Georgia
Digital Development Country Profile

Acknowledgments

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1. Introduction

1.1 Background and context

Development through digital transformation is a complex issue and touches on many enablers, from broadband availability to policies and sectoral e-strategies, as well as specific programmes fostering digital inclusion or the development of innovation communities.

Various independent research projects have been carried out by the ITU, UN agencies, and stakeholders in understanding these enablers, their impact on countries, the gaps, and opportunities. However, these studies may not reflect the inherent interdependencies among them. There is a need to provide a simple view and narrative about country's capacity to digitally transform, and various components contributing to this process.

Digital development through digital transformation has become ever more important since the outbreak of the COVID-19 pandemic, and various UN agencies and other stakeholders have assisted countries in their respective capacities relying substantially on the digital component.

Extending the availability of products and services, and empowering citizens, workers, and students in their daily engagements and needs during times of lockdown has become clear priorities of all countries. The ability to leverage the progress made in the digital sphere has become an important factor in determining resilience during the COVID-19 crisis.

As the situation is developing into a new normal where "digital" is not only a solution to an emergency but a long-term investment against risk, it is necessary to unravel the various dimensions of digital development in different countries as ICTs become increasingly important for the achievement of the Sustainable Development Goals by 2030.

1.2 Objective of the Report

The aim of the Digital Development Country Profiles series is to provide a comparative analysis for priority countries of the European region, namely Albania, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia, and Ukraine.

The Report addresses digital transformation based on the various experiences of the ITU, the UN specialised agency for ICTs, and other UN system organizations, offering a broad overview of the activities and projects being implemented at the national level and in the wider region.

This report seeks to build a reference for discussions on digital development at country level in Georgia. It will serve as a guide for future dialogue with country stakeholders and pave the way for increasing fit-for-purpose engagements of the UN system in the country. It will equip decision-makers at the national level and international stakeholders with an overview of the various components of digital development at the country level.

1.3   Methodology

The research has identified a *five-building-blocks framework* that analyses digital transformation from a variety of perspectives, enabling an understanding of how the various dimensions of digital development interact at country level. Below is a summary of each building block and an elaboration of how the particular dimension fits in the overall digital development scenario of the country.

1) Meaningful connectivity as a foundation for digital development and transformation: Robust ICT infrastructure represents a critical precondition for the transformation of a country. It provides the foundation for innovative services and economic activity to take place. With the Covid-19 pandemic, countries and communities lacking connectivity faced a greater disruption than those who did not, therefore raising the overall importance of reliable infrastructure and services that are available to all. ICT infrastructure needs to be evaluated based on several aspects critical to meaningful connectivity.

2) People-centric digital transformation: Developing digital skills and building human capacities to empower citizens, strengthen employability, and create new job opportunities is essential to match the needs of the gigabit society. The pandemic has exacerbated pre-existing inequalities, especially amongst refugees, migrants, persons with disabilities, women, and girls. While connectivity is the backbone of digital transformation, adopting a people-centric digital transformation is vital to ensure that all members of society are not only connected but meaningfully connected and, thus, fully enjoy the fruit of an ever-growing digital world. To this end, special emphasis should be given to bridging the digital divide and equipping all groups of society, including groups of people with specific needs, to take advantage of ICTs by enabling digital skills development.

3) Government-centric digital transformation: Access to government services by citizens enables productivity, transparency, and equality in digital development. Ensuring that public services are delivered digitally is an important component of digital transformation, triggering a reduction in costs and bureaucracy, and increasing efficiency. Governments also have an important role not only in promoting the right strategies collaboratively across various entities but also in ensuring that public sector transformation becomes a catalyst for digital transformation in the wider economy.

4) Sector-centric digital transformation: Although the ICT sector is important in digital transformation, most economic benefits accumulate when ICTs are also used to transform other sectors. Agriculture and health are of high importance for Southeastern European countries in the scope of this study and play a key role in job creation and economic inclusion.

5) Digital-centric innovation ecosystem: Creating an enabling environment supporting digital innovation is essential to accelerate digital transformation in a country. The ability to digitally innovate domestically is also considered a sign of maturity which leverages all four dimensions addressed previously. Without entrepreneurship-driven innovation, economic opportunities remain unexplored and the global competitiveness of countries in an increasingly digital landscape is put at risk. Through strong digital innovation ecosystems, countries can benefit from increased productivity, economic growth, and employment opportunities that catalyse digital transformation and ensure that long-term digital development has a positive impact on the country's broader economic development.

The country profiles benefited from secondary research information, including various ITU publications, activities, and statistics, as well as additional research. In addition, content from other stakeholders' publications and deliverables were taken into account. Each piece of content is presented using the context of the relevant building block under which the information has been inserted, and therefore adopts one of the 5 perspectives of digital transformation.

2.   Country Profile – Georgia

2.1   Building Block 1 – Meaningful connectivity as foundation for digital transformation

As stressed in the introduction, broadband development is of primary importance and remains a prerequisite to ensure digital development. It is the backbone for every aspect of the economy acting as a fundamental enabler for businesses, consumers and citizens. Access to the next generation of infrastructure (fixed, mobile, wireless, satellite) at an affordable price is a key prerequisite for advancing sustainable development.

This section will provide a general overview of i) connectivity indicators for Georgia, to position the country in an European and global context and will then dive into ii) the market environment; iii) current trends in access, affordability and use; iv) latest developments in connectivity policy and regulation; v) 5G development; and vi) infrastructure cybersecurity.

2.1.1 General overview on connectivity indicators

According to the latest ITU data, 72.5% of people in Georgia used the Internet in 2020, which is far below the European region average. However, the increase in the number of the Internet users is slightly slowing down compared to the previous year. The data show that in 2020, the number of users increased by 3.7 percentage points compared to 2019, and in 2019 by 6.1 percentage points compared to 2018 data.[1]

In 2020 Georgia had 99.98% of the population covered with 3G and 99.7% with 4G/LTE, the number of mobile-broadband subscriptions per 100 inhabitants was 81.6 while the number of fixed broadband subscriptions per 100 inhabitants was 25.0. Yet, both of these indicators have registered a steady increase over the last years. Since 2018, the number of fixed broadband subscriptions per 100 inhabitants experienced an annual growth with a CAGR of 7.8% and the number of active mobile-broadband subscriptions per 100 inhabitants an annual growth with a CAGR of 5.2%.[2]

In 2019, mobile Internet subscribers have consumed up to 0.08 exabytes of Internet traffic, with 77% of it consumed via 4G networks. Since 2017, the mobile Internet traffic consumption through 4G increased

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[1] ITU, World Telecommunication/ICT Indicators Database, August 2021, retrieved from https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspxhttps://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx

[2] ITU, World Telecommunication/ICT Indicators Database, August 2021, retrieved from https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspxhttps://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx

by 21 percentage points, whereas the consumption via 3G decreased by 19 percentage points, reaching a share of 22% in 2019.[3]

Fixed broadband subscribers consumed 2.24 exabytes in 2019. Nowadays, when it comes to fixed broadband technologies, fibre is by far the most used in Georgia. While the fibre infrastructure has been steadily expanding, the xDSL has been reducing. In 2019, 81.9% of total subscriptions used FTTx technology.[4] The number of fibre Internet subscriptions increased by 54.4% since 2017, and reached in 2020 a number of 835,766, while the number of xDSL subscriptions decreased in the same period of time by 74.7% and amounted to 28.8 thousand subscriptions in 2020.[5]

By the end of 2019, 61% of Georgian broadband Internet subscribers were using services with the declared speed range of 10 to 29 megabits per second.[6]

Table 1 below summarizes a set of ITU indicators that embed Georgia in a European (encompassing 46 countries of the Europe region[7]) and Global context with regards to telecommunications and Internet indicators. While on many fronts, Georgia finds itself well above World averages, there remains a non-negligible gap between the country and European region averages.

Table 1. Key Telecommunications & Internet Indicators in Georgia in comparison to the European and World average[89]

Key Indicator (2020)	Georgia	Europe	World
Fixed telephone subs per 100 inhabitants	9.5	32.5	11.6
Mobile cellular subs per 100 inhabitants	127.8	118.3	107
Active mobile broadband per 100 inhabitants	81.6	101.5	77.3
3G coverage (% of population)	99.98	98.4	93.6
LTE/WiMAX coverage (% of population)	99.7	98.5	85
Individuals using Internet (%)	72.5	84.9	59.1
Households with Internet access (%)	83.8	87.6	65.7
Fixed broadband subs per 100 inhabitants	25.0	33.8	15.8
Fixed broadband subs by speed, % distribution:			
256 kbit/s to 2 Mbit/s	0.5	0.3	1.8
2 to 10 Mbit/s	13.2	6.4	6.7
10 Mbit/s	85.8	92.3	89.9

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[3] Communications Commission. 2019 Annual Report, p.26, retrieved from https://comcom.ge/uploads/other/5/5875.pdf

[4] ITU World Telecommunication/ICT Indicators Database (December 2020 Edition)

[5] https://analytics.comcom.ge/en/statistics/?c=Internet&f=subscribers&exp=technologies&sid=903925

[6] Communications Commission. 2019 Annual Report, p.67, retrieved from https://comcom.ge/uploads/other/5/5875.pdf

[7] https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/MemberCountriesinEurope.aspx

[8] ITU, World Telecommunication/ICT Indicators Database, August 2021, retrieved from https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx

[9] ITU global and regional ICT data, retrieved from https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Oct_2021.xlsx

Figure 1 below shows a comparison of basic indicators of ICT-access in Georgia, during the years 2014, 2016, 2018, and 2020.

Figure 1. The basic indicators of ICT-access and usage in Georgia[10]
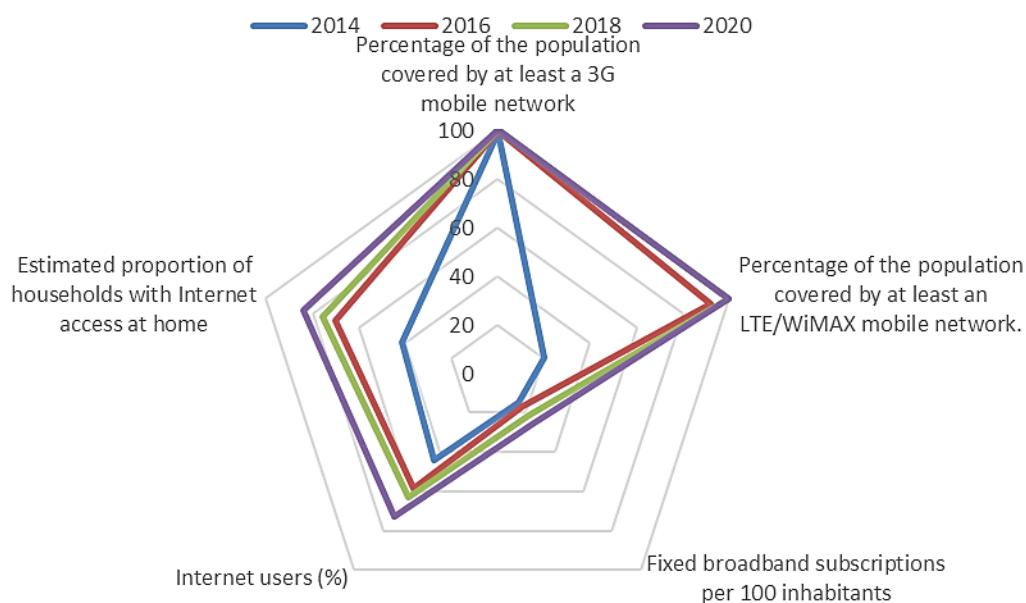
2.1.2 Market environment

According to the ITU *Measuring Information Society Report 2018*, Georgia's authorities have succeeded in their efforts to liberalize the telecommunication market and make it open and competitive. Clearly allocated responsibilities between policymaker and regulator ensure predictability of governing processes in the ICT sector, which is favourably influencing the economy. As a result, the ICT infrastructure is developing steadily, and citizens have access to high-quality telecommunication services that increase their participation in the country's socio-economic life.[11]

Key institutions that are enabling the digital transformation from a telecommunications standpoint are the Ministry of Economy and Sustainable Development, which has the mandate to develop and implement state policy in the ICT and innovation fields, as well as to promote digital development at the country level, and the Georgian National Communications Commission (COMCOM), which has the mandate to regulate the electronic communications, broadcasting, frequencies and numbering. The regulatory system is aligned with the EU regulatory framework and the legal guarantees of the regulator's independence are defined in the Constitution.

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[10] ITU, World Telecommunication/ICT Indicators Database, August 2021, retrieved from https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx

[11] Measuring the Information Society Report 2018 – Volume 2, p. 65, retrieved from https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2018/MISR-2018-Vol-2-E.pdf

In 2019, the electronic communications sector included 285 actors which generated total revenue of GEL 1,185 million (approx. EUR 318 million), of which GEL 919 million (approx. EUR 246 million) was retail revenue.[12] The retail revenue of mobile operators in 2019 amounted to GEL 499 million (approx. EUR 134 million) [13], where Magticom's market share was 46%, Silknet - 36%, and Veon Georgia - 18%. The market share of mobile operators in terms of the number of subscribers was distributed as follows: Magticom - 41%, Silknet - 33%, and Veon Georgia - 26%. Yet, the total number of mobile subscribers is not equal to the number of mobile Internet users. In this context, 71% of Veon Georgia subscribers, 66% of Silknet subscribers, and 46% MagtiCom subscribers are mobile Internet users.[14]

According to 2019 Internet traffic consumption data, the largest volume of mobile Internet traffic was consumed by Magticom subscribers, with a monthly average of 3.4 GB. This indicator is 47% higher than the year before. According to fourth-quarter 2019 statistics, MagtiCom and Veon Georgia customers consumed the same amount of 3.9 GB Internet data per month, and Silknet users 2.5 GB.[15]

When it comes to fixed Internet service providers, in 2019 88% of the revenue is generated by three market players, while the remaining 12% is distributed among 136 companies. Magticom holds 46.8% of the market in terms of revenue, Silknet - 35.4% and Akhali Kselebi Group - 5.5%.

