Digital Croatia Strategy
for the period until 2032

Republic of Croatia

Contents

Abbreviations and acronyms 4

Glossary 7

Preface 8

2 Introduction to the Digital Croatia Strategy for the period until 2032 12

2.1 Purpose of and approach to preparing a multi-sectoral strategy 13

2.2 Link with the Digital Agenda for Europe 13

2.3 Link of the Strategy with the National Development Strategy of the Republic of Croatia until 2030 14

2.4 Applying the partnership principle 14

2.5 Vision of the Digital Croatia Strategy for the period until 2032 15

3 Development needs and potential for digitalising the Croatian society, justice, public administration, and economy 16

3.1 Summarised current state analysis regarding digitalisation of the Croatian society and economy 17

3.2 Development needs and potential of four priority areas 24

3.2.1 Digital transition of the economy 24

3.2.2 Digitalisation of public administration 26

3.2.3 Development of broadband electronic communications networks 29

3.2.4 Development of digital skills and digital workplaces 30

4 Strategic objectives of the Digital Croatia Strategy for the period until 2032 32

4.1 Strategic objective 1: Developed and innovative digital economy 36

4.1.1 Digital transition of the economy - Strategic objective: Developed and innovative digital economy 36

4.1.1.1 Priority public policy implementation area 1.1: Supporting digitalisation in micro, small and medium-sized enterprises 39

4.1.1.2 Priority public policy implementation area 1.2: Digitalising public services for enterprises and securing access to anonymised public data 40

4.1.1.3 Priority public policy implementation area 1.3: Supporting digital innovation hubs 41

4.1.1.4 Priority public policy implementation area 1.4: Transforming and strengthening the competitiveness of cultural and creative industries 42

4.1.1.5 Priority public policy implementation area 1.5: Optimising the Croatian tax and parafiscal legislation and administration 42

4.2 Strategic objective 2: Digitalised public administration 43

4.2.1 Digital transformation of public administration - Strategic objective: Digitalised public administration 43

4.2.1.1 Priority public policy implementation area 2.1: Strengthening organisational and institutional capacities 46

4.2.1.2 Priority public policy implementation area 2.2: Upgrading the state's information infrastructure and advanced software solutions 47

4.2.1.3 Priority public policy implementation area 2.3: Realising complete interoperability between public services, while enabling access to citizens and business' open data 48

4.2.1.4 Priority public policy implementation area 2.4: Digitalising all key public services 49

4.2.1.5 Priority public policy implementation area 2.5: Promoting digital services and customer support among citizens 50

4.3 Strategic objective 3: VHCN deployed, available, and taken up 52

4.3.1 Development of broadband electronic communications networks - Strategic objective: VHCN deployed, available, and taken up 52

4.3.1.1 Priority public policy implementation area 3.1: Meeting the conditions of spatial planning and electronic communications networks construction 54

4.3.1.2 Priority public policy implementation area 3.2: Regulating the impact of property use costs on network development 55

4.3.1.3 Priority public policy implementation area 3.3: Support schemes for developing networks in areas lacking sufficient commercial interest for investments 56

4.3.1.4 Priority public policy implementation area 3.4: Encouraging the take-up of very high-speed services 57

4.4 Strategic objective 4: Developed digital competences for working and living in a digital age 59

4.4.1 Developing digital skills and digital workplaces – Strategic objective: Developed digital competences for working and living in a digital age 59

4.4.1.1 Priority public policy implementation area 4.1: Increasing the number of ICT specialists on the labour market 63

4.4.1.2 Priority public policy implementation area 4.2: Developing citizens' digital competences for working and living in a digital age, with the help of ICT 64

4.4.1.3 Priority public policy implementation area 4.3: Digital transition supporting the development of the education and research system 65

5 Indicative financial framework with an overview of financial assumptions for realising strategic objectives 68

6 Monitoring and evaluation framework 72

7 Management of the Strategy implementation 74

8 Environmental impact assessment of the Strategy 76

Annex 1: Table template for the sectoral / multi-sectoral strategy

Annex 2: Overview of members of the expert working group and subgroups and their contribution to the preparation of the Digital Croatia Strategy for the period until 2032

Annex 3: Current state and financial framework analysis

Abbreviations and acronyms

List of abbreviations	
AI	Artificial intelligence
API	Application programming interface
GDP	Gross domestic product
CARNet	Croatian Academic and Research Network
SSC	Shared Service Center
Croak	Croatian Artificial Intelligence Association
DESI	The Digital Economy and Society Index
Docsis	Data Over Cable System Interface Specification
DigComp	The Digital Competence Framework for Citizens
DIH	Digital Innovation Hubs
DIGITAL	Digital Europe Programme
EDIH	European Digital Innovation Hub
EMFAF	European Maritime, Fisheries and Aquaculture Fund
ERDF	European Regional Development Fund
EIF	European Investment Fund
EC	European Commission
ESF+	European Social Fund Plus
ESOP	Employees stock ownership plan
EU	European Union
EUROSTAT	Statistical office of the European Union
e-service	Service provided by a public authority/institution via digital channels
Fintech	Financial technology
JTF	Just Transition Fund

FttB	Fiber to the building
FttH	Fiber to the home
G2B	Government-to-business
G2C	Government-to-consumers
GB	Gigabyte
GHz	Gigahertz
GSB	Government service bus
HAKOM	Croatian Regulatory Authority for Network Industries
CEA-ICT	Croatian Employers' Association – Information and Communication Technologies
et al.	and other people or things
ICT	Information and Communication Technology
IMD World Competitiveness Rankings	International Institute for Management Development World Competitiveness Rankings
IRDLL	Index of Readiness for Digital Lifelong Learning
IT	Information Technology
etc.	et cetera
JRC	Joint Research Centre
HRK	Croatian kuna
MB	Megabyte
MHz	Megahertz
bn	billion
SMEs	small and medium enterprises
n/a	not applicable
NEET	Not in Education, Employment, or Training
NGA	Next Generation Access Networks

NRRP	National Recovery and Resilience Plan
e.g.	for example
NDS 2030	National Development Strategy of the Republic of Croatia until 2030
OECD	Organisation for Economic Co-operation and Development
NFP	National Framework Programme for the Development of Broadband Access Infrastructure in Areas Lacking Sufficient Commercial Interest for Investments
PESTLE	Political, economic, social, technological, legal and environmental
OPCC	Operational Programme Competitiveness and Cohesion
No.	order number
RoC	Republic of Croatia
Scaleup	A scaleup company or just scaleup is defined by the OECD as a company having an average annualized return of at least 20% in the past 3 years, and had at least 10 employees at the start of the 3 year period.
CSODDS	Central State Office for the Development of the Digital Society
sim.	similar
SRCE	University Computing Centre
Startup	Startup is a newly established company focused on creating, improving, and expanding an innovative, repetitive, and scalable business model / product, with high and intense growth potential. (Note: The official EU definition is currently being drafted.)
STEM	Science, technology, engineering and mathematics
SWOT	Strengths, weaknesses, opportunities and threats
CSII	Council for the State Information Infrastructure
MFF	Multiannual Financial Framework
VHCN	Very high capacity network(s)
xDSL	technology enabling digital transmission to the end user using voice-grade copper telephone wires
GAPA	General Administrative Procedure Act (Official Gazette no. 47/09 and 110/21)

Glossary

Term	Definition (for the needs of this document)
Digitalisation	The process of using digital technologies or ICT (to provide faster, cheaper, more secure, and higher-quality services/products).
Digital transformation	The strategical transformation placing the user at the forefront, including the digitalisation of numerous social and economic areas, in addition to cross-sectoral organisation changes.
Digital transition	The process of incrementally improving the implementation of digital transformation.
Public administration	In this document, the term “public administration” encompasses the government administration, local and regional self-government units, public services, and judiciary.

1

Preface

Croatia wants to become a country with digitally and economically competitive enterprises and digitalised public administration with personalised public services by the year 2032.

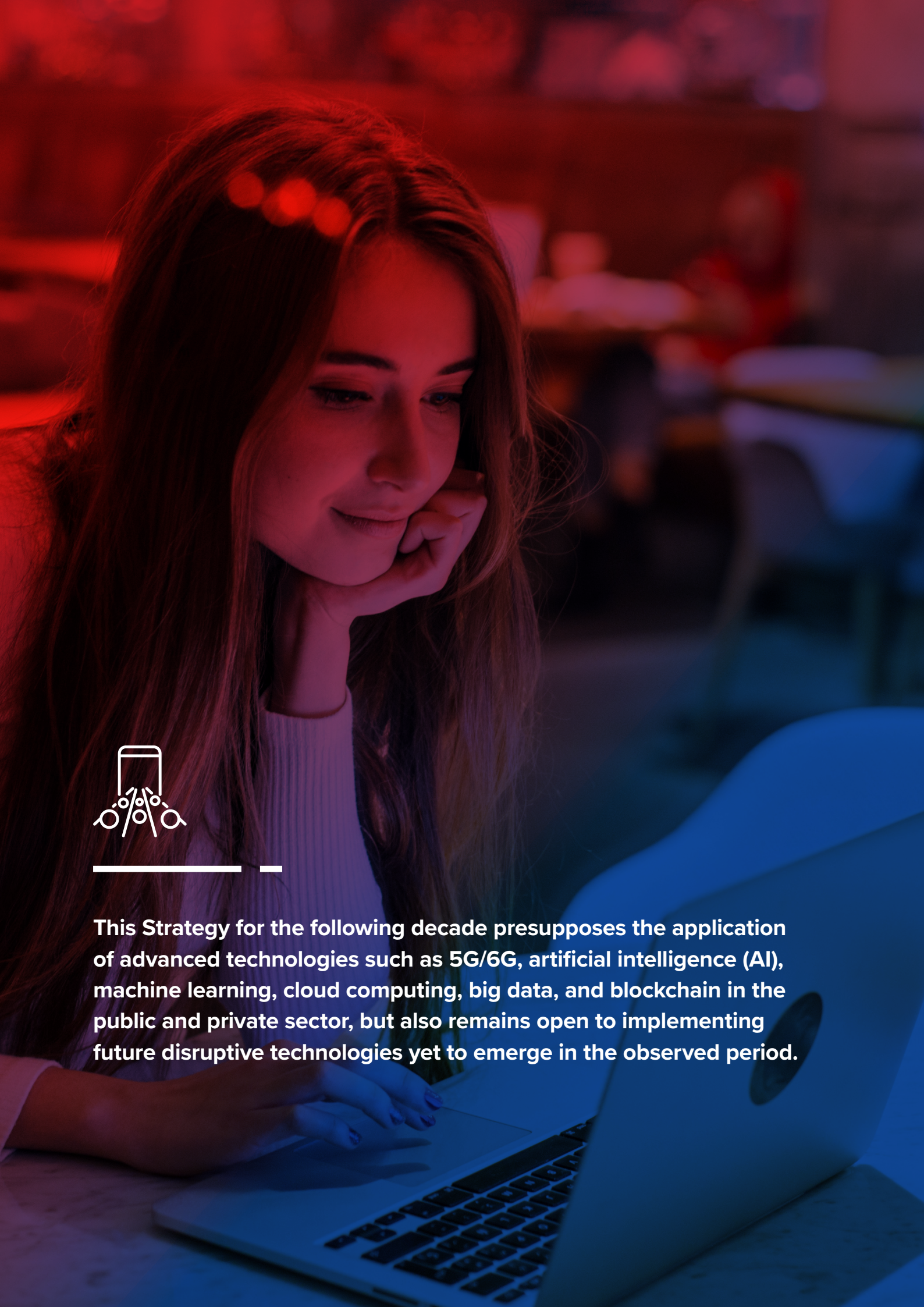
By creating a regulatory, investment, and tax environment that fosters technological development and innovation, investing in citizens' digital competences, and increasing the number of ICT specialists in the private and public sector alike, as well as applying advanced technologies in public and market activities, Croatia wants to become a country with digitally and economically competitive enterprises and digitalised public administration with personalised public services by the year 2032

To achieve this vision, concerted efforts of all stakeholders to prepare well-designed and timely implemented public digitalisation policies are necessary and may substantially contribute to Croatia's development into a competitive, innovative, and safe country with quality life conditions and equal opportunities. Thus, the Digital Croatia Strategy for the period until 2032 (hereinafter: the Strategy) defines the guidelines for a green and digital transformation of our country, as the precondition for future sustainable economic growth and social development. In order to transform Croatia in a comprehensive and structured manner, the Strategy outlines a set of clear digital transition objectives for the following ten years and defines priority public policy implementation areas in all segments of the digital ecosystem: infrastructure, technology, science and education, and innovation and markets.

Croatia, same as the rest of the world, is currently facing a period of intense changes resulting from geopolitical, public health, ecological, environmental, and economic challenges. In order to successfully address these challenges in the upcoming years, Croatia should build on the strength of digital technologies which, if managed properly, may help create a climate-neutral, resource-efficient, and resilient economy and society. Recent experience during the pandemic suggests that countries with higher digitalisation levels generally recorded lower rates of economic decline than countries that are not as digitally mature. Therefore, digitalisation not only strengthens the economy, but also makes countries more resilient in times of crises.

This Strategy for the following decade presupposes the application of advanced technologies such as 5G/6G, artificial intelligence (AI), machine learning, cloud computing, big data, and blockchain in the public and private sector, but also remains open to implementing future disruptive technologies yet to emerge in the observed period. Applying the aforementioned advanced technologies will enable higher-quality data processing and use, which will in turn contribute to the efficiency of public authorities' operations, creation of data-based public policies, personalisation of public services, relief of administrative burden, more efficient communication between public authorities and citizens, and better opportunities for the cooperation of the private and public sector. When applying new technologies, the cooperation of the academic community, private and public sector will be crucial for achieving synergy between knowledge, human capital, regulatory framework, and funding sources. Special attention will be paid to storing and protecting personal data of our citizens in safe data centres, in line with the relevant regulations in force.

Furthermore, the Strategy entails the integration of cybersecurity as the basis of reliability and sovereign-



This Strategy for the following decade presupposes the application of advanced technologies such as 5G/6G, artificial intelligence (AI), machine learning, cloud computing, big data, and blockchain in the public and private sector, but also remains open to implementing future disruptive technologies yet to emerge in the observed period.

ty of the national infrastructure and related systems and data. Namely, cyberattacks are believed to become one of the greatest risks globally in the upcoming 10-year period[1]. Thus, this Strategy anticipates the strengthening of the existing defences against distributed attacks, as well as other potential threats in a tightly interconnected information landscape. In other words, the Strategy implies continuous work on increasing the security of overall infrastructure and all protection systems and processes, with reference to the nature and extent of the threat, while applying the principle of proportionality.

As for the digitalisation of society, this Strategy also focuses on the level of digital-media literacy in Croatia, enabling citizens to efficiently access and use information and media, as well as to create and share media content on different digital platforms in a safe and responsible manner. Media literacy in the digital environment should not be limited to using different electronic devices and knowing information and communication technologies, but should also involve the ability to recognise disinformation in the public sphere and protect one's privacy and personal data[2]. It is especially important to teach children the importance of critical thinking, recognising the difference between opinion and fact, and negative behaviour and harmful online content. In Croatia, media literacy and critical thinking skills are covered in a series of curricular and cross-curricular topics in primary and secondary education, for example, as part of subjects including Croatian language, informatics, mathematics, as well as ICT use, personal and social development. Therefore, this Strategy also entails priority public policies to be implemented in the area of education.

Furthermore, Croatia shall realise its digitalisation goals by following the principles of good governance and Do No Significant Harm (DNSH) and use the relevant values and ethical approach as the basis for the digital transformation. In doing so, Croatia shall comply with the European Green Deal and put a strong focus on protecting natural resources, taking into account that implementing new digital technologies contributes to decreasing energy consumption, thus decreasing emissions of greenhouse gases. Namely, although information and communication technologies are energy-intensive[3], and accelerating social digitalisation may increase the quantity of electronic waste and its environmental impact, digital technologies, if managed properly, may help create a climate-neutral and resource-efficient economy and society, saving resources in key economic sectors responsible for most greenhouse gas emissions. Therefore, when implementing this Strategy, all competent authorities are expected to work on achieving synergy between a green and digital transition when procuring and using digital infrastructure.

Furthermore, considering the increased frequency and intensity of global geopolitical, economic, social and climate disruptions, that may result in changes to the assumptions this Strategy is based on, authorities competent for implementing the selected strategic objectives have to develop the agility and adaptability to timely and efficiently address the new circumstances, while maintaining their ability to realise strategic goals defined herein.

Finally, this Strategy is the result of a dialogue and transparent collaboration with all expert (sub-)group stakeholders, based on the principles of accuracy and completeness of data, accompanied by European and world statistical data, and the European Commission recommendations on joint and harmonised development.

1 World Economic Forum – Global Risks Report 2020

2 https://eur-lex.europa.eu/legal-content/HR/TXT/HTML/?uri=CELEX:52020XG0609(04)&from=EN

3 According to the data of the European Commission presented in the 2022 Strategic Foresight Report, information and communications technology (ICT) is responsible for 5-9% of global electricity use.

2

Introduction to the Digital Croatia Strategy for the period until 2032

The Strategy defines the vision of digitalising society, public administration, and the economy of the Republic of Croatia, the related strategic objectives and their key performance indicators, with suggested priority public policy areas necessary for their realisation.

The Strategy is also one of the strategic planning acts supporting the implementation of the National Development Strategy of the Republic of Croatia until 2030 (OG No. 13/21) as the main strategic planning document, i.e., its Strategic objective 11 "Digital transition of society and the economy" of the "Green and digital transition" development area. In addition to the national context, the need for drafting the Strategy stems from European requirements, thus the content of the Strategy has been aligned with development needs, priorities and goals contained in relevant European documents. Namely, the European Commission made the digital transformation of Europe one of its six key priorities in this term period and in 2021 presented a comprehensive plan[4] defining Europe's digital transformation ambition and goals until 2030.

2.1 Purpose of and approach to preparing a multi-sectoral strategy

The purpose of the Strategy is to set strategic objectives for transforming Croatia in the following period, with a special focus on digitalising the economy and public administration by improving the necessary infrastructure, digitalising business processes and services, and improving digital competences across Croatian society.

For its purpose to be achieved, the Strategy was prepared based on an active dialogue among all key stakeholders of the public and private sector, associations and academia during all four main project stages: (1) Preparation – during which methodology and project activities were agreed, project stakeholders were defined, and the first meeting of the expert working group was held; (2) Current state analysis – including a systematic assessment of external and internal environment in the context of the current digitalisation status of the Croatian society and the economy, with reference to development needs and potential; (3) Drafting the Strategy proposal – including the definition of strategic objectives and related performance indicators, agreement on the proposed scope of action and institutional framework for monitoring the Strategy's implementation; (4) Drafting the summary of the Strategy proposal – including the preparation of the executive summary and finalization of the comprehensive Strategy including formatting, as well as the preparation of the overall final project report.

2.2 Link with the Digital Agenda for Europe

Many new ways to communicate, shop or access information online have been integrated into our daily lives and are constantly evolving. The European digital agenda for the decade 2020-2030 addresses these issues by focusing on creating secure digital spaces and services, creating a level playing field in digital markets with large platforms and strengthening Europe's digital sovereignty, while contributing to the European goal of climate neutrality by 2050.

Following the Lisbon strategy, the Digital Agenda for Europe in 2010 identified for the first time the key enabling role of ICT in reaching Europe's goals. In 2015, the digital single market strategy developed the digital agenda further, setting out specific provisions based on three pillars:

1. Providing better access for consumers and businesses to digital goods and services across Europe;
2. Creating the right conditions for digital networks and services to flourish; and
3. Maximising the growth potential of the digital economy.

The goal of these three pillars was to ensure a just, open, and safe digital environment.

Shaping Europe's digital future from 2020 is the second five-year digital strategy focusing on three key goals in terms of digital progress: technology that works for the people, a fair and competitive economy, and an open, democratic, and sustainable society.

4 https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_hr

In 2021, the strategy was complemented by the 10-year Digital Compass: the European way for the Digital Decade, which puts the EU's digital ambitions for 2030 into concrete terms. The European Digital Compass for the EU's digital decade evolves around four cardinal points: (1) Digitalisation of public services, (2) Digital transformation of businesses, (3) Secure and sustainable digital infrastructure, and (4) Digitally skilled citizens and high-skilled experts.

2.3 Link of the Strategy with the National Development Strategy of the Republic of Croatia until 2030

As stated above, the National Development Strategy of the Republic of Croatia until 2030 (hereinafter: "National Development Strategy" or "NDS 2030") constitutes the main document and comprehensive strategic planning act defining the long-term development of society and the economy in all matters relevant for Croatia. The National Development Strategy outlines four development areas with 13 strategic objectives. Throughout the document, strong emphasis is placed on investment in digital infrastructure and introducing digital solutions in the interest of citizens and the Croatian economy.

This matter has been detailed in the Development area 3: "Green and digital transition," presenting the policies directed towards the realisation of the Strategic objective 11 "Digital transition of society and economy." As part of this strategic objective, 4 priority public policy implementation areas were selected as the basis for the Digital Croatia Strategy for the period until 2032, namely: (1) Digital transition of the economy, (2) Digitalisation of public administration, (3) Development of broadband electronic communications networks, and (4) Development of digital competences and digital workplaces.

The indicator measuring the realisation of the strategic objective 11 is the Digital Economy and Society Index (DESI). DESI tracks the progress made in EU Member States in digital competitiveness in four main Digital compass areas: (1) Human capital, (2) Connectivity, (3) Integration of digital technology, and (4) Digital public services.

2.4 Applying the partnership principle

Digitalisation as one of the priority public policy areas constitutes a key element for all government departments, which is why the preparation of this Strategy required strong coordination and clear plan for cooperation of all interested parties of the Croatian society in order to build a strong digitalised public administration, digitalised economy, and digital society.

VISION OF THE NATIONAL DEVELOPMENT STRATEGY UNTIL 2030.

In 2030, Croatia is a competitive, innovative and secure country of a distinctive identity and culture, country of preserved resources, high-quality life conditions, and equal opportunities for all.

The Central State Office for the Development of the Digital Society (hereinafter: "CSODDS") is responsible for the Strategy's preparation and implementation. The Strategy was prepared based on the partnership with the main project stakeholders, i.e., competent public authorities, representatives of business associations and social partners, academic and science community, civil society organisations and interested public, who participated in the work of the expert working group and subgroups. This way, more than 40 organisations were involved in the preparation of the Strategy, as detailed in Annex 2: "Overview of members of the expert working group and subgroups and their contribution to the preparation of the Digital Croatia Strategy for the period until 2032." During the preparation of the Strategy, CSODDS coordinated all stakeholders through regular communication, and by organising and holding working meetings, connecting stakeholders as partners during the preparation of the strategic framework and the acknowledgement of public and private perspectives in the design of relevant measures.

2.5 Vision of the Digital Croatia Strategy for the period until 2032

The National Development Strategy until 2030 (NDS 2030) outlines the following vision of the development of the Republic of Croatia:

In 2030, Croatia is a competitive, innovative and secure country of a distinctive identity and culture, country of preserved resources, high-quality life conditions, and equal opportunities for all.

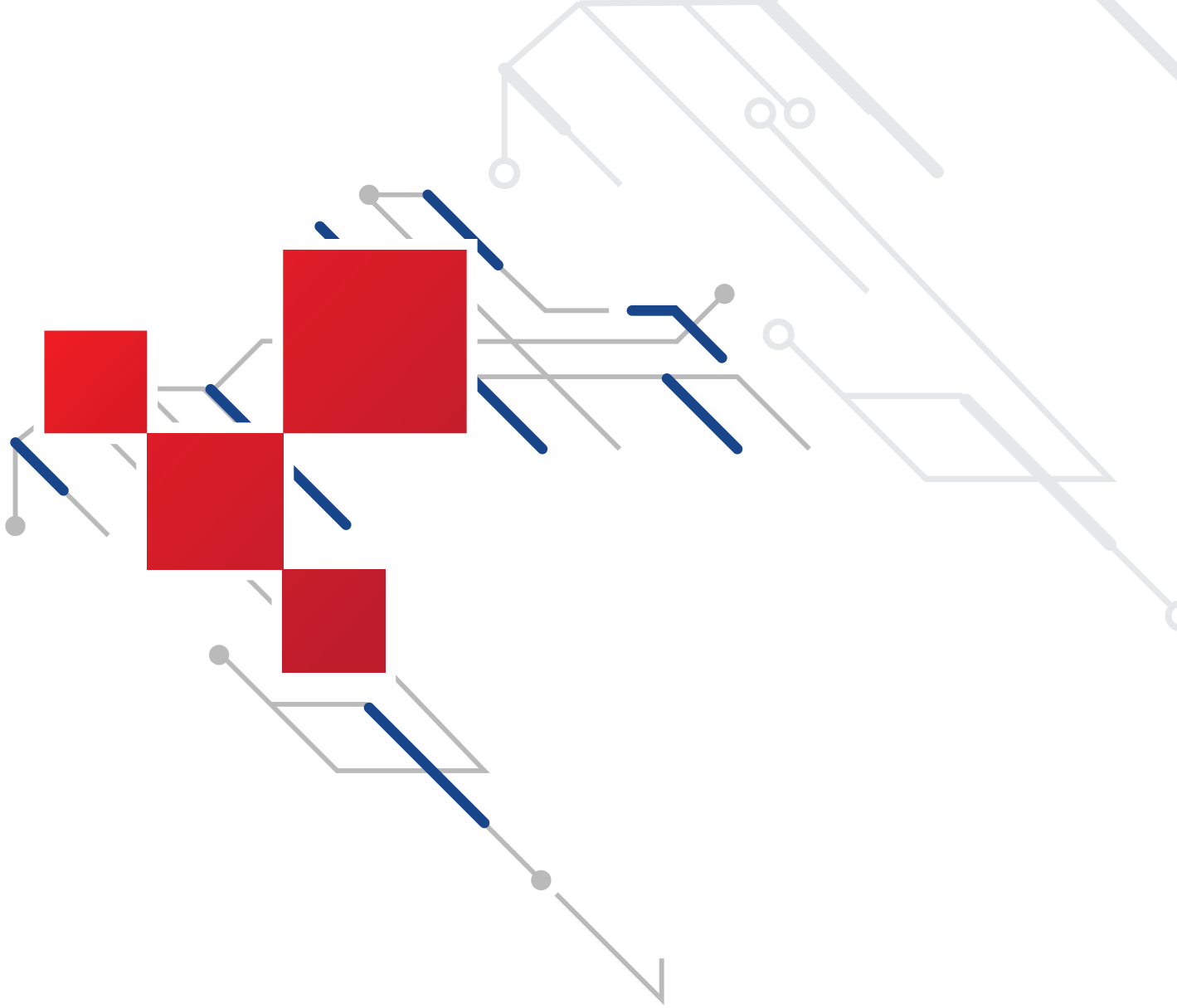
Since the digitalisation of both the public and private sector shall contribute to the realisation of the aforementioned vision by fostering the creation of a competitive and innovative economy and efficient public administration, and ultimately improve life quality, the vision of the Digital Croatia Strategy for the period until 2032 is:

"Croatia improved by digital transformation."

3

Development needs and potential for digitalising the Croatian society, justice, public administration, and economy

Development needs and potential result from the current state analysis regarding digitalisation of the Croatian public administration and economy, i.e. society as a whole, as well as the understanding of ICT technology trends that (will) disrupt our everyday lives.



3.1 Summarised current state analysis regarding digitalisation of the Croatian society and economy

The purpose of the current state analysis is to systematically assess the external environment, including socio-economical and geopolitical factors and trends, as well as the internal environment, including public administration organisational factors and implementation capacities that positively or negatively impact the ability of the Government of the Republic of Croatia to realise its vision and strategic objectives in the context of digitalisation of the Croatian society and economy.

The analysis was conducted in compliance with the previously defined national framework of the comprehensive system for strategic planning and development management. Thus, while conducting the analysis, we examined in detail all relevant strategic EU and national documentation, together with the accompanying legal framework. Namely, in line with the strategic planning acts system of the Republic of Croatia, the information contained in the relevant strategic planning acts in force had to form the basis for the analysis. In addition, we gathered and processed other different statistical data and information relevant for the Strategy.

The processing of information collected resulted in in-depth analyses such as PESTLE and SWOT, defining and assessing all factors of internal environment strengths and weaknesses, together with external environment opportunities and threats relevant for all four priority areas: digital transition of the economy, digitalisation of public administration and justice, development of broadband electronic communications networks, and development of digital competences and digital workplaces. The relevant analyses were conducted in cooperation with members of expert working subgroups. The Annex 3: “Current state and financial framework analysis” herein details the comprehensive current state analysis, whereas the following paragraphs contain several key conclusions.

