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DIGITAL SKILLS

NEEDS AND GAPS IN THE WESTERN BALKANS

SCOPE AND OBJECTIVES FOR A FULLY-FLEDGED ASSESSMENT

good.
better.
regional.

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DIGITAL SKILLS NEEDS AND GAPS IN THE WESTERN BALKANS

scope and objectives for a fully-fledged assessment

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* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence

OVERVIEW

Preparation of the report “Definition of the scope and details for a fully-fledged assessment of digital skills needs and gaps in the Western Balkans” initiated by Regional Cooperation Council aims at assessing the current economic environment in the six economies – Albania, Bosnia and Herzegovina, Kosovo*, Montenegro, Republic of North Macedonia, and Serbia to support preparation of the methodological framework for a fully-fledged assessment of digital skills needs and gaps in each of the respective economies. Such an assessment may contribute to the preparation of digital skills strategies as part of the commitments taken within the context of Common Regional Market (CRM) 2021-2024 agenda.

The overall objective of the assessment is to support Western Balkans to define the scope and details of a fully-fledged assessment of digital skills gaps and needs, focusing on key target groups per each economy while factoring respective developments and strategic objectives of each economy. In addition, the assessment aims at elaborating and defining the scope and goals of digital skills assessment, identifying industry and sector needs - for existing and emerging businesses/industries as per each economy strategic vision, reviewing market needs, proposing the methodological framework for the fully-fledged assessment of needs and gaps, etc. In addition, the assessment will ultimately define all aspects to be assessed in each economy, including preparation of proposed questionnaires.

This document consists of:

- PART I: Scope and details to support a fully-fledged assessment of digital skills needs and gaps in the Western Balkans, which contains economic insights for each economy including their respective priorities, emerging industries and priority sectors, key stakeholders and key target groups for assessment.
- PART I also elaborates the methodology developed to rank the economic footprint of industries and sectors identified across Western Balkans using the existing data, stakeholders’ evaluations and views as well as structured interviews for each of the economy. Detailed analyses of each economy are contained within this part of the document.
- PART II provides the Methodological Framework, which sets out detailed outline for conducting the fully-fledged assessment of digitals skills needs and gaps in the priority industries and/or sectors as well as target groups identified in Part I.

  The report is complemented with the proposed Questionnaires (to ease reading provided in a separate word document), containing the general questionnaire and four tailor-made questionnaires for specific industries and/or sectors. These questionnaires together with detailed instructions are to be used in the rollout of the assessment.

PART I:
SCOPE AND DETAILS TO SUPPORT A FULLY-FLEDGED ASSESSMENT OF DIGITAL SKILLS NEEDS AND GAPS IN THE WESTERN BALKANS

1. INTRODUCTION

Digital Integration of the six regional economies and transforming their industries with the innovation are the two goals that would provide for the Western Balkans six (WB6) to build a Common Regional Market (CRM). The CRM 2021-2024 agenda[1] builds on the success achieved within the context of Regional Economic Area (REA) and aims to enable modernisation and reorganisation of the regional economies through "the integration of the Western Balkan digital economy to the EU Digital Single Market".

In this context, as well as in the context of current Covid-19 pandemic, now is the critical time to assess the needs of the local economies - their current status and potential for digitalisation, the potential of their leading industries for innovation and emerging innovative potentials, as well as the digitals skills available and/or needed in the labour market in order to facilitate these goals and prepare for the future.

Progress towards developing and strengthening the supply of digital skills varies among the Western Balkan (WB) economies. Supply of digital skills is assessed by two indicators included in the DESI report 2020[2]: (i)[3] broader indicator that covers basic skills and usage is the share of internet users, which frequently use the internet, and (ii)[4] narrower indicator reflecting ICT-skills is the share of individuals with basic or above basic digital skills.

Based on Eurostat data, the proportion of individuals who frequently use the internet varied from 91% to 65% across the region in the period from 2017 to 2019[5]. Interestingly, compared to the SEE-peers, the WB economies did relatively well and held shares even above those of their peers such as in Slovenia, Croatia, Romania and Bulgaria. Between 2017 and 2019, the share of frequent internet users increased in all WB economies. When it comes to the share of individuals with basic or above basic overall digital skills data analysed through DESI report is not complete and consistent, hence assessment is not always possible, but will be provided in the analysis of each economy.

2. METHODOLOGY USED FOR THE ANALYSIS

The methodology used for the analysis presented in this document combines desk research and in-depth interviews for each of the WB economies, as well as additional filtering of overall conclusions enabling verification and consistent outcome for the entire region.

1. **Desk Research of Strategic Documents**

The aim of the first stage of the research was to identify, collect and review the strategic documents that would provide a general overview for each of the WB economies in the area of digital skills. In this stage the research focused on identifying for each WB economy:

- Overall strategic priorities of the Government;
- Official digitalisation strategy, if in place;
- Areas in focus for economic growth;
- Areas in which digitalisation plays a critical role;
- Impacts of COVID-19 crisis on economies and strategies and/or initiatives adopted as a remedy in 2020.

In addition, a short historical overview of economic developments was found relevant for each of the WB economies to put in context current strategic priorities and better understand their relevance going forward.

As a result of reviewing and analysing the above, the objectives of the research were to provide:

- An overview of strategic priorities for each of the WB economies;
- An overview of the digitalisation so far and focus going forward;
- Analysis of the impact made by COVID-19 and the role of digitalisation in remedying the crisis;
- Identified emerging industries and those for which digitalisation is critical;
- Identified stakeholders for the identified industries;
- Identified target groups that use or are in need of specific digital skills.

2. **Interviews with selected stakeholders**

In the second stage, the research was complemented with one-on-one interviews with a small group of relevant stakeholders in each of the WB economies to verify findings from the stage one of the process and to gain more in-depth insight about local economic context. The interviewees were (i) public officials provided through the official communications with each economy, (ii) private sector representatives, i.e. presidents of business associations with full overview of business needs, and/or members of associations' ' boards who participate in digitalisation initiatives.

The interviews were supported through structured questions sent to interviewees in advance to instruct the scope and focus of the interviews. During the interviews the following topics were covered:

- What is the state of digitalisation? What are the most significant initiatives in the area? What are the key issues and what skills, in particular digital skills seem to be lacking?
- What was the impact of COVID-19 crisis and what new business and/or initiatives have emerged? What was the experience of those who implemented them and what of the users?
- Verification of emerging industries and insights of their relevance, the significance of digitalisation and the need for digital skills.
- Verification of the key stakeholders and their roles.
- Verification of the target groups and their roles.

1 Action Plan 2021-2024 (https://www.rcc.int/download/docs/Final.%2520CRM%25202021-2024%2520AP.DOCX/b881f4de43f2753241c8bcb55a6ed8a9.docx)

2 https://op.europa.eu/en/publication-detail/-/publication/baf459a2-6698-11eb-aeb5-01aa75ed71a1/language-en/format-PDF/source-192754717

3 https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IFP_IU/default/table

4 https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IN_H/default/table

5 Ibid.

3. **Prioritisation of strategic and emerging industries**

Prioritisation of strategic and emerging industries has been performed in accordance with the following principles and steps:

First step: Review of strategic documents in all WB economies in order to identify strategic and emerging industries - as a result an initial list of emerging industries has been identified.

Second step: Review of industries which stood out through the first step as strategic and emerging industries in all economies: Information and Communication Technologies (ICT), E-commerce and SMEs. Because of their horizontal importance for all sectors they were later taken into account when assessing other industries. In addition, public administration and education were recognised in all WB economies as strategic sectors.

Third step: Prioritisation of unified industry categories (sectors) was conducted for each WB economy based on the following criteria:

- Treatment of the sector in selected WB economy (based on review of strategic documents):
  - (1) mainly referred as non- priority field in strategic documents;
  - (2) was not referred to in strategic documents (neutral status);
  - (3) identified as potential priority in one or more strategic documents;
  - (4) highly prioritises in one or more strategic documents;
  - (5) highly prioritises in almost all strategic documents;
- Economic relevance of the sector in selected WB economy (based on desk research):
  - (1) Low - GDP and labour growth within the sector in last decade around average;
  - (2) Medium - GDP and labour growth within the sector in last decade above average but without substantial share and growth in export;
  - (3) High - GDP and labour growth in the sector in last decade above average with substantial share and growth in export;
- SME & Entrepreneurs share in the sector in selected WB economy (based on desk research):
  - (1) Low - the sector is dominated by corporations;
  - (2) Medium - the sector is split between corporations and SMEs and Entrepreneurs;
  - (3) High - the sector is dominated by SMEs and Entrepreneurs;
- ICT impact - digital transformation potential (based on expert opinions and interviews):
  - (1) Low - digital transformation of the sector is limited, highly expensive or not likely during the next decade;
  - (2) Medium - local digital transformation of the sector is expected during the next decade - the successful examples of digital transformation available globally;
  - (3) High - digital transformation of the sector already in progress - it is possible to measure changes in WB6 markets;
- E-commerce enabling potential (based on expert opinions and interviews):
  - (1) Low - it is not likely that implementation of e-commerce could substantially improve business performances of the sector;
  - (2) Medium - implementation of e-commerce is recommended but not fundamental for improving business performance of the sector;
  - (3) High - implementation of e-commerce is a must in order to remain relevant in the sector;
- Impact of Digital Skills (based on expert opinions and interviews):
  - (1) Low - digital transformation and implementation of e-commerce will have limited impact on majority of employees in the sector;
  - (2) Medium - digital transformation and implementation of e-commerce will have impact on majority of employees in the sector in a way that part of their work duties will be adjusted and require certain digital skills;
  - (3) High - digital transformation and implementation of e-commerce will have high impact on majority of employees in the sector in a way that their work duties will be fundamentally altered while digital skills will be necessary for new duties;

Details on prioritisation of emerging industries are provided in the table "Prioritisation tables - Strategic and emerging industries", as the accompanying material for this document.

Final step: Readjusting identified industries into unified industry categories which could be used for prioritisation across WB region, in all WB economies based on the information received through the interviews.

Detailed elaboration for each economy, including the priority sectors, is given further in the document.

3. DETAILED ANALYSIS OF EACH WESTERN BALKAN ECONOMY

ALBANIA

General information and overview

Three basic indicators which provide a general overview of the current level of overall digital readiness for a specific economy are: level of internet usage, level of internet access in the households and level of overall digital skills. According to the official Eurostat data[6], the percentage of individuals who have used internet at least once in 12 months in Albania is 65% - the data is available only for 2018. This percentage is the lowest among the West-

6 Eurostat, Individuals - internet use, available at https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IFP_IU/default/table (Accessed 5 January 2021).

ern Balkan economies. Eurostat data[7] also shows that the percentage of households with internet access in Albania was 84% in 2018, which rates as second best among the Western Balkan economies. These two mentioned indicators combined suggest that although the internet infrastructure is well placed, there is still significant room for convincing the general public, and consequently the relevant stakeholders and organisations, to make the most of the benefits that digitalisation offers to them. As for the third indicator, the level of overall digital skills, there are no available data for Albania in Eurostat databases and publications. The data published in 2020 by the Institute of Statistics (INSTAT) in Albania shows that 87.1% of individuals aged 16-74 years old use the Internet on a daily basis with 98.7% accessing the Internet through their smart phones and only 23% through laptop or PCs.[8]

Another indicator which is important for the development of digital skills is their embeddedness in the areas of education, training and overall labour market. The Balkan Barometer Analytical Report on Public Opinions 2020 finds growing awareness of digitalisation's potential by region's residents. While still relatively modest, the number of respondents pursuing training in information and communications technologies has grown steadily. [9]Balkan Barometer Analytical Report on Public Opinions 2020 finds that 14% of respondents in Albania use the internet for education. However, this data refers to 2019. With the COVID-19 pandemic and the shift towards online classes, the use of internet for education has increased. Most usual topics of practice in information technology are computer use, software or applications, and learning about social media or data analysis. The most frequent learning method is online and self-study, with less training provided in the workplace. The RCC Balkan Barometer Business Opinion Report 2020 points out that employment and education are areas whose importance will grow over the next period. The report highlights that almost 80% of managers in the region stresses that digital skills are essential for conducting their businesses.[10] The lack of digital skills negatively affects both the demand and supply sides of digital products, and digital skills need to be better integrated into the education system. Digitalisation and development of digital skills can contribute to tackling high unemployment, especially in rural areas. They could create positive spill-over effects on other sectors of economy, such as tourism, and facilitate exports.[11] In addition, NEET (not in employment, education, or training) rate peaks at 37.7% for the age group 25-29, pointing at a very challenging labour market transition for young people. There is high structural unemployment, with two-thirds of unemployed being long-term unemployed, and skills mismatches.[12] Despite investments in Vocational Education and Training (VET), the system remains insufficient to address the skills mismatch. Lifelong learning and skills development outside the formal education system are fragile and inadequate, especially outside urban areas.[13]

Broader ecosystems which could be considered as drivers of digitalisation development in any economy are the SME and start-up ecosystems. Developing a dynamic and competitive SME sector has become even more of a priority for Albania due to the positive developments towards the EU accession. However, several key components of an SME-friendly business environment are missing, such as fostering entrepreneurship in the school curriculum, setting up regulatory impact assessment procedures, developing alternative financing sources besides traditional bank lending, and setting up fast-track and specific bankruptcy procedures for SMEs.[14]

As far as start-ups are concerned, a recent study[15] on the start-up ecosystem in Albania points that **innovative start-ups' role has steadily gained importance as a driving force for economic and social development towards a knowledge-based society in Albania.** According to this study, the number of start-ups operating in Albania is said to be 257 but estimates reach 550+ potential start-ups. 18% are in IT/software development, 14% in education, and 10% in e-commerce. The biggest Albanian start-up hub is Tirana. Lack of financing mechanisms is a major concern for the development of start-up ecosystem. Referring to the Global Entrepreneurship Index for 2018, Albania was 83 out of 137 analysed economies.[16] The Start-upBlink Global Report 2020 ranks Albania 72nd, an improvement of 13 places compared to the previous year, estimating that Albania is one of the economies with the best growth in the ranking of new enterprise ecosystems for 2019.[17] Moreover, the Start-upBlink notes that the ecosystem of new enterprises in Albania is still in its initial steps of development but has great potentials. This is especially true in the field of digital entrepreneurship as the Albanian economy has a young population, with young people who know several foreign languages and who, more and more, aspire to self-employment. In addition, the demand for start-up capital to set up ICT businesses is relatively low compared to EU member states. The report praises the initiatives taken by the government and development partners such as initiating the process of drafting the law on start-ups and the National Programme for New Enterprises and Innovation, which are being prepared by the Albanian government in cooperation with international partners, such as the European Union, German government (through GiZ) and Swiss government. The report also praises the active participation of Albanian youth in the hackathon organised inside and outside the economy to respond with innovative ideas to the crisis caused by COVID-19.

Strategic documents overview

The Government of Albania aims to encourage private sector investment to help meet its development goals, particularly by accelerating private sector growth and creating new

7 Eurostat, Households - level of internet access https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IN_H/default/table (Accessed 5 January 2021).

8 INSTAT, Information and Communication Technology Usage Survey, 2020, available at http://www.instat.gov.al/media/6435/anketa-mbi-p%C3%ABrdorimin-e-teknologjis%C3%AB-s%C3%AB-informacionit-dhe-komunikim-it-tik-n%C3%AB-familje-dhe-nga-individ%C3%ABt-2018-2019.pdf (Accessed 5 January 2021).

9 RCC Balkan Barometer, Public Opinion, Analytical Report, 2020, available at https://www.rcc.int/download/docs/2020-06-Balkan-Barometer-Public-Opinion_final.pdf/bf27f9fc10de8a02df9db2b60596f0cd.pdf (Accessed 5 January 2021).

10 RCC Balkan Barometer, Business Opinion, Analytical Report, 2020, available at https://www.rcc.int/download/docs/BB2020_Business.pdf/c9831b5b9c198991f8da4efcf20bf13a.pdf (Accessed 5 January 2021).

11 European Commission, 2020, "Economic Reform Programme Albania", available at https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/albania_2019-2021_erp.pdf (Accessed 15 November 2020).

12 ibid

13 ibid

14 European Commission, 2019, "SBA Fact Sheet Albania", available at https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/sba-fs-2019_albania.pdf (Accessed 15 November 2020).

15 GertiBoshnjaku, Erka Caro, Start-ups in Albania, a baseline report conducted in the framework of "EU for Innovation" Project, March 2020

16 Global Entrepreneurship Index for 2018, available at https://thegedi.org/global-entrepreneurship-and-development-index/ (Accessed 15 November 2020).

17 StartupBlink, Startup Ecosystem Ranking 2020, available at https://drive.google.com/file/d/1QigrAt5KBRMVhIcbKkbxyYZuifahrcMB/view (Accessed 15 February 2021).

jobs. This vision is outlined in the Business and Investment Development Strategy (BIDS) 2014–2020[18] and the National Strategy for Development and Integration (NSDI) 2015–2020[19]. Accordingly, Government of Albania strives to design and implement a reform agenda to promote domestic and foreign investment and maximise benefits for Albania's citizens.

According to European Commission Annual Report for Albania 2020[20], a monitoring report, finalised in October 2020, identifies the challenges to progress in implementing and monitoring the BIDS. Work to draft a new BIDS 2020-2025, covering **SMEs skills development, innovation, sustainable growth,** and conditions for attracting foreign investment, started in February 2020. The new BIDS will also incorporate the strategy on development of non-food industry.

The efforts of the Government over recent years have been focused mainly on new employment generation activities. The National Employment and Skills Strategy (NESS) 2014–2020[21] put knowledge and skills at the heart of the economic model and is expected to trigger inclusive long-term growth. **Although NESS sought out to improve the relevance and the quality of skills acquired in the education system, it does not address digital skills in particular.** The Mid-Term Review (MTR) provides a large amount of information showing that NESS 2014–2020 and its Action Plan are to a large extent an exhaustive and ambitious programme supporting the overall goal of the Strategy that is to promote quality jobs and skills opportunities for all Albanian women and men throughout the lifecycle, and that is also in line with the strategic objectives of advanced economies.[22] Its policy objectives remain highly relevant, but require more time to be achieved and thus, the Government approved in 2019 the National Employment and Skills Strategy 2019-2022 and its action plan.[23] The four policy objectives of the new strategy are: promotion of opportunities for dignified work through productive labour market policies; providing quality vocational education and training for young people and adults; promoting social inclusion and territorial cohesion and strengthening labour market governance and qualification system.[24] There is no specific focus on digital skills in the new strategy.

The cross-cutting strategy Digital Agenda for Albania 2015-2020[25] points to the integration of information and communication technologies (ICT-s) in contemporary teaching and learning, where all actors such as teachers, parents, students, policymakers, and service providers play specific roles in creating e-education spaces. However, frameworks for digital skills and competencies and Information Technology (IT) qualifications and curricula at all Albanian qualification framework levels have not been defined yet. **In March 2020, the Digital Agenda for Albania was revised again, but there is no digital skills strategy in place in this economy.** The National Plan for Sustainable Development of Digital Infrastructure, Broadband 2020-2025[26] was approved in June 2020. The Plan aims to develop the broadband infrastructure for a gigabit society, and it emphasises the development of digital skills to increase the demand and benefits of using broadband infrastructure and all services and application developments, including IoT and the use of Artificial Intelligence (AI).

The Evaluation of Pre-University Education Strategy 2014-2020[27] highlights that the utilisation of ICT is at low levels in pre-university system within the new curriculum model. The Government of Albania is in the process of drafting a new strategy for pre-university education and incorporation of digital skills must be a priority. The current national pre-university curriculum framework identifies digital competences as key competences to be developed both in the general and VET programmes. Digital competence comprises digital content creation and the use of Internet safety and problem-solving with IT. This document recommends strategically investing in ICT services in pre-university system, strengthening ICT skills for teachers and principals regarding the use of technology in teaching and learning effectively, and designing and introducing blended learning programmes. The COVID-19 pandemic impacted teaching and learning in the entire education system in Albania and demonstrated the high relevance of digital skills development in education sector both for teachers and learners. Improved digitalisation processes of education, including teaching and learning, are needed in terms of policy, but also pedagogical methodology, resources, infrastructures and skills.

The National Strategy for Science, Technology, and Innovation (NSSTI) 2017-2022[28] is implemented by two agencies, the National Agency for Scientific Research and Innovation (NASRI) and the Albanian Investment Development Agency (AIDA). All of the measures listed in NSSTI are directly linked to the smart specialisation process. NSSTI intends to maximise research (raise funds, quality, cooperation with businesses and diaspora) from 0.2% of GDP during 2009-15 to at least 0.6% (EU28 average: 2%, target EU in 2020: 3%) by 2022, according to EU Innovation Gap Analysis[29]. In the Global Competitiveness Index 2019[30], Albania ranks particularly low for innovation capability (110th of 141) and R&D (126th).

18 Albania, Council of Ministers, Business Development and Investment Strategy and action plan for the period 2014 -2020, available at https://administrata.al/Documents/strategjia%20doc/5.Strategjia%20e%20Zhvillimit%20të%20Biznesit%20dhe%20Investimeve%202014%20-%202020.pdf (Accessed 11 February 2021).

19 Albania, Council of Ministers, National Strategy for Development and Integration 2014-2020, available at http://dap.gov.al/publikime/dokumenta-strategjik/278-strategjia-kombetare-per-zhvillim-dhe-integrim (Accessed 11 February 2021).

20 European Commission, Albania Annual Report 2020, available at https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/albania_report_2020.pdf (Accessed 11 February 2021).

21 Albania, Ministry of Social Welfare and Youth, 2016, National Employment and Skills Strategy, available at https://financa.gov.al/wp-content/uploads/2018/09/NESS-ENG-8-1-15_final-version.pdf (Accessed 11 February 2021).

22 UNDP, 2018, Midterm Review of the National Employment and Skills Strategy, available at https://www.al.undp.org/content/albania/en/home/library/crisis_prevention_and_recovery/mid-term-review-of-the-employment-and-skills-strategy-2014-2020.html (Accessed 11 February 2021).

23 National Strategy for Employment and Skill 2019-2022, available at https://financa.gov.al/wp-content/uploads/2020/10/Publikim_AL_Strategjia-Komb%C3%ABtare-p%C3%ABr-Pun%C3%ABsim-dhe-Aft%C3%ABsi-2019-2022.pdf (Accessed 11 February 2021).

24 ibid.

25 National Agency for Information Society, Digital Agenda Strategy 2015 – 2020, available at https://akshi.gov.al/wp-content/uploads/2018/03/Digital_Agenda_Strategy_2015_-_2020.pdf (Accessed 11 February 2021).

26 Ministry of Infrastructure and Energy, National Plan for Sustainable Development of Digital Infrastructure Broadband 2020-2025, available at https://www.infrastruktura.gov.al/wp-content/uploads/2020/07/National-Plan-BBand-EN.pdf (Accessed 11 February 2021).

27 UNICEF, 2019, Evaluation of the Pre-University Education Strategy 2014-2020, available at https://www.unicef.org/albania/media/2036/file/Strategy%20of%20education%20apprasal_Al.pdf (Accessed 11 February 2021).

28 Albania, Council of Ministers, National Strategy for Science, Technology and Innovation, 2017-2022, available at https://administrata.al/Documents/strategjia%20doc/24.Strategjia%20Kombëtare%20për%20Shkencën%2C%20Teknologjinë%20dhe%20Inovacionin%202017%20-%202022.pdf (Accessed 11 February 2021).

29 EU for Innovation, 2019, Gap Analysis in the Innovation Ecosystem in Albania, available at http://euforinnovation.al/wp-content/uploads/2019/12/Gap-Analysis_E-Publication.pdf (Accessed 11 February 2021).

30 World Economic Forum, 2019, The Global Competitiveness Report, available at http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf (Accessed 11 February 2021).

The Business and Investment Development Strategy (BIDS) 2014–2020[31] establishes a framework for creating partnerships between Government of Albania and companies on technology improvements, innovation, and human capital development. **As such, the Action Plan 2017-2021 of the BIDS entails developing a virtual innovation support network that helps entrepreneurship.** However, the European Commission Annual Report for Albania 2020 finds that implementation of BIDS has progressed slowly, and reforms have slowed down in the past three years in the business sector. In terms of Albania's capacity to cope with competitive pressure and market forces within the European Union (EU), **its competitiveness is hindered by a lack of entrepreneurial and technological know-how, a significant skills gap**, weak institutions and low levels of investment and infrastructure quality.

Albania, as other WB economies, pledged to increase its support for research, innovation, education, training and culture at the Ministerial Meeting of the Western Balkan Platforms on Education and Training and Research and Innovation on 2 December 2 2020. At this meeting, European Union presented 'Western Balkans Agenda on Innovation, Research, Education, Culture, Youth and Sport'[32], a comprehensive, long-term cooperation strategy of the European Union and the Western Balkans. It seeks, among other objectives, to transform the national research and innovation ecosystems, enhance the quality of education and training; boost human capital development; reduce the gender and digital divide and improve mobility and connectivity.

The Economic Reform Programme (ERP) 2020-2022[33], includes 20 structural reforms. The new reform measures encapsulate some of the priorities of the current government. Priority area IV refers to research, development and innovation and the digital economy and it includes two measures that relate to digital skills:

- Reform measure 11: Improve institutional capacity of the research and innovation system
- Reform measure 12: Development of the broadband infrastructure for digital economy.

Priority area on Education and Skills Reform is highly relevant for digital skills, although it does not directly mention digital skills. It includes four measures:

- Reform measure 14: Finalisation of the pre-university curricular reform, training and hiring of teachers
- Reform measure 15: Inclusive education
- Reform measure 16: Modernisation of the early childhood education system financing
- Reform measure 17: Improve the quality and coverage of VET while ensuring linkages with the labour market.

31 Albania, Council of Ministers, Business Development and Investment Strategy and action plan for the period 2014 -2020, available at https://administrata.al/Documents/strategjia%20doc/5.Strategjia%20e%20Zhvillimit%20të%20Biznesit%20dhe%20Investimeve%202014%20-%202020.pdf (Accessed 11 February 2021).

32 European Commission, 2020, Towards a Western Balkans Agenda on Research, Innovation, Education, Culture, Youth and Sports, available at https://ec.europa.eu/info/sites/info/files/research_and_innovation/strategy_on_research_and_innovation/documents/ec_rtd_western-Balkan-agenda-factsheet.pdf (Accessed 11 February 2021).

33 Albania, Economic Reform Programme 2020-2022, available at https://new.financa.gov.al/wp-content/uploads/2020/03/Economic-Reform-Programme-2020-2022.pdf (Accessed 11 February 2021).

It is unclear why the clear reference and focus to digital skills has been removed from ERP 2020-2022, as the reform measure to expand digital skills to schools was part of the ERP 2019-2021[34].

