefit ICT market players, but more importantly, it can benefit consumers, who can gain greater access to modern infrastructure and enjoy a higher quality of service and more choice, at lower cost.

Consider, for example, the UAE's Telecommunications and Digital Government Regulatory Authority (TDRA). The authority relies on key indicators of its own and of government services to support digital transformation and bolster its comprehensive methodology. Among TDRA's strategic goals is enhancing the public's digital experience. It tracks its annual progress on this goal through seven indicators: government services' digital transformation, digital service usage, digital service awareness, website quality, service quality, digital enablers' usage, and services on the unified government services portal.[25] Similarly, Singapore's IMDA monitors and measures ICT industry revenue, employment (by gender, qualification, and other characteristics), quality of service performance (for mobile and fixed services), digital maturity of businesses, acceleration of digital adoption, and online purchase activity.

CONCLUSION

Modernized regulation should be ahead of developments in the sector and in sectors directly affected by ICT. Such regulation should set the pace of innovation. Regulators should set players free to innovate and enable them to succeed. When regulators act in this manner, they encourage the development of the ICT sector and of its broader positive impact on the economy, making them in effect partners in growth and innovation. In that way, modern regulators can provide consumers with enhanced protection, expanded choice, better quality, and more affordable services—all of which inspire their trust and in turn increase ICT service adoption. More broadly, such modern regulation can lead to a thriving, growing industry, which enables the digital economy and provides an essential catalyst for realizing the economic ambitions of GCC countries.

Appendix

#	Category	Indicator	Data Source	Global Benchmark
1	Macro level	ICT contribution to GDP (% of GDP, 2022/23)	Strategy& analysis based on data from IDC and IMF	U.S.
2	Macro level	Human Capital and Research Index (index value, 2022)	Subset of the Global Innovation Index, 2022 (https://www.wipo.int/global_innovation_index/en/2022/)	South Korea
3	Macro level	Global Cybersecurity Index (index value, 2020)	International Telecommunication Union, ITU DataHub, 2020 (https://www.itu.int/epublications/publication/D-STR-GCI.01-2021-HTM-E)	U.S.
4	Macro level	Network Readiness Index (index value, 2022)	The Network Readiness Index 2022 (https://networkreadinessindex.org/)	U.S.
5	Telecom	Telecom market size (% of GDP, 2021)	International Telecommunication Union, ITU DataHub, 2022 (https://datahub.itu.int/); IMF, World Economic Outlook Database, 2021 (https://www.imf.org/external/terms.htm)	Japan
6	Telecom	Mobile broadband penetration (mobile subscriptions to population, 2021)	International Telecommunication Union, ITU DataHub, 2022 (https://datahub.itu.int/); IMF, World Economic Outlook Database, 2021 (https://www.imf.org/external/terms.htm)	United Arab Emirates
7	Telecom	Broadband penetration (% of households with internet access at home, 2022)	International Telecommunication Union, ITU DataHub, 2022 (https://datahub.itu.int/)	Bahrain, Saudi Arabia, United Arab Emirates
8	Telecom	Price of mobile data and voice pack (high use) (% of GNI, 2021)	International Telecommunication Union, ITU DataHub, 2021 (https://datahub.itu.int/)	Luxembourg
9	Telecom	Mobile broadband speeds (Mbps, September 2023)	SpeedTest (Ookla), September 2023 (https://www.speedtest.net/global-index)	United Arab Emirates
10	Telecom	Fixed broadband speeds (Mbps, September 2023)	SpeedTest (Ookla), September 2023 (https://www.speedtest.net/global-index)	Hong Kong
11	Telecom	Mobile broadband usage per mobile subscription per month (GB, 2022)	International Telecommunication Union, ITU DataHub, 2022 (https://datahub.itu.int/)	Kuwait
12	Tech	IT spending (% of GDP, 2022/23)	Strategy& analysis based on data from IDC and IHS, 2022/23	U.S.
13	Tech	Global Innovation Index (index value, 2022)	Subset of the Global Innovation Index, 2022 (https://www.globalinnovationindex.org/gii-2022-report#)	Switzerland
14	Tech	Economic Freedom Index (index value, 2023)	Index of Economic Freedom, 2023	Singapore
15	Tech	Patents by origin (per billion purchasing power parity GDP, latest available year)	Subset of the Global Innovation Index, 2022 (https://www.wipo.int/global_innovation_index/en/2022/)	U.S.
16	Tech	Start Up Ecosystem ranking (2023)	StartupBlink Global Startup Ecosystem (2023) (https://lp.startupblink.com/report/)	U.S.

ENDNOTES

1. The GCC countries are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

2. Ex ante (Latin for *before the event*) regulations are designed to proactively identify and address potential problems to prevent harmful conduct from occurring by shaping businesses behavior and responses. This is accomplished through regulatory interventions that tell businesses precisely what to do (e.g., mandating that service providers pass an economic replicability test or comply with a price floor or ceiling prior to launching a new product or changing the price of an existing one).

3. Ex post (Latin for *after the fact*) regulations are the converse of ex ante regulations. They are instruments used after an event (e.g., a market failure or distortion) is observed.

4. Kingdom of Saudi Arabia, "Saudi Vision 2030" (https://www.vision2030.gov.sa/media/rc0b5oy1/saudi_vision203.pdf).

5. "Saudi Arabia Aims to Become a Top 20 Digital Powerhouse by 2030: Deputy Telcom Minister," *Zawya*, February 25, 2021 (https://tinyurl.com/bde2swdh).

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