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CAREC DIGITAL STRATEGY 2030

Accelerating Digital Transformation for Regional Competitiveness and Inclusive Growth

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Executive Summary

According to multiple studies, digital transformation based on effective data management can have a positive impact on economic growth, new jobs creation, and social inclusion. Today, as the world is dealing with the unprecedented challenges posed by the COVID-19 pandemic, it is becoming increasingly evident that countries that have invested in national broadband infrastructure and whose people and businesses are connected through digital platforms are faring better than others: students can benefit from online schooling, companies have shifted to online work, and government services are available through online government portals. Countries without a national broadband infrastructure, however, have been caught off-guard by the pandemic. The sudden transition to telework and distance learning has been a challenge for many in the CAREC region where more than half of the population remains unconnected.

There is broad agreement across CAREC that digitalization will not only help COVID-19 recovery, but also allow member countries to develop robust solutions in important areas such as healthcare and education, agriculture, finance, trade, and tourism, and thus fuel the development of CAREC's operational clusters in line with the CAREC Strategy 2030 that prioritizes Information and Communication Technology (ICT) as a cross-cutting issue, as well as sectoral strategies for energy, tourism, trade, and transport, ultimately leading to higher economic growth, new jobs and better services across the region. The CAREC Digital Strategy 2030 is intended as a catalyst for regional cooperation on digital matters and a mechanism to promote policy design, capacity building and dialogue on the ways social and economic challenges in the region can be addressed with the help of digital technologies.

CAREC countries must learn from the COVID-19 crisis and utilize digital technologies that have proven essential to managing through the pandemic, in the recovery period. A focus on addressing the existing imbalances in digital development across the CAREC region, on regional digital collaboration and best practice sharing can enable CAREC member countries to take advantage of the opportunity in this crisis and lay the basis for a sustainable and inclusive economic recovery. Boosting regional cooperation on digital transformation, adopting digital technologies to leverage existing ties and create new ones, and focused investment into regional interoperable digital infrastructure will help accelerate COVID-19 recovery.

The CAREC Digital Strategy 2030 was prepared by the CAREC Secretariat supported by the Asian Development Bank (ADB). The CAREC Secretariat partnered with the CAREC Institute and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), and also received feedback from development partners including the Asian Infrastructure Investment Bank (AIIB), the European Bank for Reconstruction and Development (EBRD), the Eurasian Fund for Stabilization and Development (EFSD), the International Finance Corporation (IFC), the Islamic Development Bank (IsDB), and the World Bank.

CAREC Digital Strategy 2030 Vision and Mission

In line with the overarching CAREC 2030 vision of 'Good Neighbors, Good Partners, and Good Prospects', the CAREC Digital Strategy 2030's vision is to create a common CAREC Digital Space[1] which will lead to inclusive economic growth and social well-being, new jobs, including for the disadvantaged and minority populations of the region, better services, and higher regional competitiveness.

[1] The CAREC Digital Space will be an interconnected digital ecosystem that will enable development of new digital products and services, power digital transformation and support a freer flow of data across the region.

To achieve this vision, the CAREC Digital Strategy 2030 adopts the mission of creating a data-driven digital regional economy with fast and reliable online access to relevant information and trusted, real-time, user-friendly digital services for all citizens, businesses, and administrations across the CAREC region. This mission will be achieved through the following objectives:

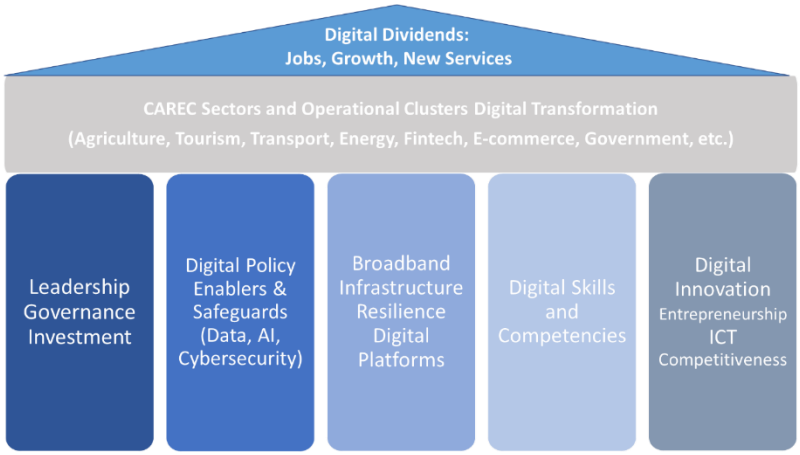
- Encourage investment into the digital infrastructure across the region to close connectivity gaps.
- Harmonize digital and data legislature to promote an enabling environment.
- Develop new digital skills, including for women, disadvantaged and minority populations, to create jobs
- Attract talent into the region to strengthen CAREC's innovation ecosystem.
- Reduce regional trade barriers to increase cross border trade and expand business opportunities for companies across the region, particularly in e-commerce.
- Improve the digital foundations (represented through the pillars in Section 6 below) and create interoperable digital platforms to enable the development of CAREC's operational clusters.

These objectives have been formulated based on inputs from stakeholders (received during a series of collaborative consultations) and will address the gaps that preclude them from attaining the above mission statement. These gaps include a lack of investment in networks, lack of R&D for digital innovation, lack of harmonized legislation and regulation to enable digital cooperation at the regional level, and a lack of interoperability in digital infrastructure.

Five Pillars of the CAREC Digital Strategy 2030

To achieve these objectives, the CAREC Digital Strategy 2030 will strengthen the following five interconnected pillars by way of improved cooperation between CAREC member countries.

Figure 1. CAREC Digital Strategy 2030 Analytical Framework



Pillar 1: Leadership, Governance, and Investment in the Digital Economy

The adoption and implementation of the CAREC Digital Strategy 2030 requires strong and dedicated regional leadership with high-level commitment to digital transformation. A coordination mechanism to ensure multi-stakeholder participation and undertake consultations and dialogue on CAREC digital issues will be implemented. The CAREC Secretariat will facilitate the coordination and organization of this process. This mechanism will make efforts to create incentives for regional cooperation in the CAREC Digital Space and will seek to attract the needed investments. It will also leverage digital technologies to pursue cross-cutting Sustainable Development Goals to promote inclusion, innovation, sustainability, resilience, partnerships, and participation.

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Pillar 2: Digital Policy Enablers and Safeguards

To create the common CAREC Digital Space and enable a freer flow of data and services in the region, CAREC member countries will work to eliminate legal barriers and harmonize the relevant policies, regulations, and standards. This will reduce the existing barriers to cross-border trade, especially through the implementation of e-commerce, e-payments, and the establishment of digital platforms within and across CAREC sectors and priority clusters.

Member countries will also work on aligning the data policies across the region to safeguard data privacy, enable public consultation, ensure transparency and non-discrimination, and strengthen security. This will create trust in online services, as well as the broader digital economy and society, and support the development of artificial intelligence and related technologies in the region.

Pillar 3: Digital Infrastructure, Resilience and Platforms

The CAREC member states' digital infrastructures should be connected based on common standards and principles of interoperability, scalability, and security. Sustaining these standards and principles is critical to the mobilization of digital platforms and the efficient operation of the common CAREC Digital Space. CAREC members will take joint action for building capacity for regional digital resilience. This will ensure the agility and adaptability of the infrastructure underpinning digital systems to withstand and bounce back from crises and shocks.

A CAREC regional platform economy is the key direction for a collaborative regional digital transformation effort. Integrated platforms will be built to implement digitalization in CAREC's operational sectors and in these foundational pillars.

Pillar 4: Digital Skills and Competencies

CAREC member countries face a shortage of skilled digital talent across sectors in the economy. Unless addressed, this shortage will deepen as the digitalization of industry and government accelerates. CAREC member countries must address the critical issue of unemployment, migration and brain drain from the region by focusing on developing and enhancing digital skills broadly. Both basic digital literacy skills of the population and advanced digital skills for professionals across all sectors of the economy will be addressed. Boosting the digital skills and competencies of public sector employees, including at senior levels, will be a priority. Improving the quality of national education systems and leveraging digital technologies to boost digital competencies across the region through advancing training, upskilling and reskilling, and promoting life-long learning will be the key focus areas in this space.

Pillar 5: Innovation, Entrepreneurship, and ICT Competitiveness

The innovation gap is at the heart of the digital divide, as digital technologies are developing faster than government and institutions are able to formulate policies to regulate these technologies and leverage their benefits for the larger good of society. To develop and boost innovation ecosystems in the absence of sufficient allocation in most national budgets, the CAREC Program will focus on fostering quick adoption, dissemination, and scaling of existing innovative products and solutions across the region and promote frugal innovation and entrepreneurship.

Promoting innovation and adoption of digital products will require educational initiatives and training programs to build digital skills that can help users understand the benefits of these solutions. Other key initiatives for building innovative enterprises include nurturing the digital innovation ecosystem across the CAREC region; promoting the adoption and effective use of digital technologies by small and medium enterprises (SMEs); promoting regional content; and supporting local ICT companies across the region to address regional demand for digital solutions and to boost ICT exports.

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CAREC Sector and Priority Cluster Transformation

The CAREC 2030 Strategy emphasizes that integrating the use of ICT across the spectrum of CAREC operations will be a cross-cutting priority. It is therefore important to establish the path for accelerating digital adoption within CAREC's five operational clusters, to achieve higher productivity, efficiency, and customer satisfaction gains at the sectoral level, which will drive the digital dividends of higher growth, new jobs, and better services.

A comprehensive list of sector wise solutions in provided in this section, which includes: fintech and e-finance solutions to boost the CAREC region's economic and financial stability; digital tourism, cross-border services, e-logistics, e-commerce, e-customs, and e-procurement to power CAREC's efforts in trade, tourism and economic corridors; 4G and 5G roll-out, digital government as a platform, regional cloud infrastructure, data centres, smart cities and villages will support CAREC's infrastructure and economic connectivity initiatives; digital agriculture, geospatial, and smart water management solutions and platforms can accelerate the growth of CAREC's agriculture and water sectors, while digital skills and competencies initiatives will help empower CAREC's human development activities. Member country governments will also participate in this process by adopting 'government as a platform' approach to promote digitalization of government services.

Implementing the CAREC Digital Strategy 2030

The CAREC Digital Strategy 2030 is at its onset ambitious in its vision and will serve as a living document which will be updated to reflect according to changing needs. In its implementation, it is important to combine the longer-term view with agile frameworks, focusing on a prioritized project portfolio and an implementation roadmap. This roadmap will highlight quick wins and low-hanging fruit in the shorter term and progress to more strategic projects while strengthening critical elements such as regional governance and institutions, partnerships, leadership skills and execution capacity.

A CAREC Digital Strategy Steering Committee will be established to determine the appropriate leadership and governance structures as well as the regional institutional framework to drive the implementation of the CAREC Digital Strategy 2030. The Steering Committee will be led and constituted by governments of the CAREC member countries, and it will be facilitated by the CAREC Secretariat. The committee will engage all the members of the CAREC Digital Space in the implementation process relying on mutual goodwill and inclusive multistakeholder consultation model that brings together public and private sector organizations across CAREC, academic institutions, the expert community, international donor organizations, global and regional technology giants, citizens, and other players. The Steering Committee, in line with the five pillars, will implement upon the following priorities:

- Develop the CAREC Digital Transformation Project Portfolio
- Launch specific initiatives to strengthen the enabling environment by harmonizing the legal and regulatory environment and by building capacity
- Build and maintain multi-stakeholder consensus across the region
- Gather and share best practices for regional digital development
- Develop and launch a strategic communications plan
- Prioritize the CAREC Project Portfolio and creating the CAREC Digital Strategy 2030 Implementation Roadmap
- Work with development partners to secure project funding
- Build public-private sector partnerships for project implementation
- Establish a monitoring system to measure progress
- Future-proof the strategy to adapt to changing scenarios and needs

The CAREC leadership must leverage global and regional best practices to enable effective implementation. Sufficient financial resources must be allocated early on to support universal broadband access across the region, the creation of common digital infrastructures and digital platforms and the implementation of the prioritized CAREC portfolio of digital transformation projects in the region.

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1. Introduction

Multiple studies indicate that digital transformation based on effective data management can have an impact on economic growth, new jobs creation, and social inclusion.[2, 3, 4] Today, as the world is dealing with the unprecedented challenges posed by the COVID-19 pandemic, it is becoming increasingly evident that countries that have invested in a national broadband infrastructure and whose people and businesses are connected through digital platforms are faring better than others. As the pandemic carries on, digital technologies have enabled a gamut of activities including contact tracing, lockdown enforcement, cooperation on vaccine development, online education, and teleworking. As millions shifted to teleworking and online schooling, in just the first few months of the crisis, data traffic increased by at least 20 %, while cyberattacks on the health sector infrastructure and mobile networks have increased by 150 %.[5]

Countries without a national broadband infrastructure have been caught off-guard by the pandemic. The sudden transition to telework and distance learning has been a challenge for many. In the CAREC member countries, more than half of the population remains unconnected.[6] The COVID-19 crisis has also exposed the severity of the rural/urban digital divide, exacerbating social and economic inequalities, hitting disadvantaged populations in remote areas, especially women, children, the elderly, the sick and the disabled. Some CAREC member countries such as the PRC, Kazakhstan, and Kyrgyzstan, were able to shift to distance learning at scale[7], while in other countries children were left without schooling for many months, as not everyone was able to benefit from online education.[8, 9]

The COVID-19 pandemic has also brought significant disruption at the regional level. As countries-imposed lockdowns and quarantines, supply chains were disrupted, trade slowed, and tourism and business travel stalled. It is crucial to start looking outwards again, while taking stock of the lessons learnt from the COVID-19 crisis and utilize digital technologies that have proven essential to managing through the pandemic, in the recovery period. A focus on regional cooperation and digitalization can enable CAREC member countries to lay the basis for a sustainable economic recovery.

Regional organizations worldwide place digital technologies at the heart of their economic development and COVID-19 recovery strategies. The European Union (EU) considers the digital economy as "the single most important driver of innovation, competitiveness, and growth in the world".[10] The Association of Southeast Asian Nations (ASEAN) intends to accelerate its digital integration which has the potential to generate a USD 1 trillion uplift in GDP by 2025.[11] The United Nations Economic Commission for Latin America and the Caribbean (UNECLAC) also aims to develop the regional digital market in order to boost socially just and

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[2] World Bank. 2016. WDR 2016 Digital Dividends. Washington D.C.

[3] The World Economic Forum (WEF) observes that "the digital economy permeates all aspects of society, including the way people interact, the economic landscape, the skills needed to get a good job, and even political decision-making". World Economic Forum. 2016. The digital economy: what is it and how will it transform our lives?

[4] The World Bank's research suggests that "just 10% increase in broadband connectivity can add at least 1% to economic growth, while 1% increase in internet connectivity corresponds with a 4.3% [increase] of export growth". World Bank. 2020. COVID-19 Prompts Urgency of Bridging Digital Divide in Central Asia.

[5] World Bank. 2021. COVID-19 Crisis Response: Digital Development Joint Action Plan and Call for Action.

[6] Global System for Mobile Communications (GSMA). Mobile Connectivity Index (accessed 15 May 2021).

[7] Maria Levina. 2020. Central Asia countries switch to remote learning amid COVID-19 outbreak. *The Times of Central Asia.* 3 April.

[8] According to recent data, around 40% of Europe and Central Asia combined online education with TV and radio to reach rural areas and those without an internet connection. In South Asia, around 40% of the countries used broadcast alone (TV or Radio only) due to the lack of internet access.

[9] Emiliana Vegas. 2020. School closures, government responses, and learning inequality around the world during COVID-19. *Brookings.* 14 April.

[10] World Bank. 2016. WDR 2016 Digital Dividends. Washington D.C.

[11] Huawei Technologies Company Limited. 2020. ASEAN to Accelerate Digital Integration for Post-COVID Economic Recovery. Jakarta.

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environmentally sustainable development in the region, drive the growth of connectivity for citizens and business, and simplify the online exchange of goods and services. The Gulf Cooperation Council (GCC) - particularly the governments of the United Arab Emirates (UAE), Bahrain, and Saudi Arabia - have been directing vast resources toward the digitalization of their infrastructure by creating the needed institutions, amending legislation, partnering with "Big Tech," and building local human capital.[12] The Eurasian Economic Union (EAEU) has adopted the EAEU Digital Agenda 2025 aimed at the creation of a common digital space and a single digital economy in the region and achieving associated digital dividends expressed in higher regional economic growth, new jobs creation in the digital and non-digital sectors and the development of new and better services.[13] Similarly, boosting regional cooperation for digital transformation in the CAREC Program will allow leveraging of digital technologies to strengthen old ties and create new ones to help accelerate the COVID-19 recovery process.

1.1 Purpose and Approach

The CAREC 2030 Strategy prioritizes information and communication technology (ICT) as a cross-cutting issue across its operational clusters (see Annex A), providing the institutional basis for the CAREC Digital Strategy 2030. CAREC leaders who gathered for the 54th Annual ADB meetings on May 4, 2021, outlined several priorities for digital transformation at the regional level.[14] Those included bridging the digital divide through investing into broadband infrastructure, leveraging digital technologies to cope with the COVID-19 crisis and its fall-out, harmonizing regulation and legislation to enable e-commerce across the region, and developing digital solutions for CAREC's operational clusters.

The CAREC Digital Strategy 2030 is intended as a catalyst for regional cooperation on digital matters and a mechanism to promote policy design, capacity building, and dialogue on the ways social and economic challenges in the region can be addressed with the help of digital technologies. The rapid development of disruptive technologies, coupled with the challenges of the COVID-19 crisis, require stronger regional cooperation and trust to accelerate digital transformation. This is an opportunity in crisis: leverage digital technologies to recover and build-back-better for a resilient and inclusive economy and society.

1.1.1 Adopting a holistic digital transformation framework

A holistic digital transformation framework (see Annex B) will allow CAREC member countries to take advantage of complementarities and synergies, align the CAREC Digital Strategy 2030 with the development agenda outlined in the CAREC 2030 Strategy, and support the implementation of the six priorities for CAREC regional digital cooperation identified by CAREC public and private sector stakeholders (see below in Section 4). The digital transformation framework comprises of the digital foundations which act as enablers of the digital transformation process and include digital leadership, policies and institutions, digital infrastructure, digital platforms, digital skills, digital data, the digital innovation and entrepreneurship ecosystem, and digital industry and support services. Digital foundations rest on non-digital foundations, such as the business environment, education, competition, financial policies, governance, access to electricity, etc. Digital solutions cover ICT applications in key economic sectors, such as education, health, tourism, trade and finance, transport, energy, urban development, and agriculture.[15] Strong digital foundations are fundamental to extracting digital dividends from sectoral transformation initiatives. A holistic and integrated approach to digital strategy is essential to maximizing the digital dividends and securing equitable benefits and inclusive economic growth[16]. Digital transformation cuts across all sectors at the local, national, and regional levels and

[12] Soliman. 2020. COVID-19 and the digital landscape in the Gulf.
[13] World Bank. 2018. The EAEU 2025 digital agenda : prospects and recommendations - overview report (English). Washington DC.
[14] ADB. 2021. CAREC at 20: Reimagining Regional Cooperation Through Digital Transformation. 54th AGM. 4 May.
[15] For more detail and background on concept and figure see Hanna 2016 and 2020. Nagy K. Hanna (2020). "Assessing the digital economy: aims, frameworks, pilots, results, and lessons." Journal of Innovation and Entrepreneurship 2020.
16 World Bank, Digital Dividends, World Development Report, 2016.

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requires the engagement and collaboration of the entire ecosystem: the public and private sectors, the expert and academic community, the innovation ecosystem, development partners and citizens.

1.1.2 CAREC Digital Strategy 2030 – Preparation and Inputs

The CAREC Digital Strategy 2030 was prepared by the CAREC Secretariat supported by the Asian Development Bank (ADB). The CAREC Secretariat partnered with the CAREC Institute and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), and also received feedback from development partners including the Asian Infrastructure Investment Bank (AIIB), the Eurasian Fund for Stabilization and Development (EFSD), the International Finance Corporation (IFC), the Islamic Development Bank (IsDB), and the World Bank.

The CAREC Digital Strategy 2030 is a collaborative effort that relied on consultation sessions with stakeholders from the CAREC region. The sessions were held in the summer of 2021, supported by a number of analytical exercises including an analysis of stakeholder inputs received through responses to CAREC questionnaires (see Annex C); a review of national digital transformation strategy documents of CAREC member countries (see Annex D); a SWOT analysis of the enabling environment and the non-digital and digital foundations of digital transformation across the CAREC region (see Annex E); a review of global best practices in driving digital transformation at the regional and country levels (see Annex F); and an analysis of secondary sources, including global development organizations reports, global digital development indices, scientific papers, notes and articles on digital development (see Annex G).

1.2 Document Structure

The strategy document consists of the main text delivering the CAREC Digital Strategy 2030 and supporting annexes. The main text of the Strategy opens with proposing the vision, mission, and objectives of the Strategy, and provides an overview of the current state of digital development across the CAREC region. It then discusses the six CAREC stakeholder priorities for digital transformation in the region and addresses the five pillars that constitute the foundations required to support CAREC stakeholder's regional digital transformation agenda, including priority areas for cluster-level digital adoption. The main text concludes with proposing strategy implementation guidelines. The annexes provide more context, research, analytical and background material as well as more detailed recommendations to various sections of the strategy.

2. CAREC Digital Strategy 2030: Vision, Mission, and Objectives

In line with the overarching CAREC 2030 vision of Good Neighbors, Good Partners, and Good Prospects, the CAREC Digital Strategy 2030 vision is to create a common CAREC Digital Space – an interconnected digital ecosystem that enables the development of new digital products and services, powers digital transformation, and supports a freer flow of data across the CAREC region. The CAREC Digital Space will generate higher digital dividends across the region, expressed in inclusive economic growth and social well-being, new jobs, including for the disadvantaged and minority populations, better services, and higher regional competitiveness.

To achieve this vision, the CAREC Digital Strategy 2030 adopts the mission of creating a data-driven digital economy with fast and reliable online access to relevant information and trusted, real-time, user-friendly digital services for all citizens, businesses, and administrations across the CAREC region. This mission will be based on high-speed internet and on secure, scalable, and interoperable digital platforms and digital infrastructure that are resilient against cyber-attacks and other crises.

The above mission translates into the following objectives, which have been derived from the priorities identified by the stakeholders (see Annex C for details):

- Encourage investment into the digital infrastructure across the region to close connectivity gaps.
- Harmonize digital and data legislature to promote an enabling environment.