The revenue received from the residential subscribers is 70% of the total amount, while the number of subscribers of this type is 95% of the total market. According to the shares of revenues received from residential and legal entity subscribers, Magticom's revenue share on the residential segment is 49% and Silknet's share is 33%. Meanwhile, on legal entity subscribers' segment, Magticom's and Silknet's revenue shares are almost equal.[16]

According to fourth-quarter statistics, the number of residential subscribers increased by 73 thousand and reached 896 thousand in 2019. As a result, household penetration of fixed broadband Internet users increased by 6.6% and reached 80.8%. Magticom was the main driver of this growth, mainly due to the expansion of its fibre-optic network, increasing its number of subscribers by 18%. The number of Silknet subscribers increased by 2% in 2019.[17]

2.1.3 Meaningful connectivity in the regional context

Meaningful connectivity depends on a variety of factors. The most important are *availability* and *affordability*. These are also the strongest determinants of another factor of connectivity, *uptake*. Looking more in depth at these three dimensions, the ITU report on Connectivity in 9 non-EU countries of Europe

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[12] The National Bank of Georgia, exchange rate on 06.07.2021 of EUR 3.7289, retrieved from
https://www.nbg.gov.ge/index.php?m=2&lng=eng

[13] The National Bank of Georgia, exchange rate on 06.07.2021 of EUR 3.7289, retrieved from
https://www.nbg.gov.ge/index.php?m=2&lng=eng

[14] Communications Commission. 2019 Annual Report, pp.38, 40, 48, retrieved from
https://comcom.ge/uploads/other/5/5875.pdf

[15] Communications Commission. 2019 Annual Report, p.49 retrieved from https://comcom.ge/uploads/other/5/5875.pdf

[16] Communications Commission. 2019 Annual Report, p.62 retrieved from https://comcom.ge/uploads/other/5/5875.pdf

[17] Communications Commission. 2019 Annual Report, p.60, retrieved from https://comcom.ge/uploads/other/5/5875.pdf

region, prepared in the context of the ITU Regional Forum for Europe on Meaningful Connectivity held on 8 and 9 March 2021,[18] shows that Georgia is well positioned, if compared to regional peers.

In terms of *availability of connectivity*, Georgia is at the forefront in two out of three indicators:

- <u>Percentage of the population covered by at least an LTE/WiMAX mobile network</u>: Georgia is leading among the 9 countries with 99.7% of the population covered by 4G/LTE services, showing this result for already the third year in a row since 2017.
- <u>Estimated proportion of households with Internet access at home</u>: according to the latest available data, 79.3% of households in Georgia are connected to the Internet. This places the country in 4th place among the regional peers, and beyond the EU-27 average of 86.6%. This indicator has gone up by 8.5 percentage points as the country had 70.7% of households covered in 2017.
- <u>Number of fibre connections per 100 inhabitants</u>: Georgia emerges as a leader among the nine countries considered in the report, reporting almost 20.0 FTTH/B subscriptions per 100 inhabitants, an indicator that is close to EU countries leaders.

With regards to the *affordability* dimension, Georgia provides relatively affordable Internet access. According to most recent data, the data only mobile broadband basket cost was 0.56% of GNI per capita for a monthly allowance of 1.5 Gb, while the fixed-broadband basket cost was 2.79% of GNI per capita for a 5Gb Internet data cap.[19]

The country not only achieved the Broadband Commission's 2% target for mobile-data basket cost, but also reached the European countries average of 0.6% of GNI per capita. Besides, the country was one of the five countries which offered a minimum of 1.5 GB for the price of less than 1% of GNI per capita. Even though the fixed-broadband basket cost significantly decreased over the last years, it is not meeting the 2% target and is far above the European countries average of 1.2% of GNI per capita.[20]

Among 9 non-EU countries of the Europe region, Georgia is the second, leading the ranking with its mobile-data broadband basket cost, while the fixed-broadband basket cost is the second from the end, followed only by North Macedonia. This is reflected as well in the international rankings, where the country is ranked 37th on the mobile-broadband basket affordability, and 85th on the fixed broadband basket cost.[21]

Finally, when it comes to *connectivity uptake*, Georgia is well-positioned in comparison to regional peers, in line with the good performance on the *affordability* and *availability* dimensions outlined above:

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[18] https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/Events/2021/MC/Default.aspx

[19] ITU Report "Measuring digital development ICT price trends", pp. 66-77, retrieved from https://www.itu.int/en/ITU-D/Statistics/Pages/ICTprices/default.aspx

[20] ITU Report "Measuring digital development ICT price trends", pp. 14, 18, 24, retrieved from https://www.itu.int/en/ITU-D/Statistics/Pages/ICTprices/default.aspx

[21] ITU Report "Measuring digital development ICT price trends", pp. 66-77, retrieved from https://www.itu.int/en/ITU-D/Statistics/Pages/ICTprices/default.aspx

- Fixed broadband subscriptions per 100 inhabitants: Georgia has 23.56 subscriptions per 100 inhabitants and it is the second result among the 9 non-EU countries. Even though it has not reached yet the EU-27 average of 34.3 subscriptions per 100 inhabitants, during the last five years, it experienced rapid annual growth with a CAGR of 10.5%. This growth rate is much higher than the EU-27 average growth with a CAGR of 3.2%, and demonstrate the fact that, while infrastructure gaps exist, they are closing quickly.

- Active mobile-broadband subscriptions per 100 inhabitants: the country has 79.9 subscriptions per 100 inhabitants compared to an EU-27 average of 108.8. However, Georgia increased its active mobile broadband subscriptions per 100 inhabitants by 47.9% from 2015 to 2019.

- Estimated proportion of households with a computer: with 62% of households estimated to be in possession of a computer at home, Georgia is still far from the EU-27 average of 80.5%. Moreover, after several years of continuous increase, the indicator suddenly decreased in 2019 by 2.8 percentage points compared to 2018, when the share was 64.9%.

- Proportion of individuals who used a computer (from any location) in the last 12 Months and Internet users (as % of the population): both indicators registered steady growth in Georgia over the last years, but the country is positioned far from EU-27 averages in 2019. The proportion of individuals who used a computer in the last 12 Months reached a share of 55.7% in 2019, experiencing in the last five years growth with a CAGR of 3.1%. Also, the divide in Internet users between the nine countries considered and the peer states in the Europe region is diminishing at an accelerated rate with Georgia's CAGR almost five times the annual growth rate of its peers. In 2019, the share of Internet users reached 68.8%.

2.1.4 Connectivity policies and regulations

Since 2010, Georgia has strengthened its support to ICTs through a variety of public-private partnerships and digital-related initiatives and programs such as zone tax exemption, foreign investments and projects to improve its labour force. The 2014 document "Georgia 2020—Social Economic Development Strategy" outlines several target areas to enhance the digital ecosystem, including high-speed broadband Internet for future development, e-literacy and capacity building, innovation and high-tech, as well as e-government.[22]

In 2014, Georgia agreed to gradually ensure the harmonization of the legislation in the field of electronic communications with the existing regulatory norms within the EU. With the assistance of the European Bank for Reconstruction and Development (EBRD), COMCOM analysed the non-compliance of Georgian legislation and regulatory norms with European directives. As a result, a two-stage package of legislative changes for radio communication was developed: The first stage involves the introduction of general liberal fundamental approaches while the second involves individual licensing.

COMCOM identified the main inconsistencies that hinder the rapid technological development of the country that include:

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[22] 5G Implementation in non-EU countries of the Europe Region, p.55

- Lack of conceptual approaches to the use of frequency resources based on general permission and individual licensing;
- Inflexible regime for determining the licensing period;
- Freedom of choice of frequency resource use form and proportional selection criteria;
- Absence of a formal written consultation procedure for the allocation and issuance of frequency resources;
- Lack of opportunity to use frequency resources in test mode in a limited geographical area for a specified period on a non-commercial basis.[23]

In 2014, the Georgian government announced its plans to provide high-speed Internet throughout the country via a program called "Broadband Internet to Every Citizen," which was executed by "OpenNet". Established by the government in 2015 as the National Program for Broadband Development as a non-entrepreneurial and non-commercial legal entity, OpenNet has performed its activities in accordance with previous development-related resolutions which was approved by the Georgian government on July 28, 2016.[24]

The Law on Electronic Communications, which is the main pillar for the telecommunication sector in the country, does not provide any specific recommendation for broadband mapping. However, it provides the possibility for the regulator, the Georgian National Communication Commission (COMCOM), to obtain data from operators in the field of electronic communications to fulfil the duties conferred by the law (Art.11). Moreover, it is relevant to notice that the country is in the process of implementing a new specific infrastructure-sharing law aimed at reducing the cost of deployment and promoting competition in the telecommunication sector, framed upon the broadband cost reduction Directive of the European commission. In April 2020, COMCOM published a resolution on "Approval of the information forms to be submitted by the authorized and/or license holders in the field of electronic communications for the purpose of mapping the telecommunication infrastructure on a single digital map", which is a milestone in the broadband mapping effort started by COMCOM in 2018. While substantial work is being done in the field of infrastructure mapping, service and investment plans are not yet mapped in the country and could provide new avenues for development in the future.[25]

More recently, Georgia's National Broadband Network Development Strategy for 2020-2025 mandates that schools, highways and public facilities must be provided with Internet access at a download speed of 1 GBps by 2025, in line with EU plans, and also aligned with plans for 5G development in the country. The strategy aims not only at creating infrastructure, but also establishing Georgia as a digital and information hub in the region between Europe and Asia while also upgrading knowledge and skills, leading to employment growth.

Within the framework of the OpenNet project and the Georgia's National Broadband Network Development Strategy for 2020-2025, the World Bank is supporting the development of broadband

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[23] 5G Implementation in non-EU countries of the Europe Region, p.59
[24] 5G Implementation in non-EU countries of the Europe Region, p.55
[25] Connectivity in Education: Status and recent developments in 9 non-EU countries, p.41

through the Log-in Georgia Project. The support package of 32.7 EUR million has the goal to expand access to affordable broadband in rural settlements and to support the development of Georgia's digital economy. The three major project outcomes include: i) increasing access to affordable broadband Internet; (ii) promoting the use of broadband-enabled digital services; and (iii) project implementation support. The project expects to connect up to 1,000 villages, including settlements in mountainous regions, to high-quality and affordable broadband service. Nearly 500,000 people, residing in locations currently unserved by high-quality broadband services stand to benefit from the deployment of the broadband infrastructure envisaged by the Log-in Georgia Project.[26]

In the context of rural areas and under the project Harmonized Digital Market (HDM) EU4Digital "Eastern Partnership Countries (EaP) Broadband Infrastructure Development Strategy," that were carried out between 2018 and 2020, key development objectives were to enhance the country's relevant legal and regulatory framework for broadband development in line with the EU norms and overcoming the digital divide across the regions.

The urban-rural divides are intertwined with the development of ICT in the country. Approximately 83% of urban households benefit from fixed broadband services, while in rural areas the figure drops to 5%. Over the past years, growth in mobile broadband has been steady, supported by the auction of spectrum in the 800MHz and 2100MHz bands which has enabled the network operators to expand the reach and capabilities of LTE services, which now covers the vast majority of the population. On a regional level, the construction of the Black Sea and the Caspian Sea submarine fibre-optic cable backbone is currently under consideration by the Ministry of Economy and Sustainable Development.[27]

Finally, from a wider regulatory standpoint, Georgia currently scores 92.5 in the ITU ICT Regulatory Tracker, placing the country at the 27th place among the countries considered for the 2020 ranking.[28] The ITU Tracker pinpoints the changes taking place in the ICT regulatory environment. It facilitates benchmarking and the identification of trends and gaps in ICT legal and regulatory frameworks and allows decision-makers to make the case for further regulatory reform towards achieving a vibrant and inclusive ICT sector.

The ICT Regulatory Tracker is composed of 50 indicators (11 composites, see full list below) grouped into four clusters:

1. Regulatory authority (focusing on the functioning of the separate regulator): Georgia scores 18 out of 20;
2. Regulatory mandates (who regulates what): Georgia scores 16.5 out of 22;
3. Regulatory regime (what regulation exists in major areas): Georgia scores 30 out of 30;
4. Competition framework for the ICT sector (level of competition in the main market segments): Georgia scores 28 out of 28.

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[26] 5G Implementation in non-EU countries of the Europe Region, p.55
[27] 5G Implementation in non-EU countries of the Europe Region, p.56
[28] https://tracker.gen5.digital/country-cards/Georgia

Figure 2 - ICT Regulatory Tracker - Georgia

ICT regulatory Tracker 2007: 71.5 (G3)
ICT regulatory Tracker 2020: 92.5 (G4)
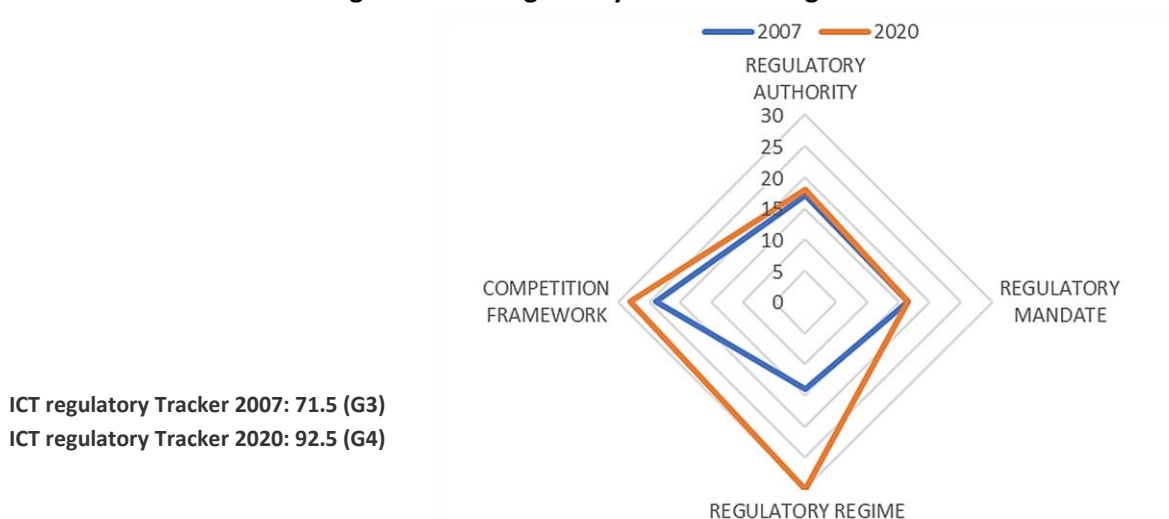
This benchmark allows to position Georgia among the group of countries with a *Fourth-Generation regulatory regime (G4)*, that is integrated and led by economic and social policy goals. Georgia reached G4 in 2014 and is among the 84% of European region countries that graduated to G4. The country's overall result is slightly lower than the Europe region average score of 94.1, but is well above the world one of 73.7.[29]

Recently, the ITU launched a reviewed Fifth Generation of regulation benchmark, focused on collaboration among different stakeholders in the ICT sector and with other sectors of the economy.[30] According to the latest methodology and release, Georgia scores 47.12 in the G5 benchmark, compared to an Europe regions average of 69.88.[31] This suggests that there is still a margin of improvement for the country, particularly with regards to the pillars on Digital Development Toolbox and Digital Economy Policy Agenda.