Strategic / emerging industries overview

Based on the analysis of the available strategic documents, as well as the available body of data and information from different statistical databases and studies, the following strategic and emerging industries and sectors have been identified in Albania:

- Information and communication technology: Software development and e-commerce
- Tourism, accommodation and related hospitality services
- Telephone and communication
- Marketing
- Financial services and banking
- Fashion: Clothing and footwear industry
- Bio and organic food processing industry
- Fishery
- Vineyard
- Paper production industry
- Hydropower
- Oil and gas
- Recycling plants
- Transportation (air, railway, road)

Using the framework developed for this study for readjusting identified industries into unified industry categories of industries and sectors across the Western Balkan region, as well as supplementing the desk review findings with inputs received through interviews with relevant stakeholders in the economy, the following prioritisation table has been developed for Albania:

Strategic / emerging industry or sector	Total score	Priority
Tourism, accommodation and related services	20 points - 100%	1
Agriculture, food (organic) and beverage	18 points - 90%	2
Creative industries	17 points - 85%	3
Telecommunications*	16 points - 80%	4
Banking and finance*	14 points - 70%	5
Energy	14 points - 70%	6
Transport – auto, railway, aviation	13 points - 65%	7
Construction	13 points - 65%	8

34 European Commission, 2019, Economic Reform Programme Albania 2019-2021, available at https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/albania_2019-2021_erp.pdf (Accessed 11 February 2021).

Strategic / emerging industry or sector	Total score	Priority
Manufacturing and processing	12 points - 60%	9
Healthcare	10 points - 50%	10
Heavy industry	10 points - 50%	11
Electrical equipment	10 points - 50%	12
INDUSTRIES-ENABLERS	Comment	
ICT – software development and outsourcing	Enabler and accelerator for digitalisation of other industries	
E-commerce	Enabler and accelerator for digitalisation of other industries	
SME, Start-ups, Entrepreneurship, Innovation	Enabler and accelerator for digitalisation of other industries	
OUTLIER SECTORS/Target Group	Comment	
Public administration, e-Government	Strategic sector for accelerating digitalisation on a nation-wide scale	
Education	Strategic sector for accelerating digitalisation on a nation-wide scale	

*Due to its high level of digital maturity it is seen more as an industry supporting digitalisation development

Key stakeholders overview

Based on the analysis of the available strategic documents, as well as the identified strategic and emerging industries and sectors, the following key stakeholders have been identified in Albania:

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Ministry of Infrastructure and Energy	Energy, transportation, ICT, construction, telecommunication	Policy maker for key industries/ strategy development at national level, action plan and policy documents	Both	High
Ministry of Education, Youth, and Sports	ICT, creative industries,	Policy maker for education and youth and skills development as cross-sectorial with Ministry of Finance and Economy / strategy development at national level, action plan and policy documents	Both	High
Ministry of Finance and Economy	ICT, Banking and finance,	Policy maker for key industries, employment and skills development and cross-sectorial with Ministry of Education, Sports and Youth/strategy development at national level, action plan and policy documents	Both	High
National Agency for Research and Innovation	All	Research funding agency / capacity building / networking / EU projects	Both	Medium
National Information Society Agency	ICT	Software development for e-services for government bodies	Both	Medium
National Agency for Electronic Communication	Telecommunication and ICT	Regulatory body, public agency	Both	Medium
National Agency for Vocational, Education, Training and Qualifications	All	Policy implementer for VET, skills development	Both	Medium
National Agency for Employment and Skills	All	Policy implementer for VET, skills development, employment opportunities	Both	High
Chamber of Commerce of Tirana	All	Business organisation	Demand	Medium
American Chamber of Commerce	All	Business organisation	Demand	Medium
Italian Chamber of Commerce	All	Business organisation	Demand	Medium
Business Albania	All	Business organisation	Demand	Medium
Union of Chamber of Commerces of Albania	All	Business organisation	Demand	Medium
Women in Business Association	All	Business organisation	Demand	Medium
GIZ(EU for Innovation, Proceed)	ICT and related domains	Skills development, funding and networking	Supply	High
Protik	ICT and related domains	Skills development, funding and networking	Supply	High
TUMO	ICT and related domains	Skills development, funding and networking	Supply	High
ICTLabs	ICT and related domains	Skills development, funding and networking	Supply	High
SwissContact	VET / entrepreneurship	Skills development, funding and networking	Supply	High
RISI Albania	ICT and Tourism	Skills development, funding and networking	Supply	High
Albanian IT Association	ICT and related domains	Skills development, funding and networking	Supply	High
HEIs	All	Skills development / academia	Supply	High
CSOs and National Civil Society Resource Centre	All	Intermediary between market and academia and policy makers	Both	Medium
Start-ups supporting: Open Labs, Officina, Dutch Hub, InnoSpace, Start-upGrid, BusinessMag, Creative Hub Albania, etc.	ICT and related domains	Skills development, funding and networking	Supply	High
AIDA	ALL	Investment, FDI	Both	High

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Yunus Social Business Haplde Combinator	ICT and related domains	Skills development, funding and networking	Supply	High
UK-Albania Tech Hub	ICT and related domains	Skills development, funding and networking	Supply	High
Techspace.al, publicly funded incubator managed by National Agency for Information Society	ICT and related domains	Incubator, skills development, funding and networking	Both	High
E-commerce start ups	ICT and related domains	Business	Supply	High
VET providers	ALL	Education	Supply	High

Key target groups overview

Based on the analysis of the available strategic documents, the identified strategic and emerging industries and sectors, as well as the identified key stakeholders, the following key target groups have emerged as the ones to be assessed in Albania:

- Human resource experts / managers from the identified strategic and emerging industries and sectors.
- Domain experts from the identified strategic and emerging industries and sectors;
- Employees, owners and executives in the SMEs operating within the identified strategic and emerging industries and sectors.
- Public administration employees (special attention may be given to employees dealing with e-government, e-services and healthcare).
- Founders and employees of start-ups from the identified strategic and emerging industries and sectors (especially the ones not dealing with technology as a priority).
- Women (capable of work according to official methodologies), especially within the identified strategic and emerging industries and sectors.
- Consumers.

Key takeaways and findings

- Limited specific focus on digital skills in policy framework: Economic Reform Programme 2020-2022 has no reform measure on digital skills.
- Currently, no national strategy on digital skills.
- Very limited national coordination on digital skills.
- Increasing awareness of the importance of digital skills, particularly in light of COVID-19 induced reality.

- Limited efforts for women inclusion in digital skills initiatives.
- Multiple and cross-sectoral strategies and policy documents, but the problem with implementation, financing, monitoring, and evaluation.
- A window of opportunity to foster digital skills agenda is presented in 2021 given that all key strategies end in 2020 or 2021.
- Increased focus on skills, employment, and entrepreneurship, particularly VET.
- Limited funding available, mostly donor-supported projects.
- Emerging and growing start-ups ecosystem.
- Diminishing of the young workforce due to migration outside Albania.
- Digital divide and marginalised communities, rural youth and women in remote areas remain a concern particularly in light of COVID-19 impact.

BOSNIA AND HERZEGOVINA

General information and overview

Three basic indicators which provide a general overview of the current level of overall digital readiness for a specific economy are: level of internet usage, level of internet access in the households and level of overall digital skills. According to official Eurostat data[35], the percentage of individuals who have used internet at least once in 12 months in Bosnia and Herzegovina was 71% in 2019, marginally decreasing from 72% in 2018. This percentage is the second lowest among the Western Balkan economies. Eurostat data[36] also shows that the percentage of households with internet access in Bosnia and Herzegovina was 72% in 2019 which rates the lowest among the Western Balkan economies. These two mentioned indicators combined suggest that there is considerable room for additional actions in the area of developing digitalisation in Bosnia and Herzegovina.

According to official Eurostat data[37], the level of digital skills for individuals in Bosnia and Herzegovina is low compared to other Western Balkan economies and the European Union member states. Data within this area is relatively poor and it can be found only for the year 2019. Looking at the percentage of individuals with basic or above basic digital skills in 2019, Bosnia and Herzegovina ranked the lowest among the Western Balkan economies – there were 24% of individuals within this category. Comparatively, the EU average was 57%. While the percentage of the ones with basic digital skills is at the same level as for other Western Balkan economies (16%), the percentage of individuals with above basic digital skills is where the biggest gap is – only 8% of individuals in Bosnia and Herzegovina belong to this category. Individuals classified as having low digital skills account for 46%, compared to the EU average of 29%. What also stands out and is a significant gap for Bosnia and Herzegovina is the percentage of individuals who have above basic software skills. Only 12% of individuals in Bosnia and Herzegovina have these advanced skills, which is by far the lowest percentage in the Western Balkans. Comparatively, the EU level was at 39%.

35 https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IFP_IU/default/table
36 https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IN_H/default/table
37 https://ec.europa.eu/eurostat/databrowser/view/ISOC_SK_DSKL_I__custom_355577/default/table

Another indicator which is important to the development of digital skills is their embeddedness in the areas of education, training and overall labour market. Balkan Barometer Analytical Report on Public Opinions 2020 finds growing awareness of digitalisation's potential by region's residents. While still relatively modest, the number of respondents pursuing training in information and communications technologies has grown steadily.[38] In Bosnia and Herzegovina, 29% use the internet for education. Most usual topics of practice in information technology are computer use, software or applications, and learning about social media or data analysis. The most frequent learning method is free online training and training provided in the workplace. The RCC Balkan Barometer Business Opinion Report 2020 points out that employment and education are areas whose importance will grow over the next period. The report highlights that for 48% of companies from Bosnia and Herzegovina digital skills are very important, while 38% of companies state that digital skills are somewhat important. The sum of these percentages is the highest among the Western Balkan economies.[39]

Broader ecosystems which could be considered as drivers of digitalisation development in any economy are the SME and start-up ecosystems. In 2016[40], SMEs in Bosnia and Herzegovina generated 66.3 % of total value added and 71.9 % of employment in the 'non- financial business economy'. In comparison, EU SMEs played a smaller role in the EU 'non-financial business economy'. SMEs in Bosnia and Herzegovina employed more people (5.4) than was average for EU SMEs, which employed 3.9, stressing the importance of the sector for the economy of Bosnia and Herzegovina. According to the same report, in 2015-2016 the value added of SMEs in the 'non-financial business economy' of Bosnia and Herzegovina grew by 7.1 %, while SME employment increased by 5.3 %.

In recent years[41], young software developers have begun establishing their own start-ups, upgrading the digitalisation process in Bosnia and Herzegovina, and are now working side by side with large outsourced multinational companies. This has led to a tremendous growth in the ICT sector. The number of ICT companies and start-ups in Bosnia and Herzegovina is growing rapidly, and according to BIT Alliance estimates (an umbrella association for the software development industry) around 1,400 companies and about 2,500 to 3,500 programmers are now working in information- technology, communications, and computer programming.

Strategic documents overview

Strategic documents on the aggregate level of Bosnia and Herzegovina are relatively poor and focused on financial-monetary and internal affairs areas. For example, there are several mid-term Strategies for managing the debt of Bosnia and Herzegovina, which are adopted every year.

Ministry of Communication and Transport, in which jurisdiction is the topic of communication and informatisation, currently has no strategic documents created and offered.

38 RCC Balkan Barometer, Public Opinion, Analytical Report, 2020 (https://www.rcc.int/download/docs/2020-06-Balkan-Barometer-Public-Opinion_final.pdf/bf27f9fc10de8a02df9db2b60596f0cd.pdf)

39 RCC Balkan Barometer, Business Opinion, Analytical Report, 2020 (https://www.rcc.int/download/docs/BB2020_Business.pdf/c9831b5b9c198991f8da4efcf20bf13a.pdf)

40 https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/sba-fs-2019_bosniaandherzegovina.pdf

41 https://www2.deloitte.com/content/dam/Deloitte/ba/Documents/about-deloitte/ba_sbf-investing-guide.pdf

Despite these scarce efforts, there are two initiatives on the level of the entire Bosnia and Herzegovina. Hence, the Joint Socio-Economic Reforms for the period 2019-2022,[42] in which one of the measures is closely connected with the topic of digitalisation and the Information Society Development Policy of Bosnia and Herzegovina for the period 2017-2021[43].

The Joint Socio-Economic Reforms document includes a measure titled "Policies that provide opportunities to youth, women and other vulnerable groups". This measure aims at ensuring incentives and special financing programmes for youth entrepreneurship, focusing on high-potential sectors – tourism, services, IT and creative industries. **Special attention is given to the improvement of digital ecosystem and incentivising digital transformation of the entire economy**, therefore making a clear link between the mentioned measure and digitalisation. One of the most important actions to be taken here is improving IT education, starting with elementary school level. **Besides that, digital transformation of all levels of authorities (public sector) will be undertaken through more frequent usage of e-government and e-services. Lastly, both entities pledge to start with the reforms of the education systems in order to make it more compatible and adjusted to the needs of the labour market**, especially in terms of digitalisation.

The Information Society Development Policy of Bosnia and Herzegovina outlines concepts, vision and the main goals and tasks for developing the information society in the entire economy. It sets out bold proposals and goals, basing the development of society on ICT and its influence. **The policy encompasses two pillars that deal specifically with strengthening the ICT industry, as well as digital literacy of population** – pillars V and VI.[44] Other pillars also have indirect connections with application of digitalisation and digital skills, such as pillar VII. Article 5.4 directly lists all stakeholders and their roles in implementing this Policy further.

Other relevant documents on entity levels include Development Strategy of the Federation of Bosnia and Herzegovina (working version)[45] which has four strategic goals, first being the accelerated economic growth. Within this strategic goal, **one of the priorities is to increase the digitalisation of the economy, which relies heavily on digital transformation and improvement of digital literacy**. Another priority within this strategic goal, supporting the development of the private sector, sets out three sectors as important ones – creative sector, tourism sector and entrepreneurship sector. **Strategic goal related to the public sector refers to the priority of implementing digital transformation of public administration.**

Republika Srpska has two relevant strategic documents that need to be taken into account. The first is Strategy for Scientific and Technological Development of RS 2017-2021 – Knowledge for Growth[46]. The most relevant part of this strategy is related to smart specialisation, which defines specific industries/sectors to be focused on in the long-term. These include ICT, development of energy sector, production of food and creative industry.

42 http://www.fbihvlada.gov.ba/file/zbhs-converted(1).pdf

43 http://www.sluzbenilist.ba/page/akt/LhPPM81UcxE=

44 http://www.sluzbenilist.ba/page/akt/LhPPM81UcxE=

45 http://fzzpr.gov.ba/download/doc/Strategija+razvoja+FBiH+2021_2027_14_07_2020.pdf/801b0f76fbfad9a0fa1a82f19439ea94.pdf

46 http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mnk/Documents/PRIJEDLOG%20-%20%20strategije%20naucnog%20i%20tehnoloskog%20razvoja%20RS%202017-2021.docx

The second relevant strategic document for Republika Srpska is the e-Government Development Strategy 2019-2022[47], clearly setting out every important aspect within this area.

Strategic / emerging industries overview

Based on the analysis of the available strategic documents, as well as the available body of data and information from different statistical databases and studies, the following strategic and emerging industries and sectors have been identified in Bosnia and Herzegovina:

- Tourism
- Services
- ICT industry
  - Product focused ICT
  - Software development
- Creative industries
  - Advertising
  - Architecture
  - Books/magazines publishing
  - Video games and movies
  - Music
  - Performing arts
  - Radio
  - TV
  - Visual arts
  - Design (especially industrial)
  - Culture
- Food production
  - Healthy/organic food
  - Autochthonous organic food with geographic origin
- Energy sector (especially renewable energy)
- Public administration / E-government / E-services
- Education
  - Elementary ICT education
  - High-school education compatible with the needs of labour market
  - Student education compatible with the needs of labour market
- SME sector (especially on the principles of green economy and ecologisation)
- Entrepreneurship/start-up sector
- Healthcare

Using the framework developed for this study for readjusting identified industries into unified industry categories of industries and sectors across the Western Balkan region, as well as supplementing the desk review findings with inputs received through interviews with relevant stakeholders in the economy, the following prioritisation table has been developed for Bosnia and Herzegovina:

Strategic / emerging industry or sector	Total score	Priority
Agriculture, food and beverage (organic food production, standard food production, fishery, wine production, agriculture)	18 points - 90%	1
Tourism, accommodation and related services	18 points - 90%	2
Creative industries	17 points - 85%	3
Energy	13 points - 65%	4
Telecommunications*	13 points - 65%	5
Manufacturing and processing	13 points - 65%	6
Healthcare	12 points - 60%	7
Banking and finance*	12 points - 60%	8
Transport – auto, railway, aviation	11 points - 55%	9
Heavy industry	8 points - 40%	10
Construction	8 points - 40%	11
Electrical equipment	7 points - 35%	12
INDUSTRIES-ENABLERS	**Comment**	
ICT – software development and outsourcing	Enabler and accelerator for digitalisation of other industries	
E-commerce	Enabler and accelerator for digitalisation of other industries	
SME, Start-ups, Entrepreneurship, Innovation	Enabler and accelerator for digitalisation of other industries	
OUTLIER SECTORS/Target Group	**Comment**	
Public administration, e-Government	Strategic sector for accelerating digitalisation on a nation-wide scale	
Education	Strategic sector for accelerating digitalisation on a nation-wide scale	

*Due to its high level of digital maturity it is seen more as an industry supporting digitalisation development

Key stakeholders overview

Based on the analysis of the available strategic documents, as well as the identified strategic and emerging industries and sectors, the following key stakeholders have been identified in Bosnia and Herzegovina:

47 https://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mnk/Documents/Strategija%20e%20uprave%20pdf.pdf

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Council of Ministers of Bosnia and Herzegovina	All	Body of executive authority of Bosnia and Herzegovina	Both	Medium
Ministry of Communication and Transport of Bosnia and Herzegovina	ICT	Preparation and development of strategic and planning documents in the field of IT	Supply	High
Ministry of Civil Affairs of Bosnia and Herzegovina	Education, e-government	Planning and definition of international strategy in the fields of science and education	Supply	Medium
Agency for Preschool, Elementary-school and Middle-school Education (APOSO)	Education	Establishing standards of knowledge and developing curricula	Supply	High
Agency for Development of Higher Education and Quality Assurance (AVO)	Education	All relevant tasks related to higher education and quality assurance	Supply	High
Ministry of Scientific and Technological Development, Higher Education and Information Society of Republika Srpska	Education, ICT	Administrative and other professional tasks related to scientific and technological development, improvement of higher education and development of information society as well as creation and monitoring of strategies in mentioned areas	Supply	High
Formal education institutions	Education	Providing education in the fields of ICT, digitalisation, business, economy, and technology to different target groups	Supply	High
Non-formal education institutions	Education, ICT, creative industries	Providing non-formal education in the fields of ICT, digitalisation, business, innovation, and technology to different target groups	Supply	High
BIT Alliance	ICT, creative industries	Dedicated to resolving the lack of highly skilled employees and poorly developed IT infrastructure, accompanied with the lack of development incentives	Both	High
ALDI	SMEs, start-ups, manufacturing and processing, ICT	Focused on economic, social and political development in a way to take advantage of digital technologies for greater citizen involvement in social and economic life	Supply	Medium

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Chamber of Economy of the Federation of Bosnia and Herzegovina	Tourism, manufacturing and processing, heavy industry, SME, entrepreneurship, agriculture, energy, education	Improving business and economy environment, improving entrepreneurship	Demand	Medium
Chamber of Commerce of the Republika Srpska (Centre for Digital Transformation)	Tourism, manufacturing and processing, heavy industry, SME, entrepreneurship, agriculture, energy, education	Improving business and economy environment, improving entrepreneurship	Demand	Medium
Foreign Investors Council	ICT, education, energy	Improving business and economy environment	Demand	Low

Key target groups overview

Based on the analysis of the available strategic documents, the identified strategic and emerging industries and sectors, as well as the identified key stakeholders, the following key target groups have emerged as the ones to be assessed in Bosnia and Herzegovina:

- HR experts / managers from the identified strategic and emerging industries and sectors;
- Domain experts from the identified strategic and emerging industries and sectors;
- Employees, owners and executives in the SMEs operating within the identified strategic and emerging industries and sectors;
- In case education is a sector to be assessed the target group will include: Teachers and professors (elementary schools, high-schools and higher education institutions); Youth – elementary schools pupils, high-school pupils and students;
- Public administration employees (special attention may be given to employees dealing with e-government, e-services and healthcare);
- Founders and employees of start-ups from the identified strategic and emerging industries and sectors (especially the ones not dealing with technology as a priority);
- Women (capable of work according to official methodologies), especially within the identified strategic and emerging industries and sectors;
- Vulnerable groups (minorities and people with disabilities).

Key takeaways and findings

- Only two strategic documents that can be linked to digital skills.
- Slow and complicated bureaucracy stalling economic development and consequently development of digital skills.

- Economy is still more dependent on traditional industries like automotive, metallurgy and construction.
- ICT sector a crucial one for further economic development, however the most significant problem is lack of adequate human resources to satisfy needs and demands of the market.
- Start-up ecosystems in the early stages of development.
- Smart specialisation strategies emphasise new industries such as ICT, creative industries and organic food production, and more traditional ones like tourism.

KOSOVO*

General information and overview

Three basic indicators which provide a general overview of the current level of overall digital readiness for a specific economy are: level of internet usage, level of internet access in the households and level of overall digital skills. According to official Eurostat data[48], the percentage of individuals who have used internet at least once in 12 months in Kosovo* was 91% in 2019, steadily increasing from 88% in 2018 and 86% in 2017. This percentage is the highest among the Western Balkan economies. Eurostat data[49] also shows that the percentage of households with internet access in Kosovo* was 93% in 2019 which again rates as the highest among the Western Balkan economies. These two mentioned indicators combined suggest that there is a very solid base for additional actions in the area of developing digitalisation in Kosovo*.

On the other hand, according to official Eurostat data[50], the level of digital skills for individuals in Kosovo* is low compared to other economies in the Western Balkans and the European Union member states. Data within this area is relatively poor and it can be found only for the years 2017 and 2019. Looking at the percentage of individuals with basic or above basic digital skills, Kosovo* ranks the second lowest among the Western Balkan economies – there were 28% of individuals within this category in 2019, which represents an increase from 21% in 2017. Comparatively, the EU average was 57%. The percentage of the ones with basic digital skills is where Kosovo* ranks the lowest among the WB economies with 13% in 2019. The percentage of individuals with above basic digital skills is on average for the Western Balkan economies – 14% of individuals in Kosovo* belonged to this category in 2019. Individuals classified as having low digital skills accounted for 59% in 2019, compared to the EU average of 29%, and this is the highest percentage among the Western Balkans. Percentage of individuals who have above basic software skills was very decent at 26% in 2019, an increase of 10pp compared to 2018. Comparatively, the EU level was at 39%.

48 EuroStat, Individual Internet Use, 2021, available at https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IFP_IU/default/table (Accessed 5 January 2021).

49 EuroStat, Households - level of internet access, 2021, available at https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IN_H/default/table (Accessed 5 January 2021).

50 EuroStat, Individuals' level of digital skills, 2021, available at https://ec.europa.eu/eurostat/databrowser/view/ISOC_SK_DSKL_I__custom_355577/default/table (Accessed 5 January 2021).

Another indicator which is important for the development of digital skills is their embeddedness in the areas of education, training and overall labour market. Balkan Barometer Analytical Report on Public Opinions 2020 finds growing awareness of digitalisation's potential by an increasing number of region's residents. While still relatively modest, the number of respondents pursuing training in information and communications technologies has grown steadily.[51] In Kosovo*, 24% use the internet for education. Most usual topics of training in information technology are computer use, software or applications, and learning about social media or data analysis. The most frequent learning method is online and self-study, with less training provided in the workplace. The RCC Balkan Barometer Business Opinion Report 2020 points out that employment and education are areas whose importance will grow over the next period. The report highlights that almost 80% of managers in the region stresses that digital skills are essential for conducting their businesses.[52] Additionally, it is estimated that the output of the universities is insufficient in terms of quality and quantity. IT companies have to invest substantially in university graduates because their skills profile does not match market requirements. There is a mismatch between curricula and the requirements of companies. Kosovo* has the youngest population in Europe, which gives this economy an excellent potential for development, according to World Bank analysis[53].

Broader ecosystems which could be considered as drivers of digitalisation development in any economy are the SME and start-up ecosystems. OECD points out that as with other parts of Europe, small and medium-sized enterprises (SMEs) and entrepreneurs are key drivers of inclusive and sustainable growth, job creation, skills development, and innovation for the Western Balkans.[54] Developing a dynamic and competitive SME sector has become even more of a priority for Kosovo* in its EU integration process. OECD notes that Kosovo* has made good progress in supporting SMEs in the digital economy. The Economic Reform Programme 2019-2021 reflects the importance of SMEs in the digital economy, and the Ministry of Economic Development is looking to implement a project to broaden access to and use of ICT. A positive pattern has been the wide range of training on digital skills made available to SMEs, including online training, the costs of which are partly covered by the Ministry of Innovation and Entrepreneurship.[55] Furthermore, the skills gap between education/training and labour market needs remains a binding constraint for growth and employment.[56]

The infrastructure is developing day-to-day with a growing number of start-ups, entrepreneurs, and other actors contributing to building this path. The cooperation between relevant CSOs, universities, and government bodies is increasing. It's pertinent to say that the start-up ecosystem needs to follow models from developed economies to grow in the

51 RCC Balkan Barometer, Public Opinion, Analytical Report, 2020, available at https://www.rcc.int/pubs/95/report-on-the-preparation-of-post-2020-strategy-in-the-western-balkans (Accessed 5 January 2021).

52 RCC Balkan Barometer, Business Opinion, Analytical Report, 2020, available at https://www.rcc.int/pubs/95/report-on-the-preparation-of-post-2020-strategy-in-the-western-balkans (Accessed 5 January 2021).

53 Work Bank, 2019, "Job Opportunities for Youth in Kosovo: Two steps forward one step back?", available at https://www.worldbank.org/en/news/opinion/2019/03/15/job-opportunities-for-youth-in-kosovo-two-steps-forward-one-steback (Accessed 5 January 2021).

54 OECD, 2019, SME Policy Index: Western Balkans and Turkey 2019, available at https://www.oecd-ilibrary.org/docserver/g2g9fa9a-en.pdf?expires=1604417205&id=id&accname=guest&checksum=141C9B068B61BC03B2E4B3CCED110603 (Accessed 5 January 2021).

55 ibid. p. 333

56 ibid. p.56.

following years, especially in the R&D sector[57]. With an increasing number of start-ups, entrepreneurs, and different events, the ecosystem scene shows signs of development. A lot of start-ups have managed to raise funds from foreign and local capital. Nevertheless, stronger cooperation among relevant stakeholders and the government would strengthen collaboration within the community in developing new innovative products and services.

Strategic documents overview

The Government approved the National Development Strategy 2016-2021 (NDS) of Kosovo*[58] in January 2016. The primary purpose of this document is to establish a clear plan for the European Integration of Kosovo* in all areas. Nevertheless, digital skills are not seen as part of a specific intervention in the Strategy. In terms of education, the measures set out will allow for inclusion of children age 0-6 in pre-school programmes, enhance the quality of teaching at the primary and secondary level and establish stronger connection between the curricula and labour market needs.