Conclusions of analyses per priority area

Digital transition of the economy

Main conclusions of analyses conducted per priority area:

Digital transition of the economy

- According to the last available data on the 2022 Digital Economy and Society Index (DESI), the Republic of Croatia performed above the EU average in the Integration of digital technology dimension, i.e., it ranked 14th among 27 EU countries. Namely, 50% of Croatian SMEs have at least a basic level of digital intensity, which is below the EU average of 55%. As for ICT for environmental sustainability, 75% of Croatian enterprises have a medium/high level of intensity, substantially more than the EU average (66%). Croatia scores low in terms of electronic information sharing (24%) and social media (24%), pointing to a low acceptance of very advanced and integrated IT solutions in the operations of enterprises. Croatian enterprises are taking advantage of the opportunities presented by online commerce: 29% of SMEs sell online (above the EU average of 18%) while 13% of all SMEs are selling across borders with 13% of turnover coming from the online segment. Advanced technologies are steadily gaining popularity among Croatian enterprises. 35% of them use cloud solutions, 43% use e-invoices and 9% use AI technologies. For all these three indicators, Croatia performs above the EU average.
- According to 2020 IMD World Digital Competitiveness Rankings, Croatia ranks 52 of 63 countries. Furthermore, Croatia lags behind other countries, especially in terms of international experience, employee training, regulatory framework for development and application of technology, and agility of companies to respond to opportunities and threats. As for e-invoices, in 2021 Croatia scored above the EU average by 10.8 percentage points, largely due to contactless business operations during the Covid-19 pandemic, and the entry into force of the Act on e-Invoicing in Public Procurement (OG No. 94/18). Although this Act regulates the explicit obligation of public procurement entities, it has undoubtedly encouraged business entities to exchange e-invoices.
- The strength of the national IT sector represents an important economic precondition for further

digitalising the Croatian society. Namely, the Croatian IT sector is continuously growing and, according to the last available data, in 2019 it accounted for 4.48% of the national GDP and in 2021 it accounted for 5.8% of total exports of the Republic of Croatia. Further strengthening of the sector is key for maintaining ICT experts in Croatia and, thus, for an accelerated digitalisation of society and the economy. Furthermore, the growth of the national IT sector resulted in a substantial increase in available (attractive) capital for developing/acquiring IT companies.

- In addition to ICT, the financial sector is one of the sectors affecting the digital transformation of society. The digital transformation of the financial sector, in particular the digitalisation of payment systems and instruments, plays an important role in a quicker uptake of digital changes in the economy and society in general, by developing customer trust in the functioning of e-trade and e-services. Therefore, further encouraging the digitalisation of payment systems and instruments should enable an accelerated digital transformation of the Croatian society.
- Moreover, the analysis also points to the fact that not enough has been done on a national level in terms of further shifting the tax burden away from labour and employee income (e.g. remuneration in the form of allocation of shares and stock options (so-called ESOP – Employee Stock Ownership Plan), nor in terms of encouraging investment of natural persons (angel investors) in startups in their early stages of development through targeted personal income tax reliefs, all in order to make the system more competitive in comparison with the relevant industry in other Central and Eastern European countries and focused on keeping the ICT workforce in Croatia.
- Research[5] points to the increase in overall global revenue from entertainment and media. In 2026, advertising will be the single largest sector, accounting for nearly 35.1% of all industry revenue. Distributors are focusing on more local content and going even more local within national markets. Over time, the increasing availability of compelling E&M content, services and experiences will attract a greater share of consumers' attention. According to the Study of the needs for digitally transforming cultural and creative industries in Croatia[6] conducted in 2021, only 25.89% of respondents from the relevant industries believes that formal education in Croatia enables the acquisition of necessary competences. A mere 35% of respondents are familiar with the EU funding opportunities within the Creative Europe programme, divided into the culture, media, and cross-cultural strand, indicating a need for building additional capacities of Croatian stakeholders from the creative and cultural sector.

5 „Perspectives from the Global Entertainment & Media Outlook 2022–2026" by PwC https://www.pwc.com/gx/en/industries/tmt/media/outlook/outlook-perspectives.html Global Entertainment & Media 2022–2026 Perspectives Report (pwc.com)

6 Study of the needs for digitally transforming cultural and creative industries in Croatia ISPITIVANJE-POTREBA-DIGITALNE-TRANSFORMACIJE-KULTURNIH-I-KREATIVNIH-INDUSTRIJA.pdf (digitalnapismenost.com.hr)

Conclusions of analyses per priority area

Digitalisation of public administration

Digitalisation of public administration

- More than 100 digital public services were available on the e-Citizens platform in 2022. In October 2022, the platform had 1.7 million users, recording a 30% increase in 18 months. The relevant increase is due to the redesign of the system, improving the user experience and making the system user-friendly and more intuitive, combined with the COVID-19 pandemic urging citizens to use the e-Citizens portal in order to create their EU Digital COVID Certificates to facilitate movement and travel. Finally, citizens were able to independently (digitally) register themselves and their household members in the 2021 Census, an additional reason to use the e-Citizens system.
- As for the digitalisation of the public administration infrastructure, substantial developments were recorded in the previous period, especially in the context of the Shared Service Center (SSC), also known as the "state cloud". By 2022, more than 300 public institutions, such as ministries, public authorities, hospitals etc. became SSC users and use one of its services.
- The Regulation on Administrative Operations (OG No. 75/21) stipulating the obligation to adjust, i.e. set up, information systems for administrative operations of the government administration was adopted. This Regulation enables comprehensive administrative operations in electronic format and stipulates a functional obligation to connect and exchange data with other IT systems managed separately for certain administrative areas, as well as the option to connect and exchange data with the reporting system on the status of administrative procedures[7]
- A platform with e-services for e/m-Signature and e/m-Stamp was set up, enabling electronic and mobile signing of documents, as well as authorising and examining the validity of electronic signatures and stamps in the operations of government and public authorities. By June 2022, 33 government and public authorities, that is local and regional self-government units, joined the platform.
- The justice system has been also continuously investing in the development of new services, applications, and functionalities. The citizens are most likely to take note of this in terms of the set-up and functioning of the "e-Communication", "Certificate confirming the absence of any criminal record", and "Land registry extract" systems. Furthermore, an integrated system for managing court cases –

7 Single information system for supervising the implementation of the General Administrative Procedure Act (Official Gazette no. 47/09, 110/21) – so-called GAPA IT.

e-Filing – used by all Croatian courts was set up, the Case Tracking System (CTS) of the State Attorney General of the Republic of Croatia used by all county and municipal state attorney's offices was upgraded, and a single service point for accessing land registry and cadastre data was set up as part of the Joint Information System (JIS).

- Individual national public authorities that need to comply with EU requirements for the purpose of joint harmonisation, standardisation, and integration of information systems, such as the Customs Administration, have successfully met the set conditions thus far. Therefore, the Republic of Croatia has already successfully developed a part of the e-Customs system in order to ensure trade facilitation and, at the same time, the effectiveness of customs controls, thus reducing costs for business and risk for society, whereas in the current decade, in line with the Union Customs Code and the e-Multi-Annual Strategic Plan for electronic Customs (MASP-C), it shall develop the remaining e-systems and upgrade the existing ones with new functionalities.
- In the context of coordination and interoperability mechanisms necessary for exchanging data and conducting business analyses of public administration, the development of the Government Service Bus (GSB), as the central point for a secure data exchange, has continued. In 2022, 17 public authorities have successfully integrated 33 registers and records into the production environment and 32 registers and records into the test environment of GSB to ensure a secure data exchange between public authorities and institutions with the legal right to exchange data with central and public registers. Furthermore, 90 authorities/institutions which downloaded data for their business processes have been integrated into the GSB, and a total of 44 web-services / Application Programming Interfaces (APIs) have been integrated for the purpose of downloading data. The aforementioned results represent steps towards achieving the objective set for the upcoming period, i.e., the establishment of a central interoperability system in order to consolidate central registers and integrate them into the GSB, alongside a central interoperability portal in line with the European Interoperability Framework, while preparing interoperability standards and policies.
- All of the aforementioned developments in the context of realising digital projects in public administration and justice are aligned with Croatia's score in the Digital public services dimension of the DESI, which increased from 33.4 (in 2016) to 53.6 (in 2022), pointing to an increase in maturity of digital public services and administrative procedures in the last 5 years. However, compared with the average of EU countries whose DESI increased at a faster pace in the equivalent period, we may conclude that Croatia is not being digitalised fast enough. Namely, Croatia lags behind the average digital development of most EU countries, scoring below the EU average in the Digital public services dimension in 2022, and ranking 23rd of 27 member states.
- According to the eGovernment Benchmark 2021[8], the level of digitalisation of public administration (e-government) amounts to 61%, ranking Croatia 26th in Europe (of the 36 countries included in the study). The study points to the fact that the Republic of Croatia makes insufficient use of its ICT potential to provide public e-services and other public services. Namely, although some areas in the Republic of Croatia have been adequately digitalised multiple years ago, the study emphasizes the fact that Croatia is yet to secure important pre-conditions to improve the overall public e-service system, including regularly monitoring technological trends, implementing advanced technological solutions when digitalising services and administrative procedures, as well as upgrading the existing information infrastructure and system, especially in case of central registers systems.

8 European Commission - eGovernment benchmark 2021: Entering a new digital government era

Conclusions of analyses per priority area

Development of broadband electronic communications networks

Development of broadband electronic communications networks

- According to the latest available DESI 2022 scores, Croatia ranks 24th in the Connectivity dimension and remains below the EU average, with the deviation from the EU average increasing substantially in the last year. The relevant DESI indicators show that Croatia still lags behind the rest of the EU in the high-speed (100 Mbps and 1 Gbps) fixed broadband take-up and in the broadband price index, particularly since the price gap further increased in the last year. As far as the Next generation access (NGA) broadband coverage, Croatia slightly lags behind the EU average, whereas in terms of Very high capacity network (VHCN) coverage, Croatia substantially lags behind the EU average. Furthermore, Croatia scores low in the 5G coverage of populated areas.
- It is necessary to adjust the construction and spatial planning regulatory framework in a way that promotes VHCN deployment, while cutting costs and streamlining procedures..
- In conclusion, analyses show that the greatest challenges Croatia currently faces in terms of development and use of broadband electronic communication networks concern NGA and VHCN coverage of rural areas, overall VHCN coverage, use of high-speed (over 100 Mbps) services, and high prices.

Digital competences and digital workplaces

- As for the Human capital dimension of the DESI, Croatia ranks 9th of the EU-27, a substantial progress in relation to 2021, when Croatia ranked 16th in the EU. The level of digital skills among the Croatian population is above the EU-27 average in several key Human capital indicators, namely digital skills and ICT specialists. In Croatia, 63% of people between 16 and 74 years have at least basic digital skills (versus the EU average of 54%) and 31% of individuals have above-basic digital skills (versus the EU average of 26%). Additionally, 81% of individuals in Croatia have at least basic digital content creation skills, significantly outperforming the EU average (66%). Nevertheless, ICT specialists account for a relatively low percentage (3.6%) of the workforce in Croatia compared to the EU average (4.5%), due to an insufficient inflow of ICT specialists from educational institutions and abroad, accompanied by an outflow of specialists into other EU countries. In addition, in 2021, Croatia had the highest relative number of ICT specialists leaving the country in the EU. Female ICT specialists represent a slightly higher share of the total number of ICT specialists than the EU average (21% and 19% respectively). However, it is necessary to continue fostering inclusion of women in ICT in order to achieve gender equality in the ICT sector.
- The main obstacle to realising the digitalisation potential is the lack of compliance of workforce skills with labour market needs, not only in terms

Conclusions of analyses per priority area

Digital competences and digital workplaces

of the number of ICT specialists, but also digital skills of the workforce outside the ICT sector. Other key weaknesses of Croatia in the area of digital competences and digital workplaces that need addressing entail the lack of primary and secondary school teachers in STEM areas (primarily maths, physics, and informatics) who leave the education system on account of low salaries. Shortage of ICT specialists on the labour market considering the needs and potential growth of companies also constitutes a major weakness. Furthermore, the analysis has shown that not enough of Croatian citizens participate in lifelong learning to acquire digital competences.

- In the previous period, in order to address its needs and realise its potential in the area of digital competences and digital workplaces, the Republic of Croatia launched the e-School programme, as a comprehensive digital transformation of the teaching and educational processes. Croatia has also developed a Strategic framework for digital maturity of the schools and school education in order to continue digitally transforming the education system. Moreover, it established The Croatian National Digital Skills and Jobs Coalition with the aim of encouraging job creation and increasing the number of employed digital professionals in Croatia. Regional centres of excellence in vocational education (including engineering and computing) were established to promote the development of students' digital skills that meet the market demands. Furthermore, to promote the acquisition of digital skills by the workforce that meet the market demands, a lifelong education system was organised. Moreover, digital literacy was introduced to various subjects and extracurricular programmes, informatics became a mandatory subject in the 5th and 6th grade of primary schools, and all informatics curricula for primary and secondary schools were reformed. As of the academic year 2020/2021, all primary schools have to offer informatics as an elective course from the 1st to the 4th grade. In order to prepare for the introduction of the new course, teaching staff was expanded, special classrooms were equipped, and the teaching staff was trained to implement the curriculum focused on computational thinking and coding, as well as internet safety and participation in e-society. Furthermore, the project for strengthening civil society organisations in STEM areas worth HRK 150 million was launched in order to include these organisations in the development of citizens' digital skills. According to The Index of Readiness for Digital Lifelong Learning (IRDLL), Croatia ranks 13th of 27 EU member states. According to this Index, Croatia has the best results in the "Policies and institutions for digital learning" area, ranking 3rd of 27 EU member states. In contrast, Croatia is almost at the bottom of the list in the "Learning participation and outcomes" (24th) and "Availability of digital learning" (21st) areas.

Development needs and potential

Digital transition of the economy

3.2 Development needs and potential of four priority areas

Based on the analysis conducted and understanding of ICT trends, the development needs and potential for all four priority areas were identified.

3.2.1 Digital transition of the economy

By adjusting the administrative and legislative framework, make the Croatian economy, especially the ICT sector and accompanying startup[9] / scaleup[10] landscape, more competitive in relation to other countries.

In order to raise awareness on the necessity of innovation as a driver of growth of the Croatian economy, scaling of operations, and the increase in number of new unicorn companies, it is necessary to adjust and optimise the administrative and legislative framework in Croatia in cooperation with entrepreneurs. This also refers to taxes and parafiscal charges and increasing the efficiency of administrative requirements.

Continue incentivizing the promotion and strengthening of (formal, informal, and lifelong) education/training in ICT and reducing the administrative and tax burden to attract and hire foreign ICT specialists.

Shortage of ICT specialists on the labour market of the Republic of Croatia is the starting point for all other recognised needs for the digital transition of Croatia's economy. Considering the current negative demographic trends in Croatia, this challenge needs to be addressed in a different manner, that is by intensifying the promotion of STEM education among Croatian citizens, making the STEM labour market in Croatia increasingly appealing for foreign professionals, continuously using aid for supporting university studies in areas where there is a workforce shortage, and defining enrolment quotas that meet labour market needs.

Increase implementation and use of advanced technologies in Croatian enterprises, especially micro, small, and medium enterprises through targeted training of the management structure (in the public and private sector) in the digital transformation area, including the analysis of similar digitalisation project experiences and focus on understanding the digital transformation concept.

9 Startup is a company established by an entrepreneur to seek repetitive and scalable business models. The official EU definition is currently being drafted.

10 OECD defines a scale-up as a company having an average annualised return of at least 20% in the past 3 years, and at least 10 employees at the start of the 3 year period.

Experience and competences of the enterprise's management structure are key for a successful digital transformation of the enterprise's management support, but even more important for developing new products and services based on digital technologies. Targeted staff training should be used to increase competitiveness on the EU market, especially for SMEs.

Further shift the tax burden away from work and employee income (e.g. remuneration in the form of allocation of shares and stock options / ESOP models) in order to create a stimulating business environment for young companies, especially to retain national ICT specialist and STEM talents.

Croatia should bridge the gap with the EU labour market and EU business environment offering more tax and investment incentives, one of the leading causes of the drain of ICT specialists and STEM talents who are unable to efficiently develop their business and innovation ideas in Croatia's existing business environment. In order to create an environment that stimulates business, it is necessary to sign agreements for the avoidance of double taxation with key partner countries.

Increase the business efficiency of SMEs, accounting for 99.8%[11] of Croatian economic operators, by raising the level of their digital literacy and encouraging business ideas based on digital, disruptive, and innovative technologies.

Despite their potentially large advantages, SMEs nevertheless lag behind in digital transformation. New technologies offer a series of solutions for improving operations and overcoming size limitations that SMEs face. SMEs are at the core of the Croatian industrial structure, creating most jobs and forming the basis for an inclusive and sustainable society. Increasing the digital literacy level of employees and the management structure of enterprises is one of the key steps for improving their business efficiency. Digitalisation of SMEs has become a main policy priority in OECD and other countries, especially in the context of strengthening their resilience to emergency situations.

Enable opening of additional public services for entrepreneurs to secure a high-quality basis for developing new business models as well as new products and services.

Substantial potential for developing new, innovative products and services is unused due to a very limited access to data in public registers of the Republic of Croatia or limited options of public digital services. E-services for enterprises should be further developed and the existing national open data portal, containing high-value datasets and based on public data interoperability, should be improved and then used by enterprises, together with disruptive technologies such as AI and machine learning, in test settings for developing innovations and subsequently in real-world settings.

11 Based on the data of the Croatian Bureau of Statistics (of the number of operating enterprises) https://podaci.dzs.hr/2022/hr/29182

Development needs and potential

Digitalisation of public administration

3.2.2 Digitalisation of public administration

Based on the Standard for Developing Public e-Services in the Republic of Croatia, continue the coordinated digitalisation and transformation of public services that are user-centred, conducted by agile teams, with a special focus on addressing citizens' life events or legal entities' business events.

In 2021 and 2022, an agile approach was adopted for developing new functionalities of the e-Citizens system as well as the system as a whole, used by citizens and businesses for accessing e-services provided by public authorities. However, the majority of the existing e-services of the system were created by digitising parts of certain procedures or existing offline public services. Therefore, in order to further digitalise public services, the government department has to prepare for agile operations and establish teams as defined in the Standard for Developing Public e-Services in the Republic of Croatia so as to secure that future services resolve citizens' life events and are personalised at the same time. This implies that, when creating a new service, users' (not institutional) needs are considered first and then the desired user experience is outlined. As a result, the overall number of public digital services in the e-Citizens system is expected to decrease. Once services provided by five/six different government departments are merged into a single service resolving citizens' complex life events or legal entities' business events, partial solutions will no longer be needed. Considering the future complexity of services and functionalities of the e-Citizens system, permanent interinstitutional teams should be established for the purpose of maintaining, upgrading, and improving services. These types of services, naturally, require integration of all databases and central registers into the Government Service Bus (GSB).

Continuously optimise and digitise fundamental and supporting public administration business processes.

Life events and public services entail all prescribed interactions between users (citizens and enterprises) and public authorities on all levels (state, municipality, county). The aim is to secure efficient service provision to users that meets their expectations. The Croatian public administration still has a traditional approach to organising its operations, based on separate functions in the relevant hierarchy (function approach). Therefore, the public administration processes are to a certain extent siloed, addressing specific parts of procedures, then integrated into a comprehensive service by users. Such business processes impact efficiency, user satisfaction, and welfare of public administration employees. In addition, public authorities are currently facing a large operational burden caused in part by suboptimal, i.e. manual, business processes based on repetitive activities and a large number of administrative procedures. Such business processes have an adverse impact on the quality of work and efficiency of public officials, as well as the perceived transparency of the public administration's operations. Thus, a systematic analysis of underlying and supporting business processes is necessary before digitalisation based on established scenarios for process optimisation or re-engineering.

Continue developing and modernising the state's information infrastructure and use advanced software solutions as the basis for a secure, flexible, and efficient electronic interaction of public authorities with all relevant stakeholders.

Ensuring the joint use of information and communication technologies within the state's infrastructure is an important precondition for further developing and modernising public administration. Namely, the existing state's infrastructure does not meet the needs of an accelerated digitalisation of public administration. Therefore, there is a clear need for consolidating and expanding the state's information infrastructure and services and upgrading the Shared Service Center (SSC), which will, inter alia, contribute to the improvement and cost-effectiveness of the system and the establishment of a more efficient communication with citizens and enterprises.

Develop a national interoperability framework, including a complete interconnection of central registers of all government departments with a higher degree of interinstitutional cooperation and coordination.

Croatian public authorities have at their disposal around 600 different registers and databases, 19 of which are defined as crucial by the CSODDS. Despite the legal obligation to secure the availability of collected authentic data from all public authorities' central registers, all legal obstacles to their integration and interconnection into a central interoperability system have not yet been removed. The lack of integration and interconnectedness of the relevant public registers has an adverse impact on the efficiency of public services and the quality and completeness of digital public services. Furthermore, the analysis of activities from the Action Plan for the implementation of the e-Croatia 2020 Strategy revealed a lack of a systematic approach to public administration digitalisation, resulting in siloed solutions developed for narrow, functional public administration areas with no relevant impact on the digital transformation of public administration. Namely, it is not that public authorities do not care about citizens' needs, they are merely focused on managing their own programmes instead on resolving citizens' comprehensive needs. Moreover, citizens' life events are seldom (or almost never) within the competence of a single public authority or even one level of government (local, regional, national). Therefore, upgrading and interconnecting general registers within the central interoperability system and implementing a central data warehouse through a higher degree of interinstitutional cooperation and coordination are one of the key development preconditions for an accelerated digitalisation of public administration and justice.

In addition, many official records are not kept in a way that fosters decision-making and government department monitoring, and are often incomplete or have inadequate quality, which is why additional efforts are needed for their improvement. Furthermore, whenever possible considering the nature of data, it should be established spatial data sets that can be visualised using interactive maps and exchanged online in compliance with regulations on the national infrastructure of spatial data, thus improving bases for decision-making and managing processes and development in general.

Continue strengthening human resources and the organisational structure of authorities responsible for coordinating and implementing an accelerated digitalisation of public services.

Considering the scope and complexity of digitally transforming society and public administration in the Republic of Croatia, insufficient attention has been paid so far to a clear distribution of responsibilities and cooperation arrangements for digitalisation projects. Thus, in the following period, it is necessary to establish an efficient organisation and management framework for coordinating the implementation of the digital strategy within and among government levels.

Coordinating digitalisation is meant to address siloed funding, until now allocated based on individual requests and lobbying by certain authorities to receive funding for their specific digitalisation projects. In addition, planning public projects often follows the traditional waterfall model which assesses the comprehensive financial burden in the opening stage of the project, and then change requests are made in line with project needs. However, digitalisation projects addressing citizens' life events, as well as all agile projects, require iterative and continued funding. A lack of coordinated long-term planning for operational financing of such projects may slow down or even limit public administration in its transformation of digital services.

A major need that requires addressing in the following period is attracting talent to the government and public administration (uncompetitive salaries and employment restrictions), in order to secure sufficient human resources necessary for implementing digitalisation.

Educate officials on e-service provision and continuously invest in their acquisition of digital competences.

The current state analysis showed that so-far investments in digitalisation of public administration have not been accompanied by applicable measures for increasing digital literacy, which would include public officials. Therefore, there is a need for standardised training on providing public e-services for public administration employees, as well as advanced training in the area of ICT, new technologies, and digitalisation project management skills for officials working on digital transformation.

Furthermore, agile teams should be established with research, development, and innovation as their core activities, not additional ones (as it was the case until now). An agile approach is necessary to achieve this, as it entails additional training and understanding across public administration, thus contributing to a successful digitalisation. This implies accepting the fact that our understanding of digitalisation processes (of public services, supporting processes and similar) and implementation of accompanying projects will take place through continuous iterations and upgrades. An agile approach to developing services enables, for example, several iterations for key project stakeholders (including users) until the desired outcome is achieved. This requires a working culture that does not punish mistakes, but uses them as lessons instead, as well as fosters inquisitiveness, innovation, research, analytical thinking, active listening, and openness to the unknown. In other words, in addition to applying an agile approach, organisational units should be established in a way that clearly distinguishes between administrative and repetitive tasks from creative and innovative ones. Contact with users and feedback collected from both natural persons and business entities shall form the basis for the prototype solution and iteration of public digital services, as well as the basis for digitally transforming public administration.

Implement promotional and training arrangements for citizens and enterprises on the use of available e-services to increase the number of their users, with the ultimate goal of increasing citizens' trust in public institutions.

There is a pronounced shortage of adequate informational and training arrangements for citizens and enterprises in the area of available public administration digital services, resulting in the non-use of existing e-services. Namely, merely digitalising services will not have the desired outcome if the targeted users do not start using them. This is why it is necessary to conduct promotional activities for raising public awareness on the existence of the e-Citizens system and using the e-services it provides, as well as design educational materials and campaigns for citizens on how to use the relevant digital services.

Development needs and potential

Development of broadband electronic communications networks

3.2.3 Development of broadband electronic communications networks

Secure very high capacity network (VHCN) coverage for households and public purposes

According to DESI 2022, fixed very high capacity network (VHCN) coverage in Croatia is showing progress but lagging behind the rest of the EU (70% households), reaching only 52% households. In order to use the potential of modern technologies to the maximum and completely digitalise the economy in the upcoming period, we need cutting-edge very high capacity broadband networks. This is a precondition for meeting other development potential based on developed electronic communications infrastructure. Gigabit for everyone is a goal of the Digital Compass, which is why Croatia needs to undertake the steps necessary for increasing VHCN coverage in order to bridge the gap with other EU countries.

Substantially improve VHCN coverage in rural areas and on islands

With regard to the previously defined development need, it is important to emphasize that, according to DESI 2022, Croatia lags substantially behind EU average in terms of VHCN coverage in rural areas. Thus, there is a clear need for increasing VHCN coverage in rural areas and on islands to reduce the gap in comparison to other EU member countries, but also to decrease regional disparities on a national level. This will enable equivalent development options for both residents and enterprises in rural and urban areas of the Republic of Croatia.

Increase 5G coverage in urban areas as well as major transport paths

Although Croatia, having assigned a spectrum in the 700 MHz, the 3.6 GHz, and the 26 GHz bands for 5G networks, became 100% ready to introduce 5G and laid foundations for developing 5G networks, according to DESI 2022, 5G coverage for all populated areas in Croatia is below the EU average (Croatia 54%, EU average 66%). Therefore, there is a clear need for increasing 5G coverage in the upcoming period, which will in turn decrease regional disparities and provide equal opportunities to residents and enterprises from all parts of Croatia to use services and develop new business models.

Improve and encourage the take-up of very high-speed broadband services (at least 100 Mbps)

The analysis conducted and DESI 2022 data jointly point to the fact that Croatia lags substantially behind most EU countries in the take-up of very high-speed services. Namely, the take-up of at least 100 Mbps fixed broadband speeds is only at 16%, despite the fact that 52% households are already covered by VHCN. Therefore, one of the key development needs in the area of network development is to improve and encourage the take-up of very high-speed broadband services. In the upcoming short-term period, this should result in the increase in number of users of at least 100 Mbps fixed broadband speeds, whereas in the long run, this should alter the way end users perceive the benefits of high broadband speeds, increase the take-up of very high-speed broadband services, increase competition and, subsequently, result in a drop in service prices.

Improve the construction and spatial planning regulatory framework in a way that promotes VHCN deployment, by cutting costs and streamlining procedures.

The analysis determined a strong need for improving the regulatory framework affecting the speed and costs of constructing VHCN, in order to use the network development potential and reach national goals and goals of the Digital Compass. Substantial development potential for an accelerated development of broadband electronic communication networks of very high speeds may be secured through improvements in the construction and spatial planning regulatory framework by designing a framework that will promote VHCN deployment, while cutting costs and streamlining procedures.

Development needs and potential

Development of digital skills and digital workplaces

3.2.4 Development of digital skills and digital workplaces

Increase the number of ICT specialists on the labour market

One of the key challenges of digitalising the Croatian society and economy is the shortage of ICT specialists graduating from secondary and higher education establishments, as well as adult education establishments, and a weak inflow of ICT specialists and students from abroad, accompanied by an outflow of specialists into other EU countries. Therefore, it is necessary to increase the number of ICT graduates and foreign ICT specialists.

Increase the level of digital competences and reskill the workforce with non-ICT professions in line with the labour market needs

Digitalisation will change the way traditional, non-ICT professions have functioned so far. In order to reap all of the benefits of digital transformation and increase competitiveness and the value of work, it is necessary to upskill the workforce for using digital technologies in performing non-ICT tasks. At the same time, it is essential to additionally encourage reskilling and retraining of employed people with professions that are in low demand to ICT professions which are in high demand.

Increase the level of citizens' basic and advanced digital competences to ensure their active participation in the digital society.

In order to help citizens engage with everyday digital technologies, it is necessary to increase their basic and advanced digital competences within all five categories detailed in DigComp2.2.[12], with a special focus on the safe use of digital technologies.