2.1.5 Next generation infrastructure: 5G Development

Since 2016, Georgia has been actively involved in the work of the Spectrum Expert Working Group within the EaPeReg network to advance the implementation and harmonization of next generation networks. In order to keep pace with the developments on the global scale, the preliminary strategy meant to introduce 5G was developed, incorporating elements such as coverage obligations, network access, and the possibility of joint ventures to build the network. Besides, in July 2019, Georgian National Communications Commission (COMCOM) started a 5G consultation process with operators to obtain their views and plans on 5G.

Already in December 2019, COMCOM developed and published the "Strategy for Promoting the Development of 5G Network and Services". The document contains information about the plans, vision

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[29] Global ICT Regulatory Outlook 2020 Pointing the way forward to collaborative regulation, pp.29, 31, retrieved from: https://digitalregulation.org/wp-content/uploads/ebat-19-00942_Global-ICT-Regulatory-Outlook-2019-v11.pdf
[30] https://gen5.digital/

[31] https://digitalregulation.org/wp-content/uploads/G5Benchmark_ReviewBoardReport_21062021.pdf

and goals of the Commission, including: I) 5G Frequency Band Release, Coordination and Harmonization Plan; II) Expected sequence of transmission for temporary use of 5G frequency bands III) List of liabilities; IV) Plan for legislative changes that will affect 5G; V) On development in Georgia; and VI) Examples of future use of 5G in Georgia. This document has been created with the purpose of making the spectrum dedicated for mobile broadband services available for operators in the first half of 2020.

In April 2020, COMCOM published the "5G Frequency Resource Fee Consulting Document." As part of the consultation process, an online meeting was held to discuss questions related to the calculation of fees.

In December 2020, COMCOM published the "5G Terms and Conditions Consultation Paper". The consultation builds upon the previous consultations and on the previously calculated reserve prices, to present a vision regarding the obligations and licensing conditions for 5G service frequencies in the forthcoming auction.

COMCOM plans to hold an auction in 2021 to allocate the spectrum necessary for 5G deployment. COMCOM states that when determining the basic requirements for the 700 MHz and 3400-3800 MHz frequency spectrum, it is recommended for providers to make a specific coverage plan, which will include a specific list of cities and major roads to be covered under the 5G license. Besides, the regulator notes that the license should impose certain obligations regarding the coverage of specific settlements, as well as in terms of investments and network development. [32]

According to the 5G Terms and Conditions Consultation Paper, a total of 400 MHz will be available under the auction for frequencies in the 700 MHz, 800 MHz, 3,400 - 3,800 MHz frequency bands. Within the scope of auctions, the regulator plans to make available 4 lots of a category A bundles and 7 lots of category B standalone lots. The spectrum cap will be 2x10 MHz in both the 700 MHz and 800 MHz bands and 100 MHz in the 3.4-3.8GHz band. Moreover, the reserve price has been set to GEL 363,000 (approx. EUR 97.5 thousand)/1MHz in the 700 MHz band, GEL 741,000 (approx. EUR 199.2 thousand)/1MHz in the 800 MHz band and GEL 52,000 (approx. EUR 13.8 thousand)/1 MHz in the 3.4-3.8 GHz band.[33]

With regards to the licensing period, according to the Law of Georgia on Electronic Communications, the licenses issued will be valid for 15 years from the date of issue and obligation to start the activities is 6 months after the date. Regarding coverage obligations, incremental obligations with time are foreseen with the first obligations expected to be applicable 2 years from obtaining the license. Finally, the document also sets technical terms for operation.

In April 2020, COMCOM informed the local press that it has already carried out large-scale work to install 5G Internet infrastructure and soon will announce a tender for operators. The Georgian Association of Small and Medium Operators indicated to the local press that Internet tariffs will decline after 5G is

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[32] 5G Implementation in non-EU countries of the Europe Region, pp.57-59

[33] The National Bank of Georgia, exchange rate on 06.07.2021 of EUR 3.7289, retrieved from https://www.nbg.gov.ge/index.php?m=2&lng=eng

introduced in the country, maintained that the COMCOM sets optimal prices for operators leading up to the frequency spectrum auction in the country.[34]

In August 2020, MagtiCom has announced it has started testing 5G technology, cooperating with 'three leading telecommunication equipment manufacturers around the world' to conduct the trials, and will also partner with a fourth in the near future. However, MagtiCom does not plan to launch 5G commercially unless the average Internet use per subscriber on the retail cellular market exceeds 15-20 GB.[35]

Finally, with regards to the Electromagnetic Fields levels policy, COMCOM has studied the effects of mobile phone electromagnetic radiation in the past. The research aimed to advise the public about the harmful effects and permissible norms of mobile phone electromagnetic radiation, as well as to inform the population about measures to protect against electromagnetic radiation.[36]

2.1.6 Increasing Infrastructure reliability through cybersecurity

According to the 2020 ITU Global Cybersecurity Index, Georgia ranks 30th in the Europe region and 55th globally. This index is a trusted reference that measures the commitment of countries to cybersecurity at a global level – to raise awareness of the importance and different dimensions of the issue and assess countries' ICT sector resilience and reliability. It highlighted the legal measures as the country strength area as well as cooperative measures and capacity development as an area of potential growth.[37]

The country is paying increasingly more attention to strengthening cybersecurity and is a member of the Budapest Convention on cybercrime[38]. Among the triggers for Georgia's immense efforts is the fact that the country has repeatedly become the subject of cyberespionage and full-scale cyber-attacks.

Since 2008, when the first large scale attacks on the government ICT infrastructure occurred[39], Georgia developed the roadmap and framework for its Cyber Security Strategy. In 2011, the Computer Emergency Response Team (CERT.GOV.GE) was set up to manage incidents against information security in the cyberspace of Georgia. Later in 2012, the Law of Georgia on Information Security entered into force. Since then, no other national cybersecurity laws have been approved.

According to the Law on Information Security, the minimum requirements for Information Security have been defined at the national level based on ISO/IEC 27001, and approved by the Order of the Chairman of LEPL Data Exchange Agency. These requirements are mandatory for the critical information

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[34] 5G Implementation in non-EU countries of the Europe Region, pp.60-62

[35] https://cbw.ge/business/magticom-launches-5g-technology-in-testing-regime

[36] 5G Implementation in non-EU countries of the Europe Region, p.61

[37] ITU Global Cybersecurity Index (GCI) 2020, pp. 26, 30, 112.

[38] https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/185?module=signatures-by-treaty&treatynum=185

[39] https://www.nytimes.com/2008/08/13/technology/13cyber.html?fbclid=IwAR2srrH7CfQez2ZR9j9ns5MWm-eCkyBtzwLnlTFYaUW1Vj2oR1wd2uvEdBs

infrastructure operators, the list of which was approved in 2014, and covers 39 organizations. The list of critical information system subjects in the field of defence was approved separately. [40]

The first National Cybersecurity Strategy of Georgia and its Action Plan 2012-2015 was followed by a second Action plan for 2017-2018. The strategy relied on 5 directions defining the cybersecurity policy and responsible state agencies. Those core pillars covered: research and analysis, improving the legislative framework regarding cybersecurity issues, institutional coordination between governmental bodies to ensure the proper functioning of cybersecurity infrastructure, public awareness, and international cooperation in the cybersecurity field.[41]

In line with the current legal framework and the National Strategy on Georgian Cybersecurity, information security system coordination and regulation management fall under the responsibilities of the Digital Governance Agency. The agency represents the authority in charge of both regulating and overseeing the implementation of the policy. Also, the Computer Emergency Response Team functions under the subordination of the Digital Governance Agency. Other than that, the Cyber Security Bureau coordinates the introduction and protection of the minimum standards of information security in the defence field.[42]

Additionally, Georgia has built up cyber capacity in-house through on-the-job training and training of teacher measures. Technical teams participate in international competitions with other CERT representatives, often successfully. In addition, the Georgian technical community provides trainings to other country stakeholders and counterparts. Country representatives participate as invited experts and trainers of some international training in information and cybersecurity.[43]

Yet, these developments resulted in unexpected changes in terms of the country positioning in the global rankings with the country passing from 8th position in the 2017 ITU Global Cybersecurity Index,[44] to 18th in the 2018 ITU Global Cybersecurity Index[45] and now to 55th.[46] This might not be due to decreased performance but to the fact that other countries have been catching up and leapfrogging in this field.

In order to improve the situation, several challenges need to be addressed including: insufficient funding, insufficient commitments of national authorities to cybersecurity matters, lack of awareness, and lack of

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[40] https://idfi.ge/public/upload/GG/CyberN333.pdf?fbclid=IwAR0d8q8H-d-9L-Lp94zCP4rMFFZOZLl1GihD83MX2I6bJu1rwlXupW6pH1o, pp. 9-10

[41] https://www.researchgate.net/publication/338801857_Cybersecurity_in_the_Making_-_Policy_and_Law_a_Case_Study_of_Georgia, pp. 165-168

[42] Cybersecurity Reform in Georgia: Existing Challenges, International Practice and Recommendations, 2020, p.10, retrieved from https://idfi.ge/public/upload/GG/CyberN333.pdf?fbclid=IwAR0d8q8H-d-9L-Lp94zCP4rMFFZOZLl1GihD83MX2I6bJu1rwlXupW6pH1o

[43] ITU Global Cybersecurity Index (GCI) 2018, p.46, retrieved from: https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2018-PDF-E.pdf,

[44] ITU Global Cybersecurity Index (GCI) 2017, p.56, retrieved from: https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2017-R1-PDF-E.pdf

[45] ITU Global Cybersecurity Index (GCI) 2018, p.60, retrieved from https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2018-PDF-E.pdf,

[46] ITU Global Cybersecurity Index (GCI) 2020, pp. 26, retrieved from: https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2021-PDF-E.pdf

qualified personnel and resources. This might be achieved through strengthening of the law on information security, harmonizing the legislation with the NIS Directive, enhancing international cooperation and development of legislation related to critical information infrastructure.[47]

2.2 Building Block 2 – People - centric digital transformation

Addressing more in-depth the usage of ICTs by people and various groups of society allows a more comprehensive framing of the digital divide and identification of gaps that may require policy intervention to ensure that access to digital services is truly for all. This requires examining various dimensions of digital inclusion, including (i) digital skills development, (ii) gender issues, (iii) ICT accessibility for persons with disabilities, and (iv) child online protection.

2.2.1 Digital skills development

The 2019 Caucasus Barometer pointed out that 47% of the Georgian population did not have the basic knowledge to use computers. However, the lack of digital literacy does not prevent the population from using social media mainly by phones. 95% of respondents' fell under this category, while only 14% were using the Internet to look for jobs and 17% were able to install software other than gaming applications.[48]

The country's educational framework for ICT studies was finetuned in 2018, when the Georgian Ministry of Education announced a comprehensive reform of general education with the goal of introducing digital education to all public schools in the country. The main objective of the program included: I) implementing more diverse digital initiatives in public schools; II) guaranteeing continued, high-quality education to all students; and III) boosting student creativity by making learning fun, exciting, and engaging.[49]

Currently, there is a small number of stand-out university programs, but the volume of ICT graduates is not yet close to market needs. Apart from universities, private organizations offer subsidized courses in web and mobile applications. Yet, there is a high degree of mismatch between qualifications and skills directly pertaining to innovation, with an excess supply of higher or overqualification. There appears to be weak coordination between qualifications required of the workforce and qualifications provided by the educational system. Although there have been valiant efforts to introduce entrepreneurship programs in universities, a clear skills gap exists in terms of competent business professionals and skilled engineers.

Investment in science, technology, engineering and mathematics (STEM) education at all levels is essential to encourage interest in entrepreneurship and technology to grow the ecosystem long-term. A humanitarian aid program in rural Georgia has helped introduce children to STEM by running science camps and providing starter robot kits to strengthen their basic understanding of coding and machine learning. Many STEM education opportunities for young people are through informal education rather

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[47] https://eufordigital.eu/wp-content/uploads/2020/10/Cybersecurity-guidelines-for-the-Eastern-Partner-countries.pdf?fbclid=IwAR1My-uZHouAOXQYjczjtBOAgYe-RlArOie1QhzFBChonqDBW-mqy2-lERg , p.4

[48] https://eufordigital.eu/wp-content/uploads/2021/03/Digital-Literacy-in-times-of-the-Covid-19-in-the-Eastern-Partnership-Countries.pdf?fbclid=IwAR2kFS_wx3JwEmJPD_x34kenMxbi1r8lUyohCznf12-qS3vlGST4mMFp_ug

[49] Connectivity in Education: Status and recent developments in 9 non-EU countries, p.46

than in schools. Grass root projects should be supported and encouraged to help raise the aspirations of Georgian youth and increase uptake in STEM subjects in higher education.[50]

Another rural development initiative "Teachers' Digital Skill Development Initiative" aimed to strengthen school teachers' skills, modernize and create a student-cantered learning environment with a particular focus on usage of digital education learning platforms in Akhmeta and Keda Municipalities. The project addresses the social and economic concerns of teachers, students and schools from two mountainous municipalities – Akhmeta and Keda by skills and capacity enhancement, network creation and digital education learning platforms promotion[51]

As digital skills are required in a wide variety of industries, nearly 300 students at 40 schools across the country benefited from The Film Corner – a program led by the Milan-based Fondazione Cineteca Italiana and supported by other European institutions. Adopted by the Georgian National Film Centre as a new format for its own Cinema in School project, the program teaches students aged between 13-19 techniques for production and completion of practical tasks.[52]

CyberLab is another useful online resource created by Computer Emergency Response Team (CERT.GOV.GE) that helps IT students from educational institutions interested in cybersecurity to deepen their practical skills, so they can better discover and then respond to cyber incidents. The portal also helps IT personnel from both the public and private sectors, where readiness is critically important to defend against attack, ensure cyber sustainability, and improve skills. Exercises available on the portal are diverse and cover: cryptography, malware code analyses of real incidents, log file analysis of cyber incidents that occurred on real servers, reverse engineering, network flaw analyses, cyber analytics etc.[53]

2.2.2 Bridging the gendered digital divide – Women and girls in the ICT and STEM sectors

Women's access to ICT

In terms of Internet use in the general population, the gender gap in Georgia is relatively small and among the lowest in the Western Balkan region.[54] In 2019, 67.8% of the female population was using the Internet, 2.3% lower than the men population. Looking into the Internet use by age cohorts, the percentage of users is highest among individuals aged 15-24 years (98.9%), followed by the age group of 25-74 years (69.7%).[55]

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[50] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.10

[51] https://www.usgodigital.com/eng

[52] https://agenda.ge/en/news/2020/1674?fbclid=IwAR3wY7IeA_Z37V4Nt2tKV6zHQpbV2zLTna1rm1r16NcqQxnqWEZ3Q1MzLQ0

[53] ITU Global Cybersecurity Index (GCI) 2018, p.41, retrieved from https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2018-PDF-E.pdf

[54] ITU-UN Women "Digitally Empowered Generation Equality : Women, Girls and ICT in the context of COVID 19 in selected Western Balkan and Eastern Europe Partnership countries" (2021), retrieved from:
https://www.itu.int/en/myitu/Publications/2021/05/31/10/16/Digitally-empowered-Generation-Equality

[55] ITU World Telecommunication/ICT Indicators database (2019), retrieved from https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx

According to ITU-UN Women "Digitally Empowered Generation Equality" Report, in Georgia, gender differences can be observed in the way men and women use the Internet. Women are far more interested in leisure pursuits, such as social networking and reading online news, while men use the Internet for more practical purposes, such as Internet banking or downloading software.