Kosovo* Economic Reform Programme 2019-2021[59] comprises seven structural reform priority areas: education and skills, research, development and innovation, and the digital economy, employment, and labour market. The education and skills priority reform seeks to increase vocational education and training based on labour market requirements by developing new occupational standards and reviewing curricula based on the business sector dialogue. Digital skills are not a specific part of this document but are presumably included under the general definition of "skills". Digital economy has been named a critical sector for Kosovo*'s economic development. ICT holds significant growth; however, ICT promotional policies are relatively modest compared to other regional economies.

Kosovo* IT Strategy 2016-2020[60] is a core document composed of 9 strategic pillars. This Strategy was conceived at the same time as a strategic guideline and roadmap. Its vision is to "promote digital transformation and supporting Kosovo* in becoming a knowledge-based economy." The focus of Kosovo* IT strategy is on software and IT service. Pillar 5 of this Strategy is dedicated to improving IT education and promoting Kosovo*'s HR excellence. This strategic pillar is directed toward fostering education and human resources by continuously improving IT education in Kosovo* on the primary, secondary, and mainly tertiary levels. The pillar also foresees that "Special emphasis needs to be placed to aligning IT curricula with the specific needs of the private sector and to fostering close cooperation between the universities and the IT industry."

The Electronic Communications Sector Policy 2013-2020 (Digital Agenda)[61], on the other hand, is a vital instrument which identifies and addresses three problematic areas: ICT infrastructure development, development of electronic content and services and promotion of their use, and enhancement of Kosovo* residents' ability to use the ICT.

57 Startup Ecosystem in Kosovo*, 2019, available at https://startupeurope.network/ecosystems/xk (Accessed 5 January 2021).

58 Kosovo*, Office of the Prime Minister, 2016, National Development Strategy 2016-2021, available at https://kryeministri-ks.net/repository/docs/National_Development_Strategy_2016-2021_ENG.pdf (Accessed 5 January 2021).

59 Economic Reform Programme, Kosovo*, 2019-2021, available at https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/erp_2019-2021.pdf (Accessed 5 January 2021).

60 Kosovo*, Information Technology Strategy, available at https://mzhe-ks.net/repository/docs/IT_Strategy.pdf (Accessed 5 January 2021).

61 Kosovo*, Office of the Prime Minister, 2013, Electronic Communication Sector Policy 2013-2020, available http://www.kryeministri-ks.net/repository/docs/Electronic_Communication_Sector_Policy_2013-2020.pdf (Accessed 5 January 2021).

Since 2018, Kosovo* has a National Strategy for Innovation and Entrepreneurship (2019-2023)[62] in place with the vision for the economy to base its economic competitiveness on the effective use of knowledge, creativity and innovation, be recognised internationally as a digitally oriented centre and regionally for its innovation and scientific research with economic effects, and become a centre of regional development of the digital economy.

Kosovo* began implementing smart specialisation in 2018[63]. The recommendation is to create an intelligent specialisation strategy to underpin national research and innovation strategies and policies. Besides, Kosovo* has an Information Technology Strategy which focuses on innovation, among other areas. **The institutional framework has become conducive to fostering innovation in enterprises.** The establishment of the Ministry for Innovation and Entrepreneurship in 2017 has underpinned the institutional framework for streamlining innovation in policymaking. Although its operational portfolio is still narrow, the ministry now has significant resources for rolling out new instruments to foster innovation and establishing innovation centres across the economy as reported in the OECD SME Policy Index for Western Balkans and Turkey 2019[64].

The European Commission Annual Report on Kosovo* 2020[65] finds that Kosovo*'s research, development and innovation system is underdeveloped and underfinanced. Public research spending is virtually non-existent. While the Law on Research and Scientific Activities envisages EUR 14 million in annual funding, the budget allocation in 2019 stood at only EUR 1.6 million. A good example is recent initiative of the Ministry for Innovation and Entrepreneurship to sign agreements with the municipality of Ferizaj/Uroševac and the University of Pristina to establish two centres for innovation and entrepreneurship which would bridge academia and the private sector.

Strategic / emerging industries overview

Based on the analysis of the available strategic documents, as well as the available body of data and information from different statistical databases and studies, the following strategic and emerging industries and sectors have been identified in Kosovo*:

- Information technology
- Creative industries
- Agriculture and livestock
- Energy and mining
- Vineyards
- Textile

62 Kosovo*, National Strategy for Innovation and Entrepreneurship, 2019-2023, available at https://konsultimet.rks-gov.net/Storage/Consultations/15-02-29-24122018/1.%20Strategjia%20Kombetare%20per%20Inovacion%20dhe%20Ndermarresi_Shqip.pdf (Accessed 5 January 2021).

63 European Union, Smart Specialisation Platform, available at https://s3platform.jrc.ec.europa.eu/en/web/guest/ (Accessed 5 January 2021).

64 OECD, 2019, SME Policy Index: Western Balkans and Turkey 2019, available at https://www.oecd-ilibrary.org/docserver/g2g9fa9a-en.pdf?expires=1604417205&id=id&accname=guest&checksum=141C9B068B61BC03B2E4B3CCED110603 (Accessed 5 January 2021).

65 European Commission, Kosovo* Annual Report 202, available at https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/kosovo_report_2020.pdf (Accessed 5 January 2021).

- Construction
- Tourism
- Banking
- Communication

Using the framework developed for this study for readjusting identified industries into unified industry categories of industries and sectors across the Western Balkan region, as well as supplementing the desk review findings with inputs received through interviews with relevant stakeholders in the economy, the following prioritisation table has been developed for Kosovo*:

Strategic / emerging industry or sector	Total score	Priority
Creative Industries	18 points - 90%	1
Tourism, accommodation and related services	17 points - 85%	2
Agriculture, food and beverage (organic food production, standard food production, fishery, wine production, agriculture)	16 points - 80%	3
Banking and finance*	15 points - 75%	2
Telecommunications*	14 points - 70%	5
Energy	14 points - 70%	6
Heavy industry	14 points - 70%	7
Construction	13 points - 65%	8
Manufacturing and processing	12 points - 60%	9
Transport – auto, railway, aviation	12 points - 60%	10
Healthcare	10 points - 50%	11
Electrical equipment	10 points - 50%	12
INDUSTRIES-ENABLERS	Comment	
ICT – software development and outsourcing	Enabler and accelerator for digitalisation of other industries	
E-commerce	Enabler and accelerator for digitalisation of other industries	
SME, Start-ups, Entrepreneurship, Innovation	Enabler and accelerator for digitalisation of other industries	
OUTLIER SECTORS/Target Group	Comment	
Public administration, e-Government	Strategic sector for accelerating digitalisation on a nation-wide scale	
Education	Strategic sector for accelerating digitalisation on a nation-wide scale	

*Due to its high level of digital maturity it is seen more as an industry supporting digitalisation development

Key stakeholders overview

Based on the analysis of the available strategic documents, as well as the identified strategic and emerging industries and sectors, the following key stakeholders have been identified in Kosovo*:

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Ministry of Economy and Environment	ALL	Government and policy makers/ strategy development	Both	High
Ministry of Education and Science and Technology	Education and skills and ICT	Government and policy makers/ strategy development	Both	High
Ministry of Finance	Banking and finance and related	Government and policy makers/ strategy development	Both	High
ASHI	ICT and telecommunications	Government and policy makers/ strategy development	Demand	High
Centre for Innovation and Technology Transfer	ICT and telecommunications	Resource centre, skills development, funding, networking	Both	High
Centre for Higher Education, Research and Technology Cooperation	All	Policy implementer/research and academia/links to business	Both	Medium
Innovation Centre Kosovo*	ICT and telecommunications	Resource centre, skills development, funding, networking	Supply	High
STIKK	ICT and telecommunications	Resource centre, skills development, funding, networking/umbrella organisation	Supply	High
Start-ups/Accelerators: Bonevet, Gjirafa Inc, Hello, Decissio, Solaborate, Hum App, Formon	ICT and telecommunications	Resource centre, skills development, funding, networking	Demand	High
Kosovo* Investment and Enterprise Support Agency	ALL	Policy implementer	Both	Medium
Universities: University of Prishtina; Riinvest; Universum	ALL	Resource centre, skills development, funding, networking	Supply	High
ShkollaDixhitale&StarLabs.dev	ICT and telecommunications	Resource centre, skills development, ICT outsource	Both	Medium
Chamber of Commerce	ALL	Business umbrella organisation	Demand	High
Internet Project Kosovo* Foundation IPKO	ICT and telecommunications	Resource centre, skills development, funding, networking	Demand	High
Youth Online and Upward (YOU) Program	ICT and telecommunications	Resource centre, skills development, funding, networking	Demand	High
Kosovo* Digital Economy (KODE)	ICT and telecommunications	Resource centre, skills development, funding, networking	Demand	High

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Women in Online Work (Wow)	ICT and telecommunications	Resource centre, skills development, funding, networking	Demand	High
Growth in Rural Areas of Kosovo* Technical Assistance Programme.	Agriculture and related	Resource centre, skills development, funding, networking	Demand	High

Key target groups overview

Based on the analysis of the available strategic documents, the identified strategic and emerging industries and sectors, as well as the identified key stakeholders, the following key target groups have emerged as the ones to be assessed in Kosovo*:

- HR experts / managers from the identified strategic and emerging industries and sectors.
- Domain experts from the identified strategic and emerging industries and sectors.
- Employees, owners and executives in the SMEs operating within the identified strategic and emerging industries and sectors.
- In case education is a sector to be assessed the target group will include: Teachers and professors (elementary schools, high-schools and higher education institutions) Youth – elementary schools' pupils, high-school pupils and students
- Public administration employees (special attention may be given to employees dealing with e-government, e-services and healthcare).
- Founders and employees of start-ups from the identified strategic and emerging industries and sectors (especially the ones not dealing with technology as a priority).
- Women (capable of work according to official methodologies), especially within the identified strategic and emerging industries and sectors.
- Consumers.

Key takeaways and findings

- Current policy framework does not have a specific focus on digital skills.
- There is a lack of national coordination on digital skills.
- There is a window of opportunity for digital skills agenda considering that the IT strategy as well as Kosovo* Digital Agenda will be reviewed in 2021 and a new Digital Agenda will be drafted.
- Increased policy focus on skills, employment, innovation and entrepreneurship.
- Limited funding available, mostly donor supported projects.
- Increasing and vibrant start-ups ecosystem.
- Young workforce and very well-equipped with IT skills and technology – savvy.

MONTENEGRO

General information and overview

Three basic indicators which provide a general overview of the current level of overall digital readiness for a specific economy are: level of internet usage, level of internet access in the households and level of overall digital skills. According to official Eurostat data[66], the percentage of individuals who have used internet at least once in 12 months in Montenegro was 76% in 2019, marginally increasing from 74% in 2018 and 73% in 2017. This percentage represents a medium value among the Western Balkan economies. The percentages are almost the same when it comes to Eurostat data[67] of households with internet access -74% of households in Montenegro had internet access in 2019, increasing from 72% in 2018 and 71% in 2017. Again, these values put Montenegro in the medium tier of Western Balkan economies.

However, looking at the overall digital skills data the outlook is slightly different. According to official Eurostat data[68], the level of digital skills for individuals in Montenegro is high compared to other economies in the Western Balkans, and close to the levels found in the European Union member states. However, data within this area is relatively poor and it can be found only for the year 2017, making the results isolated and somewhat difficult to compare. Looking at the percentage of individuals with basic or above basic digital skills, Montenegro ranks the highest among the Western Balkan economies – there were 50% of individuals within this category in 2017. Comparatively, the EU average was 57%. The percentage of the ones with basic digital skills was 35%, while the percentage of individuals with above basic digital skills is on average for the Western Balkan economies – 14% of individuals in Montenegro belonged to this category in 2017. Individuals classified as having low digital skills accounted for 22% in 2017, compared to the EU average of 29%, and this is the lowest percentage among the Western Balkans. Percentage of individuals who have above basic software skills is the highest in the Western Balkan and stood at 34% in 2019 (the only data available for this year in Montenegro). Comparatively, the EU level was at 39%.

Another indicator which is important to the development of digital skills is their embeddedness in the areas of education, training and overall labour market. Balkan Barometer Analytical Report on Public Opinion 2020 finds growing awareness of digitalisation's potential by region's residents. While still relatively modest, the number of respondents pursuing training in information and communications technologies has grown steadily.[69] In Montenegro, 36% use the internet for education. Most usual topics of practice in information technology are e-commerce, social media, programming and data analysis. The most frequent learning method is free online training and training provided in the workplace. The RCC Balkan Barometer Business Opinion Report 2020 points out that employment and education are areas whose importance will grow over the next period. The report highlights that for 44% of companies from Montenegro digital skills are very important, while 41% of

66 https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IFP_IU/default/table

67 https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IN_H/default/table

68 https://ec.europa.eu/eurostat/databrowser/view/ISOC_SK_DSKL_I__custom_355577/default/table

69 RCC Balkan Barometer, Public Opinion, Analytical Report, 2020 (https://www.rcc.int/download/docs/2020-06-Balkan-Barometer-Public-Opinion_final.pdf/bf27f9fc10de8a02df9db2b60596f0cd.pdf)

companies state that digital skills are somewhat important. The sum of these percentages is the second highest among the Western Balkan economies.[70] Additionally, since 2012, the working-age population (15-64 years) remained almost stagnant, whereas the activity rate rose by 9 percentage points (10 percentage points for men and 7.7 percentage points for women). Between 2012 and 2019, employment grew by almost a quarter: 46,200 new jobs were created. Over this period, **employment gains were reported mainly in high-skill sectors, such as finance, ICT, and other sophisticated services**[71].

Broader ecosystems which could be considered as drivers of digitalisation development in any economy are the SME and start-up ecosystems. The need to constantly stimulate and strengthen the SME sector is one of the key pillars of rapid economic development of Montenegro. According to OECD SME Policy Index: Western Balkans and Turkey 2019[72], in 2017, there were 30,238 SMEs in Montenegro, making up 99.8% of the total business sector. Breakdown of Montenegrin enterprises is as follows: 94.4% micro enterprises, 4.5% small enterprises, 0.9% medium-sized enterprises and just 0.2% large enterprises. In total, 106,014 people were employed by SMEs in Montenegro in 2017, representing 80.1% of total business sector employment. SMEs contribution to the business sector's value added increased from 64.5% in 2013 to 70.5% in 2016, much higher than the EU average where SMEs only accounted for 56.8%. The most striking development between 2013 and 2016 in the SME sector in Montenegro was in SMEs share of exports, which increased by 19.6 percentage points to reach 75.3% of all exports in 2016.

However, according to the Ministry of Economy analysis from 2019[73], Montenegrin start-up ecosystem is at an early stage of development and without a completed infrastructure that would make Montenegro an attractive start-up destination in the short-term. Also, there is a need for specialisation and training of young and highly skilled staff, as well as the creation of a better and more stimulating legal and investment environment for the development of start-up companies. The incentives provided by the Government of Montenegro to the SME sector are not designed for the specific needs of start-ups and do not include incentive measures such as organising necessary IT specialisations, setting up accelerators, co-working spaces, competitions for start-ups, mentoring, etc.

Strategic documents overview

New Government in Montenegro was formed in early December 2020. Government has 12 ministries based on seven pillars: **green economy, digital transformation, regional cooperation and connectivity, improving competitiveness, social protection, equal social opportunities and good governance**, with EU integration as cross-cutting pillar. The Government Programme[74] proclaimed that it will support **manufacturing and processing industry, food production, IT sector, tourism** and other aspects of economic development which are sustainable and inclusive, based on innovation and knowledge. **Digital transformation** is established as a second out of the seven pillars of the new government programme.

70 RCC Balkan Barometer, Business Opinion, Analytical Report, 2020 (https://www.rcc.int/download/docs/BB2020_Business.pdf/c9831b5b9c198991f8da4efcf20bf13a.pdf)

71 https://wiiw.ac.at/western-Balkan-labor-market-trends-2020-dlp-5300.pdf

72 https://www.oecd.org/publications/sme-policy-index-western-Balkan-and-turkey-2019-g2g9fa9a-en.htm

73 https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2019/Telecom19/3.%20Ratka%20Strugar.pdf

74 https://zakoni.skupstina.me/zakoni/web/dokumenta/zakoni-i-drugi-akti/22/2386-13978-00-33-20-1-1.pdfhttps:/zakoni.skupstina.me/zakoni/web/dokumenta/zakoni-i-drugi-akti/22/2386-13978-00-33-20-1-1.pdf

Consequently, the approach which is adopted calls for smart growth by investing into education, innovations and development of new products by using ICT and new digital society tools. Digitisation is particularly proclaimed in the context of transparency and efficiency of the public sector by establishing a new **Ministry of Public Administration, Digital Society and Media** which should have a role in all these sectors. The programme also provides that the **Ministry of Economic Development** has a goal to establish Montenegro as an attractive and safe investment location in order to promote industry, SMEs, tourism and IT sector concluding that strategic commitment of Montenegro rests on knowledge society focusing on information technologies, digital transformation and smart approach. Therefore, it seems that competence over digital transformation and digital skills will be divided between these two ministries and **Ministry of Education, Science, Culture and Sports**.

The Strategy for Development of Vocational Education in Montenegro 2020-2024 with the Action Plan 2020-2022[75] **(VET Strategy) recognises the importance of digital skills in various contexts.** According to the VET Strategy digital skills should be widely integrated in VET programmes. Facing mismatch between the skills and knowledge and the challenge of the need for improving labour force skills resulting from the changes in the market labour demands in the school year 2017/2018 a new concept of **dual education** was introduced.

Montenegro 2020 Progress Report[76] noted that implementation of the national qualifications framework (referenced to the European qualifications framework in 2014) and moving to a learning outcomes approach prove demanding, as evidenced also by the persisting skills mismatch with labour market needs. Proper implementation of the Strategy is expected to be an important element moving forward, given its focus on providing quality and inclusive education geared towards the labour market, and the need for green and digital skills.

The Information Society Development Strategy 2020[77] was enacted in 2016. It focuses, among others, on e-business, e-education and e-health with special focus on e-inclusion, e-government and R&D. Although the Information Society Development Strategy was valid until 2020 no specific information could be gathered during this analysis on the process of preparation of the new Strategy. That might be the case because the Ministry of Public Administration in the first half of 2020 commenced the process of preparing **Digital Transformation Strategy 2021-2025** by inviting interested parties to submit proposals and suggestions. As of May 2020, time by which the Report was open for consultation[78], no additional information on the progress of preparation of this strategy has been published.

Montenegro Economic Reform Programme 2020-2022 (MERP) presents economic policy for the medium term as a basis for economic dialogue with the European Commission in the EU integration process. Sustainable and inclusive economic growth is proclaimed as the strategic development objective while Montenegro's priority reform measures in the MERP which can be linked to digital skills are: **energy and transport** market reform, research, development and innovation **(RDI) and digital economy, education and skills, and**

75 Strategy for the Development of Vocational Education in Montenegro 2020-2024 with the Action Plan 2020-2022 (https://mps.gov.me/ResourceManager/FileDownload.aspx?rid=395479&rType=2&file=Strategija%2520razvoja%2520strucnog%2520obrazovanja%2520u%2520Crnoj%2520Gori%2520.docx)

76 https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/montenegro_report_2020.pdf

77 Strategy for the Information Society Development 2020 (https://mju.gov.me/ResourceManager/FileDownload.aspx?rid=364356&rType=2&file=Strategy%2520for%2520the%2520information%2520society%2520development%25202020.pdf)

78 Report on consultation (http://eusluge.euprava.me/eParticipacija/GetFile.aspx?Id=628)

employment and labour market. The following reform measures are specified in MERP for the areas of industry, agriculture, tourism and financial services: support to **technological modernisation of manufacturing industry**; support to **investments in food production** sector with the aim of boosting competitiveness; and **diversification of tourism product**.

Montenegro Development Directions 2018-2021[79] (MDD) reflect the Government policy to create an environment for implementation of projects, especially in the **tourism** and **energy sectors**, according to a model that does not imply Government's participation in providing the funds as well as government's commitment to expand and improve transport infrastructure. Strengthening of policies, namely implementation of measures within the development direction of inclusive growth, due to their nature, is mainly supported or financed by the budget funds. In order to implement the strategic development goals, four priority sectors of development have been formally established: **tourism, energy, agriculture and rural development and manufacturing**.

The Industrial Policy of Montenegro 2019-2023[80] (IP 2023) provides evidence of gradual changing of the structure of Montenegro economy, from the over industrialised and rigid to open, service oriented economy with the development model based on FDI and strengthening of service sector (which has the highest employment rate growth). IP 2023 identifies **insufficient level of digitalisation in business operations** at the enterprise level as one of the key problems linked to its goal "Stimulating innovation, technology transfer, and development of entrepreneurship". As one of the areas of intervention it proposes stimulating digital transformation of business.

Implementation of the programme of support to SME entails implementation of priority activities set out in the Strategy for Development of Micro, Small and Medium-sized Enterprises 2018-2022[81] (MSME Strategy), MDD[82] and policy recommendations given in the EU Small Business Act – SBA.MSME Strategy proclaims development of entrepreneurial knowledge, skills and competencies as its third goal with the following specific objectives: entrepreneurial competencies in education system, capacity building of business services providers and promotion of life-long learning amongst entrepreneurs. MSME Strategy also establishes operational goal (no. 6) on digital transformation which includes measures on promotion of digital and support to digital transformation and e-commerce.

Montenegro Smart Specialisation Strategy (S3)[83] is enacted for the period 2019-2024 and is based on three key strategic directions: Healthy, Sustainable and Digitalised Montenegro. The Strategy identifies **tourism**, **construction**, and **transport** as the **key growth sectors** while the main driver of the economic growth in the coming period will be strong capital investment activities as well as investments in the area of **tourism**, **energy** (for example, construction of a solar power plant in Briska Gora), **telecommunications**, etc. However, given that **transport, construction and financial services do not have an export component,** they are generally less qualified to be economic priorities. A statistical overview and analysis of national economy data shows that specialised sectors with strong economic potential are: **agriculture and food, energy, ICT, manufacturing industry, medicine and quality of life, construction and tourism**. However, given that the construction sector accounts for the highest growth recorded (8.8%) compared to all industrial sectors, it justifiably finds its place among the priority business sectors. ICT is the main sector in terms of outgoing I&R&D parameters for Montenegro followed by the environment, health and wellbeing, as well as better societies. The final priority domains determined by the S3 are:

1. Sustainable agriculture and food value chain,
2. Energy and sustainable environment,
3. Sustainable and health tourism – as vertical priorities, and
4. Information and Communication Technologies – as horizontal priority.

Strategic / emerging industries overview

Based on the analysis of the available strategic documents, as well as the available body of data and information from different statistical databases and studies, the following strategic and emerging industries and sectors have been identified in Montenegro:

- Tourism
- Services
- ICT industry
- Healthcare
- Food production
- Energy sector (especially renewable energy)
- Metals, wood and stone industry
- Construction
- Public administration / E-government / E-services
- SME sector

Using the framework developed for this study for readjusting identified industries into unified industry categories of industries and sectors across the Western Balkan region, as well as supplementing the desk review findings with inputs received through interviews with relevant stakeholders in the economy, the following prioritisation table has been developed for Montenegro:

Strategic / emerging industry or sector	Total score	Priority
Tourism, accommodation and related services	18 points - 90%	1
Creative industries	16 points - 80%	1
Agriculture, food and beverage (organic food production, standard food production, fishery, wine production, agriculture)	15 points - 75%	3

79 Montenegro Development Directions 2018-2021 (https://www.mif.gov.me/ResourceManager/FileDownload.aspx?rId=312995&rType=2)

80 Industrial policy of Montenegro 2019-2023 (https://mek.gov.me/ResourceManager/FileDownload.aspx?rid=385869&rType=2&file=Industrial%2520Policy%25202019-2023.pdf)

81 Strategy for the Development of Micro, Small and Medium-sized Enterprises 2018-2022 (https://www.gov.me/ResourceManager/FileDownload.aspx?rId=325628&rType=2)

82 Montenegro Development Directions 2018-2021 (https://www.mif.gov.me/ResourceManager/FileDownload.aspx?rId=312995&rType=2)

83 https://mna.gov.me/en/ministry/Smart_Specialisation/

Strategic / emerging industry or sector	Total score	Priority
Healthcare	15 points - 75%	3
Electrical equipment	14 points - 70%	5
Manufacturing and processing	14 points - 70%	5
Energy	14 points - 70%	5
Transport - auto, railway, aviation	12 points - 60%	8
Construction	12 points - 60%	8
Telecommunications*	12 points - 60%	8
Banking and finance*	11 points - 55%	11
Heavy industry	9 points - 45%	12
INDUSTRIES-ENABLERS	Comment	
ICT – software development and outsourcing	Enabler and accelerator for digitalisation of other industries	
E-commerce	Enabler and accelerator for digitalisation of other industries	
SME, Start-ups, Entrepreneurship, Innovation	Enabler and accelerator for digitalisation of other industries	
OUTLIER SECTORS/Target Group	Comment	
Public administration, e-Government	Strategic sector for accelerating digitalisation on a nation-wide scale	
Education	Strategic sector for accelerating digitalisation on a nation-wide scale	

*Due to its high level of digital maturity it is seen more as an industry supporting digitalisation development

Key stakeholders overview

Based on the analysis of the available strategic documents, as well as the identified strategic and emerging industries and sectors, the following key stakeholders have been identified in Montenegro:

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Government of Montenegro	All	Body of executive authority in Montenegro	Both	High
Ministry of Public Administration, Digital Society and Media	All (ICT, Public Administration, e-government, Creative Industries)	Preparation and development of strategic and planning documents in the field of Public Administration, Digital Transformation and Media	Supply	High
Ministry of Education, Science, Culture and Sports	Education and ICT	Preparation and development of strategic and planning documents in the field education and science	Supply	High
Ministry of Economic Development	Tourism, E-Commerce, Creative Industries, Electrical equipment, Manufacturing, SMEs	Preparation and development of strategic and planning documents in the field of economy	Supply	High
Ministry of Agriculture, Forestry and Water Management	Agriculture, Green Energy	Preparation and development of strategic and planning documents in the field of agriculture	Supply	Medium
Ministry of Health	Healthcare	Preparation and development of strategic and planning documents in the field of health	Supply	Medium
Ministry of Ecology, Planning and Urbanism Ministry of Capital Investments	Green Energy	Preparation and development of strategic and planning documents in the field of ecology and energy	Supply	Low
Business associations (Chamber of Economy of Montenegro, Montenegro Business Alliance, American Chamber of Commerce Montenegro, Montenegrin Foreign Investors Council, Association of Montenegro Managers, Montenegrin Employers Federation, Engineering Chamber of Montenegro, Montenegrin Medical Chamber, Pharmaceutical Chamber of Montenegro, Dental Chamber of Montenegro, Chamber of Physiotherapists	ALL – SME	Improving the business and economy environment, improving entrepreneurship	Demand	Low

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Start-up community (Technopolis - The Innovation and Entrepreneurship Centre, M:tel Digital Factory, MEBAN (Montenegro Business Angels Network), Digitalizuj.me, Foundation Young Innovators MN, Innovation Centre Porto Montenegro, Business Incubator Cetinje)	All - ICT, SME, Creative Industry	Improving business environment and capacities of SMEs, ICT and Creative Industry	Both	High
Academia, formal and non-formal education institutions	All	Providing education in the fields of ICT, digitalisation, business, economy, technology to different target groups	Supply	Medium
Sector representatives - Tourism: National Tourism Organisation of Montenegro, Local Tourism Organisations of Montenegro, Health Tourism Cluster, hotels and resorts, travel agencies, public and private health institutions, spa and wellness centres and pharmaceutical companies, Public Company for Coastal Zone Management, Public Company National Parks, Public Company Ski Resorts of Montenegro	Tourism, Healthcare	Improving business environment and capacities of tourism and health tourism	Demand	Medium
Sector representatives - Agriculture: National Association of Beekeepers, Association of Olive Producers Boka - Ulcinj, National Association of Vine-growers and Wine-makers, Cluster of registered cheese producers, Cluster of small wineries, Cluster of fisheries, Cluster of olive producers, Montenegrin prosciutto cluster, Raspberry producers cluster	Agriculture	Improving business environment and capacities of agriculture sector	Demand	Medium
Sector representatives - Environment: Association of Oil Companies of Montenegro, Association of Concessionaires of Small Hydro Power Plants	Environment	Improving business environment and capacities of environment	Demand	Medium
Cultural institutions: libraries, museums, archives, institutes for protection of cultural heritage	Tourism, Creative Industries	Holders of cultural heritage which could be digitised and used in different contexts	Demand	Low

Key target groups overview

Based on the analysis of the available strategic documents, the identified strategic and emerging industries and sectors, as well as the identified key stakeholders, the following key target groups have emerged as the ones to be assessed in Montenegro:

- HR experts / managers from the identified strategic and emerging industries and sectors;
- Domain experts from the identified strategic and emerging industries and sectors;
- Employees, owners and executives in the SMEs operating within the identified strategic and emerging industries and sectors;

- In case education is a sector to be assessed the target group will include Teachers and professors (high-schools and higher education institutions);
- Public administration employees (special attention may be given to employees dealing with e-government, e-services and healthcare);
- Secondary: founders and employees of start-ups from the identified strategic and emerging industries and sectors (especially the ones not dealing with technology as a priority).