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- Develop new digital skills, including for women, disadvantaged and minority populations, to create jobs
- Attract talent into the region to strengthen CAREC's innovation ecosystem.
- Reduce regional trade barriers to increase cross border trade and expand business opportunities for companies across the region, particularly in e-commerce.
- Improve the digital foundations (represented through the pillars in Section 6 below) and create interoperable digital platforms to enable the development of CAREC's operational clusters.

3. Digital Adoption across CAREC: Current State Overview

The levels of digital development across the CAREC region vary significantly and most CAREC member countries have under-developed digital ecosystems.[17] According to the World Bank's classification of countries based on their level of digital development into three groups (transforming, transitioning, and emerging)[18], the CAREC member countries fall into the emerging and transitioning categories. Emerging countries include Afghanistan, Pakistan, Tajikistan, and Turkmenistan. Transitioning countries include Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, the PRC, and Uzbekistan.The differences between CAREC member countries are also reflected in the rankings of CAREC member countries in global digital development indices (see Annex G for more details).

CAREC member countries realize the wide-ranging opportunities for digitalization. An analysis of CAREC members' national digital transformation strategies revealed that all the CAREC member countries have included digital transformation as a priority in their national development strategies, and some have adopted initial concept documents or more detailed programs, strategies and plans related to various aspects of digital transformation (see Annex D for more detail). There is broad agreement that digitalization will not only provide economic benefits but also allow member countries to develop robust solutions in important areas such as health and education, and fuel the development of CAREC's operational clusters through digital trading platforms, digital taxation, automated payment systems for rail and road freight, etc. They also acknowledge the existence of barriers to regional digitalization that relate to the lack of physical infrastructure, the lack of a supportive policy environment, the lack of interoperability among existing systems and insufficient private sector investment, and recognize the need for integrated regional solutions to these challenges.[19] A SWOT analysis of the region conducted for the preparation of the CAREC Digital Strategy 2030 (see Annex E for more details) concluded that to accelerate digital transformation across the CAREC region and achieve digital dividends, it is important to close the gaps in digital adoption within the CAREC member countries. This requires CAREC members to invest in strong digital foundations and cooperate on best practices and knowledge sharing so that emerging countries can accelerate adoption of solutions and benefit from lessons learnt by the transitioning countries. The main priorities for member countries are highlighted in the next section.

4. Aligning the non-digital foundations for digital development

A well-functioning digital economy rests upon a number of non-digital foundations that ensure a viable environment for its functioning and growth. These non-digital foundations include economic factors such as competition, finance, governance, regulation, and trade, which are derived from the macro-policy foundations in an economy and serve as enablers of the digital foundations (see Annex B, which charts out the non-digital and digital foundations), and are critical for securing the digital dividends from ICT

[17] While the People's Republic of China (PRC) is a leader in digital development, only 33.9 % of the rest of CAREC's population are able to accesses the internet. Broadband access across the region is also far below global and other regional averages (only 6.6% of population has access to fixed broadband in the region). See Annex G for more details.
[18] World Bank. 2017. Reaping Digital Dividends: Leveraging the Internet for Development in Europe and Central Asia.
[19] ADB. 2021. CAREC at 20: Reimagining Regional Cooperation Through Digital Transformation. 54th AGM. 4 May.

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investments.[20] They manifest in the form of a positive business climate that is conducive to investment in innovation and entrepreneurial activity, the presence of an educated and skilled workforce, a streamlined and supportive legislative and regulatory environment, and strong local, national, and regional governance institutions.

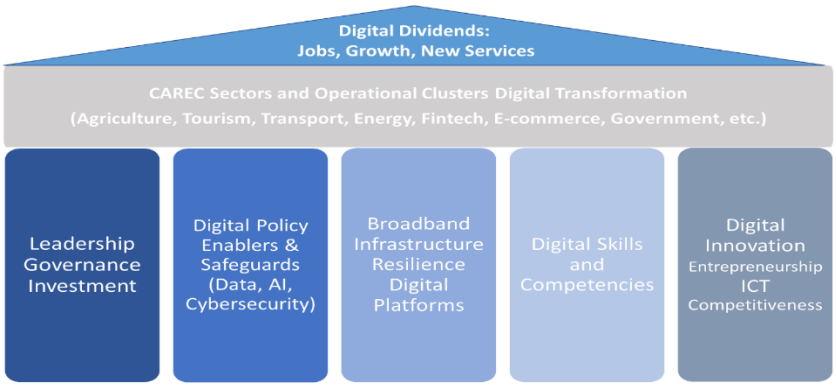
For the CAREC member countries, business environment, institutional and regulatory frameworks, and human capital are specifically important due to their relatively weak performance. Initiatives to improve the business climate across the region include the deregulation of the telecommunications sector and the encouragement of competition to secure reliable, affordable, and accessible internet services. Modernization of the institutional, legal, and regulatory frameworks, removal of restrictions on access to wholesale and retail internet services (including to international gateways) and simplification of licensing procedures are key steps to strengthen the non-digital foundations. The adoption and harmonization of regional legislation to enable cross-border trade and other services, and the simplification of government operations and procurement would also contribute to the creation of a better enabling environment across the region. The CAREC Program, under the CAREC Integrated Trade Agenda 2030, is implementing steps to reduce trade barriers which will serve to improve this factor. While on average, CAREC member countries rank higher on human capital than on other development indices, most education systems across CAREC are nevertheless not sufficiently agile to respond swiftly to the new skills and competencies in digital transformation across economic spheres. It is important to strengthen the education ecosystem, bolstering STEM education and digital innovation. The COVID-19 crisis has highlighted the potential of online education, therefore bridging the digital divide to ensure universal access to online education and training across the region should become a top regional priority. The establishment of regional education platforms will be an efficient and effective mechanism to address education and training gaps, as well as to enable the development of digital economy skills and expansion of professional networks across the region.

Other non-digital foundations, such as infrastructure (logistics, electricity) and taxation, also impact digital transformation and any changes should be designed with this framework in mind.

5. CAREC Digital Strategy 2030 Pillars: Strengthening the Digital Foundations

Strong digital foundations are essential for the scaling and diffusion of digital applications and best practices across the public and private sectors. The CAREC Digital Strategy 2030 digital foundations rests on the five pillars shown in Figure 1. These pillars are closely inter-connected and must be addressed concurrently. These pillars will in turn support digital transformation across CAREC's operational clusters.

Figure 1. Pillars of the digital foundations



[20] World Bank. 2016. WDR 2016 Digital Dividends. Washington D.C

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5.1 Pillar 1: Leadership, Governance, and Investment in the Digital Economy

5.1.1 Strengthening regional institutions for digital leadership

Strong regional leadership and coordination will achieve buy-in into the common vision and objectives of the CAREC Digital Strategy 2030. It is important to create an effective governance structure in the region to drive the implementation of the Strategy, as well as to strengthen the institutional structure of the entities responsible for designing, implementing, and following up on the various initiatives and projects. Therefore, regional digital transformation initiatives will be supported by leadership committed to digital transformation at the national level in CAREC member countries.

For coordinating at the regional level, a mechanism to ensure multi-stakeholder participation and undertake consultations and dialogue on regional digital issues will be implemented. The CAREC Secretariat will facilitate the coordination of this process. This mechanism will make efforts to create incentives for regional cooperation in the CAREC Digital Space and will seek to attract the needed investments. It will also leverage digital technologies to pursue cross-cutting Sustainable Development Goals to promote inclusion, innovation, sustainability, resilience, partnerships, and participation.

5.1.2 Creating incentives for regional cooperation in the CAREC Digital Space

Sharing best practices and scaling successful solutions is a convenient starting point to lay the ground for further regional cooperation. CAREC member governments have proposed several areas for best practice sharing across the region, building on successful digital initiatives at the national level such as creating digital awareness, nurturing innovation and entrepreneurship, and extending broadband connectivity to remote and mountainous areas (see Annex C for more details).[21] The experience of the more digitally advanced CAREC members can help emerging countries accelerate their digital transformation progress. To enable this process, a best practice sharing and solution scaling platform will be created to facilitate collaboration.

Developing regulations aimed at the creation of an enabling environment for smaller-scale connectivity providers, including broadband cooperatives, municipal networks and local businesses would also help improve connectivity and close the digital divide. License exemptions and tax incentive schemes for smaller operators and for telecom providers could be considered where service provision is not commercially viable. Innovative financing models and public-private sector partnerships such as the indefeasible right of use (IRU) mechanism can be explored to attract private sector investment into broadband connectivity projects, including in rural and remote areas. Capacity building and modernization and alignment of member countries' legal and regulatory frameworks may be required to implement innovative financing approaches. Ambitious regional infrastructure development initiatives, such as the GIGA Initiative - a UNICEF and ITU-driven partnership to connect every school in the world to the Internet, - can provide inspiration. Kazakhstan, Kyrgyzstan, and Uzbekistan are already among the first 11 GIGA country participants. Other regional initiatives to consider include the World Bank's Digital CASA Program, PRC's Belt and Road Initiative and the Digital Silk Road Strategy, the Islamic Development Bank's South-South Cooperation and Reverse Linkage program, etc.[22]

The private sector led by ICT companies should be the driving force of regional digital cooperation and sectoral transformation, and governments must provide, simplify, and align legislation and policy to create the enabling environment that encourages and supports regional digital cooperation and promotes

[21] As proposed by member countries during the CAREC country consultation session in June 2021.

[22] The World Bank's Digital Central Asia and South Asia (CASA) Program aims to increase access to more affordable internet, crowd-in private investment, and improve participating governments' capacity to deliver digital government services in Central Asia and parts of South Asia, through the development of a regionally integrated digital infrastructure and enabling environment. PRC's Belt and Road Initiative and the Digital Silk Road Strategy aim to provide investment into a single digital infrastructure across a larger region, which includes CAREC member countries.

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investment and entrepreneurship. During the consultation process, private sector stakeholders have assigned top priority to partnering on digital solutions at the regional level through collaboration between ICT companies across the region. They also proposed the establishment of regional tax-free zones for digital solutions development and the creation of special tax regimes to attract investors and start-ups in digital transformation. A regional digital tax-free innovation zone can be explored as a pilot initiative within the CAREC Digital Space to create a restriction-free digital innovation and collaboration environment. Private sector stakeholders also highlighted the need for the introduction of tax incentives for research and development and the creation of regional ICT export support agencies and other regional governance organizations that would help ICT companies across the region introduce and scale their solutions across CAREC and beyond (see Annex H for more details).

5.1.3 Attracting Investment in the digital economy

Investment is one of the key drivers of digital transformation so CAREC member countries should actively seek out public and private investment partners, as well as global donor organizations to fuel digital transformation projects in the region. Lack of investment in the digital economy across CAREC member countries has been highlighted as the top obstacle to regional digital cooperation by CAREC private sector stakeholders. It is important to ensure sufficient investment into basic digital infrastructure.[23] In some CAREC countries, better telecom sector governance and an improved legislative and regulatory framework would be a prerequisite for private sector-led broadband infrastructure development. CAREC governments should focus their efforts on expanding infrastructure where it may not be profitable for private investors, such as broadband connectivity in remote and rural areas, whereas profitable regional projects, such as smart city transformation, e-commerce platforms, digital agriculture, industry transformation through the implementation of Industry 4.0 and associated disruptive technologies such as the industrial internet of things (IoT), 3D printing, digital twins, digital identity infrastructure, fintech, etc. should be brought to the attention of private investors.

CAREC member countries shall consider developing a venue, potentially a digital platform, to convene international investors to support innovative infrastructure and venture financing and explore different models of investment into digital infrastructure and projects across the region (building on this, and depending on the level of response, events such as an annual CAREC Digital Transformation Investment Conference will considered, where proposals for new regional digital projects can be presented to attract financing). A prioritized investment portfolio of digital projects will be created to help guide investors to specific opportunities in the region.

Lastly, complementary digital pillars and non-digital foundations must also be developed to draw investment. CAREC governments must align their regulatory frameworks to ensure they are conducive to private sector investment, especially vis-a-vis small and medium enterprises (SMEs) and startups who may not have the needed resources to navigate excessive regulatory and licensing demands.

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[23] According to a recent WEF Survey, the top three elements that global investors care about when investing in new digital activities in a particular country or region are: data security regulations, copyright laws to protect intellectual property, and data privacy regulations. The top three elements that investors care about in deciding to adopt digital technologies are: availability of e-payment services, support for starting digital businesses, and support for local digital skills development. The top three regulatory elements that investors care about when investing in digital infrastructure are the ease of receiving licences for digital infrastructure, availability of skilled local engineers and other workers, the use of international standards, and regional coordination for infrastructure investment (tied for 3rd). The top three physical elements that investors care about when investing in digital infrastructure are international connectivity, national connectivity, and urban connectivity. These global investor priorities tie in with CAREC country priorities for regional digital cooperation. They should be considered and aligned with at all the stages of implementing the CAREC Digital Strategy 2030 to ensure adequate investment into the regional digital economy and attract funding for priority digital initiatives. Source: World Economic Forum. 2020. Digital FDI: Policies, regulations, and measures to attract FDI in the digital economy.

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5.1.4 Promoting an inclusive regional digital economy

Given considerable variation in the levels of digitalization across the CAREC region, it is important for CAREC member countries to adopt an integrated and holistic approach to digital development, bridging the divide between digital hubs and innovation centers in urban areas and the digitally underdeveloped communities in rural, mountainous, and unconnected parts of the region. The COVID-19 pandemic has exacerbated the digital divides across the region. Digital technologies must be used pro-actively to close those digital divides and to engage the youth, women, senior citizens, rural communities, the unemployed, people with lower levels of education, and the disabled in participating in the digital economy and society and benefitting from digital services.

To improve inclusion in a complementary pillar, CAREC member countries will consider developing region-wide distance education programs that leverages each other's strengths. These may include tools and content designed for mobile devices in low-connectivity settings, or to assist teachers in remote areas to improve their digital skills and integrate distance learning into the teaching process.

5.1.5 Leveraging digital technologies to pursue cross-cutting sustainable development goals

The UN Sustainable Development Goals of inclusion, innovation, sustainability, resilience, partnerships, and participation will apply broadly to the CAREC Digital Strategy's efforts to provide meaningful connectivity across the region.

To ensure alignment with these principles, the CAREC Digital Strategy 2030 will:

- Promote partnerships among the public and private sectors, universities, and civil society organizations
- Encourage the creation of digital public goods to realize the benefits of increased internet connectivity across the region
- Establish a comprehensive and non-discriminatory perspective in public policies for digital inclusion[24]
- Promote telework in the region, updating labor policies to ensure adequate social protection, especially for vulnerable groups.
- Leverage the use of digital technologies to mitigate the effects of climate change and natural disasters, reduce greenhouse gas emissions and promote green sustainable development.
- Promote civil society participation in assessment, mediation, transparency, capacity building, and consumer protection.

5.2 Pillar 2: Digital Policy Enablers and Safeguards

5.2.1 Harmonizing legislation and regulations across CAREC member countries and adopting regional legislation to promote digital partnerships

The creation of a common CAREC digital space requires the elimination of legal barriers and harmonization of regulations, taxation, and digital identification systems to enable a freer flow of data between CAREC member countries. The CAREC Integrated Trade Agenda 2030 (CITA 2030) is undertaking measures to reduce existing barriers to cross-border trade. By coordinating with the CITA 2030, especially on the implementation of e-commerce and e-payments, both producers and consumers of digital services will benefit. Further cross-border competition between firms will allow realization of economies of scale at a regional level. CAREC member countries will adopt regional standards for digital identity, digital signature, e-apostille and electronic medical records.

[24] In line with UN efforts in this space, annual scorecards on digital inclusion can be created to measure both digital inclusion and literacy. Source: United Nations. 2020. Report of the Secretary-General: Roadmap for Digital Cooperation.

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Harmonization of regional policies and standards requires an inclusive consultation process within the region's digital ecosystem. This should take into account best practices from other regional organizations such as the EU and ASEAN that promote data harmonization and common standards to empower cross-border digital transformation and the implementation of new technologies such as artificial intelligence.[25, 26]

5.2.2 Enhancing the cybersecurity of the CAREC region

According to the 2020 Global Cybersecurity Index, the most cyber-secure countries in the CAREC region are – Kazakhstan (31st), PRC (33d), and Azerbaijan (40th). Georgia, Pakistan, Uzbekistan, and have some level of commitment to cybersecurity, while Afghanistan, Kyrgyzstan, Mongolia, Tajikistan, and Turkmenistan still face significant challenges.[27]

CAREC member governments should become more active in global cybersecurity initiatives and further strengthen relations with the international community and the private sector on cybersecurity. Measures for consideration include harmonization of cybersecurity regulations, improved computer emergency response team (CERT) cooperation among CAREC members, additional training and capacity building. (See Annex H for more recommendations on regional cybersecurity initiatives).

As cybersecurity is a top priority for global funding organizations, including the IFC and the World Bank that have launched the Cybersecurity Multi-Donor Trust Fund under the umbrella of the Digital Development Partnership, CAREC member countries will explore collaboration with these institutions to boost cybersecurity.

5.2.3 Aligning data policies across CAREC member countries

Effective digital transformation and implementation of new disruptive technologies, such as artificial intelligence, the internet of things (IoT), blockchain, etc. requires alignment of data policies across the region. CAREC member countries will explore options for adopting regional data policies that address the shared needs and requirements of the common CAREC Digital Space while also ensuring the harmonious development of data strategies at the country level to bring in effective data management (which includes data creation, collection, protection, sharing, processing, storage, analysis, use, and reuse).

Such CAREC regional data policies must emphasize the need for trustworthy regional data infrastructures to collect, share, process, store, analyse, and archive data to support the implementation of priority regional digital transformation initiatives. They should address the importance of setting data standards across the region and issue semantic interoperability guidelines for data sharing. Effective data management at the regional level also requires appropriate governance structures overseeing the complete data life cycle. To propel regional digital transformation initiatives, regional data polices should address the sharing, use and reuse of data across the CAREC region; aligning existing data policies, laws and regulations; setting up regional institutions for data governance; ensuring provisions for data sovereignty at the country level; developing new data policies to ensure trust in the data economy; creating mechanisms to harness the value of regional data and translate it into data-powered products and services; and creating an integrated data system to manage all aspects of the data lifecycle in the region.

After aligning data policies across the region CAREC member countries will be able to create a regional data governance regime to include data policies, data governance regulations, data infrastructures, platforms and

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[25] For example, the European Single Digital Market is a framework designed to facilitate access and trade leveraging digital data. Similarly, the EU-AU Digital Economy Task Force is a platform for partnerships between the private sector, donors, international organizations, financial institutions, and civil society to progress African digital transformation for cross-border digital integration and to bring benefits to all citizens. In Asia, the ASEAN Framework on Digital Data Governance aims to harmonize data standards, data governance and data protection frameworks regionally to enable innovation, cross-border trade, and cybersecurity.

[26] World Bank. 2021. Thought Leadership and Fresh Insight from the World Bank's Digital Development Practice.

[27] Global Cybersecurity Index 2020: International Telecommunication Union (ITU). 2020. ITU GCI.

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architectures, data analytics, data skills and other elements (see Annex H for more detail on regional data policies).

5.2.4 Supporting the development of Artificial Intelligence (AI) in the region

Aligned regional and national AI policies should aim to help CAREC members catch up and leapfrog in their digital development. These policies should include building AI capabilities including robust digital economy foundations; building capacity at the regional level; convening and aligning stakeholders, particularly the private sector, around a common regional AI agenda; lowering costs and barriers to entry for businesses; delivering innovative business models superior to traditional solutions; and reaching the underserved through AI solutions. At the same time, regional AI policies should address security issues and the need to upgrade the skills of the labour force to prepare for the job displacement that can result from these technologies.

5.3 Pillar 3: Digital Infrastructure, Resilience, and Platforms

5.3.1 Connecting Digital Infrastructure to bridge the digital divide

Most CAREC member countries have high rates of mobile penetration, but many lag in broadband access. This warrants the extension of wireless networks to unserved and under-served areas and building terrestrial backbone infrastructure. To support growing broadband use and data traffic, including over mobile, and stimulate the development of online government services and business innovation, substantial fiber-based national backbones and backhaul infrastructure will be essential.[28] Affordable mobile access is particularly important to ensure digital inclusion and offer mobile connectivity opportunities in rural, mountainous, underdeveloped, and difficult to access areas. Underserved communities should be proactively offered mobile broadband connectivity as a public good requiring a dedicated effort by governments and innovative partnerships with the private sector.

Improvements in digital connectivity can provide leap-frogging opportunities to CAREC member countries that are currently lagging in digital development due to digital connectivity gaps or slow mobile internet speeds. Encouraging the use of cost-efficient technologies to bring affordable broadband access to remote, rural and semi-urban areas, fostering sustainable investment models and the development of alternative connectivity providers such as community networks can help bridge the digital divide across the region.

Appropriate metrics to measure the efficient use of the radio-electronic spectrum are also needed. Spectrum is a key input to expanding access to mobile broadband access. With the need to increase 4G uptake and prepare for 5G, governments need to ensure that their spectrum policy provides a long-term and predictable investment environment for the license holders, enhances digital inclusion, and is in line with global standards. Governments also need to balance the trade-off between increasing government revenue and achieving digital inclusion objectives: high spectrum prices tend to translate to higher prices and lower quality access to end-users, especially in developing countries. Infrastructure sharing and cross-sector co-deployment can minimize costs, disruption, and environmental impacts.[29, 30] Co-deployment of fibre-optic cables or mobile towers alongside roads, water mains, and power transmissions is a strategic approach to accelerate the rollout of broadband networks and helps future-proof the infrastructure assets. To ensure equitable digital access across the region, CAREC member countries will adopt policies and plans with specific targets relating to affordable universal access stipulating the deployment of resilient high-capacity broadband networks.

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[28] ADB. 2015. Unleashing the Potential of the Internet in Central Asia, South Asia, the Caucasus and Beyond. Consultant's Report. Regional: Digital Economy Study in Central and West Asia

[29] Columbia Centre on Sustainable Investment. 2017. Toolkit on Cross-Sector Infrastructure Sharing

[30] United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). 2020. ICT Infrastructure Co Deployment with Transport and Energy Infrastructure in North and Central Asia

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Lastly, CAREC member countries must consider greener approaches to the design of digital infrastructure projects such as regional data centers and telecom infrastructure that leverage renewable energy and must explore opportunities for infrastructure sharing across the region.

5.3.2 Building digital resilience capacity

Digital technologies, infrastructure, and tools are becoming increasingly critical as they are used by governments and businesses to enable key operations and processes and to address and manage crisis situations - as has been vividly demonstrated during the COVID-19 crisis. As digital transformation accelerates, more critical services and processes are provided in digital form or rely on digital infrastructure, resulting in higher cyberattack risks.