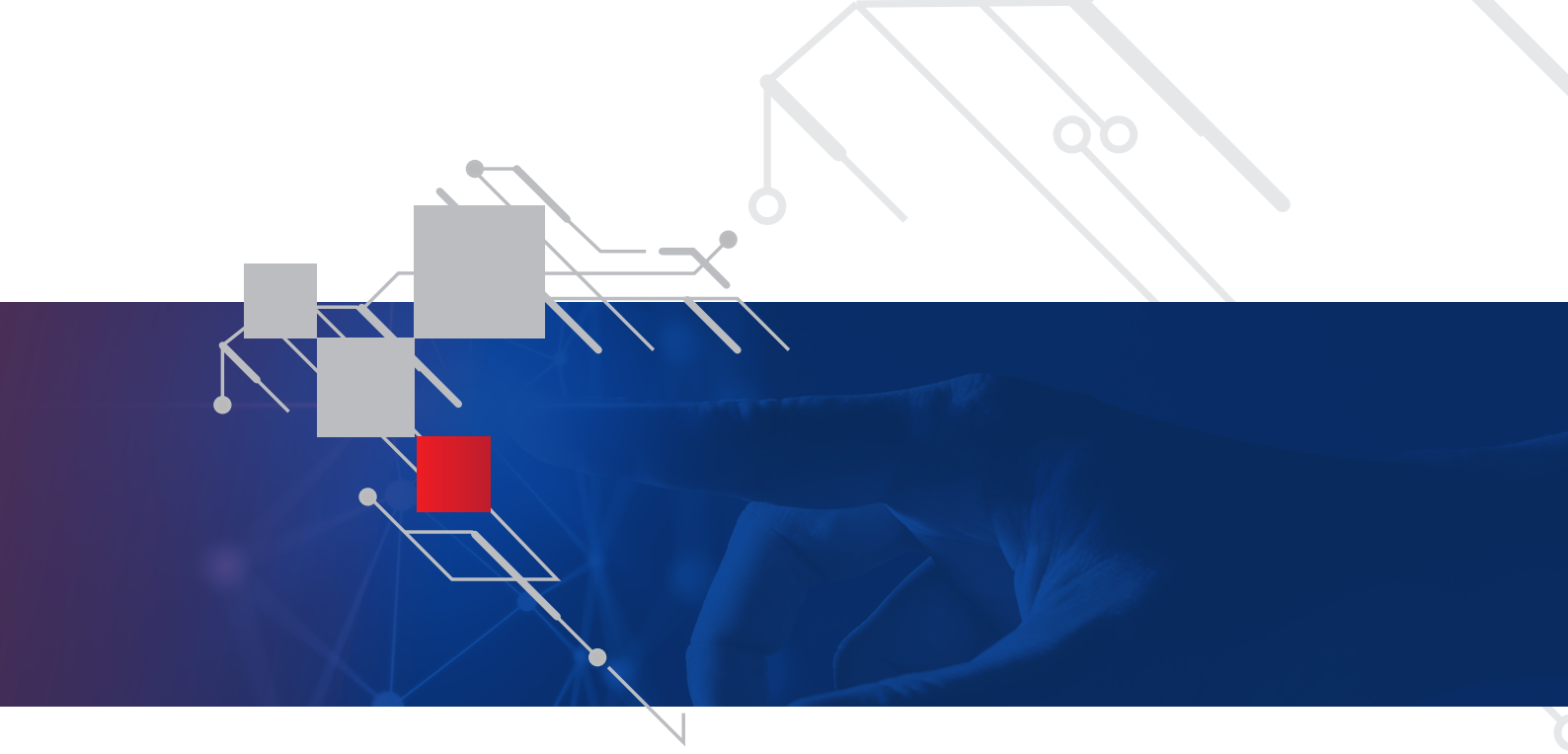
Further digital transition of the education system and launch of a programme for students interested in ICT topics

In order to prepare future generations for living and working with digital technologies and increasing the quality of education, primary, secondary, and tertiary education should be constantly upgraded with digital technologies and aligned with the required digital competences. The upcoming digitalisation of education comprises four key areas: digitally mature environment, digitally mature and confident teachers, ICT supporting learning and teaching, and digital leadership.

Redefine tertiary education enrolment quotas to increase the number of ICT graduates

To increase the number of ICT graduates entering the labour market, we must decrease the number of individuals graduating from non-technological studies, foster full enrolment quotas of existing accredited computing and ICT studies, increase the number of study programmes taught in English, balance the enrolment quotas of study programmes taught in Croatian and English in line with the labour market's projected needs, and enrol a substantial number of foreign students in IT and computing study programmes. Redefining enrolment quotas will reduce the gap between the relevant quotas and the number

12 https://publications.jrc.ec.europa.eu/repository/handle/JRC128415



of students actually enrolled, increase the efficiency of the tertiary education system, and address the real needs of the Croatian economy. Furthermore, in order to increase the number of students enrolled in study programmes taught in English, as well as the number of these programmes, more spacious facilities are needed, which would then enable a smooth running of study programmes.

Redefine secondary education enrolment quotas to prepare students for attending and graduating from STEM studies

Knowledge of science, mathematics and physics is considered key for successfully completing the first years of ICT and computing studies and obtaining a bachelor's or master's degree in these fields. This is why as many as possible young people with the necessary background knowledge in general subjects should be enrolled in ICT and computing studies, which will directly result in an increased number of ICT experts. Croatia has the smallest share of children in general secondary education in the EU (where they account for 50% on average). This is why one of the key goals of the National Recovery and Resilience Plan 2021-2026 is to increase the percentage of children in grammar schools to 35% by 2026, while the National Council for Development of Human Potential recommends increasing the percentage to 40% by 2030.

Increase the number of teachers and premises of higher education establishments in the ICT area

Furthermore, in order to increase the number of ICT graduates and ensure they receive a high-quality education, it is necessary to increase the number of teachers and improve the competitiveness of their position on the labour market in order to keep them in the educational system. In addition, the premises should be upgraded as well, including the digital infrastructure of institutions educating ICT specialists.

Attract foreign ICT students and specialists by internationalising higher education

A systematic approach to internationalisation of higher education and the labour market can attract foreign ICT students and specialists, with the ultimate goal of increasing the number of ICT specialists on the labour market. Croatia's important asset in that respect is that it is considered an extremely pleasant and safe country.

Encourage the development and use of digital tools in education to ensure equal opportunities for education and acquisition of digital competences for all citizens

Digital technologies enable, inter alia, the integration of digital tools into educational processes and complementing the regular educational process with online classes, offering a wide range of citizens the opportunity to efficiently and effectively acquire digital skills, regardless of their whereabouts.

Encourage greater representation of women among ICT specialists

It is necessary to promote equal representation of women in the ICT sector. This issue should be addressed in primary education, by encouraging girls to pursue STEM subjects and, subsequently, participate in ICT formal and informal learning programmes. Greater representation of women in the ICT sector will result in an increased number of ICT specialists on the labour market.

4

Strategic objectives of the Digital Croatia Strategy for the period until 2032

Based on the vision defining what we want to achieve through digitalisation and based on the current state analysis as well as development needs and potential recognised, we have established 4 strategic objectives in 4 priority areas, with the aim of digitalising the Croatian society, public administration, and the economy in the period until 2032.

As detailed in Figure 1, performance indicators were defined for each strategic objective, as well as priority public policy implementation areas. These strategic objectives form a basis for defining special objectives in national plans.

1.

Developed and innovative digital economy

	Initial score (2022)	Target score (2032)
Integration of digital technology (DESI)	40.0	Above the EU average (66,0)
ICT sector, in % GDP-a	4,5 % (2019)	13%

Supporting digitalisation in micro, small and medium-sized enterprises

Digitalisation of public services for enterprises and securing access to anonymised public data

Supporting digital innovation hubs

Transforming and strengthening the competitiveness of cultural and creative industries

Optimising the Croatian tax and parafiscal legislation and administration

2.

Digitalised public administration

	Initial score (2022)	Target score (2032)
Digital public services (4a e-Government (DESI))	53.6	EU average (85,61)
eGovernment Benchmark	61 % (2021)	Above the average of (35) european countries (85 %)

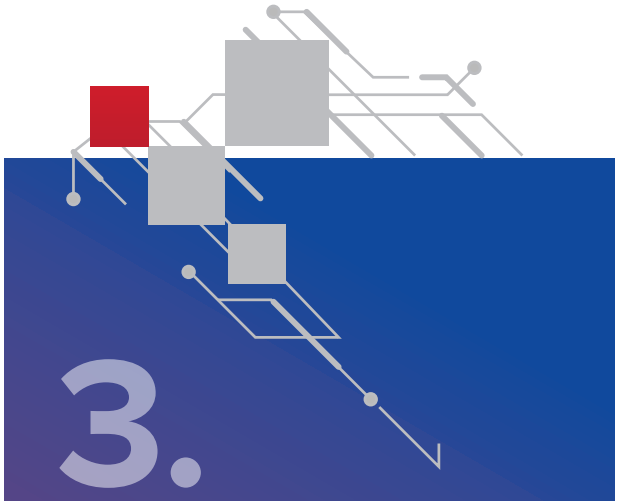
Strengthening organisational and institutional capacities

Upgrading the state information infrastructure and advanced software solutions

Realising complete interoperability between public services and justice, while enabling access to citizens and business' open data

Digitalising all key public services

Promoting digital services and customer support among citizen



3.

VHCN deployed, available, and taken up

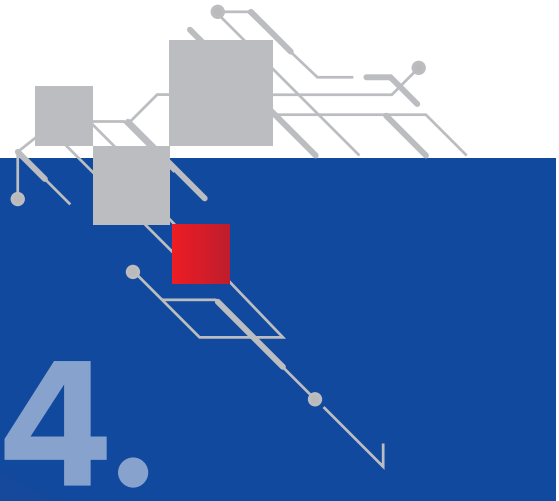
	Initial score (2022)	Target score (2032)
Connectivity (DESI)	48.1	EU average (95,0)

Meeting the conditions of a spatial planning and electronic communications networks construction

Regulating the impact of property use costs on network development

National Framework Programme for the Development of Broadband Backhaul Infrastructure in Areas Lacking Sufficient Commercial Interest for Investments

Encouraging the take-up of very high-speed services



4.

Developed digital competences for working and living in a digital age

	Initial score (2022)	Target score (2032)
Human capital (DESI)	51.8	Among the EU top 5 (70,0)
ICT specialists in employment, % of total individuals in employment	3,6 (2021)	EU average (> 8 %)
Indivisuals' digital skills	63%	Amont the EU top 5 (> 80 %)

Increasing the number of ICT specialists on the labour market

Developing citizens' digital competences for working and living in a digital age, with help of ICT

Digital transition supporting the development of the education and research system

4.1

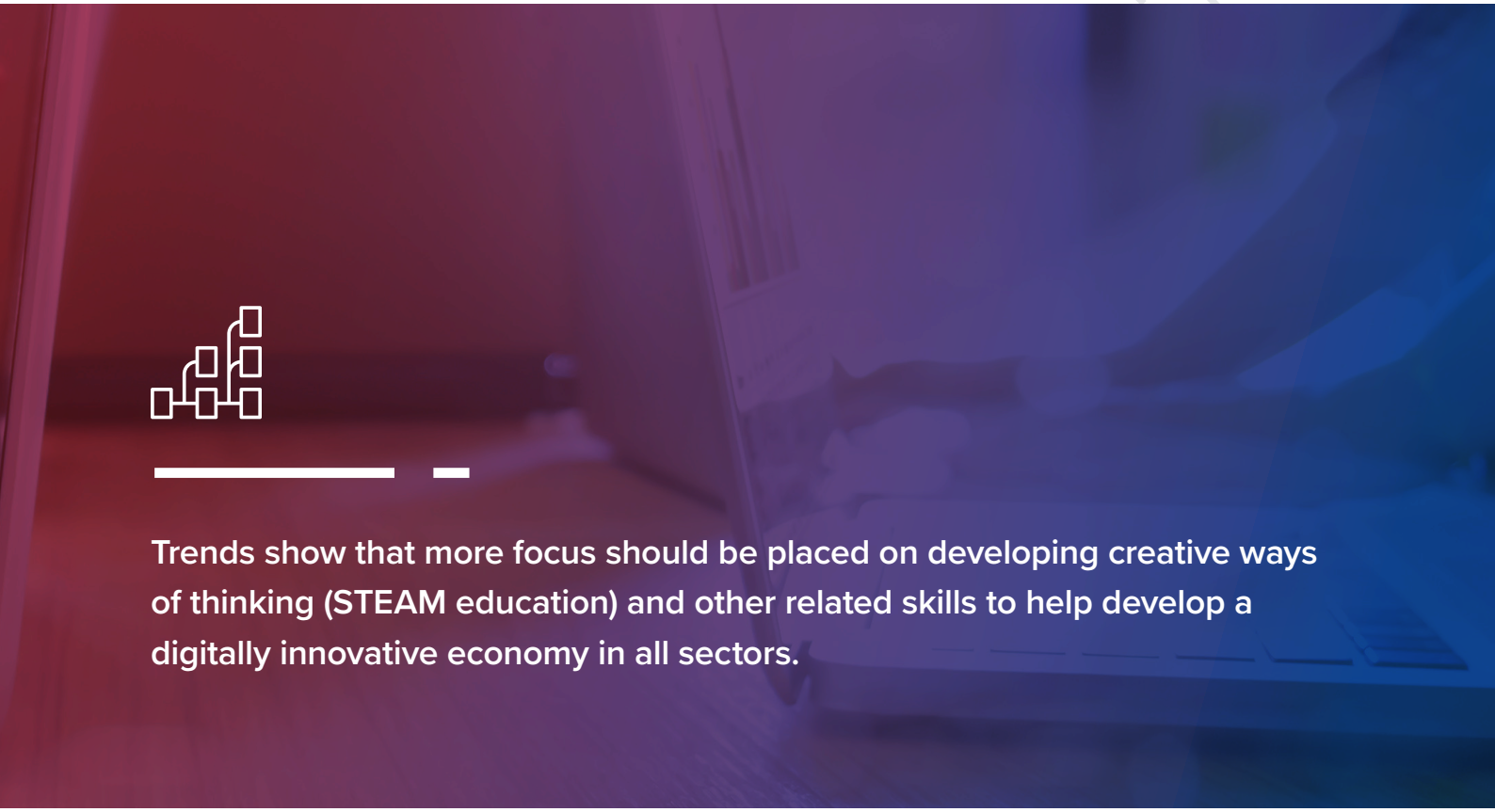
Strategic objective 1: **Developed and innovative digital economy**

4.1.1 Digital transition of the economy – Strategic objective: Developed and innovative digital economy

In line with the goals of the Digital Compass Europe, Croatia has, in its Digital Croatia Strategy for the period until 2032, set as its long-term strategic objective the development of a digital economy and society comparable and competitive with the EU economy and society, with a special focus on SMEs that account for more than 99% of business entities in Croatia and ICT enterprises.

One of the key challenges is to improve Croatia's results in the Integration of digital technology dimension (DESI 2022), since the results show there is substantial room for improving the score of Croatian SMEs with at least a basic level of digital intensity, which was below the EU average in 2022. This is why a strong focus should be placed on digitalisation and digital transition of the entire economy, including the industry, especially the processing industry, service activities, paying special attention to SMEs with low digitalisation levels, which directly affect their competitiveness.

In addition, there is a need for tracking intrinsic – internal – development factors of the ICT sector, which should drive advanced digital initiatives in the sector, but also keep ICT talents in Croatia. One of the approaches to realising ICT sector growth is reducing the administrative and parafiscal burden and optimising the tax legislation, but also fostering innovation while digitalising the economy, by developing dedicated digital innovation centres that use advanced test settings.



Trends show that more focus should be placed on developing creative ways of thinking (STEAM education) and other related skills to help develop a digitally innovative economy in all sectors.

Cybersecurity has to be permanently incorporated into the development of the digital economy and society, thus securing trust in digital technology and digital transformation. Namely, cyber threats and cyberattacks accompany digitalisation, which is why technologies used for digital transition of the economy should support the integrity, safety, and resilience of digital infrastructure and communication networks and services.

Although STEM professionals have played a key role in sustainable growth and stability of advanced global economies and became a key component in developing different industries, trends show that more focus should be placed on developing creative ways of thinking (STEAM education) and other related skills to help develop a digitally innovative economy in all sectors.

In line with the goals of the European Green Agenda for the Republic of Croatia, bringing digital into our lives has helped us reduce our carbon footprint. However, we need to ensure that digital technologies do not consume more energy than they save. At present, digital technologies account for between 8-10% of our energy consumption, and 2-4% of our greenhouse gas emissions[13]. The EU is planning to update existing laws and introduce new measures to achieve its green and digital goals for the next decade. One such measure is ensuring data centres are climate neutral, energy-efficient and sustainable by 2030 at the latest.

13 Green digital sector | Shaping Europe's digital future (europa.eu)

Performance indicator:		Initial score:	Target score:
1. II.02.7.11 Integration of digital technology (DESI)	Total score based on DESI Digital intensity, Digital technologies for enterprises, and e-Commerce sub-components	**40,00 (2022)**	Above the EU average Value: 64.58 (2030) 66.00 (2032)
2. II.02.7.04 ICT sector, in % of GDP	Share of value of final goods and services produced in the Croatian ICT sector in cash units, for the given year. The share is given as a percentage amount.	**4,48 %[14] (2022)**	Value: 12% (2030) 13% (2032)

Link with the development area of the National Development Strategy until 2030:

Development area 1: Sustainable economy and society

Strategic objective 1: "Competitive and innovative economy"

Priorities in implementing public policies contributing to the development of a globally competitive, green, and digital industry

Performance indicator:

- Share of gross domestic expenditure on research and development (GERD) in GDP
  - Initial score: 0.97% (2018)
  - Target score 2030: 3 %

Development area 3: Green and digital transition

Strategic objective 11: "Digital transition of society and the economy"

Policy priorities in the area of digital transition of the economy:

- Encouraging digital transformation and application of advanced technologies
- Securing a widespread use of digital technologies, strengthening strategic digital capacities, and increasing the level of the economy's digital maturity
- Developing the state information infrastructure and standardised digital platforms for economic purposes
  - Supporting the creation of new digital industries

Performance indicator:

- DESI
  - Initial score: 47.60 (rank 20th) (2020)
  - Target score 2030: Reach EU average

14 Latest values available for 2019: https://ec.europa.eu/eurostat/databrowser/view/ISOC_BDE15AG/bookmark/table?lang=en&bookmarkId=1a924b68-1e09-480a-857a-f8853e95c5f7

Authority responsible for the implementation of the strategic objective:	■ Central State Office for the Development of the Digital Society ■ Ministry of Economy and Sustainable Development ■ Ministry of Culture and Media
Priority public policy implementation area:	1.1. Supporting digitalisation in micro, small and medium-sized enterprises 1.2. Digitalising public services for enterprises and securing access to anonymised public data 1.3. Supporting digital innovation hubs 1.4. Transforming and strengthening the competitiveness of cultural and creative industries 1.5. Optimising the Croatian tax and parafiscal legislation and administration

Link with the UN Sustainable Development Goals:	**Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all** ■ Digitalisation of the economic sector in Croatia shall have a measurable impact on economic growth and employment **Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation** ■ Planned measures shall encourage sustainable (green and digital) innovation in the public and private sector **Goal 10: Reduce inequality within and among countries** ■ Growth in the share of the ICT sector in Croatia's GDP shall have a positive impact on Croatia's competitiveness on the international market, and the regional measures shall reduce inequalities within Croatia **Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable** ■ New ICT infrastructure shall meet the circular economy demands, including waste prevention and recycling.

4.1.1.1 Priority public policy implementation area 1.1: Supporting digitalisation in micro, small and medium-sized enterprises

Targeted measures are needed for fostering digital transition in the business operations of micro, small and medium enterprises in all industrial sectors in Croatia that substantially lag behind the EU average in terms of digital transition, which impacts both competitiveness and resilience of Croatia on the EU and global market. Therefore, in the entire 10-year period, it is necessary to secure dedicated financial instruments as the basis for fostering growth of entrepreneurial ideas based on digital disruptive technologies.

The purpose of the relevant area of intervention is to strengthen and encourage the implementation of digital technologies in all sectors and secure the necessary conditions for digitalising operations and active use and development of new technologies and, with their help, create new ideas, products and services.

The business enterprise sector will have to expand the range of products and services by using new technologies and new regulatory solutions enabling streamlined operations and promoting the use of digital technologies in new types of operations will have to be introduced. Cooperation within the business enterprise sector should be actively encouraged, as well as the collaboration of science and economy on a national and international level, which is key for developing and applying innovative solutions creating added value for the economy and society as a whole.

In order to make further progress and support a stronger investment cycle in the market of the Republic of Croatian, extra funds should be invested in new technologies (including green and digital technologies) and the operations of SMEs should be

strengthened. The digital transformation of enterprises in Croatia should comprise a substantial uptake of new technologies such as cloud computing, AI, big data processing, producing semiconductors and microchips[15] to make Croatia contribute substantially to EU's target of 75% enterprises meeting the conditions for the realisation of the relevant goal. In this context, the use of digital communication platforms would facilitate content creation and exchange, leading to innovation and directly resulting in strengthening the global reach and competitiveness of Croatian enterprises. Namely, in order to truly raise the digital competences of Croatian enterprises and their clients, it is necessary to encourage the availability of basic digital tools enabling enterprises, especially startups, to develop further innovative solutions. By establishing a digital base and tools with simple upgrades, scaling of enterprises and reaching predefined digitalisation targets of the Croatian economy will be substantially accelerated.

Considering all of the above, in order to further encourage investment activities on the Croatian market in the following period, it is necessary to: (i) develop additional financial instruments supporting the investment needs of specific target groups with no or restricted access to banks' funding (micro enterprises, startups, young entrepreneurs, investment in RDI, economic operators investing in lesser developed areas etc.); (ii) secure more favourable funding conditions for SMEs in their growth and development stages (entities that have access to funding), with the aim of strengthening their competitiveness and resilience and a more successful green and digital transition.

Competent authority:

Ministry of Economy and Sustainable Development

Estimated budget:

HRK 2,000 million (EUR 250 million)

Source of funding:

Croatia will have at its disposal over EUR 23.5 billion (more than 40% of Croatia's annual GDP) disbursed from the Recovery and Resilience Facility of EUR 750 billion and the Multiannual Financial Framework 2021-2027, i.e. European Union budget for the 2021-2027 period. This amount constitutes a lever for economic growth and development, with 20% of the funds to be used for the digital component. This should be done in line with the budget of the Ministry of Economy and Sustainable Development, and with the future economic development plan.

- National Recovery and Resilience Plan (2021-2026) (NRRP)
- Multiannual Financial Framework 2021-2027, i.e. European Union budget for the 2021-2027 period
- Operational Programme Competitiveness and Cohesion (2021-2027) (OPCC)
- State budget of the Republic of Croatia, sources of funding combined in the state budget and budgets that are part of the general government budget

4.1.1.2 Priority public policy implementation area 1.2: Digitalising public services for enterprises and securing access to anonymised public data

In order to optimise the operations of entrepreneurs in Croatia, as well as the use of disruptive digital technologies in developing new products and services based on high-value public data, we need to secure a thorough and accelerated digitalisation of public services for entrepreneurs and citizens alike, as well as public data availability on digital interfaces developed in line with security and legislative requirements.

We need to secure the collection of data in standardised formats (structured and non-structured data), advanced analytic and visualisation of collected data that would then become available via an open source platform, with AI analytic tools and elements implemented, available to the private and public sector for the purpose of developing new, innovative services.

This should be based on the principle of interoperability, with the implementation of standard APIs for accessing open data with the aim of upgrading the Open data portal in Croatia and revitalising its use by introducing standard APIs that will enable the collection of other data of public authorities, cities, and communities, as well as other civil services, public undertakings, and private sector. In addition, users should be trained on how to use the platform in order to maximise the use of the solution offered.

Users shall enjoy ongoing technical support for analysis and visualisation activities, and the system shall be constantly upgraded with security mechanisms, thus guaranteeing a safe storage of data with limited access classification.

Competent authority:

Central State Office for the Development of the Digital Society

Estimated budget:

HRK 150 million (EUR 20 million)

Source of funding:

- National Recovery and Resilience Plan (2021-2026) (NRRP)
- State budget of the Republic of Croatia, sources of funding combined in the state budget and budgets that are part of the general government budget

15 https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-chips-act_en

4.1.1.3 Priority public policy implementation area 1.3: Supporting digital innovation hubs

We need to be headed towards a more competitive and smarter Europe by promoting an innovative and smart economic transformation. In order to achieve this, we need to strengthen our research, innovation, and digitalisation capacities, competitiveness, and micro, small and medium enterprises' competences. In line with the Digital Compass of the Europe's Digital Decade, Croatia shall foster research and innovation initiatives in the area of digitalisation to contribute to EU's goal of growing scale-ups & finance to double EU "unicorns". One of the ways for meeting the targets defined in the Digital Decade policy programme 2030 is to expand Digital Innovation Hubs (DIHs) and European Digital Innovation Hubs (EDIHs) across the EU.

European Digital Innovation Hubs (EDIHs) are non-profit consortia helping companies, especially startups and SMEs, to digitalise their operations, develop digital skills, and intermediate between service providers in the area of new technologies and users. EDIHs constitute (regional) centres that provide specialised and networked services, supporting EU's digital transformation and disseminating the latest achievements, especially in the area of AI, cybersecurity, and supercomputing. The Digital Europe Programme (2021-2027) of the European Commission will provide funding for strengthening EU capacities in the aforementioned areas and establishing an EDIH network.

DIHs support further digitalisation of the economy and SMEs. Furthermore, they are one-stop shops providing access to technical expertise, the possibility to 'test before invest', different training programmes for users, and advisory and other key services to companies exploring the options of further digitalising their operations.

Strengthening EU's competitiveness, building a stronger innovation capacity, and a more efficient and accelerated expansion of innovation among EU countries requires strengthening national and regional innovation ecosystems as well as supporting growth of the digital economy.

Having started in the prior financial period, the "Smart Specialisation" approach (S3) has become the basis for research and innovation investments within the European Regional Development Fund (ERDF). This approach is based on the idea that smart specialisation connects all government levels, academia, economy, and civil society in designing and implementing a long-term growth strategy in a particular innovation ecosystem.

Moreover, smart specialisation also encourages interregional cooperation in joint growth potential priorities. Facilitating a cross-border approach and cooperation in the area of research, innovation, and industry enables developing products and designing processes, resulting in new value chains across the EU.

Croatia will update its research and development strategies (RIS3) to upgrade what it has developed so far and implement improvements in regional and national innovation ecosystems financed by the ERDF. Special attention will be paid to supporting regions undergoing an industrial transition, taking the necessary steps for expanding their economic activities to more innovative and sustainable areas.

Croatia will do so through:

- Investments in research and innovation capacities and application of advanced technologies such as the internet of things, AI, big data sets analysis, virtual and augmented reality, 3D printing, machine learning, robotics etc. to encourage innovation and accelerated productivity growth;
- Supporting (E)DIH activities for further digitalising operations, developing digital skills of entrepreneurs, fostering digital innovation, and strengthening the digital-innovation ecosystem.

Competent authority:

Ministry of Economy and Sustainable Development

Central State Office for the Development of the Digital Society

Estimated budget:

HRK 150-300 million (EUR 20-40 million)

Source of funding:

In addition to the regional/national development funds available from its budget, Croatia should also consider EU funds, especially the European Regional Development Fund (ERDF) 2021-2027 and the upcoming Digital Europe Programme (DIGITAL) to support the digital transformation of SMEs.

Digital innovation hubs financed by the new Digital Europe Programme (2021-2027) will get the European Digital Innovation Hubs (EDIH) designation. Please note that (E)DIH need to strive for improving the competitiveness of local and regional economies by fostering innovation through digital technologies and should focus on regional and local advantages to respond to regional and local needs

- National Recovery and Resilience Plan (2021-2026)
- Operational Programme Competitiveness and Cohesion (2021-2027), within the Smarter Europe policy goal
- Digital Europe Programme (2021-2027)

4.1.1.4 Priority public policy implementation area 1.4: Transforming and strengthening the competitiveness of cultural and creative industries

The digital environment, especially in times of crisis, became a central point of creation, production, sharing and consuming cultural content. Adapting to the digital landscape is a precondition for developing cultural and creative industries, whether content is created and distributed in digital format or contact with the audience is made digitally. In a short period of time, the cultural and creative industries had to strengthen its capacities, and member countries had to adjust their legislation to ensure a fair framework for realising income and protecting property rights in a digital surrounding.

Cultural and creative industries belong to sectors that felt the consequences of the COVID-19 pandemic the most, and the sudden drop in income jeopardised their financial sustainability and resulted in a decrease in production activities and further investments in new business models and creation of new content and services.

Considering the sector's specifics, but also the exceptional contribution of the cultural and creative industries to the entire economy and resulting innovation of all sectors, the European Parliament advised member states to direct 2% of the total Recovery and Resilience Facility allocation towards the recovery of cultural and creative industries and secure they remain operational.

Enterprises operating in the area of cultural and creative industries need financial funds for adapting their operations to the single digital market and new regulatory framework in the EU and Croatia, strengthening capacities for adjusting and quickly transitioning to new business terms, becoming competitive and using the full market potential, as well as developing innovative business models and industrial standards, platforms, applications and other products and services the digital audience finds attractive.