Key takeaways and findings

- Strategic priorities of the new Government in Montenegro include digital transformation and regional cooperation and connectivity.
- There is no indication of the preparation of the Digital Skills Strategy.
- Montenegro enacted numerous strategies and programmes in the field of Economic Development, Education, Employment, Information Society, etc., which are relevant for digital skills but mainly with limited prioritisation of sectors.
- Smart Specialisation Strategy is relevant because it provides a good and relevant example of prioritisation of sectors.
- SMEs dominate the economy's business sector. The start-ups ecosystem is still young and under development.
- High dependence on tourism, evidenced during the pandemic period.

REPUBLIC OF NORTH MACEDONIA

General information and overview

Three basic indicators which provide a general overview of the current level of overall digital readiness for a specific economy are: level of internet usage, level of internet access in the households and level of overall digital skills. According to official Eurostat data[84], the percentage of individuals who have used internet at least once in 12 months in the Republic of North Macedonia was 82% in 2019, marginally increasing from 81% in 2018 and 76% in 2017. This percentage is the second highest among the Western Balkan economies. Eurostat data[85] also shows that the percentage of households with internet access was 82% in 2019, increasing from 79% in 2018 and 74% in 2017 which again rates amongst the highest in the Western Balkan economies.

Despite very solid indicators related to internet penetration and usage, according to official Eurostat data[86], the level of digital skills for individuals is average compared to other economies in the Western Balkans and the European Union member states. Data within this area is rich and it can be found for years 2015, 2016, 2017 and 2019. Looking at the percentage of individuals with basic or above basic digital skills, the Republic of North Macedonia is

84 https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IFP_IU/default/table

85 https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IN_H/default/table

86 https://ec.europa.eu/eurostat/databrowser/view/ISOC_SK_DSKL_I__custom_355577/default/table

ranked in the middle – there were 32% of individuals within this category in 2019, a stable level throughout the five-year period observed. Comparatively, the EU average was 57%. The percentage of the ones with basic digital skills is where the Republic of North Macedonia is on average with the WB economies standing at 16% in 2019. The percentage of individuals with above basic digital skills is also on average for the Western Balkan economies – 15% of individuals in the Republic of North Macedonia belonged to this category in 2019. Individuals classified as having low digital skills accounted for 50% in 2019, compared to the EU average of 29%, and this is the second highest percentage among the Western Balkans and a steep increase compared to previous years. Percentage of individuals who have above basic software skills is the second lowest among the Western Balkan economies at 20% in 2019. Comparatively, the EU level was at 39%.

Another indicator which is important for the development of digital skills is their embeddedness in the areas of education, training and overall labour market. Balkan Barometer Analytical Report on Public Opinions 2020 finds growing awareness of digitalisation's potential by region's residents. While still relatively modest, the number of respondents pursuing training in information and communications technologies has grown steadily.[87] In the Republic of North Macedonia, 35% use the internet for education. Most usual topics of practice in information technology are social media, data analysis and other fields of use such as computers, software or applications. The most frequent learning method is training provided in the workplace and free online training. The RCC Balkan Barometer Business Opinion Report 2020 points out that employment and education are areas whose importance will grow over the next period. The report highlights that digital skills are very important for 24% of companies from the Republic of North Macedonia, while 39% of companies state that digital skills are somewhat important. The sum of these percentages is the second lowest among the Western Balkan economies.[88]

Broader ecosystems which could be considered as drivers of digitalisation development in any economy are the SME and start-up ecosystems. In the Republic of North Macedonia[89], SMEs play an important role in the non- financial business economy. In 2017, they generated roughly three out of four jobs (74.2%) and nearly two-thirds (63.4%) of total value added. One of the fastest growing SME sectors in the Republic of North Macedonia in 2012-2017 was information and communication. SMEs in this sector generated striking value-added growth of 64.4%, and even higher employment growth of 65.9%. Another fast-growing SME sector was professional activities, which generated increases of 40.1% in value added and 41.8% in employment in the same period.

The start-up and innovation ecosystem in the Republic of North Macedonia is in its initial stage of development and it is increasing. Government's commitment to the innovative economy is reflected in the latest strategic document: Government Work Programme 2020-2024,[90] where the innovation sector is recognised as bringing value, transforming economy, and developing human resources at higher wages. So far, the driving force of the sector were associations, such as Start-up Macedonia that helps networking between

87 RCC Balkan Barometer, Public Opinion, Analytical Report, 2020 (https://www.rcc.int/download/docs/2020-06-Balkan-Barometer-Public-Opinion_final.pdf/bf27f9fc10de8a02df9db2b60596f0cd.pdf)

88 RCC Balkan Barometer, Business Opinion, Analytical Report, 2020 (https://www.rcc.int/download/docs/BB2020_Business.pdf/c9831b5b9c198991f8da4efcf20bf13a.pdf)

89 https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/sba-fs-2019_north-macedonia.pdf

90 https://vlada.mk/sites/default/files/dokumenti/programme_for_work_of_the_government_for_2020-2024.pdf

start-ups, shares information about available funds and works on creating a relevant start up community, as well as other initiatives, such as FEIT and INNOFEIT that foster education and link higher education with the industry - ICT, innovation and start-up sector. The faculties having a role in fostering innovation are Technology and Metallurgic Faculty Skopje, Electro-Engineering Faculty Skopje, Information Technologies Faculty Skopje, and Machine Engineering Faculty Skopje.

Strategic documents overview

In the Republic of North Macedonia Report 2020[91] issued on 6th October 2020, the European Commission clearly highlights the reforms of the public administration as one of the key focus areas in the accession negotiations for the economy. The recommendations stress **the importance of operationalisation of the open government data portal** and the publication of data on government spending, all with the objective to ensure greater transparency and foster fight against corruption. As full membership in EU and NATO remains high priority of the Government of the Republic of North Macedonia, **the implementation of Open Government could be seen as the focal point of Government strategies**. This suggests the importance of the priority to fully implement e-Government ensuring open data and transparency.

The reforms in this area are high on the Government's agenda with the objective to build the information society, ensuring efficient and connected institutions and providing public services to citizens and businesses, to contribute to development of IT and ICT sector, and improve education and professional training for development of relevant knowledge, skills and competences. In its long-term strategy the Government has committed to form a central institution for coordinating and implementing the process of digitisation in society and IT support for public administration institutions. The reforms strategy and the plan are outlined in two documents: Public Administration Reform Strategy 2018-2022[92] and Public Administration Reform Action Plan 2018-2022[93].

The Ministry of Information Society and Administration is leading the agenda for developing and promoting the information society in the Republic of North Macedonia. Its strategy and action plans focus on the public administration reform and its digitalisation, which includes the initiatives towards: (1) creating and maintaining a register of information and communication systems and information equipment within the public administration bodies; (2) creating the integrated information and communication network, databases, interconnection and exchange of information, security aspects and infrastructure development of public institutions, legal entities and other persons entrusted by law to exercise public authority; and (3) keeping a Register of civil and public servants. These are to be supported with actions plans for training and development of civil servants as well as developing and coordinating policies related to human resource management. In addition, the Ministry is also looking to foster the introduction of international standards for information and telecommunication technologies.

The Government of the Republic of North Macedonia is also committed to the reforms in the education system and investment in innovation and information technology. This is reflected in the Strategic Plan of the Ministry of Education and Science 2020-2022[94] and in Education Strategy 2018-2025 along with the Action Plan[95].

The Ministry of Education and Science adopted the National Vocational Education and Training (VET) Strategy 2013-2020[96] and as part of its action plan fosters the importance of ICT in teaching and learning for development of digital skills of VET students in three regional VET centres (Kumanovo, Tetovo, and Ohrid). The initiatives are supported by European Training Foundation (ETF). During 2020, the ETF has been monitoring the establishment of Regional VET centres and the re-organisation of the VET schools network, developing mapping of work-based learning developments. The ETF will also provide support to the Ministry of Labour and Social Protection and the National Employment Agency in refining the employment strategic framework and enhancing skills intelligence gathering to better link VET and labour market demand.

Also, as part of the efforts, the E-school project has been implemented to enable all teachers in primary and secondary schools to introduce innovative usage of ICT and digital instructional tools in the teaching process. Back in 2019, Digital Youth Work - Past, Present, Future training was organised to raise awareness of digital competences of youth specialists and equip them with the necessary knowledge to create distance learning models. In addition, the conversion of educational materials and textbooks into e-forms is also one of the objectives in focus, which encourages domestic authors and production of materials.

One of the measures envisaged under the **Revised Operational Plan for Active Programmes and Measures for Employment and Services in the Labour Market for 2020**[97] is to support self-employment, which is one of the ways to curve the unemployment rate through grants for youth entrepreneurship. In addition, the Government has developed the National Strategy for SMEs 2018-2023 to encourage SME sector.

In the circumstances of the COVID pandemic, the Government of the Republic of North Macedonia has issued a proposal of the Operational Programme for 2020-2024[98], which further stresses the commitment to innovation and digitalisation as a requirement for sustainable growth. The Ministry of Education and Science has managed the implementation of a unified distance learning platform enabling long-distance learning to be in place for the beginning of the school year 2020/21. As part of the third package of economic measure for COVID Relief, the Ministry of Education, in cooperation with the Ministry of Information Society and Administration, provided 2.500 vouchers for digital skills training for young people under 30 years of age. Also, during the COVID pandemic, the shift has been observed in the market dynamics bringing about the emergence of e-commerce and delivery services as accompanying branch. E-commerce has absorbed the variety of other sectors, mainly retail and SMEs, and small producers of foods and goods. Given relatively low level of the overall digital skills in the economy, this area seems to be the one requiring more attention in the future. Currently, there are no strategic documents or action plans envisaging support for this area.

91 https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/north_macedonia_report_2020.pdf
92 https://mioa.gov.mk/sites/default/files/pbl_files/documents/strategies/par_strategy_2018-2022_final_en.pdf
93 https://mioa.gov.mk/sites/default/files/pbl_files/documents/strategies/ap_for_pars_2018-2022_april2018_eng.pdf
94 https://mon.gov.mk/stored/document/Strateski%20plan%20%202020-2022.pdf
95 http://mrk.mk/wp-content/uploads/2018/10/Strategija-za-obrazovanie-ENG-WEB-1.pdf
96 http://csoo.edu.mk/images/vet%20strategy_en%20-%20final.pdf
97 https://av.gov.mk/content/ОП/REVIDIRAN%20OP%2009%2009%202020.pdf
98 https://vlada.mk/sites/default/files/dokumenti/programme_for_work_of_the_government_for_2020-2024.pdf

Strategic / emerging industries overview

Based on the analysis of the available strategic documents, the following strategic and emerging industries and sectors have been identified in the Republic of North Macedonia:

- Public administration / E-government / E-services
- Education
  - Elementary ICT education
  - High-school education compatible with the needs of the labour market
  - Student education compatible with the needs of the labour market
  - Vocational trainings and career change education
  - Education technology
- ICT industry
  - Product focused ICT
  - Software development
  - Cyber security / Data protection
- SMEs
  - Entrepreneurship/start-up sector
  - Banking and financial services
  - Delivery services
- Mobile operators
- E-commerce
  - FMCG
  - SMEs
- Healthcare and health technology

Using the framework developed for this study for readjusting identified industries into unified industry categories of industries and sectors across the Western Balkan region, as well as supplementing the desk review findings with inputs received through interviews with relevant stakeholders in the economy, the following prioritisation table has been developed for the Republic of North Macedonia:

Strategic / emerging industry or sector	Total score	Priority
Agriculture, food and beverage (organic food production, standard food production, fishery, wine production, agriculture)	16 points - 80%	1
Manufacturing and processing	13 points - 65%	2
Healthcare	13 points - 65%	3
Tourism, accommodation and related services	11 points - 55%	4
Banking and finance*	11 points - 55%	5
Telecommunications*	11 points - 55%	6
Energy	9 points - 45%	7
Transport - auto, railway, aviation	8 points - 40%	8
Creative industries	7 points - 35%	9
Heavy industry	7 points - 35%	10
Construction	7 points - 35%	11
Electrical equipment	6 points - 30%	12
INDUSTRIES-ENABLERS	**Comment**	
ICT – software development and outsourcing	Enabler and accelerator for digitalisation of other industries	
E-commerce	Enabler and accelerator for digitalisation of other industries	
SME, Start-ups, Entrepreneurship, Innovation	Enabler and accelerator for digitalisation of other industries	
OUTLIER SECTORS/Target Group	**Comment**	
Public administration, e-Government	Strategic sector for accelerating digitalisation on a nation-wide scale	
Education	Strategic sector for accelerating digitalisation on a nation-wide scale	

*Due to its high level of digital maturity it is seen more as an industry supporting digitalisation development

Key stakeholders overview

Based on the analysis of the available strategic documents, as well as the identified strategic and emerging industries and sectors, the following key stakeholders have been identified in the Republic of North Macedonia:

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Ministry of Information Society and Administration	Public Administration, Education	Sets agenda objectives and leads implementation of information society, as well as enables public servants to use technology and digital tools	Both	High
Macedonian Chamber of Information and Communication Technologies MASIT	ICT, IT, Education	Supports the community of ICT companies and allows dialogue through networking	Supply	High
E-Commerce Association	ICT, SMEs, Manufacturing and Processing, Agriculture (food), Delivery	Supports the community and allows dialogue through networking	Supply	High

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Agency for Personal Data Protection	Public Administration, ICT	Implements, controls and develops regulations for data protection	Supply	Low
ICT Digital Forum	Public Administration, ICT	Promotes introduction and implementation of cyber security standards	Supply	Low
Ministry of Education and Science	Education	Sets agenda and leads implementation of digitalisation of the educational system, including providing equipment and training for teachers	Both	High
Centre for Vocational Education and Training	Education, Agriculture, Manufacturing, Tourism	Provider of vocational training at high school level	Supply	Low
Centre for Adult Education	Education, Agriculture, Manufacturing, Tourism	Provides training for adults and for career change	Supply	Medium
Agency for Quality Assurance in Higher Education	Education	Administrative tasks to ensure standards in higher education and development of information society	Supply	Medium
Bureau for Development of Education	Education	Developing educational programmes for the entire education system	Supply	Medium
Non-formal education institutions	Education, ICT, creative industries, SMEs, Start Ups and Innovation	Providing non-formal education in the fields of ICT, digitalisation, business, innovation and technology to different target groups	Supply	High
Start-up Macedonia	Education, ICT, creative industries, SMEs, Start Ups and Innovation	Provides support the start-up community and innovation through networking and education	Supply	High
Social Innovation Hub	Education, ICT, creative industries, SMEs, Start Ups and Innovation	Provides a variety of programmes and trainings, fosters social entrepreneurship and cooperation	Supply	Low
Centre for Technology Transfer and Innovations – FEIT and INNOFEIT (opened by the Faculty of Electrical Engineering and Information Technologies)	Education, ICT, innovation	Provides relevant education and connects academia, the students and the industry	Supply	High
Academic community responsible of developing IT and ICT knowledge in higher education (Technology and Metallurgic Faculty Skopje, Electro-Engineering Faculty Skopje, Information Technologies Faculty Skopje, Machine Engineering Faculty Skopje)	Education, ICT, Start Ups and Innovation	Develops relevant ICT skills and knowledge in higher education required for future development of the industry and enables network of relevant stakeholders	Supply	High
Foreign Investor Council	ICT, large companies, public administration	Provides support to business community through networking and dialogue	Supply	Medium
American Chamber of Commerce	ICT, large companies, public administration	Provides support to business community through networking and dialogue	Supply	Medium

Key target groups overview

Based on the analysis of the available strategic documents, the identified strategic and emerging industries and sectors, as well as the identified key stakeholders, the following key target groups have emerged as the ones to be assessed in the Republic of North Macedonia:

- Public administration employees (special attention may be given to employees dealing with e-government, e-services and healthcare);
- HR experts / managers from the identified strategic and emerging industries and sectors;
- In case education is a sector to be assessed the target group will include: Teachers and professors (elementary schools, high-schools and higher education institutions); Youth – elementary schools pupils, high-school pupils and students;
- Domain experts from the identified strategic and emerging industries and sectors;
- Employees, owners and executives in the SMEs operating within the identified strategic and emerging industries and sectors;
- Founders and employees of start-ups from the identified strategic and emerging industries and sectors (especially the ones not dealing with technology as a priority);
- Women (capable of work according to official methodologies), especially within the identified strategic and emerging industries and sectors;
- Vulnerable groups (minorities and people with disabilities).

Key takeaways and findings

- The implementation of e-government is the focus of public administration. There are clear strategies and action plans in place and implementation is underway.
- Digitalisation of education was in focus, and with COVID crisis it was forced to be fully implemented.
- COVID crisis has caused the emergence of E-commerce, which has spread across industries, absorbing mostly SMEs, manufacturers of food, clothing and other consumer goods.
- Cyber security is recognised as a priority and there is a strategy and action plan in place, but there is no sufficient awareness about it in the implementation phase.
- There are many initiatives linking higher education, ICT, innovation and start-up, increasing start-ups ecosystem. However, there is no official strategy by the Government to support it on larger scale.

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General information and overview

Three basic indicators which provide a general overview of the current level of overall digital readiness for a specific economy are: level of internet usage, level of internet access in the households and level of overall digital skills. According to official Eurostat data[99], the percentage of individuals who have used internet at least once in 12 months in Serbia was 79% in 2019, increasing from 75% in 2018 and 71% in 2017. This percentage represents a medium value among the Western Balkan economies. Eurostat data[100] also shows that the percentage of households with internet access in Serbia was 80% in 2019, solidly increasing from 73% in 2018 and 68% in 2017 which again rates as a medium value among the Western Balkan economies.

Additionally, according to official Eurostat data[101], level of digital skills for individuals in Serbia is high compared to other economies in the Western Balkans, and close to the levels found in the European Union member states. Data within this area is relatively poor and it can be found only for the years 2017 and 2019. Looking at the percentage of individuals with basic or above basic digital skills, Serbia ranked the highest among the Western Balkan economies in 2019 – there were 46% of individuals within this category. Comparatively, the EU average was 57%. The percentage of the ones with basic digital skills was 26%, while the percentage of individuals with above basic digital skills is the highest for the Western Balkan economies – 20% of individuals in Serbia belonged to this category in 2019. Individuals classified as having low digital skills accounted for 31% in 2019, compared to the EU average of 29%, and this is the lowest percentage among the Western Balkan in the mentioned year. Percentage of individuals who have above basic software skills is the second highest in the Western Balkan and stood at 29% in 2019. Comparatively, the EU level was at 39%.

Another indicator which is important to the development of digital skills is their embeddedness in the areas of education, training and overall labour market. Balkan Barometer Analytical Report on Public Opinions 2020 finds growing awareness of digitalisation's potential by region's residents. While still relatively modest, the number of respondents pursuing training in information and communications technologies has grown steadily.[102] In Serbia, 41% use the internet for education, and this is the highest percentage among the Western Balkan economies. Most usual topics of practice in information technology are specific software applications for work, data analysis, social media and other fields related to the use of computers, software and applications. The most frequent learning method is training provided in the workplace and free online training. The RCC Balkan Barometer Business Opinion Report 2020 points out that employment and education are areas whose importance will grow over the next period. The report highlights that for 20% of companies from Serbia digital skills are very important (second lowest among Western Balkan economies), while 58% of companies state that digital skills are somewhat important (the highest among the economies).[103]

Broader ecosystems which could be considered as drivers of digitalisation development in any economy are the SME and start-up ecosystems. SMEs dominate the Serbian business economy, accounting for 99% of all enterprises, according to the OECD data[104]. Namely, in 2018, SMEs employed more than 65% of the labour force and accounted for 57.4% of total gross value added and for 37% of total exports. Sector-specific data indicates that most SMEs belonged to the trade sector (26.0%), followed by the manufacturing sector (15.4%), professional, scientific and innovative activities (12.8%), and transportation and storage (10.0%).

According to Digital Serbia Initiative research "Start-up Scanner"[105], Serbian start-up ecosystem is in its first development stage, known as the activation phase. According to Start-upGenome's research Serbia has between 200 and 400 start-ups and the ecosystem's value is almost €300 million. Most Serbian start-ups are operating in the following fields: Enterprise solutions, AI, Big Data and Analysis, Gaming, Smart City and Blockchain and Crypto. Start-up Genome has recognised Blockchain and Gaming as the highest potential subsectors. The Serbian start-up ecosystem is still small in size, resources, and start-up experience, but is one of the fastest growing compared to other ecosystems in the same stage. The primary customers of Serbian start-ups are most commonly businesses (57%) and consumers (41%). Serbian start-ups target the global market more often, only 22% are targeting domestically or regionally (Serbia 11% - former Yugoslavia 11%), whereas total of 69% are focused on western markets (US (37%), Europe (26%), UK (5%) and Canada (1%)) and 6% of start-ups define their market as global.

99 https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IFP_IU/default/table

100 https://ec.europa.eu/eurostat/databrowser/view/ISOC_CI_IN_H/default/table

101 https://ec.europa.eu/eurostat/databrowser/view/ISOC_SK_DSKL_I__custom_355577/default/table

102 RCC Balkan Barometer, Public Opinion, Analytical Report, 2020 (https://www.rcc.int/download/docs/2020-06-Balkan-Barometer-Public-Opinion_final.pdf/bf27f9fc10de8a02df9db2b60596f0cd.pdf)

103 RCC Balkan Barometer, Business Opinion, Analytical Report, 2020 (https://www.rcc.int/download/docs/BB2020_Business.pdf/c9831b5b9c198991f8da4efcf20bf13a.pdf)

104 https://www.oecd-ilibrary.org/sites/54da3754-en/index.html?itemId=/content/component/54da3754-en

105 https://www.dsi.rs/en/startup-scanner-2019/

Strategic documents overview

There are many strategic documents that to a greater or lesser extent relate to digital skills. Two Ministries have competence over the implementation of strategic documents adopted by the Government of Serbia: the Ministry of Trade, Tourism and Telecommunications (MTTT) and the Ministry of Education, Science and Technological Development (MPNT).

Strategy for the development of digital skills in Serbia for the period from 2020 to 2024[106] is a strategic programme which regulates in full the development of digital skills of the population in order to use the potential of modern information and communication technologies to improve the quality of life of all citizens, increase employment, work efficiency and economic growth of society. Timeframe is 4 years and MTTT prepared a Proposal of Action Plan for implementation of the Strategy for period 2021-2022. Public debate was conducted in April 2021. It is expected that the Action Plan will be adopted in Q2 2021.[107] Objectives of the Serbian Strategy are the following:

1. Improving digital competencies in the **education** system
2. Improving basic and advanced digital skills for all **citizens**
3. Developing digital skills in relation to the needs of the **labour market**
4. Lifelong learning of **ICT professionals**

The Strategy mission is to improve the system that enhances citizens' digital skills by developing computational thinking, providing the skills necessary for daily life and developing a successful career in the digital economy, as well as providing the conditions for further advancement of knowledge and skills of ICT professionals. Research indicates that there will be more and more jobs globally in the coming years for people with advanced digital skills, with a tendency to accelerate.

Besides **education, citizens, labour and ICT experts as main target groups**, the Strategy also recognises **women, children and youth, people with disabilities, consumers, entrepreneurs and public administration** as additional target groups. In the process of preparation, **the Strategy did not conduct sector analysis** or prioritised sectors which would need support by improving digital skills. However, preparation of the Strategy included several relevant studies: the first with the aim to recognise digital competencies required for different sectors (areas of work) and job categories (conducted via questionnaire), the second analysing demand for digital skills on labour market (conducted via job posting data analysis) and the third Comparative Analysis of International Experiences and Good Practices in Child Online Safety Policies and Empowerment of Children as They Explore the Digital World prepared by UNICEF, Serbia.

The main conclusions of the first study were: (1) the competencies required at the advanced or expert level in all areas of work include the use of internet technologies for communication, information search and use of digital content in a legal and ethical manner; **(2)** no digital competency is irrelevant and superfluous, no matter of the work area or job category. The question only refers to the proper level needed, with the relatively quick tendency of raising the requirement ranks in the years to come.

The second study, conducted via analysis of 100.000 job postings in the period from 2013 to 2019, concluded that there is a raise in requests for digital skills on all levels. According to the study, some of the sectors which have higher demand for digital skills are **IT, finance, trade, pharmacy, administration, engineering** and **health**. The Study concluded that the required level of digital skills is highest for professionals, then clerical (administrative) jobs while the lowest level of digital skills is needed for operational jobs (the same conclusion was drawn by the first study).