CAREC private and public sector representatives have highlighted digital resilience as a top priority for regional digital collaboration.[31] The CAREC region is vulnerable to various types of natural disasters, and it is one of the most seismically active areas in the world. An analysis of the transmission map of fibre optic cables in Central Asia showed that the existing ICT infrastructure may be exposed to seismic, flood and landslide risks leading to internet disconnection, with risks especially high in Turkmenistan and Uzbekistan, and moderate for Azerbaijan, Kyrgyzstan and Tajikistan.[32] CAREC member countries will adopt legal, regulatory and policy frameworks to promote the resilience of digital infrastructure and services, such as data centers, terrestrial fiberoptic cables, power generators, etc. In the framework of collaboration on disaster risk management across the region, a CAREC Geospatial Information Platform will be considered during implementation to help share geospatial data across borders, particularly environmental information that can be leveraged in disaster responses.

A complementary pillar for resilience is also cybersecurity. CAREC member countries should consider adopting an integrated standards-based risk management framework to build regional digital resilience capability (see Annex H for a list of cybersecurity initiatives).

The region should also learn from the COVID-19 experience that has revealed the infrastructure, policy, and response management shortcomings across CAREC and should create targeted programs to address those gaps. It is important to develop, strengthen and sustain the resilience and security of specialized digital infrastructure to ensure business continuity and the uninterrupted availability and security of digital government services, digital education, e-health, online research and development, and other key services across the region to withstand potential natural disasters, security crises, pandemics, and other unexpected events.

5.3.3 Building a CAREC regional platform economy

Platform based business models create value by connecting users (both consumers and producers) on an online network. The platform does not own the means of production, but rather creates the means of connection. The strength of the platform economy lies in its ability to eliminate trade barriers by using increased information sharing between different players and circulation of data to its advantage. This creates a much more open economic system, with much greater participation of its users.[33]

For CAREC, platforms offer unprecedented opportunities for regional connectivity, integration, innovation, and economic growth. They can boost innovation across the region, power local content development and transform industry, business and SMEs by matching supply and demand for products and services. They can bring together various stakeholder to scale education, training, digital skills development, and capacity

[31] Digital resilience refers to the agility and adaptability of the laws, regulations, institutions, human resources, and of the infrastructure underpinning core digital systems to withstand and bounce back from crises and shocks.
[32] United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). 2018. AP-IS Policy Briefs No.2: Enhancing E-resilience for Digital Economy in Central Asia, December 2018. Bangkok.
[33] Deloitte. 2019. The Rise of the Platform Economy. Netherlands.

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building efforts, including for minorities and disadvantaged communities in remote areas. They can help create a regional job market and connect talent with job opportunities. Platforms can also boost tourism and travel; transform agriculture, energy, transport and other strategic sectors and power smart cities and villages. They can also help identify sources of funding for specific digital transformation projects. While global and regional platforms are active across the CAREC region, it is important to nurture national and regional platforms to empower local producers and consumers to facilitate trade across borders.

To deliver digital dividends, a regional platform economy requires strong digital foundations, including ubiquitous broadband connectivity, cloud infrastructure, basic and advanced digital skills, interoperability of digital infrastructures across the region, common regional data and AI policies, and the application of emerging technologies. Investment in strong, scalable, and secure regional cloud infrastructure is required to support regional digital platforms. CAREC member countries will consider adopting the hybrid cloud model, including a "cloud first" policy to create cloud-based virtual environments, with appropriate data safeguards in place.

A CAREC Digital Space Portal will be considered by CAREC member countries to provide access and link all of the region's future interconnected digital platforms and platform clusters (such as the digital innovation platform; the digital industry, digital SMEs and fintech platforms; the digital skills, education, training and job opportunities platforms; the digital agriculture and food platforms; as well as other platforms that will continue to appear as the digital transformation process takes hold). The CAREC Digital Space Portal will input its data from the CAREC Open Data Portal which will host publicly available information at a single point of access (see Annex H for more detail).

5.4 Pillar 4: Digital Skills and Competencies

In most CAREC member countries there is a shortage of skilled digital talent across all sectors of the economy. This digital skills shortage will get worse as the digitization of industry and government accelerates.

The CAREC member countries will address the critical issue of unemployment, migration and brain drain from the region by focusing on developing and enhancing digital skills broadly across the CAREC population. These should be both: basic digital literacy skills for everyone and advanced digital skills for the young people and professionals across all sectors of the economy to enable them to fill the existing talent gaps, evolve their careers and take up new and better jobs. CAREC governments will focus on establishing strong education systems, particularly in STEM fields, while investors can work with the private sector and the academic community to roll-out e-education platforms with specific training programs focusing on professional, managerial, advanced, and other types of digital skills.

To accelerate the development of digital skills across CAREC, digital literacy programs for all citizens need to be introduced. Priority must be assigned to the development of professional and managerial digital skills for public sector employees, including at the senior management level, especially in light of the competencies required for the implementation of the CAREC Digital Strategy 2030. A CAREC Digital Skills Platform will be considered by CAREC member countries to launch basic digital skills programs and courses for the general population, advanced digital skills courses on various subject areas for digital professionals, such as courses related to specific skillsets, new technologies, or sector-specific solutions and architectures, as well as digital leadership and management courses for senior public and private sector workers. This platform could link into existing global and regional digital skills platforms such as, for example, the UN Asia and Pacific Centre for ICT training Virtual Academy[34].

CAREC member countries will consider a CAREC Digital Literacy and Digital Skills Action plan to be coordinated with and adopted by the member states, to develop regional digital skills programs using common e-learning platforms and tools. Specific policies will be based on an analysis of the labour market

[34] United Nations Asian and Pacific Training Centre for Information and Communication Technology for Development (UNAPCICT). https://www.unapcict.org/

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dynamics and address basic universal digital skills for everyone, as well as specific digital skills needs at various educational levels (see Annex H for more on the CAREC Digital Skills initiatives).

5.5 Pillar 5: Innovation, Entrepreneurship, and ICT Competitiveness

5.5.1 Nurturing the digital innovation ecosystem

The innovation gap is at the heart of the digital divide, as digital technologies are developing faster than government and institutions are able to formulate policies to regulate these technologies and leverage their benefits for the larger good of society. There is a need to develop appropriate policies, programs, resources, and know-how to empower innovation across the region and encourage collaboration between key stakeholders, including the public and private sectors, the academic and expert communities, research and development institutes, angel networks, and venture capital to support the region's entrepreneurs to deliver innovative solutions required to compete in the digital age.

The importance of technology startups in the digital economy presents an opportunity for the CAREC region to leapfrog and develop a unique regional innovation ecosystem. Most innovation ecosystems define their area of influence or their constituency locally or sub-nationally. A regional (cross-border ecosystem) would bring considerable advantages as well as challenges which CAREC can help tackle. Even more importantly, to enable leapfrogging despite humble budget allocation for innovation in most national budgets, and to boost the innovation ecosystem, CAREC needs to develop a mechanism to foster the quick adoption, dissemination and scaling of existing innovative products and solutions across the region, leveraging its combined market size.

Product, service, data, and regulatory sandboxes across CAREC can encourage innovation, strengthen the innovation ecosystem, encourage co-creation of value, and allow companies in CAREC member countries to experiment with new ideas and reach scale at the regional level. Linkages with national education, research and scientific institutions will bring the innovations to the market by realizing its commercial viability. Cooperation between the public and private sectors and the academia within the regional digital ecosystem will be encouraged by CAREC member countries to accelerate the development of technology companies, starting with incubators, accelerators, business networking and digital ecosystem observatories and onto the prototyping, piloting, and scaling of new digital applications, products and services. Complementary pillars including development of necessary digital skills and know-how, digital inclusion to help to solve the problems of the poor and disadvantaged communities across the region, leveraging new technologies such as AI, IoT, and data analytics in the innovation process will be given priority in this process.

CAREC member countries should develop national and regional digital innovation policies and build an associated digital platform to scale effective policy solutions and mechanisms for encouraging digital innovators. Regional policies should provide a set of instruments that incentivize investors and companies to innovate and to keep talented people in the region. The CAREC program's work on startups ecosystem development can serve as the pilot for these initiatives to build-upon. A CAREC Digital Innovation Platform will provide easy access to knowledge, learning resources, indicators, and communities of practice on the design, implementation, and evaluation of digital innovation policies. It would help governments and non-government organizations learn from good practices on developing digital innovation policies across CAREC member countries and elsewhere. The CAREC Digital Innovation Platform would be integrated into the CAREC Digital Space Portal.

National and regional public relations campaigns are needed to improve the public perception of digital entrepreneurs and to boost the value of innovation and digital adoption. These may feature personal stories of entrepreneurs and innovators and success stories of startups in different areas of the region's social and

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economic life. These initiatives will be part of the regional strategic digital transformation communication plan.[35]

5.5.2 Promoting the adoption and effective use of digital technologies by SMEs

Digital technologies offer unprecedented opportunities for companies, notably SMEs, to enter new markets by enabling them to participate in regional and global digital supply chains. Similar to other regional initiatives that leverage digital technologies to boost SME development, such as that of the EU,[36] CAREC member countries should focus on improving the framework conditions for the smart use of digital technologies in its key operational clusters and consider the establishment of a CAREC Digital SMEs Program and a CAREC Digital SMEs Platform(see Annex H for more on regional SME initiatives).

A vibrant regional digital economy requires the development of local and regional digital services, systems integration, and software development companies focusing on serving local governments and businesses. Opportunities for local ICT companies to grow within the CAREC region are particularly valuable as they can create a testing ground and a competitive environment for local companies to become regional players and to extend their product and service offering and experience beyond their native countries.

A CAREC Digital Business Platform will be considered by CAREC member countries to enable local ICT companies to gain regional visibility by promoting their products and services on the platform and learn about government tenders and contracting opportunities across the CAREC region. Governments across the region would be encouraged to conduct their tendering and procurement of ICT services through this platform. The platform can also connect various ICT, Innovation and Technology parks across the region to establish an innovation network.

5.5.3 Promoting regional content

Leveraging digital technologies to close the digital content gap at the regional level can contribute to the preservation of the cultural heritage of the CAREC member countries. It can also help preserve the cultural and linguistic wealth and diversity of the CAREC member countries, promote cultural expression and local languages, as well as complement the development of the tourism sector in the region. Local digital content development and sharing at the regional CAREC level will also enable member countries to benefit from more regional cooperation opportunities by leading to new business opportunities in sectors such as trade, agriculture, transportation, tourism, media, and ICT.

A CAREC Regional Content Development Platform will become channel way to provide local content developers with an opportunity to create, manage and distribute their content across the region. This platform can help build an inclusive knowledge society across CAREC and create opportunities for minorities and disadvantaged groups to participate in content creation and exchange. It would also widen access to local content across the region and enable the collection, localization, preservation, and dissemination of local and regional content. At the regional level, the production of regional digital content through intellectual property protection policies as well as funding mechanisms should be encouraged. Developing an enabling environment for local content creation, including online training programs to improve basic literacy, critical thinking ability, as well as media, information and digital literacy skills is important. CAREC member countries can also work with global development organizations who invest in building local content development skills and opportunities, for example, the UNESCO Program for Creative Content.[37] As governments collect and distribute information that is both relevant to communities and local in nature, CAREC member countries

[35] See Section 7 which discusses implementation for more details on the strategic communications plan.
[36] European DIGITAL SME Alliance. https://www.digitalsme.eu/
[37] United Nations Educational, Scientific and Cultural Organization. UNESCO's Programme for Creative Content.

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will also consider creation of government platforms across the region during the course of implementation of this Strategy.[38]

6. CAREC Sector and Cluster Transformation

6.1 Leveraging Digital Technologies to Accelerate CAREC Operational Cluster Transformation

The CAREC 2030 Strategy emphasizes that integrating the use of ICT across the spectrum of CAREC operations will be a cross-cutting priority.[39] It is therefore important to establish the path for accelerating digital adoption within CAREC's five operational clusters, to achieve higher productivity, efficiency, and customer satisfaction gains at the sectoral level, which will drive the digital dividends of higher growth, new jobs, and better services.

The CAREC Digital Strategy 2030 implementation will further work on developing cluster-level digital transformation strategies, project portfolios, and implementation roadmaps. Some of the ways these will be pursued are described in the following sections.

6.2 Government as a Platform

The digital transformation of government is a key element in the creation of the CAREC Digital Space. Sharing data and services between public administrations within and across borders facilitates freer movement of goods, capital, services, and people.

Joint efforts from CAREC member countries are required to ensure the efficiency of cross-border digital public services through enabling data exchanges and interoperable digital public service delivery. In line with global best practices, CAREC governments will aim to adopt the "government as a platform" (GaaP) approach to deliver innovative public services nationally and regionally in more efficient and user-friendly ways. This approach enables the co-creation of a wide range of services by all economic actors, including administrations, citizens, and businesses, whereas governments evolve to the role of ecosystem moderator from their traditional role of government as a service provider.[40] The CAREC member governments should place emphasis on facilitating new, improved regional and cross-border services, on the reuse of common components and platforms, on consolidation of infrastructures, on data sharing with third parties and between administrations in priority areas, and on the development of trusted, user-centric digital solutions.

6.3 Economic and Financial Stability: e-Finance/Fintech

The financial sector is often a leader in leveraging disruptive digital technologies. The establishment of online marketplace lending platforms in the region matching lenders with borrowers is a speedy and convenient way to offer credits across the region, especially to SMEs and individuals at lower interest rates without the need of collateral. Technology platforms and e-payment solutions can also facilitate access to finance across the value chain for product suppliers and distributors and help gather data about SMEs to enable lending decisions, as well as provide SMEs access to business management tools.

Mobile money solutions can expand the reach of financial services to the unserved and underserved populations of the CAREC region. FinTech can help address the gender gaps in financial inclusion by giving women greater control over their finances and removing the barriers of distance, physical safety, and cultural perceptions through online solutions. While over the last decade women across the region have become

[38] United Nations Educational, Scientific and Cultural Organization. 2012. The Relationship between Local Content, Internet Development and Access Prices.
[39] ADB. 2017. CAREC 2030: Connecting the Region for Shared and Sustainable Development. CAREC Program.
[40] Government as a Platform (GaaP) Readiness Index. 2018. GaaP RI.

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more active users of financial services, the gender gap persists.[41] Fintech can contribute to economic and financial stability in the region.[42] A recent CAREC Institute working paper noted that the region "trails the world and other regions on financial inclusion" but has "immense potential for financial inclusion by harnessing financial technologies".[43] Co-ordinated regulatory reform will encourage the use of such technologies to promote financial inclusion and boost growth. Governments can learn from the way that other countries (for example, in sub-Saharan Africa) have encouraged private-sector partnerships between banks and mobile network operators to enable financial inclusion. It is important to ensure regional interoperability of mobile payment and banking systems. Alignment and standardization can smooth cross-border transactions, strengthen financial integration and promote stability.

To leverage fintech solutions in the region and spur the emergence of new players and SMEs in this field, appropriate supervision of the sector and updated regional policies on security, data management, including data standards and personal data protection, and interoperability of financial systems are required. It is therefore recommended to define a system architecture, information architecture and transformation roadmap for the financial sector. An overall architecture of financial systems, interoperability guidelines and IT standards for financial sector transformation across CAREC will be developed based on the sector's stakeholders' proposals for legislation and regulatory supervision, data management and data protection. The resulting regulatory and supervisory framework would encourage existing firms and new entrants to provide innovative services and financial products for clients across the region.[44]

6.4 Trade, Tourism and Economic Corridors

CAREC's geographical position as a hub between Asia and Europe emphasizes the opportunity to leverage digital solutions to accelerate the development of trade, tourism, transportation, and economic corridors across the region.

6.4.1 E-Logistics, cross-border services, and e-customs

The objective of the Customs Cooperation Committee (CCC) under the CITA 2030 includes promoting innovations on digital trade initiatives, including on customs technology, supply chain management, and paperless trade. The CAREC Digital Strategy 2030 will work in sync with the CITA 2030 to implement e-logistics services and supplement their agenda by introducing the latest developments in supply chain and logistical technologies. These supplementary activities will include activities such as creating a regional hub for the transit of goods for the transformation of the logistics and transportation sectors, leveraging emerging technologies such as IoT combined with mobile technologies, ensuring interoperability at all levels including a common legal framework, business processes, standard document and data formats and technically compatible infrastructures is crucial for delivering interconnected solutions for warehousing, transport, and delivery of goods based on regional and global supply chains. Other integrated solutions such as introducing automated payment systems for rail and road freight to improve efficiency will also be considered.

The CAREC member countries can consider the development of a cross-border e-logistics platform to support the information exchanges underpinning cross-border and transnational supply chains. Integrating logistics, customs clearance, finance, and insurance functions on a single unified platform will enable smoother functioning of cross-border movement.[45]

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[41] ADB. 2019. Policy Brief: Closing the Gender Gap in Financial Inclusion through Fintech. Manila.
[42] CAREC Program. 2021. CAREC at 20: Reimagining Regional Cooperation Through Digital Transformation.
[43] CAREC Institute. 2021. Financial Inclusion and Fintech in CAREC. Urumqi.
[44] This process should be followed to map out the digital transformation roadmap for each of CAREC's priority sectors.
[45] The example of Singapore's National Trading Platform can be studied as a best practice.

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For cross-border services and e-customs, business process re-engineering should be based on the 'digital by default' principle to support paperless transactions across the region. The paperless systems should be interoperable, scalable, and secure, and support the common customs processes. The CAREC Digital Strategy 2030 will also promote initiatives such as online licensing and certification, unified checkpoint models, electronic queues at border points, and information sharing mechanisms using digital platforms.

6.4.2 E-commerce

Another area where coordinated regulatory reform will encourage technological adoption and provide regional benefits is e-commerce. [46] Most CAREC members are not well integrated into the global economy (excluding the PRC, CAREC accounts for less than 1% of global trade). Digital technologies offer an opportunity for increasing trade volume and scope.

In line with the CITA 2030, the CAREC Digital Strategy 2030 will promote the growth of e-commerce across the region by harmonizing regulations for the taxation of cross-border e-commerce and improving the exchange of financial information between revenue authorities. In particular, the CAREC Digital Strategy 2030 will undertake actions to address the low public trust in online transactions. This will include supporting policy for the online resolution of complaints and improving user protection. Legislation and standards-based regulations for smartphone services (m-commerce), back-office cloud-based e-commerce, digital currencies, and cybersecurity for financial transactions will be necessary to gain the trust of users and to ensure a level playing field for developers and new entrants into the e-commerce domain.[47]

6.4.3 Digital tourism

Digital technologies will be a key element for making improvements in the tourism sector and addressing some of the challenges being facing today, including the impact of the COVID-19 pandemic, the global lack of awareness of the cultural wealth of the CAREC region, the perceived safety, security and travel risks, the fragmentation of the sector.

The CAREC Tourism Strategy 2030 has introduced digital solutions to addresses these issues, for instance, by implementing the CAREC Tourism Portal. By building further on the portal, a CAREC Tourism Platform can be developed to promote cooperation and horizontal linkages between all the stakeholders in the tourism ecosystem of the CAREC region, including public administrations, health and education authorities, transportation, travel, tourism, hospitality, finance, insurance, food, and agriculture industries, tourism promotion agencies and organizations, etc. The platform can be used for destination awareness-building, marketing and promotion, using the latest AR/VR technologies, also available from companies and start-ups in the region, information sharing, advocacy, on-going training, capacity building, best practice sharing and skills development, creation and positioning of new products and services, networking and cross-sectoral linkages. It can launch future initiatives such as single CAREC e-visa, the use of national IDs as travel documents for CAREC citizens, liberalization of CAREC air space and other regional marketing initiatives. The CAREC Tourism Platform will thus contribute to the overall sustainable development of a competitive tourism industry across CAREC with spill-overs into other sectors.

Other platforms such as a CAREC Cultural Heritage Digital Platform and a CAREC Gastronomy Platform will also be considered for implementation as further initiatives that can be undertaken as part of the digital transformation of the tourism sector (see Annex I for further details).

[46] CAREC Program. 2021. CAREC at 20: Reimagining Regional Cooperation Through Digital Transformation.
[47] World Bank. 2021. (Research is in progress).

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6.4.4 E-Procurement platform for public administrations

Public procurement of goods and services represents a significant part of the CAREC economy. Digital procurement offers opportunities for both governments and suppliers to streamline and simplify their processes and make them more efficient and more transparent by cutting delays and reducing costs. Implementing a common CAREC e-Procurement platform comparable with the EU's PEPPOL projector would enable cross-border procurement between an administration in one country and suppliers in another country. Developing an open source CAREC e-Procurement platform for Member States' public administrations through a public-private partnership with suppliers would create an agile and transparent procurement mechanism, and could engage not only large private sector companies, but also SMEs and startups.

6.5 Infrastructure and Economic Connectivity: Connecting Smart Cities and Villages Across CAREC

Migration to cities, refugee crises and the COVID-19 pandemic have emphasized the increased need for digital technologies to address urban and rural challenges. To scale the roll-out of inclusive people-centric smart city solutions across the CAREC region, CAREC will consider developing a regional platform-based CAREC Smart Cities Program to accelerate the efforts of individual cities to become "smart". The program would enable cities across CAREC to learn from each by sharing local and international best practices; help create the institutional and governance structures to manage complex smart cities projects across the region; plan the required infrastructure investments, reinforce the non-digital and digital foundations for smart cities development; and create a regional ecosystem connecting urban government, telecommunications and technology providers, the academic and scientific communities, development and funding partners, as well as city resident representatives. Smart cities across CAREC will contribute to the development of CAREC's key operational clusters by fostering tourism, trade, and economic connectivity. (See Annex I for more on CAREC Smart City Development).

Given the need to bridge the urban-rural digital divide across the region, the CAREC Smart Cities Program would also include a focus on 'smart villages' by extending the reach of broadband infrastructure and regional platforms to the rural areas and enabling towns and villages across the region to access digital services, such as e-health and e-education, take advantage of digital agriculture technologies, implement AI solutions for agribusiness and engage in e-commerce and trade with other villages and cities across the region and beyond[48].

Success in scaling and connecting smart cities and villages across CAREC will strengthen the innovation and entrepreneurship ecosystem across the region and boost the development of CAREC's key operational clusters. A network of connected smart cities and villages across the region will accelerate the emergence of CAREC as a smart region boasting a high level of inclusive economic and social development and global competitiveness.

6.6 Agriculture and Water Cluster: Digital Agriculture[49]

In spite of general urbanization trends, CAREC member countries still have high percentages of populations living in rural areas (see Annex I for more details). Thus, expanding broadband connectivity to rural areas, raising awareness of digital technologies among rural populations, and developing digital skills and competencies in rural areas are key to bridging the digital divide and achieving digital dividends in the CAREC

[48] See the PRC's TaoBao villages example in Annex I

[49] See Annex H for more details

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region. The predominance of rural populations also explains why CAREC member countries identified digital agriculture as a priority for digital transformation in the region.[50]

A comprehensive approach to digital adoption in agriculture is required to transform agriculture into an economic recovery engine for the region, especially in light of the COVID-19 pandemic, rising concerns about food security and the need to make the sector more resilient to climate change. Digital solutions and best practices can help improve the region's global competitiveness and the market reach of its agricultural products. Digital transformation of the sector should become a joint coordinated effort of the key stakeholders of the CAREC agriculture ecosystem, including key ministries and public sector entities, private sector companies from a wide range of relevant sectors including storage, transportation, logistics, machinery producers, biotechnology, telecom and chemical industry players, agri-tech and fintech solution providers, as well as academic institutions and the farmer communities.