Figure 3 – Share of individuals using the Internet
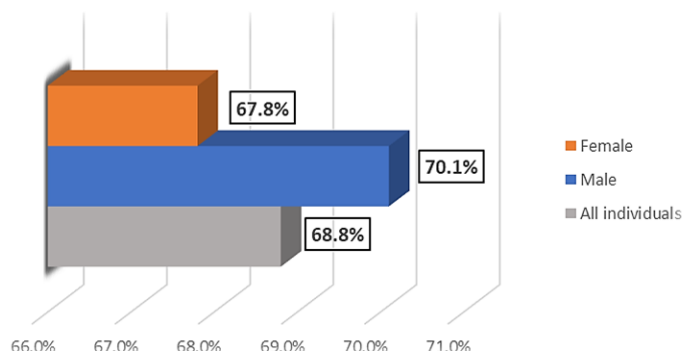
Women's participation and leadership in ICT

In general, 47% of employees are women, and 53% are men.[56] However, just 12% of women in Georgia are employed in careers related to science, technology and engineering.[57] In terms of ownership forms, the number of women who own a company lag behind men by 16%. In terms of the size of enterprises, men are also leading by 16%. As for the ICT sector, the wage gender gap is also evident between men and women, with women earning 74% of the average male salary. In 2018, the

Figure 4 – Share of men and women in the leadership positions
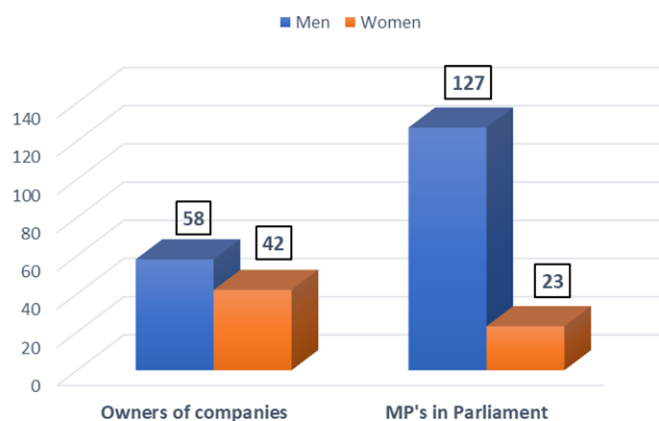

average salary for women was higher in the electricity, gas, steam and air conditioning sectors, but the remaining areas are still lagging behind. In 2018, there was also a significant difference in ownership of newly established enterprises, with only 29 female owners as opposed to 52 male owners.[58]

Even within female-dominated sectors, women rarely occupy executive, upper management or other decision-making positions and have fewer opportunities for promotion and career advancement. While the number of female parliamentarians has risen from 6.4% in 2008, it was still only 16% in 2017 (a mere 23 of the 150 parliamentary seats), far below the target of at least 30% outlined in the Beijing Platform for Action. Women are also underrepresented in local government. In the executive branches of the Government in Georgia, women account for only 15.4% of Sakrebulo (representative council) members.

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[56] ITU-UN Women "Digitally Empowered Generation Equality: Women, Girls and ICT in the context of COVID 19 in selected Western Balkan and Eastern Europe Partnership countries", p. 64.

[57] ITU-UN Women study, EU4Digital, 2020, "How women can change the field of innovation in Georgia",p.31, retrieved from: https://eufordigital .eu/how-women-can-change-the-field-of-innovation-in-georgia

[58] ITU-UN Women "Digitally Empowered Generation Equality: Women, Girls and ICT in the context of COVID 19 in selected Western Balkan and Eastern Europe Partnership countries", p. 64.

This figure has remained unchanged since the 2010 elections. In the local government elections held in October 2017, all elected mayors were male.[59] The recently launched ITU Network of Women seeks to address this gap and empower women to take on leadership roles in their respective organizations.[60]

Women in ICT education

Women are severely under-represented in ICT education. Only 14.5% of women studying computing graduate, compared with 70.5% of men. A similar imbalance is also evident in engineering, manufacturing and construction, with women representing only 16.1% of graduates. Women are primarily over-represented in the humanities and arts, seen as typically female professions.[61]

Figure 5 – Share of men and women graduating in ICT related fields
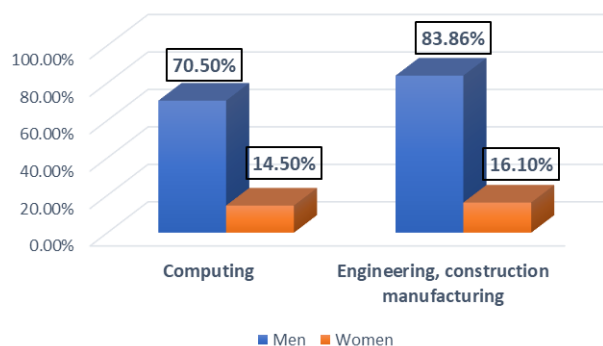
The Government of Georgia recognizes the need to reform and upgrade the education system and implements new models for this purpose. However, the Georgian Unified Strategy for Education and Science 2017-2021 does not acknowledge or address gendered digital divides.[62]

The general and widespread lack of access to education and training experienced by Georgian women has several ramifications for their use of ICTs. The high rate of illiteracy among Georgian women is the first obstacle to ICT use. Language issues are intensified for women, as they have less time, money, and access to learn English – the dominant language of ICTs – or translate existing information and training documents into French or local languages. Social influences on women's relationship to technology also affect women's attitudes toward ICTs.[63] One solution to help solve some of these issues was initiated by a local Georgian non-profit, Educare, which translates educational materials from sites such as Code.org and Khan Academy into local languages.[64] ITU's Girls in ICT initiative has also been tackling these issues for ten years. The European Celebration of the 10th Anniversary of Girls in ICTs, which was held in April 2021, aimed to raise awareness, share stories and encourage more girls and young women to actively pursue careers in science, technology, engineering, arts, and mathematics (STEAM) to bridge the gender

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[59] ITU-UN Women "Digitally Empowered Generation Equality: Women, Girls and ICT in the context of COVID 19 in selected Western Balkan and Eastern Europe Partnership countries", p. 64.

[60] https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC21/NoW/Pages/Events/Regional/Europe/2021_01.aspx

[61] ITU-UN Women "Digitally Empowered Generation Equality: Women, Girls and ICT in the context of COVID 19 in selected Western Balkan and Eastern Europe Partnership countries", p. 65.

[62] ITU-UN Women "Digitally Empowered Generation Equality: Women, Girls and ICT in the context of COVID 19 in selected Western Balkan and Eastern Europe Partnership countries", p. 17.

[63] ITU-UN Women "Digitally Empowered Generation Equality: Women, Girls and ICT in the context of COVID 19 in selected Western Balkan and Eastern Europe Partnership countries", p. 65.

[64] ITU-UN Women "Digitally Empowered Generation Equality: Women, Girls and ICT in the context of COVID 19 in selected Western Balkan and Eastern Europe Partnership countries", p. 14.

digital divide as well as engage the European community and promote collaboration through partnerships.[65]

Dark side of ICT and cyberviolence

During the past two decades and in the aftermath of the dissolution of the Soviet Union, Georgia has seen considerable progress in advancing the policy and legislative framework around gender equality and violence against women. In 1994, Georgia acceded to the Convention on the Elimination of All Forms of Discrimination against Women, ratified in 2017 the Istanbul Convention, and adopted a milestone legal framework aimed at harmonizing its domestic legislation with the conventions. In addition, Georgia endorsed the SDGs by nationalizing all 17 goals, including Goal 5 to achieve gender equality and empower all women and girls, including via the elimination of all forms of violence against all women and girls in public and private spheres.[66]

Despite all of it, the country currently faces a widespread experience of violence against women which also extends to the online world. Conversations with more than 20 female politicians from Georgia revealed that all of them had experienced cyberbullying and threats, which extended to their family members.[67] The rise of online violence is particularly worrisome in the context of COVID-19 albeit many important services, including assistance and support for gender-based violence, have moved online.[68]

To tackle some of the dark sides of ICTs, the UNESCO produced a guideline targeting cyberbullying and online harassment "Reporting on violence against women and girls: a handbook for journalists"[69] and launched together with ITU a comprehensive action-oriented study targeting hate speech and other aspects in "Balancing Act: Countering Digital Disinformation while respecting Freedom of Expression"[70]

Good practices to increase women participation in STEM careers

An upskilling program on coding, web development and social media marketing was shown to increase young women's economic security in Georgia. Working in conjunction with UN Women, Google's Women Techmakers Program, FabLab (a digital training centre) and Georgian universities, the program matched young women aged 18-35 years with IT instructors. The women received training, followed by paid and unpaid internships in leading Georgian companies. While approximately 45 % of beneficiaries did not have a stable income at the start of the program, at the end of it, a number were offered jobs with their

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[65] https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/Events/2021/GInICT/Default.aspx

[66] ITU-UN Women "Digitally Empowered Generation Equality: Women, Girls and ICT in the context of COVID 19 in selected Western Balkan and Eastern Europe Partnership countries", p. 65.

[67] UN Women Georgia, 2020, "Debate begins about preventing violence against women in politics and elections", available at https://georgia.unwomen.org/en/news/stories/2020/03/debate-begins-about -preventing-violence-against-women-in-politics-and-elections

[68] Generation Equality, 2020, "Future of equality: She talks #1 report", available at https://www.wecf.org/wp -content/uploads/2020/10/09102020_SheTalksI-_Future-of-Equality_-Report.pdf

[69] UNESCO Handbook "Reporting on violence against women and girls: a handbook for journalists" available at https://unesdoc.unesco.org/ark:/48223/pf0000371524

[70] ITU-UNESCO "Balancing Act: Countering Digital Disinformation while respecting Freedom of Expression" available at https://en.unesco.org/publications/balanceact

employers, some became freelancers collaborating with the employers, and others continued their internships with the same or different companies with the potential of later employment. Overall, 42% of participants have seen their income increase while taking part in the program, and 63% of participants found new employment through their involvement in the project. One trainee who owned her own business reported that her income had tripled since learning how to conduct social media campaigns.[71]

Women are active but remain under-represented in the ecosystem. GITA data shows between 2018-2020, among the Matching Grants Program 95 winners, there were 33 female founders/co-founders. The ecosystem is trying to address this issue. Enterprise Georgia prioritizes women in their programs and the Bank of Georgia received a long-term local currency loan of GEL 100 million Georgian (approx. EUR 26.8 million) from the World Bank to help boost access to finance for small businesses and women entrepreneurs.[72]

For the first time in Georgia, with additional funding provided by the European Bank for Reconstruction and Development (EBRD), Bank of Georgia offers women a new program "Women Startup", which will help women realize their business idea or expand an existing one. GEL 25 million (approx. EUR 6,7 million)[73] has been allocated within the program's scope for the successful realization of women's businesses in Georgia.[74]

Another notable good practice is the close interlinkages between industries and higher education institutions. Georgian Business and Technology University maintains close ties and cooperation with local technology companies. Representatives from local and international companies sit on the university board, and industry needs inform the IT curriculum. In this way, the university ensures that students gain the practical skills needed for a seamless transition into their professional careers.[75]

2.2.3 Digital inclusion and ICT accessibility for persons with disabilities

Georgia ratified the Convention on the Rights of Persons with Disabilities (UN CRPD) in March 2014[76] and its Optional Protocol in April 2021[77]. The UNCRPD stipulates (Article 9 - Accessibility) that countries should ensure equal access of persons with disabilities to the physical environment, transportation, information and communications (ICTs), including information and communications technologies and systems. In July 2018, the Committee on the Rights of Persons with Disabilities received the Initial state party report

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[71] ITU-UN Women "Digitally Empowered Generation Equality: Women, Girls and ICT in the context of COVID 19 in selected Western Balkan and Eastern Europe Partnership countries", p. 45.

[72] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.13

[73] The National Bank of Georgia, exchange rate on 06.07.2021 of EUR 3.7289, retrieved from https://www.nbg.gov.ge/index.php?m=2&lng=eng

[74] ITU 2021. GEORGIA: ICT-CENTRIC INNOVATION ECOSYSTEM SNAPSHOT AND RECOMMENDATIONS FOR ACCELERATING DIGITAL TRANSFORMATION, p.18

[75] ITU-UN Women "Digitally Empowered Generation Equality: Women, Girls and ICT in the context of COVID 19 in selected Western Balkan and Eastern Europe Partnership countries", p. 24.

[76] ITU report on "ICT accessibility assessment for the Europe region", p.70,72, retrieved from https://www.itu.int/en/publications/ITU-D/Pages/publications.aspx?parent=D-PHCB-ICT_ACCESS_EUR.01-2021&media=paper

[77] https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=IV-15-a&chapter=4&clang=_en

submitted by the Government of Georgia. The Committee has yet published its concluding observations of the situation in Georgia.

Since the ratification of the UN CRPD, Georgia has made several efforts in harmonizing its national legislation with the UN CRPD and its Optional Protocol, such as the adoption of the Law on the Elimination of All Forms of Discrimination, change of definition of persons with disabilities on the Law on Social Protection of Persons with Disabilities and the Law on Medical and Social Expertise. Despite these changes, the legislation still contains terms that are incompatible with the principles of the Convention and are based on the medical perception of disability.[78] Moreover, the main principles of the CRPD (for example, formal notions for Universal Design, Reasonable Accommodation and Accessibility) have yet incorporated into the Georgian legislation.[79] As a result, one of the most critical national strategies in improving the lives of persons with disabilities, e.g., the National Strategy for the Protection of Human Rights in Georgia 2014-2020, still focuses on harmonizing the national legislative framework with the principle of the CRPD.