Competent authority: Ministry of Culture and Media

Estimated budget: HRK 100 million (EUR 13 million)

Source of funding: The funding mechanism shall use calls for business entities in the cultural and creative industries to strengthen capacities for adjusting their operations to a new regulatory and legislative framework of the single digital market aimed at achieving sustainable development, supporting only investments whose activities contribute to the relevant goal and clearly define the digital contribution in the business processes, production, distribution and content and services availability segments.

- The investment planned in the Recovery and Resilience Plan 2021-2026 is not a part of the estimated budget, since activities shall be detailed in the strategic planning acts of the Ministry of Culture and Media.
- Regional/national development funds available from the budget of the Republic of Croatia

4.1.1.5 Priority public policy implementation area 1.5: Optimising the Croatian tax and parafiscal legislation and administration

One of the preconditions for successfully implementing digital transformation and digitising the economy is the harmonisation of a strategic, regulatory and implementation framework relieving the economy of administrative and parafiscal charges, especially for SMEs, in order to create a stimulating and competitive business environment. Changes in the area of digitalisation require fast responses in terms of adjusting the necessary legislation and removing business obstacles both in Croatia and the international market, especially legislation directly or indirectly affecting operations, development and application of innovation based on digital technologies, such as:

- Legislation in the area of new technologies (e.g. AI, use of online services and platforms);
- Legislation in the area of data access and use, intellectual property in the ICT sector, etc.

In doing so, it is extremely important to assess the potential impact of new regulations, as well as to analyse existing regulations to determine their general use or the need for their simplification since developing and applying new technologies results in both opportunities and risks related to protecting privacy, fundamental human rights, discrimination, etc. Therefore, it is necessary to optimise the new or amended legal solutions in a way that encourages digital transformation and competitiveness of the business sector and aligns them with the proposals put forward in the joint dialogue with the business community representatives.

Furthermore, issues should be addressed by changes to the regulatory framework decreasing and optimising the number of administrative requirements set before the business enterprise sector.

Competent authority:

Ministry of Finance

Estimated budget:

Not applicable

Source of funding:

Not applicable

4.2

Strategic objective 2: **Digitalised public administration**

4.2.1 **Digital transformation of public administration – Strategic objective: Digitalised public administration**

Digitalisation of public administration shall have a multiple impact on the development of Croatian society. Citizens' access to fast, cheap, secure, and high-quality e-services ensures a safe and efficient social and business environment and is a precondition for citizens' equal and active contribution to smart, sustainable, and inclusive growth. As far as internal functioning of public administration is concerned, digitalisation increases efficiency and quality of work of public officials, helps rationalise operations, and contributes to the ethics and integrity of public institutions.

The Government of the Republic of Croatia is committed to an accelerated digitalisation of public administration, placing the focus on the user perspective and establishing an agile approach to work. In particular, it has identified the relevance of accelerating the upgrade of the existing e-Citizens system in order to transform the existing services into services addressing our citizens' most frequent life events. Furthermore, having recognised the importance of cloud computing for further digitalisation, the Government of the Republic of Croatia will, in accordance with national needs and EU guidelines, continue working on improving and harmonising the relevant legislative framework in terms of using cloud technology for the needs of the state information infrastructure.

A high level of digitalisation of public administration may be reached by further investments in:

- Operational effectiveness of public administration, by developing modern and efficient internal digital resources (including hardware and software infrastructure, related databases, digitalised internal processes, digitally trained personnel, and improved organisation structure);
- Citizens' user experience that is relieved of administrative burden and enables easier service access by digitalising key public services for addressing citizens' life events or legal entities' business events, in accordance with the Standard for Developing Public e-Services in the Republic of Croatia;
- New technologies to make better use of data collected for the need of creating public policies based on real data and a more personalised access to public services.

Performance indicator:		Initial score:	Target score:
II.02.7.12 Digital public services (DESI)	The European Commission has been monitoring Member States' digital progress through the Digital Economy and Society Index (DESI) reports since 2014. DESI is based on the four main Digital Compass sub-categories, one of them being Digital public services. This sub-category entails five sub-components: ■ 4.a.1. e-Government users ■ 4.a.2. Pre-filled forms ■ 4.a.3. Digital public services for citizens ■ 4.a.4. Digital public services for businesses ■ 4.a.5. Open data	**53,6 (2022)**	EU average Value: 81,60 (2030) 85,61 (2032)
II.02.7.14 eGovernment Benchmark	The eGovernment Benchmark compares how governments deliver digital public services across Europe. It has become an internationally recognised study that looks at how digital platforms for citizens continue to change and improve. This study evaluates online public services on four dimensions, broken down into 48 survey questions. The study is published by the European Commission (Directorate-General for Communications Networks, Content and Technology).	**61 % (2021)**	Above the average of (35) European countries in the eGovernment Benchmark Vrijednost: 81 % (2030) 85 % (2032)

Authority responsible for the implementation of the strategic objective:	■ Central State Office for the Development of the Digital Society ■ Ministry of Justice and Public Administration
Priority public policy implementation areas:	2.1. Strengthening organisational and institutional capacities 2.2. Upgrading the state information infrastructure and advanced software solutions 2.3. Realising complete interoperability between public services, while enabling access to citizens and business' open data 2.4. Digitalising all key public services 2.5. Promoting digital services and customer support among citizens

Link with the development area of the National Development Strategy until 2030:

Development area 3: "Green and digital transition"

Strategic objective 11: "Digital transition of the society and economy"

Policy priorities in the area of digital transition of the economy:

- Develop the state information infrastructure

Policy priorities in the area of digitalisation of public administration:

- Optimising, digitalising and modernising public administration and justice as part of the administrative simplification policy
- Increasing the number of automated and digitalised public administration and justice processes and services
- Increasing the availability of interoperable public services to citizens and economic entities
- Strengthening the capacity and developing digital competences of public administration and judicial employees
- Protecting personal data and ensuring public access to all data owned by public authorities in a simple and interoperable manner.

Performance indicator:

- DESI
  - Initial score: 47.60 (rank 20th) (2020)
  - Target score 2030: Reach EU average

Development area 1: "Sustainable economy and society"

Strategic objective 3: "Efficient and effective justice, public administration and state property management"

Implementation of policy priorities in the area of justice:

- Optimising and digitalising services and processes in the justice system

Policy priorities in the area of public administration:

- Increasing the quality and simplifying written and electronic communications among public communications

Performance indicator:

- Time of resolving litigious and commercial cases in the first instance
  - Initial score: 374 days (2018)
  - Target score 2030: 250 days
- Global Competitiveness Index (GCI) – Component 1: Institutions
  - Initial score: rank 77th (2019)
  - Target score 2030: < rank 60

Link with the UN Sustainable Development Goals:	**Goal 16.** Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels. Digitalisation of supporting business processes contributes to increasing the efficiency and transparency of public administration, thus encouraging ethical behaviour and decreasing the risk of corruption. By means of digitalisation, public services become simpler, more efficient, accessible and personalised, therefore contributing to an overall improvement in the life standard of all citizens.

4.2.1.1 Priority public policy implementation area 2.1: Strengthening organisational and institutional capacities

Planning and implementing the digital transformation of Croatia largely depends on the organisation and human resources of all government and public authorities implementing the measures within the scope of this Strategy. In doing so, an efficient organisation and management framework for coordinating the implementation of the digital strategy within and among government levels will be established by:

- Defining clear institutional roles and responsibilities in order to improve the coordination mechanisms for all public digitalisation initiatives and secure the implementation of the digital strategy. This entails both strategic and operational management. The Governing council, consisting of ministers and secretaries of state, is in charge of strategic management and selecting priorities and key projects, as well as defining the general direction of the digital transformation of the public sector. The operational coordinating body, or the interdepartmental working group, is in charge of the technical aspect of management. The interdepartmental working group is an advisory body of the Governing council, implementing its decisions;
- Strengthening the legitimacy and the organisational-institutional capacity of CSODDS as the body responsible for the digitalisation of the public sector, including redefining the functions and redesigning the organisation chart of CSODDS, and ensuring its higher rank in the government administration, thus enabling CSODDS to coordinate and implement horizontal, cross-sectoral digitalisation activities. Its future role will, inter alia, encompass:
  - Coordinated planning and prioritising projects that focus on digitally transforming public administration, followed by establishing a comprehensive funding approach, that is, an approach to applying for funding (e.g. coordinating different funding requests and establishing a digital fund as a budget category encompassing all funds necessary for an accelerated digital transformation of public administration, used for funding all public authorities' digitalisation projects (including e-services, infrastructure, interoperability, training public officials, etc.));
  - Establishing a system for verifying business cases and decisions on procurement/use of ICT technology, in order to increase the level of responsibility in the public sector, improve decision-making and the management of digitalisation projects, ultimately decreasing risks of project delays and other issues connected to the project management;
  - Defining a comprehensive, integrated system for managing projects in the public sector, including a common method, templates, and tools for managing digitalisation projects;
  - Establishing a framework for tracking and evaluating performance of digitalisation projects (including the use of key implementation indicators) and the framework for reporting on the progress of public administration digitalisation projects.

In addition to organisational capacities, human resources will be strengthened by:

- Training/strengthening digital competences of public officials and servants (especially in CSODDS) for the needs of digital transformation, as well as acquiring competences necessary for agile operations and managing projects requiring

the use of such digitalisation methods in all public authorities;
- Introducing a competence model for redefining knowledge and competences necessary for performing public administration tasks, in addition to new training programmes for developing digital and green competences, and management competences.

Trainings on preparing and implementing digitalisation activities, initiatives, and projects will be developed and introduced to public authorities with the help of the National School for Public Administration and, if necessary, through cooperation and/or partnerships with NGOs and private sector actors.

Competent authority:

Central State Office for the Development of the Digital Society

Ministry of Justice and Public Administration

Estimated budget:

HRK 65 million (EUR 8.6 million)

Source of funding:

- Multiannual Financial Framework (MFF) of the European Union (for the 2014-2020 period, implementation by 2023, as well as the 2021-2027, 2028-2034 periods) includin:
  - programs funded by: European Regional Development Fund (ERDF) and European Social Fund Plus (ESF+),
  - Recovery and Resilience Facility (areas defined in the National Recovery and Resilience Plan 2021-2026)
- State budget and all sources of funding combined in the state budget and budgets that are part of the general government budget

4.2.1.2 Priority public policy implementation area 2.2: Upgrading the state's information infrastructure and advanced software solutions

The basis for further digitalising public administration is timely planning, developing and promoting the use of joint digital solutions and information infrastructure in the public sector, as well as the Shared Service Center (SSC) as an organisational-business model for providing joint ICT solutions and services in the public sector.

Therefore, an accelerated investment in consolidating and upgrading the state information infrastructure is planned, including the Central interoperability system, public registers, e-Citizens, e-Customs, technical standards, classifications, and national information structure networks HITRONet and CARNet. Furthermore, in line with the Act on State Information Infrastructure (OG No. 92/14) and the Decree on Organisational and Technical Standards for Connecting to the National Information Infrastructure (OG No. 60/2017), the capacities of the SSC shall be expanded and upgraded and investments in human resources necessary for integrating future applications and new functionalities shall be continued. SSC capacities may be strengthened in several different ways that comply with the relevant legislative framework, including relying on commercial solutions and the private sector. SSC development is one of the long-term national priorities, which is why the Government of the Republic of Croatia declared it a strategic project.

Digitalisation of supporting business processes of bodies governed by public law (including administrative operations, administrative and court proceedings, etc.) and streamlining electronic communications and (digital) delivery of documents/forms among public institutions, including data exchange for PIN groups (so-called "batch processing"), currently not supported by the GSB, will continue.

This will encourage the introduction of advanced digital technologies, such as blockchain and AI, with integrated elements of machine and deep learning, speech recognition and robotics, into the operations of public administration. In the following ten years, AI development and use will globally transform society, which is why a special focus will be placed precisely on monitoring good practices in the area of AI application in the public sector and, subsequently, preparing and realising similar projects in the Croatian environment. In order for that to happen, legal and regulatory acts will be amended to enable and foster electronic communications and digitalisation of administrative and other procedures, as well as business processes of bodies governed by public law.

Furthermore, special attention will be paid to cybersecurity of all infrastructural elements, including technical and organisational measures for managing risks, with reference to the latest technological developments considered to be best practices in the area of cybersecurity, such as measures for preventing and mitigating the impact of incidents on network and information systems security. The implementation of

this policy entails IT and cybersecurity professional training for public officials.

Developing advanced digital solutions in public administration and modernising information infrastructure will include available resources of private organisations, which will additionally stimulate the development of IT enterprises in Croatia. Furthermore, advanced contracting arrangements for ICT/digital projects in the public sector, such as innovation partnerships, competitive dialogue, and dynamic purchasing systems, will encourage public procurement, in line with EU and local regulations.

The consolidated system of state information infrastructure shall contribute to the standardisation of digital services, rationalisation of expenses of the entire ICT system of public administration, but also decrease energy consumption, pollution and environmental impact. Furthermore, this intervention will contribute to increasing citizens' trust in public administration, as well as help establish a common European infrastructure and cloud services that are competitive, green, and secure, aimed at strengthening European digital sovereignty and increasing the competitiveness of European businesses and industry

Competent authority:

Central State Office for the Development of the Digital Society

Estimated budget:

HRK 2,500 million (EUR 332 million)

Source of funding:

- Multiannual Financial Framework (MFF) of the European Union (for the 2014-2020 period, implementation by 2023, as well as the 2021-2027, 2028-2034 periods) including:
  - programs funded by: European Regional Development Fund (ERDF) and European Social Fund Plus (ESF+)
  - Recovery and Resilience Facility (areas defined in the National Recovery and Resilience Plan 2021-2026)
  - Technical Support Instrument – TSI
- State budget and all sources of funding combined in the state budget and budgets that are part of the general government budget

4.2.1.3 Priority public policy implementation area 2.3: Realising complete interoperability between public services, while enabling access to citizens and business' open data

The siloed structure of public administration processes and data fragmentation will be resolved by standardising and interconnecting registers, establishing a data exchange platform, and realising complete interoperability between public services. In order to do so, the following preconditions have to be met:

- An e-Government Interoperability Framework (e-GIF) will be prepared in compliance with the European Interoperability Framework (EIF), in order to better support the interoperability of public e-services;
- Legal provisions will be harmonised to incorporate interoperability standards into public procurement procedures with the aim of encouraging the procurement of interoperable IT solutions;
- A platform that fosters managing, tracking, and disclosing components of the e-Government Interoperability Framework will be established;
- Single relevant sources for individual data entities from registers will be defined, while advocating for the authentication of data entities from registers;
- A new integrated population register will be established as a primary source of personal data, together with integrated national platforms for registering business entities;
- A Government Service Bus (GSB) will become a central point for accessing and exchanging data from different authentic sources (public registers).

In addition to interoperability, a single digital gateway to provide access to information, to procedures and to assistance and problem-solving services will be established, in line with the relevant regulation (Single Digital Gateway Regulation (SDGR)), while fully applying the 'once-only' principle and ensuring a cross-border data exchange between EU countries.

Interoperable and interconnected information systems are not only needed on a national level; instead, certain public authorities, such as the Customs Administration, have to achieve maximum compliance with EU requirements. Moreover, the Customs Administration is required to transition to the e-Customs system, with the goal of integrating customs authorities of the EU's customs union, which includes the standardisation of data elements and IT system procedures. Namely, the Union Customs Code aims at a fully automated customs union – an interoperable environment based on quick and simple services, using digitalised customs controls and supervision to

meet the accelerated growth of international trade and better address the challenges of transnational organised crime and security threats. Therefore, the public authorities whose main activities subject them to the EU requirements in terms of protecting the financial interests of the Union and its Member States and protecting the Union from unfair and illegal trade while supporting legitimate business activity will receive support for investing in adjustments necessary to meet the relevant interoperability/interconnectivity requirements and increase the overall digitalisation level.

In addition to making the system interconnected/interoperable, the digitalisation of public administration data (including historical archives) will continue. Furthermore, in order to improve data management, reporting methods and decision-making procedures on all government levels, a (meta)data storage system will be introduced, with different data repositories as ecosystems enabling data extraction, entry, transformation, and storage, as well as data analysis and visualisation, and application of AI-based machine learning. This is why a data lake and a data warehouse will be established and upgraded. The data warehouse will be divided into two segments:

a) public authorities' data repository for analysing data using data analysis, processing, and visualisation tools, in order to secure data-driven policy making;

b) open (anonymised) data repository, with implemented analytic tools and AI elements, available to both the private and public sector, and the academic community for developing new services creating added value and economic benefits for society.

All public authorities shall strictly adhere to the decision on cataloguing data and metadata for each process and programming solution, and the requirement to publish the relevant data on the open data portal. Namely, the framework for the free flow of non-personal data in the European Union and the European Interoperability Framework (EIF) encourage regularly publishing data from registers in machine-readable and non-proprietary formats, accompanied by metadata, on the central open data portal, thus contributing to interoperability and seamless data flow (across borders).

The regulation enabling data porting and processing in line with the Regulation (EU) 2018/1807 on a framework for the free flow of non-personal data in the European Union will be adopted, thus contributing to the EU's goal of a Digital Single Market. This open data policy shall foster a closer cooperation between public administration and the private sector in the area of IT, improve digital public services, and increase public administration transparency.

Competent authority:

Central State Office for Development of the Digital Society in cooperation with owners of central registers

Estimated budget:

HRK 480 million (EUR 64 million)

Source of funding:

- Multiannual Financial Framework (MFF) of the European Union (for the 2014-2020 period, implementation by 2023, as well as the 2021-2027, 2028-2034 periods) including:
  - programs funded by: European Regional Development Fund (ERDF) and European Social Fund Plus (ESF+)
  - Recovery and Resilience Facility (areas defined in the National Recovery and Resilience Plan 2021-2026)
  - Technical Support Instrument – TSI
- State budget and all sources of funding combined in the state budget and budgets that are part of the general government budget

4.2.1.4 Priority public policy implementation area 2.4: Digitalising all key public services

One of the key strategic guidelines for transforming public administration is further digitalising public services offered by the e-Citizens system. Croatia is committed to realising the goals set in the Digitalisation of public services area of the Digital Compass, that is, to have all key public services completely available to citizens and enterprises online, i.e., in digital format, by 2032. Furthermore, the synergy between interventions in this area (inter alia, encompassing digitalisation of public health services) and interventions in the area of developing the state information infrastructure and interoperability, will encourage the realisation of EU's goal to enable citizens to access and exchange their full electronic health records throughout the EU.

Therefore, in accordance with the Standard for Developing Public e-Services in the Republic of Croatia and the implemented quality management system in public administration, further digitalisation of public services will be based on the analysis and overview of

the user journey and experience. In doing so, abilities and options of different group users in line with Directive (EU) 2019/882 of the European Parliament and of the Council on the accessibility requirements for products and services (OJ L 151, 7 June 2019) will be considered. Furthermore, business processes need to be reshaped through procedure streamlining, followed by service redesign, accompanied by amendments to regulatory and administrative requirements. These processes constitute key preconditions for digitalising the public service as a life event. Namely, the aim is to digitalise all key public services for addressing citizens' life events, including the following:

- Citizens' and family rights;
- Healthcare;
- Education or traineeship;
- Work and retirement
- Mobility, travel, transport, and vehicles;
- Consumer rights;
- Starting, running and closing a business;
- Starting a small claims procedure;
- Rule of law and safety;
- Housing and environmental protection.

Anticipation will be an important feature of the aforementioned services. Namely, based on the information that a certain life situation has arisen, the system will prompt users to meet all of the new obligations resulting thereof, using a single digital system. The Ministry of Justice and Public Administration and CSODDS will jointly create an exhaustive list of life situations, in line with the "key public services" definition from the Digital Compass of the European Commission. Once the relevant areas have been defined, CSODDS will start developing the services together with competent authorities, by applying an agile approach and complying with the Standard for Developing Public e-Services.

The relevant digital services will be available at all times to all citizens and business entities anywhere in Croatia and the EU, i.e., the European Economic Area (EEA). As with the new interface of the e-Citizens platform, services must be available for all electronic devices and must meet the digital accessibility requirement and, if needed, be available in the English language.

Competent authority:

Central State Office for the Development of the Digital Society

Ministry of Justice and Public Administration

Estimated budget:

HRK 800 million (EUR 106 million)

Source of funding:

- Multiannual Financial Framework (MFF) of the European Union (for the 2014-2020 period, implementation by 2023, as well as the 2021-2027, 2028-2034 periods) including:
  - programs funded by: European Regional Development Fund (ERDF) and European Social Fund Plus (ESF+)
  - Recovery and Resilience Facility (areas defined in the National Recovery and Resilience Plan 2021-2026)
- State budget and all sources of funding combined in the state budget and budgets that are part of the general government budget

4.2.1.5 **Priority public policy implementation area 2.5: Promoting digital services and customer support among citizens**

In addition to the digitalisation of public administration and services, substantial efforts will be made to promote the use of public digital services, as well as to inform users about their safety (protection of submitted data). Namely, in order to raise citizens and business entities' awareness of the values of digital public services (such as increased productivity, time savings, etc.), advertising campaigns will be conducted, social media used, and trainings and educational campaigns on the use of the relevant services. Special efforts will be made to train frontline officers to instruct users to opt for digital public services and thus help citizens, especially senior citizens, adjust to using these services. In addition, the goal of at least 80% of citizens using a digital identification document (eID), as defined in the Digital Compass, has to be met. The use of an eID, i.e., a digital credential, enables the user to log into the e-Citizens system and use public digital services. In order for the citizens to use all services offered by the system, regardless of their security level, citizens should be additionally encouraged to use their eIDs. Using digital identification documents with the highest security level, such as an eID, enables the use of all functionalities offered by the system. Furthermore, an eID should be used

One of the key preconditions for digitalising the economy is the existence of modern broadband electronic communications networks enabling gigabit connectivity.

for accessing public digital services, whereas the authentication system of the e-Citizens platform should be externalised, in order to enable citizens and business to use it for their economic activities.

In order to improve the interaction between citizens, enterprises, and public services when it comes to digital public services, a one-stop-shop will be established as a centralised customer support system. This system will enable citizens/businesses a quicker access to information, but also enable them to write comments and suggestions and evaluate digital public services. Furthermore, it will help manage relations with citizens and constantly improve their user experience by using specialised platforms and advanced technologies, such as big data, AI, and machine learning. These technologies will also be incorporated into a digital platform for public services in order to present relevant information and recommendations to users in real time. The one-stop-shop will transform the way public officials communicate with users, increase public administration transparency, and increase citizens' trust in public administration in general.

Competent authority:

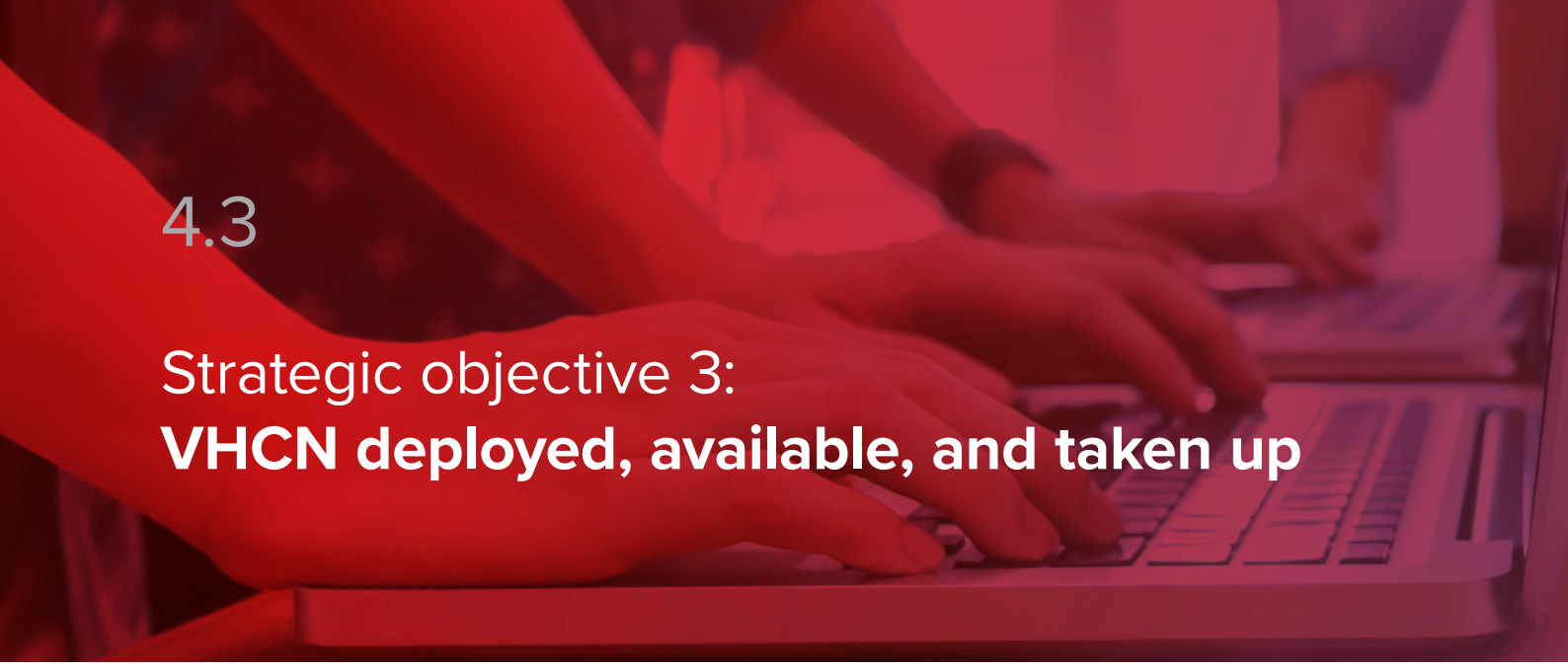
Central State Office for the Development of the Digital Society

Estimated budget:

HRK 55 million (EUR 7.3 million)

Source of funding:

- Multiannual Financial Framework (MFF) of the European Union (for the 2014-2020 period, implementation by 2023, as well as the 2021-2027, 2028-2034 periods) including:
  - programs funded by: European Regional Development Fund (ERDF) and European Social Fund Plus (ESF+)
  - Recovery and Resilience Facility (areas defined in the National Recovery and Resilience Plan 2021-2026)
- State budget and all sources of funding combined in the state budget and budgets that are part of the general government budget



4.3

Strategic objective 3:
VHCN deployed, available, and taken up

4.3.1 **Development of broadband electronic communications networks - Strategic objective: VHCN deployed, available, and taken up**

This strategic objective covers two dimensions referring to broadband electronic communications networks.

The first dimension covers the development, construction, and increasing coverage of broadband electronic communications networks, in particular VHCN and 5G. One of the key preconditions for digitalising the economy is the existence of modern broadband electronic communications networks enabling gigabit connectivity. Developing the relevant networks will enable a continued growth of digital services requiring very high-speed transmission capacities and reliability, as well as different business models. Furthermore, networks enabling gigabit connectivity will secure the capacities necessary for the exponential growth of data traffic, enabling citizens and businesses to thoroughly benefit from new digital communication services. Development and construction of networks enabling gigabit connectivity for all Croatian households will bridge the digital gap between urban and rural areas in Croatia, contributing to a uniform regional development. One of the targets set out in the 2030 Digital Compass is that all populated areas should be covered by networks at a fixed location and next-generation wireless high-speed networks. These networks and the options they provide are indispensable for implementing most of the activities contained herein. Therefore, until 2032, Croatia should achieve complete (100%) VHCN coverage and complete (100%) 5G coverage in populated areas and along major transport paths, in line with the 2030 Digital Compass. In addition, these targets form the basis for developing broadband electronic communications networks and all other digitalisation areas in Croatia.

Moreover, the relevant strategic objective foresees the increase in take-up of very high-speed broadband services, in order to achieve the EU average. The European Commission recognised this issue and in DESI 2022 stressed the fact that “Croatia is investing the available funding in the development of networks, rather than supporting take-up stimulation.” Therefore, this strategic objective, together with the increased take-up of very high-speed broadband services, will complement the objective of modern broadband electronic communications networks construction and coverage.

All related priority public policy implementation areas will contribute to the realisation of this strategic objective until 2032.