CAREC member countries will consider hosting a regional digital platform for food and agriculture (this can link with the International Platform for Digital Food and Agriculture proposed by the FAO) (see Annex I for more details on the CAREC Digital Food and Agriculture Platform).[51] CAREC member countries will also join in the global digital agriculture collaboration and knowledge sharing through online communities of practice, including existing regional networks, such as ESCORENA and AGROWEB, and global platforms such as the e-Agriculture Community of Practice.

6.7 Human Development

Greater use of digital platforms can boost the development of skills and help integrate the regional labour market. A regional job-search system would help match workers to jobs more efficiently. It would also provide valuable information about the availability or shortage of skills in particular areas.

The CAREC Job Opportunities and Mobility Platform will be considered to match job vacancies with job seekers across the region and support the freer movement of talent throughout the CAREC region for cross-border recruitment, and to help reduce brain-drain from the region. The system would provide information, advice, and recruitment/job-matching services. The system would be integrated with social protection services platforms to provide a 'one stop shop' for employment opportunities and would focus on addressing issues related to cross-border employment. The platform would also establish a network of advisors to offer quality services for both workers and employers.

The COVID-19 pandemic has highlighted the potential of remote-learning technologies. Given the highest priority assigned by CAREC stakeholders to basic and advanced digital skills development and universal digital literacy, action should be taken to catalyze cross-border cooperation on higher education, adult learning and technical/vocational training based on the pooling of educational resources and expertise. Promotion of regional trade in education services could expand supply and choice while enhancing quality. Digital education platforms created through collaboration and best practice sharing between educational institutions across the region could be established based on remote-learning technology.

A similar approach could be taken in healthcare, where telemedicine technology allows for remote consultations, sharing of resources and expertise and greater cooperation between health specialists across the region. The pandemic can also serve as a catalyst for regional cooperation in monitoring of communicable diseases, including the development of early-warning systems and surveillance centres.

[50] In response to the CAREC Secretariat Questionnaire in June 2021

[51] Food & Agriculture Organization of United Nations. 2020. International Platform for Digital Food and Agriculture.

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7. Implementing the CAREC Digital Strategy 2030

The CAREC Digital Strategy 2030 will be a living document that shall be regularly updated to reflect progress and introduce new actions. This approach requires ongoing collaboration between CAREC member states, and a clear understanding of which tasks need to be performed locally and where central governance is necessary. Close member state collaboration is also required in harmonizing legislation, in exchanging data and in developing systems. Appropriate governance structures should be agreed with the member states to ensure that this collaboration becomes the norm.

7.1 Establishing Implementation principles

There are several important principles to follow in the implementation of the CAREC Digital Strategy 2030.[52]

Adopting a holistic digital transformation vision and an inclusive digital ecosystem approach is important throughout the implementation process, making sure that sufficient attention is given to the strengthening of the region's non-digital and digital foundations to support both larger regional digital initiatives, as well as specific operational cluster and sectoral projects. It is also important to adopt an active CAREC policy framework for interoperability at the legal, organizational, semantic, and technical levels.[53]

The CAREC Digital Strategy 2030 is ambitious in its vision, thus it is important to combine the longer-term view with agile implementation, focusing on a prioritized project portfolio and an implementation roadmap highlighting quick wins and low-hanging fruit in the shorter term and progressing to more strategic, harder to execute projects as regional governance, collaboration, execution capacity and skills are developed and strengthened.

Developing regional governance structures, institutions, partnerships for collaboration and digital managerial and leadership skills is a critical element of the implementation process required to ensure sustainability and should be adequately resourced and supported. As a first step, a CAREC Digital Collaboration Platform can be established to enable coordination and best practice sharing across member countries on all issues related to strategy implementation.

7.2 Establishing a governance structure for regional digital development

A CAREC Digital Strategy Steering Committee will be established to determine the appropriate leadership and governance structures as well as the regional institutional framework to drive the implementation of the CAREC Digital Strategy 2030. The Steering Committee will be led and constituted by governments of the CAREC member countries, and it will be facilitated by the CAREC Secretariat. The committee will engage all the members of the CAREC Digital Space in the implementation process relying on mutual goodwill and inclusive multistakeholder consultation model that brings together public and private sector organizations across CAREC, academic institutions, the expert community, international donor organizations, global and regional technology giants, citizens, and other players.[54] Broad engagement and collaboration are necessary to achieve the regional multiplier effect in digital dividends. Active regional leadership is critical in providing

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[52] See Annex B for global best practices in digital strategy implementation.

[53] Legal interoperability ensures that legislation is designed to enable uninterrupted economic cooperation allowing organizations to work together and to ensure that data exchanges have legal significance. Organizational interoperability ensures that the business processes of administrations and companies are aligned. Semantic interoperability ensures that the format and meaning of exchanged data and information is preserved and understood by all parties. Technical interoperability ensures that formal technical specifications and standards are complied with while developing and connecting digital services, platforms, systems, and infrastructures. The promotion of interoperability at each of these levels is an indispensable condition for the technological compatibility of digital communications and real-time digital data exchanges, and for the ongoing development and deployment of cross-border cross-sectoral public services.

[54] For an example on multi-stakeholder models, refer to the Community Model of the Internet Corporation for Assigned Names and Numbers (ICANN). Community.

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the authorizing environment and enabling linkages between key digital ecosystem stakeholders across the region (local communities, private enterprises, non-government organizations, multinational organizations, academia, and government agencies).

The overall implementation of the CAREC Digital Strategy 2030 will be led and guided by CAREC member countries and supported by the CAREC Secretariat in facilitating the process, helping drive the momentum, gaining stakeholder support for the strategy, and implementing the strategic communications plan. The CAREC Secretariat will also enable alignment with the donor and investment communities to help mobilize appropriate resources for the Strategy implementation, and support policy dialogue and sector-specific digital transformation initiatives. In the short-term, the CAREC Secretariat can:

- Build consensus and encourage policy dialogue within the framework of the CAREC Digital Strategy 2030
- Support quick wins and low hanging fruit projects at the initial implementation phases
- Align development programs and funding with digital transformation goals
- Develop knowledge products and platforms for best practice sharing across CAREC
- Facilitate the mobilization of investment by increasing engagement with multilateral development institutions
- Strengthen public and private sector dialogue for expanded participation of the private sector in mobilizing technical and financial resources needed for digital transformation
- Promote the development of a conducive business environment to allow increased private sector participation.
- Propose specific initiatives on the harmonization of regulation and legislature to enable digital initiatives across the region
- Promote independent regulators and agile regulation to support the establishment of a virtual tax-free digital innovation zone and regulatory sandboxes to allow for innovation and ecosystem development where companies can experiment with new ideas and test them at the regional level.

7.3 Key implementation Priorities

7.3.1 Developing the CAREC Digital Transformation project portfolio and implementation roadmap

A CAREC Digital Project Portfolio can be developed by including the projects proposed in this Strategy. The portfolio will take into account the global and local best practices, inputs received during consultations with CAREC public and private sector stakeholders, projects that have been discussed at various CAREC digital transformation workshops, as well as any additional inputs from member countries to be received during future brainstorming and consultation sessions across the CAREC digital ecosystem (see Annex J for more on the CAREC Digital Project Portfolio).

Projects can be grouped in line with the objective of strengthening CAREC's non-digital and digital foundations, on the one hand, and driving digital adoption in CAREC's priority operational clusters, on the other hand, taking into account the priority initiatives proposed by public and private sector stakeholders during the consultations process as well as existing digital initiatives launched in line with CAREC sectoral strategies, such as, for example, the CAREC Tourism Portal, the CAREC smart energy grid, e-commerce, intelligent transport initiatives, etc.

A complete portfolio of CAREC regional digital transformation projects reflecting the entire spectrum of CAREC member needs would then be prioritized and translated into a CAREC digital transformation roadmap complete with a timeline for implementation and KPIs for success measurement. The CAREC Digital Project Portfolio will undergo a thorough prioritization based on the strategic importance of each of the proposed projects on the one hand, and its ease or difficulty of execution, on the other hand.

It is important to include representatives of the entire CAREC Digital Transformation ecosystem in the prioritization exercise that would generate the CAREC Prioritized Digital Transformation Project Portfolio

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and a comprehensive CAREC Digital Transformation Roadmap, complete with targets, success measures and KPIs, and associated action plans and budgets.

The CAREC Ministerial Conference would agree on this comprehensive roadmap, action plan and budgets. The Strategy should be reviewed and updated regularly to identify new priorities for digital transformation based on economic and political changes in the region and the rapid development of new technologies. CAREC should adopt a long-term view of digital transformation, while ensuring agility in the implementation process. Progress in implementing the Strategy should be reviewed on a regular basis and corrective actions and associated budgets should be initiated. Regular reviews should be used to identify new priority sectors/markets for digital transformation based on market and technological developments and political decisions for enhanced economic cooperation. It should also take into account the accelerating pace of technological innovation and the shortening of policy gestation cycles.

Common strategy implementation guidelines based on global best practices (see Annex F) should be shared with policy-makers across the region and digital project management guidelines for the implementation of the CAREC Digital Strategy 2030 should be adopted in order to provide project managers across the region with the processes, tools and techniques necessary to successfully deliver quality digital solutions.

7.3.2 Strengthening the enabling environment and capacity building

To ease the Strategy implementation process, special attention should be paid to strengthening the enabling environment for digital transformation across the CAREC region through the establishment of predictable enabling policies and safeguards to promote trust in digital technologies. Issues of trust need to be addressed with legislation for the protection of data and the creation of structures for cybersecurity. Open Internet, open data, open standards, and open source should be promoted.

Digital solutions awareness building as part of the strategic communications plan for the CAREC Digital Strategy 2030, as well as the roll-out of digital and project management skills training for public and private sector managers are important at the early stages of implementation.

7.3.3 Gathering and sharing best practice for digital development

A CAREC Digital Solutions Center[55] can be established in the region to collect regional best practices, adapt and disseminate them through the CAREC Collaboration Platform (discussed in section 7.1) and at workshops, conferences and seminars. The Center can sponsor an annual conference as a forum for sharing best practices and exchanging information on experiences and lessons learnt across the CAREC region and beyond.

The Center could also focus on improving the measurement of digital transformation and the digital economy by strengthening data collection, analysis and review for official statistics, use of new methods and advanced technologies such as big data analytics, strengthening and harmonization of common frameworks of indicators and their monitoring and evaluation at the local, national, and regional levels.

7.3.4 Establishing a monitoring system for digital transformation progress and impact

CAREC political leaders need to be able to assess the impact of their digital strategies and adapt them to changing circumstances. Horizon scanning activities should become customary to keep pace with the rates of technological change. An important issue to be addressed is measuring the benefits of the CAREC Digital Space and monitoring the progress towards achieving them. A results and monitoring framework for the digital strategy can be developed, as well as a Measurement Toolkit with indicators, metrics, statistics, processes, and tools to measure the benefits of the CAREC Digital Space for member states.

[55] Built upon the UNESCAP proposal for a regional Digital Solutions Center.

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7.3.5 Building public-private sector partnerships for project portfolio development and implementation

The public and private sectors across CAREC should work closely together throughout the implementation process, particularly in the early stages, to create positive momentum through the launch of high-visibility regional initiatives and the rapid implementation of pilot projects. A special fund can be established to support the roll-out of select pilot projects that can demonstrate the value of digital technologies to address key economic and social issues across CAREC and accelerate the pace of digital adoption across the region. The public and private sectors across CAREC should collaborate on the digital transformation project portfolio development and prioritization to decide which existing solutions can be successfully scaled across the region to create quick wins as part of the CAREC Digital Strategy 2030 implementation process.

7.3.6 Working with development partners to accelerate digital transformation across CAREC

International development partners and donors play a critical role in supporting the development and implementation of the CAREC Digital Strategy 2030 with international expertise, best practice, capacity building, technical assistance, and financing.

The Asian Development Bank has recognized the urgency of leveraging digital technologies to support economic and social development in the CAREC region, especially in light of the ongoing COVID-19 pandemic and is fully behind the development and implementation of the CAREC Digital Strategy 2030. Other organizations such as the IFC, the International Telecommunication Union (ITU), the Islamic Development Bank (IsDB), UNESCAP and other UN agencies, the World Bank and others can also provide the needed resources and support. IsDB's South-South Cooperation initiative and its Reverse Linkage program, for example, can help implement specific elements of the CAREC Digital Strategy 2030.

7.3.7 Future Proofing the CAREC Digital Strategy 2030: strategic planning, futures thinking and strategic foresight for CAREC digital cooperation

Given the increasing volatility, uncertainty, complexity, and disruption globally and in the CAREC region, it is important to apply futures thinking and foresight approaches to the CAREC Digital Strategy 2030 and its future implementation roadmap.[56] This would involve exploring and preparing for a wide range of possibilities, planning for different scenarios, identifying potential opportunities and challenges, and designing innovative ways to anticipate change and stay on track with digital transformation under rapidly evolving circumstances.

Following the best practices of Singapore, Korea, and others, CAREC member countries can use strategic foresight approaches including scenario planning, horizon scanning and back-casting to improve their capacity to anticipate change and prioritize the implementation of technologies that are likely to become important and promise significant opportunities. Similarly, technology foresight can help identify associated risks to the implementation of the CAREC Digital Strategy 2030.

7.3.8 Developing a strategic communication plan

It is important to develop an effective communication plan to convey the vision, objectives, and key pillars of the Digital CAREC 2030 Strategy, as well as the benefits and digital dividends expected as a result of its implementation. It is also key to communicate a sense of urgency, build regional consensus among all the key stakeholders for the implementation of the strategy and keep all the stakeholders updated on implementation progress.

A powerful digital transformation awareness-building campaign supported by a Strategic Communication Plan may be considered to launch in alignment with the CAREC Digital Strategy 2030 to ensure a high-level

[56] ADB. 2020. Futures Thinking in Asia and the Pacific: Why Foresight Matters for Policy Makers. Manila.

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of visibility and leadership commitment to the Strategy and to accelerate the implementation process by generating positive momentum, highlighting successes of regional collaborative digital initiatives, promoting best practices and lessons learnt across the region, empowering digital champions and ensuring digital inclusion.

CAREC governments can work together to establish a network of digital champions, appointed at national and regional levels, to raise awareness of the challenges and benefits of the transition to a new digital economy and society and share their own personal and business success stories of digital transformation. Individuals who are well-known in their countries for pioneering the digital agenda can be appointed as digital ambassadors to promote all aspects of the CAREC Digital Strategy 2030 in the national and regional media, including social media platforms, online seminars, TV programs, regional events, fora, and conferences and arguing the importance of digital education, digital skills, digital innovation and collaboration, sectoral transformation, and citizen participation.

The communications strategy would aim to create a sense of urgency of digital adoption and encourage all stakeholders to assume ownership of the vision to solidify their buy-in and support. High-level workshops to communicate the Strategy to key government and private sector stakeholders should be organized. A public relations campaign should be considered with the media focusing on citizens and businesses to promote the Digital Space. Specific initiatives would be aimed at improving the public perception of digital entrepreneurs and the value of innovation and digital adoption across the region through the promotion of innovation and digital adoption success stories in different areas of the region's social and economic life.

A CAREC Digital Space Road Show could travel across the region visiting administrations, companies, schools, and universities explaining the relevance of the CAREC Digital Strategy 2030 and emphasizing the expectations, challenges, and potential benefits for all.

A team at the CAREC Secretariat can be responsible for developing and implementing this communications strategy with resources for collecting, aggregating, and disseminating information on all aspects of the Digital Space and managing its online presence. This team would also contribute to the interactive CAREC Digital Space Portal targeting citizens, businesses, stakeholders, and others interested in the opportunities presented by the CAREC Digital Space. The portal would include position papers, policy consultations, progress reports, news, live streams, online conferences and seminars, events, blogs, and a discussion forum. Over time it can become the 'go to' site for all matters related to the Digital Space.

8. Conclusion

The CAREC leadership must leverage global and local best practices to develop the pillars which will address the six priorities at the core of the CAREC stakeholders' digital agenda (see Annex C). The effective implementation of the CAREC Digital Strategy 2030 will enable CAREC member countries to jointly overcome existing development challenges and achieve a multiplier effect in digital dividends. Regional partnerships in the CAREC Digital Space will fuel the growth of priority clusters, help accelerate the digital transformation of emerging countries and create new growth opportunities across the CAREC region. For developing the common CAREC Digital Space, countries can rely on their rich history of coexistence, collaboration and trade and leverage digital technologies to empower regional cooperation.

Sufficient financial resources must be allocated early on to support universal broadband access across the region and the creation of a common digital infrastructure and digital platforms to enable the digitalization of leading economic sectors and operational clusters and the creation of regional digital markets enhanced by a favorable regulatory framework. Focused work within the CAREC Digital Ecosystem comprising the public and private sectors, international funding and donor organizations, the scientific and expert communities, as well as community representatives is required to ensure the availability of adequate funding of priority digital infrastructure investments and the prioritized CAREC portfolio of digital transformation projects in the region.

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Programs designed to boost digital skills and competencies across the region, both basic and advanced, should be emphasized. Public-private partnerships for the implementation of priority initiatives, an ongoing dialog among all interested players in the regional digital ecosystem, and the scaling of the best digital solutions and practices across the region are key to success.

Delays in the implementation of the CAREC Digital Strategy 2030 may cause higher brain-drain from the region and a rise in the influence of global players leading to the monopolization of CAREC's digital space, lost opportunities for economic growth, job creation, regional competitiveness, sustainable livelihoods, and a winner-takes-all situation threatening the digital sovereignty of the region.

The first steps on the journey to the CAREC Digital Space could include the agreement on the CAREC Digital Strategy vision, the endorsement of the CAREC Digital Strategy 2030 by the Ministerial Conference, agreement on the governance model and the creation of the Steering Committee. The Strategic Communications Plan can also be launched.

The launch of specific quick win pilots and low-hanging fruit projects would lay the ground for the implementation process. Priority should be given to those actions with maximum impact in the short term. Successful implementation of a set of projects and actions with both regional and local benefits would create positive momentum and support for the CAREC Digital Strategy 2030 across the region, lay the foundation for the implementation of more complex digital transformation initiatives in the longer-term and raise the status of CAREC and its member countries globally.

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Annexes

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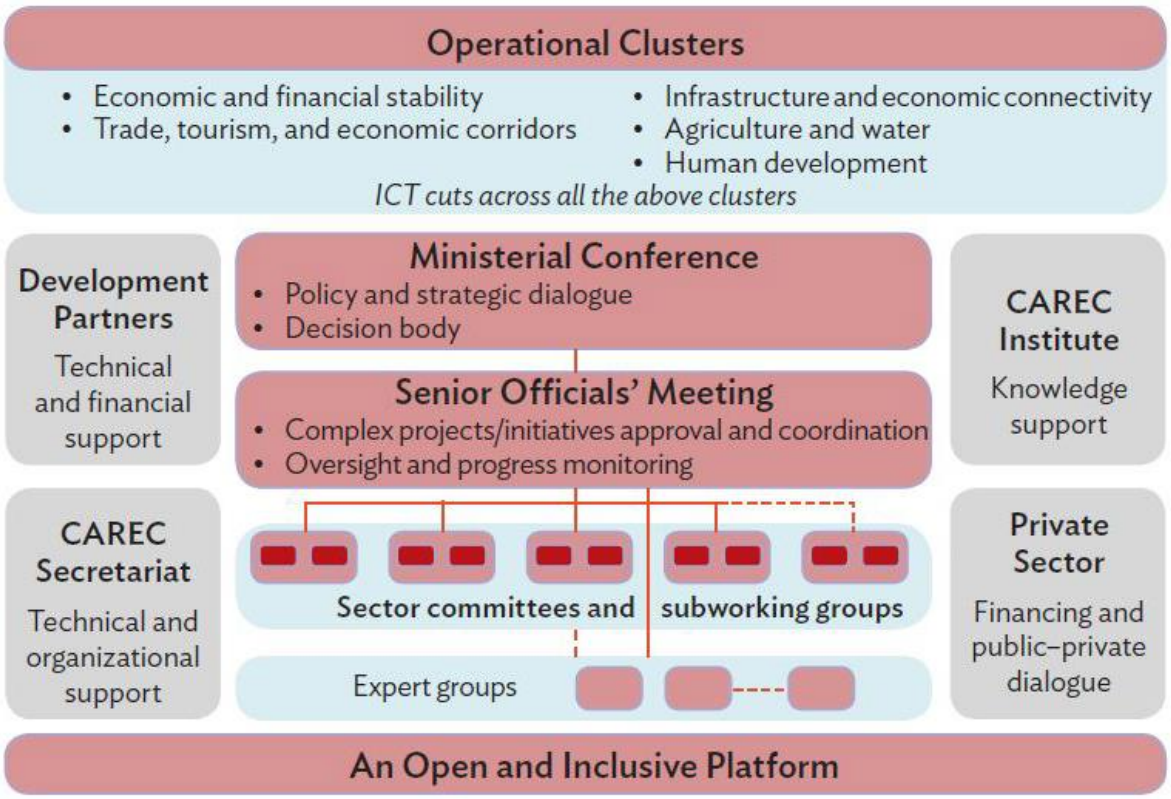
Annex A. CAREC Program Institutional Framework

Figure 2. CAREC 2030 Institutional Framework



CAREC = Central Asia Regional Economic Cooperation, ICT = information and communication technology.
Source: CAREC Secretariat.