Disability inclusion policies and initiatives in Georgia are still focused on accessibility in the physical or built environment, and only a few policies touch upon accessibility in the information, communication, and technology (ICT) area.[80] In March 2015, LEPL 112 -the emergency assistance system in Georgia, activated text messaging and video call service designated for persons with hearing and visual impairments where messages from persons with hearing and visual impairments are received by operators trained in sign language. The Law of Georgia (Article 16) on Broadcasting stipulates that public broadcaster shall take into account the interests of persons with disabilities and provide sign language interpretation in their programs related to elections and/or referenda and/or plebiscites. However, this requirement does not extend to private broadcasters and other types of broadcasting programs.[81]

Despite these positive changes, it is still challenging to create conditions necessary for persons with disabilities to access information, means of communication and various services, which also need detailed regulation at the legislative level.[82] Accessibility of public services is still narrowly defined by having remote access to government services, and the initiative is still agency-specific rather than broadly implemented across public administration bodies.[83] Legislative and implementation frameworks in the following aspects could benefit from further improvement in Georgia: laws or regulations defining

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[78] Initial state party report submitted by the Government of Georgia (2018), available online at https://tbInternet.ohchr.org/_layouts/15/treatybodyexternal/Download.aspx?symbolno=CRPD%2fC%2fGEO%2f1&Lang=en.

[79] Universal Periodic Review (UPR) Mid-term Review Report on Georgia's UPR Second Cycle by the Coalition for Equality (2018), accessed online at https://osgf.ge/wp-content/uploads/2018/07/UPR.pdf

[80] See Initial state party report submitted by the Government of Georgia (2018), p. 8-11 & p. 27-28, available at https://tbInternet.ohchr.org/_layouts/15/treatybodyexternal/Download.aspx?symbolno=CRPD%2fC%2fGEO%2f1&Lang=en

[81] According to EU-Georgia Association Agreement, Georgia undertook a responsibility to reflect the provisions of the Directive of the European Parliament and the European Council on the Provision of Audio-Visual Media Services in the legislation of Georgia, which encourage the provider of audio-visual media services to gradually make their services accessible for persons with disabilities.

[82] Report of the Public Defender of Georgia on the Situation of Protection of Human Rights and Freedoms in Georgia 2019, available at https://ombudsman.ge/res/docs/2020070407523954521.pdf

[83] See Initial state party report submitted by the Government of Georgia (2018), p. 8-11 & p. 27-28, available at https://tbInternet.ohchr.org/_layouts/15/treatybodyexternal/Download.aspx?symbolno=CRPD%2fC%2fGEO%2f1&Lang=en

accessibility requirements for ICT products, digital services, public websites, and other essential services; laws or regulations defining functional accessibility requirements for public procurement of ICT products and services; facilitate and promote the engagement and participation of persons with disabilities; promote the adoption of ICT accessibility in education, including role-based ICT accessibility training courses for education institution staffs; and establish financial schemes to support the provision of accessible information and communications, as well as of ICT products and services, for persons with disabilities.

In this context, UNESCO promotes the adoption of ICT accessibility in education through "Learning for All: Guidelines on the Inclusion of Learners with Disabilities in Open and Distance Learning"[84] Besides, in June 2021, together with UNPRPD, they organized a webinar on "Ensuring Inclusion of Learners with Disabilities in Open and Distance Learning"[85] targeting Central Asia and the Caucasus region. Through their efforts, they aim at recognizing the value of open and distance learning as one of the most sustainable methods of overcoming the educational barriers faced by people with disabilities.

ITU is also strongly committed to advancing digital accessibility. Accessibility is not only embedded in the Union's strategic goals and targets but, in 2018, ITU Member States affirmed that enabling environments ensuring accessible ICTs for persons with disabilities should be established in all countries by 2023.[86] The ITU Office for Europe actively collaborates with partner organizations to foster enabling environments, ensuring accessible ICTs for persons with disabilities and inclusive digital society in the region. The efforts to promote ICTs accessibility consist of the following tracks:

- Annual ITU-EC Forum on Accessible Europe: ICT for All;
- Regional Competition: Innovative Digital Solutions for Accessible Europe;
- ICT Accessibility Assessment for Europe Region;
- Technical Assessment in Enhancing ICTs Accessibility at a country level - Example of Serbia;
- Capacity building in ICT Accessibility.

2.2.4 Building trust and confidence in the use of ICTs for children and youth

Georgia ratified the Council of Europe Convention on Protection of Children against Sexual Exploitation and Sexual Abuse ("the Lanzarote Convention") in September 2014, and is a member of WePROTECT Global Alliance.

Georgia benefited from the ITU support on strengthening the national child online protection ecosystem, through the research and survey conducted by (SWGfL) from September to December 2018. The results highlighted the main challenges the country is facing including:

- Low public awareness of online risks, harms, and global online threats;

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[84] UNESCO "Learning for All: Guidelines on the Inclusion of Learners with Disabilities in Open and Distance Learning", available at https://unesdoc.unesco.org/ark:/48223/pf0000244355
[85] http://en.unesco.kz/webinar-on-ensuring-inclusion-of-learners-with-disabilities-in-open-and-distance-learning
[86] ITU Strategic Goal 2 – Inclusiveness, Target 2.9.

- Little support to teachers and professionals dealing with child online safety issues;
- Online bullying and lack of common understanding of this issue;
- Few actions to prevent access to illegal child abuse content online.

Schools are in the frontline struggling to keep up with child protection issues. Teachers in Georgia have a wide variety of responsibilities and need support and guidance to cover child online protection issues. Even though school Internet connectivity appears to be filtered and blocks access to specific undesired content, the provision of child online protection in schools across the country could be improved.

Besides, there is no common understanding of what constitutes suitable and effective online child protection provision for schools. Whilst there are many child online protection tools and resources produced across the world, there is a significant need for these to be adapted and translated for use in Georgia.

Specialists and professionals need proper levels of support to understand and recognize the first signs of online threats or consequences they might have on children. Teachers are often best placed to be the voice of advice for children and need to have regular training so they can continue to stay prepared for new threats and trends. As online bullying seems to be a significant challenge in Georgia, unfortunately, there does not seem to be a common understanding or a coherent response to online bullying as well.

Legislation with regards to online bullying is weak, although there is work already underway to introduce new laws covering harassment. According to the European Union General Data Protection Regulation 2016/679 (GDPR), children merit specific protection with regard to their personal data, as they may be less aware of the risks, consequences and safeguards and their rights in relation to the processing of personal data. Article 8 of the GDPR concerning the conditions applicable to child consent in relation to information society services is highly relevant to the situation in Georgia. Further alignment with the GDPR is anticipated in the future.

To alleviate these challenges, Georgia is implementing constructive activities in the area of child online protection however they lack coherence and coordination. There is strong support from 16 stakeholders to participate and collaborate in the field of child online protection. These include government authorities, non-governmental organizations, and industry/private sector representatives.[87]

To improve the situation with the low public awareness of online threats, the awareness raising initiative "Safer Internet Day" is organized on the yearly basis by Internet Society – Georgia Chapter (ISOC – Georgia).[88]

On the legislative side, the authorities issued a new code of children's rights that has come into force on September 1, 2020. It aims to protect, develop and improve the lives of children in Georgia by introducing critical aspects regarding child online protection as:

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[87] Status of national child online protection ecosystems in South Eastern Europe, pp.30-31
[88] https://isoc.ge/saferInternetday/

- Parents have the opportunity to appeal to Internet service providers to restrict access to websites that are dangerous for children;
- Websites that display movies, animated films, TV series, and games are required to show special age markings for programs that are inappropriate for minors under 18, 15, 12 and 7;
- TV companies are obliged not to broadcast inappropriate programs for minors under 18 from 6 pm to midnight, for minors under 15 from 6 pm to 11 pm; 6 pm to 9 pm for a minor under 12 years.[89]

To advance on compliance with ITU child online protection guidelines, several recommendations were developed:

- Children guidelines: Education about digital literacy, fake news and media literacy should be incorporated more into awareness-raising and educational activities.
- Parents and educator guidelines: Low public awareness of online risks and harms with an apparent need for further raising the public awareness and increasing the level of education of the online harms and dangers as well as the benefits and opportunities.
- Industry guidelines: industry representatives' activities and a stronger involvement should be encouraged and coordinated. A centralized national Safer Internet Centre could be the solution to this. A gap is presented in telecommunication and mobile operator understanding of blocking, filtering and parental controls. International case studies, cooperation and education should be encouraged on this topic.
- Policy-maker guidelines: There is obvious governmental support to the field of child online protection in Georgia, and the interest from various stakeholders seems to create a great starting point for all of the stakeholders to be actively involved in creating a safer Internet for children in Georgia. Some information is lacking around the availability of illegal child abuse content in Georgia and this topic needs to be thoroughly researched, understood and actions need to be taken that access is prevented to such content.[90]

Through its COP Guidelines, ITU is supporting countries in Europe and beyond to adopt a strategic and holistic approach to child online protection that brings all components together at the country level, as well as to provide expert guidance on the various dimensions of COP, including for children, parents and educators, industry and policymakers.[91]

2.3   Building block 3 – Government - centric digital transformation

One of the most important triggers of the digital transformation at the national level is the government's approach to ICTs for governance and administrative purposes, as well as the delivery of public services online.

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[89] https://agenda.ge/en/news/2020/2690?fbclid=IwAR2L-yUHPRIv2vruHzxAc-Dm6mZDWzLdMqJOFtA9kgIllcTa4E8mY1H65sg

[90] Status of national child online protection ecosystems in South Eastern Europe, p.32

[91] https://www.itu-cop-guidelines.com/

This section will look at (i) the general approach to e-government in Georgia and (ii) an example of the specific approach used with regards to the use of ICTs in the education system from an administrative and service delivery perspective.

2.3.1 E-government policy

According to the 2020 UN E-Government Survey results, Georgia is losing the opportunity to become a leader in the region in terms of e-government development. E-Government Development Index ranked Georgia 65th out of 193 countries with a score of 0.72. Compared to 2018 results, the country has dropped by 5 positions in this ranking, improving its score by 0.03 points in 2020. E-Participation Index ranks the country 80th out of 193 countries with a score of 0.64. The country improved its performance by 0.02 points and its position in the ranking by 7 places compared to 2018. Even though the country's scores on two dimensions measured by the survey have slightly improved, other countries show a higher development rate and Georgia falls behind the average scores of other European countries.[92][93]

Yet, Georgia made substantial work by implementing a broad range of reforms aimed at increasing the efficiency of the public sector and improving institutional frameworks.

"Georgia 2020" development strategy, adopted in 2014, aimed at the development of electronic services and expansion of e-governance system, improving access to public services, as well as reducing the potential amount of time spent during administrative procedures. Georgia's overall national strategy "Government Program 2021-2024, Toward Building a European State" focuses primarily on enhancing the effectiveness of public governance by digitalizing public institutions' internal processes, as well as upgrading the remote services, making the outcomes tangible for every citizen.

"A Digital Georgia: e-Georgia Strategy and Action Plan 2014-2018" framework establishes the vision for the e-Georgia strategy. It sought to raise efficiency and effectiveness through integrated, secure and high-quality digital services offered by the public sector. This translates into 11 thematic priorities grouped in six mission statements covering: Service Areas, Future Excellence, ICT Enablers, Frameworks and Governance, and Awareness. A new digital strategy (2021-2024) is currently being developed and is expected to be based on three focus areas: (i) front-end service delivery, (ii) back-end service production, and (iii) enabling capacities and capabilities.

The implementation of the e-Georgia Strategy (2014-2018) was accompanied by the public administration reform and the public sector transformation to accommodate the development process needs. In such a way, in 2020, the Legal Entity of Public Law (LEPL) Digital Governance Agency (DGA) of the Ministry of Justice was created to lead the development of Digital Georgia. It emerged from the consolidation of two

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[92] https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2020-Survey/2020%20UN%20E-Government%20Survey%20(Full%20Report).pdf

[93] https://idfi.ge/en/e-governance-e-participation-georgia-index-2020?fbclid=IwAR2AHIsAbnITNBYxlynZKe4U-_Ja5QiNTWguhTHUguF3YUlAfiruM9nJO2A

institutions within the Ministry of Justice and undertook the functions of both the Data Exchange Agency and Smartlogic.[94]

Besides, the country has a comprehensive legal framework supporting e-government transformation which includes: the Personal Data Protection Law adopted in 2011, the Law on Electronic Document and Digital Signature adopted in 2008 and updated in 2017 with a new title "Electronic Document and Electronic Trusted Services", the Law on Unified State Registry of Information issued in 2011, the General Administrative Code, etc.[95]

Currently, 22 Public Service Halls, 61 Community Centres and 71 Express Community Centres, act as a one-stop-shop network for delivering up to 800 services to citizens. This network is considered to be user-friendly and highly efficient. For example, Public Service Halls have three main service areas: Self-Service Area (automated for enabling self-service), Prompt Service Area (for services requiring less than 5 min.), and Prolonged Service Area (for services requiring more than 5 min.). Moreover, the customer flow is regulated by an integrated electronic queue management system, and navigation banners simplify orientation and movement inside the building, and there is on-site personal support if needed.[96]

In 2012, a unified digital services portal "My.gov.ge" was launched and currently features about 700 digital services designed for both citizens and businesses. The portal allows citizens to get a fully digitized public service from applying and paying for the service, to the point of receiving an official electronic document signed with an electronic signature. However, only about 2,000 users access the portal daily compared to 20,000 people served daily in the Public Halls. The demand for digital services is low, even taking into account that it registered an increase of up to 40% compared to last year. As a result, less than 10% of Georgian citizens are using governmental digital services and less than 2% using digital signature. An important fact to be mentioned in this context is that every citizen has an electronic identity card which includes both a certificate of identification and a certificate of digital signature.[97]

Among the drawbacks is also the fact that most digital services are not adapted to the needs of people with disabilities. Additionally, despite the existing of Georgian Government Gateway (3G), an interoperability platform operational since 2011, the Ministries, Departments and Agencies (MDAs) are not mandated to integrate their services in a single portal. The platform is supporting data sharing across public sector MDAs and with the private sector, but it has not been officially adopted by the Government until now. With this level of misalignment, several more portals are being developed by MDAs in parallel to the unified one such as the taxpayer portal and a system for electronic declaration, used by more than 97% of taxpayers, and the public procurement portal which serves 100% of governmental tenders.