Other strategies under the jurisdiction of MTTT are focused primarily on the development of information technology (Strategy for Development of Information Technology Industry 2017-2020[108]), information society (Strategy for Development of Information Society up to 2020[109]) and information security (Strategy for Development of Information Security 2017-2020[110]) and relate to the period up to 2020. These strategies do have certain goals and measures regarding education and strengthening of human resources targeting citizens, industry and public administration. Although these strategies are not in force any more, the MTTT prepared a Proposal of Strategy for Development of Information Society and Cyber Security 2021-2026 with Action Plan for its implementation for the period from 2021 to 2023.[111] The Strategy for Development of New Generation Networks 2023[112] states that there is a huge shortage of digital skills in Serbia on all levels and proclaims development of digital skills as a specific goal. The fields identified are the same as those in Digital Skills Development Strategy: **education, citizens, labour and ICT experts**. Finally, the Programme for Empowerment of Women in Information and Communication Technologies for the period from 2019 to 2020[113] adopted by the MTTT envisages programme measures and activities whose implementation should contribute to reducing the gender gap in the digital sector and improving the participation of women in ICT sector.

The strategic documents under the jurisdiction of the MTTT primarily relate the education of children and adults. The analysis of the mentioned strategic documents identified the following priorities and goals: (i) ensuring **high quality of education in primary and secondary schools** (ii) defining **IT equipment in schools**, (iii) introducing **compulsory IT subjects** in primary and secondary schools, and **work in specialised IT departments**, (iv) developing different models to support **professional development of teachers** to implement new educational programmes and training all teachers to use **ICT in teaching** or its preparation (v) creating conditions for development of **education and training programmes** that would meet requirements regarding knowledge and skills identified **for the target groups of adults**, which also includes programmes that acquire information and communication skills.

106 https://mtt.gov.rs/en/download/Strategy%20of%20Digital%20Skills%20Development%20in%20the%20Republic%20of%20Serbia%20for%20the%20period%202020-2024.pdf

107 https://mtt.gov.rs/saopstenja-najave/javna-rasprava-o-predlogu-akcionog-plana/

108 https://mtt.gov.rs/en/download/Strategy%20on%20Development%20of%20Information%20Technology%20Industry%20for%20the%20period%20from%202017%20go%202020.pdf

109 Strategy for the Development of the Information Society up to 2020 (http://www.srbija.gov.rs/extfile/sr/135791/strategija_razvoja_informacionog_drustva0288_cyr.zip)

110 https://mtt.gov.rs/en/download/3/Strategy.pdf

111 https://mtt.gov.rs/saopstenja-najave/javna-rasprava-4/

112 https://mtt.gov.rs/download/3/2A_Strategija%20razvoja%20mreza%20-%202023.pdf

113 https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/drugiakt/2019/18/1/reg

The overall goal of the Strategy for Scientific and Technological Development of Serbia for the period from 2016 to 2020 – Research for Innovation[114], under the competence of the MPNT, is to improve the efficiency and effectiveness of scientific and research systems. In addition to the overall goal, the Strategy focuses on six specific objectives out of which the particularly relevant is "Ensuring the excellence and availability of human resources for science and industry and social activities". A new Science and Education Strategy is currently being prepared and it will merge science and education into one strategic document. In 2015, the Autonomous Province of Vojvodina adopted the Smart Specialisation Programme in Research and Innovation for the period from 2015 to 2020[115]. The identified priorities of the Regional Programme are: **agricultural production and food industry, information and communication technologies, metal industry and tourism. At the end of 2019, the Strategy for Development of Artificial Intelligence**[116] in Serbia for the period from 2020 to 2025 was adopted. The Strategy has five specific objectives: education, science and innovation, economy based on AI, public sector services and ethical and secure AI. These specific objectives should contribute to the overall objective of the Strategy: the use of artificial intelligence in the function of economic growth, employment and better quality of life. The specific objective no. 3 focuses on **SMEs, health, agriculture, transport and smart cities**.

The overall goal of the new Industrial Policy Strategy 2021-2030[117] is to raise competitiveness of Serbia's Serbia with a focus on industry-led development, which involves advanced production and high value-added services, based on the achievements of the Industrial Revolution 4.0. There are five specific objectives out of which the first two are relevant for digital skills: raising the technological level of the industry and its **transformation towards digitalisation and automation**, and **increased contribution of scientific and research solutions** in the process of development and digitalisation of the domestic industry.

The **creative industries** do not have an umbrella Strategy that regulates their development and strategic framework, but the Government has recognised the creative industries as one of the prioritised growing sectors of the economy and established the Creative Industries Council in 2018. Upon the initiative of the Prime Minister of Serbia and upon the proposal of the Creative Industries Council, a National Platform Serbia Creates[118] was established in 2019. According to Serbia Creates, the creative industries in the Serbian economy are contributing between 3.4 and 7.1% to GDP (depending on whether creative industries are defined in a narrow or a broader sense), growing faster than the rest of the economy (sectoral GVA increased by 16.4% between 2014 and 2016) and has over 30,000 registered businesses, mostly SMEs, which employ over 100,000 people - 70% of whom are 25-44 years old and majority with university degree.

Strategy for Supporting the Development of Small and Medium-sized Enterprises, Entrepreneurship and Competitiveness for the period from 2015 to 2020[119] focuses on conditions for SMEs operations, and the infrastructure to support start-up companies developed

114 https://kg.ac.rs/Docs/Strategija-engleski-jezik.pdf

115 http://www.budzet.vojvodina.gov.rs/wp-content/uploads/2016/01/RIS3final02.04.15..pdf

116 https://www.srbija.gov.rs/tekst/en/149169/strategy-for-the-development-of-artificial-intelligence-in-the-republic-of-serbia-for-the-period-2020-2025.php

117 https://privreda.gov.rs/wp-content/uploads/2020/05/Industrijska-Strategija-Vlade-Srbije-F01.pdf

118 https://www.serbiacreates.rs

119 http://www.privreda.gov.rs/wp-content/uploads/2017/01/Strategija-I-Plan_eng_poslednje.pdf

through the establishment of incubators, start-up centres and science technology parks, as well as through the establishment of financial support programmes through grants.

The Smart Specialisation Strategy[120] is an important instrument for improving the innovation and research ecosystem in Serbia, as well as for the development of innovation and knowledge-based economy. The priority areas identified through the preparation of this document, which represent competitive advantages for Serbia and as such require further investments, include **information and communication technologies, food for the future, creative industries, machines and production processes of the future, etc**. The Strategy recognises **IT industry** as the fastest growing industry in Serbia, with a potential to develop own sophisticated software solutions and services thanks to the growing number of technology start-ups, entrepreneurial spirit and growing interest of young people in IT science. When it comes to **agriculture**, the changing habits of modern consumers dictate the demand for high quality and diverse products. **Machinery and manufacturing**, as well as **creative industries** are recognised as priority sectors. Key measures of the Strategy include cross-sectoral cooperation, **modernisation of education system**, increase in **innovation capacities of local businesses**, and cooperation between research and business sectors. The Smart Specialisation Strategy identified the following 6 priority areas:

Vertical priority areas:

1. Information and Communication Technologies
2. Food for Future
3. Creative Industries
4. Future Machines and Manufacturing Systems

Horizontal (supporting) areas:

5. Energy Efficient and Eco-smart Solutions
6. Key Enabling Technologies (KET) and Emerging Technologies

Strategic / emerging industries overview

Based on the analysis of the available strategic documents, as well as the available body of data and information from different statistical databases and studies, the following strategic and emerging industries and sectors have been identified in Serbia:

- ICT industry
- Key Enabling Technologies
- Creative industries
- Agriculture and food production
- Machinery, mechanical appliances and electrical equipment
- Auto, railway and aviation industry

120 https://pametnaspecijalizacija.mpn.gov.rs/wp-content/uploads/2020/09/Smart-Specialization-Strategy-of-the-RS-for-the-period-2020-to-2027.pdf

- Chemical, Plastic, Rubber, Textiles, Metals, Wood and Stone industry
- Manufacturing
- Construction
- Green sector (especially renewable energy and energy efficiency)
- Public administration / E-government / E-services
- SME sector
- Entrepreneurship/start-up sector
- Healthcare
- Services - Professional Services

Using the framework developed for this study for readjusting identified industries into unified industry categories of industries and sectors across the Western Balkan region, as well as supplementing the desk review findings with inputs received through interviews with relevant stakeholders in the economy, the following prioritisation table has been developed for Serbia:

Strategic / emerging industry or sector	Total score	Priority
Creative industries	20 points - 100%	1
Electrical equipment	16 points - 80%	2
Manufacturing and processing	16 points - 80%	2
Tourism, accommodation and related services	16 points - 80%	2
Agriculture, food and beverage (organic food production, standard food production, fishery, wine production, agriculture)	15 points - 75%	5
Healthcare	14 points - 70%	6
Energy	13 points - 65%	7
Telecommunications*	13 points - 65%	7
Transport - auto, railway, aviation	12 points - 60%	9
Construction	11 points - 55%	10
Heavy industry	11 points - 55%	10
Banking and finance*	11 points - 55%	10
INDUSTRIES-ENABLERS	Comment	
ICT – software development and outsourcing	Enabler and accelerator for digitalisation of other industries	
E-commerce	Enabler and accelerator for digitalisation of other industries	
SME, Start-ups, Entrepreneurship, Innovation	Enabler and accelerator for digitalisation of other industries	
OUTLIER SECTORS/Target Group	Comment	
Public administration, e-Government	Strategic sector for accelerating digitalisation on a nation-wide scale	
Education	Strategic sector for accelerating digitalisation on a nation-wide scale	

*Due to its high level of digital maturity it is seen more as an industry supporting digitalisation development

Key stakeholders overview

Based on the analysis of the available strategic documents, as well as the identified strategic and emerging industries and sectors, the following key stakeholders have been identified in Serbia:

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Government of Serbia - Offie of the Prime Minister	All (ICT, Creative Industries)	Body of executive authority in Montenegro	Both	High
Ministry of Trade, Tourism and Telecommunications	ICT and Digital Skills, Trade, eCommerce and Tourism	Preparation and development of strategic and planning documents in the field of ICT and digital skills, trade and tourism	Supply	High
Ministry of Culture and Media	Media and Creative Industries	Preparation and development of strategic and planning documents in the field of media and creative industries	Supply	Medium
Ministry of Education, Science and Technology	Education and Science	Preparation and development of strategic and planning documents in the field education and science	Supply	High
Ministry of Economy	Industry, SMEs	Preparation and development of strategic and planning documents in the field of economy	Supply	High
Ministry of Agriculture	Agriculture	Preparation and development of strategic and planning documents in the field of agriculture	Supply	Medium
Ministry of Health	Healthcare	Preparation and development of strategic and planning documents in the field of health	Supply	Medium
Ministry of Public Administration	Public Administration, e-government	Preparation and development of strategic and planning documents in the field of Public Administration and e-government	Supply	High
Government Office for IT and eGovernment	Public Administration, e-government	Implementation in the field of e-government	Supply	High
National Academy of Public Administration	Public Administration, Education	Education in a field of public administration	Supply	High
National Employment Service,				
Agency for Qualifications and Sector Skills Councils, Education Quality Evaluation Institute	Employment, Education	Education and improvement of skills of labour in order to match demand of the employers	Supply	High

Institution/organisation	Strategic/emerging industry link	Role of stakeholder	Supply/demand side	Potential influence
Business associations (Serbian Chamber of Commerce, American Chamber of Commerce Serbia, Foreign Investors Council, NALED, E-commerce Association of Serbia)	ALL - SME	Improving the business and economy environment, improving entrepreneurship	Demand	Low
Start-up and creative industry community (IT incubators and accelerators: SEEICT - StartIt Impact Hub, Marsh Open Space, ICT Hub, Business Incubator Novi Sad, Business Incubator of Technical Faculties Belgrade, Fabrika in Sombor, Pomak coworking Zaječar, Infostud HUB Subotica, DigitalnaSrbija, Nova Iskra, Mokrin House)	All - ICT, SME, Creative Industry	Improving business environment and capacities of SMEs, ICT and creative industries	Both	High
Academia, formal and non- formal education institutions.	All	Providing education in the fields of ICT, digitalisation, business, economy, technology to different target groups	Supply	Medium
Clusters: (Automotive Cluster of Serbia, Belgrade, ICT Network, Belgrade, Cluster of Fashion and Clothing Industry of Serbia, Belgrade, Pannonian Bee Cluster, Novi Sad, Cluster of the Tourist Microregion of the City of Sremska Mitrovica, Sremska Mitrovica, Cluster of Health, Wellness and Spa Tourism of Serbia, Belgrade, Niš Cluster of Advanced Technologies, Niš, Business Association ICT Cluster of Central Serbia, Kragujevac, Vojvodina ICT Cluster, Novi Sad, Vojvodina Organic Agriculture Cluster, Novi Sad, Vojvodina Metal Cluster, Temerin)	All	Improving business environment and capacities of various sectors	Demand	Medium
International actors (UNDP, GIZ, British Council, Unicef, USAID, EU Delegation Serbia)	All	Improving business environment, education and digital skills	Supply	HIGH
Cultural institutions: libraries, museums, archives, institutes for protection of cultural heritage	Tourism, Creative Industries	Holders of cultural heritage which could be digitised and used in different contexts.	Demand	Low

Key target groups overview

Based on the analysis of the available strategic documents, the identified strategic and emerging industries and sectors, as well as the identified key stakeholders, the following key target groups have emerged as the ones to be assessed in Serbia:

- HR experts / managers from the identified strategic and emerging industries and sectors;

- Domain experts from the identified strategic and emerging industries and sectors;
- Employees, owners and executives in the SMEs operating within the identified strategic and emerging industries and sectors;
- In case education is a sector to be assessed the target group will include: Teachers and professors (elementary schools, high-schools and higher education institutions); Youth – elementary schools pupils, high-school pupils and students;
- Public administration employees (special attention may be given to employees dealing with e-government, e-services and healthcare);
- Founders and employees of start-ups from the identified strategic and emerging industries and sectors (especially the ones not dealing with technology as a priority);
- Women (capable of work according to official methodologies), especially within the identified strategic and emerging industries and sectors;
- Vulnerable groups (people with disabilities);
- Consumers.

Key takeaways and findings

- Digital Skills Strategy focuses on education, citizens, labour and ICT experts in accordance with European Digital Competence Framework which assesses digital competencies in different domains (work, education, entrepreneurship, citizenship). Additional target groups are women, children and youth, people with disabilities, consumers, entrepreneurs and public administration. As a comprehensive strategic document, the Strategy includes sector of commerce, including ICT sector and issues related to the labour market. Bearing in mind that digital skills development is crucial for further development of various sectors – agriculture, energy sector, healthcare, etc. – it is expected that the relevant strategic documents in the mentioned fields also include goals, measures and activities related to digital skills development.
- Serbia enacted numerous strategies and programmes in the fields of IT, Creative Industries, Information Society, New Generation Networks, Education, Artificial Intelligence, etc., which are relevant for digital skills but mainly without prioritisation of sectors.
- Smart Specialisation Strategy is relevant because it provides a good and relevant example of sector prioritisation.
- SMEs dominate the Serbian economy's business sector.
- Increasing and vibrant start-ups ecosystem.
- Depopulation problem.

4. FINAL CONCLUSION

Based on the data collected through desk research, information and insights produced by using the methodology for assessment as defined in Part I, Section 2 "Methodology used for the analysis" as well as the feedback received from each Western Balkan economy, the following sectors/industries were identified as potentials to conduct a fully-fledged assessment of digital skills gaps and needs:

1. **Public administration;**

and the following industries:

1. **Tourism, accommodation and related services;**
2. **Agriculture, food and beverage;**
3. **Creative industries.**

PART II:
METHODOLOGICAL FRAMEWORK FOR A FULLY-FLEDGED ASSESSMENT OF DIGITAL SKILLS NEEDS AND GAPS IN THE WESTERN BALKANS

I. INTRODUCTION

Digitalisation of economies provoked by technological development leads to transformation of every sector - public, business or civil - changing workplaces and requirements toward employees' profiles on the labour market. As it is said, new technology "has strong potential to disrupt productive sectors and markets" (CSTD, 2018, 2).

Digital skills are becoming a prerequisite for performing most of the contemporary jobs. Nevertheless, some jobs are becoming more digitalised than others and some industries are recognised as being strategically more important to digitalise, others are emerging and require new technologies to support their performance. It creates potential gaps in some sectors and locations concerning employees' competencies and requirements for their up- and re-skilling.

The Digital Agenda for Europe 2020 (European Commission, 2020) sees digital competence as one of the key competencies for knowledge-based society. This competence is an inevitable part of every list of future workforce skill forecasts.

Economies of the Western Balkans are not excluded from this process. However, they have their own specific characteristics concerning industries more or less affected by technological changes, depending on the market, economy and strategy of each economy. These characteristics were outlined in more details in Part I of this document for each economy.

When considering the perspective of digital skills development, Balkan Barometer 2020[121] gives interesting data of growing awareness of digital skills training needs. Statistics say that Montenegro has the highest number of respondents engaging in IT training, while respondents in Albania are most willing to invest in their further IT education. Not so satisfying fact is that the most training is for computer, software and application usage (mostly in the Republic of North Macedonia), followed by social media training, data analysis and database management. Montenegro has the highest rate of more specialised training choices (online marketing data analysis, social media and programming languages), while in Serbia skills on job related applications are acquired through training.

II. CONCEPT OF THE FRAMEWORK - THEORETICAL BACKGROUND

1. Digital Skills definition

There are many different yet related and comparable conceptions found in literature that refer to the ones capability to use different digital tools for wide purposes, as well as for their job performance. Ala-Mutka (2011) provides very comprehensive overview of terms used to describe digital skills and competencies of a user.

Digital literacy is the "**ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies for**

121 https://www.rcc.int/balkanbarometer/results/2/

employment, decent jobs and entrepreneurship. It includes competencies that are variously referred to as computer literacy, ICT literacy, information literacy and media literacy" (Law et al., 2018). E-skills as the concept prevalently used by industry refer to effective use of software tools supporting business functions within industry (Ala-Mutka, 2011).

Less specific definition referring to digital competence is provided in Ferrari`s (2012) and Torres-Coronas & Vidal-Blasco (2011) conceptions, where he former covers wide aspect of living in digital society and the latter focuses on the ability to use information technologies. Ferrari says that it is the "**confident, critical and creative use of ICT to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society**" (2012, 3). Others, for the purpose of relevant definition, see digital competencies as the "**ability to understand and express by making analytical, productive and creative use of the information technologies and social software to transform information into knowledge**" (Torres-Coronas & Vidal-Blasco 2011, 62).

European Parliament and the Council[122] defined it in 2006: "**digital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication**". It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via internet.

When it comes to the skills and knowledge, Ala-Mutka (2011) **divided them into instrumental (operational and medium related) and advanced ones (media application, strategic and for personal purposes) with attitudes that might be intercultural, critical, creative, autonomous and responsible, which can be recognised as part of different well-known conceptions.**

In the context of work, Oberlander (2020) and colleagues propose the concept of digital competencies defining them as: "**set of basic knowledge, skills, abilities, and other characteristics that enable people at work to efficiently and successfully accomplish their job tasks regarding digital media at work**" (2020, 5). Adopting this perspective, the measuring of digital competence represents ***various capabilities of a person to solve problems in an authentic context using digital technologies*** (Laanpere, 2019, 11). First step is to decide about conceptual framework to be extensive, inclusive and flexible enough to enable adaptation for different target groups and contexts. Some guidelines are given in the Digital Skills Toolkit[123] that provides help to particular economies in order to define their own strategies of digital skills upgrading. By digital skills they assume the "**combination of behaviours, expertise, know-how, work habits, character traits, dispositions and critical understandings**"[124], developed on three levels (basic, intermediate and advanced).

In other sources, a distinction is made between knowledge, skills and competencies. Knowledge is defined as "a set of facts, principles, theories and practical knowledge within the field of work or learning". Skills refer to "the ability to apply this knowledge", while competence is considered to be "the demonstrable ability to use all knowledge and skills for personal well-being". Therefore, digital skills should be viewed more as practical and measurable outcomes of media, information and digital literacy. Digital literacy models include

122 https://europa.eu/epc/publications_en

123 Digital Skills Toolkit – ITU. www.itu.int › 2018-Publications › BDT-2018 › E...

124 Broadband Commission for Sustainable Development (2017). Working Group on Education. Digital skills for life and work, 4. https://broadbandcommission.org/working-groups/education/

knowledge, skills and competencies. In the literature taken into consideration, digital skills are defined more as a practical, measurable application of certain knowledge and skills in the use of digital, while digital competencies are considered as the ability to apply this knowledge and skills in different life contexts, from personal to professional. In this sense, digital literacy is a set of awareness, practical skills and competencies necessary for users to access, understand, evaluate, share with others and create digital content, in a planned and applicable manner, in order to meet personal and professional goals.[125]

2. Digital skills' conceptual frameworks

Ferrari (2012) says that digital competence framework is: "***an instrument for the development or assessment of digital competence according to a set of criteria, which establishes descriptors of intertwined competencies aimed at enhancing the digital literacy of a specific target group***".

There are different methodological approaches for assessing digital competencies and skills of citizens generally and employees in particular. See Sparks and colleagues (2016).

There are conceptions that, basically, distinguish general aspects of using digital tools for work and aspects that are relevant and specific for concrete domain of work. It is possible to make difference between (1) generic ICT skills (and attitude toward adopting technological advances), (2) technical and professional (industry-specific), and (3) complementary ICT soft skills (digital entrepreneurship, for example) (ILO, OECD, 2018).

Some methodological frameworks integrate many aspects into one. For example, International Labour Organisation and International Telecommunication Union (ITU) differentiate (1) basic digital skills related to simply usage of technologies, (2) advanced digital skills covering programming knowledge, (3) soft skills applied through digital tools, i.e. communication, leading, and (4) digital entrepreneurship (online market research, financial platforms) (According to CSTD, 2018).

One comprehensive model of digital skills' classification recognises the importance to make a difference between digital skills needed for ICT professionals and for other categories of employees and categorise it into two levels (Di Maggio et al., 2004). Digital skills for all other occupations are at the level of adoption (digital literacy and usage of technological devices and services) (1) and generic use (2), while ICT professionals need to be able to use them creatively and to adapt existing technologies, (3) and create a new one (4).

Interesting model based on content analysis of different studies is given in Oberlander's (2020) study where he tried to create a dynamic framework based on clustering different frameworks and approaches found in large number of researches. He extracted 25 clusters of competences that might be useful for creating a framework.

One relatively influential framework for assessing digital competencies in different domains (work, education, entrepreneurship, citizenship) named the European Digital Competence Framework is conceived by Joint Research Centre (JRC). The idea was to develop one conceptual model based on empirical studies that can provide the structure to study digital competence in real situations and across different contexts.

125 Development of digital skills and competencies: A brief overview of the state of 13 digital literacy models, Katalina Jordake, Ilse Marjan, Dorin Balden, Studies in Media, Innovation and Technology, University of Vrije, Belgium, p. 65, available at the link: https://www.nb.rs/view_file.php?file_id=5610

The current version of DigComp framework (DigComp2.1) (Carretero, et al., 2017) includes 21 competencies organised in 5 areas of competences: (1) information and data literacy, (2) communication and collaboration, (3) digital content creation, (4) safety, and (5) problem solving. These competencies are assessed at eight levels of proficiency: 2 foundation levels, 2 intermediate levels, 2 advanced and 2 highly specialised levels, combining the criteria of task complexity (simple, well-defined, non-routine tasks, complex), demonstrated autonomy (with guidance, independent, being able to guide others) and cognitive domain (remembering, understanding, applying, evaluating, creating).

The advantages of this model are that it is well developed, widely accepted and offers general case and illustrations of usage (knowledge, skills and attitudes applicable to each competence) enabling researchers to develop their own models and adapt them for different purposes, as INTEF (National Institute of Education Technologies and Teacher Training), for example, did (Kalentrić, et al., 2017) for teachers.

Besides the development of suitable framework and defining digital skills operationally, there is a problem of differentiating levels of proficiency and appropriate scale. For example, in the ESafetyKit project (http://www.esafetykit.net) there are not only different levels that matter but there are also three different criteria according to which differentiation is attained. The first criterion considers the maturity, the second one is about the width or depth of the application-related content (*an increaseed number of applications that a learner is able to use, and an ability to use more commands/functions within application*) and the third one seems to be the most relevant for this study, the increase of cognitive complexity of the activity (KNOW-USE-CREATE dimensions).

3. Measuring digital skills

When measuring constructs, at least four aspects should be taken into consideration: **the validity of the instrument, its reliability, objectivity and selectiveness**. First, validity should be guaranteed grounding the instrument on actual behaviour (extracted from the experience of employees in relevant domains) and putting it in the wider theoretical and methodological framework. Reliability, at least internal, is based on the internal consistency of the scale and adequate factorial structure representing different indicators. The intention in this study was to provide objectivity through detailed guide for administering the instrument, as well as selectivity, by offering different levels of expertise to choose.

According to Carretero (Carretero, et al., 2017), there are various techniques to measure digital skills: (1) knowledge-based assessment, (2) performance-based assessment, and (3) self-assessment approach. The most valid is to observe someone's performance on concrete task or in laboratory settings (van Deursen et al., 2017), for some purposes procedural and declarative knowledge is important. Self-assessment of one's own skills is economic and useful.

The proposed questionnaires represent the combination of performance and self-assessment approach.

Based on his comprehensive analysis of different models of assessing digital skills, Sparks (2016) gives recommendations for creating an effective digital literacy assessment battery: (1) Define digital competencies as evolving, (2) use real world scenario, (3) measure cognitive skills rather than technology ones, (4) use minimal and highly familiar technology elements (varying in familiarity), (5) develop automated scoring, and (6) think about giving interpretations (score reports). According to Ala-Mutka (2011), there should be at least two levels of analysis: conceptual level where main areas of digital competencies are operationalised followed by concrete tasks to be carried out by current tools in real work practices.