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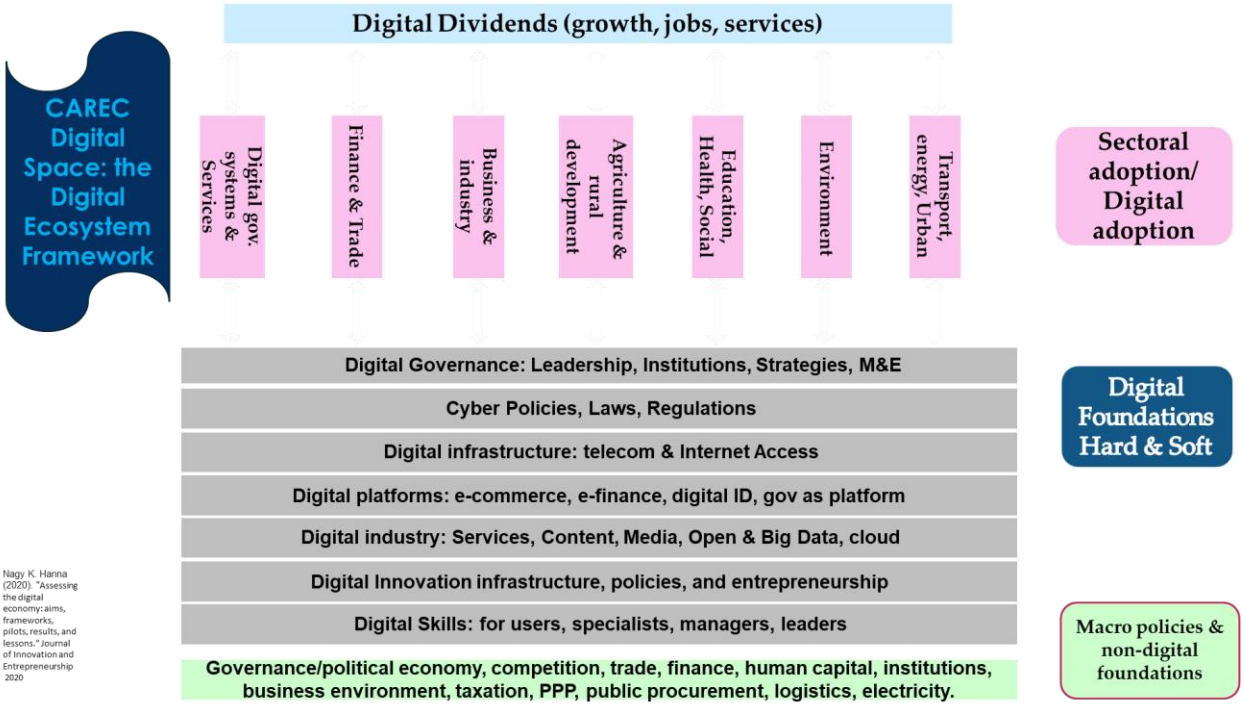
Annex B. Digital Transformation Framework

Traditionally, governments and aid agencies have tended to focus on internet access as the primary driver for the digital economy, coupled with free-standing investments in specific sectoral applications, but without due attention to the complementary digital and non-digital foundations. There is a growing recognition that a holistic and integrated approach to digital strategy is essential to maximizing the digital dividends and securing equitable benefits and inclusive economic growth.[57,58,59]

The digital transformation framework helps to broaden the focus and redress common imbalances in pursing digital transformation at the regional level.

Figure3. The CAREC Digital Ecosystem Framework



[57] World Bank. 2016. Digital Dividends, World Development Report.
[58] Hanna. 2016. Mastering Digital Transformation. Emerald Publications.
[59] Hanna. 2020. Assessing the Digital Economy. Journal of Innovation and Entrepreneurship.

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Annex C. Stakeholder Input Analysis

CAREC public and private sector representatives agreed that the biggest obstacles to the development of a common CAREC Digital Space are a lack of investment in telecommunications networks, lack of R&D for digital innovation, lack of harmonized legislation and regulation to enable digital cooperation at the regional level, and a lack of interoperability in digital infrastructure. Stakeholders also agreed on the following six priorities for regional digital cooperation reflecting the importance of building strong digital foundations at the regional level:

- Building basic and advanced digital skills and universal digital literacy
- Developing and nurturing a regional innovation and entrepreneurship ecosystem through boosting support for innovation and R&D and creating the governance structures for regional ICT partnerships
- Attracting investment into networks and the digital economy while ensuring systems interoperability
- Boosting digital resilience and cybersecurity
- Harmonizing regional regulation and legislation to enable regional digital cooperation, including a digital trade and finance system
- Manifesting political will and building trust in regional digital cooperation

Public sector stakeholders also highlighted the need to provide universal broadband access, especially in remote and mountainous areas. The private sector emphasized the need for partnering on digital solutions through cooperation between ICT companies across the region and the opportunities presented by emerging technologies.

CAREC stakeholders also realize the importance of digital adoption in key sectors. Public sector stakeholders prioritized digital agriculture and tourism, while the private sector emphasized the need to develop digital trade and establish a regional digital finance and payments system.

Digital dividends are achieved through sector and cluster-level transformation supported by strong digital and non-digital foundations. To address CAREC stakeholder digital development priorities, it is important to ensure the alignment of non-digital foundations at the regional level and strengthen CAREC's digital foundations.

Opportunities and Obstacles to CAREC Regional Digital Cooperation: public sector

Figure 4. Opportunities for Regional Digital Cooperation-Government

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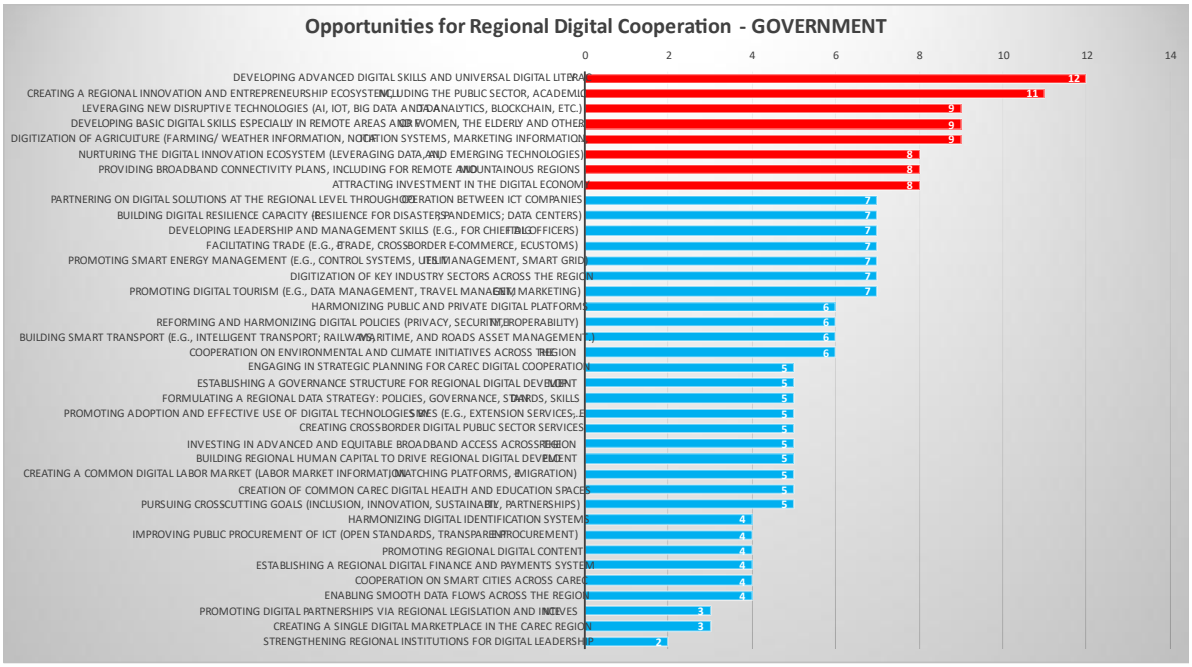
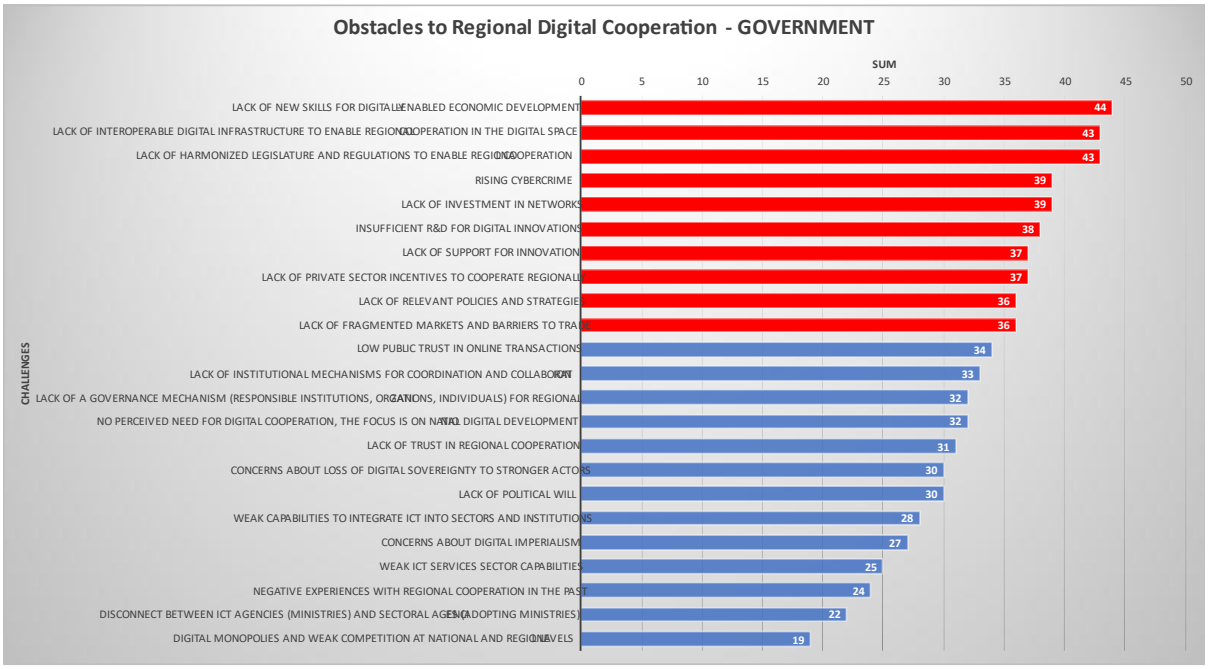


Figure 5. Obstacles to Regional Digital Cooperation-Government



Opportunities and Obstacles to CAREC Regional Digital Cooperation: private sector

Figure 6. Opportunities for Regional Digital Cooperation-Private Sector

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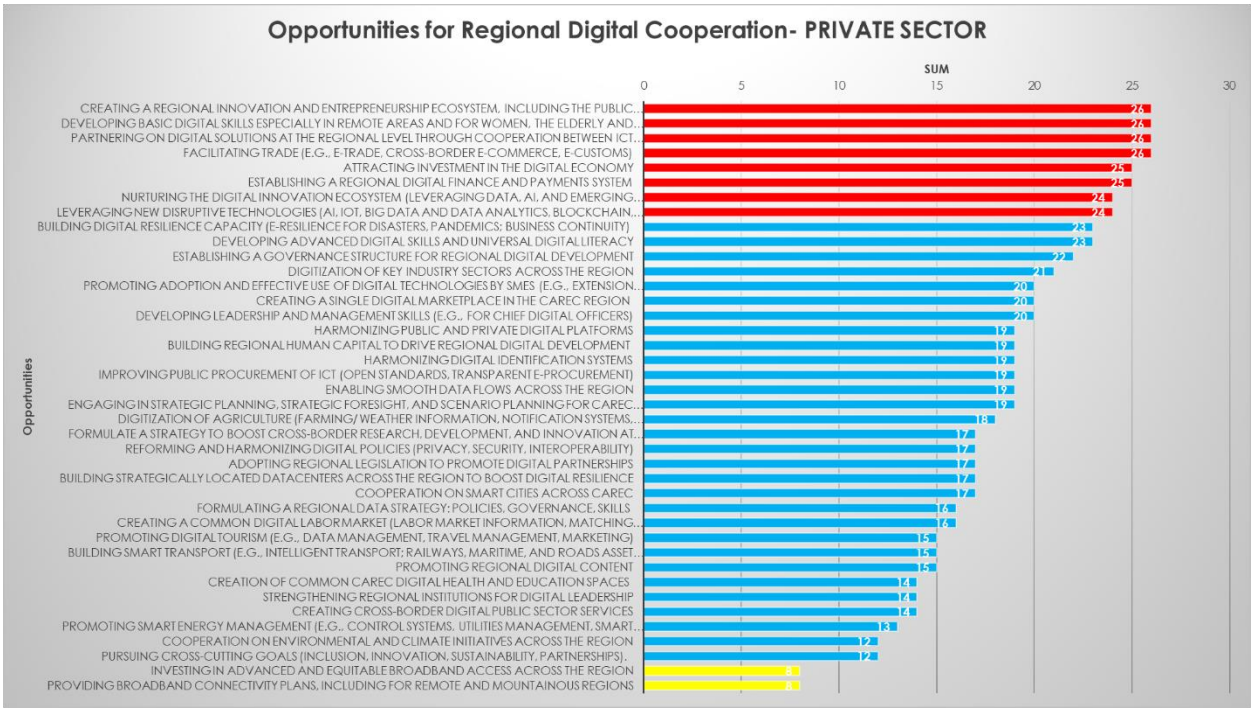
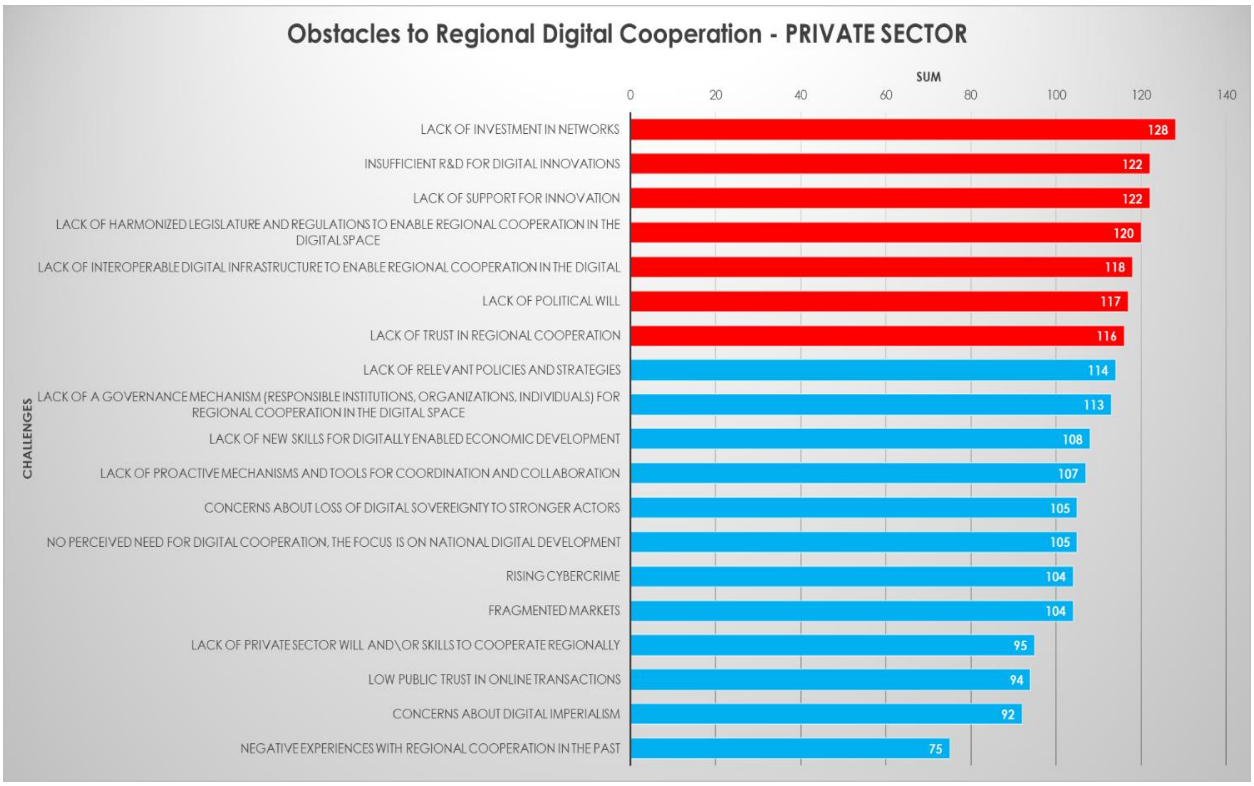


Figure 7. Obstacles to Regional Digital Cooperation-Private Sector



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Annex D. CAREC member countries' national digital transformation strategies and priorities as reflected in strategy documents

All the CAREC member countries have included digital transformation as a priority in their national development strategies, and some have adopted initial concept documents or more detailed programs, strategies and plans related to various aspects of digital transformation. A reading of these documents reveals certain commonalities and priority focus areas across CAREC member countries.

All CAREC members consider digital technologies and digital transformation to be a means of increasing national competitiveness and citizen well-being. To achieve these goals, countries emphasize the importance of infrastructure investments to provide ubiquitous broadband access and develop digital platforms to enable e-learning and e-health service provision, especially in the wake of the COVID-19 pandemic. All countries stress the need to develop digital skills and competencies and boost innovation capabilities.

In their strategic documents, emerging countries like Afghanistan, Pakistan, Tajikistan, and Turkmenistan prioritize infrastructure development for affordable internet access, improving the digital literacy of the population and bridging the digital divide, as well as public sector reform aimed at the re-engineering of government processes and the provision of citizen-centric e-government services. They worry about digital empowerment, closing the digital skills gap, creating opportunities for their young populations in the ICT sector and connecting to the rest of the region through e-commerce. Pakistan advocates a holistic technology strategy with digital technologies enabling sectoral transformation, boosting innovation and entrepreneurship and empowering women and youth, while Tajikistan aims to leverage digital technologies to fight poverty, achieve energy independence, food security, and create new jobs for the population.

Transition followers like Kyrgyzstan, Uzbekistan and Mongolia prioritize broadband access, legislature for digital development, effective data management, cloud services, cybersecurity, smart cities, digital platforms, developing the innovation ecosystem and the introduction of disruptive technologies such as AI, IoT, and Big Data for sectoral transformation. Mongolia is looking to Estonia's model for e-government transformation.

Transition leaders like the PRC, Azerbaijan, Georgia, and Kazakhstan prioritize effective data policies, cybersecurity, the use of disruptive technologies such as AI, IoT, and blockchain, investment into human capital for digital development, the use of digital technologies for inclusive and green growth, investment into research and development. Azerbaijan is focusing on green and sustainable growth and the launch of smart cities and villages, Georgia looks to close the digital divide and empower ICT innovation and entrepreneurship, while Kazakhstan is prioritizing cybersecurity, digital agriculture, digital industry transformation and digital skills and human capital development.

At the regional level, CAREC members prioritize the use of digital technologies to combat the COVID-19 pandemic and its consequences, such as poverty and instability, and other issues such as food security which may lie beyond the capacity of any single country and can help sustain economic growth. They emphasize the importance of expanding broadband access to increase connectivity, close the digital divide and to facilitate online learning, e-health, and business continuity. They also point to the need to boost digital literacy and digital skills for human development. They stress the importance of knowledge and best practice sharing, as well as regional research and development.[60]

[60] ADB. 2021. CAREC at 20: Reimagining Regional Cooperation Through Digital Transformation. 54th AGM. 4 May.

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Annex E. Regional digital transformation opportunities and challenges: SWOT Analysis[61]

The 2016 World Bank Report 'Reaping Digital Dividends: Leveraging the Internet for Development in Europe and Central Asia' emphasized that not everyone takes equal advantage of the benefits of the internet. In fact, there can be an increase in inequality between countries and population groups within countries. Much of this depends on the appropriate implementation of digital transformation in the context of creating the conditions necessary for significant societal transformations.[62] In some CAREC member countries, internet providers were until recently monopolized by the state, leading to high costs of internet access and low service quality. The reluctance of the private sector to take risks slowed down the adoption of internet technologies for business needs.

Moreover, geopolitical issues, weak diplomatic ties, and a certain reluctance to cooperate across some parts of the region are obstacles to digital adoption preventing universal and low-cost broadband access, international transit traffic growth, and cooperation on a regional digital agenda to scale economic and social dividends of digital transformation, which can be significant (see the discussion of the experience of other regional organizations earlier in this document). Providing citizens and businesses with opportunities to prosper in the digital economy will depend on the political will of CAREC member countries' leaders to cooperate, the creation of effective governance institutions, investment into a secure, reliable, scalable, and interoperable regional digital infrastructure, effective integration mechanisms, as well as the adoption of a regulatory and legal framework that supports digital transformation, innovation, and sustainable investment.

Several key factors determine the success of digital transformation initiatives at the local, national, or regional level. These factors include the strength and consistency of leadership commitment to digital transformation; the effectiveness of a region's governance and institutions to manage digital transformation initiatives in the short, medium and long term; the quality of the enabling environment in the region that supports the implementation of digital strategies, initiatives and projects and incentivizes digital adoption in the public and private sector; the level of digital skills and competencies across the region, including advanced professional digital skills, as well as the general level of digital literacy of the population at large required to function in a digital economy and society; the access to digital technologies such as broadband and mobile connectivity, cloud technologies, etc.; and the openness to and support of digital innovation across the region.

An assessment of the level of development of these factors across the region revealed the following strengths, weaknesses, opportunities, and threats across CAREC member countries.

1. CAREC Strengths

- Strategic location of CAREC member countries at the heart of Eurasia and the Silk Road with historical and modern-day links to Europe, Russia, South and East Asia
- Deregulation of telecommunications in most countries leading to an emerging and largely competitive telecom sector across the region
- Qualified IT professionals in many countries of the region
- Access to cheap green energy
- Strong political commitment to digital transformation at the national level
- Digital transformation is a national priority across the region, initial concept documents adopted by all governments, with leaders like the PRC and Kazakhstan actively developing more detailed strategies and policies on data, artificial intelligence, cybersecurity, etc.

[61] The SWOT discussion is based on inputs received through questionnaires, consultation sessions with CAREC member countries in 2021, UNESCAP analysis and World Bank research.

[62] World Bank. 2017. Reaping Digital Dividends: Leveraging the Internet for Development in Europe and Central Asia. Washington D.C.

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- Basic legal framework for digital development broadly in place at the country level. Transition leaders are updating key regulations and legislation driven by rapid changes in technology and environment.
- Basic foundations for digital public services in place, with digital adoption leaders ahead of others in the quality and variety of digital public services. Regional efforts are focused on enabling cross-border transactions and e-commerce.
- Growing activity in e-commerce with some local platforms and mobile payment apps in some countries and AliExpress active across the region.
- Some local content developments
- Positive dynamics for supporting innovation and startups in the digital sector in digital adoption leaders like Kazakhstan, the PRC, and Georgia, as well as in Kyrgyzstan and Uzbekistan (establishment of government support programs, accelerators, technology parks, venture funds, coworking spaces, etc)
- Some participation in regional and global digital initiatives, for example, the PRC's Belt and Road and the Digital Silk Road Initiatives to build digital connectivity across the region. Kazakhstan, Kyrgyzstan, and Uzbekistan are engaged with the ITU/UNICEF GIGA Initiative that aims to connect every school. Kazakhstan and Kyrgyzstan are part of the EAEU 2025 Digital Agenda.
- Digital skills programs developed by digital leaders like the PRC and Kazakhstan and also introduced at some educational institutions in Uzbekistan and Kyrgyzstan.