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[94] World Bank. 2021. A Whole of Government Approach as a Key Foundation for the Digital Economy in Georgia. © World Bank, pp.7-8

[95] World Bank. 2021. A Whole of Government Approach as a Key Foundation for the Digital Economy in Georgia. © World Bank, p.18

[96] World Bank. 2021. A Whole of Government Approach as a Key Foundation for the Digital Economy in Georgia. © World Bank, pp.9-10

[97] World Bank. 2021. A Whole of Government Approach as a Key Foundation for the Digital Economy in Georgia. © World Bank p.10

Besides, this created conditions for the existence of five different document management systems developed by five different government IT offices, three different HR systems and three different cloud infrastructures.[98]

When it comes to the crosscutting systems, key electronic systems designed and implemented throughout the public sector are: Treasury – e-State Treasury Electronic Service System, e-Budget - electronic budget management system, e-DMS - Government Debt and Investment Project Management System, TAX – tax and customs administration system, and e-Public Procurement System and e-HRMS - Electronic Human Resource Management System. An online digital learning platform for civil servants, and a government-wide Monitoring & Evaluation platform for policy-makers are under development among others.[99]

Also, as an active member of the Open Government Partnership, the country aims to implement its national commitments. So, the Government decree mandates public institutions to publish open data on the specially designed portal "data.gov.ge" which is operated by DGA. Yet, the implementation is uneven and the portal has only published 173 datasets.[100]

In terms of the adoption of disruptive technologies, some MDAs use business intelligence solutions for data analytics systems such as blockchain technology by the Public Registry for property registration. Georgia introduced smart contracts in real estate registrations, in order to enhance transparency and efficiency, and to reduce costs. It is therefore now possible to register land titles in Bitcoin blockchain, making Georgia one of the first countries to use this technology to complete property-related government transactions. [101]

Furthermore, there is a growing interest in the use of Artificial Intelligence (AI), Machine Learning or Big Data building on the existing experiences. For example, the Revenue Service is particularly interested in exploring the possibility of incorporating AI tools for tax and customs administration.[102]

As a response to the COVID 19 pandemic, were developed new electronic services on e-platforms like "Plan for the Future"[103] platform helping businesses in obtaining permission to operate as COVID safe space, and "Vaccination registration portal"[104] allowing citizens to register for COVID 19 vaccinations. Yet the demand for the new services was exponentially growing from both citizens and businesses side.[105]

All of it led to huge amounts of personal data getting into the digital space and made the protection of citizens' privacy an important issue in Georgia. Nevertheless, since 2013, when the Office of the Personal Data Protection Inspector was established, the country was taking active measures to improve the legal environment and introduce international best practices. Currently, the State Inspector's Service is an

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[98] World Bank. 2021. A Whole of Government Approach as a Key Foundation for the Digital Economy in Georgia, pp.11, 14

[99] World Bank. 2021. A Whole of Government Approach as a Key Foundation for the Digital Economy in Georgia, p. 12

[100] World Bank. 2021. A Whole of Government Approach as a Key Foundation for the Digital Economy in Georgia, p. 17

[101] ITU and FAO. 2020. Status of Digital Agriculture in 18 countries of Europe and Central Asia, p.24

[102] World Bank. 2021. A Whole of Government Approach as a Key Foundation for the Digital Economy in Georgia, p. 24

[103] https://labour.moh.gov.ge

[104] https://booking.moh.gov.ge

[105] World Bank. 2021. A Whole of Government Approach as a Key Foundation for the Digital Economy in Georgia, p. 10

independent state authority that, as a legal successor of the Office of the Personal Data Protection Inspector, is monitoring lawfulness of personal data processing, the covert investigative actions and activities performed within the central databank of electronic communications identification data, and conducts impartial investigations of crimes committed against human rights and freedoms.[106]

As for data protection regulation, the new Law on Personal Data Protection will, once in force, align Georgia with EU standards for data protection. Also, the position of Personal Data Protection Officer will be created in private and public institutions under a new law.

Moreover, a week-long campaign organized in January 2021 and supported by EU, UNDP, and OHCHR, engaged state agencies, civil society, schools and citizens. It covered a wide array of topics from processing health-related information and using social media to launching new educational programs in data protection. It included signing of an MoU between several Georgian universities and the State Inspector's Service to introduce new educational programs in data protection and create more opportunities in this field for Georgian students.[107]

2.3.2 ICTs and the education system

In the context of e-government, e-administration, e-delivery of government services, the education sector is a critical component of digital transformation in that it can be taken as an example of the status of modernization of digital public services delivery. Looking at the education sector from a perspective of the governance of the education system and the delivery of education, and beyond the actual content delivered (i.e. curricula including digital skills), proves that ICTs are playing an even more essential role.

The newly ITU-UNICEF report on "Connectivity in Education: Status and recent developments in 9 non-EU countries of Europe region" published in October 2021[108] looks at the two dimensions of ICTs for e-government of education and ICTs as a medium for delivering remote education, among other.

With a highly decentralized system, schools in Georgia operate with significant autonomy, allowing them to proceed with teacher hiring, adaptations to the national curriculum and management of financial resources from the government. However, even among schools with the same number of students, some schools receive up to three times as much funding as others.

According to data from the Ministry of Education, in the 2020-21 academic year, there are about 2,309 public and private schools in Georgia—including 2086 public and 223 private schools. These schools enroll about 609,095 students and employ about 62,699 teachers.

In terms of school mapping and data collection on the educational system, the national Education Management Information System (EMIS) collects data from all schools throughout the country, and the National Assessment and Examinations Centre (NAEC) is responsible for storing assessment data and conducting the examination of it for students and teachers. This configuration has limitations, as both

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[106] https://personaldata.ge/en/about-us?fbclid=IwAR0QBudOXyNIbFRWQ9od9Vq44hNNiGq7if_c-y3rf36HaTIDHuCDJY-hkvw

[107] https://agenda.ge/en/news/2021/236?fbclid=IwAR1dzzK_1tCM9BLPTGGs8PyHi4Jsvz555yHbV6V4BvC9-BXvvkd5Wq2WhhA

[108] https://www.itu.int/pub/D-PHCB-CONN_EDUC-2021

bodies mostly work with their own data and neither is responsible for the evaluation of the system as a whole. Moreover, accessing the information, particularly in an analytical manner, remains a challenge in the country.

Despite these limitations, Georgia's Ministry of Education, Science, Culture and Sport has a designated space on its website with a geographic illustration of ongoing infrastructure projects in the country, as well as a portal called "e-Catalog," which is an electronic catalogue of educational institutions containing complete information about general education public schools. This system allows the user to retrieve information about the infrastructure of the institution, the learning process, teaching, teachers and student achievements. The layers for the mapping of projects include: I) Educational Resource Centres; II) Newly built schools; III) Construction underway; IV) Tbilisi public schools; V) MCA-Georgia Millennium Program; and VI) Partially refurbished public schools. As of December 2020, this interactive map with information on school-related infrastructure has been visualized about 150,000 times.

According to OECD data, in 2015 Georgia had 0.3 computers per student which is almost half of the OECD average (0.77). In the context of COVID-19, a 2020 joint report between the UNICEF and ITU show that 15% of school-age children in Georgia do not have Internet connection in their homes. Furthermore, Georgia's EMIS shows that 20% of children in Georgia have access to neither computers nor the Internet, significantly limiting their attainment of their right to education. In addition to unequal access to ICTs and reliable connectivity, there is also a discrepancy in terms of geographic location. Rural areas are likely to be home for students with lower household income, which has a direct link to students' academic performance, as students in urban areas outperform those living in rural settings. As financial pressures mount for many families during the COVID-19 pandemic, these disparities are likely to worsen.

To tackle problems with connectivity and access to computers, the education foundation "Educare Georgia" and its donors from the private sector came to rescue people in need (Edu Care Georgia, 2020). The foundation established a platform "give Internet," which calls for everyone to donate Internet access to underprivileged high-school students. The platform was active prior to the outbreak of the COVID-19, yet the donations from the private sector and the general public have multiplied during the pandemic. As a result, the platform has delivered computers and provided Internet access to hundreds of students around the country.[109]

With 661,500 school-age children directly affected by school closures due to the COVID-19[110] on 21 March 2020, the Ministry of Education, Science, Culture and Sport of Georgia and the First Channel of Georgia launched a project called "Teleskola". The project's main goal was to provide educational content for students of all grades and in different subjects across the country's schools via TV, thus allowing students without access to the Internet to retrieve content for learning purposes. Lessons prepared in accordance with the National Curriculum were conducted by experienced teachers in various subjects, taking also into

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[109] https://eufordigital.eu/wp-content/uploads/2021/03/Digital-Literacy-in-times-of-the-Covid-19-in-the-Eastern-Partnership-Countries.pdf?fbclid=IwAR2kFS_wx3JwEmJPD_x34kenMxbi1r8lUyohCznf12-qS3vIGST4mMFp_ug, p.25-26

[110] https://www.unicef.org/georgia/press-releases/15-cent-georgias-school-age-children-have-no-internet-access-home-new-unicef-itu?fbclid=IwAR3DnXBru0nZVdFgXKdCDDseqT1TjLJPj-OQwERyH08DGXDwW3wW7jY0d5o

account the interests of ethnic minorities. The government announced that Teleskola will remain a long-term project and will continue even after overcoming the threat of coronavirus. Moreover, the Second Channel of Georgia will be gradually transformed into an educational platform called "First Channel—Education", which will translate and showcase the world's best educational programs in the future.

Other initiatives that were implemented in this regard with the support of UN agencies and international partners included:

- "iSchool" project was created with the goal of simplifying the teaching processes, providing support to the fundamentals in education, helping with the development of creative thinking, and increasing motivation among teachers and students. It aims to popularize the use of online learning and electronic materials so that anyone across Georgia can access the educational resources they need in one place. Students can download assignments and complete them independently, as well as get acquainted with the necessary materials. Teaching materials are also available for teachers.
- Partnership with Kant Academy and the UNICEF Georgia focused on improving adolescents' knowledge-base and transferrable skills, as well as promoting a healthy lifestyle. In addition, it covered more than 40 online events meant to help establish online networks among adolescents, online training for young people and support for peer-to-peer education.
- Partnership with the Estonian Embassy and UNICEF to launch a program to support educators (e.g., teachers and school administrators) with distance teaching at 100 schools throughout Georgia, including remote and mountainous areas.
- UNICEF, in partnership with the CSO Coalition Education for All and the Ministry of Education, is developing teaching and learning resources for effective distance/online learning. It has also been developing an education platform to support distance learning in Abkhazia.
- the Ministry of Education has created Microsoft Office 365 user profiles for about 600,000 students at Georgian public schools and up to 55,000 teachers and staff through the Education Information Management System (EMIS). A portal has been created that allows students and their parents to access students' data without the direct involvement of the school administration and teachers.
- UNICEF has also delivered entertainment and educational materials for kindergartens and a youth centre, as well as computers, projectors and network devices for schools in Pankisi Gorge.
- the Education for All Coalition, with the UNICEF support and in partnership with CK-12 Foundation, translated and adapted interactive online teaching and learning resources for students and teachers of Georgia. The adapted content and learning resources have also been made available on the Ministry's designated website called "Electronic Resources Portal.

2.3.3 E-waste management
According to the Regional E-waste Monitor CIS + Georgia[111], in Georgia, e-waste is legislated as a specific waste stream under the Waste Management Code of 2015. However, several bylaws are still to be enacted for the full implementation of the Code.

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[111] Regional E-waste Monitor CIS + Georgia, 2021, retrieved from: https://ewastemonitor.info/wp-content/uploads/2021/11/REM_2021_CISGEORGIA_WEB_final_nov_11_spreads.pdf

In addition to the Waste Management Code, other relevant legal instruments in the field of waste characterization, transport, and handling are as follows:

− Governmental Decree No. 145 of 26 March 2016 on Special Requirements for Collection and Treatment of Hazardous Waste.
− Law No. 4952 of 13 April 2016 on import, export, and transit of waste.
− Georgian Government Decree No. 159 of April 2016 on Rules for Collection and Treatment of Municipal Waste.
− Georgian Government Decree No. 426 of 2015 on Identification of Waste List and Classification of Waste According to Types and Characteristics of the Waste.
− Georgian Government Decree No. 421 of 11 August 2015 on Arrangement, Operation, Closure, and Post-care of Landfill.
− Law of Georgia No. 519 of 1996 on Environmental Protection.
− Resolution No. 326 of 25 May 2020 on the approval of the technical regulation on waste management of EEE.
− Resolution No. 324 of 25 May 2020 on Approval of Technical Regulation on Batteries and Battery Waste Management.

In line with the above-mentioned legal instruments, in 2020, an EPR system for e-waste was established and the Department of Environmental Supervision under the Ministry of Environmental Protection and Agriculture was made responsible for environmental enforcement and conducts environmental supervision with its central and regional offices throughout Georgia.

Moreover, the Georgian government adopted a National Strategy 2016 - 2030 and a National Action Plan 2016-2020, setting targets for the collection and recycling of e-waste. It aims to make the waste management industry fully self-sufficient by 2030, creating a system in which the population and private sector will fully cover the costs.

The country ratified the Basel, Rotterdam and Stockholm Conventions, as well as signed the Minamata Convention on Mercury in 2013, though the ratification of the Minimata Convention has not yet been finalised. Besides, it has committed to align the national legal framework on this issue with relevant EU Directives.

Figure 6 – EEE POM and e-waste generated in Georgia

Since the official e-waste statistics are not compiled at the national level, the UNU/UNITAR internal data served as a reference for the calculation of the major indicators for Georgia.

In such a way, the amount of EEE POM in Georgia increased from 8.3 kg/inh in 2010 to 11.8 kg/inh in 2019. During the past decade, the EEE POM in Georgia showed an overall
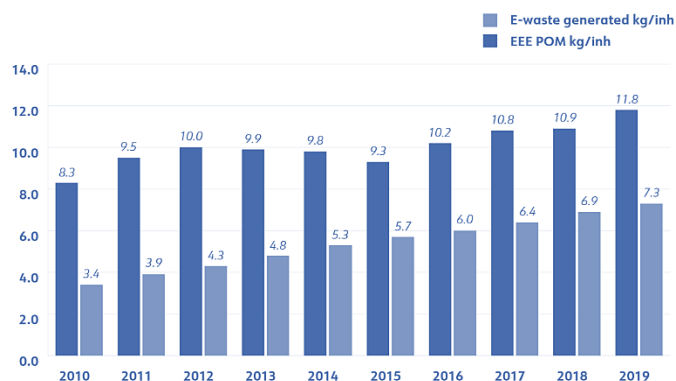
increasing trend, increasing from 8.3 kg/inh (31.5 kt) to 11.8 kg/inh (43.5 kt) in 2019. From 2013 to 2015 was registered the only insignificant decrease of EEE POM.