III. APPROACH USED TO PREPARE THE METHODOLOGICAL FRAMEWORK AND QUESTIONNAIRES

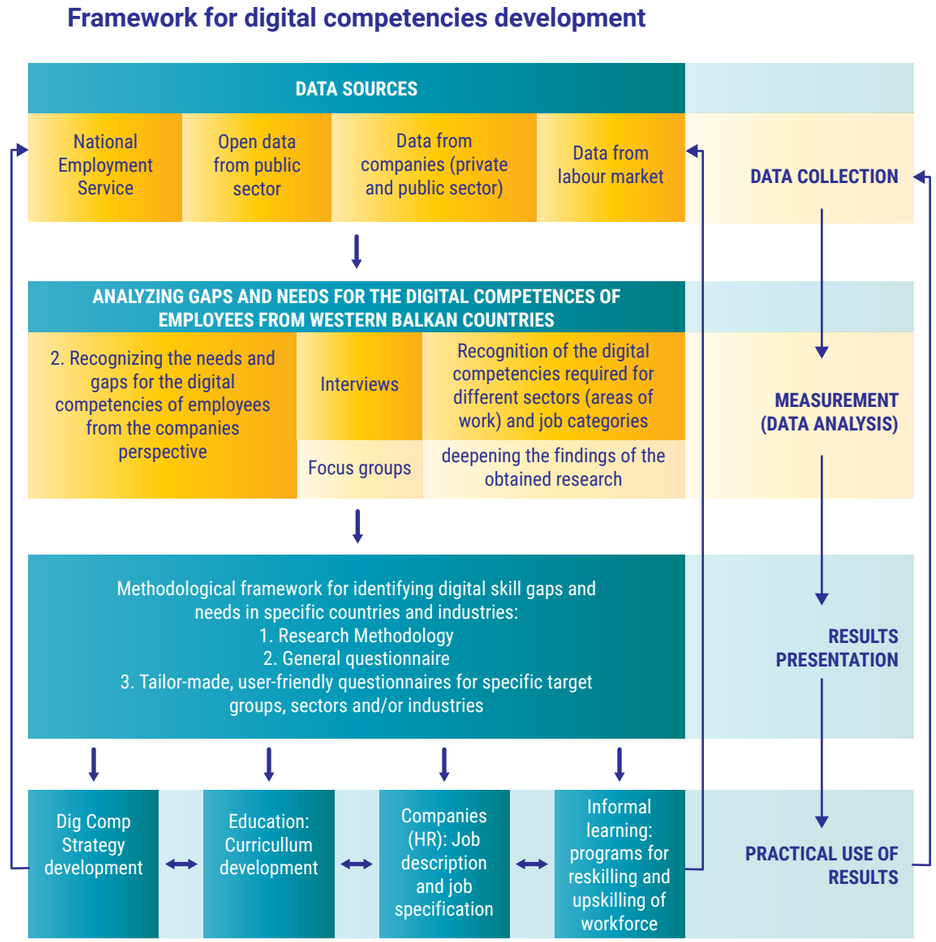

Figure 1: Framework for digital competencies development

III.1. Methods and techniques used

In order to gain insights into strategic and emerging industries in the region and concrete digital skills that these industries cover, data from desk review (identifying the strategic and specific priorities of each economy) and interviews with public policy decision makers were complemented further with the information gathered through focus group with targeted experts from different sectors and economies. Additionally, interviews with professionals from different positions in specific domain of interest were also conducted, with the goal to create tailor-made questionnaires for different industries.

The process of collecting additional information and data to define the methodological framework for identification of digital skills gap and needs so as to adjust digital competency framework for special purposes consisted of three steps:

1. Preparing focus groups meetings

The information from desk research and interviews with stakeholders from the public institutions helped creating the guide for conducting focus group meetings among different targeted economies. Key features considered contain:

- Projected sample - approximately 6 (min 5, max 8) HR and domain experts from different sectors (i.e. representatives of organisations in different phases of digital transformation, etc., that are in the continuous contact with workforce in the labour market. Respondents included in the focus groups were requested to have understanding of the digital skills concept, to be acknowledged with the needs for specific digital skills for completing business tasks, to be involved in the process of selection and the assessment of digital skills, to be at managerial position (i.e. line manager, general manager, entrepreneur, HR manager, recruitment specialist, selection and training expert).
- The activity goal - to identify the potential indicators and sample of questions for assessing general digital skills gap (in reference to digital skills needs).
- Content of the discussion to be oriented around: (1) areas of digital skills expertise needed, (2) indicators of different digital skills in different areas of application, (3) how to map digital skills gaps.
- The expected outcome - to define structure and content relevant for general questionnaire for assessing the digital skill gap among labour force in specific region.

Key takeaways for the discussions in the focus group:

- Information and data literacy is a competency area that everyone refers to.
- As very important competency area, everyone identifies the competencies needed for communication and collaboration, at the level of use (intermediate level), and digital content creation (depending on an industry).
- The digital competence is not a question of age or position in hierarchy; it depends on someone's individual engagement.
- Regarding digitalisation, and digital competencies, all participants agreed that there is no difference at the level of economies in the region, not even industry. They believe that the biggest difference stems from the educational profile.

- Digital competencies in the domain of security and safety emerged as recent and important issue, followed by the competencies considering problem solving in digital environment. It is concluded that more investments should be made into development of these two competency areas.
- They are reluctant to recognise the gap in the development of digital competencies within their industry. They all insisted that they are now digitised. It is symptomatic that digital competence that refers precisely to the ability to recognise the gap in the development of digital competencies is the one to be emphasised. All participants confirmed that there is no significant difference in the way work is done in economies in the region, and even in the world (e.g. for a job as a producer, the same competencies are required regardless of the economy in which the job is done).

For more details please see **Annex 1 - Focus Group Guide** and **Annex 2 - Summarised overview of the topics discussed in focus group discussions.**

2. Conducting semi-structured interviews

The semi-structured interviews with employees from targeted industries provided the background for preparation of the questionnaires for digital skills development (level of expertise) for specific identified emerging economies in targeted regions.

The goal for the interviews was to identify the specificities for digital competency and skills demand for targeted emerging economy in order to create structure and content of tailor-made questionnaires (mainly for level of expertise) for specific identified emerging economies in targeted regions.

Key takeaways from the interviews:

- Although a company can be highly digitised in the sense that the processes are digitised and that there is technical and technological support, it does not necessarily mean that people working in such companies must have a high level of digital skills
- IT sector has to be seen in a different perspective (has its own uniqueness), as some previous authors also found when developing their frameworks
- The main difference is not in the areas of competences, although some are more relevant for one domain while others are less emphasised in one, and more in other domains, but in the concrete digital tools
- Some digital tools are cross-sectional and used for sometimes different and sometimes same purposes and it seems that lot of tools are used independently of the industry (not industry specific)
- Nevertheless, there are some domain specific tools
- The main difference considering positions and sometimes domains (industries) are in the expected level of expertise
- Digital literacy (searching, sharing, retrieving), tools for communication and collaboration are relevant digital skills for all domains
- Content creation is more important in some domains than others and need to be combined with other expertise and talents

- Safety issues (privacy and data security) becoming more and more important in all domains
- Problem solving is considered to be the most demanding competence and many respondents are still relying on IT support when faced with troubles in functioning
- Nevertheless, they are usually aware of the gaps in skills and have an idea how to improve it
- The motivation for development varies depending on the domains (from start-up and freelancers with more initiative to employees in public sector to whom the acquiring new skills are often imposed)
- The motivation for creative usage of tools is sometimes inspired by the imperfection of the tools they use which are open sourced or trial versions.
- Analysing the differences and similarities between activities and digital tools used by representatives of various industries, it is possible to create a unique digital skills assessment questionnaire that covers more industries. For example, tourism and services have comparable scenarios and purposes of use as e-commerce. Entrepreneurs in production and freelancers in creative industries use different tools (sometimes the same) but the required skills do not vary much, as well as the usage scenarios.

Please see additional details in **Annex 4 – Interviews structure and respondents, Annex 5 - Digital tools "discovered" to be used in different industries, Annex 6 - Interview results for digital skills and level of expertise, Annex 7 - Interview results for other sectors and/or industries** (ICT, Energy, Healthcare, and Education).

3. Create instruments and provide methodological guidelines

Two interrelated yet independent instruments were created to assess digital skills needs and potential gap in general (assessment from HR and/or domain experts) and for specific emerging economies (employees' assessment) . The final outcome of this step relates to the preparation of the methodological framework and guidelines for administering, evaluating and interpreting results.

IV. PROPOSED CONTENT OF THE QUESTIONNAIRES

IV. 1. Digital competence indicators and related questions

Digital competence indicators are based on Digital Competence Framework defined in the Digital Skills Development Manual (European Commission on Digital Competences). General questionnaire and tailor-made questionnaires are designed upon those indicators of digital skills development. General part of the questionnaires contains the proposed concrete questions as presented in Table 1. These questions are developed by the team of consultants based on the digital competence indicators and represent the practical usage of the digital skills.

Table 1: Digital competence indicators and related questions

DIGITAL COMPETENCY INDICATORS		PROPOSED QUESTIONS
Competence areas	Competences	
1. Information and data literacy	**1.1. Browsing, searching and filtering data, information and digital content**	Q1: Is the employee able to use internet search engines to find relevant information.
	1.2. Evaluating data, information and digital content	Q2: Is the employee able to evaluate reliability of information found on Internet.
	1.3. Managing data, information and digital content	Q3: Can the employee save and store data, information and content (exp, text, imagines, music, video, internet pages) and retrieve them.
2. Communication and collaboration	**2.1. Interacting through digital technologies**	Q4: Is the employee able to use internet technologies for communication (email, skype, WhatsApp, Viber, intranet…).
	2.2. Sharing through digital technologies	Q5. Is the employee able to use companies' digital storage for sharing information (Dropbox, OneDrive, Google Drive...)
	2.3. Engaging in citizenship through digital technologies	Q6: Is the employee able to use digital services for following and participating in digital environment (communication using forums and social networks…)
	2.4. Collaborating through digital technologies	Q7 Is the employee able to use digital tools for collaborative teamwork (Dropbox, Google Drive, Microsoft Teams, Trello, Slack...)
	2.5. Netiquette	Q8: Does the employee follow code of conduct and communication in virtual environment (and does the employee understand the difference between the rules on different platforms).
	2.6. Managing digital identity	Q9: Is the employee able to manage online identity (choosing appropriate content in communication, managing one or more digital accounts)
3. Digital content creation	**3.1. Developing digital content**	Q10: Is the employee able to create and edit digital content (text, pictures…) in different formats (.doc, .jpeg, .png, .xlsx, .pdf….)
	3.2. Integrating and re-elaborating digital content	Q11: Is the employee using formatting functions within different tools (e.g. generating letters, merging documents of different formats, using advanced formulas, macros, using forms such as WordPress).
	3.3. Copyright and licenses	Q12: Is the employee able to use digital content in a legal and ethical manner, taking into account copyrights and licenses.
	3.4. Programming	Q13: Does the employee use databases and programming languages (SQL, Ruby, Python, Visual Basic, Java, C # ...).

DIGITAL COMPETENCY INDICATORS		PROPOSED QUESTIONS
Competence areas	Competences	
4. Safety	**4.1. Protecting devices**	Q14 Does the employee use different ways to protect digital devices and digital content (antivirus programmes, malware detectors, use passwords to access devices ...).
	4.2. Protecting personal data and privacy	Q15: Is the employee able to protect personal data and privacy in a digital environment (understands when it is necessary to share personal information with third parties).
	4.3. Protecting health and well-being	Q16: Is the employee able to protect the health and well-being of oneself and others from possible dangers when using digital technologies (e.g. ergonomics, addiction risk, cyber violence).
	4.4. Protecting the environment	Q17 Is the employee able to recognise the impact of using digital technologies on the environment (energy saving, use of electronic documents, cost-effective settings on devices).
5. Problem solving	**5.1. Solving technical problems**	Q18: Is the employee able to evaluate which technology tools can be used to solve business problems (for example, preparing a business presentation in ppt or Prezi, working with excel tables ...).
	5.2. Identifying needs and technological response	Q19: Is the employee able to solve the technical problem encountered during the use of digital technologies and maintain them daily (for example, installing a new version of the software, changing the password, updating the programme, checking the internet connection ...)
	5.3. Creatively using digital technologies	Q20: Does the employee use digital technology for knowledge innovation in this domain (online tutorials, online courses, webinars, chatting with colleagues about problems, parts of the experience).
	5.4. Identifying digital competence gaps	Q21: Does the employee know how to identify their own gaps in digital competences and how to improve them.

Similarly, questions are proposed for every emerging industry as per conclusion above tailor-made.

One key question with 4 possible answers is created for each competence and the respective level of competence is assigned. Levels indicate the extent to which this competence is required to be developed for performing a job in a category in the selected field of work/sector:

- **Level 0**: One does not recognise a competency or there is no need for it.
- **Level 1**: Basic level: One knows that a competency exists and is able to perform with someone's help.
- **Level 2**: Intermediate: Is able to use the competency individually to solve simple and already familiar problems.
- **Level 3**: Advanced level: Knows to use the competency to solve business problems at an advanced level and is able to explain to others or develop a new solution for complex problems.

Please see below the example with a question, related answers and levels assigned for each of them.

*Table 2: Example - Competence 1.1. (**Browsing, searching and filtering data, information and digital content**) and the respective competence level assigned*

DIGITAL COMPETENCY INDICATORS		QUESTION	ANSWERS	LEVEL ASSIGNED
1. Information and data literacy	**1.1. Browsing, searching and filtering data, information and digital content**	Q1: When finding relevant content in the digital medium (internet) for performing my job	A1: It is not necessary to know what digital tool to use	Level 0
			A2: It is enough to know how to use search engine by typing in key words	Level 1 - basic
			A3: One should know how to use filters to specify search according to current needs	Level 2 – intermediate
			A4: It is expected that one is able to narrow search for specific content	Level 3 - advanced

IV.2. Description of the battery for the questionnaires – the guidelines

WHOM the framework is intended to?

Western Balkan economies to support conducting a fully-fledged assessment of digital skills gaps and needs.

WHO will conduct and administer questionnaires?

This framework is prepared for a specialised team of experts/company able to conduct the assessment in each Western Balkan economy and/or for any interested company throughout the region interested to conduct self-assessment as per their interests.

WHO will be tested?

Domain experts, HR managers, supervisors, and any other employee as deemed needed from each WB economy perspective.

WHY is this application created?

To be user friendly and provide support to (i) assess digital skill gaps, (ii) identify learning and upskilling needs in targeted domains, (iii) help creating professional development plans, guide goals, targeted groups and areas of competence for digital skill trainings, and (v) evaluate progress in developing digital skills.

HOW it looks like?

See Figure 2 for additional details

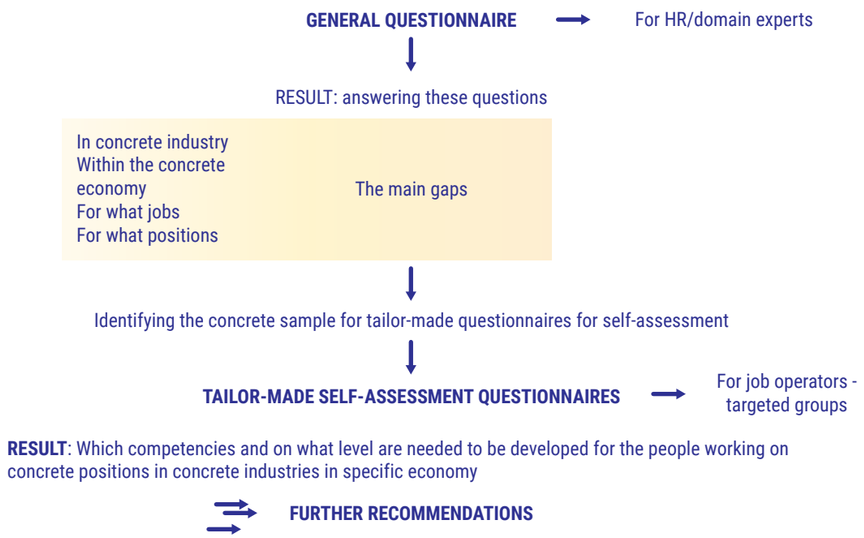

Figure 2: Schematic description of the process

The proposed approach consists of two dependent questionnaires, intended to be administered subsequently:

- **General questionnaire**: RECOGNISING THE DIGITAL COMPETENCIES GAPS IN WB6 ECONOMIES and
- **Tailor-made questionnaires for targeted industries**: RECOGNISING THE COMPETENCIES REQUIRED FOR PERFORMING A JOB

General questionnaire is intended to collect data about digital skill gap in targeted industry, assessed by supervisors and/or HR managers. It contains 3 sections:

1. First section covers general questions about the industry, location, organisation.
2. Second section considers the job categorisation.
3. Third section: Competencies gaps cover the content of digital competencies based on DigComp framework (21 indicators of digital competencies).

The third section consists of 21 descriptions of digital skills covering five areas of competencies (according to DigComp framework): digital literacy, communication and collaboration, digital content creation, security and safety and problem solving.

Respondents are expected to assess if concrete skill is important for performing the job of employees at different positions (in targeted industry), and if it is important how they evaluate the digital readiness of their employees (do they fulfil demand or they display lack of assessed skill). – Three levels of assessment (0 – not necessary for performing job, 1-necessary but there is no gap, 2 – necessary with existing gap).

Scoring is based on sum of the answers for each skill and competence area, as well as for the whole questionnaire:

- Minimum score for the whole questionnaire is 0-zero, when there is an assessment that none of the digital skills are required for performing a job
- Maximum score is 21x2=42, when every skill is important, and the gap is identified (lack of it).

Estimated time needed to fill in the questionnaire is about 10 minutes.

Scoring is intended to be used for mapping the potential digital skills gaps and creating the sample for the tailor-made questionnaire. It is possible to gain individual scores for each skill and for each area of digital competency.

Tailor-made questionnaire is intended to collect data from the employees performing concrete job and their estimation of the appropriate level of digital skills in order to perform that job. It contains 2 sections:

1. First section covers general questions.
2. Second section considers the competencies required for performing particular job.

Second section covers real scenarios of using digital skills for performing everyday work activities and tasks. It is modelled also according to DigComp framework, with 21 task situations while offering four different behaviours (solutions) in task accomplishment describing four levels of digital skill expertise.

Respondents are expected to assess the required level of digital skill expertise for the job they perform (from their own experience) based on the descriptions given in the test. There are 4 levels of assessment: level 0, level 1, level 2 and level 3 as advanced level, which means that advance level of competence is required for performing a job.

Scoring is based on the sum of scores for each item, with:

- minimum score of 21x0=0 points and
- maximum score of 21x3=63.

The higher the score is the higher level of competency is needed. In addition, it is possible to calculate the score for single skill and single competency area.

Estimated time needed to fill in the questionnaire is 20 minutes.

Based on the guidelines, draft questionnaires are prepared and given in the separate document. They are subject to changes and adjustments according to the inputs from WB economies and other members of the Working Group on digital skills.

IV.3. How to score the general questionnaire: recognising the digital competencies gaps in WB6

By completing the following questions, mark competency gaps for concrete positions (levels) in your organisation (mark those competencies that are required for performing a job, but your employees do not possess them).

Read the examples of digital skills needed for performing different jobs and mark those skills that are irrelevant, necessary but prevalently present, and necessary but with substantial lack among your employees for different positions in your organisation. The following scoring is proposed:

- If the defined skill is not important for performing the job well at a certain position (for jobs in your organisation), mark 0.
- If the defined skill is important for performing the job at a certain position (for jobs in your organisation) and your employees (employees in your organisation) are skilful in that domain, mark 1.
- If the defined skill is important for performing the job at a certain position (for jobs in your organisation) and you assess that your employees (employees in your organisation) lack these skills, mark 2.

Hence:

- 0 – not necessary for performing job;
- 1- necessary but there is no gap;
- 2 – necessary with existing gaps.

Employee (is/is able to):	Operational and clerical	Junior	Senior	Managerial
1.1. Use internet search engines to find relevant information.	0 1 2	0 1 2	0 1 2	0 1 2
1.2. Evaluate reliability of information found on internet.	0 1 2	0 1 2	0 1 2	0 1 2
1.3. Save and store data, information and content (exp, text, imagines, music, video, internet pages) and retrieve them.	0 1 2	0 1 2	0 1 2	0 1 2
SCORE FOR DL – digital literacy				
2.1. Use internet technologies for communication (email, skype, WhatsApp, Viber, intranet…).	0 1 2	0 1 2	0 1 2	0 1 2
2.2. Use companies' digital storage for sharing information (Dropbox, OneDrive, Google Drive…)	0 1 2	0 1 2	0 1 2	0 1 2
2.3. Use digital services for following and participating in digital environment (communication using forums and social networks…)	0 1 2	0 1 2	0 1 2	0 1 2
2.4. Use digital tool for collaborative teamwork (Dropbox, Google Drive, Microsoft Teams, Trello, Slack…).	0 1 2	0 1 2	0 1 2	0 1 2
2.5. Follow code of conduct and communication in virtual environment (understands the difference between the rules on different platforms).	0 1 2	0 1 2	0 1 2	0 1 2
2.6. Manage online identity (choosing appropriate content in communication, managing one or more digital accounts)	0 1 2	0 1 2	0 1 2	0 1 2

Employee (is/is able to):	Operational and clerical	Junior	Senior	Managerial
SCORE FOR C&C – communication and cooperation				
3.1. Create and edit digital content (text, pictures…) in different formats (.doc, .jpeg, .png, .xlsx, .pdf….)	0 1 2	0 1 2	0 1 2	0 1 2
3.2. Use formatting functions within different tools (e.g. generating letters, merging documents of different formats, using advanced formulas, macros, using forms such as WordPress).	0 1 2	0 1 2	0 1 2	0 1 2
3.3. Use digital content in a legal and ethical manner, taking into account copyrights and licenses.	0 1 2	0 1 2	0 1 2	0 1 2
3.4. Use databases and programming languages (SQL, Ruby, Python, Visual Basic, Java, C # ...).	0 1 2	0 1 2	0 1 2	0 1 2
SCORE FOR DCC – digital content creation				
4.1. Use different ways to protect digital devices and digital content (antivirus programmes, malware detectors, use passwords to access devices …)	0 1 2	0 1 2	0 1 2	0 1 2
4.2. Protect personal data and privacy in a digital environment (understand when it is necessary to share personal information with third parties)	0 1 2	0 1 2	0 1 2	0 1 2
4.3. Protect the health and well-being of oneself and others from possible dangers when using digital technologies (e.g. Ergonomics, addiction risk, cyber violence)	0 1 2	0 1 2	0 1 2	0 1 2
4.4. Recognise the impact of using digital technologies on the environment (energy saving, use of electronic documents, cost-effective settings on devices)	0 1 2	0 1 2	0 1 2	0 1 2
SCORE FOR SS – safety and security				
5.1. Able to evaluate which technology tools can be used to solve business problems (for example, preparing a business presentation in ppt or Prezi, working with excel tables …	0 1 2	0 1 2	0 1 2	0 1 2
5.2. Able to solve the technical problem encountered during the use of digital technologies and maintain them daily (for example, installing a new version of the software, changing the password, updating the programme, checking the internet connection …)	0 1 2	0 1 2	0 1 2	0 1 2
5.3. Use digital technology for knowledge innovation in this domain (online tutorials, online courses, webinars, chatting with colleagues about problems)	0 1 2	0 1 2	0 1 2	0 1 2

Employee (is/is able to):	Operational and clerical	Junior	Senior	Managerial
5.4. Knows how to identify its own gaps in digital competences and how to improve them.	0 1 2	0 1 2	0 1 2	0 1 2
SCORE FOR PS – problem solving				
SCORES (OVERALL)				

IV.4. How to score the tailored-made questionnaire

PUBLIC ADMINISTRATION EXAMPLE

From your experience, circle the answer representing the level of digital competencies that are important (necessary) for performing your job. (In each answer, a person (behaviour) when using digital technologies for professional practice (for professional purposes) is described). Think from the perspective of your everyday activities and tasks and digital skills that are necessary for a person to be able to perform your job.	
Information and data literacy	Category
1. Use internet search engines to find relevant information	Competence
In order to find some relevant information and content in the digital medium (internet) important for my job, a person:	**Question**
Does not need to know what tool to use	Level 0
Can use search engine by typing in key words	Level 1 - basic
Should know how to use filters to specify search according to their needs	Level 2 - intermediate
Should know how to narrow search for specific content (use specific web sites, forums …)	Level 3 - advanced
2. Evaluate reliability of information found on internet	Competence
To evaluate reliability of information found on internet a person should:	**Question**
Be aware that some contents are not reliable but he/she does not need to be sure how to verify its credibility	Level 0
Be able to make a basic assessment before using it for performing tasks by analysing some facts, like author, or origin.	Level 1 - basic
Be able to assess the credibility of the data comparing it with different sources that he/she knows are trustworthy (that are proved to be)	Level 2 - intermediate
Have well-defined and efficient strategy combining technological and offline resources to assess the validity of information	Level 3 - advanced
3. Save and store data, information and content (exp, text, imagines, music, video, internet pages) and retrieve them	Competence
To store data, information and content a person should:	**Question**
Be aware that files can be saved and stored on the computer but does not need to know how	Level 0
Know how to use different tools for storing information and different relevant content.	Level 1 - basic
Be able to create backup and tag files, but calls IT support for help to retrieve content and information on computer	Level 2 - intermediate
Know how to retrieve content and information on computer or on the web on their own.	Level 3 - advanced

Communication and collaboration	Category
1. Use internet technologies for communication (email, skype, WhatsApp, Viber, intranet…)	Competence
In order to communicate with colleagues and clients (citizens) a person:	**Question**
(could) Rather do it face-to-face or ask someone to do it for him/her	Level 0
Uses one well known tool for digital communication (email)	Level 1 - basic
Uses different communicative tools depending on whom he/she communicates with (colleagues or clients).	Level 2 - intermediate
Is able to create many different accounts and social groups for different communications depending on purpose.	Level 3 - advanced
2. Use companies' digital storage for sharing information (Dropbox, OneDrive, Google Drive...)	Competence
To share some information with colleagues and clients (citizens) a person should:	**Question**
Ask someone to help him/her (Calls IT support).	Level 0
Know how to share information using one digital tool he/she feels comfortable with (send them via mail or viber).	Level 1 - basic
Be able to share content and resources through online communities, networks and collaborative platforms.	Level 2 - intermediate
Be able to regularly publish information that he/she develops collaboratively on social networks where he/she exchanges ideas and experiences on daily bases (with colleagues all around the world)	Level 3 - advanced
3. Use digital services for following and participating in digital environment (communication using forums and social networks…)	Competence
When comes to professional online societies, platforms and meetings a person should:	**Question**
Be aware that it is possible to be a part and engage in professional groups through online participation but he/she does not need to know how.	Level 0
Be involved in online professional communities, sometimes.	Level 1 - basic
Be active in more than one professional group created online.	Level 2 - intermediate
Be able to create online groups and organise professional meetings.	Level 3 - advanced
4. Use digital tool for collaborative teamwork (Dropbox, Google Drive, Microsoft Teams, Trello, Slack...)	Competence
For working collaboratively with colleagues in digital environment a person:	**Question**
Does not need to be sure how to do it.	Level 0
Should be able to join online collaborative working space if someone else organise it	Level 1 - basic
Should be able to organise online collaborative activity using well known application.	Level 2 - intermediate
Should be able to organise online collaborative activities on any platform and adjust it for project/work specific needs	Level 3 - advanced
5. Follow code of conduct and communication in virtual environment (understands the difference between the rules on different platforms)	Competence
To communicate via digital platforms with colleagues and clients (citizens) a person (performing my job) should:	**Question**
Behave like he/she behaves offline.	Level 0
Know basic rules of access and behaviour in social networks and communication channels in digital media.	Level 1 - basic