2. CAREC Weaknesses

- Landlocked location of many CAREC member countries, many remote mountainous areas make connectivity costly and difficult.
- Lack of political will for regional cooperation exacerbated by ongoing political conflicts in the region.
- Lack of a regional focus on the digital economy resulting in a lack of regional governance institutions focused on driving digital adoption.
- Lack of a regional institution (based within the region) to drive regional cooperation on digital transformation.
- Lack of trust in regional digital cooperation and a reluctance to cooperate.
- Low International bandwidth and weak international infrastructure.
- Ongoing protection of incumbent operators in some countries including gateway control creating barriers to new entrants and causing reduced competition, higher prices, less innovation, fewer services, and lower quality of service.
- Lack of broadband access preventing the roll-out of digital government and private sector services and resulting in poor access to telemedicine and distance learning that are critical to combat COVID-19.
- Under-developed scientific and research networks in most countries, except the PRC.
- High wholesale and consumer prices of telecom services resulting in lower broadband adoption rates
- Lack of an adopted national digital transformation strategy and detailed implementation documents in most countries of the region. Emerging countries and transition followers have high-level concept papers while transition leaders have more focused digital strategy documents.
- Regulatory mismatch over rapidly growing digital economy needs across most countries. Legislation, standards, and policies are not harmonized to enable smooth digital interactions. Regional efforts are focused mainly on legislation enabling cross-border transactions and e-commerce.
- Lack of progress in regional content development
- Underdeveloped instruments for monitoring digital transformation and assessing its economic and social impact across most countries.
- Low level of digital skills among the general population and among professionals and senior private and public sector leaders who lack advanced professional and managerial digital skills across most countries.

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- Low digital literacy of the population and a growing digital divide across the region: urban/rural, gender, generational, income-related
- Insufficient private sector investment into digital infrastructure and services.
- Lack of awareness of the benefits and opportunities of digital transformation in the public and private sectors and the general population across most countries
- Limited digital infrastructure, broadband access and underdeveloped digital platforms in most countries
- Lack of compatibility and interoperability in digital government infrastructures across the region
- Lack of effective data policies, poor data usage practices, in many CAREC countries most data is still in paper form.
- Significant demand-side barriers to the uptake of digital technologies in many CAREC countries, including the lack of digital skills, high cost of broadband access, smart phones, and laptops.
- Lack of coordination and collaboration between digital transformation stakeholders within the digital ecosystem and beyond at both the national and regional level
- Slow digital transformation of the public sector in most countries
- Even slower digital adoption of industry and businesses in most countries
- Weak Innovation and Research and Development in most countries
- Lack of effective private-public sector partnerships in most countries
- Underdeveloped cybersecurity mechanisms in most countries except the PRC
- Limited funding for digital transformation initiatives in the public and private sectors in most countries
- Lack of active private sector engagement in digital transformation initiatives in most countries

3. Opportunities

- Deregulation of telecom markets and the development of competitive and affordable digital services
- 4G rollout across CAREC can boost the development of digital services and local digital content
- Availability of next generation telecommunications like 5G to support disruptive technologies and sectoral transformation
- Emergence of new business models and smart solutions based on digital technologies
- Growing strategic importance of data and AI
- Human capital strengths, a young and growing population open to new technologies
- Boosting basic and advanced digital skills can help innovation and entrepreneurship in the region and create new jobs.
- Technology transfer and best practice sharing opportunities across the region through global and regional initiatives such as the Belt and Road, GIGA, Digital CASA, AP-IS, etc.
- Successful solutions and best practice scaling opportunities between CAREC members
- An emerging vibrant startup scene in several countries, especially the PRC, Georgia, and Kazakhstan
- Digital technologies applications in key economic sectors and clusters such as Agriculture, Tourism, Smart Cities, Trade, etc

4. Threats

- Lack of political will for regional cooperation, ongoing conflicts between member states, geopolitical instability, and frequent crises.
- Lack of commitment on the part of national and regional elites to regional digital project implementation.
- COVID-19 impact and its economic and social consequences, including healthcare systems collapse, unemployment, concerns about food security, disruption of education, social upheavals, etc
- Exponential growth of cyber-attacks and cybercrime and low levels of digital resilience and cybersecurity in most CAREC member countries

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- High barriers to entry into markets across the region and limited access to external markets
- Insufficient digital skills, both basic and advanced, in most countries
- Growing Digital Divide: urban/rural, exacerbated by topography in mountainous areas, generational, income, gender, other minorities
- Low levels of trust in digital technologies across the region

To accelerate digital transformation across the CAREC region and achieve digital dividends, it is important to leverage the region's strengths, act on opportunities, address the weaknesses and neutralize the threats revealed in the course of the analysis.

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Annex F. Global Best Practices in Digital Strategy Implementation

An analysis of global best practices in the development and implementation of digital transformation strategies at the country, sub-regional and regional levels can be summarized in the following guidelines to policymakers across the region.

1. Develop leadership and governance

Adopt a holistic vision and ecosystem approach

- Develop in-depth understanding of existing digital ecosystem—beyond silos
- Prioritize digital foundations over stand-alone applications
- Build consensus on a vision, driven by development priorities and opportunities
- Develop a sense of urgency and commitment to transformation
- Use holistic digital diagnostics to set realistic targets
- Develop synergies among ecosystem elements

Take a Long-term view, combined with agile implementation

- Encourage long-term thinking for outcomes and sustainability—marathon
- Capture low-hanging-fruits to build commitment and demonstrate quick payoff
- Build agile implementation capabilities and processes
- Phase digital transformation programs in line with augmented capabilities
- Develop medium-term investment plans and diversify sources of finance, including IFIs.

Develop digital leadership and institutions

- Build leadership institutions with clear roles and competencies
- Develop collaborative links with adopting sectors
- Build a cadre of digital transformation leaders—CDTOs
- Develop agile, independent regulatory agencies
- Balance central leadership with bottom-up innovation
- Build institutions for national, regional, and global cooperation.

2. Develop policies, regulations, data, and cybersecurity

- Develop enabling policies and safeguards to establish competition and trust
- Support and encourage reuse of open data, open standards, and open source
- Develop a whole-of-society cybersecurity and resilience strategies
- Invest in digital public goods, in partnership with business and civil society
- Develop AI policy and strategy to enable innovation, and accelerate adoption
- Promote integration of data and processes among public agencies
- Build geospatial information platforms for environmental resilience

3. Build digital infrastructure and platforms

- Encourage competition to build backbone, and secure, affordable Internet service
- Adopt innovative institutional and financing mechanisms to drive access and usage
- Develop and regulate digital platforms for identification, commerce, finance, and services
- Prioritize mobile connectivity and cloud infrastructure
- Promote sharing of infrastructure and spectrum

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- Promote network interconnection and interoperability of services and platforms
- Promote partnerships for digital platforms in priority areas

4. Develop skills and competencies

- Promote universal digital literacy and skills through education systems and enterprises
- Develop analytics, artificial intelligence, and data management capabilities
- Develop centres of excellence for digital capacity development
- Develop, attract, and retain digital talents in public and private sector
- Develop tailored and sustainable training systems for civil servants
- Integrate digital education into management programs
- Promote digital academies, competence centres, and apprenticeship schemes
- Promote digitally enabled learning at all education levels

5. Promote ICT sector, innovation, and finance

Develop the digital sector to support local transformation

- Develop a competitive digital services industry for jobs and ecosystem dynamism
- Prioritize digital sector mission as key enabler for transforming whole economy
- Advance "ease of doing business" for dynamic digital services
- Develop public-private partnerships to promote a competitive digital industry
- Promote export strategies for digital services in partnership with industry associations
- Adopt appropriate international standards and best practices in public procurement of ICT
- Promote the development of digitized, development-relevant local content

Promote innovation and finance for transformation

- Nurture innovation and entrepreneurship ecosystems—demand-led techno-parks
- Develop programs to scale up and diffuse digital innovations among SMEs
- Set priorities, pilots, and safeguards for emerging technologies
- Prioritize inclusive and frugal innovation, and develop grassroots innovation networks
- Promote access to finance for digital startups and SMEs
- Promote digital financial literacy.
- Promote FinTech in mobile, digital payment, money transfer, banking.

6. Transform business and public sectors

Develop ICT-enabled economy and sector-wide transformation strategies

- Align digital strategy with country economic development strategies.
- Prioritize adoption capabilities in key user clusters--adopt sector-wide approaches
- Promote digital transformation of SMEs via business associations and local governments
- Emphasize sustainable, scalable, sector-wide digital applications
- Provide sector-specific complementary investments and training to maximize digital dividends
- Target country and regional comparative advantages for accelerated transformation.
- Prioritize "intelligent" infrastructure for sustainability: smart transport, energy, cities.
- Promote e-trade particularly in digital services and products
- Develop digital platforms for the transforming sectors

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Engineer effective adoption of digital government

- Develop digital government vision, strategy, and implementation roadmap.
- Use digital government as a platform for data, services, and public-private partnership
- Mobilize demand for good government and improved public services
- Adopt a whole-of-government approach for digitizing core systems and key services
- Digitize country registries covering citizens, business, and land.
- Support local initiatives for digitized local government services
- Use digital government for transparency and accountability.
- Adopt best practices in e-gov: single window, interoperability, user-centric, multi-channels, etc.

7. Cross-cutting goals (principles)

Promote digital inclusion

- Address the digital divide and pre-existing inequalities
- Use shared access, community centres and low-cost channels to reach low-resource settings
- Identify and stimulate nascent demand in lagging regions—local content
- Promote digital culture and literacy to secure wide and effective adoption
- Prioritize affordable access and build transformation capabilities of small business
- Build informational capabilities of social intermediaries and marginalized communities
- Prioritize youth and women for wide developmental impact

Promote ownership and partnerships

- Build broad multi-stakeholder ownership and participation
- Create digital platforms for consultation, collaboration, and project generation
- Develop strategic communication strategy to generate national consensus
- Build partnerships, among stakeholders, across sectors, at all levels, and over time
- Develop and partner with private ICT services associations
- Build capacity of weak stakeholders to participate effectively
- Develop country-led forums for digital cooperation with development finance partners.
- Invest in collaborative tools among universities, suppliers, and users.

Maximize learning and adaptation

- Shift from rigid blueprint plans to adaptive, learning, results-driven strategies.
- Capture local knowledge and grassroots innovations--develop scaling up mechanisms
- Balance central direction with local initiative-- Integrate local learning into strategies
- Build foresight capabilities—scan and prepare for disruptive technologies
- Focus research on adoption, evaluation, and outcomes
- Engage local universities and think tanks in locally relevant, applied research.
- Keep score through timely monitoring and evaluation—multiple feedback.
- Develop the statistical benchmarks of the digital economy
- Create platforms and centres of excellence to capture and diffuse best practice.

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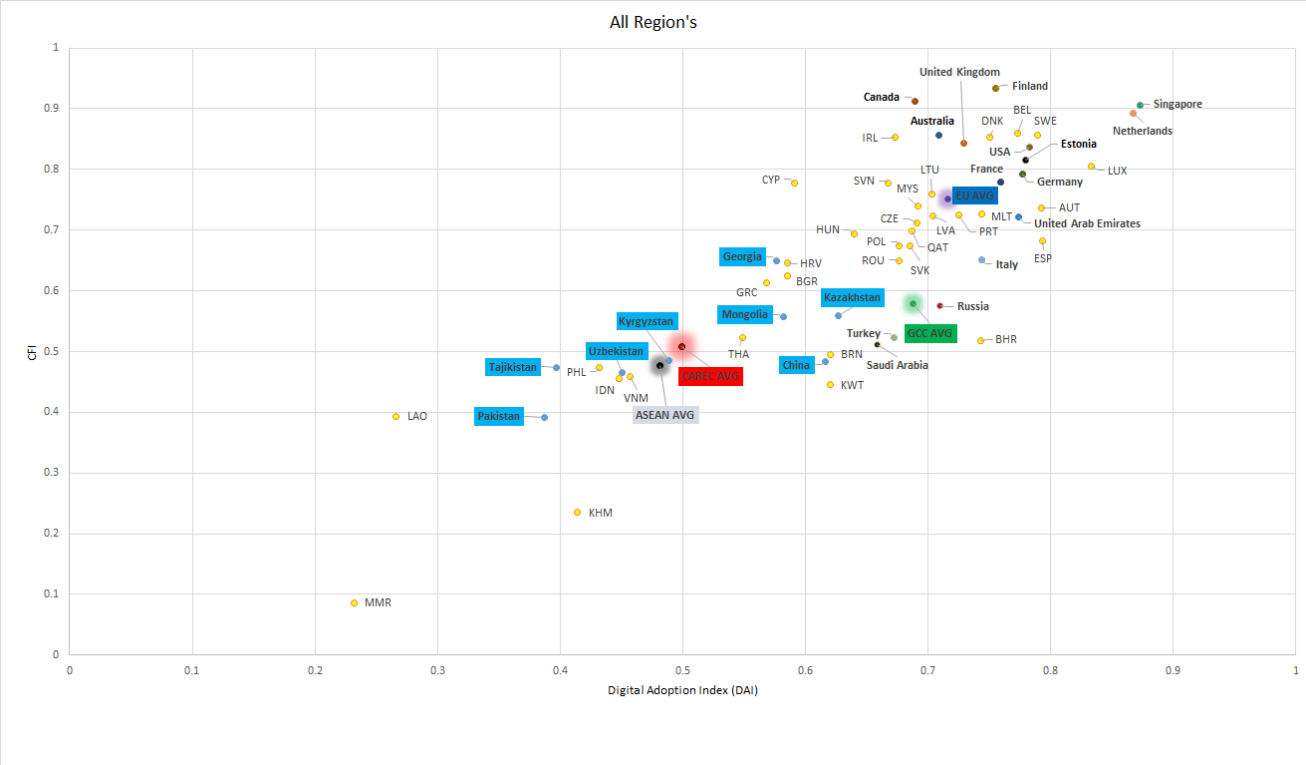
Annex G. Digital Adoption across CAREC: current state overview

1. CAREC Member Countries in the Global Digital Race: Emerging and Transitioning

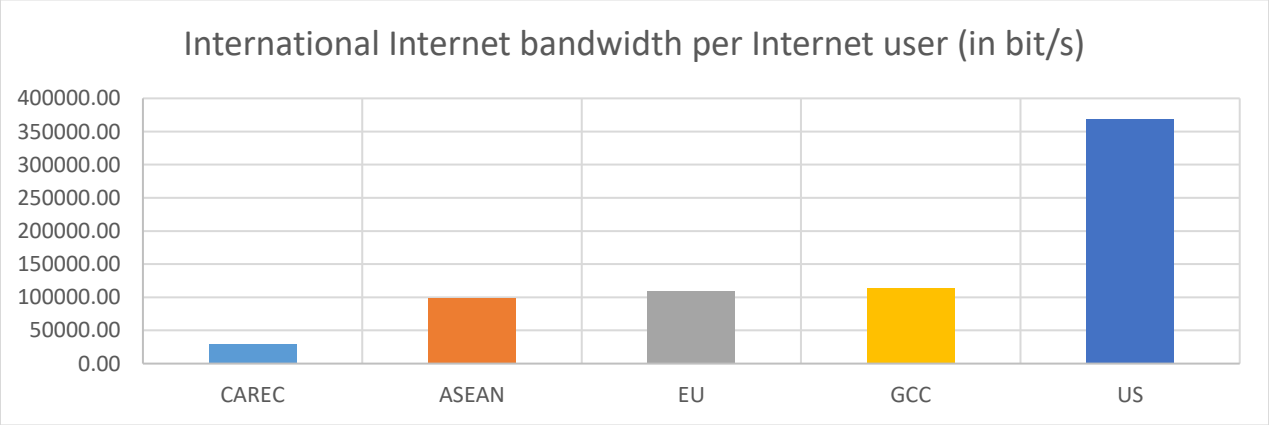
Figure 8. CAREC Countries in the Global Digital Race



Source: ADB analysis; WDR 2016[63] .

2. Bandwidth per user: CAREC vs Other Regional Organizations

Figure 9. Bandwidth per User: CAREC vs Other Regions



Source: ADB analysis; ITU Data[64]

[63] World Bank. 2016. WDR 2016 Digital Dividends. Washington D.C.
[64] International Telecommunication Union (ITU). World Telecommunication/ICT Indicators Database 2019.

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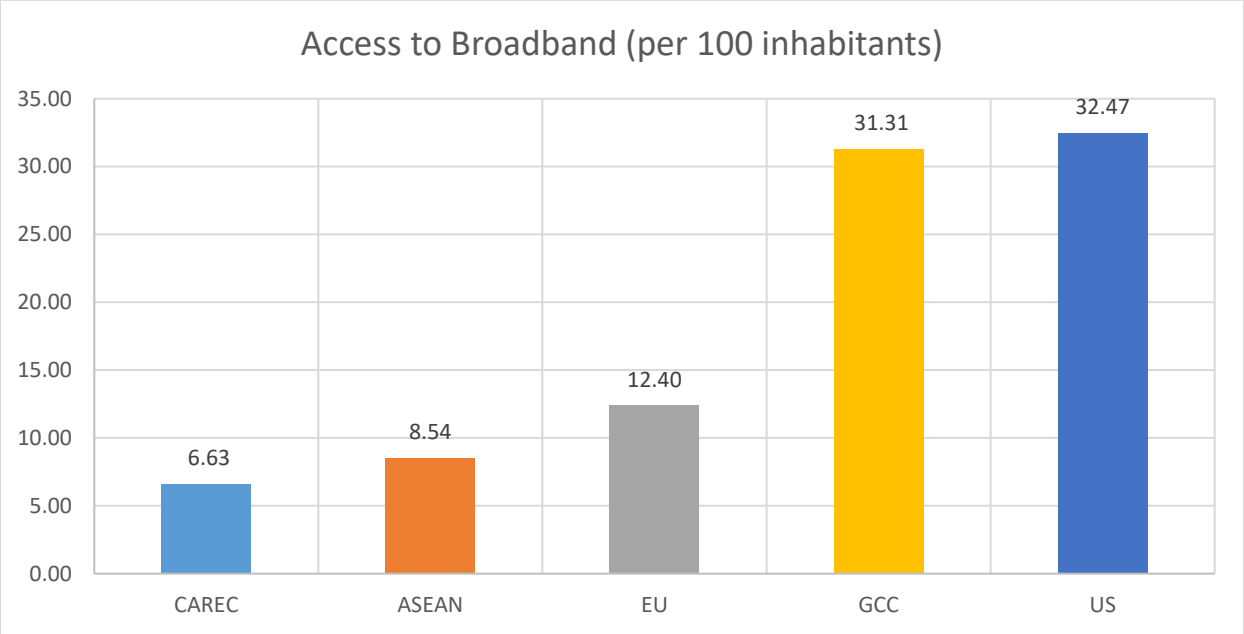
3. Access to Fixed Broadband: CAREC vs Other Regional Organizations

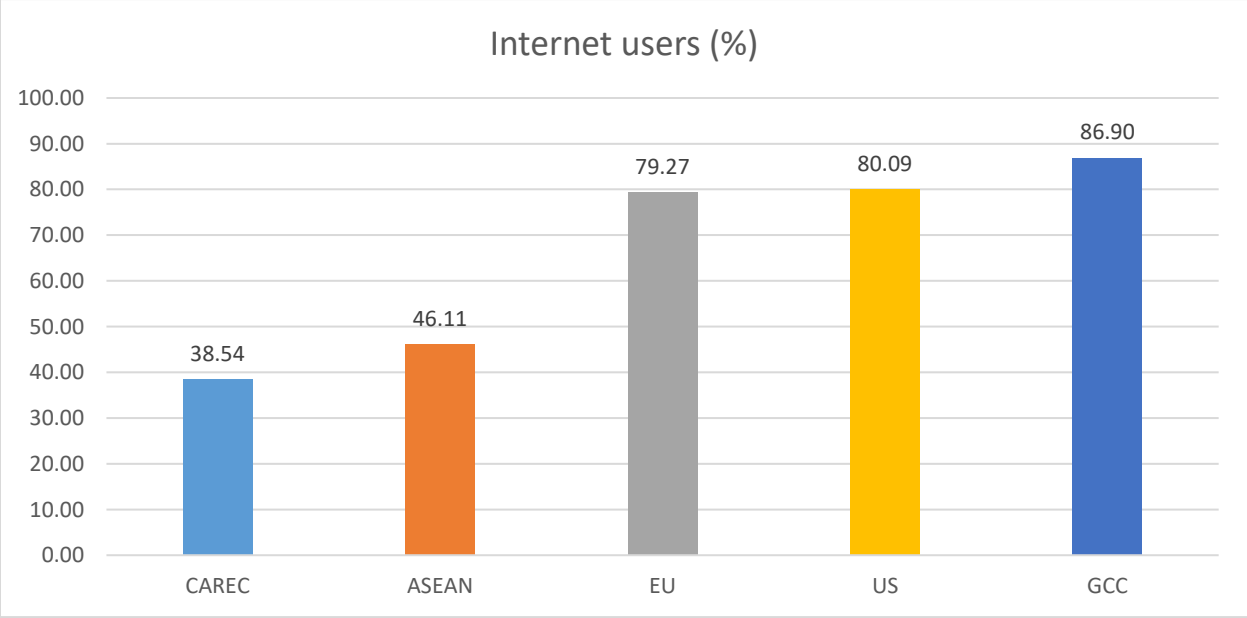
Figure 10. Access to Fixed Broadband: CAREC vs Other Regions



Source: ADB analysis; ITU Data[65]

4. Internet Users as Percentage of the Population: CAREC vs Other Regional Organizations

Figure 11. Internet Users in percentage: CAREC vs Other Regions



Source: ADB analysis; ITU Data[66]

[65] International Telecommunication Union (ITU). World Telecommunication/ICT Indicators Database 2019.
[66] International Telecommunication Union (ITU). World Telecommunication/ICT Indicators Database 2019.