The largest share of EEE per category was represented by the temperature exchange equipment with 4.0 kg/inh, equivalent to 34 percent of the total EEE POM per inhabitant, and small equipment, with 3.6 kg/inh, equivalent to 30 percent of the total. At the same time, there are only a few EEE producers in Georgia, and just 1% of the EEE POM is assembled within the country.

The e-waste generated by the country increased more than twice since 2010 and reached 7.3 kg/inh (26.9 kt) in 2019. From this amount of e-waste, 9.3 kt was small equipment, 6.2 kt was temperature exchange equipment, 5.6 kt was large equipment, 3.6 kt was screens and monitors, 1.6 kt was small IT, and 0.4 kt was lamps.

Despite having a National Waste Management Strategy and an Action Plan that envisions both the adoption of waste prevention measures and the separate collection of recyclable wastes, the actual implementation remains a challenge. As a result, a large percentage of waste ends up in landfills, and e-waste is susceptible to the same end destination. To limit this outcome, the Georgian government is considering introducing a "landfill fee", which might reduce e-waste of little value that enters landfills.

Moreover, the country does not currently have e-waste treatment capacity related to the formal sector, though several informal actors are collecting and partially treating e-waste.

2.4   Building block 4 – Sector - centric digital transformation

Having addressed the digital transformation dimensions of infrastructure, people-centric and government-centric approaches, this section will utilize the critical lens of sector-centric digital transformation, analysing the specific sectors which are affected by, and which dually enable, increasing levels of digital transformation in Georgia.

This section will address (i) digital agriculture as a key productive sector in Georgia, (ii) Digital health and e-health services and (iii) the role of SMEs in fostering digital transformation.

2.4.1 Digital agriculture

According to 2018 data, only 34.13% of the country territory represent agricultural land[112], which is 23718 sq. Km[113]. Yet, the share of arable land is even smaller reaching about 4.5% of the country territory in 2018[114], and only about 35% of it is currently cultivated. [115]

According to the ITU and FAO joint report on Status of Digital Agriculture in 18 countries of Europe and Central Asia, Georgia is characterized by altitudinal zonation, a natural layering of ecosystems that occurs at distinct elevations as a result of varying environmental conditions. The country has only 39% of arable

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[112] https://tradingeconomics.com/georgia/agricultural-land-percent-of-land-area-wb-data.html
[113] https://tradingeconomics.com/georgia/agricultural-land-sq-km-wb-data.html
[114] https://tradingeconomics.com/georgia/arable-land-percent-of-land-area-wb-data.html
[115] ITU and FAO. 2020. Status of Digital Agriculture in 18 countries of Europe and Central Asia, p.22

land located at 500 m. above sea level, 29% at 500–1000 m. above sea level, 21 % at 1000–1500 m. above sea level and 11% at over 1500 m. above sea level.

Regardless of the geographical particularities and the difficulties related to it, the share of the agricultural sector in Georgia's GDP is about 7%, though it has been slowly decreasing in recent years. Agriculture still occupies about 45% of the country's labour force, and 98% of farmworkers are considered self-employed.

The current Strategy for the Agricultural Development of Georgia 2015–2020 emphasizes the creation of efficient market information collection, processing and dissemination services, to collect data from various stakeholders engaged in the agricultural sector. The strategy also highlights the use of modern technologies and innovative methods in practice and calls for an agricultural extension strategy (which was approved in 2017 and revised in 2019, with the support of FAO). The goal of the agricultural extension strategy is to improve the competitiveness of Georgia's agriculture sector by providing knowledge, information and support to farmers and transforming the current information and advisory system into a real needs-based extension service system. The revision of the extension strategy was approved at the end of 2019 (with the participation of EU and FAO representatives).

The new Strategy for Agriculture and Rural Development 2021–2027 was approved in 2019. It is supported by the EU, UNDP and FAO, and it includes the development of competitive agricultural and non-agricultural sectors, the sustainable use of natural resources, ecosystem conservation, climate change adaptation, food product and animal feed safety, and the development of veterinary and plant protection systems.

To support the agricultural sector, with the technical guidance of FAO and under the ENPARD Program, the Market Information System of the Ministry of Environmental Protection and Agriculture was developed in 2015. The Ministry took full control of it in 2016. The system references agricultural product prices for over 60 products which are collected weekly from 59 municipalities. The data are made available via the Ministry website.

The Ministry has also built the Data Warehouse, a comprehensive repository of the databases produced by it and its agencies constructed along the lines of the data portal created by the European Commission Joint Research Centre. The Data Warehouse is able to consolidate and analyse data from different databases, and to create semi-automated reports based on common parameters such as product and region. It is, therefore, a powerful tool for supporting advanced analytics, policy-making and reporting, and can also promote inter-agency coordination.

FAO/ENPARD has also provided support for the creation of an online repository of most of the extension materials produced by the Ministry and other partners (NGOs, donors). The materials (including not only texts, but also videos and other resources) are collected and undergo a technical revision before being uploaded to the online extension library (elibrary.mepa.gov.ge), where they can be filtered and downloaded.

Besides, they enabled the National Statistical Agency (GEOSTAT) to improve the current quarterly survey of agricultural holdings (Computer Assisted Personal Interviews). The data collection methodology was

launched in 2018 and a first survey, on aquaculture holdings, implemented. FAO has also provided support enabling the Ministry and GEOSTAT to produce agriculture-related SDG indicators.

Through its ENPARD program, the EU helps to modernize Georgian agriculture by supporting the roll-out of the agriculture cooperative model, providing 1 600 cooperatives with financial and technical support. It has also lent support for the establishment of 59 information and consultation centres around the country, at which over 250 000 farmers have been trained to date. One of the main functions of these centres is to provide capacity development for farmers by introducing them to modern technologies/innovations.

Besides, since 2016, the Georgia Zrda Activity funded by USAID, has supported three digital platforms focused on connecting smallholder farmers to the larger value chain by providing information, online input sales, and market match-making. The supported digital platforms were Kalo.ge, Traktor.ge, and Agronavti (gfa.org.ge). Each of them tackled the sector issues with its own revenue model and approach to sustainability. By providing critical developmental financing and support, local innovators and entrepreneurs were empowered to unleash their potential to return viable products that will transform the agricultural value chain.[116]

In 2021, a brand-new digital platform for farmers is to be launched with the support of the United Nations Development Program (UNDP) and the Swiss Agency for Development and Cooperation (SDC). It will offer easy access for farmers to online training and an electronic library, as it is packed with training courses and information materials prepared by the RDA, UNDP and the UN Food and Agriculture Organization (FAO). Currently, the platform is piloted in four regions and shall become fully operational by the end of the year.[117]

Moreover, in 2021, FAO completed the e-Agriculture Assessment in Georgia aimed to determine the level of farmers' digital skills, to contribute to the capacity building of the farmers in sharing the information with digital technologies, and ensure access to the database with relevant agriculture service providers among all relevant stakeholders. Lastly, as one of the outputs of the assessment, FAO will develop a publication of the best practices/cases in digital agriculture, demonstrating both the return of investment for the selected cases and the diversity of deployed technologies to enable further upscaling.[118]

2.4.2 Digital health

In the past decade, considerable policy strides have been made in Georgia to transform the healthcare system and the health services delivery. To rebuild its healthcare infrastructure, in 2014, the Government of Georgia approved the Georgian Health System State Concept 2014–2020 on universal health coverage.

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[116] https://chemonics.com/blog/supporting-healthy-digital-platform-competition-in-the-georgian-agriculture-market/
[117] https://www.ge.undp.org/content/georgia/en/home/presscenter/pressreleases/2021/vet-learning-farmers-digital-technology.html
[118] UN in Georgia Mapping Survey on Digital Cooperation

This led to a new model of collaboration in the provision of the health services and set the basis for further actions meant to provide affordable and qualitative healthcare for all citizens.[119]

The development of an overarching national Public Health Strategy was delayed due to the COVID-19 outbreak. However, significant progress was registered on the electronic healthcare system, improving the quality of care and reducing inequalities in the health system as well as on alignment of the national regulatory basis with the EU directives on blood safety, tissue transplantation, tracking of environmental health, and tobacco control.[120]

With emerging of new technologies and the urgent need to accelerate the absorption of them caused by the Covid-19 pandemic, Georgia recognized the need for a dedicated eHealth strategy but it hasn't approved one yet. However, the country has a defined eHealth architectural model formally approved.

Key eHealth governing bodies in this framework are the Ministry of IDPs, Labour, Health and Social Affairs of Georgia, Ministry of Justice, Office of the Personal Data Protection Inspector, National Centre for Disease Control and Public Health, Regulation Agency for Medical Activities, State Development Agency, Digital Governance Agency, Social Service Agency. Besides, the state enterprises and private sector players are also part of the eHealth model. Those include private companies that develop Hospital Management Systems, insurance companies, and pharmaceutical companies.[121]

Currently, the State of National patient portal is operational and includes information about social and health state services. It can be accessed via http://ehealth.moh.gov.ge/, and a mobile application is available for its access. Yet, a separate Patient Portal exists to access Electronic Health Records (EHR).[122]

The country has a separate Electronic Health Records regulation in place. As part of it, the regulations enabling Patient Summary services was adopted.

EHR implementation started in 2019 and is still ongoing. It offers a possibility for doctors to access the health records of their patients (with informed consent), and patients are enabled to electronically access their full health records and decide which information can be shared with their other doctors. EHR is mandatory for every patient facility which provides medical services within the framework of any governmental medical program.

In Georgia, national or private pharmacy information systems are integrated with eHealth information systems via ePrescription service. Its implementation started in 2018, but in 2020 it was used only in Tbilisi area. However, the system is planned to be implemented throughout the country. It offers doctors an easy way to prescribe drugs electronically and empower pharmacies with a tool to check prescriptions electronically and make sales with accuracy. In their turn, patients have the possibility to electronically

[119]https://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news+and+events/news/impact-stories/georgia-health-care-system-overcomes-growing-pains

[120] https://eeas.europa.eu/sites/default/files/2021_association_implementation_report_in_georgia.pdf

[121] https://eufordigital.eu/wp-content/uploads/2021/02/Analysis-of-the-current-state-of-eHealth-in-the-Eastern-partner-countries.pdf, p.14

[122] https://eufordigital.eu/wp-content/uploads/2021/02/Analysis-of-the-current-state-of-eHealth-in-the-Eastern-partner-countries.pdf, p.20

check prescribed drugs and control the validity of their prescriptions. At the same time, the Ministry obtains accurate statistics about drug consumption, especially antibiotics and information about sales of drugs.[123]

Moreover, the country also has a highly effective practice of combining an e-prescription platform with the Georgian postal services to deliver medicine to at-risk groups, a centralized COVID-19 monitoring system that is updated twice a day, as well as other solutions like contact tracing through mobile application use.[124]

Health care professionals are also actively engaging in the digital transformation of the sector in a variety of ways. An example of positive practice in this regard is the virtual clinic for real patients developed as "Project Atlas". A doctor that returned to his home country to help address the Covid-19 issues decided to replicate some of the teleworking solutions successfully employed in the United States. So, he created virtual clinics that could accommodate as many patients as necessary without absorbing hours of doctors' time. Through this Project by the end of December 2020, over 5000 COVID-19 patients had been "seen" by doctors. This was possible due to the cooperation with Georgia's National Centre for Disease Control (NCDC), which was providing a list of new COVID-19 patients every morning, who were then contacted by medical students and invited to join a virtual room. The small minority of patients without smartphones were contacted with traditional calls and still placed in one of the virtual rooms with a doctor.[125]

2.4.3 The role of SMEs

The Georgian private sector is dominated by services which provide 44.5% of jobs. This sector is boosted by the hotel, restaurant, transport, and telecommunications industries.

Deep reforms in economic management and governance have earned Georgia a reputation of "star reformer," scoring 7th out of 190 countries for Ease of Doing Business. The SME Development Strategy 2016-2020 has been adopted, improving legislation, institutional and regulatory frameworks, and the operational environment, widening access to finance, developing entrepreneurial skills, broadening internationalization, and supporting innovation activities. However, SMEs still face challenges in terms of funding for innovation and attracting and retaining digital talent.[126]

Tax incentives have enabled Georgia to attract a US technology company that will create 400 local jobs. Although viewed by some actors as positive for the ecosystem, start-ups and SMEs stated there is an issue in the discrepancy between tax regimes applied to foreign and local companies. This results in foreign IT

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[123] https://eufordigital.eu/wp-content/uploads/2021/06/Involvement-of-the-EaP-region-in-relevant-EU-projects-programmes-and-initiatives-notably-the-European-Innovation-Partnership-on-Active-and-Healthy-Ageing.pdf, pp. 35-36

[124] https://www.euneighbours.eu/en/east/stay-informed/news/ehealth-network-meeting-highlights-covid-19-data-collection-practices?fbclid=IwAR0jxi6eh0QakTSheRus3-R5MmKLttTLp24LNIkoArrahBoWj1U-BYXfK-w

[125] https://www.euro.who.int/en/countries/georgia/news/news/2021/2/empowerment-through-digital-health-virtual-rooms-of-real-patients-a-georgian-doctor-reimagines-his-countrys-health-care-system

[126] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.5

companies paying less tax, enabling them to offer better salaries and recruit the already scarce talent from local companies. The private sector viewed this as potentially harmful to the ecosystem.

Meanwhile, SMEs and start-ups struggle to find suitable ready-to-work technical talent, and larger organizations have had to invest in internal training programs to develop graduates. There is intense competition for qualified personnel, and headhunting is rife. In a less mature ecosystem, such as Georgia, much of the best talent is migrating to Europe and the US for better opportunities. In addition, the growth and popularity of remote working is contributing to the brain drain. To attempt to reduce this, the government launched a "Work from Georgia" initiative to attract intellectual nomads to the country. However, this is yet to demonstrate real benefits to the local ecosystem.

The players in the ecosystem recognize that there exists a culture of piracy and copying of intellectual property. It is particularly challenging for start-ups looking for venture capital, as US investors require international IP protection. Start-ups are reluctant to file patents in Georgia as this exposes their ideas and offers no IP protection outside of the country. Although the Government of Georgia has tried to strengthen the legislative and institutional framework relevant to intellectual property protection, awareness and implementation remain an issue. Individuals rather than businesses file most patents, which shows a need to develop a collaborative research culture with companies and universities.