Know how to re-read every message and post and reflect on the convenience of sending it before doing it.	Level 2 - intermediate
Adapt the way of communication to the context, audience and purposes.	Level 3 - advanced
6. Manage online identity (choosing appropriate content in communication, managing one or more digital accounts)	Competence
When it comes to the so-called online/professional identity a person should:	**Question**
Be aware that we develop some virtual identity in virtual space and leave some traces behind.	Level 0
Take care about the image and digital identity he/she creates and track digital fingerprint.	Level 1 - basic
Actively create his/hers virtual identity and leaves passwords and other personal data only on secure places.	Level 2 - intermediate
Manage different digital identities depending on the context and purpose and monitor the data he/she produces, protecting digital reputation.	Level 3 - advanced
Digital content creation	Category
1. Create and edit digital content (text, pictures…) in different formats (.doc, .jpeg, .png, .xlsx, .pdf….)	Competence
To write reports a person:	**Question**
Does not need to be sure how to make them digital.	Level 0
Should be able to write a report in MS Word or in different formats using computer programmes with the help of IT support.	Level 1 - basic
Should be able to create digital reports and presentations in different formats.	Level 2 - intermediate
Should be able to create digital reports and presentations in different formats, combining different tools.	Level 3 - advanced
2. Use formatting functions within different tools (e.g. generating letters, merging documents of different formats, using advanced formulas, macros, using forms such as WordPress)	Competence
In order to improve digital content a person:	**Question**
Does not need to use internet and digital tools for that purposes.	Level 0
Should sometimes consult internet or colleagues to help him/her create or use some digital material.	Level 1 - basic
Should know how to combine and modify the material from Internet using different tools.	Level 2 - intermediate
Should know how to use advance software or applications functions to create content from different sources.	Level 3 - advanced
3. Use digital content in a legal and ethical manner, taking into account copyrights and licenses	Competence
When a person uses materials from internet he/she should:	**Question**
Be aware that some content distributed on the internet might be copyrighted but usually he/she does not pay attention to that – think that all material on internet are open-sourced.	Level 0
Respect copyright both to access and download files.	Level 1 - basic
Respect license and cite origin properly, whenever he/she uses some digital content of another author.	Level 2 - intermediate
Know how different types of licenses are applied to information and resources that he/she creates.	Level 3 - advanced

4. Use databases and programming languages (SQL, Ruby, Python, Visual Basic, Java, C # ...)	Competence
When it comes to programming languages and using databases for performing my job (specific sites, databases…) a person:	**Question**
Does not need to know to how to do it.	Level 0
Should know how to operate them at basic level.	Level 1 - basic
Should be able to modify some simple software functions and applications in a basic configuration level	Level 2 - intermediate
Should be able to make several modifications on several applications and to adjust some open source software to suit their needs, or even write a source code.	Level 3 - advanced
Safety	Category
1. Use different ways to protect digital devices and digital content (antivirus programmes, malware detectors, use passwords to access devices ...)	Competence
When using platforms and software relevant for my work a person:	**Question**
Does not need to know what possible risks might occur and does not think about potential risks.	Level 0
Should be aware about potential risks but he/she does not know how to install protection software (antivirus, antispam) without help.	Level 1 - basic
Should be able to install protection software (antivirus, antispam) on devices he/she uses.	Level 2 - intermediate
Should check, test and update his/hers digital devices to identify vulnerabilities or operating failures and seek appropriate solutions.	Level 3 - advanced
2. Protect personal data and privacy in a digital environment (understand when it is necessary to share personal information with third parties)	Competence
When sharing information online a person:	**Question**
Does not need to think about clients' protection and privacy.	Level 0
Should be aware that in online environments he/she can share only certain types of information about himself and his clients.	Level 1 - basic
Should generally understand privacy related issues and have a basic understanding of how the data is collected and used on different platforms.	Level 2 - intermediate
Should know how to protect privacy of all stakeholders and often change the default privacy settings for online services to improve privacy protection.	Level 3 - advanced
3. Protect the health and well-being of oneself and others from possible dangers when using digital technologies (e.g. Ergonomics, addiction risk, cyber violence)	Competence
When thinking about possible dangers of using digital technologies for performing your job a person should:	**Question**
Know that there are some but does not need to be sure what they are.	Level 0
Understand the health risks associated with the use of technologies (from ergonomic aspects to addiction to technologies)	Level 1 - basic
Know how to use technology so it does not harm his/hers health and well-being as well as his/hers clients (citizens).	Level 2 - intermediate
Be able to create detection strategies and intervention protocols in case of potential addiction or cyberbulling.	Level 3 - advanced
4. Recognise the impact of using digital technologies on the environment (energy saving, use of electronic documents, cost-effective settings on devices)	Competence

When it comes to the impact of using digital technologies on the environment a person:	**Question**
Does not need to be sure how to reduce energy consumption in the use of digital devices and lessen the environmental harm from producing it.	Level 0
Should have limited knowledge about some energy saving measures and sometimes apply them when using devices.	Level 1 - basic
Should save energy by acquiring enough environmentally friendly equipment and services.	Level 2 - intermediate
Should convey, share and promote the necessity of sustainable use of technology among colleagues and clients (citizens).	Level 3 - advanced
Problem solving	Category
1. Able to evaluate which technology tools can be used to solve business problems (for example, preparing a business presentation in ppt or Prezi, working with excel tables ...	Competence
When facing different professional tasks that needs to be solved online a person:	**Question**
Does not need to be sure what tools and platforms are available and to know what to choose.	Level 0
Should be able to choose a tool that is recommended by colleagues or that he/she knows well (although sometimes is aware that it is not the best solution).	Level 1 - basic
Should critically assess and make informed decisions when choosing a tool, device, application for concrete task even when is not familiar with specific tool.	Level 2 - intermediate
Should have knowledge of wide range of possible tools and be able to decide which tool fits the best with the goals.	Level 3 - advanced
2. Able to solve the technical problem encountered during the use of digital technologies and maintain them daily (for example, installing a new version of the software, changing the password, updating the programme, checking the internet connection ...)	Competence
When facing technical problem during the use of digital technologies for performing my job it is necessary for a person be able to:	**Question**
Call someone to help and try to clearly explain the problem.	Level 0
Recognise the technical problem and explain it clearly to technical support or solve it by using tutorial if it is not a complex one.	Level 1 - basic
Solve complex technical problem independently just relying on tools found on the internet.	Level 2 - intermediate
Help others to solve technical problems.	Level 3 - advanced
3. Use digital technology for knowledge innovation in this domain (online tutorials, online courses, webinars, chatting with colleagues about problems, parts of the experience)	Competence
When it comes to the innovative and creative use of digital tools and-knowledge innovation important for performing my job it is necessary for a person:	**Question**
A person does not need to know how to learn online.	Level 0
To be able to use only tools that are mandatory and provided by institution.	Level 1 - basic
To be able to use wide range of innovative digital devices and learning platforms to expend my knowledge.	Level 2 - intermediate

To be able to be actively involved in groups and communities dedicated to creating content and sharing knowledge with others.	Level 3 - advanced
4. Identifying digital gaps in digital competence	Competence
When I think about the level of digital competencies that are important for performing my job a person should:	**Question**
Be aware of limitations but does not need to know about concrete area and training needs.	Level 0
Be able to use internet to identify training adequate to the needs in the area of digital competencies that he/she lacks.	Level 1 - basic
Know exactly what area of competence he/she needs to improve and how.	Level 2 - intermediate
Have his/her own system of continuously improving the use of digital tools.	Level 3 - advanced
SCORING	

V. PLANNING SAMPLE – MULTI-PHASED PROCESS OF DEFINING FINAL SAMPLE

Creating sample

First phase – defining industries in chosen economy

As introduced above, the industries in focus for all Western Balkan economies are defined.

General questionnaire is created to be completed by managers or HR managers in different industries. Targeted industries should be described according to the economies and towns.

The targeted industry for the economy is based on the report of its importance (strategically important emerging industry, and industry that is crucial for economic development of the targeted economy).

Information needed: (1) economy, (2) regions (county) – towns, (3) mapping institutions/companies/organisations within each region (county) - town, (4) identifying existing positions (levels –operational/clerical, managerial, junior, middle, and senior).

Identified units of analysis create hierarchy and each level represents one cluster in population.

Steps:

1. Choose industry for the specific economy (already defined by this report)
2. Divide economy into counties (regions, areas)
3. Map institutions/companies/organisations within each county (regions, areas)
4. Get informed about the percentage of the total participation of identified institutions/companies in the whole population of institutions/companies
5. Plan sample – number of institutions/companies/organisations from each county according to the number (percentage) of their contribution to the whole sample of institutions/companies/organisations

6. Randomly chose institutions/companies/organisations (in prescribed number – see step 5) from each county (regions, areas) or
7. Identify existing positions in extracted institutions/companies/organisation – based on the organisational structure (if applicable)
8. Identify the potential respondents within chosen institution/company/organisation – Manager, Supervisor, HR Manager
9. Communicate the institutions/companies/organisation – arrange questionnaire dissemination

RECOMMENDED PROFILES OF RESPONDENTS:

Managers, Supervisors, HR managers, experts who are acquainted with demands for digital skills in targeted domain of work.

RECOMMENDED NUMBER OF RESPONDENTS:

Defining number of respondents depends on the number of counties (regions, areas) and relevant institutions/companies/organisations in each of them.

According to the information of the number of the relevant institutions/companies/organisations in each county (region, area), the number of the targeted institutions/companies/organisations in the sample should depend on its share in the whole population (of all institutions/companies/organisations in all counties)[126].

The numbers of concrete respondents that are recruited from the chosen institutions/companies/organisations are based on the number of different job positions present within the institution/company/organisation (organisational structure and job descriptions might be helpful). It is important to choose person that can cover the most positions (if it is applicable all positions) in organisation. The number of them depends on the variety of positions in the organisation. At least one should be included but it is recommended to include as many as it is necessary in order to gain information about all existing positions[127].

The concrete number of respondents also depends on the desired level of precision and accuracy (for example we may want 95% confidence level). We have to take into a consideration the expected response rate. If we are optimistic we could expect about 25% of contacted respondents to answer accurately to questionnaire. It is complicated with the situation that we have to have the number of respondents from different clusters so their number should approximately reflect their share in the whole population.

Also, the sample is clustered which means that, once we decide on the quantity of the whole sample for the industry and the economy (based on the information of the total number of units – institutions/companies/organisations), we have to decide on the number of units for each cluster according to the proportion of its participation in the whole sample. The general formula for deciding on the total number of respondents in the sample is:

126 For example, if there are five counties and there are total of 100 institutions of which 10 are in first county, 20 in the second, 10 in third, 20 in fourth, and 40 institutions/companies/organisations in the fifth then the sample would be: 1 random company from the first county, 2 from the second, 1 from the third, 2 from the fourth and 4 from the fifth. So, 10 institutions are covered in the proportion that correspondents to the proportion of the institutions in the whole population (in that county).

127 For example, if there is no person in one institution/company/organisation acquainted with all the jobs and positions, and their demand for digital competencies is not known to one person, it is necessary to include more of them.

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where: n0 – sample size, Z score – confidence level, p – expected prevalence, q – expected non-prevalence, e – desired precision (estimated error).

The formula for defining the number of respondents from each cluster in the whole sample is:

ns=nxNs/n

Where: ns number in the stratum sample; Ns – number in the population stratum; n – number of respondents in sample; number of people in population.

Based on the identified gaps, **the sample for tailor-made self-assessment** is created. Identify clusters (regions) and positions where the highest gap between required and assessed digital skills are found and then make them the targeted institutions for the second step in the survey.

The criteria for entering into a sample are based on the quantity and content of the gap. In the general questionnaire respondent has the opportunity to give three answers to the competency: 0 – not necessary for performing job, 1- necessary but there is no gap, 2 – necessary with existing gap. Whenever discrepancy is found, these positions in these institutions within this region (county, area) should be taken into a consideration for including in the sample for the second phase of testing.

After scoring and getting data from the completed questionnaires for the specific industry – public administration in the economy, the results should describe the situation in the whole economy for the targeted industry. The ranking of the data should be done in order to access the extent of the gap and to prioritise. First criteria is the county (region, area), second is the position and the third is competency (might not be necessary in this phase).

For example, the table for prioritising categories of respondents, candidates for second testing sample might look like this:

Table: Example of ranking counties (regions, areas) and positions for determining priorities for selecting respondents for the second testing sample

Criteria: County (area, region)	Criteria position				Rank (based on overall score)
	Clerical	Junior	Senior	Managerial	
1st(sum of institutions)	Score	Score	Score	Score	
2nd ……	Score	Score	Score	Score	
	Score	Score	Score	Score	
	Score	Score	Score	Score	
RANK (for positions)					

THE PROFILE OF RESPONDENTS IN SAMPLE: Employees working in the positions, in jobs that are targeted as the positions and jobs where there is the highest level of gap between required and current digital skilfulness.

THE NUMBER OF RESPONDENTS IN SAMPLE: After targeting the regions and institutions/ companies organisations, the sample will be created based on the number of employees at the critical positions.

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ANNEX 1 - FOCUS GROUP GUIDE

FOCUS GROUP GUIDE:

I. Considering the topic of digital skills awareness and experiences with identifying digital skills respondents claim

1. Rank the level of digitalisation in their industry and economy, company
2. About digital skills becoming more important in last few years they expected…
3. Digital skills that are hard to acquire

II. Digital skills shortage considerations

1. How do you perceive the level of digital skilfulness among current employees in your company? Industry? Does that level match the requirements?
2. What is the situation with labour market? Is it easy to replace employees for different positions? What positions are hard to replace? What digital skills are hard to find among potential and current employees? What digital skills they have or lack?
3. How do you bridge the gap? What strategies you use or recommend for the situation?

III. Identifying the content of specific skills among different areas of competence

COMPETENCIES AREAS:

1. Information and data literacy
2. Communication and collaboration
3. Digital content creation
4. Safety
5. Problem solving

1. What areas of digital competencies are crucial for employees in your industry? Company?
2. What are the specific skills crucial for performing work? Provide an concrete example for specific competencies for each domain important for performing a job in your industry/company

IV. Identifying the priorities and mapping the digital skills gap

1. Could you rank (order) different areas of digital competencies based on their importance for performing job in your company/industry?

2. In which of the categories is the largest gap in your industry: what skills/competencies are necessary for employees to develop in order to perform their jobs?

ANNEX 2 - SUMMARISED OVERVIEW OF THE TOPICS DISCUSSED IN FOCUS GROUP

The suggested industry context of the respondents is given in the following table, specifying the preferred industry for each economy. The industries are given in rows and economies are given in the columns specifying the number of potential respondents from particular industries in each economy. The highlighted cells indicate the preference from a given economy to include these industries in the respondents list.

Table: Guidelines for recruiting respondents for focus group from different industries in different economies

Emerging industry / Economy	AL	BA	KS*	MK	ME	RS
ICT - software development and outsourcing	**1**	1	1	**1**	1	1
SME, start-ups, entrepreneurship, innovation		1	1	1	1	**1**
Creative industries	1	**1**	1			**1**
Agriculture, food and beverage	1	1	1		1	1
Public administration, E-government		1		**1**	**1**	**1**
Healthcare		**1**		**1**	**1**	**1**
Energy	**1**	1	**1**			
Tourism, accommodation and related services	**1**	1			1	
E-commerce	**1**	**1**	1	**1**	1	1
Telecommunications	**1**			1		
Banking and finance	**1**		1			
Education (E-education), HR and professional trainings		1		**1**		
Transport (auto, railway, aviation) and Construction			1		1	1
Electrical equipment						1
Manufacturing, processing and heavy industry						1

Summarised overview of the topics discussed in focus group

Topics	Economy	Bosna and Hercegovina	Serbia		Montenegro
	Industry	Creative industry/media	IT	Health	Entrepreneurship
Digital skills awareness and experiences with identifying digital skills		"The film industry is already mainly digitalised, even 10 years ago. People have adapted."	"Even before the pandemic, everything was digital, but because of the pandemic, we all switched to digital overnight. We realised how much time we wasted before this level of digitisation on transportation, for example." "One of the services we offer is to help clients digitise so that we are completely into this topic."	"We use advantages of digitalisation but we need to monitor constantly what is permitted and what is not."	"Covid-19 has only changed people's attitude towards digitalisation. Now people are much more rational and everything is going much faster."
Digital skills shortage		He/she does not recognise the gap.	"Bureaucrats" hampered (slowed down) the digitalisation process. Due to the COVID-19, they also became more ready.	The biggest gap exists with older doctors, but also with the medical staff in general. They mostly adapt and duplicate their efforts. Technical support is available at all times.	"People want to learn what is a trend and if they can benefit from it. For example, in a short time, people developed the skills of creating video clips, digital content, because the situation forced them to do so. " "People who are used to learning develop digital competencies much faster. Young people often do not have the habit of learning. "
Identifying the content of specific skills among different areas of competence		Problem solving. Safety. Communication and collaboration. "All areas are very important, for example, collaboration and the digital content creation."	Communication and collaboration. Safety. Creating digital content.	"Everyone is expected to know how to use this specific software or applications at work. For administrative staff, a higher level is implied."	Everyone uses a software solution "Discord" for communication. "Although, someone has better communication skills but teams complement each other."

Topics	Economy	Bosna and Hercegovina	Serbia		Montenegro
	Industry	Creative industry/media	IT	Health	Entrepreneurship
Identifying the priorities and mapping the digital skill gap	Crucial	Problem solving. Safety. "Solving problems is a very important thing for producers. Being clever. Security has become very important because there were gaps at the industry level. This was not the case five years ago. "	"Definitely communication and collaboration is very important. Then the priority is to create digital content. We will not be a mere administrative. Problem solving is very important." "Safety is very important to us because of sensitive data."	Safety and communication and collaboration. "... we constantly monitor what is permitted (by the law) and what is not. For example, it is easier to integrate patient databases because we work in multiple locations. I would like Zoom to stay because everything works much faster. "	Communication and collaboration. Creating digital content.
	Gap	Safety, given that there were flaws there.	Safety. "The only thing left is signing contracts in traditional way (without digital signature) because regulations do not allow differently." Problem solving "It happens in our economy that young people who are digitally competent want to do everything double, both digitally and bring paper, which is very unusual."	Most noticeable is with doctors. In order to digitise prescription procedures, for example, intervention is needed in the areas of data literacy, safety and digital content creation.	The biggest problem is when there is no readiness to learn.

ANNEX 3 - QUESTIONS FOR SEMI-STRUCTURED INTERVIEWS

Questions for the interviews:

1. How do you see the level of digitalisation in your industry concerning your economy (comparing to the other economies in region and EU member states?
2. What digital tools do you and your colleagues use on everyday basis? What digital tools do you and your colleagues use that are considered to be important for doing your job?
3. From your perspective, are many business activities digitalised? What activities recently became digital?
4. What are the activities that you see are digitalised in your industry? Can you give me some typical scenario of digital skill usage in your work? How does it look like concretely? Can you describe it?
   a. What tasks are digitalised in your work?
   b. How can you be sure that it has no copyright or is not corrupted?
   c. How do you communicate with your colleagues, clients, customers/patients? How do you find them/how they find you?
   d. How do you collaborate with them? Share tasks, make arrangements, discuss?
   e. Do you have a nick name or special ID (mark) profile, pseudonym or something that makes you recognisable in digital environment?
   f. What tools do you use/how do you create the content of your work/perform your task/provide your service to clients? Do you combine more methods?
   g. Do you participate in some professional online groups? Via what social platform? Do you generate topics and materials and discuss topics or just listen to what others say?
   h. How do you go along with data protection and securing the content and the computer programme you use? What do you do for that purpose?
   i. How do you handle real and potential glitches when using systems? What do you do when something goes wrong? Do you have some support? What kind of support? Can you handle some problems by yourself? Do you use internet to solve these kinds of problems?
   j. Do you adjust digital tools you use according to your purposes? How? Do you combine different tools for different purposes? Do you use some tools for some new, unexpected, not previously defined purposes? How do you describe creative or innovative usage of the tools?
   k. Do you use internet to improve your knowledge in some domains? Where do you find materials and tutorials? Do you know some Webinars, online courses concerning the topics you are interested in?
   l. How can you be sure that it has no copyright or is not corrupted?
5. Can you make any differentiation between various positions regarding the level of digital skills needs?
6. What should you know to be able to finish your business tasks? Is some of that knowledge considered to be digitalised? What are the crucial, basic digital skills in your profession?
7. Are the competencies of people working in your domain at the proper level? Do their competencies match the requirements?
8. What are the main problems? How do you see them? Is there any shortage in skilfulness of people working in your area of expertise concerning their digital skills? Are there any differences between positions, operational or managerial, concerning digital skills? In what way? In the level or in quality of skill?

ANNEX 4 – INTERVIEWS STRUCTURE AND RESPONDENTS

Desk research also served to target possible individuals for interviews to help defining the scope and content of digital skills assessment as well as tailor-made questionnaires for targeted sectors. The suggested structure of interviewees is given in the table below. They should have experience in the domain of work using related digital tools on daily basis and be capable of sharing these experiences.

Table: Suggested structure of respondents for interviews based on the economy, industry, position and form of employment

No.	Sector/form of employment	industry	Economy	Position	(MK, AL, KS)	(RS, ME,BA)
1	Public	Government	MK, RS, ME	Operational/ clerical	1 (MK)	1 (RS/ME)
2				Managerial	1(MK)	1(RS/ME)
3		Education	MK, BA	Senior-experts (teachers)	1(MK)	1 (BA)
4	Private/public	Healthcare	MK, RS	Experts - senior	1 (MK)	1 (RS)
5	Private	IT	All	Junior	1	1
6				Senior	1	1
7				Managerial	1	1
8		Tourism and services	ME, AL	Operational/ clerical	1 (AL)	1 (ME)
9		e-commerce	BA, MK	Operational/ clerical	1 (MK)	1 (BA)
10		Energetics	RS, KS, MK, BA	Operational/ clerical	1 (KS/MK)	1 (RS/BS)
11	Freelance/entre-preneur/start up	Creative indus-try	BA, RS, KS, MK	(fashion, mar-keting, …) digital marketing	1 (KS)	1 (BA/RS)
12		Organic food	AL, BA	Agriculture.	1 (AL)	1 (BA)
Total					12	12

24 employees have been interviewed (for details see table below) in different targeted industries and working domains. The interviews helped to understand the list of specific tools and scenarios used (whether the processes are digitalised, ought to be digitalised or are planned to be digitalised). The answers were used as guidelines for the preparation of questionnaires, in addition to the knowledge and information gathered from desk research and expert competence of the team.

Initials	Position	Industry	Economy
V.S.	Manager	Public administration – eGovernment	Republic of North Macedonia
A.S.	Senior	Digital marketing	Serbia
Đ.K.	Entrepreneurship	Architecture	Serbia
T.P.	Manager	Gov. administration	Serbia
Z.L.	Senior	IT	Serbia
S.P.	Freelancer	Digital social marketing	Serbia
D.Č.	Senior	IT	Republic of North Macedonia
M.R.	Doctor	Healthcare	Serbia
Z.M.	Doctor	Healthcare	Republic of North Macedonia
S.P.V.	Nurse	Healthcare	Serbia
N.R.	Manager	Energetics	Serbia
M.K.	Manager in tourism	Tourism and service	Albania
N.P.	Expert	Service *economic develop	Albania
N.M.	Middle position	tourism	Serbia
T.J.	Administrative officer	Government	Serbia
T.J.	Owner	Vegan food production (SME), organic food	Serbia
P.B.	Owner	Transport and retail	Serbia
P.P.	Administrative worker	Government administration	Serbia
M.G.	Expert	Personal service provider	Serbia
S.S.	Senior	Services	Serbia
I.M.	Expert	Education	Serbia
B.R.	Teacher	Education	Serbia
Z.P.	Owner	Personal service provider	Montenegro
S.A.	Manager	Energy (legal issues)	Kosovo*

ANNEX 5 - INTERVIEW RESULTS: DIGITAL TOOLS "DISCOVERED" TO BE USED IN DIFFERENT INDUSTRIES

Interview results: Digital tools "discovered" to be used in different industries

Industry	Purpose	Tool
Government - public administration	Accounting software	
	CRM software (customer relationship management software)	
	Data base and query software	
	Publishing software	Acrobat Reader (Adobe)
	Electronic mail software	Microsoft Outlook, Gmail
	Filing software	
	Enterprise integration software	ERP
	Project management software	
	Web page creation and editing	Linkedin, Facebook, Instagram…
	Calendar and scheduling	Microsoft Outlook, Google calendar, Mobile phone calendar
	Decision support systems	
	Video conferencing, online meetings	Zoom, Microsoft Teams
	Data analysis in spreadsheet	Microsoft excel
	Writing text - word processing	Microsoft word
	Creating presentations	Microsoft Power point
	Social groups, communication	Viber, WhatsApp
	Translating	Google Translate
Education	Videoconferencing, online meetings	Zoom, Microsoft Teams, Google Meet
	Online learning platforms (teaching end course administration)	Learning management systems: Moodle
	Online teaching	Zoom, Microsoft Teams, Google Meet, Google classroom, Moodle,
	Whiteboards	One Note, Canvas chrome app, Jamboard, Whiteboard app, Aww app, Flipgrid, Explain everything, Educreations app
	Power point and other multimedia presenters (presentation software)	Microsoft Power point, Prezi
Healthcare	Writing text - word processing	Microsoft word
	Computer-based training software	Bridge, Core Archive, Tovuti.. https://www.softwareadvice.com/lms/computer-based-training-comparison/
	Electronic mail software	Microsoft Outlook, Gmail
	Browsing for information	Google Chrome
	Analytical of scientific software	Google Scholar, Google Analytics
	Social groups, communication	Viber, WhatsApp
	Student management software	DMIS
	Distance learning and teaching	BigBlueButton
	Internal communication	Google Package
	Connecting with governmental institutions	SMIAL
	Electronic mail software	Microsoft Outlook, Gmail
	Medical information systems (software)	HELIANT
	Browsing for information	Google Chrome, Specialised medical blogs or sites
	Writing text - word processing	Microsoft word
	Videoconferencing, online meetings	Zoom, Google Meet
	Creating presentations	Microsoft Power point
	Social groups, communication	Viber, WhatsApp
	Business intelligence and data analysis software	
	Data base search	Medical databases, legislations, medicaments. medical image database system
	Specific medical equipment	electronic blood pressure units, accessories, electronic blood pressure units, EKG, EEG, medical warehouse data base,
IT	Videoconferencing, online meetings	Zoom, Microsoft Teams, Google Meet
	Using electronic mail	Microsoft Outlook, Gmail
	Calendar and scheduling	Microsoft Outlook, Google calendar, Mobile phone calendar
	Video conferencing, online meetings	Zoom, Microsoft Teams
	Data analysis in spreadsheet	Microsoft excel
	Writing reports	Office 365 (Word)
	Creating presentations	Microsoft Power point
	Browsing for information	Google Chrome
	Using digital platforms for communication and collaboration	Teams, Zoom, Slack, Emails, viber, Whatsapp….
	Digital tool for collaboration (code versioning controlling systems)	Jira, Confluence
	Social groups, communication	Viber, WhatsApp
	Decision support systems	
	Object or component oriented development software –	