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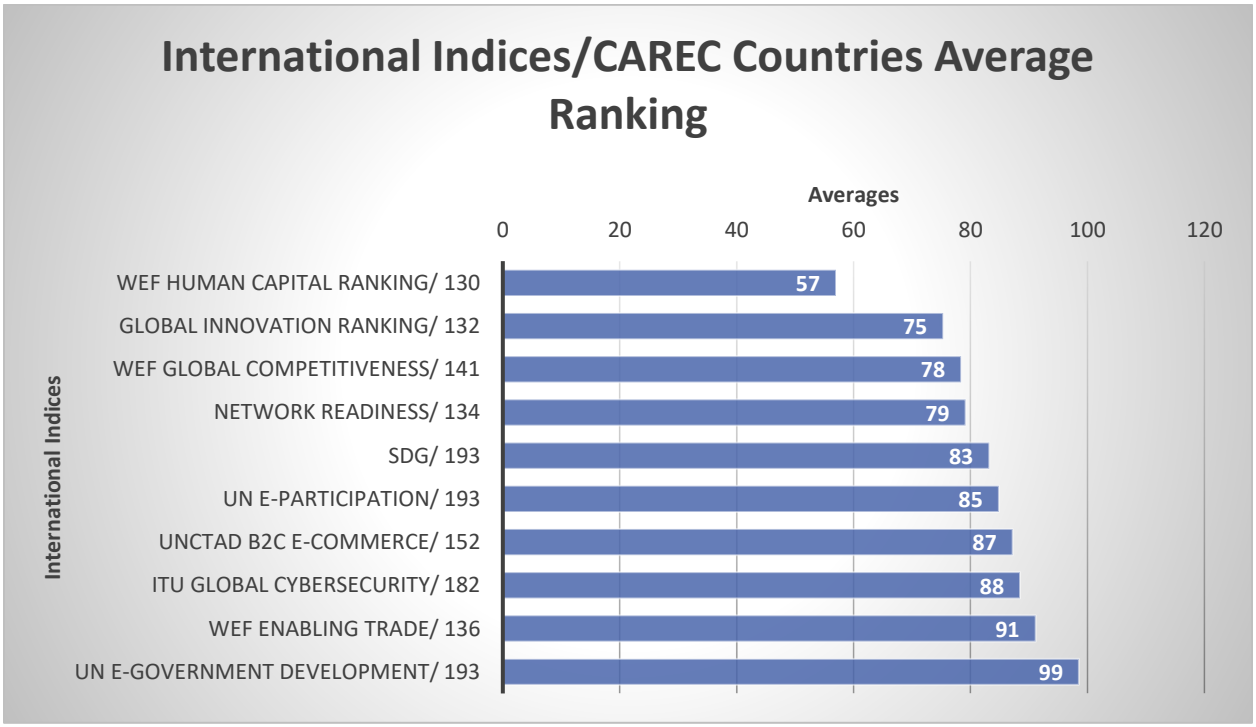
5. Key International Indices: CAREC Member Countries' Average Rankings

Figure 12. International Indices: CAREC Member Countries Average Ranking



Source: ADB analysis using global indices indicators[67]

[67] Source for indicators:

- E-Government Index (EGDI) 2020: United Nations. 2020. UN-EGDI;
- E-Participation Index (EPART) 2020 United Nations. 2020. UN-EPART
- Sustainable Development Goals (SDG) Index 2021: Sustainable Development Report. 2021. SDG Index
- Global Cybersecurity Index 2020: International Telecommunication Union (ITU). 2020. ITU GCI.
- Global Competitiveness Index 2019: World Economic Forum. 2019. WEF GCI
- Enabling Trade Index 2016: World Economic Forum. 2016. WEF ETI.
- Network Readiness Index (NRI) 2020: Network Readiness Index. 2020. NRI.
- E-Commerce Index 2020: United Nations Conference on Trade and Development. 2020. UNCTAD B2C E-Commerce Index.
- Human Capital Index (HCI) 2017: World Economic Forum. 2017. WEF HCI
- Percentage of Population with Secondary & Tertiary Education 2021: World Bank. 2021. WB HCI.
- Global Innovation Index (GII) 2021: World International Property Organization (WIPO). 2021. GII

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6. International Indices: CAREC Member Countries' Rankings

Table 1. International Indices: CAREC Member Countries Rankings

International Indices (# of Countries Rankings)	AFG	AZB	CHN	GEO	KAZ	KGZ	MON	PAK	TJK	TKM	UZB	CAREC AVG
Global Innovation Ranking/ 132	N/A	80	12	63	79	98	58	99	103	N/A	86	75
ITU Global Cybersecurity/ 182	171	40	33	55	31	92	120	79	138	144	70	88
Network Readiness/ 134	N/A	66	40	68	56	94	89	111	109	N/A	N/A	79
SDG/ 193	139	54	48	58	65	52	107	134	78	114	66	83
UN E-Government Development/ 193	169	70	45	65	29	83	92	153	133	158	87	99
UN E-Participation/ 193	118	73	9	80	26	66	87	103	146	179	46	85
UNCTAD B2C E-Commerce/ 152	143	65	55	47	60	97	61	116	121	N/A	107	87
WEF Enabling Trade/ 136	N/A	71	61	41	88	113	119	122	114	N/A	N/A	91
WEF Global Competitiveness/ 141	N/A	58	28	74	55	96	102	110	104	N/A	N/A	78
WEF Human Capital Ranking/ 130	N/A	N/A	34	N/A	29	46	51	125	57	N/A	N/A	57

Source: ADB analysis using various indicators [68]

[68]Source for indicators:
E-Government Index (EGDI) 2020: United Nations. 2020. UN-EGDI.
E-Participation Index (EPART) 2020): United Nations. 2020. UN-EPART.
Sustainable Development Goals (SDG) Index 2021: Sustainable Development Report. 2021. SDG Index.
Global Cybersecurity Index 2020: International Telecommunication Union (ITU). 2020. ITU GCI.
Global Competitiveness Index 2019: World Economic Forum. 2019. WEF GCI.
Enabling Trade Index 2016: World Economic Forum. 2016. WEF ETI.
Network Readiness Index (NRI) 2020: Network Readiness Index. 2020. NRI.
E-Commerce Index 2020: United Nations Conference on Trade and Development. 2020. UNCTAD B2C E-Commerce Index.
Human Capital Index (HCI) 2017: World Economic Forum. 2017. WEF HCI.
Percentage of Population with Secondary & Tertiary Education 2021: World Bank. 2021. WB HCI.
Human Capital Index (HCI) 2017: World Economic Forum. 2017. WEF HCI.
Global Innovation Index (GII) 2021: World International Property Organization (WIPO). 2021. GII.
2020: World International Property Organization (WIPO). 2020. GII.

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Annex H. Potential areas for regional cooperation in the CAREC Digital Space

Consultations with the public and private sector across the region revealed several priority areas for collaboration.[69]

Both government and private sector respondents identified the creation of a regional innovation and entrepreneurship ecosystem as a top priority for regional digital cooperation, and CAREC governments have expressed their willingness to work together on regional training, incubation and acceleration programs for startups whereas the private sector is ready to contribute existing solutions for SME digital enablement across the region. This can be one of the first collaborative public-private sector projects to be launched within the framework of the CAREC Digital Strategy 2030 to catalyse regional collaboration and build momentum for the Strategy implementation process.

Specifically, at the government level, several countries have volunteered to lead collaboration on top priority initiatives and build a platform to foster collaboration and best practice sharing, boost digital innovation and the digital transformation of SMEs, digital skills and capacity building. For example, for the top regional priority of digital innovation and SME enablement, a regional acceleration program for startups was proposed by GITA, Georgia; the creation of a regional startup hub was proposed by Kazakhstan; startup training and acceleration was proposed by Kyrgyzstan, joint incubation, acceleration, and training for startups was proposed by IT Park, Uzbekistan. To drive this initiative, CAREC can consider the establishment of a virtual tax-free regional IT zone for startups, SMEs, and ICT companies across the region.

Thus, the development of a regional digital innovation and SME enablement platform, a virtual tax-free regional IT zone followed by a physical digital innovation hub can become quick wins in the implementation of the CAREC Digital Strategy 2030.

For the top regional priority of digital skills and capacity building, the PRC has offered digital competencies training and Azerbaijan proposed training for digital leaders and change managers. Thus, the development of a regional Digital Skills and Competencies platform to host these trainings can become another quick win. This platform can also become the go-to resource for best practice sharing. Specific areas proposed by CAREC member countries include e-government best practices from Kazakhstan, e-education and training best practices from the PRC, digital agriculture know-how from Pakistan, broadband roll-out in remote and mountainous regions and digital transformation awareness building best practices from Georgia, training and capacity building in the use of digital technologies for senior citizens from the PRC, leveraging digital technologies to address COVID-19 challenges from Kazakhstan, and smart cities and villages best practices from Azerbaijan.

Private sector companies propose a wide range of existing digital transformation solutions that can be scaled regionally to enable government and private sector transformation as well as SME enablement. Georgia, for example, has proposed to share its experience in leveraging broadband access for development, launching awareness-raising programs on the benefits of broadband for populations in rural, remote, and mountainous areas to help people understand how to make the internet work for them. It has also offered to share experience on enabling SME development and proposed specific SME solutions for e-commerce, e-business, and e-government. It has also suggested to help build a regional innovation and startup ecosystem and host startups from across the region in Georgia for training and networking. Kazakhstan proposed to host a regional hub for CAREC startups and also suggested to launch regional cooperation on digital identity. It also offered to share its experience in mobile e-government services. Kazakhstan's Zerde Holding proposed to share its experience in e-government services, intelligent transport and the e-freight initiative. Pakistan is willing to share its experience in digital agriculture.

[69] Consultations were conducted by the CAREC Secretariat in the summer of 2021.

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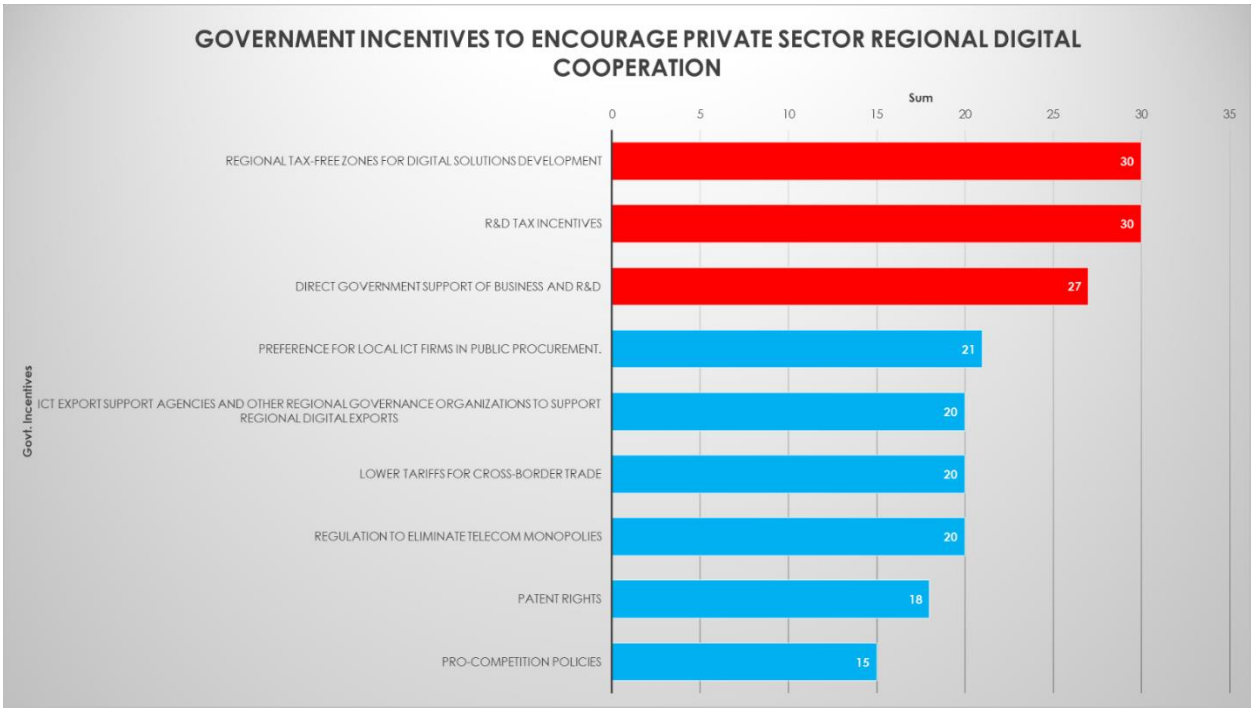
Pillar 1 Leadership, Governance, and Investment in the Digital Economy

Figure 13. Government Incentives to Encourage Private Sector Regional Digital Cooperation



Pillar 2 Digital Policy Enablers and Safeguards

Proposed CAREC Cybersecurity Initiatives:

- Build awareness across the CAREC region of the need to strengthen cybersecurity and resilience in the face of rapidly rising global threats and attacks.
- Develop communication mechanisms to spread awareness across the general population of the region.
- Develop a mechanism for best practice sharing across the region and globally and learn from global cybersecurity leaders like the PRC and Russia.
- Enable best practice sharing across the region and with global leaders in the field.
- Establish a regional focal point for cybersecurity issues.
- Set up a CAREC regional CERT.
- Develop, formulate, and align regulatory frameworks to protect critical regional infrastructure from cyberattacks.
- Enforce regular cybersecurity upgrades to national cyber defence systems.
- Strengthen regional cybersecurity expertise, organize regular training, and attract talent into the region.
- Focus on building cybersecurity skills and work with educational institutions and vocational training organizations across the region to develop comprehensive cybersecurity training materials to be available online and at colleges and universities across the region.
- Conduct regional cyberattack simulation exercises to test cyber defence systems in real time situations and practice rapid response.

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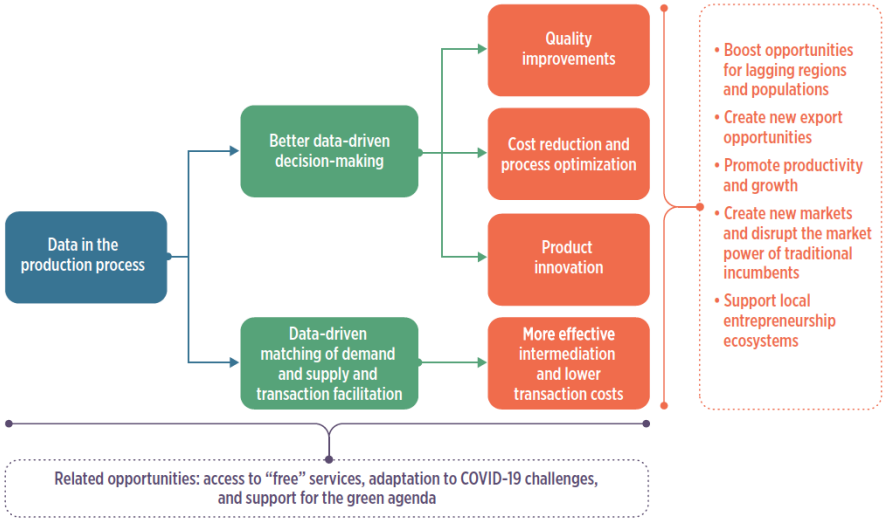
Aligning Data Policies across CAREC

Today data has become the fuel of digital development. Effective data management is key to success in digital transformation and the achievement of digital dividends expressed in higher economic growth, new jobs, better services, and social inclusion. A data-driven approach can lead to improved citizen-centred service delivery, clearer policy development, evidence-based decision-making, and the emergence of innovative business models. New horizons for lagging regions and populations, new export areas and new markets for domestic industries and entrepreneurs, increases in productivity and efficiency in the public and private sectors, creation of new markets and opportunities for local entrepreneurs are just some of the advantages of an effective approach to data management. (See Figure below)

Figure 14. The role of Data in the Production Process: Pathways to Development



Source: World Development Report Data for Better Lives, World Bank, 2021

Reliable statistical data is a serious challenge for most CAREC member countries. Data about many countries of the region is difficult to access. While basic access data such as mobile penetration and broadband subscription indicators have become relatively common, the countries of the CAREC region, especially emerging countries, still tend to show missing data across many basic statistical categories. And often where data is apparent, it is nationally defined and remains incomparable.[70] With the exception of the PRC, none of the CAREC member countries have formulated a national data strategy to date. In Kazakhstan, Kyrgyzstan, and Uzbekistan, laws on personal data date back to 2013, 2008, and 2003, respectively. Attempting to keep up with the EU's GDPR[71], Turkmenistan in 2017 and Tajikistan in 2018 have adopted new policies that nevertheless still remain limited in reach, given poor enforcement[72].

CAREC data policies should be based on principles of open standards, technological neutrality, and interoperability. These principles expedite government service delivery through multiple channels and devices. CAREC member countries should also develop the institutional and regulatory frameworks for data

[70] ADB. 2015. Unleashing the Potential of the Internet in Central Asia, South Asia, the Caucasus and Beyond. Consultant's Report. Regional: Digital Economy Study in Central and West Asia.
[71] General Data Protection Regulation (GDPR). https://gdpr-info.eu/
[72] Y.T. Yan. 2019. Smart Cities or Surveillance? Huawei in Central Asia. *The Diplomat.* 7 August.

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security, protection and privacy and stipulate that, apart from force majeure exceptions, such as pandemics or other crises requiring government intervention, the privacy of citizens data will be safeguarded.

It is important to coordinate multi-stakeholder actions aimed at ensuring privacy and personal data protection, the protection of consumers and their rights on online platforms, while ensuring access to public information and freedom of expression in the digital environment, restricting improper and unauthorized use of data and strengthening mechanisms of collaboration between administrations across the region.

Adopting common standards on open data across CAREC can guide the private and public sectors on how to provide open access to data sets, ensuring that more data become available as digital public goods, while respecting privacy and confidentiality. Central to the implementation of digital public goods are robust human rights and governance frameworks to enhance trust in technology and data use, while ensuring inclusion.[73]

Effective data policies require the creation of a trust environment between all the players of the regional data ecosystem, including the public sector, the private sector, businesses, academia, and the citizens/end users. It is important to establish the enabling conditions for a social contract between government and the governed so that data can become a force for public good. As with all the key elements of digital transformation, the key challenge is not just technology, but the social and culture transformation required to achieve an inclusive culture of data sharing and collaboration across government and non-governmental groups in traditionally conservative CAREC societies with low levels of institutional and interpersonal trust.

Global and Local Best Practices in Developing Regional Data Strategies

It would be useful to learn from global and local best practice in formulating regional data policies. Other regional organizations, notably the EU, have realized the importance of regional data strategies. The implementation of the European Interoperability Framework (EIF) in the 27 EU Member States has been a key element of the EU data strategy as it contributes to the achievement of important initiatives such as the Digital Single Market Strategy, the eGovernment Action Plan, the Tallinn Ministerial Declaration on eGovernment and the Once-Only principle.

The EIF supports national data strategies, the simplification of cross-border and cross-sector data exchanges, and with its recommendations for semantic interoperability, which are a prerequisite for the sharing and reuse of data, it is facilitating the emergence of Europe's data economy and the implementation of the European strategy for data. [74]

Pillar 3 Digital Infrastructure, Resilience and Platforms

Leveraging new disruptive technologies to accelerate digital transformation has been identified as a top priority by CAREC governments. In order to do so effectively across the region, it is important to strengthen the digital foundations, ensuring pervasive broadband connectivity to bridge the digital divide, boost digital skills, especially professional skills required to work with new digital technologies, harmonize legislature and regulations across the region, and ensure interoperability of digital infrastructures.

[73] United Nations. 2020. Report of the Secretary-General: Roadmap for Digital Cooperation.
[74] World Bank. 2021. (Research is in progress).

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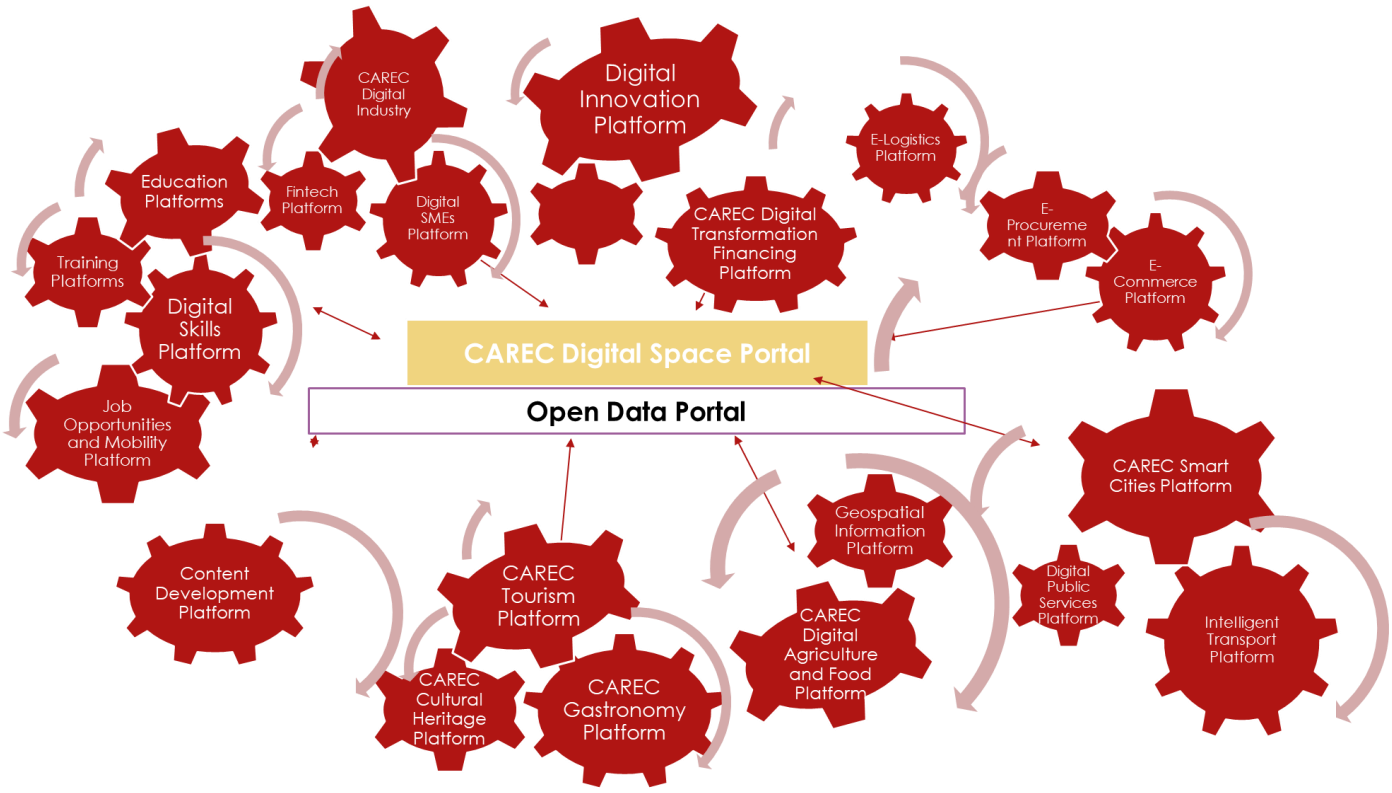
Building a Regional Platform Economy in CAREC

Figure 15. The CAREC Platform Economy



CAREC Open Data Portal

Several CAREC Member States have open data government portals. This is not sufficient to unlock the full potential of shared and re-usable public sector data across the region. A single point of access – the CAREC Open Data Portal - would improve accessibility and increase the value of CAREC's public data. Issues of metadata standards, data standards and linked data need to be addressed. Guidelines for data providers and facilities to allow users to search, link, download and reuse the data for commercial or non-commercial purposes should be provided. Combining government data, business data and scientific data can contribute to building the data economy delivering the innovative services and the data-driven public policies which will benefit society.