Performance indicator:		**Initial score:**	**Target score:**
II.02.7.08 Connectivity (DESI)	This indicator refers to the Connectivity category (DESI). The Connectivity dimension entails 10 sub-dimensions tracking the development and coverage of fixed and mobile networks, fixed and mobile broadband take-up, 5G spectrum and broadband price index.	**48,1 (2022)**	EU average Value: 83,08 (2030) 95,00 (2032)

Authority responsible for the implementation of the strategic objective	■ Ministry of the Sea, Transport and Infrastructure
Priority public policy implementation areas:	3.1. Meeting the conditions of spatial planning and electronic communications networks construction 3.2. Regulating the impact of property use costs on network developmen 3.3. Support schemes for developing networks in areas lacking sufficient commercial interest for investments 3.4. Encouraging the take-up of very high-speed services

Link with the development area of the National Development Strategy until 2030:

Development area 3: Green and digital transition

Strategic objective 11: "Digital transition of society and economy"

- Priority public policy implementation area 3: Development of broadband electronic communications networks
  - Implementation priority: Development and construction of broadband infrastructure and VHCN enabling gigabit connectivity

Performance indicator:

- DESI
  - Initial score: 47.60 (rank 20th) (2020)
  - Target score 2030: Reach EU average

Development area 4: Balanced regional development

Strategic objective 12: Development of assisted areas and areas with development specifics

- Priority public policy implementation area 1: Development of assisted and mountainous areas
  - Implementation priority: Development and construction of broadband infrastructure and VHCN
- Priority public policy implementation area 2: Development of smart and sustainable islands
  - Implementation priority: Development and construction of sub-sea-terrestrial broadband fibre networks and VHCN

Performance indicator:

- Differences in GDP per capita
  - Initial score: 3.10 (2017)
  - Target score 2030: 2.50

Link with the UN Sustainable Development Goals

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

- Development and construction of broadband electronic communications networks will foster sustainable innovation in the public and private sector (green and digital)

Goal 10: Reduce inequality within and among countries

- Development and construction of broadband electronic communications networks will have a positive impact on Croatia's competitiveness and reduce inequalities within Croatia

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

- New infrastructure shall meet the circular economy demands, including waste prevention and recycling.

4.3.1.1 Priority public policy implementation area 3.1: Meeting the conditions of spatial planning and electronic communications networks construction

This priority area refers to improving the regulatory framework in the area of construction and harmonising regulations in the area of electronic communications and regulations in the area of construction and spatial planning, fostering investment in broadband electronic communications networks.

During the preparation of the National Recovery and Resilience Plan (2021-2026), administrative and regulatory obstacles were detected in the area of construction and spatial planning of broadband electronic communications networks. These obstacles mostly limit and in certain areas of Croatia even completely prevent the development of broadband electronic communications networks and thus meeting the network development targets. Furthermore, the relevant obstacles are evidenced in the extensive and lengthy permit-granting procedures for constructing broadband electronic communications networks and spatial plans including provisions that substantially hamper the construction of mobile electronic communications networks. Moreover, during the preparation of the National Plan for Broadband Development 2021-2027, it was concluded that the complexity and diverging practices in terms of implementing the legislative framework in the area of construction represented material obstacles to constructing new electronic communications networks in the 2016-2020 period. In addition, it was also concluded that different spatial planning practices and the limits resulting thereof also hampered the planning and construction of new broadband electronic communications networks. These conclusions were made based on the *Analysis of the effects of implemented measures and activities from the Action Plan of the Strategy for Broadband Development in the Republic of Croatia for the 2016–2020 period*.

Based on all of the aforementioned and considering the fact that the national plans in the related area (the National Recovery and Resilience Plan (2021-2026) and the National Plan for Broadband Development (2021-2027)) had been adopted before the Strategy was prepared, in the relevant priority area the Strategy will rely on construction and spatial planning measures and activities outlined in the aforementioned national plans. The relevant measures and activities are the following:

- Measure M2 *Improvement and uniform application of the legislative framework in the area of construction and strengthening spatial planning practices concerning VHCN deployment* from the National Plan for Broadband Development 2021-2027;
- Reform measure *C2.3. R4 Strengthening connectivity as a cornerstone of the digital transition of*

society and the economy from the National Recovery and Resilience Plan (2021-2026).

All activities of the measures outlined in the National Plan for Broadband Development (2021-2027) and the National Recovery and Resilience Plan (2021-2026) are being or have already been implemented. In order to achieve the key step 202 (realised on 30 June 2022), the following acts were adopted:

- Electronic Communications Act (OG No. 76/22);
- Regulation amending the Regulation on the definition of construction works, other projects and surfaces of state and regional significance (OG No. 75/22); and
- Ordinance amending the Ordinance on simple and other construction works (OG No. 74/22).

Moreover, in addition to the activities defined in the National Recovery and Resilience Plan (2021-2026) and the National Plan for Broadband Development (2021-2027), in this priority area, activities examining the compliance of provisions from the relevant regulations (e.g. the Building Act (OG No. 153/13, 20/17, 39/19, and 125/19); the Physical Planning Act (OG No. 153/13, 65/17, 114/18, 39/19, and 98/19 etc.)) will be continuously conducted to ensure that spatial plans of local self-government units do not hamper development and construction of broadband electronic communications networks.

In this priority area, the relevant amendments to the regulatory framework and harmonisation of regulations will strengthen the institutional framework and cooperation among stakeholders, which is key for constructing broadband electronic communications networks. Moreover, efforts will be continuously made to eliminate potential obstacles for developing broadband electronic communications networks in the form of existing and/or future regulations adversely affecting the speed and costs of constructing networks.

Competent authority:

Ministry of Physical Planning, Construction and State Assets

Croatian Regulatory Authority for Network Industries

Ministry of the Sea, Transport and Infrastructure

Estimated budget:

National Recovery and Resilience Plan (2021-2026) – Reform C2.3 R4 - HRK 3,013,800 (EUR 402,390)

National Plan for Broadband Development (2021-2027) – HRK 90,000 (EUR 12,000) + funds for regular activities

Source of funding:

- Recovery and Resilience Facility
- State budget, HAKOM's financial plan

4.3.1.2 Priority public policy implementation area 3.2: Regulating the impact of property use costs on network development

This priority area covers the potential issue of high right-of-way fees and introducing local taxes (for the use of public areas to install electronic communications infrastructure), as well as other potential charges on other legal bases for constructing broadband electronic communications networks. The relevant taxes and potential charges may substantially affect the implementation of activities, measures, and objectives concerning the development of broadband electronic communications networks from different strategic planning acts.

In the last two of its DESI reports (2021 and 2022), the European Commission concluded that high right-of-way fees were hurdles to the deployment of broadband electronic communications networks, same as the World Bank in its 2021 Assessment of the Digital Market in Croatia report.

In addition to the reports of the European Commission and World Bank, until now several analyses and studies were conducted on the impacts of parafiscal charges in the sector, the most relevant for this area being:

- Study on the impact of regulated fees on investment potential of the private sector for developing NGA broadband networks (2017), Ministry of the Sea, Transport and Infrastructure;
- Analytical Determinants of the Rights-of-Way Fee for Electronic Communications Infrastructure, 2018, Institute of Economics in Zagreb.

In line with the aforementioned, it is necessary to examine whether right-of-way fees constitute a key element adversely affecting the costs of constructing broadband electronic communications networks.

Within the relevant priority area, considering the analyses conducted and steps taken, the competent authorities shall, in order to secure that fees stimulate investments in further network developments, analyse and, if necessary, introduce amendments to the existing regulatory framework to ensure the implementation of the provision contained in Article 64 (1) of the Electronic Communications Act (OG No. 76/22) defining the fee as equitable for common goods managers or property owners and operators of electronic communications networks and services, as well as in terms of public interest in developing the electronic communications market. This will result in a framework stimulating investments in developing broadband electronic communications networks.

In addition to the right-of-way fees, the relevant priority area will also address the local and regional self-government units' practice of defining local taxes and other potential charges for constructing broadband electronic communication networks, which may create substantial uncertainties for business operations and financial planning of operators, thus adversely affecting the construction of broadband electronic communication networks.

By 2032, an active dialogue among key stakeholders will have been completed, as well as activities aimed at harmonising the local and regional self-government units' discretions and constitutional right to define local taxes with their obligations to implement activities, measures, and targets in the area of developing broadband electronic communications networks stipulated in different strategic planning acts. The relevant activities should result in proposed new steps that should positively impact future investments in developing broadband electronic communications networks

This priority area will ensure that property fees (right-of-way fees and local taxes) do not unduly burden the construction of broadband electronic communication networks.

Competent authority:

Local and regional self-government units

Croatian Regulatory Authority for Network Industries

Estimated budget:

Not applicable

Source of funding:

Funds for regular activities

4.3.1.3 Priority public policy implementation area 3.3: Support schemes for developing networks in areas lacking sufficient commercial interest for investments

This priority area refers to the implementation of support schemes for areas lacking sufficient commercial interest for investments.

The Strategy will rely on the already adopted support schemes for areas lacking sufficient commercial interest for investments, i.e., support schemes being implemented and support schemes from the National Recovery and Resilience Plan (2021-2026).

The support schemes currently being implemented are the following:

- National Framework Programme for the Development of Broadband Access Infrastructure, a national state aid programme focusing on broadband access infrastructure construction in rural and suburban areas, i.e., areas with identified market failures or areas lacking commercial investment for constructing broadband infrastructure; and
- National Programme for Broadband Access Infrastructure (NP-BBI).

These two programmes are funded from the Multiannual Financial Framework (MFF) for the 2014-2020 period, to be implemented by the end of 2023.

The support schemes included in the National Recovery and Resilience Plan (2021-2026) are the following:

- Investment C2.3 R4 I1 Implementation of projects under the National Framework Programme for the Development of Broadband Infrastructure in areas where there is insufficient commercial interest in investment (NFP 2); and
- Investment C2.3. R4-I2 Construction of passive electronic communications infrastructure.

In addition, support schemes will be included in the future MFF after 2027, in the period until 2032, if the indicators of coverage in rural areas (lacking commercial interest) show that state interventions are necessary to support the construction of broadband electronic communications networks, in order to achieve the strategic objective related to VHCN coverage.

The analysis of the Ministry of the Sea, Transport and Infrastructure, which preceded the preparation of the new Operational Programme Competitiveness and Cohesion (2021-2027), concluded that HRK 8,037.3 million in investments is needed to achieve the objectives of the National Plan for Broadband Development (2021-2027) throughout Croatia. A large share of the investment (84.0%) refers to non-commercial investments, in the total amount of HRK 6,753.3 million. The support for non-commercial investments amounts to HRK 4,725.9 million, i.e., 70% of the total amount of non-commercial investments. If necessary, a new analysis of necessary investments will be conducted as the basis for a new support scheme.

Competent authority:

Ministry of the Sea, Transport and Infrastructure

Ministry of Regional Growth and EU Funds

Estimated budget:

a) National Recovery and Resilience Plan (2021-2026) Investment C2.3 R4-I1 – HRK 799,999,997 (EUR 106,178,246)

b) National Recovery and Resilience Plan (2021-2026) Investment C2.3 R4-I2 – HRK 147,338,008 (EUR 19,555,114)

c) Operational Programme Competitiveness and Cohesion (2014-2020) – NFP – HRK 687,116,550.62 (EUR 91,196,038)

d) Operational Programme Competitiveness and Cohesion (2014-2020) – NP-BBI – HRK 329.2 m (EUR 43.69 m)

e) Operational Programme Competitiveness and Cohesion (2014-2020) – NP-BBI – HRK 376.7 m (EUR 50 m)

Source of funding:

a) Recovery and Resilience Facility,

b) Recovery and Resilience Facility

c) Multiannual Financial Framework 2014-2020

d) Multiannual Financial Framework 2014-2020,

e) Multiannual Financial Framework 2021-2027

4.3.1.4 Priority public policy implementation area 3.4: Encouraging the take-up of very high-speed services

Within this priority area, a comprehensive analysis will be conducted in terms of potential activities and measures on the demand side, representing an upgrade of the measures on the supply side (complementary to the measures on the supply side), that could have a positive impact on the take-up of very high-speed services, bringing Croatia closer to the EU average. The analysis will define the best types of interventions, that is activities, on the demand side, securing an efficient use of public funds.

Any intervention on the demand side will enable the use of already constructed broadband electronic communication networks of very high speeds, most of which have not resulted in revenue for the investor so far, thus securing the monetisation of investments into the network construction. Once the number of gigabit network users increases through selected activities on the demand side, their improved user experience will gradually result in an overall improvement of the view of the benefits of high-speed broadband access. All of this will ultimately foster competition in the VCHN area.

Activities on the demand side should primarily refer to already existing VHCN (FTTH, FTTB and DOCSIS 3.1 cable[16]) since all of these technologies offer download speed of at least 1 Gbps. Furthermore, these activities should also focus on increasing the speed in case the user has already taken up the relevant service or on the user taking it up in case they already haven't. However, in that case, a minimum speed of the activities on the demand side should be defined. At first, this speed could amount to 100 Mbps, as this is the speed covered in the Connectivity dimension of the DESI.

The expected short-term outcome of the activities on the demand side is an increased number of users of at least 100 Mbps broadband speeds, whereas the expected long-term outcome is the end users' changed view of the benefits of higher speeds, increased competition, and a resulting drop in prices.

A potential activity on the demand side requiring a particularly in-depth analysis is the introduction of a voucher-based support scheme, decreasing costs for end users and encouraging them to take up higher-speed services. This activity has already been in-

16 https://digital-strategy.ec.europa.eu/en/policies/broadband-technology-overview

As reliance upon online and digital technologies increases, the workforce must meet the increasing demand for digital competences. This applies to all citizens that need digital competences in their everyday lives, both professional and personal, with a special focus on cybersecurity.

troduced in some EU countries (Greece and Italy), with the relevant support schemes approved by the European Commission. The analysis will show whether the voucher-based support scheme is reasonable and feasible, but also define the following constituents relevant for implementing the support scheme:

- primary scope of the support scheme / geographical scope of the intervention
- targeted beneficiaries
- amount of support
- duration of support
- source of funding
- regulatory mechanisms ensuring non-discrimination and competition, and
- award and control mechanisms.

If the voucher-based support scheme proves to be the best method, funds will be allocated to the support scheme on the demand side, fostering the take-up of at least 100 Mbps fixed broadband speeds. This will gradually close the gap between the Republic of Croatia and the EU.

Activities on the demand side are the first step in fostering the take-up of at least 100 Mbps fixed broadband speeds, thus encouraging competition and closing the gap between the Republic of Croatia and the EU. As a result, the 'At least 1 Gbps take-up' indicator will gradually improve until 2032.

Competent authority:

Croatian Regulatory Authority for Network Industries

Estimated budget:

HRK 290,000 (EUR 38,490)

Source of funding:

Financial plan of the Croatian Regulatory Authority for Network Industries

4.4

Strategic objective 4: **Developed digital competences for working and living in a digital age**

4.4.1 **Developing digital skills and digital workplaces – Strategic objective: Developed digital competences for working and living in a digital age**

Digital transformation is on the rise, affecting all aspects of life: human communication, the way of doing business, and the modern economy. Therefore, digital competences are fundamental for performing everyday tasks of many modern professions. Furthermore, companies and institutions, both public and private, expect most of their employees to have acquired digital competences, as key for fostering innovation and competitiveness. As reliance upon online and digital technologies increases, the workforce must meet the increasing demand for digital competences. This applies to all citizens that need digital competences in their everyday lives, both professional and personal, with a special focus on cybersecurity.

The 2030 Digital Compass defines the following digital targets in the Union: at least 80 % of EU citizens have at least basic digital skills; at least 20 million ICT specialists are employed within the Union (around 10% of people employed), while increasing the number of women in ICT. In Human capital, Croatia ranks 9th of the 27 EU countries. Regardless of the fact that Croatia scores above the EU average in this dimension, citizens have to continue developing their digital competences to keep pace with technological developments, with a special focus on the safe use of digital technologies.

The current state analysis shows that ICT specialists account for a relatively low percentage of the workforce in Croatia compared to the EU average, due to an insufficient number of ICT graduates and foreign ICT specialists, accompanied by an outflow of local ICT specialists into other EU countries. In 2021, Croatia had the highest relative number of ICT specialists leaving the country in the EU. The other challenge for realising the digitalisation potential is the lack of compliance of workforce skills with labour market needs, not only in terms of the number of ICT specialists, but also digital skills of the workforce outside the ICT sector.

In addition, digitalisation of education is crucial for developing digital competences and workplaces. Therefore, to ensure that citizens and future workforce have the necessary digital competences, content on digital technologies has been incorporated into curricular and cross-curricular topics in primary and secondary education. However, it is also necessary to foster the digital transformation of higher education and invest into research and technological infrastructure in STEM and ICT areas.

Performance indicator:		Initial score:	Target score:
1. II.02.7.09 Human capital (DESI)	Human capital is one of the 4 key DESI dimensions. The Human capital dimension is broken down into two sub-dimensions: Internet user skills, including three indicators, and Advanced skills and development, including four indicators. Internet user skills are measured as the share of citizens with: ■ At least basic digital skills ■ Above basic digital skills ■ At least basic digital content creation skills. Advanced skills and development are measured as the share of: ■ ICT specialists in employment ■ Female ICT specialists ■ ICT graduates ■ Enterprises providing ICT training.	**51,8 (2022, ranks 9th in the EU)**	Among the top 5 EU countries Value: 68 (2030) 70 (2032)
2. II.02.7.05, ICT specialists in employment, % of total individuals in employment	A digitally skilled population and highly skilled digital professionals is one of the four cardinal points of the Digital Compass 2030. Ensuring that at least 20 million ICT specialists are employed within the Union, to secure a sustainable, prosperous, human-centred future of the EU Eurostat defines ICT specialists as "persons who have the ability to develop, operate and maintain ICT systems and for whom ICTs constitute the main part of their job." ICT specialists indicator is based on microdata of the European Union Labour Force Survey (EU-LFS).	**3,6 % (2021, 23rd in the EU)**	EU average Value: >7 % (2030) >8 % (2032)
3. II.02.7.07 Individuals' digital skills	The indicator is based on the *Digital Competence Framework 2.0*. and measures individual activities related to internet or software use, which are performed by individuals aged 16-74 in five specific areas (Information and data literacy, Communication and collaboration, Digital content creation, Safety, and Problem solving). Presumably, individuals performing certain activities have the necessary competences. 'At least basic skills' is combining together the number of individuals (16-74 years old) having either 'basic digital skills' or 'above basic digital skills'.	**63 % (2021, ranks 9th in the EU)**	Among the top 5 EU countries Value: >75 % (2030) >80 % (2032)

Link with the development area of the National Development Strategy until 2030:

Development area 1: Sustainable economy and society

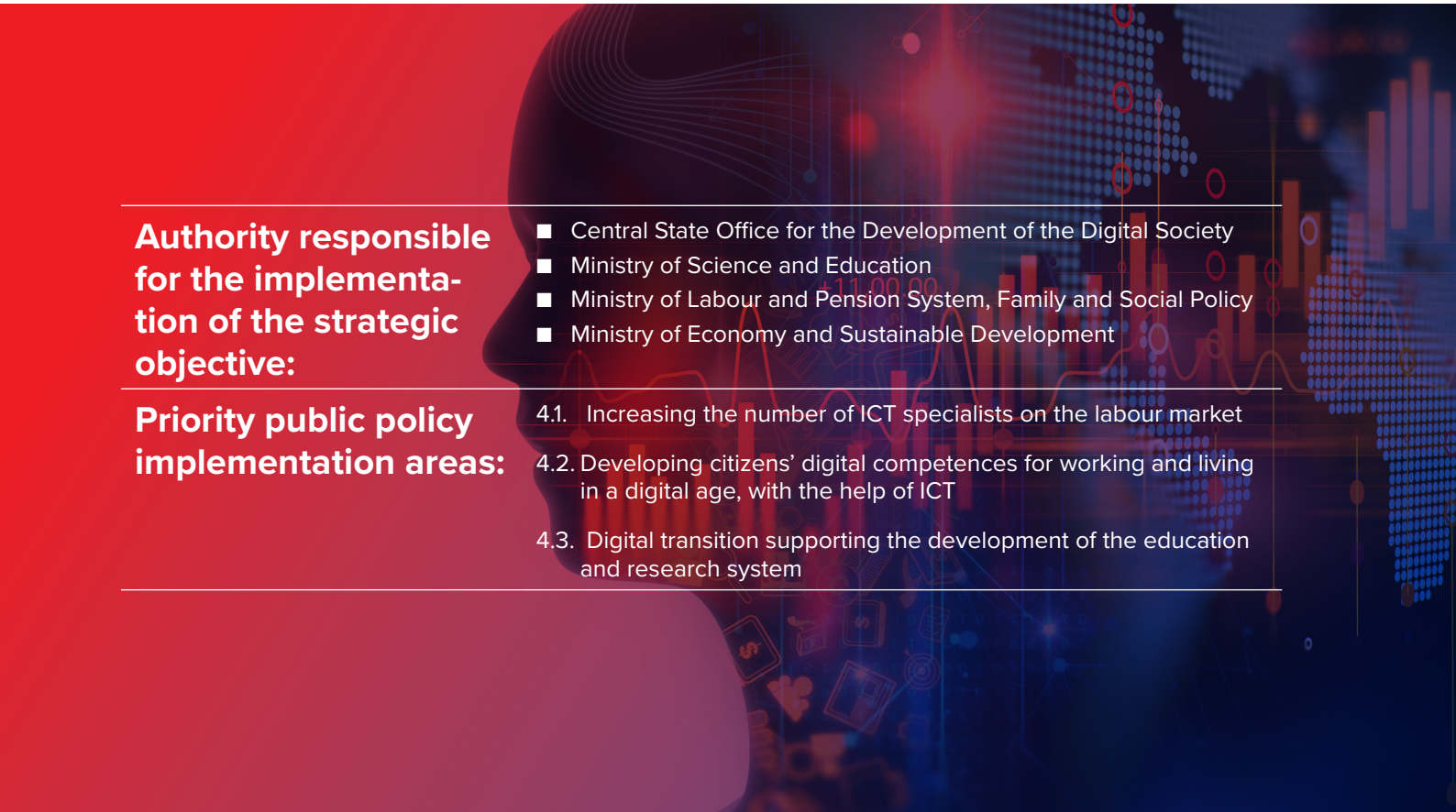
Strategic objective 2: "Educated and employed people"

- Policy priorities in the area of improving higher education:
  - Develop and internationalise the higher education system following modern European trends by improving the accessibility of higher education that meets the needs of the labour market and society
- Policy priorities in the area of labour market and employment:
  - Develop human resources through vocational guidance, supporting adult education, training and improving the competences and knowledge of the working population, especially young people and people belonging to the NEET category, with a special focus on business and digital competences, as a key precondition for strengthening SMEs
- Policy priorities in the area of acquiring and developing basic and vocational competences:
  - Develop analytical, critical, and creative thinking, as well as algorithmic and conceptual thinking
  - Improve the qualifications of teachers and school principals, and attract and retain quality educators, with a special focus on addressing shortages in specific educator groups

Performance indicator:

- Share of adults (25-64) in lifelong learning
  - Initial score 2019: 3.5%
  - Target score 2030: Reach EU average
- Employment rate (20-64)
  - Initial score 2019: 66.7%
  - Target score 2030: 75%

Link with the development area of the National Development Strategy until 2030:	**Development area 3: Green and digital transition**
	
	Strategic objective 11: "Digital transition of society and economy"
	
	■ Policy priorities in the area of developing digital competences and digital workplaces:
	  ■ Increase the number of ICT specialists on the labour market
	  ■ Raise the digital competences of non-ICT specialists;
	  ■ Retrain the workforce and support the acquisition of digital competences necessary for jobs in the digital society;
	  ■ Increase the level of citizens' basic and advanced digital competences to ensure their active participation in the digital society.
	  ■ Support secondary schools and higher education institutions for jobs in the digital society
	■ Policy priorities in the area of digitalisation of public administration:
	  ■ Strengthening the capacity and developing digital competences of public administration and justice employees
	
	Performance indicator:
	
	■ DESI
	  ■ Initial score: 47.60 (rank 20th) (2020)
	  ■ Target score 2030: Reach EU average



Authority responsible for the implementation of the strategic objective:	■ Central State Office for the Development of the Digital Society ■ Ministry of Science and Education ■ Ministry of Labour and Pension System, Family and Social Policy ■ Ministry of Economy and Sustainable Development
Priority public policy implementation areas:	4.1. Increasing the number of ICT specialists on the labour market 4.2. Developing citizens' digital competences for working and living in a digital age, with the help of ICT 4.3. Digital transition supporting the development of the education and research system

Link with the UN Sustainable Development Goals:

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

- Further digitalisation of the entire education system will secure a higher-quality education, with a special focus on lifelong learning for acquiring digital competences.

Goal 5: Achieve gender equality and empower all women and girls

- This goal promotes the inclusion of women and girls in ICT education and careers.

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

- Promote the acquisition of digital skills by both employed and unemployed persons, in line with the labour market needs.

Goal 10: Reduce inequality within and among countries

- Developing digital competences and digital workplaces will decrease regional disparities, but also bridge the gap between the Republic of Croatia and leading EU member countries in terms of digitalisation.

4.4.1.1 Priority public policy implementation area 4.1: Increasing the number of ICT specialists on the labour market

The greatest challenge for realising the full digital transformation potential lies in the fact that not enough ICT graduates or foreign ICT specialists enter the labour market, accompanied by an outflow of ICT specialists into other EU countries. In order to meet the needs of the Croatian economy, the number of ICT specialists and ICT graduates needs to increase.

In the 2012-2021 period, the average annual turnover rate for ICT specialists amounted to 4.8%, slightly higher than the EU average of 4.6%. In September 2021, Croatia had around 51 000 employed ICT specialists, accounting for 3.6% of the total number of employed people, whereas in the most advanced EU member countries, such as Sweden and Finland, ICT specialists account for more than 7% of the total number of employed people. The number of ICT specialists has to increase in almost all Croatian counties, since their current number is not enough to address the challenges presented herein. Software engineers, developers, and infrastructure specialists are in high demand, which is expected to increase in the future. Furthermore, as the application of ICT in our everyday lives increases and expands, cybersecurity specialists are expected to become sought after.

The number of ICT graduates has to increase. Since the digital transformation of the Croatian society and the entire economy will enable more intensive investments in strengthening the capacities of Croatian higher education institutions, this should enable the establishment of new university study programmes and enlarging the enrolment quotas of existing university study programmes in the field of technical sciences (computing) and social sciences (information and communication sciences), while meeting the conditions necessary for their operations – encouraging recruitment and retaining teaching staff, as well as strengthening the higher education infrastructure. However, the main challenge for enlarging the enrolment quotas is that most Croatian students graduate from vocational secondary education, more than the EU average, and enrol in university study programmes underprepared. Therefore, it is necessary to increase the number of students in gymnasiums, with a special focus on mathematics programmes.

STEM and ICT scholarships for undergraduate and graduate students will be awarded to increase the number of ICT specialists. Furthermore, creating a framework for attracting students and researchers in STEM and ICT areas will encourage young researchers to focus on smart specialisation, that is, acquire competences that meet the market needs. Developing a model for encouraging the promotion of research-

ers and conducting cutting-edge research activities in STEM and ICT areas will include programmes for young researchers pursuing individual careers, traineeships, and mobility or establishing startups of spinoffs. Financial support will be used to foster STEM and ICT projects focused on promoting equality, such as addressing gender bias in AI, developing technologies that could help elderly people and people with disabilities in their everyday life, etc. By offering better and more competitive work conditions, the number and quality of researchers will increase, thus securing better career management of researchers in the area of teaching and innovation. Preparing a new framework will enable attracting and retaining young Croatian scientists, i.e., reduce brain drain.

In Croatia, the highest share of the 51 thousand ICT specialists employed in 2021 graduated from tertiary education institutions (61.3%), and the remaining ICT specialists graduated from a non-tertiary education institution. In order to increase the number of ICT specialists, it is necessary to encourage informal education of the workforce, especially of unemployed people and vulnerable groups. Reskilling the workforce with non-ICT professions will be encouraged by establishing an informal voucher-based adult education scheme for employed and unemployed people. At the same time, higher education institutions will be encouraged to carry out short programmes, designed and offered in cooperation with employers, aimed at expanding and refreshing the knowledge of ICT specialists in demand on the labour market and necessary for developing the economy.

Furthermore, internationalising higher education and the labour market will attract foreign students and ICT specialists. Viability of study and joint study programmes taught in foreign languages by higher education institutions in the Republic of Croatia is crucial for further internationalising the higher education system, as well as improving the quality of higher education, by integrating the relevant programmes into the European and global higher education environment. The new framework for promoting research in STEM and ICT areas can help attract foreign scientists from the EU and the world and retain young Croatian scientist, i.e., reduce brain drain. In addition, further efforts are needed for attracting foreign ICT specialists to the Croatian labour market, by promoting Croatia as a safe and pleasant country.

Of the ICT specialists employed in 2021, 80% were male, and only 20% female. Therefore, a special focus should be placed on encouraging greater representation of women among ICT specialists by actively promoting equal participation and fostering employment of a greater number of women in the sector.

Competent authority:

Ministry of Labour and Pension System, Family and Social Policy of the Republic of Croatia

Ministry of Science and Education

Central State Office for the Development of the Digital Society

Estimated budget: HRK 700 million (EUR 93 million)

Source of funding:

- Multiannual Financial Framework (MFF) of the European Union for the 2021-2027 period, including:
  - programs funded by: European Regional Development Fund (ERDF) and European Social Fund Plus (ESF+)
  - Recovery and Resilience Facility (areas defined in the National Recovery and Resilience Plan 2021-2026)
- State budget and all sources of funding combined in the state budget and budgets that are part of the general government budget

4.4.1.2 Priority public policy implementation area 4.2: Developing citizens' digital competences for working and living in a digital age, with the help of ICT

As a result of the changes digital technologies have introduced to our everyday lives, citizens have to acquire the necessary digital competences. The level of digital competences of the Croatian population is higher than the EU-27 average, as based on several key indicators. Nevertheless, continued efforts are still needed for developing digital competences of all citizens living in a digital age, with a special focus on competences necessary for the secure use of ICT in everyday life. When adopting policies for developing citizens' digital competences, i.e., encouraging them to engage in targeted trainings for acquiring and improving digital literacy skills, special attention will be paid to the elderly, disabled people, and other people with weak digital literacy skills. These user groups will have access to an adjusted interface of public digital services, as detailed in the Strategic objective 2 and

Priority area 2.4. Strengthening the capacities of civil society organisations will be encouraged, in order to include them in developing citizens' digital competences or children's STEAM competences. The use of the Digital Competence Framework for Citizens DigComp2.2. will be encouraged for designing training programmes.