Most stakeholders perceived Bank of Georgia and TBC Bank to be the champions providing support for innovation, social responsibility, and e-commerce. Some start-ups also expressed a desire and willingness to act as role models. However, Georgia needs more diverse advocates representing each group of actors to rally everyone around a common cause and drive initiatives.[127]

Georgia's digital competitiveness remains hampered by an immature capital market and a lack of private investment. Foreign Direct Investments in Georgia has fallen since 2017 and more efforts are needed to unlock the country's potential to be an attractive investment destination. The banking sector is one of the most digitally advanced in the country but it remains risk-averse to lending. Due to high-interest rates and personal guarantees bank loans are unsuitable for financing start-ups. Alternative financing sources, such as angel, seed, venture capital, leasing and factoring, are largely unavailable from private sources in Georgia, and the nascent capital market infrastructure prevents easy exit from investments. Access to financial resources is critical as many start-ups currently follow a bootstrapping strategy to achieve their goals using self-sustaining resources, which slows down innovation and commercialization. [128]

Throughout 2016-2017, GITA developed three schemes to provide capital for innovation: the Micro Grants, the Start-up Georgia and the Matching Grants programs. Startup Georgia project received a total of 726 applications, of which 149 were for high-tech components Within the framework of the high-tech component of Startup Georgia, 20 start-ups were selected and financed with the amount of GEL 100 000

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[127] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation. pp.9-10

[128] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation. pp.12

(approx. EUR 26.9 thousand)[129]. These were evaluated by leading international experts from Silicon Valley and submitted to global investors in Silicon Valley. GITA complements its financial support with training, coaching, mentoring and consulting services for all program beneficiaries. Many stakeholders felt GITA had helped to kickstart the ecosystem, but there is a need to develop venture capital and nurture alternative funding sources such as crowdfunding.

With the emerging ICT sector, Georgia is working hard to establish itself as a growing hub for information and communication technology. In this context, the EU-funded 'SME Development and DCFTA in Georgia' project have set up the Georgian ICT Cluster to help drive the sector's competitiveness. According to GIZ, 90% of customers of ICT companies are local organizations representing banking or retail sectors and governmental agencies. Also, many IT companies work in the online gaming and gambling fields, only developing new applications to serve that industry. Currently, there exists a low awareness of Georgian ICT companies in international markets. The government should continue to support export and cluster development which will be vital to the success of the digital innovation ecosystem.

In recent years the country has invested in public support programs and infrastructure to create a fertile ground for innovation. One of them is the Impact Hub which is part of the world's leading social entrepreneurial global network (100+ locations) of collaborators focused on prototyping the future of business and society. It is a co-working space to meet, collaborate, produce, learn, network, create, and is popular among entrepreneurial circles in Tbilisi. Impact Hub is based in Fabrika, formerly a large textile factory and the city's cultural hotspot. It regularly hosts vibrant networking events for the digital ecosystem. [130]

Another driver of change is the Data Fest Tbilisi. It is an annual international conference organized by ForSet, Tbilisi Startup Bureau, and Minimaxai about data and communication, bringing together journalists, CSO activists, marketing specialists, business professionals, government officials, data analysts, developers, and designers working with data. In addition, it serves as a platform for sharing the most recent developments in the technology ecosystem.

All these efforts are multiplied by the 500Georgia which is a world-class accelerator program designed to promote entrepreneurship in Georgia, help develop the tech ecosystem, connect with international networks, and help Georgian companies with their fundraising. This collaboration between GITA, 500 Startups and Bank of Georgia supports technology-focused and enabled firms with global potential. The program is a combination of intensive and remote training over seven months. The top companies are selected to spend four weeks in San Francisco for an immersion experience focused on elevating a global mindset and helping prepare for cross-border expansion. Since its inception in Silicon Valley, 500 Startups has invested in over 2,400 companies. [131]

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[129] The National Bank of Georgia, exchange rate on 06.07.2021 of EUR 3.7289, retrieved from https://www.nbg.gov.ge/index.php?m=2&lng=eng

[130] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation. P.17

[131] ITU 2021 Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.18

Entrepreneurs need to stimulate innovation by building companies that deliver novel solutions. This is hampered by a low level of research and development and insufficient collaboration between public R&D institutions and SMEs. Measures that integrate innovation in key sectors, so that startups and SMEs can unleash their full potential and expand beyond their niche, making a transformation in other sectors possible. [132]

2.5   Building block 5 – Digital - centric innovation ecosystem

Digital innovation is both an enabler of digital transformation in all dimensions addressed above and also a measure of the robustness of digital development at the country level. A good level of digital innovation in a given country also underpins endogenous digital development, rather than development that depends on foreign markets.

The innovation divide stems in part from inefficiencies in the use or allocation of resources in the innovation ecosystem, from inefficiency or lack of key supports, policies, and other elements of a nurturing environment, as well as a need for stronger collaboration between stakeholders to develop a complete ecosystem through coordinated support activities.

This section addresses the importance of innovation ecosystems as local catalysers of creativity in the use of digital technologies for business as well as touches upon AI potential to boost the country transformation.

2.5.1 Digital innovation ecosystem

Georgia ranks above average on key international rankings on entrepreneurship, innovation and technology. The Global Innovation Index (2020) ranks the country 63rd out of 131 countries, and the Global Entrepreneurship Index (2018) 77th out of 137 countries. These performances are translated into similar competitiveness for the country as Georgia only ranks 74th out of 141 countries in the Global Competitiveness Index (2019).[133]

The Government plans to seed incentives and assets for innovation aiming to build a cutting-edge technology-driven economy that will foster progress in the region.

Since the creation of GITA in 2014, there have been significant efforts to develop the digital ecosystem in Georgia. Besides, ICT-centric innovation development was one of the priorities of the Social-economic Development Strategy of Georgia, "Georgia, 2020". It fostered private sector competitiveness by improving access to finance and support in commercialization, developing the infrastructure necessary for innovation, and establishing an efficient communication network. To a large extent, it has laid the foundations of a vibrant ICT innovation ecosystem.

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[132] ITU 2021 Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.15-16
[133] ITU 2021 Regional Good Practices Accelerating innovation, entrepreneurship and digital transformation —Europe, p.5

Since 2020 the Georgian Government has made several attempts to adopt a new national innovation strategy; however, none have been published due to leadership changes in responsible institutions and changing policy priorities. As a result, all actors within the ecosystem were not aware of a clear vision or national innovation strategy. There is undoubtedly a need for one shared vision to engage all relevant stakeholders in sustainable digital transformation.[134]

Supportive policies and regulations provide fertile ground for the efforts of entrepreneurs and innovators. Besides, Business Associations and formal networks are active in the Georgian ecosystem. However, some stakeholders perceived these as mainly supporting large companies and the ICT sector is underrepresented.[135]

Meanwhile, to provide the necessary soft infrastructure, GITA established five Techparks and innovation centres focused on the development of technologies and the innovation ecosystem. These offer physical space with fabrication laboratories, equipped with high technology machines, free open co-working space, training facilities, and business incubation. Apart from the Techparks, universities provide laboratories for innovation, however these lack up-to-date equipment and are not open access.

The ICT training program established by GITA ensures an adequate level of mentoring and training. It aims to train 3,000 IT specialists by March of 2023. However, to secure the demand for ICT and AI training and increase uptake, it is vital to raise awareness of career opportunities and the benefits of digitalization.[136]

On the other hand, there has been a surge of interest in entrepreneurship from young people in Georgia. Unfortunately, they often lack the resources and suitable business and technical skills to start competitive enterprises and focus on traditional sectors within their comfort zone, such as retail and tourism. Due to high unemployment, setting up a business is sometimes more for survival than a genuine interest in becoming the next unicorn. However, this mindset is changing, and the education system could help drive this change. Moreover, Georgia could tap into the young people educated abroad who have the ambition to create their own ventures.

Risk-taking and failure are not yet embraced in Georgia as an opportunity for learning. Due to the lack of capital and resources, ecosystem members felt that failure is poorly viewed, and there exists a tendency for citizens to blame others when things go wrong. The country needs to cultivate an innovative, entrepreneurial culture by sharing these fundamental values and developing a willingness to iterate and learn.[137]

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[134] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.7

[135] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.11

[136] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.8

[137] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.13

Demand for digital consumption exists within Georgia, and citizens benefit from innovations in peer-to-peer lending and personal financial management products. The main challenge remains the size of the market as innovators are unable to develop and expand. To be successful, entrepreneurs need to focus their products and services on global markets.[138]

GITA is addressing this challenge by providing support to scale up abroad. Regular events organized by the public and private sector to foster innovation take place across the ecosystem. Actors recognized the Impact Hub, Startup Bureau, and Startup Grind as holding habitual gatherings to facilitate essential knowledge sharing. Although the small start-up community appears open and inclusive, not all stakeholder groups are actively engaged, especially in AI, potentially limiting ecosystem growth.[139]

Currently, the ecosystem perceives a lack of competitiveness regionally and nationally. However, in the region, Georgia has an advantage of using existing telecommunications infrastructure, including the submarine Black Sea Fibre-Optic Cable System to develop the corridor between Europe and the Middle East via Armenia. This gives Georgia the potential to position itself as a safe and trusted data conductor and digital hub.[140]

2.5.2 AI as an engine of productivity and economic growth

In 2020, Georgia reached 43.39/100 index score and was ranked 72nd out of 172 countries, according to the AI Readiness index. The index covered 33 indicators across 10 dimensions concentrated on 3 areas: government, technology sector, data and infrastructure. The study showed that the country is strong on data representativeness and availability indicators. However, it is lagging behind on two crucial dimensions of government vision and technology sector size.[141]

The country's aim is to be positioned as a digital hub with AI as an engine of productivity and economic growth with a possible highly disruptive effect on the economy and society. Georgia has the potential to leapfrog digital development if existing ICT policies and programs are comprehensive enough to address opportunities in the economy. However, the development of the AI ecosystem requires some prerequisites, such as a well-developed ICT sector and good STEM education. AI should be a part of the overall digital ecosystem strategy.[142]

Currently, there is no single government institution responsible for setting AI policy in Georgia. It is crucial to set AI policy goals, especially for business development, improving government services, and economic

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[138] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.11

[139] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.13

[140] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.8

[141] https://www.oxfordinsights.com/government-ai-readiness-index-2020

[142] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.7

growth. There is also no specific legal regulation on AI. The most important legal act related to AI is the Georgian law on Personal Data Protection. The State Inspectorate is responsible for monitoring and ensuring compliance in this area. It recently recommended the Ministry of Internal Affairs to change practices regarding information registry, data retention dates, and deletion upon expiration dates.[143]

AI is a natural part of the technology ecosystem and faces some of the same challenges as: a lack of skilled labour and industrial development and trust. In addition, the lack of local cloud infrastructure is an issue as AI development is heavily reliant on it.[144] Yet, in Georgia, there is no cloud infrastructure. Therefore, some companies use cloud services from companies like Microsoft, Amazon, Apple, and Google but are experiencing network lags. Nevertheless, local cloud computing technologies could improve AI development and support ecosystem growth. Cloud computing technologies could accelerate AI development and give AI developers quick access to infrastructure environments (computing power, etc.) and data management and AI services. Cloud computing with AI can reduce costs and offer more flexibility, especially for small businesses, since they do not need to set up the complete infrastructure. Instead, firms could rent cloud platforms for a monthly fee and scale their services later if required.[145]

However, cloud computing raises concerns about data security (including data loss, data breaches, privacy protection, and legal compliance regarding the data), unauthorized use of cloud services, accessibility of cloud services, and vendor lock-in. One of the important factors regarding the use of cloud infrastructure is digital sovereignty regulations imposed by many countries that require that customer data be stored domestically rather than abroad. Some of these concerns, especially those regarding privacy, security and legal compliance, could be addressed by physically locating the cloud inside the country. Physically close infrastructure will reduce network lag and increase cloud availability and service responsiveness.[146]

The introduction of artificial intelligence systems in the Georgian public sector is at an early stage of development. The most prevalent AI technologies in the civil service are chatbots, used by several government agencies to consult citizens.[147] One of its examples is the first AI-based public servant, C Bot, able to provide assistance to the residents of the city of Rustavi on questions, statistics and recommendations related to COVID-19 (EU4Business, 2020).[148]

On the other hand, the Ministry of Internal Affairs uses AI in image processing (radar and video technologies for road traffic), and law enforcement agencies use automated facial recognition technology.

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[143] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.9

[144] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.16

[145] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.8

[146] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.8

[147] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.5

[148] Digital Literacy in times of the Covid-19 in the Eastern Partnership Countries, p.26, retrieved from https://eufordigital.eu/wp-content/uploads/2021/03/Digital-Literacy-in-times-of-the-Covid-19-in-the-Eastern-Partnership-Countries.pdf?fbclid=IwAR2kFS_wx3JwEmJPD_x34kenMxbi1r8lUyohCznf12-qS3vIGST4mMFp_ug

The Georgian Prosecutor's Office uses some AI-based applications to support criminal investigations. Besides, there are many successful examples of AI solutions in the private sector, especially in insurance and banking, including a neobank that exists only as a mobile app, without branches and physical presence. [149]

Besides, AI stakeholders are not very well connected. As a result, companies are struggling to build local synergies and benefit from knowledge sharing and collaboration.[150] Yet, one of the stakeholders that may lead the change is considered to be "AI Georgia" which aims to promote and raise awareness of artificial intelligence as a separate field in the country, conducting studies in this area and introducing AI technologies. AI Georgia's mission is to promote and facilitate the adoption of AI in the private sector and open and maintain the dialog between businesses, executive and legislative branches of the state. The purpose of this association is to: disseminate AI in the private sector, conduct and support local or international research; find, recruit or up-skill talent; provide assistance to the state to formulate the legislative framework. In addition, generate and share use cases of transforming business operations from traditional methods to advanced AI across different industries.[151]

3.   Conclusions

This document has provided a framework to unravel digital development that includes five identified dimensions of digital transformation. It has provided information about Georgia for each domain, based on the experiences and activities of the ITU and other stakeholders operating in the country and wider region.

This report will serve as a reference for discussions on digital development at the country level as well as stock-taking of relevant activities, initiatives and projects and experiences developed by UN agencies involved in digital transformation work in Georgia. It will serve as a guide for future dialogue with country stakeholders and pave the way for increasingly fit-for-purpose engagements of the UN system in the country.

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[149] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.5

[150] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.11

[151] ITU 2021. Georgia: ICT-centric innovation ecosystem snapshot and recommendations for accelerating digital transformation, p.18