For open government services to be provided, there is a need for a sufficient amount of open data that is accessible to the public and business. Approving common open data standards and ensuring data's synchronization and quality are key. Creating an open data repository through the CAREC Open Data Portal will accelerate digital transformation in the region, leading to higher growth, new jobs, and better services across the region.

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Pillar 4. Digital Skills and Competencies

In today's economy most jobs already require some level of digital skills and given the accelerating rate of digital adoption, tomorrow's digital space jobs will require specific skills associated with new and emerging technologies. In most CAREC member countries there is a shortage of skilled digital talent across all sectors of the economy. National and local governments lack the skills needed to re-engineer government processes to deliver productivity and efficiency gains through digital adoption. They struggle to ensure systems interoperability and standards across all government agencies, to enable the free flow of data within and beyond government, to develop new and timely digital services for the one-stop-shop single window e-government portals launched across the region, and to provide support to the users of digital government services.

There is a shortage of skilled digital professionals at the sectoral level, in industry, agriculture, business and services to leverage digital technologies to increase private sector productivity and efficiency, whether in production, supply chain management, or customer relationship management.

And there is a shortage of skilled digital talent at the startup ecosystem level needed to leverage digital technologies to create new, innovative products and services.

This is why CAREC public sector stakeholders have identified the lack of digital skills as the top obstacle to digital transformation in the region and both public and private sector stakeholders have highlighted building basic, professional and advanced digital skills across the region as a top priority for regional digital cooperation.

Levels of youth unemployment and labour out-migration from the CAREC region are high. While official unemployment numbers in the region are between as low as 4.9 % in Uzbekistan and up to 23.9 % in Afghanistan, experts agree that the real numbers are much higher. This is also confirmed by the high rates of labour migration from the region, especially from the Central Asian countries of Tajikistan, Uzbekistan, Kyrgyzstan, and Kazakhstan to the Russian Federation. Russia's Federal Migration Service estimates that in addition to the legal holders of work permits from these countries, 7-8 million people from these countries work in Russia illegally, while some politicians put this number as high as 15 million.[75]

Some CAREC member countries are already collaborating with large multinational private sector companies in building digital skills across the region. In 2014, Huawei, for example, signed an agreement with Tashkent University of Information Technologies (TUIT) that created education opportunities for young Uzbek students to study in the PRC, culminating in the 2017 launch of the "Seeds for the Future" initiative through which Uzbek students were given the opportunity to attend the BRI International Forum and invited to visit and take classes at Huawei's headquarters in the PRC. Huawei intends to continue the education program despite the ongoing pandemic and is committed to seeking new talents and providing job opportunities.[76] Cisco has been running Networking Academy Programs across the region for many years offering certified networking engineer qualifications.

Specific actions to address the lack of IT professionals include:

- Implement innovative educational training programs on breakthrough technologies, starting from an early age (STEM, robotics).
- Update school and university curricula to incorporate digital skills and competencies in science, technology, engineering and mathematics (STEM) courses and update digital educational resources and teaching standards accordingly.

[75] M. Laruelle. 2007. Central Asian Labour Migrants in Russia: The "Diasporization" of the Central Asian States?. Central Asia-Caucasus Institute & Silk Road Studies Program.
[76] Huawei Technologies Company Limited. https://www.huawei.com/en/?ic_medium=direct&ic_source=surlent

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- Develop undergraduate, graduate and postgraduate courses in computer science and software engineering and courses in IT-related subjects, including innovation and entrepreneurship. It is important to promote close collaboration between academic institutions and industry to design education programs and training courses.
- Develop special training courses for public sector employees, as well as private sector companies to strengthen advanced digital, technical and professional skills and competencies.
- Establish incentives for governments and companies across CAREC to provide opportunities for continuous learning to workers, based on individual and local needs and labour market requirements
- Promote an inclusive CAREC digital culture and government support to incentivize the youth, women, rural populations, and other disadvantaged groups to acquire digital skills.
- Develop a network of centres of digital competencies across the region through cooperation with educational institutions, non-profit organizations, and business associations, and by attracting qualified experts from other countries.
- Nurture, support and promote talented IT professionals and provide opportunities for development to prevent brain drain from the region.
- Develop effective incentives mechanisms to attract and retain highly professional IT specialists in the public sector (for example, competitive wages, support for professional development and access to global knowledge, scholarships, and participation in competitions).
- Encourage local content creation across the region and create targeted training programs on ways to create, record and disseminate local content.

Pillar 5 Innovation, Entrepreneurship, and ICT Competitiveness

Nurturing the Digital Innovation Ecosystem

In recent years, significant increases in investments in science and technology, particularly in the PRC, but also in other emerging markets, have shifted the global distribution of knowledge and innovation resources in favour of Asia. Whereas innovation used to flow mostly in one direction, from highly developed to emerging economies, these flows are becoming increasingly two-way[77]. The OECD predicts that while global production and diffusion of new knowledge will intensify, so will competition for talent and resources between countries and regions.[78]

Some CAREC member countries are already nurturing their startup and innovation environments. In addition to the PRC's digital adoption and innovation leadership, other CAREC member countries, such as Georgia, Kazakhstan, Kyrgyzstan, Mongolia, and Uzbekistan have also invested in their innovation ecosystems by building startup hubs, accelerators, and attracting venture capital. Kazakhstan's capital Nur-Sultan has won a maximum ranking for innovation funding growth from Startup Genome. The tax-free Astana Hub founded in 2018, houses more than 500 IT companies while the Astana International Financial Centre introduced a fintech regulatory sandbox and visa-free entry for residents of 57 countries. Georgia's Innovation and Technology Agency focuses on the development of the innovation ecosystem in Georgia and collaborates with startup platforms in Silicon Valley while also exploring avenues for regional cooperation for building a startup ecosystem and launching digital awareness and digital skills training initiatives in CAREC member countries. Georgia and Kazakhstan have offered to apply and scale their innovation ecosystem development.

Promoting the adoption and effective use of digital technologies by SMEs

The regional CAREC Digital SMEs Program would:

[77] World Bank. 2018. Competing in the Digital Age: Policy Implications for the Russian Federation. Washington D.C.
[78] Organisation for Economic Co-operation and Development (OECD). 2016. OECD Science, Technology and Innovation Outlook 2016.

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- Develop incentives, training, and regionally funded extension programs to support the adoption and effective use of e-business solutions by SMEs.
- Establish a regional CAREC SME digital platform that would fuel regional SME collaboration and provide access to programs and tools for effective digital development and collaboration.
- Leverage the platform to promote digital presence and effective adoption, dissemination and use of advanced Industry 4.0 digital tools to foster business productivity and competitiveness, as well as entrepreneurship and structural change.
- Engage local government agencies and business associations in supporting local SMEs through their digital transformation process, including by bringing them onto the digital SME platform.
- Establish advisory centers across the region to help SMEs to leverage digital technologies to increase efficiency, market access, customer relationship management and develop new products and services.
- Provide SMEs with government incentives and subsidies for the acquisition of digital solutions and the development of digital skills.
- Enable SMEs best practice sharing across the region and extend SME access to expertise and standard digital solutions such as CRM, hosting, and data analytics tools via the CAREC SME digital platform.

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Annex I. Accelerating the digital transformation of CAREC operational clusters

Going forward, it is important to formulate sector-level digital transformation strategies to envisage the implementation of digital technologies in each of CAREC's operational clusters, as well as in other key sectors where the region has established comparative advantage, and focus on empowering these clusters through the use of new technologies such as the internet of things, industry 4.0, artificial intelligence, blockchain, etc. To encourage cluster-level innovation, it is recommended to introduce experimental "sandboxes" to pilot and test innovative solutions without fear of legal or other repercussions.

Connecting Smart Cities and Villages Across CAREC

More than half of the world's population lives in cities. By 2050, two-thirds of all humanity—6.5 billion people—will be urban[79]. The rapid growth of cities as a result of urbanization and a rise in migration has led to a boom in mega-cities, especially in the developing world. Global competition is increasingly taking place between cities, as they strive to attract the best talent and investment from around the world.

Leveraging new disruptive technologies, especially 5G-enabled internet of things, artificial intelligence, and big data to boost urban development and the quality of life will determine the winners and losers in this competition as smart cities compete with each other on the strength of their non-digital and digital foundations, the quality of their enabling environment and public services. Thus, the successful development of connected smart cities across a region like CAREC will attract talent and investment, leading to increased regional competitiveness and social and economic benefits for the region's population.

Over the last decade, the CAREC region has also experienced urbanization and migration to cities. Digital technologies can help governments in the region to manage these processes and address the challenges that arise, such as public safety and security, extension of government services to newly arrived migrants, healthcare, education, employment, etc.

Many cities across the region are already implementing smart city projects and solutions focusing on leveraging digital technologies to transform municipal services ranging from traffic management, transportation, public safety and security, emergency response, garbage disposal and procurement to education, healthcare, social support and culture. Over 500 cities in the PRC are launching smart city initiatives. In CAREC, Almaty, Astana, Ashgabat, Bishkek, Dushanbe, Kabul, Lahore, and Tashkent are all investing into smart city solutions, albeit with varying degrees of success. Kazakhstan's Almaty, for example, has implemented smart lighting solutions, automated mudslide hazard monitoring, and the Sergek traffic video surveillance system is operational in both Almaty and Nursultan.

Companies from the PRC are actively promoting their smart city solutions across CAREC, powered by 5G technologies that support the Internet of Things and encouraged by the PRC's Belt and Road Initiative and the Digital Silk Road Strategy aimed at promoting the export of Chinese digital innovation, technologies and infrastructure and supported by Chinese financing across the region.[80, 81, 82] This initiative has been well

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[79] United Nations Development Programme (UNDP). Goal 11: Sustainable cities and communities.

[80] In 2018, Huawei Tech Investment Tashkent, working with the State Committee of the Republic of Uzbekistan for Development of Tourism and Uzbek Ministry of Internal Affairs, agreed to implement a "Safe Tourism" pilot project in the city of Bukhara (Petition.gov.uz, July 13, 2018). The "Safe Tourism" project is a part of the greater "Safe City" concept and combines a set of solutions including the creation of a converged command center; a unified LTE communication network; a data center; high-definition video cameras with face recognition function and processing software for big data analysis to optimize urban management. The Bukhara project mirrors similar initiatives previously carried out in Nairobi, Kenya; Lahore, Pakistan; Saudi Arabia and Dushanbe, Tajikistan (Uza.uz).

[81] Y.T. Yan. 2019. Smart Cities or Surveillance? Huawei in Central Asia. *The Diplomat.* 7 August.

[82] S. Sukhankin. 2021. Tracking the Digital Component of the BRI in Central Asia, Part One: Exporting "Safe Cities" to Uzbekistan. *The Jamestown Foundation.* 11 February.

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received by CAREC governments, especially in light of the increased need for digital solutions to address the COVID-19 crisis, with large implementations taking place across Uzbekistan, Kazakhstan, Tajikistan and elsewhere in CAREC.

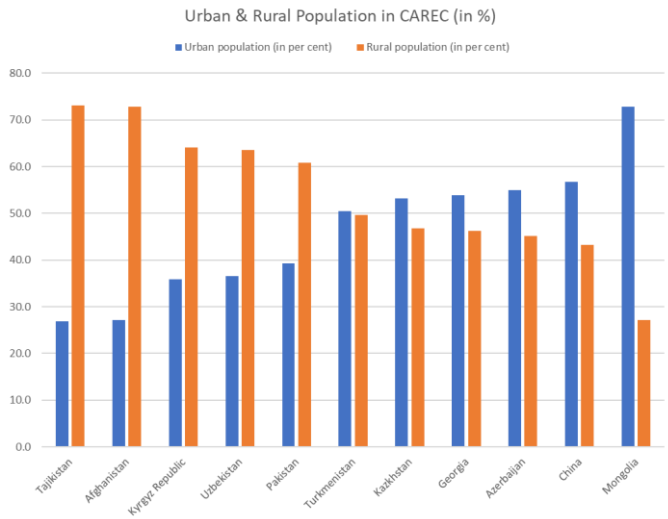
Smart Villages can help bridge the urban-rural digital divide across the region. For example, the PRC's Alibaba TaoBao platform can be an effective tool to bring villages across the region to participate in e-trade[83]. Within the PRC, TaoBao is transforming rural areas where about 40 % of the PRC's population live: in 2018, this platform generated USD$195 billion worth of e-commerce sales, up 30.4% year-over-year and outpacing the 24% growth seen in the PRC's overall e-commerce market. E-commerce is enabling more rural residents to become entrepreneurs, creating new job opportunities, and raising incomes even in the most impoverished areas: household incomes in Taobao Villages are almost three times that of the average rural household income in the PRC, and are similar to urban household incomes. E-commerce in rural areas has also led to higher household consumption, reduced income inequality, and created better job opportunities for women and young people. In 2019, Taobao Villages created 6.8 million jobs throughout the e-commerce value chain.[84] The TaoBao model should be considered for scaling across the CAREC region to boost rural development in CAREC member countries.

In Azerbaijan, smart village development is a government priority and a focus of the rebuilding effort in Karabakh[85] and the PRC's Huawei plans to help Azerbaijan's government by supplying the most advanced technologies, including the first-time implementation of Gigabit AirPON technologies to reduce optical-fibre cable laying requirements and save costs, as well as the roll-out of smart education, health, and agriculture systems.[86]

Digital Agriculture

Digital Agriculture has been identified as a top priority for sectoral transformation by CAREC government stakeholders which is not surprising given the predominance or high percentage of rural populations in most CAREC member countries.

Figure 16. CAREC Population in percentage: Urban vs Rural



[83] J. Wang. 2019. Taobao Villages Driving 'Inclusive Growth' in Rural China. *Alizila.* 25 November.
[84] World Bank. 2019. Stimulating jobs, growth, entrepreneurship, income in rural China through e-commerce. Washington D.C.
[85] M. Mehdiyev. 2021. As Azerbaijan Looks To Restore Its Karabakh Region, Global Know-How Could Be Key. *Caspian News.* 29 April.
[86] AZERTAC. 2021. Huawei to apply its most advanced technologies in Karabakh.

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The Food and Agriculture Organization (FAO) forecasts that by 2050, over 90 % of the demand for global food production will be met by increasing the yield of current arable land based on advances in agricultural research[87], a goal that is high on the agenda of CAREC member countries, especially in light of ensuring food security.

In the US, enhancing digital agriculture technologies already in use today - and increasing producers' usage to full-scale - could create at least $47 billion each year in additional gross benefit for the U.S. economy. Rural broadband e-connectivity is the driver of more than one-third of that potential value, equal to $18 billion of annual economic improvements[88].

Digital technologies such as the Internet of Things, Artificial Intelligence, Blockchain and Big Data are transforming farming and agribusiness across the globe, not only for large commercial players and small farms in the world's wealthier countries but increasingly in the middle-income and emerging markets as well.

Leveraging digital technologies in agriculture across the CAREC region can help raise farmers' productivity and efficiency, address water management and land arability problems high on the agenda of regional leaders, help manage environmental impacts, allow CAREC farmers access to global agricultural knowledge, link CAREC producers to new customers and markets, allow them to explore niche and higher value-added specializations such as organic agriculture, and increase the share of agriculture contribution to regional GDPs and exports.

Some CAREC member countries have already made good progress towards adopting digital technologies in their agricultural sectors, including the use of precision agriculture, crop and livestock monitoring, and digital soil maps, although the adoption of new technologies is lagging for smallholder farmers due to the remaining rural digital divide affecting the availability and quality of Internet access, connectivity costs, lack of awareness and digital skills gap. Several countries have included digital agriculture in their Digital Transformation documents and some CAREC members, including Kyrgyzstan, Tajikistan and Uzbekistan have approached international organizations such as the FAO for assistance in the development of their national e-agriculture strategies.[89]

Digital Tourism

The CAREC Cultural Heritage Digital Platform can offer integrated online access to CAREC's rich cultural, religious, scientific, and historical heritage and create a digital library of cultural and scientific artefacts (books, paintings, music, film, etc.) from national libraries, galleries, archives and museums. This platform would not only raise local, regional, and global awareness of CAREC history and culture and attract tourists to the region but also contribute to local and regional digital content creation and allow the emergence of new services in the content and media sectors. It would also, through value added services, boost growth and jobs in the content and media sectors.

Given the richness of food traditions and cuisines across the CAREC region, the creation of the CAREC Gastronomy Platform is another initiative that can raise the tourism attractiveness of the region while at the same time boost the growth of the food, agribusiness, and hospitality industries across CAREC. The CAREC Gastronomy Platform would bring together suppliers from across the region such as local producers and farmers, bakers and winemakers, food experts and chefs specializing in unique and specialized products and enable them to promote and market their products and services to tourism organizations, restaurants, hotels, catering companies, retailers, and other types of consumers. Implementation of blockchain solutions on the platform can help trace the origins of all the products and ensure their adherence to quality and sanitary standards. Integration with the CAREC Cultural Heritage Platform can enable the development of

[87] High-Level Expert Forum (HLEF). 2009. Global agriculture towards 2050.
[88] United States Department of Agriculture (USDA). 2019. A Case for Rural Broadband.
[89] Food and Agriculture Organization (FAO). 2020. Status of Digital Agriculture in 18 countries of Europe and Central Asia.

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gastronomy narratives linked to the cultural and historical origins of the region and spur the creation of innovative products and services. Integration with the CAREC Digital Agriculture Platforms can help local suppliers find new consumers and markets for their products and services across the region. Integration with global gastronomy platforms would help raise CAREC's visibility globally and attract more visitors to the region.

Digital Agriculture

The CAREC Digital Food and Agriculture Platform would include a database of digital agricultural services, products, and projects. It would also complement other related regional and international platforms such as, for example, the Central Asia Climate Information Platform.[90]

Regional policies should set standards for agricultural data-collection methods and systems, including agriculture-specific digital indicators, regional interoperability standards, procurement mechanisms, etc.

Specific regional initiatives can include the creation of a regional data repository for disease surveillance and monitoring of animal products to facilitate regional trade by allowing closer integration within regional and global value chains; further cooperation on existing initiatives to introduce common sanitary and phytosanitary measures; development of digital land and water accounting systems; addressing gaps in the provision and analysis of weather data, and other predictive tools for farmers, including the monitoring of regional water distribution, basin water management and storage; and the usage of satellite imagery, procured and analysed at the regional level, to support weather forecasting, agricultural monitoring and water management.[91]

Such an approach would serve to disseminate conceptual models, methodologies and good practices regarding innovative technologies, interoperability standards and open-data access. Digitalization of agriculture across CAREC has the potential to accelerate the transformation towards more sustainable and inclusive agriculture and food systems, help bridge the digital divide, ensure food security, and achieve the Sustainable Development Goals (SDGs)[92], even in remote areas.

CAREC member countries must encourage broader adoption of digital technologies by large and small agriculture producers and focus on the digital transformation of the entire agribusiness cluster that includes not only production but also storage, transportation, and logistics companies, financing and telecom service providers, the scientific community, venture capital, machinery, biotechnology and chemical industry players, and others, and use digital platforms and other tools to enable collaboration, gain access, and provide products and services to new customers and market segments nationally, regionally, and globally.[93]

[90] Central Asia Climate Information Platform (CACIP). https://centralasiaclimateportal.org/
[91] CAREC Program. 2021. CAREC at 20: Reimagining Regional Cooperation Through Digital Transformation. Manila.
[92] UNDT4ECA supports digitalization to achieve SDGs both at regional and country levels.
[93] World Bank. 2018. Competing in the Digital Age: Policy Implications for the Russian Federation. Washington D.C.

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Annex J. Potential areas of implementation of the CAREC Digital Strategy 2030

CAREC's economic connectivity cluster can be boosted through closing the digital divide through ubiquitous broadband access. A portfolio of investment projects focused on building secure interoperable networking and data infrastructure across the region, bridging the digital divide and providing universal broadband access, including in remote and mountainous areas should be created and discussed with CAREC's digital ecosystem stakeholders.

CAREC's Economic and Financial Stability cluster would benefit from financial inclusion and fintech solutions and initiatives to ensure the interoperability of mobile payment and banking systems to utilize mobile payments for transactions.

CAREC's Trade, Tourism and Economic Corridors cluster can drive a wide range of projects, including digital trading platforms for the region to reduce transaction costs, improve transparency and accountability, and reduce delays and other associated risks; harmonization of regulation and legislation to enable e-commerce and the establishment of cross-border services; e-commerce, e- customs and digital taxation, online licensing and certification, unified checkpoint systems; electronic queues at border points, and a variety of information sharing mechanisms.

Tourism in CAREC would specifically benefit from a CAREC tourism platform to support the Digital Silk Road, e-visa regimes; the adoption of digital solutions to ensure health and safety for arrivals to the region and cooperation on safety, security and counterterrorism through the use of digital technologies.

Transportation in the region would be boosted by the introduction of automated payment systems for rail and road freight to improve efficiency; and the development of an integrated transit and transportation system to enable the freer movement of goods and services across the region.

In Water and Agriculture, electronic land and water accounting systems; a regional data repository for disease surveillance; a monitoring mechanism for animal products; AI-enabled weather forecasting; agricultural monitoring and water management using predictive tools and satellite imagery can empower the development of the cluster.

In Human Development, the CAREC job opportunities and mobility platform, regional digital skills platforms, healthcare platforms and telemedicine services, systems to monitor the pandemic and other communicable diseases and early-warning systems can be established

The complete CAREC project portfolio should undergo prioritization. Projects that are strategically important, will have a large impact, lead to digital dividends yet are easy to implement and do not require excessive funding, investment, or capacity building, should be prioritized in the early stages of Strategy implementation as quick wins. These projects will help manifest results, build positive momentum, and increase member countries' commitment to regional digital transformation initiatives and the CAREC Digital Strategy 2030.

Projects that may not be of strategic importance yet are easy to implement in the short-term at the regional level should also be prioritized as low-hanging fruit, as they too will help to generate member country buy-in and a shared sense of achievement regarding digital adoption in the region.

Projects that are of strategic importance, high impact and are likely to generate regional digital dividends, yet are difficult to implement and require significant funding, investment, skill and execution capacity should be planned for the mid to longer-term and carefully mapped out by using a phased approach with interim targets to ensure ongoing availability of financing and the time required for upskilling and capacity building.

Projects that are not of strategic importance and not high impact yet are difficult and expensive to implement should be eliminated from the CAREC Project Portfolio.

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