In addition to citizens improving their digital competences, the workforce with non-ICT professions will also develop their digital competences. Digital technology had changed the job descriptions of many different professions, including non-ICT ones. It is highly probable that the demand for specialists in digitalised traditional and creative professions will steadily increase in the future. In order to reap all of the benefits of digital transformation and increase competitiveness and the value of work, it is necessary to upskill the workforce for using digital technologies in performing non-ICT tasks and develop human resources in traditional industries and professions in line with the needs of the digital environment. Formal and informal learning programmes, developed using the Croatian Qualifications Framework instrument and lifelong learning vouchers, will ensure both employed and unemployed people may acquire digital competences, with particular benefits for vulnerable groups such as the young and long-term unemployed. The establishment and implementation of a voucher system has already been mentioned in the priority area 4.1. However, in this case, the focus should be placed on trainings for acquiring digital competences necessary for traditional professions using ICT (e.g. digital marketing). At the same time, higher education institutions will be encouraged to carry out short programmes aimed at expanding and refreshing the digital competences in demand on the labour market and necessary for developing the economy. In addition, employment measures and the legal framework for the modern labour market and the economy of the future will be improved and the development of active employment policy measures will continue, with a special focus on including the long-term unemployed in the digital transition and helping them prepare for it. Adopting new competences will increase employment and secure a better correlation between supply and demand on the labour market.

Competent authority:

Ministry of Labour and Pension System, Family and Social Policy of the Republic of Croatia

Ministry of Economy and Sustainable Development

Croatian Employment Service

Central State Office for the Development of the Digital Society

Estimated budge:

HRK 300 million (EUR 40 million)

Source of funding:

- Multiannual Financial Framework (MFF) of the European Union for the 2021-2027 period, including:
  - programs funded by: European Regional Development Fund (ERDF) and European Social Fund Plus (ESF+)
  - Recovery and Resilience Facility (areas defined in the National Recovery and Resilience Plan 2021-2026)
- State budget and all sources of funding combined in the state budget and budgets that are part of the general government budget

4.4.1.3 Priority public policy implementation area 4.3: Digital transition supporting the development of the education and research system

In order to reap all of the benefits of digital transformation and prepare citizens for the digital age, the education and research system should use the options offered by digital technologies. Therefore, the purpose of this intervention is use ICT to further develop the education system by opening up additional options for transferring knowledge and realising the desired educational outcomes.

As for primary and secondary education, the Strategic Framework for the Digital Maturity of Schools and Education System defines 4 key areas for the digital transition of schools: digitally mature environment, digitally mature and confident teachers, ICT supporting learning and teaching, and digital leadership.

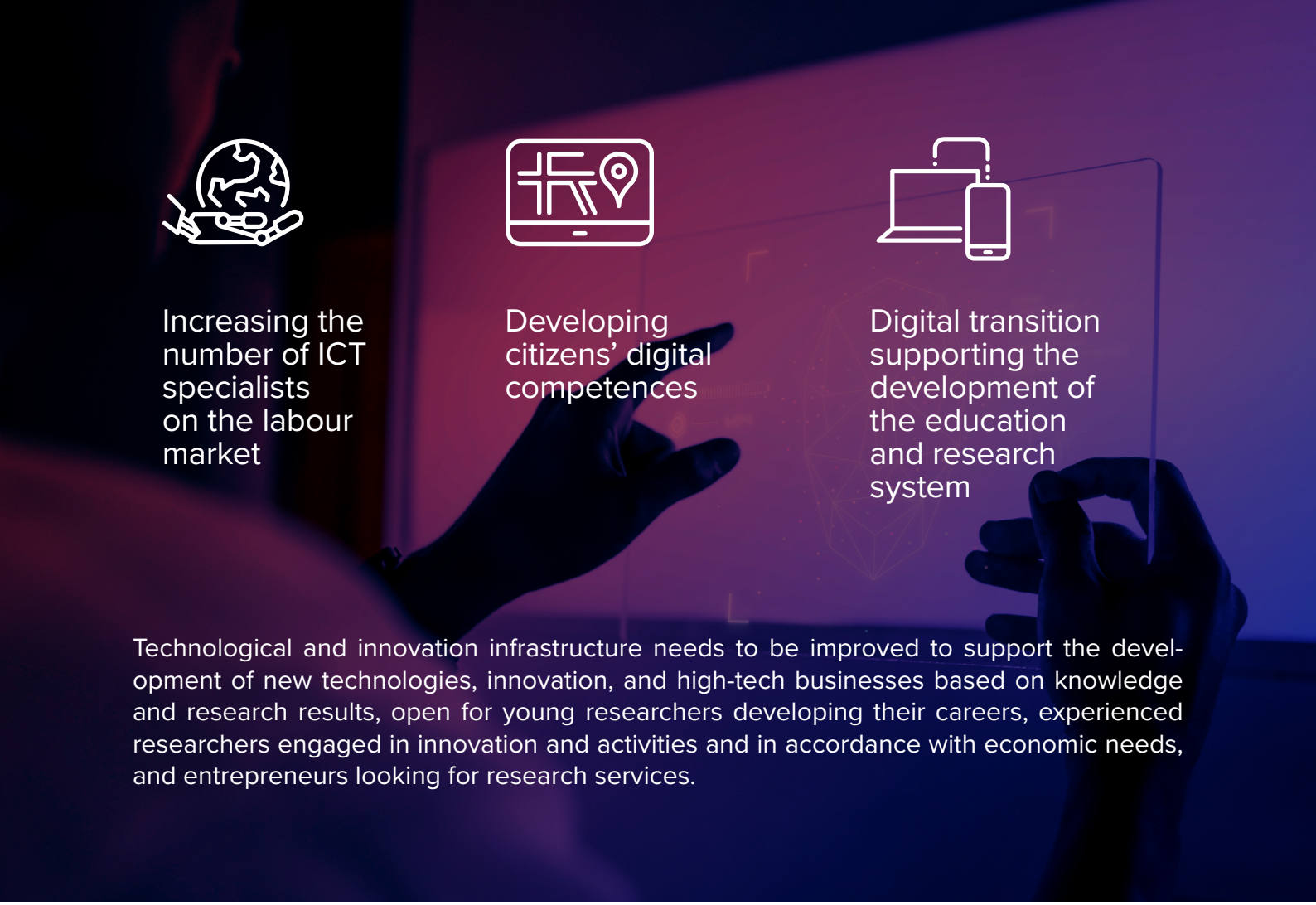
Whether students will acquire digital competences depends on the teachers' digital competences level. Developing and strengthening digital competences of educators is an ongoing process, which has already started and needs to be continued. In 2019, as part of the curriculum reform and the e-Schools project, a teacher training was organised on the level of

Croatia's education system, with more than 40 000 participants (teachers and school principals). A new teacher training model was adopted in 2019, rewarding successful teaching programmes, innovativeness, and developing an open digital education. This intervention will foster further development of teachers' digital competences in primary and secondary education. Digital education programmes for teachers and students will include critical analyses of information, digital storytelling, use of digital devices and video production equipment, as well as software for processing, editing, and distributing multimedia content online.

Large, robust investments in ICT infrastructure of education institutions have been realised through the e-Schools project and complementary investments from other funding sources, so there is no need for additional, substantial investments in this respect. The e-Schools project will have digitally transformed teaching and business processes in all Croatian schools funded from the government budget by the year 2023. This project will secure a purposeful, reliable, and secure ICT environment that meets the needs of schools, increase efficiency and coherency of education processes, improve digital competences contributing to digital maturity of schools and the strategic leadership of schools for raising their digital maturity. Ultimately, the e-Schools project will substantially contribute to securing equal opportunities for digital education in all Croatian schools. Once the e-Schools project has been completed, investments will focus on maintaining IT infrastructure and accompanying equipment, while continuously upgrading the functionalities of existing ICT system elements in the education system. Furthermore, investments need to be made into the core network and computer e-infrastructure of the education system, in order for the national ICT resources (network and cloud) to keep up with technological trends and customer demands (development, regulatory maintenance, and infrastructure management). When implementing the relevant investments, special attention will be paid to securing equal opportunities for digital education in all primary and secondary education establishments.

The e-Schools project will encourage improving innovative teaching and learning methods, an efficient, balanced, and adequate application of digital technologies and tools in teaching and business processes of schools. When introducing and using digital technologies in the education system, especially in the early stages of education of children, it is necessary to consider the well-being of educators and children, as well as potential negative effects of inadequate application and use of digital technologies in teaching on overall well-being and health of children/students and educators. The purpose of integrating digital technologies into education processes is to support and facilitate the work of educators and improve the learning experience of children and students. These technologies should not replace the physical presence and interaction among children/students and between children/students and educators. The full-day teaching model will provide more time for additional elective and extra-curricular activities, including quality and relevant activities that are age-appropriate and adapted to the development stages and interests of children and students. One of the objectives of the measures related to the structural reform of the education system is to strengthen basic competences that form the basis for lifelong learning and upgrading competences in line with social changes, technological developments, and economic needs. Competences necessary for the secure use of ICT are an important part of the basic competences, aimed at protecting young people from unintended consequences of technology, such as: i) smartphone addiction, tablet addiction, etc.; ii) excessive social media usage and social media's influence on young people's self-esteem; iii) online hate speech and bullying; iv) lack of physical activity and spending a lot of time indoors, etc. Information, media, and digital literacy are also interconnected in the curricula of the Croatian language and informatics for primary schools and gymnasiums.

Digital transformation of education entails modernising higher education for the digital age. The Croatian Scientific and Educational Cloud (HR-ZOO) project will be completed in the first half of 2023, securing a new generation of private e-infrastructure of the research and higher education system in the Republic of Croatia, in line with the good practices of other EU countries. Nevertheless, higher education institutions are inadequately and inconsistently equipped for quality higher education, requiring an efficient investment in digitally transforming higher education institutions using digital education infrastructure and tools and improving teachers' competences for working in a digital environment. The e-Universities project financed from the NRRP will improve the digital transformation of higher education institutions, including investments in infrastructure and teachers' competences. This project will also improve the business systems of higher education in order to address the challenges of the currently siloed structure of solutions and data fragmentation. In addition, it will encourage develop-



ing open digital teaching resources, while purchasing active equipment and improving the passive network supporting new technologies and digital teaching resources. Moreover, it will secure better and more competitive work conditions for researchers.

Furthermore, the technological and innovation infrastructure needs to be improved to support the development of new technologies, innovation, and high-tech businesses based on knowledge and research results, open for young researchers developing their careers, experienced researchers engaged in innovation and activities and in accordance with economic needs, and entrepreneurs looking for research services. This intervention will finance scientific, technological, and innovation infrastructure of strategic relevance and with large research potential for STEM and ICT areas, directly contributing to strengthening human resources for cutting-edge research and cooperation with the business sector, encouraging clean technologies and the green and digital transition.

Competent authority:

Ministry of Science and Education

Central State Office for the Development of the Digital Society

Estimated budget:

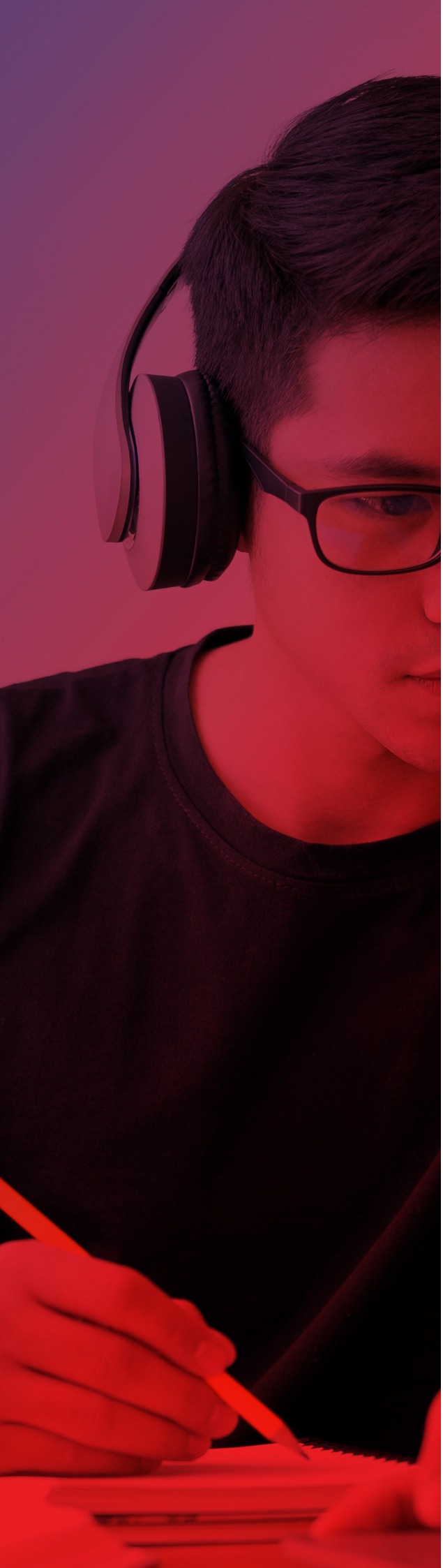
HRK 1,150 million (EUR 153 million)

Source of funding:

- Multiannual Financial Framework (MFF) of the European Union for the 2021-2027 period, including:
  - programs funded by: European Regional Development Fund (ERDF) and European Social Fund Plus (ESF+)
  - Recovery and Resilience Facility (areas defined in the National Recovery and Resilience Plan 2021-2026)
- State budget and all sources of funding combined in the state budget and budgets that are part of the general government budget

5

Indicative financial framework with an overview of financial assumptions for realising strategic objectives



The financial framework for implementing this Strategy is included in the:

- State budget of Croatia, all sources of funding combined in the state budget and budgets that are part of the general government budget
- Multiannual Financial Framework (MFF) of the European Union (for the 2014-2020 period, implementation by 2023, as well as the 2021-2027 period) including:
  - programs funded by: European Regional Development Fund (ERDF), European Social Fund Plus (ESF+), Just Transition Fund (JTF) and European Maritime, Fisheries and Aquaculture Fund (EMFAF) (areas defined in the Operational Programme Competitiveness and Cohesion (2021-2027) (OPCC) and Operational Programme Efficient Human Resources (2021-2027))
  - Recovery and Resilience Facility (areas defined in the National Recovery and Resilience Plan (NRRP) 2021-2026)

Implementation funds are planned in the financial frameworks of mid-term strategic planning acts:

- National Plan for Public Administration Development (2022-2027)
- National Plan for Broadband Development (2021-2027)
- National Plan for Justice System Development (2022-2027)
- National Strategy for Equalization of Opportunities for Persons with Disabilities (2021-2027)
- National Plan for Healthcare Development (2021-2027)
- National Plan for Island Development (2021-2027)

In other words, in addition to government and potentially private funding, implementation of strategic goals and public policy priorities of the Digital Croatia Strategy for the period until 2032 will largely rely on EU funding. Namely, Croatia will have at its disposal over EUR 23.5 billion (more than 40% of Croatia's annual GDP) disbursed from the EUR 750 billion recovery effort, NextGenerationEU, and the Multiannual Financial Framework 2021-2027, i.e. European Union budget for the 2021-2027 period, giving it a lever for economic growth and development. The relevant funds will increase the funding of Croatia's development needs and be used for investments in strategic objective such as the recognizable, competitive, innovative, and digital economy and society, green and digital transition, and balanced regional development. Croatia will use the Recovery and Resilience Facility to provide strong financial support to public investments and reforms for increasing the resilience of the economy, foster employment, develop competences, education, research, development, and innovation, and strengthening public administration and infrastructure. More than 22% of the National Recovery and Resilience Plan (2021-2026) funds are to be used for digital transformation. Investments in the relevant areas will be aligned with the multiannual strategic goals focused on promoting digital transformation of the Croatian public administration and the economy, i.e., the Croatian society as a whole.

The main areas fostering private investment are connected with the digital economy, high-capacity networks, and digital skills. Investments in digitalisation will encourage the activation of private capital through several models, for example: co-funding projects supported by EU funds for business entities, as well as angel investors in startups. The main areas fostering private investment are connected with the digital economy, high-capacity networks, and digital skills. Private investments in the use of digital technologies in everyday operations are the main drivers of companies' increased competitiveness, as well as digitalisation of the Croatian economy. Furthermore, private investments of telecommunications companies and internet service providers in VHCN construction, marketing, and products and services portfolio will increase VHCN take-up in the following period. Companies will continue investing in digital competences training programmes for their employees, while civil society organisations will organise programmes for increasing digital competences of citizens at their own expense.

The indicative financial framework for implementing strategic objectives contained herein is the following:

Approximately HRK 2,400 million (EUR 303 million) is needed for the realisation of the first strategic objective, **Developed and innovative digital economy**. Of the total estimated amount, HRK 2,000 million (EUR 250 million) will be used to support digitalisation in micro, small and medium-sized enterprises. The outstanding funds will be allocated in the following manner: HRK 150 million (EUR 20 million) will be used for digitalising public services for enterprises and securing access to anonymised public data, HRK 150-300 million (EUR 20-40 million) will be used for supporting digital innovation hubs, whereas HRK 100 million (EUR 13 million) will be used for transforming and strengthening the competitiveness of cultural and creative industries. Optimising the Croatian tax and parafiscal legislation and administration does not require funding.

Digitalised public administration is the second strategic objective requiring around HRK 3,900 million (EUR 515 million) in funding. The estimated cost of upgrading the state information infrastructure and ad-

Developed and innovative digital economy

EUR 303 million

Digitalised public administration

EUR 515 million

VHCN deployed, available, and taken up

EUR 311.1 millio

Developed digital competences for working and living in a digital age

EUR 286 million

vanced software solutions amounts to HRK 2,500 million (EUR 332 million), whereas HRK 480 million (EUR 64 million) will be used for achieving complete interoperability between public services, while enabling access to citizens and business' open data. HRK 65 million (EUR 8.6 million) will be used for strengthen organisational and institutional capacities and HRK 800 million (EUR 106 million) will be used for digitalising all key public services. Finally, HRK 55 million (EUR 7.3 million) will be used to promote digital services and customer support among citizens.

Around HRK 2,344 million (EUR 311.1 million) is needed for the realisation of the third strategic objective, **VHCN deployed, available, and taken up**. HRK 3.1 million (EUR 0.4 million) will be used for meeting the conditions of spatial planning and electronic communications networks construction, while HRK 2,340 million (EUR 310.6 million) will be used for support schemes for developing networks in areas lacking sufficient commercial interest for investments, and HRK 0.3 million (EUR 0.05 million) will be used for encouraging the take-up of very high-speed services. No funds are needed for regulating the impact of property use costs on network development.

Around HRK 2,150 million (EUR 286 million) is needed for the realisation of the fourth strategic objective, **Developed digital competences for working and living in a digital age**, with HRK 700 million (EUR 286 million) to be used for increasing the number of ICT specialists on the labour market, HRK 300 million (EUR 43 million) for developing citizens' digital competences for working and living in a digital age, with the help of ICT, and HRK 1,150 million (EUR 153 million) for the digital transition supporting the development of the education and research system.

The amounts provided above are indicative. The total amount of funding will be defined after the successful completion of negotiations with the European Commission, and approval of the relevant funding amounts by the competent ministries.

6 Monitoring and evaluation framework

This chapter provides an overview of the modality for monitoring the implementation of the Digital Croatia Strategy for the period until 2032, as well as the reporting method and time frame in the 2022-2032 period.

As defined in Article 45 of the Act on the System for Strategic Planning and Development Management in the Republic of Croatia (OG No. 123/17), the strategic planning coordinator of the CSODDS is responsible for monitoring and reporting on the implementation of the Strategy. Monitoring and reporting on the implementation of strategic planning acts are essential for strategic planning. When it comes to the Digital Croatia Strategy for the period until 2032, this includes the collection, analysis, and comparison of indicators used for systematically monitoring the performance of the objectives of the Strategy.

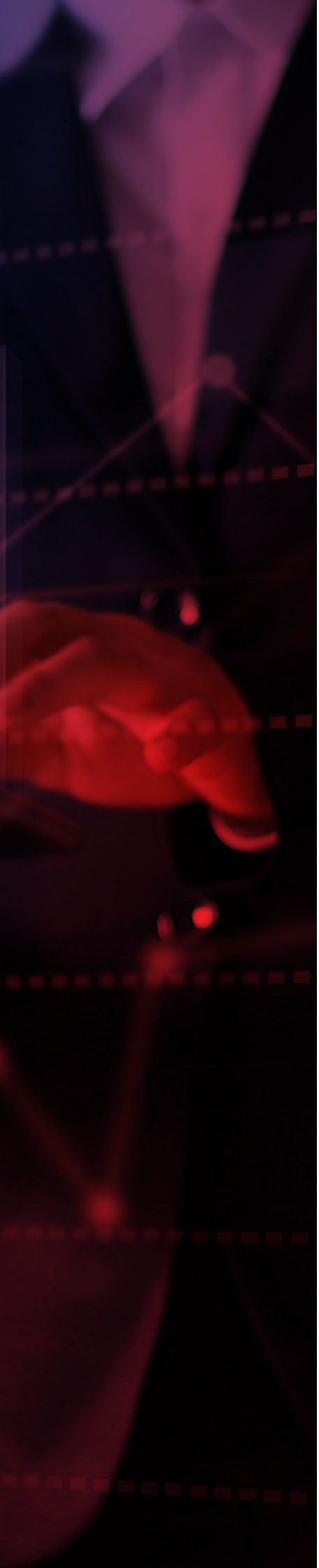
Mid-term evaluation of the Strategy is planned for 2027, in order to track its progress or detect potential shortcomings in its implementation and, as a result of the evaluation, prepare amendments if necessary. Since the Strategy will be applied until the end of 2032, the post-implementation evaluation will be conducted in 2033, providing a concise review of the Strategy's overall impact, i.e., its efficiency and effectiveness throughout its implementation.

The evaluation will be conducted by external or internal experts who are independent of the authorities in charge of preparing and implementing strategic planning acts, launched by the head of the digitalisation authority by adopting a decision on the beginning of the evaluation process, in line with the evaluation plan. CSODDS is responsible for establishing the Evaluation Committee.

Data and analyses regarding the Strategy evaluation and results will become publicly available on the CSODDS's website.

7 Management of the Strategy implementation

Ever since the Republic of Croatia joined the EU, its government has been increasing its efforts to digitally transform Croatia and provide public e-services to citizens and businesses.



Digitalisation is defined as a priority in all relevant strategic planning acts of the Republic of Croatia. Namely, “Digital transformation of the society and economy” is one of the strategic objectives of the National Development Strategy of the Republic of Croatia until 2030, whereas the digitalisation of public administration is a priority recognised in the Government Programme 2020-2024, in the objective *4.1. Efficient, transparent, and resilient country* and in the National Recovery and Resilience Plan 2021-2026 in the sub-component *C2.3. Digital transition of society and public administration*.

Public administration no longer exclusively faces challenges in the area of digitalisation and technological modernisation, but also digital transformation which, due to its horizontal nature, entails a digitalisation authority in the centre of all Government activities. Namely, the digitalisation authority: a) launches and prepares initial digital policies, considering the interests of all government departments; b) coordinates the implementation of the Strategy and details indicators necessary for efficiently monitoring and evaluating implementation; c) cooperates with government departments and advises on adoption of technology-neutral acts eliminating overlapping competences; d) proactively communicates the strategic objectives of digital transformation both internally and externally, together with the way to achieve them by implementing projects and other activities; e) participates in preparing the plan on regularly training public officials in the area of digital skills; and f) regularly reports on the progress of digital transformation in the Republic of Croatia.

The Strategy encompasses a wide range of government institutions, local and regional self-government units, and the public sector, which is why efficient coordination of all relevant stakeholders is key for its successful implementation. In order to secure the Strategy is implemented in a quality manner, we suggest setting up the following management structure: 1) the Governing council aligning digital policies and government departments’ priorities in the area of digital transformation; 2) Operational interdepartmental working group defining and communicating internally how to realise the digital policy targets through Strategy implementation. In addition, we suggest establishing an 3) Advisory council to continue the implementation of the Strategy by actively engaging in regular consultations with all key stakeholders, i.e., direct and indirect beneficiaries of the Strategy.

Managing the digital transformation is a process that requires abandoning the siloed approach to creating digital policies, resulting from the needs of government departments, and interpreting what digital transformation means for each department. Transitioning from technological modernisation to mature digital transformation requires empowering the authority in charge of digital transformation, in addition to the Governing council and the Operational interdepartmental working group, which will proactively eliminate overlapping competences of government authorities and is a recognisable actor to the digital transformation process. The competent authority thus becomes equipped with all tools necessary for a uniform digital transformation of the entire public administration.

8

Environmental impact assessment of the Strategy

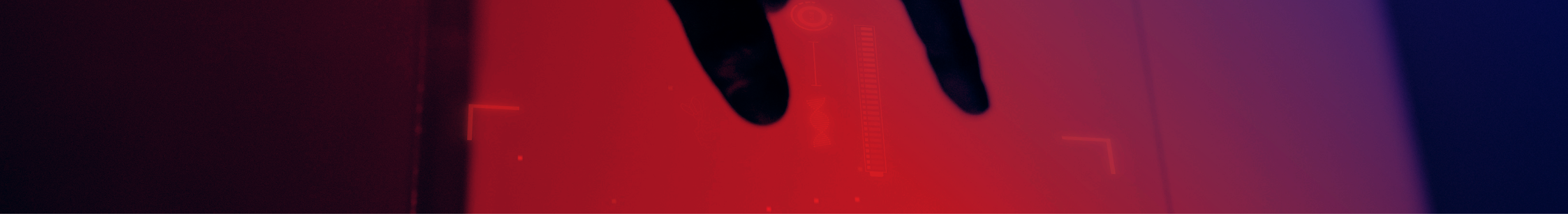
Article 63 (1) of the Environmental Protection Act (Official Gazette no. 80/13, 153/13, 78/15, 12/18 and 118/18) stipulates that an environmental impact assessment shall be conducted for plans and their amendments, including those that are EU-funded, but adopted on a national level in the areas of agriculture, forestry, fisheries, energy, industry, mining, transport, electronic communications, tourism, spatial planning, regional growth, and water and waste management, if they define the framework for projects subject to a preliminary assessment of the requirement for an environmental impact assessment.

Therefore, based on Article 66 (1) of the Environmental Protection Act (Official Gazette no. 80/13, 153/13, 78/15, 12/18 and 118/18) and after examining the request submitted by the CSODDS, the Directorate for Environmental Impact Assessments and Sustainable Waste Management of the Ministry of Economy and Sustainable Development concluded that no environmental impact assessment of the Strategy was necessary.