Industry	Purpose	Tool
IT	Use Enterprise Resource Planning (ERP) software	
	Using business intelligence and data analysis software,	
	Customer relationship management (CRM) software	
Tourism and services, E-commerce	Accounting software, financial analysis software	
	Business intelligence data analysis software	
	Data base management system, data base and query software	
	Calendar and scheduling software	MS outlook
	Document management software	word, excel
	Enterprise integration application software	ERP
	Graphic or photo imaging software	
	Point of sale software, sales and marketing software, point of sale payment terminals	POS
	Web page creation and editing software, web platform developing software	API solution, BusTiket4.me
	Electronic mail software	
	Internet browser software	
	Office suite software	
	Public address systems	
	Vehicle navigation systems	
	Printers	
	Ticket dispensing machines	
Creative industries	Web platform development software	
	Content plagiarism tools	
	Presentation software	
	Digital cameras	
	Content idea generators	
	Free image databases	
	Sales and marketing software	
	Web page creation and editing software	
	Communication and collaboration	Jira, Slack, Zoom
	Publishing on networks	LinkedIn, Facebook, Instagram, Tik Tok, Twitter
	Content management system, Video creation and editing software	Word press, Photoshop, Camzia
	Document management software	Image editors, SS software solutions
	Sharing	Buffer, Hootsuite, Job rack,
Creative industries	Writing and planning	Google drive (doc, sheets), Google calendar personal digital assistants (PDA)
	Tracking website traffic and visitors` behave	Google analytics, Headline analysers
	Tracking the competition	Ahrefs (SemRush),
	e-mail marketing tool	MailChimp, Aweber
	A heat maps tool, track users` interaction with website	Crazzyegg
	Checking how website performs in order to improve visibility	Screaming Fog, Blade, Big paket
	Sketching and modelling	AutoCAD, Revit,
	3D modelling, animation, visualisation, graphic or photo imaging software	3DS Max, SketchUp, MayaBlender, Houdini, Cinema 4D, ZBrush
	Rendering (motors for rendering)	Corona render, Vray
	For collaboration and distant working	Team viewer
	For video presentation and downloading music and transforming it in mp3, conversion software	4K slideshow maker

ANNEX 6 - INTERVIEW RESULTS: DIGITAL SKILLS AND LEVEL OF EXPERTISE

Grid intersecting activities and tasks with digital skills and level of expertise needed found for particular industries and positions (based on interviews (desk research, focus group and job analysis)

NOTE – Abbreviations for Digital skill column:

- DL - Digital Literacy
- DCC – Digital Content Creation
- C&C – Communication & Collaboration
- SS – Safety and Security
- PS – Problem Solving

sector/ empl.form	Industry	Position	Activities	Tasks
Public	**PUBLIC ADMINIS-TRATION**	Operation-al/	Communicating with col-leagues/citizens	Appointing, organising and participat-ing in meetings
				Clerical
			Correspondence	Sharing online material
				Writing e-mails
			Creating documents	Creating online material
				Scanning documents
				Creating invitation for meetings
				Format documents
			Filing and archiving, creating and maintaining data base	Storage information - Compile, copy, sort and file records
				Retrieve relevant information from the databases
				Sorting e-mail
				Create timetable and organise activi-ties digitally
				Proofread data
			Managing and using citizens data	Correcting information in database
				Sharing information from database
				Saving citizens' data

sector/ empl.form	Industry	Position	Activities	Tasks
Public	**PUBLIC ADMINIS-TRATION**	Manage-rial	Analysing documents	Finding and reading legislations, strategies, policies, reports
				Evaluating documents
			Creating documentation	Create strategies, policies, reports
				Make presentations
			Sharing documentation	Presenting materials
				Sending materials
			Communicating with differ-ent stakeholders	Debating and negotiating
				Delegating activities
				Participating in meetings
		Senior experts/ teachers		Coordinate activities with external stakeholders
				Participation in different invents
				Present information to public
				Correspondence
			Organise activities	Scheduling and organising meetings
				Developing plan
				Sharing plan and delegating tasks
			Professional development	Following and updating professional knowledge
				Support the professional develop-ment of others
			Make decisions	Use relevant information for making decisions
				Consult, discuss and negotiate
				Use digital tools for supporting decision
	EDUCA-TION		Professional improvement (development)	Follow trends in domain
				Find relevant online courses, semi-nars…
				Attend online courses, seminars
				Communication and collaboration with colleagues
				Professional meetings and boards online, networking
				Sharing experiences with colleagues
				Conduct research in a domain
			Prepare courses	Search, download and retrieve digital materials (Know where to find them (sites), how to use key words for search, how to check its authenticity; take care of licenses, copyrights and privacy, create digital warehouse for materi-als, categorise materials)

sector/ empl.form	Industry	Position	Activities	Tasks
Public	**EDUCATION**	Senior experts/ teachers	Prepare courses	Prepare objectives and outlines of courses
				Creating digital learning material
				Adjust digital materials (Adding special effects on learning material, modify digital material according to needs, modify and transform digital material into different formats).
			Manage online learning environment	Adapt teaching strategies
				Adjust platform interface for current needs, selecting platforms, PLS – personalised learning systems usage
			Organise, manage and support learning process	Organizes meetings classes, organises tests
				Conduct online teaching process
				Sharing teaching material
				Enable and support students' co-operation and collaboration (virtual teams)
				Instruct students how to use digital platforms
				Support self-regulated learning
			Follow student`s learning process and achievement	Prepare online tests and quizzes
				Administer online tests and quizzes
				Share online material with students, sharing tests and quizzes
				Generate, select, critically analyse and interpret digital evidence of learner activities, performance and progress
			Administer students` database and points	Managing list of students and their grades, digitalised assessment strategies
			Communication with students, parents	Online consultation
				Reporting learner`s performance
				Provide timely feedback to students
				E-mail and platform texting

sector/ empl.form	Industry	Position	Activities	Tasks
Private/ public	**HEALTH-CARE**	Experts	Professional development	Find relevant information at the internet
				Publishing results online
				Online conferences – participating
				Being aware of the impact of ICT on the domain
				Following new tendencies in domain
				Mentor colleagues
				Participating in online professional social groups
			Communication and collaboration with colleagues	Organising or participating in e-doctor platforms
				Sharing information with colleagues
				Communicating with nurses – request for patients data
				Sending medical instructions to colleagues (to perform diagnostic tests)
				Request data from diagnostic tests
			Examining patients	Operating with diagnostic equipment - Use different diagnostic electronic devices
				Communicating with patients (E-mail, sms, social networks)
				Analyse and interpret patients' histories, symptoms
				Creating medical instruction
				Creating and posting diagnose
				Writing prescriptions
			Treating patients	Recommend diagnostic or therapeutic interventions
				Order, perform and interpret the results of diagnostic tests
				Prescribe medications: dosage
				Administering medications (revenue from digital warehouse)
				Recommend interventions
				Develop treatment plans
				Share treatment plan
			Maintain complete and detailed medical record	Creating and managing e-medical record
				Use electronic database of patients – retrieve and use information
				Using specialised medical information systems
				Online scheduling

sector/ empl.form	Industry	Position	Activities	Tasks
Private/ public	**Energy**	Operation-al/ Clerical	Daily tasks	Electricity usage reading on the location using specialised equipment or mobile phones
				Sending documentation from the location (pictures and reports automatically generated directly from software)
				Communication with supervisor, daily
		Manage-rial/team lead	Daily operations of department and managerial activities	Planning employees monthly activates
				Organising roots for electricity readings, allocating people
				Writing reports
				Answering clients complains
				Reading information from specialised software for electricity readings
				Communication with employees and supervisors
Private	**IT**	Manage-rial	Daily operations of department and managerial activities	Communication and collaboration with team members (internal communication)
				Communication with clients
				Analysing workflows
				Establishing priorities
				Developing standards and setting deadlines
				Writing reports
				Assign and review the work
				Meet with department heads, managers, supervisors, vendors, and others, to solicit cooperation and resolve problems
				Develop and interpret organisational goals, policies, and procedures
			Project management	Consult with users, management, vendors, and technicians to assess computing needs and system requirements.
				Review project plans to plan and coordinate project activity
				Planning project activities
				Coordinating and allocating people and other resources
				Tracking project progress

sector/ empl.form	Industry	Position	Activities	Tasks
Private	**IT**	Manage-rial	HR activities	Participating in recruiting and hiring employees
				Conducting interviews
				Participating in hiring employees or participating in staffing decisions, deciding on final offers (EVP)
				Supervise staff
				Participating in performance appraisals
				Participating in employees career planning
			Knowledge innovation	Following innovation in specific discipline (software testing)
				Creating educational content (Updating companies wikis and blogs)
				Following employees development
				Develop computer information resources, providing for data security and control, strategic computing, and disaster recovery
			Communication with customers and partners	Transmit information between partners, customers…
	Tourism and services (trade)	Operation-al/clerical		Greeting customers
				Online customer service (use, manage)
				Resolve complaints
				Providing information and assistance
				Negotiating and conferring with customers about services
				Sharing information publically (announcing arrivals, …)
				Scheduling appointments
				Requesting information about availability of service, products…
				Delivering information about availability of service, products…
				Inform clients, customers about essential information (travel times, transportations)
				Online correspondence with customers and partners
				Make a deal with clients and partners (official)
				Give informed advices
				Networking

sector/ empl.form	Industry	Position	Activities	Tasks
Private	**Tour-ism and services (trade)**	Operation-al/clerical	Commercial services: E-commerce	Receive payments
				Record receipts for services
				Creating electronic invoice
				Collect deposits, payments and fees
				Paying bills electronically (using e banking)
				Calculate costs, goods, services.
				Sell offer, product, travel packages,
				Manage budgets
			Creating documents	Creating e-boarding cards
				Online reservations
				Plan and arrange itinerary
				Booking activities
				Infographic and data visualisation
			Managing documentation	Collecting passengers, customers documentation
				Checking passengers, customers documentation
				Managing, baggage, cargo
				Record and maintain information about customers, products…
				Business data analysis, data mining and modelling
			Monitoring activities	Using GPS systems to follow/monitor vehicles
				Online monitoring sales chain
				Managing warehouse and stocks of merchandise
				Checking availability of service, locations…
				Evaluate services
				Merchandise performance analysis
			Marketing activities	Prepare business offer
				Provide or create brochures and marketing material
				Administering web sites (creating)
				Create and use virtual tours
				Presenting material online
				Distribute promotional material
				Collecting and analysing customer satisfaction questionnaires
				Organise and lead online promotion campaign

sector/ empl.form	Industry	Position	Activities	Tasks
	E-COM-MERCE		Managing gods and orders	Fill customers' orders
				Create, manage or automate orders or invoices
				Purchasing goods
				Search or retrieve data in information system (data base)
				Keep records of documentation
				Returning customers' gods
			Payment and calculations	Receive and process payment
				Set product prices and announce them
				Calculate costs (shipping, taxes, submissions…)
				Execute financial transactions
				Create financial analysis
				Prepare budget
				Analyse financial records
				Digital banking transactions
			Communicate with custom-ers	Deliver offers
				Deliver confirmations
				Correspond with customers about details
				Resolve customer complaints
				Advise costumers
				Sale merchandise
			Marketing activities	Compose descriptions of merchan-dise
				Create images of merchandise
				Create offers
				Create marketing material
				Share marketing material
				Monitor customer satisfaction (cre-ate surveys)
				Compare marketing potential of different digital platforms
				Choosing marketing content type
				Making a business plan
				Choose sales channel

sector/ empl.form	Industry	Position	Activities	Tasks
FREELANCERS AND ENTREPRENEURS **Developing procedures Freelance**	**CREATIVE INDUSTRY (fashion, marketing, graphic designers, video game designers, video editors, writers) + organic food and agricultural production**	Operational/clerical	Develop content	Develop promotional materials
				Prepare material in different formats
				Adjust downloaded materials
				Download materials
				Adapt downloaded materials
				Create illustrations
				Integrate multimedia material
				Design layouts for printing materials
				Write informational material
				Develop artistic or design concepts
				Product the goods
			Planning and organising – managing business	Formulate basic online design of presentation
				Developing marketing plan and strategies
				Plan and manage project
				Product planning
				Manage own accounts and projects
				Control the process
				Working with budgets - financial planning
				Paying taxes
				Using systems for bookkeeping
				Scheduling
				Examine marketing materials
				Tracking merchandise, cargo….
			Selling and marketing	Present work to clients
				Direct financial operations
				Creating electronic invoice
				Other E-commerce activities
			Conduct research	Following trends
				Evaluate the feasibility of ideas
				Online conferences
				Investigate product characteristics
				Find opportunities on internet
				Organising meetings
				Sharing documents
				Digital marketing activities
				Simulate the process
				Search materials

sector/ empl.form	Industry	Position	Activities	Tasks
			Communication and cooperation	Discuss client requirements
				Negotiate with production
				Sharing ideas
				Networking
				Coordinate supply chain

ANNEX 7 - INTERVIEW RESULTS WITH RESPONDENTS FOR DIFFERENT SECTORS

Representatives of public administration

They believe that the level of digitalisation in their sector is high compared to other government sectors in Serbia, and regarding some procedures it could even be said that it is high even considering EU member states. It is a government sector that is significantly oriented towards the economy, i.e. towards providing information to individuals who want to import a product, for example. There are plans to connect and digitise bodies and institutes that are important for that, to connect everything in one place, on one platform. Everything is implemented within various projects approved by the EU. As for the digital skills that are needed to do the job, they are primarily in the domain of information and data literacy and communication and collaboration. They communicate with clients mainly via e-mail or portal, although some procedures are still such that they require a paper form. As for cooperation with colleagues, they have a collaborative space for work and shared folders, they know how to use them but not how to create and set them up, for which they have IT support. They become aware of the importance and obligations of data protection. They use specialised platforms and software for which they have different privileges depending on the levels in the organisational structure. They see the problem of administration as the biggest challenge, because a large number of documents are still only in paper form, i.e. the administrative procedures they have established and described should be digitised.

“The biggest problems are the administration, regulations, number of letters and documents that have to be sent physically… it is essential that the administrative procedures that we have listed are digitised … to become truly electronic…We do not use electronic signature yet…”

“In our daily activities we respond to emails, writing documents and regulations, collaboratively filling in the CEFTA portal…”

“When clients request the interpretation of the regulations… they need to give us confirmation in the old-fashioned way, they have to deliver the payment physically or scan the payment… electronic payment has not yet been digitised … that slows down the process significantly.”

“Due to a Covid-19 pandemic situation, we have started to use some webinars within the projects in which we participate … Zoom and other meeting platforms… engineers set everything up for us and then we just click on the link…”

Also, there is one important demand to have in mind, besides creating the critical mass of digital competent public administration service users. It is essential to make digital administrative procedures easier compared to traditional, and to create them to be as simple as possible.

Representatives of creative industries

Creative industries seem to be the most fragmented category of employees that share one common faith of being relatively advanced in using digital tools (in creative manner) and integrating various self-employed freelancers and entrepreneurs. Even the respondents believed to be in the same category of digital marketing are segmented into a *digital content marketing* and ***social media marketing***. One idea is to create a platform for Western Balkan economies, where people can offer different creative products and services, and could be integrated and presented to a global market. In that way gaps might be easily spotted and proper specialisations might be introduced in order to provide concurrent products.

The situation in **digital marketing** seen by the respondents is illustrated by the example of local companies which, when posting job advertisements, miss the point of what is expected from this position and job profile. It is an indicator that they *usually do not know what is it about. The impression is also that companies often hire digital marketing teams without knowing how digital marketing works, expecting to see profit immediately*. The targeted market for this employment is economies outside the Western Balkans. It is not still valued properly. So, people are self-employed usually as freelancers providing services to foreign companies. They are “catching” clients on social networks and job searching platforms (job rack, linkedin, upwork). Nevertheless, according to different consulted documents and interviews with stakeholders, creative industry is one of the hidden gems with lot of developmental potential in the region.

Concerning digital content marketing and its target to *increase visibility of the company on search engines and social media*, we learned that the crucial digital skill is the knowledge of SEO (search engine optimisation) and content creation, which, in digital environment, include multimedia. They ae all aware of the importance to *follow trends* and to constantly up skill themselves (through webinars, by own experience through trial and mistakes, online courses, …).

Communications with potential clients are performed by e-mail, Slack and Jira and now more often via Zoom platform. E–mail is the tool for sending offers and marketing plans (usually created in word or pdf). Slack and Jira are for negotiations and contracts. Creating content is achieved in Photoshop, Camzia, and video in Figma. It seems that creativity is expected also in using different digital tools, due to the fact that licensed programmes are expensive and that it is sometimes necessary to use trial versions, open source programmes and versions that have glitches (without technical back-up). So, to create something with tools that are available requires lot of improvisation and innovative usage of technology (“*using programme for photos to insert music by clicking, which I found to be possible by chance*”). Sometimes it is possible to use platforms for collaboration to create network.

It brings the question of copyrights, security and safety. The impression is that it is not well covered in this industry. But it has started to gain importance over the past few years, increasing with the level of expertise and informal hierarchy that exists between them (according to the experience, income, number of clients, reputation of clients and variety of services they offer). Troubleshooting is covered by the technical support of the used networks.

First decision considers the medium for placing the content (Facebook, Instagram, LinkedIn, twitter, ipress, tic toc) and then, before sharing it, the space has to be reserved (scheduling time, frequency…). There are programmes like Buffer and Hootsuite for sharing. Created content are store on USB and computer memory, sometimes on cloud.

Architecture is also often seen as the creative industry and mainly it is based on entrepreneurial model of business. Nowadays, *it is almost impossible to be an architect without knowledge of using professional software*. The problem our entrepreneurs in this domain are facing is the cost of this software. Sometimes we use open source, even cracked and old software in order to be competitive in the market. Some architects only use software for visualisation, modelling and animation but it is more advanced and required to use specialised software for rendering scenes and including different materials that make visualisation of the scenes more realistic. Customers often ask for it, sometimes expecting video presentation. The issue of copyrights is similarly tackled as it is in the domain of marketing.

Representatives of tourism, accommodation and related services

Although it seems that tourism might be a compact industry, it is not the case. Also, different forms of tourism are in the different phases of digitalisation with some of them completely dependent on digital platforms and others using it as the additional tool. Nevertheless, it seems that more and more activities in the domain of tourism migrate towards online business.

From the strategic point of view, specific issue in **tourism** is related to a lack of unique digital database (even for an economy), instead of which different platforms are used as providers of services. Digitalisation in this domain is essential but goes very slow compared to the EU. The disabling factor is the lack of infrastructure and administration that will help businesses, especially small agencies that are not well digitally integrated. For example, applying for a loan in banks involves lot of paperwork and very few banks offer proper level of digital support.

Tourism workers mainly use reservation system to keep track of reservations, payments, and clients. They operate online booking. For retrieving information most agencies use excel and for communication there is *omni channel that integrates all means of communication (whatsapp, facebook, instagram) in one platform*. It makes work easier. In this industry, the impact is made by hotel reservation system that replaces e-mails, phone calls, notebooks. In Albania, for example, around 50% of hotels have reservation systems.

Also, there is API solution (in last few years, where *all suppliers are integrated in one system via XML connection* and it is possible to give this system to end clients and subagents. It replaced manual work: a client asks an agency for a ticket or a hotel, the agency looks at the price, puts it on commission and communicates it to client is replaced with the situation when clients see the prices themselves and book it (rent a car, etc.).

The enabling fact is that many tourists have enough IT knowledge to do that on their own and also the *travel agents who use the systems do not need lot of skills to make bookings, print vouchers, and check for reservation*. Nevertheless, *the team in the back office, which deals with mapping, xml connection and all the technicalities* needs to be trained, which makes things difficult due to the new technology and lack of experience with it.

Different services providers, from transportation to professional services (in domain of law, psychotherapy, beauty and cosmetics, real estate agencies) are also becoming digital. For **retail and transportation** services the basic thing is to provide merchandise tracking options and most of them are using it for a relatively long time. They say that they need to have a system to control the process and the important thing is to integrate all actors in the supply chain and to provide a platform for coordination and communication. It is essential to avoid the bullwhip effect and potential delay or losing cargo. It seems that more and more activities are based on tracking applications (CargoWise, Auditshipment, Cargo Scout, Deliver Pro) replacing telephone calls and even e-mails. Also, the important thing is to make schedules and plan the process. When you have more vehicles, more suppliers or more purchasers and orders, it is not easy to coordinate and organise it. The dispatchers need to have digital support in the activity.

For **service providers** the most important thing is their visibility that is gained through relevant social networks. Especially important is to be current and present all the time. The interesting example of providing services using digital infrastructure is real estate agency City Expert, the first online real estate agency, providing services for renting and selling properties. They display all available properties online (with realistic 3D overview) and schedul tours in similar vain. So, the agent does not need to be present. Today some professional services are provided online, with conducting consultations and psychotherapies online using well-known platforms.

Representatives of organic food production and e-commerce

The idea is to transpose door to door selling into a virtual space, *to make harder to customer to discard the offer*. It demands integration of different factors and developing an infrastructure that will enable managing warehouses, databases, organising selling and buying as one integral activity with digital marketing and administration (creating invoice, electronic stamp and signature), paying and financial procedures included. Infrastructure is not ready yet and people sometimes do not have good experience with this way of doing business. It is necessary to make online activities in e-commerce more intuitive and easier. Sometimes safety is raised as an issue. And it is believed that the main problem for majority of Western Balkan economies lies in high provision and commissions for payments abroad.

Organic food production and supply are becoming more present in WB economies and have their own challenges related to digitalisation. The issue identified in the interview with the owner of organic food production star-up relates to the different role customers have in the new circumstances compared to the traditional way of providing and placing the merchandise on the market. It is said that customers *become collaborators not consumers*

anymore. It has implication on communication between them. Learning how to use different digital tools goes along with everyday business, learning from the most competent person in the office or by themselves. For entrepreneurs generally, in different domains, it is important to be part of the wider community and to be networked with related business. For example, our collocutor is a member of international vegan entrepreneur group via Happy Cow application that enables integration of all vegan businesses. Being part of the community called Vegan Investing Club is important as it makes information available about different relevant news (sending bulletins and organising conferences).

Additional:

Representatives of ICT industry

Although IT industry itself implies a high level of digital skills among employees, certain differences are still being identified. When it comes to the core business positions (such are developers, software engineers, testers…), there is more talk of differences in the level of domain knowledge rather than digital skills, because even if there is a need to use some specific communication or collaboration tools or specific software solutions, their basic digital skills level will be enough to easily upgrade in that domain. A difference may be found in certain supporting functions or activities such as marketing, HR, projects, etc. Additionally, a specificity of this industry we have identified is the measuring or identifying the level of digital skills essential and specific for their jobs. What could be considered a high level digital competencies in another industry, in ICT is a low or medium level. Also, different tools for collaboration emerged such as, for example, code versioning controlling systems (or software) such is Git.

"…Since our company has offices in several economies in the region, I think there is no difference in skills needed to do the job ... but when hiring you can see the difference and it is assumed that it comes from variances in the education system of economies ..."

"I believe that through the education of IT professionals, digital skills are also developed, and that they are largely implied for professions in this field ...."

"What can be viewed as a high level of a certain digital skill in the IT domain implied …. as going without saying or assessing…. is not the case in supporting functions…."

Representatives of Energy

An interview conducted with a person employed in the electricity distribution of Serbia provided insights into the level of digital skills needed to perform jobs in the lowest positions (workers) as well as in the lowest managerial positions. In general, the level of digitalisation is very low and technical equipment is old, but there are plans for upgrading. The general conclusion is that although a company can be highly digitised in the sense that the processes are digitised (or only one process) and that there is technical and technological support, it does not necessarily mean that people working in that company must have high level of digital skills. For example, there is a pilot programme running on remotely readable electricity consumption, which is a highly digital process, but from the point of view of employees who use that information, a basic level of digital skills is needed, such as using e-mail and reading digital documents (word). As far as the specific needs for digital

skills are concerned, the lowest positions, such as workers who read the level of electricity consumption, require a basic level of the information and data literacy (DL) domain, which includes the use of mobile phones, and email. At lower management positions a slightly higher level is expected, but again in the domain of DL and Communication and Collaboration (C&C).

"… workers who read electricity only use those specialised software… just click one button to send a report or a picture as work evidence…."

"… for my work I use only MS word or already predefined excel sheets that I just fill with new information… for planning and writing reports .."

"… for communication with employees we sometimes use *Viber* .. "

Representatives of Healthcare

In this domain, interviews were conducted in the public and private sectors. No specific differences in the way of performing jobs for doctors or nurses (core business) were identified. One thing identified though is that there are more administrative staff in the private sector who must have a higher level of digital skills in order to maintain the system and enter a large amount of data, which was one of the main challenges identified by doctors in the public sector (because they do not have additional staff for administrative work).

"Everything is great because of availability and visibility of the data… but literally this is an additional job… especially, and it often happens, that when we have many emergencies during the day, doctors needs to stay 2-3 hours after working hours to type in the data… less time for patients… "

Looking into more details in performing the work of a doctor, the required level of digital skills refers primarily to the basic level when it comes to keeping records of patients (taking medical history, diagnoses, prescriptions, writing reports ...). This means that using medical information system (such as HELIANT) is considered as minimum for doctors and nurses (DL).

"… as soon as the patient enters, there is all patient data at your disposal (in the HELIANT programme, at the city level), all examinations, all analyses, all reports… doctors need to write a report on every examination they have conducted….."

But as a basis for success in this job, in addition to basic practical work related skills, the dominant part is to monitor the development of science and research in a certain domain. Thus, modern technologies enable the development of knowledge and improvement using various digital tools and professional online social groups.

"Achievements regarding the progress of the pharmaceutical industry will have to be monitored, medicaments are changing, treatment protocols are changing… a person needs to be updated and ready to self-educate."

The domain of data security becomes particularly important, but it seems that doctors are not the ones that are considering those issues, but other supportive managerial functions (legal, administrative, IT support).

Representatives of Education

Although different distant learning conceptions are present in educational practices and educators are aware of Moodle and its possibilities, during the Covid-19 crisis and lockdown, digital skills for educators became more relevant. They had to learn how to use Google classrooms, some of them are using MS Teams platform and other platforms whose primary usage is in the domain of business collaboration. For example, the main problem was also in the fact that students and pupils are learning to use those platforms at the same time as the professors and at the beginning it did not function as was expected.

Also, some equivocal recommendations from the higher levels create confusion in some situations. It is easier with those pupils that are old enough and that the role of parents in their digital learning environment was not necessary or crucial. Also, the problem was that some pupils and students do not have access to internet or equipment. There was a questionnaire about that issue but it now seems it stayed only on the level of information. For younger children, the special problem was digital skills of their parents and even time they had to spend on using it.

It seems that the process is much easier if there is some agreement at the level of institution about the platform that is going to be used. Some faculties, for example, let professors decide by themselves, and also some teachers are using “what is the most convenient for them”, so students, parents of pupils are communicating with one professor using one platform and with the other using another platform. Sometimes communication with the same educator covers different tools: “for example, sending tasks using Viber and submitting finished assignments via e-mail”. It was rather “challenging but at the same time, it teaches us many new skills”.

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