Digital Croatia Strategy
for the period until 2032

Annex 1

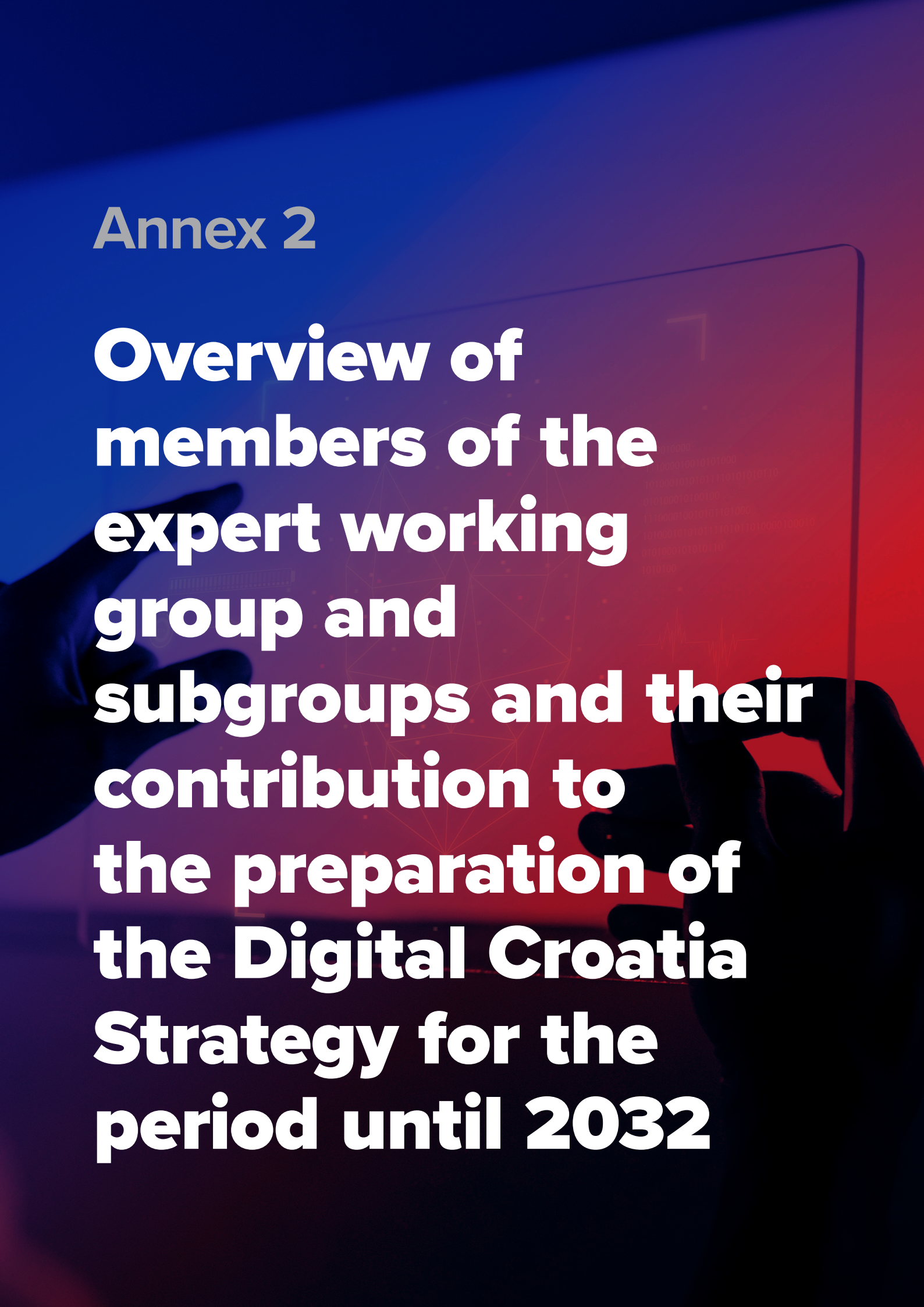
Table template for the sectoral / multi-sectoral strategy



Annex 1: Table template for the sectoral / multi-sectoral strategy											
COMPETENT AUTHORITY	Central State Office for the Development of the Digital Society	NAME OF THE ACT	Digital Croatia Strategy for the period until 2032			VALIDITY PERIOD:	2022 –2030/2032				
Development area of NDS 2030:	DA 3 Green and digital transition										
Strategic objectives											
No. of strategic objective	Name of the objective of the sectoral / multi-sectoral strategy	Performance indicator	Initial score of the performance indicator (2022, if not stated otherwise)	Target score of the performance indicator (end of 2030)	Authority responsible for the implementation of the strategic goal	Name of strategic project with national importance	Total estimated value of implementing a strategic project with national importance	Authority implementing the strategic project with national importance	Green transition contribution (YES/NO)	Digital transformation contribution (YES/NO)	SDO
1	Developed and innovative digital economy	II.02.7.11 Integration of digital technology (DESI)	40	Above the EU average Estimate: 74.58 (2030) 76.00 (2032)	- Central State Office for the Development of the Digital Society - Ministry of Economy and Sustainable Development - Ministry of Culture and Media	n/a	n/a	n/a	YES	YES	- Objective 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all - Objective 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation - Objective 10: Reduce inequality within and among countries - Objective 11: Make cities and human settlements inclusive, safe, resilient and sustainable
		II.02.7.04 ICT sector, in % of GDP	4.48%	Estimate: 12% (2030) 13% (2032)							
2	Digitalised public administration	II.02.7.12 Digital public services (DESI)	53.6	EU average Estimate: 81.60 (2030) 84.61 (2032)	- Central State Office for the Development of the Digital Society - Ministry of Justice and Public Administration	n/a	n/a	n/a	YES	YES	- Objective 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
		II.02.7.14 eGovernment Benchmark	61% (2021)	Estimate: 81% (2030) 85% (2032)							
3	VHCN and 5G deployed, available, and taken up	II.02.7.08 Connectivity (DESI)	48.1	EU average until 2030	- Ministry of the Sea, Transport and Infrastructure	n/a	n/a	n/a	YES	YES	- Objective 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation - Objective 10: Reduce inequality within and among countries - Objective 11: Make cities and human settlements inclusive, safe, resilient and sustainable
4	Developed digital competences for working and living in a digital age	II.02.7.09 Human capital (DESI)	51.8 (2022, 9th in the EU)	Become one of the top 5 EU-27 countries by 2030 (Estimate: 68)	- Central State Office for the Development of the Digital Society - Ministry of Science and Education - Ministry of Labour and Pension System, Family and Social Policy	n/a	n/a	n/a	YES	YES	- Objective 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all - Objective 5: Achieve gender equality and empower all women and girls - Objective 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all Objective 10: Reduce inequality within and among countries
		II.02.7.05, ICT specialists in employment, % of total individuals in employment	3.6 % (2021, 23rd in the EU)	Realise the EU average by 2030 (Estimate: > 8%)							
		II.02.7.07 Individuals' digital skills	63 % (2021, ranks 9th in the EU)	Become one of the top 5 EU-27 countries by 2030							

Annex 2

Overview of members of the expert working group and subgroups and their contribution to the preparation of the Digital Croatia Strategy for the period until 2032



EXPERT WORKING GROUP

The Expert Working Group (EWG) has been established based on the decision of the CSODDS, a body responsible for the preparation of the Draft of the Digital Croatia Strategy proposal for the period until 2032. EWG members have been defined in the Decision on the Establishment of the Expert Working Group and its amendments, and the work undertaken by the EWG has been regulated by the Description of Actions and Work Plan of the Expert Working Group for the Preparation of the Draft of the Digital Croatia Strategy for the Period until 2032 which, in addition to the basic and composition provisions, entails provisions on the EWG's work, reporting method, and all other relevant work determinants of the appointed group.

The aforementioned Decision appoints the EWG members taking part in the preparation of the Draft of the Digital Croatia Strategy:

- Chair of the expert working group – State Secretary Bernard Gršić (CSODDS);
- CSODDS project team: Brankica Alujević Grgas, Lana Belas, Martina Koščec Perić, Josipa Kovačić, Ivan Penava, Jana Šimić, Igor Ljubi, Nikola Modrušan, Željko Holik, Tamara Horvat Klemen, and Lidija Suman;
- Other members of the EWG: representatives of government authorities, relevant public institutions and companies, local and regional self-government units, academic community, and business associations;
- External associates (Deloitte Savjetodavne Usluge d.o.o.).

A total of 40 institutions, with 101 representatives of public authorities, relevant public institutions and companies, local and regional self-government units, academic community, and business associations, took part in the work of the EWG.

Institution	Number of representatives
1. Public authorities, relevant public institutions and companies:	64
■ Agency for Electronic Media	2
■ Agencija za komercijalnu djelatnost d.o.o	2
■ Agencija za podršku informacijskim sustavima i informacijskim tehnologijama d.o.o.	2
■ National School for Public Administration	2
■ State Intellectual Property Office	2
■ Financial agency	2
■ Croatian Regulatory Authority for Network Industries	2
■ Croatian Employment Service	2
■ Ministry of Finance, Customs Administration	2
■ Ministry of Finance, Tax Administration	2
■ Ministry of Economy and Sustainable Development	4
■ Ministry of Culture and Media	2
■ Ministry of the Sea, Transport and Infrastructure	2
■ Ministry of Justice and Public Administration	2
■ Ministry of Physical Planning, Construction and State Assets	2
■ Ministry of Labour and Pension System, Family and Social Policy	2
■ Ministry of Regional Growth and EU Funds	2
■ Ministry of the Interior	5
■ Ministry of Health	2
■ Ministry of Science and Education	2
■ OiV – Odašiljači i veze d.o.o.	2

■ Security and Intelligence Agency	2
■ Central State Office of Demography and Youth	2
■ Central State Office for the Development of the Digital Society	11
■ Office of the Prime Minister of the Republic of Croatia	2
2. Business associations:	15
■ Croatian Chamber of Economy	5
■ Croatian Chamber of Trades and Crafts	2
■ Croatian Employers' Association	6
■ Croatian Artificial Intelligence Association CroAI	2
3. Academic community:	18
■ CARNet – Croatian Academic and Research Network	3
■ Faculty of Electrical Engineering and Computing, Zagreb	2
■ Faculty of Electrical Engineering, Computer Science and Information Technology, Osijek	2
■ Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split	2
■ Faculty of Organization and Informatics, Varaždin	2
■ University of Zagreb University Computing Centre (SRCE)	2
■ University North	2
■ Faculty of Engineering of the University of Rijeka	1
■ Algebra University College	2
4. Associations of local and regional self-government units:	4
■ Croatian County Association	2
■ Association of Cities in the Republic of Croatia	2
UKUPNO	**101**

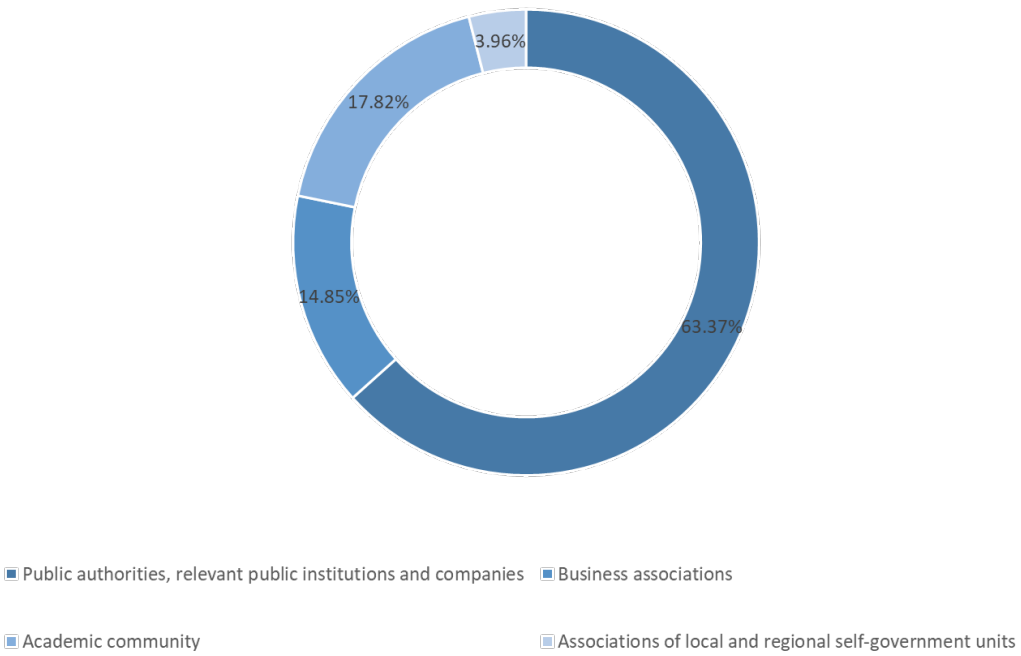


Figure 1: Representation of institutions (% of total members) in the EWG

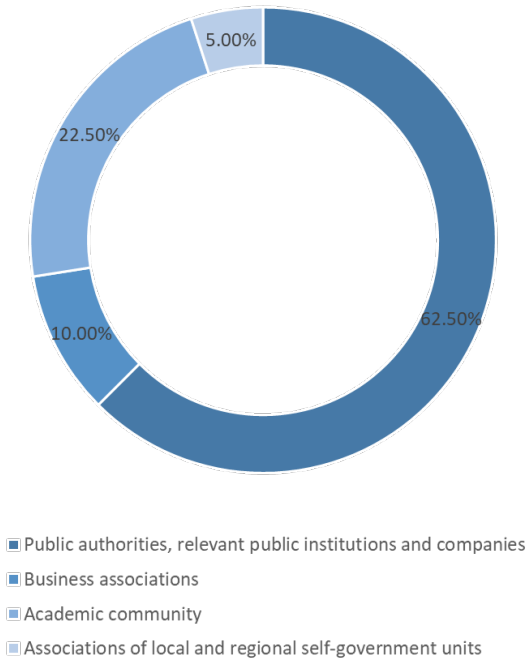


Figure 2: Representation of institutions (% of total institutions) in the EWG

During the preparation of the Digital Croatia Strategy for the period until 2032, EWG members took part in the following activities:

1. Initial meeting of the EWG to meet all stakeholders involved and agree on the project methodology for the preparation of the Strategy;
2. EWG's workshop during which the current state analysis based on the contributions of Expert Working Subgroups was presented, as well as in the discussion on key findings of the current state analysis conducted;
3. Discussion on the comprehensive Draft of the Digital Croatia Strategy Proposal for the Period until 2032.

EXPERT WORKING SUBGROUPS

In order to improve the operationalisation of work and increase efficiency of the Strategy preparation, EWG members have been divided into four Expert Working Subgroups (EWS) based on recognised priority areas of digitalisation of the Croatian society and the economy: (I) Digital transition of the economy, (II) Digitalisation of public administration and justice, (III) Development of broadband electronic communications networks and (IV) Development of digital competences and digital workplaces. EWG members have applied for participating in one or several subgroups during the initial EWG meeting according to their areas of expertise and interests. In addition, other bodies and organisations wanting to participate and contribute have also been involved in the work of individual EWSs, including: AmCham Croatia, Croatian Independent Software Exporters, and the Croatian Startup Ecosystem Association – CRO STARTUP.

The following figures present the members of the four EWSs.

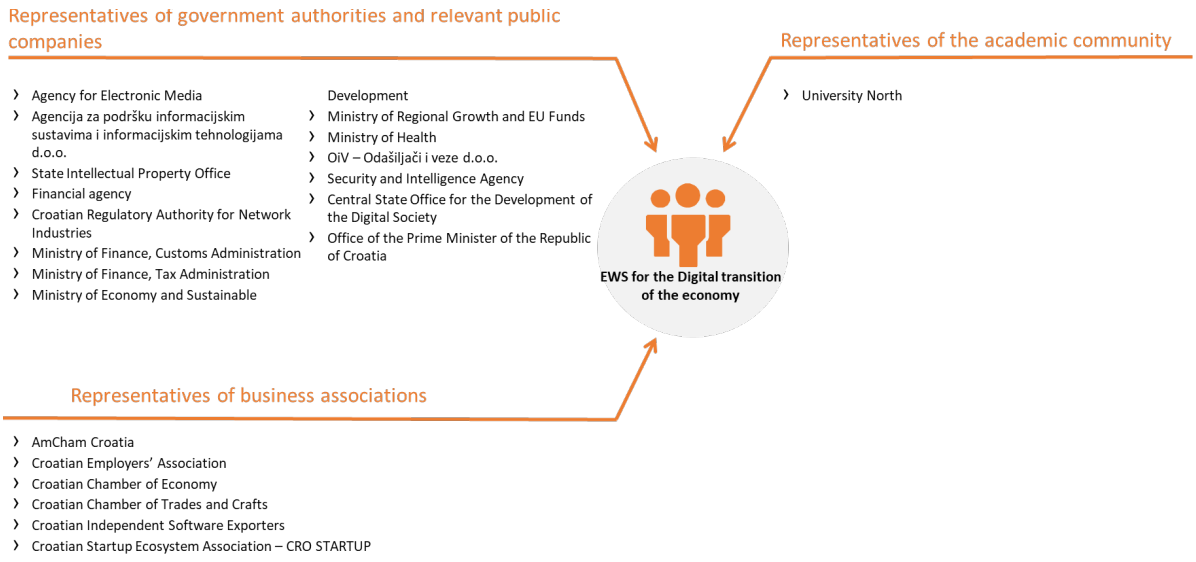


Figure 3: Members of the EWS for the Digital transition of the economy

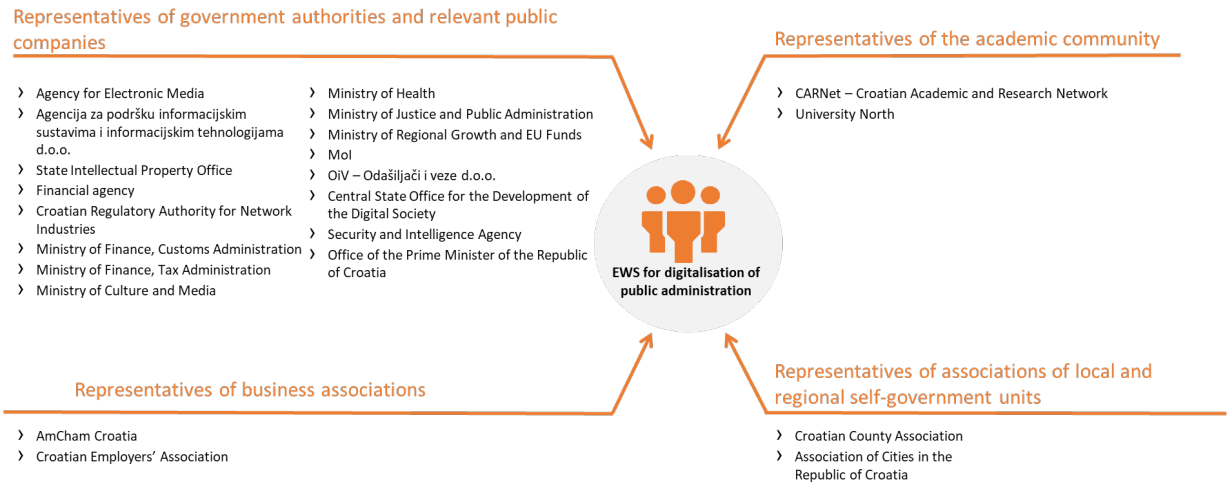


Figure 4: Members of the EWS for the Digitalisation of public administration and justice

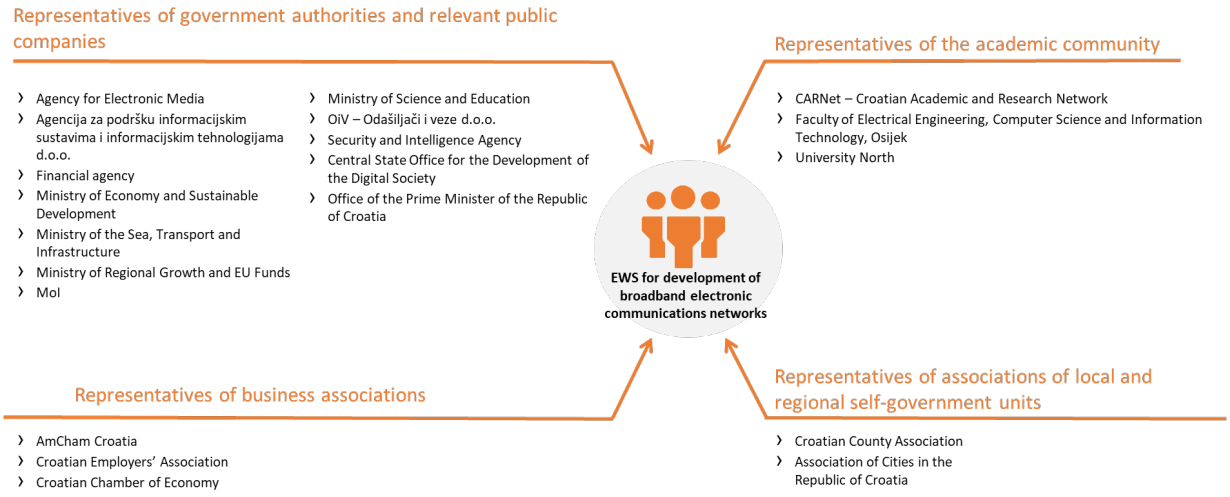


Figure 5: Members of the EWS for the Development of broadband electronic communications networks

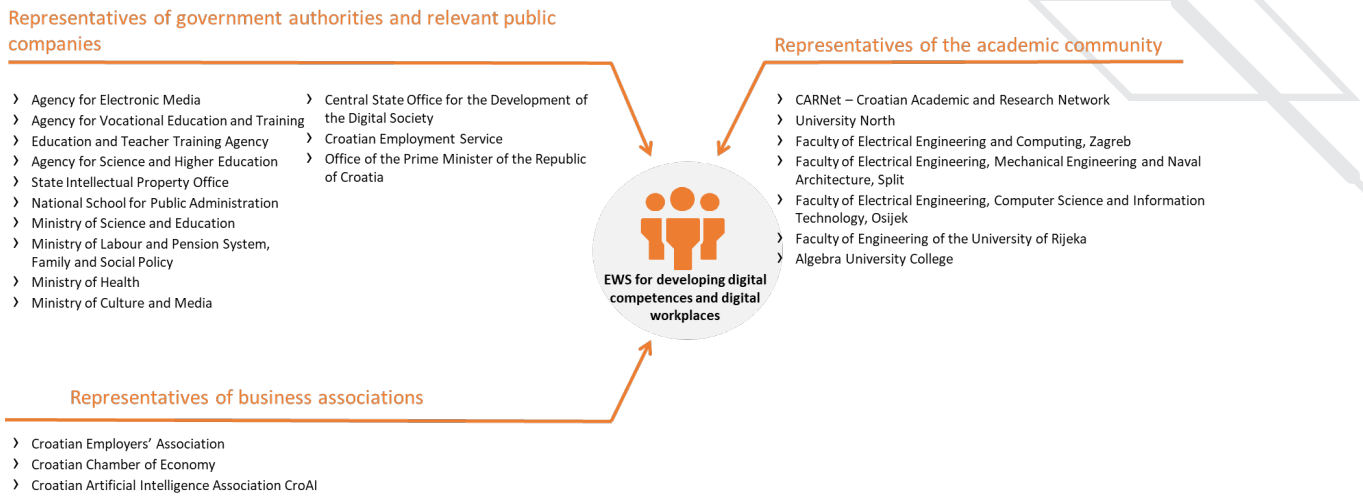


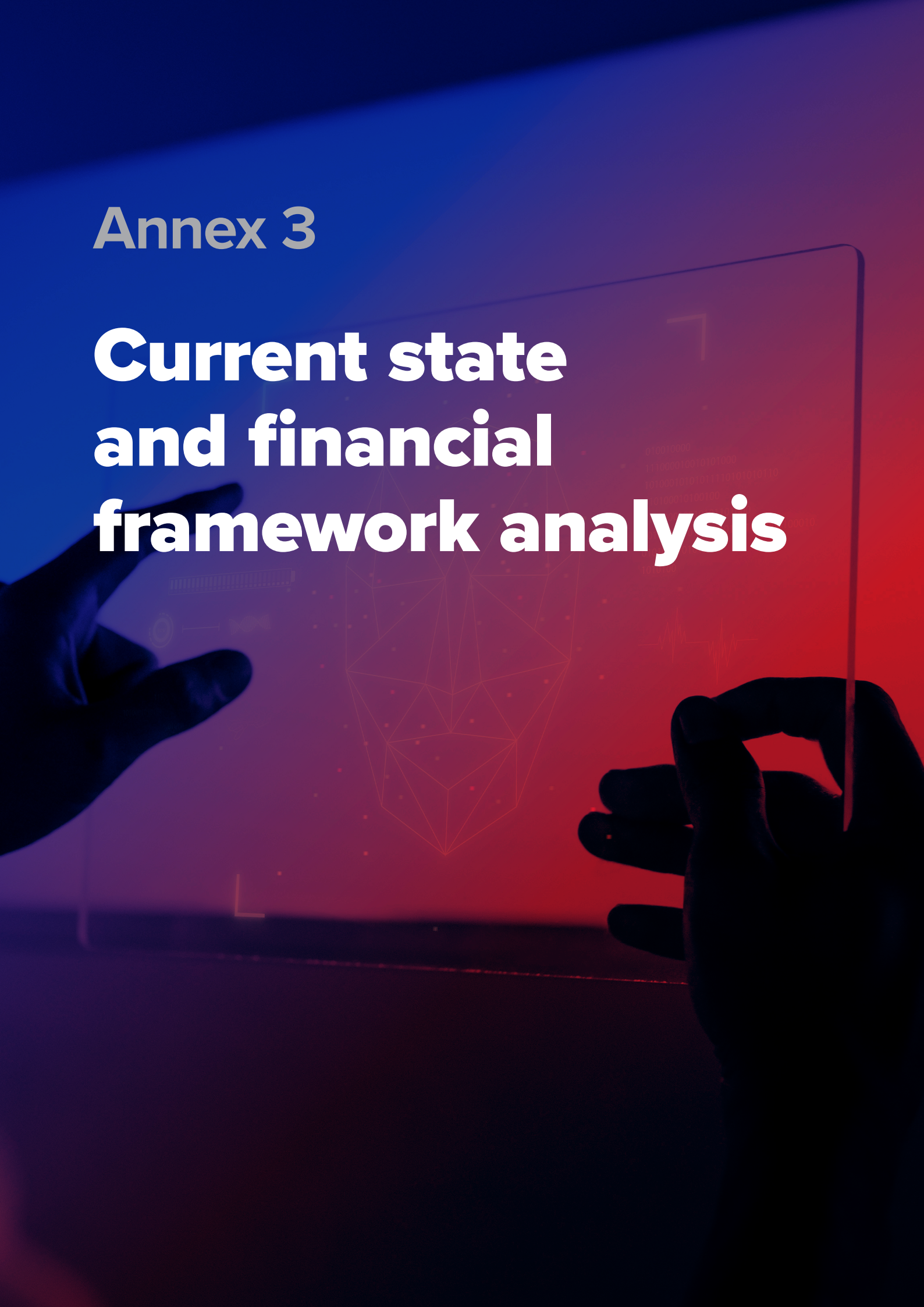
Figure 6: Members of the EWS for the Development of digital competences and digital workplaces

During the preparation of the Digital Croatia Strategy for the period until 2032, members of EWSs took part in the following activities:

1. Participation in initial meetings of individual subgroups, during which the current state of individual priority areas was presented and members have completed the questionnaires on information regarding key EU and national documents to be considered and key opportunities and challenges of digitally transforming individual areas;
2. Discussion and voting during SWOT analyses for individual priority areas, including identifying and evaluating key strengths, weaknesses, opportunities, and threats of digitally transforming individual priority areas;
3. Agreeing on key findings of the current state analysis in the form of development needs and potential;
4. Discussion on defining strategic objectives of priority areas and related performance indicators, belonging targets and priority areas of implementing public policies contributing to the realisation of the relevant strategic objective.

Annex 3

Current state and financial framework analysis



Abbreviations and acronym

List of abbreviations

Abbreviation	Description
AI	Artificial intelligence
API	Application programming interface
ASHE	Agency for science and higher education
GDP	Gross domestic product
SSC	Shared Service Centre
DESI	The Digital Economy and Society Index
DigComp	The Digital Competence Framework for Citizens
et al.	and other people or things
EECC	European Electronic Communications Code
EMFAF	European Maritime, Fisheries and Aquaculture Fund
ERDF	European Regional Development Fund
EHDS	European Health Data Space
EIF	European Investment Fund
EC	European Commission
ERP	Enterprise resources planning
ESCO	European Skills, Competences, Qualifications and Occupations
ESF+	European Social Fund Plus
ESOP	Employees stock ownership plan
EU	European Union
EUROSTAT	Statistical office of the European Union
Fintech	Financial technology
JTF	Just Transition Fund
G2B	Government to business

G2C	Government to consumers
Gb	Gigabyte
GHz	Gigahertz
GSB	Government service bus
HAKOM	Croatian Regulatory Authority for Network Industrie
CDI	Croatian Digital Index
CSMI	Croatian Society for Medical Informatics
CEA-ICT	Croatian Employers' Association – Information and Communication Technologies
HZMO	Croatian Pension Insurance Institute
CES	Croatian Employment Service
ICT	engl. Information and Communication Technology
IoT	Internet of Things
IRDLL	Index of Readiness for Digital Lifelong Learning
IT	Information technology (computers and components)
etc.	et cetera
JRC	Joint Research Centre
HRK	Croatian kuna
Mb	Megabyte
MHz	Megahertz
bn	billion
MSTI	Ministry of the Sea, Transport and Infrastructure
SMEs	small and medium enterprises
MoI	Ministry of the Interior
MSE	Ministry of Science and Education
N/A	not applicable
NGA	Next Generation Access
OG	Official Gazette

NRRP	National Recovery and Resilience Plan
e.g.	for example
NDS	National Development Strategy
OECD	Organisation for Economic Co-operation and Development
NFP	National Framework Programme for the Development of Broadband Backhaul Infrastructure in Areas Lacking Sufficient Commercial Interest for Investments
OPCC	Operational Programme Competitiveness and Cohesion
PESTLE	Political, economic, social, technological, legal and environmental
OPCC	Operational Programme Competitiveness and Cohesion
PSI	Public Sector Information
No	order number
RoC	Republic of Croatia
CSODDS	Central State Office for Development of the Digital Society
sim.	similar
SRCE	University Computing Centre
STEM	Science, technology, engineering and mathematics
SWOT	Strengths, weaknesses, opportunities and threats
CSII.	Council for the State Information Infrastructure
MFF	Multiannual Financial Framework
VHCN	Very high capacity network
xDSL	technology enabling digital transmission to the end user using voice-grade copper telephone wires
CRE	Centres of Research Excellence
ECA	Electronic Communications Act
GAPA	General Administrative Procedure Act

1 Introduction

1.1 Purpose of the current state and financial framework analysis

The purpose of the current state analysis is to systematically assess the external environment, including socio-economical and geopolitical factors and trends, as well as the internal environment, including organisational factors and capacities that positively or negatively impact the ability of the RoC government to realise its vision and strategic and specific objectives in the context of digitalising the Croatian society and the economy.

The current state analysis, reviewing the development needs and potential for digitalising Croatia in the long term, is a key precondition for defining quality strategic objectives and preparing the Strategy.

1.2 Current state analysis approach

Having adopted legal and regulatory acts in the area of strategic planning, the government of the Republic of Croatia has designed a legal framework for a comprehensive system for strategic planning and development management in order to ensure a higher-quality framing and implementation of public policies and projects on all public government levels[1].

Within the relevant framework, Guidance on Preparing Sectoral and Multi-Sectoral Strategies and the Strategic Planning Manual have been adopted, defining, inter alia, the methodology for preparing and conducting a current state analysis.

The current state analysis has been structured in line with four priority areas identified in the National Development Strategy until 2030, namely: digital transition of economy, digitalisation of public administration and justice, development of broadband electronic communications networks, and development of digital competences and digital workplaces. While conducting the analysis, we examined in detail all relevant strategic EU and national documentation, analytical and reporting materials concerning all four priority areas, together with the accompanying legal framework.

In line with the strategic planning acts system of the RoC, there is a three-tiered hierarchy of acts, namely long-term, mid-term, and short-term strategic planning acts. Therefore, during the preparation of this Strategy, all information contained in the relevant strategic planning acts in force on both the national and the EU level had to be considered. However, when analysing strategic acts on the EU level, it is necessary to consider the varying digitalisation levels of EU member countries, as well as Croatian specifics, i.e., Croatia's challenges and opportunities in terms of digitalisation of society and the economy.

As detailed in the figure below, the key documents considered are the 2030 Digital Compass: the European way for the Digital Decade, defining EU objectives for enhancing digitalisation in EU member countries and the National Development Strategy until 2030, defining the ambitions of the Republic of Croatia in the context of further digitalisation.

---

1 The legal framework of the system for strategic planning of the Republic of Croatia encompasses the following regulations:

- Act on the System for Strategic Planning and Development Management in the Republic of Croatia (OG No. 123/17);
- Regulation on Guidelines for Preparing Strategic Planning Acts of National, Local and Regional Self-Government Importance (OG No. 89/18);
- Regulation on the Organisation, Content and Maintenance of the Central Electronic Registry of Development Projects (OG No. 42/18)
- Ordinance on Deadlines and Monitoring and Reporting Procedures for the Implementation of Strategic Planning Acts of National,
- Local and Regional Self-Government Importance (OG No. 6/19);
- Ordinance on Implementing the Evaluation Procedure (OG No. 66/19).

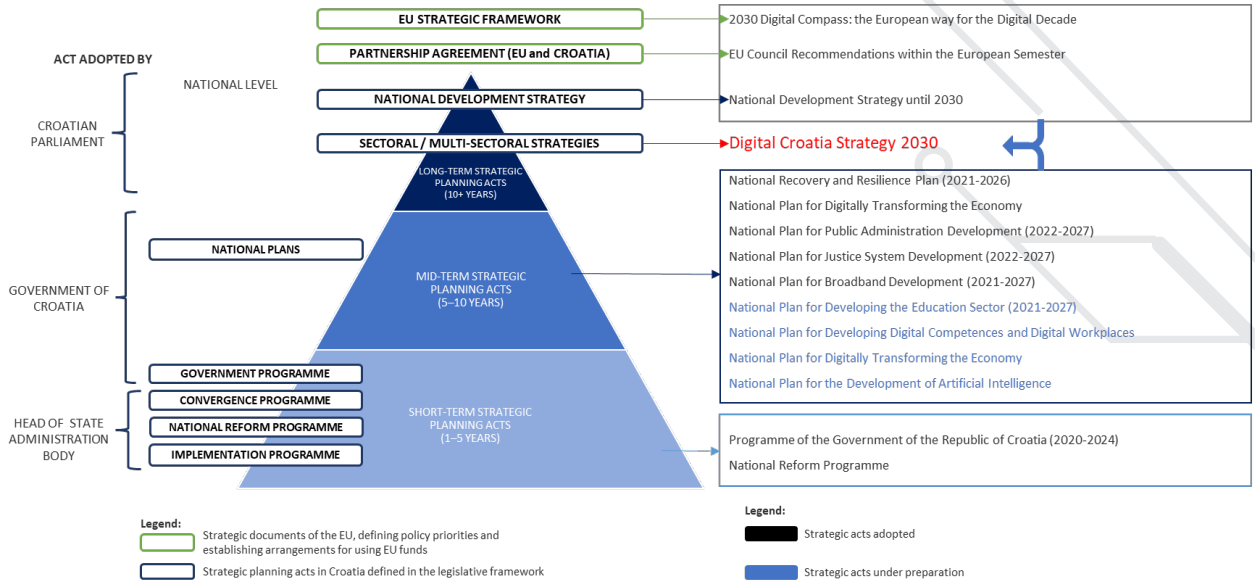


Figure 7: Strategic planning acts system of the RoC (source: Strategic Planning Manual, May 2020, and Deloitte's analysis)

In addition to the relevant strategic planning acts, during the current state analysis, we also considered the conclusions of prior research, audits, strategic reports, and other documents, as detailed in the following sub-chapter "List of documentation used".

The information collected and processed was used as the basis for a PESTLE analysis and, subsequently, together with discussions held at workshops of subgroups of the Expert Working Group for the preparation of the Draft of the Digital Croatia Strategy for the period until 2030 (hereinafter: subgroups) formed the basis for an in-depth current state analysis using the SWOT method, examining internal strengths and weaknesses, as well as external opportunities and threats relevant for all four priority areas.

1.3 List of documentation used:

While conducting the current state analysis, the project team examined all relevant national and EU acts in the area of strategic planning, belonging to all three hierarchical tiers, namely:

- 2030 Digital Compass: the European way for the Digital Decade;
- A Digital Single Market Strategy for Europe;
- The 2030 Policy Programme "Path to the Digital Decade";
- National Development Strategy of the RoC until 2030;
- Draft – Operational Programme Competitiveness and Cohesion (2021-2027);
- Draft – Operational Programme Efficient Human Resources (2021-2027);
- National Recovery and Resilience Plan (2021-2026);
- National Plan for Public Administration Development (2022-2027);
- National Plan for Broadband Development (2021-2027);
- National Plan for Justice System Development (2022-2027);
- National Strategy for Equalization of Opportunities for Persons with Disabilities (2021-2027);
- National Plan for Healthcare Development (2021-2027);
- National Plan for Island Development (2021-2027);

- National Programme for Broadband Backhaul Infrastructure (NP-BBI);
- National Reform Programme (2022);
- Programme of the Government of the Republic of Croatia (2020-2024);
- Strategy of Public Administration Development (2015-2020);
- e-Croatia 2020 Strategy;
- Strategic Framework for the Digital Maturity of Schools and Education System in the Republic of Croatia (2030);
- The Strategy for Education, Science and Technology – New Colours of Knowledge (2014-2020).

Other relevant documents reviewed and considered are the following:

- EU Council Recommendations within the European Semester;
- ESCO Strategic framework;
- Berlin Declaration on Digital Society and Value-Based Digital Government (2020)[2];
- Recommendation of the Council on Digital Government Strategies (2022)[3];
- Council Recommendation of 29 November 2021 on blended learning approaches for high-quality and inclusive primary and secondary education;
- Council Recommendation on the 2020 National Reform Programme of Croatia and delivering a Council opinion on the 2020 Convergence Programme of Croatia;
- European Digital Innovation Hubs of the Digital Europe Programme;
- The Digital Competence Framework for Citizens – DigComp (DigComp 2.2., DigCompEDU, DigCompORG);
- Commission Recommendation of 3 June 2021 on a common Union Toolbox for a coordinated approach towards a European Digital Identity Framework;
- Digital Education Policies in Europe and Beyond (JRC);
- European Skills Agenda for sustainable competitiveness, social fairness and resilience (2020);
- Industry 5.0: A Transformative Vision for Europe;
- SME Strategy for a Sustainable and Digital Europe;
- European data strategy;
- EU's Cybersecurity Strategy for the Digital Decade;
- Digital Services Act;
- Digital Markets Act;
- Data Governance Act;
- Artificial Intelligence Act;
- Regulation of the European Parliament and of the Council on digital operational resilience for the financial sector;
- Commission Recommendation of 8 February 2022 on a common Union toolbox to address semiconductor shortages and an EU mechanism for monitoring the semiconductor ecosystem;
- Multi-Annual Strategic Plan for electronic Customs – MASP-C;
- eGovernment Action Plan[4];

2 Document signed at the ministerial meeting held during Germany's Presidency of the Council of the European Union (8 December 2020)
3 OECD
4 eGovernment Action Plan 2016-2020 Accelerating the digital transformation of government

- Commission Recommendation of 3 June 2021 on a common Union Toolbox for a coordinated approach towards a European Digital Identity Framework;
- Global strategy on digital health 2020-2025[5];
- Building Sustainable Digital Health Services in Europe: lessons learned from the COVID-19 Pandemic[6];
- 5G Action Plan;
- EU Connectivity Toolbox;
- OECD Investment Policy Review: Croatia;
- Standard for Developing Public e-Services in the Republic of Croatia;
- E-Services Development Programme (e-Citizens);
- Open Data Policy (2018);
- Artificial Intelligence Potential for Croatia (CEA-ICT Association) (2019);
- Artificial Intelligence Development Strategy of the Republic of Croatia (under preparation);
- "Implementation of a Quality Management System in Public Administration" project; Ministry of Justice and Public Administration (currently implemented);
- "Development of a Public Administration Competency Framework" project; Ministry of Justice and Public Administration (currently implemented);
- Artificial Intelligence Potential for Croatia (CEA-ICT Association, 2019);
- The Digital Economy and Society Index (DESI) (2021) – Croatia;
- Index of Readiness for Digital Lifelong Learning;
- Public Administration Modernization - National Development Strategy Croatia 2030 Policy Note (World Bank) (2019)[7];
- Proposal for the Internationalisation Programme, Croatian Employers' Association and Economic-Social Council (2022);
- Recommendations for Enrolment Policy and Scholarship Policies, Croatian Employment Service (CES);
- Teaching Staff and the Pandemic (Agency for Science and Higher Education) (2022);
- Declaration on e-Health – ten years later, Bulletin of the Croatian Medical Informatics Society (CroSMI) (2022);
- Analysis of potential for the application of additional financial assistance for the construction of Very High Capacity Networks (VHCN);
- Country Report – Croatia: 2020 European Semester: Assessment of progress on structural reforms, prevention and correction of macroeconomic imbalances, and results of in-depth reviews under Regulation (EU) No 1176/2011;
- Council Recommendation on the 2020 National Reform Programme of Croatia and delivering a Council opinion on the 2020 Convergence Programme of Croatia;
- Croatian Roadmap for the Implementation of the Connectivity Toolbox;
- Connectivity Toolbox: Implementation Report of the Republic of Croatia;
- Multi-Annual Strategic Plan for Taxation (MASP-T);

---

5 World Health Organisation (WHO)

6 2020

7This policy note was prepared by the experts of the World Bank Group in the context of the Reimbursable Advisory Services Agreement "Support for Establishing the System for Strategic Planning and Development Management and for Preparing the 2030 National Development Strategy".

- Assessment of the Digital market in Croatia[8].

Furthermore, we reviewed the relevant legislative framework:

- General Administrative Procedure Act (OG 47/09); Act Amending the General Administrative Procedure Act (OG 110/21);
- Act on the Right of Access to Information (OG 25/13, 85/15, 69/22);
- Services Act (OG 80/13);
- State Information Infrastructure Act (OG 92/14);
- Act on the Accessibility of Websites and Programming Solutions for Mobile Devices of Public Sector Bodies (OG 17/2019);
- Information Security Act (OG 79/07);
- Data Secrecy Act (OG 79/07, 86/12);
- Electronic Communications Act (OG 76/22);
- Ordinance on the types and content of permits laying down the conditions for the re-use of information (OG 67/17);
- Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information (OJ L 172, 26.6.2019);
- Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies (OJ L 327, 2.12.2016);
- Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (OJ L 321, 17.12.2018);
- Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts;
- Regulation (EU) 2018/1724 of the European Parliament and of the Council of 2 October 2018 establishing a single digital gateway to provide access to information, to procedures and to assistance and problem-solving services and amending Regulation (EU) No 1024/2012 (OJ L 295, 21.11.2018);
- Decree on Organisational and Technical Standards for Connecting to the National Information Infrastructure (OG 60/2017);
- Decree on the Establishment of the Public Register for the Coordination of Projects on the State Information Infrastructure (OG 134/14);
- Decree on Office Operations (OG 75/21).

2 Priority area: Digital transition of the economy

2.1 Introduction and context

The digitalisation of society and the economy has already started and will intensify in this decade, both on the EU and other markets Croatian businesses operate on. Advanced technologies increasingly integrated in social and economic activities comprise the Internet of Things (IoT), artificial intelligence, big data, virtual and augmented reality, 3D printing, machine learning, robotics and have the potential to transform traditional operations and create new products, services, and business activities.

Monitoring the dynamic of digital technology development as well as implementation and use in all social and business spheres is becoming increasingly challenging and requires an innovative approach. Adapting to this

8 World Bank

environment is called digital transformation, comprising much more than merely implementing new technologies into operations – it includes radical changes in ways of thinking and perceiving organisations' operations. In other words, the digital transformation of economy may be defined as an "ongoing process of changing operations while investing in competences, projects, infrastructure, and information technology, which requires interwoven human, machine, and business operations."[9]

The crucial factors for starting a digital transformation are the following: digital infrastructure, access to finance, and demand and supply of digital competences. Therefore, these are precisely the areas the Government's political, economic and regulatory efforts should focus on. Both the EU and Croatian Government use economic programmes, with a particular emphasis on small and medium enterprises, to boost productivity by financing digital transformation projects and applying new technologies for enhancing competitiveness on the global market. Continuous digital transition of economy requires further investments in digital infrastructure and advanced technologies, and implementing measures fostering the development of innovation and new digital business models. Furthermore, digital transformation of operations requires understanding the importance of using information technologies in enterprises, as well as strong management support as a key preconditions for successful implementation, since this type of transition changes the structure of operations in an enterprise. To increase global competitiveness and create solutions for global social challenges, it is extremely important to foster digital maturity of Croatian enterprises. Furthermore, the initiative for securing availability of data owned by public authorities, with the highest level of citizens' personal data protection, will encourage the development of new data-based services and business initiatives. Additionaly, the economy's digital transition relies on changes to the administrative and legislative framework enabling entrepreneurial and market freedoms, ensuring personal data protection, facilitating the use of advanced technologies, and fostering business sector's investment in research, development, and innovation.

In addition to all of the above, we should stress the fact that in December 2021 the European Commission introduced the concept of Industry 5.0[10], an approach that provides a vision of industry that aims beyond efficiency and productivity as the sole goals, and reinforces the role and the contribution of industry to society. Industry 5.0 places the well-being of the worker at the centre of the production process and uses new technologies to provide prosperity beyond jobs and growth while respecting the production limits of the planet to protect biodiversity and address climate changes. This concept favours circular production models and supports technologies that make the use of natural resources more efficient, thus strengthening industry resilience.

2.2 Current state analysis of the digital transition of the economy

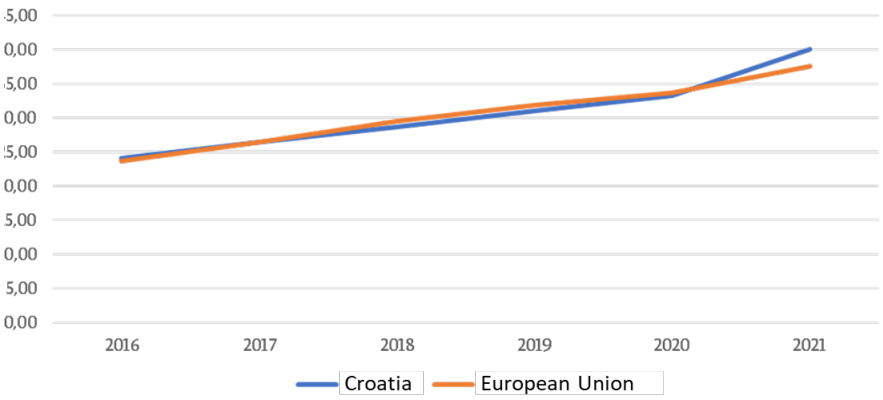
2.2.1 Digitalisation from the perspective of DESI

The current state analysis is primarily based on the Digital Economy and Society Index (DESI) which monitors Europe's overall digital performance and tracks the progress of EU countries in their digital competitiveness. DESI monitors four key dimensions, one of them being Integration of digital technology (in the economy).

According to the last available data, in 2021 the Republic of Croatia performed above the EU average in the Integration of digital technology dimension, i.e., it ranked 13th among EU countries. The figure below provides an overview of the trends in the Integration of digital technology dimension during the 2016-2021 period in the RoC and the EU average.

9 Roe, D.: "6 Digital Transformation Challenges Enterprises Need To Overcome", available at: https://www.cmswire.com/digital-workplace/6-digital-transformation-challenges-enterprises-need-to-overcome/

10 Industry 5.0: A Transformative Vision for Europe, available at: https://ec.europa.eu/info/publications/industry-50-transformative-vision-europe_en



	2016.	2017.	2018.	2019.	2020.	2021.
ntegration of digital echnology (RoC)	24,01	26,36	28,71	31,00	33,30	40,00
ntegration of digital echnology (EU)	23,63	26,36	29,49	31,82	33,66	37,60
Gap	0,38	0	-0,78	-0,82	-0,36	2,4

Figure 8: Overview of trends in the Integration of digital technology dimension in the RoC and the EU average in the 2016-2021 period (Source: DESI 2021)

The figure clearly shows that in the observed period the RoC increased its maturity in the area of integration of digital technology into the economic sector, and that the RoC has followed the trend of other EU countries in the last couple of years, at times performing above the EU average.

In order to understand the current state of the RoC's digital transition in more detail, we need to analyse the relevant dimension on the level of its sub-dimensions and indicators provided in Table 3:

- 3.a. Digital intensity
  - 3a1 SMEs with at least a basic level of digital intensity (% SMEs)
    - Although this indicator is above the EU average, it should be monitored closely since it substantially deviates from EU's 2030 objectives for the same sub-objective
- 3b Integration of digital technology by enterprises
  - 3b1 Electronic information sharing (% enterprises)
  - 3b2 Social media (% enterprises)
  - 3b3 Big data (% enterprises)
    - Although this indicator is nearly equal to the EU average, it should be monitored closely since it substantially deviates from EU's 2030 objectives for the same sub-objective
  - 3b4 Cloud (% enterprises)
    - Although this indicator is above the EU average, it should be monitored closely since it substantially deviates from EU's 2030 objectives for the same sub-objective
  - 3b5 AI (% enterprises)
    - Although this indicator is nearly equal to the EU average, it should be monitored closely since it substantially deviates from EU's 2030 objectives for the same sub-objective
  - 3b6 ICT for environmental sustainability (% enterprises having medium/high intensity of green action through ICT)

- 3b7 e-Invoices (% enterprises)
  - The use of e-invoices surged in 2021 due to the combined effects of the entry into force of the Act on eInvoicing in Public Procurement in 2019 and remote work and operations due to the COVID-19 pandemic.
- 3c1 SMEs selling online (% SMEs)
- 3c2 e-Commerce turnover (% SME turnover)
- 3c3 Selling online cross-border (% SMEs)

The table below provides an overview of the results of all indicators within the Integration of digital technology dimension in the 2016-2021 period of the RoC and the EU average.

Table 1: Overview of the results of all indicators within the Integration of digital technology dimension in the 2016-2021 period of the RoC and the EU average in % (source: DESI 2021)

	2016	2017	2018	2019	2020	2021
3. Integration of digital technology (HR)	24.01	26.36	28.71	31.00	33.30	40.00
3a Digital intensity	30.40	35.40	39.50	43.20	46.30	49.50
3a1 SMEs with at least a basic level of digital intensity (% SMEs)	-	-	-	-	-	62.10
3b Integration of digital technology by enterprises	20.99	23.14	25.84	27.77	29.76	36.26
3b1 Electronic information sharing (% enterprises)	28.70	28.70	25.60	25.60	26.00	26.00
3b2 Social media (% enterprises)	14.50	14.70	16.40	16.40	22.40	22.40
3b3 Big data (% enterprises)	-	9.30	9.30	10.30	10.30	13.60
3b4 Cloud (% enterprises)	15.20	15.70	21.70	21.70	21.70	28.50
3b5 AI (% enterprises)	-	-	-	-	-	20.60
3b6 ICT for environmental sustainability (% enterprises having medium/high intensity of green action through ICT)	-	-	-	-	-	74.90
3b7 e-Invoices (% enterprises)	-	-	-	12.30	12.30	43.00
3c E-Commerce	31.64	32.28	31.30	34.10	37.02	47.80
3c1 SMEs selling online (% SMEs)	18.90	18.00	17.10	17.60	21.30	30.10
3c2 e-Commerce turnover (% SME turnover)	7.07	8.29	8.72	11.20	9.03	13.80
3c3 Selling online cross-border (% SMEs)	8.94	8.94	8.31	8.31	10.20	10.20
3. Integration of digital technology (EU)	23.63	26.36	29.49	31.82	33.66	37.60
3a Digital intensity	28.40	33.20	37.10	40.80	43.80	46.90
3a1 SMEs with at least a basic level of digital intensity (% SMEs)	-	-	-	-	-	60.20
3b Integration of digital technology by enterprises	21.26	23.95	27.15	29.93	31.63	36.20
3b1 Electronic information sharing (% enterprises)			36.10	36.10	35.90	35.90
3b2 Social media (% enterprises)	15.20	17.50	18.30	18.30	23.30	23.30
3b3 Big data (% enterprises)	-	9.13	9.13	12.30	12.30	14.20
3b4 Cloud (% enterprises)	-	12.20		16.10	16.10	25.60
3b5 AI (% enterprises)	-	-	-	-	-	24.70
3b6 ICT for environmental sustainability (% enterprises having medium/high intensity of green action through ICT)	-	-	-	-	-	65.90
3b7 e-Invoices (% enterprises)	-	-	-	24.80	24.80	32.20
3c E-Commerce	29.80	30.57	32.80	32.00	33.30	34.70
3c1 SMEs selling online (% SMEs)	15.60	17.00	16.80	16.20	16.60	17.50
3c2 e-Commerce turnover (% SME turnover)	9.57	9.35	10.40	10.00	10.90	11.70
3c3 Selling online cross-border (% SMEs)	7.30	7.30	8.29	8.29	8.43	8.43

62% of Croatian SMEs have at least a basic level of digital intensity, which is slightly below the EU average of 60%. As for ICT for environmental sustainability, 75% of Croatian enterprises use ICT for environmental sustainability purposes, significantly outperforming the EU average (66%).

The table provided above clearly shows that Croatian enterprises are taking advantage of the opportunities presented by online commerce, pointing to a difference in favour of the RoC compared to the EU with regard to the SMEs selling online (% SMEs) indicator: namely, the percentage of SMEs selling online in Croatia is nearly double the percentage of SMEs selling online in the EU.

Similarly, in the e-Invoices category, Croatia's 2021 result surpassed the EU average by 10.8 percentage points, largely due to remote operations during the COVID-19 pandemic, and the entry into force of the Act on eInvoicing in Public Procurement. Although the Act on eInvoicing in Public Procurement regulates the obligation of public procurement entities, the Act undoubtedly encouraged business entities to exchange e-invoices.

Croatia performs below the EU average in terms of electronic information sharing and AI, pointing to a low acceptance of very advanced and integrated IT solutions in the operations of enterprises in the RoC.

2.2.2 Evaluation of the current state of digital transition – other sources of data

In addition to the scores achieved in the relevant DESI dimensions and accompanying indicators, we should also mention the Croatian Digital Index (CDI)[11] analysis, conducted by an independent advisor, focusing on the readiness of the Croatian economy to address the challenges resulting from an extremely fast-paced growth and development of new digital technologies, substantially changing the traditional way of doing business in Croatia.

The aim of the research was to analyse the digital readiness of enterprises operating in different economic sectors and use the results obtained to prepare recommendations and guidelines for improving the digital capacities of Croatian enterprises, and the Croatian economy as a whole. Same as with DESI, these results showed that the level of digitalisation of the Croatian economy in 2021 slightly improved in relation to 2020. Nonetheless, despite this positive trend, the overall score has still not reached a satisfactory level, and the growth pace is very slow, all of which clearly shows that there is substantial room for progress in the coming years.

In addition, in 2018, ICT services accounted for 4.07% of Croatia's GDP. This shows that Croatia has a good basis for further increasing its presence in the digital economy. However, there are certain risks Croatia must face on its path towards digitalisation, for instance:

- as many as 19% of Croatian enterprises on at least one occasion had issues resulting from ICT security incidents, in comparison with 13% of EU enterprises;
- Croatia has one of the lowest levels of research and development investment in the EU (0.7% of GDP) and, in general terms, unfavourable growth factors in knowledge-based sectors.

According to 2020 IMD World Digital Competitiveness Rankings[12], Croatia ranks 52 of 63 countries. Furthermore, Croatia lags behind other countries, especially in terms of international experience, employee training, regulatory framework for development and application of technology, and agility of companies to respond to opportunities and threats. Although the categories of the IMD World Digital Competitiveness Rankings differ from the DESI dimensions, Croatia is still at the lower end of the scale. In addition, in 2021, Croatia was only one out of three EU member countries with a drop in the number of employed ICT specialists[13], largely due to the burden on labour of highly qualified people (taxes and contributions on labour), EU's open labour market with many member countries (e.g., The Netherlands, Ireland) paying large relocation incentives, and insufficient higher and adult education quotas.

11 https://apsolon.com/publikacije/digitalna-transformacija-u-hrvatskoj-2021/

12 IMD World Competitiveness Ranking 2020: showing strength of small economies | IMD News

13 https://ec.europa.eu/eurostat/databrowser/view/isoc_sks_itspt/default/table?lang=en

2.2.3 Analysis of the correlation of the Draft of the Digital Croatia Strategy Proposal for the Period until 2032 with strategic planning acts in the area of the digital transition of the economy

The Draft of the Digital Croatia Strategy Proposal for the Period until 2032 is a multi-sectoral strategic planning act to be used as a basis for preparing strategic planning acts applicable for the development and digitalisation of the economy. The existing strategic planning act of the RoC, the National Recovery and Resilience Plan (2021-2026), is based on strategic documents, programmes, recommendations, and obligations. As such, the Plan represents a clear and coherent framework for realising reforms, as well as development, social, environmental, and all other Government goals in the current decade. The Plan has been aligned with the National Development Strategy Croatia 2030, as well as other key strategic planning acts.

The strategic planning acts, adopted before the Strategy was completed, will be aligned while defining strategic objectives and belonging measures and activities in the area of the digital transition of the economy so that they encompass all reforms, measures, activities, projects, and investments that form part of the already adopted strategic planning acts.

At the time of preparation of this Analysis, the National Plan for Digitally Transforming the Economy is being prepared as well, advocating a faster-paced development of the digital society and using opportunities offered by ICT technologies, as well as general economic and social benefits. The Plan stipulates measures for resolving major deficiencies when it comes to developing the digital economy: rapid development of digital businesses, increased competitiveness in the ICT sector, overall digitalisation, development of digital infrastructure, strengthened cybersecurity, and development of an inclusive information society. The Plan should encompass measures for fostering entrepreneurial ideas based on digital disruptive technologies, developing new business models for the digital economy, strengthening digital competences, increasing the level of cybersecurity, and improving public digital services for economic needs. The National Plan for Digitally Transforming the Economy will be aligned with relevant EU and national legislative and strategic frameworks, including the Digital Europe Programme (2021-2027).

The National Plan for the Development of Artificial Intelligence will define the plans for increasing the uptake of AI technologies in order to transform the Croatian economy, exceeding the mere implementation of technology, in order to thoroughly examine business models and introduce radical measures for increasing productivity and creating new growth areas. The goal of the Plan is to:

- enhance research and develop innovations in order to introduce AI to the Croatian economy;
- develop competences and human resources;
- improve data access, digital infrastructure, and security;
- develop an ethical and legal framework for using A.

The National Plan for the Development of Artificial Intelligence of the RoC will comply with the AI package of the European Commission, presented in April 2021, Digital Europe Programme (2021-2027), and other relevant EU and national legislative and strategic frameworks.

2.2.4 Previous achievements in the area of digital transition of the economy

In addition to the aforementioned indicators and comparative statistics, the current state and trends of the digital transition of the economy may be analysed in absolute terms, i.e., based on specific moves towards the growth of certain economic factors in the digital area.

In that sense, since the Act on eInvoicing in Public Procurement entered into force in December 2018, the central platform for exchanging eInvoices managed by the Financial Agency (Fina) has brought together 39,037 business entities as senders of invoices, 23,959 of business entities using information intermediaries to access the central platform, and 5,788 entities subject to the Public Procurement Act. Moreover, the entities subject to the Public Procurement Act have received almost 17 million invoices as of the date of entry into force of the Act, a precedent in the digitalisation of operations of both business entities and public authorities.

The current state analysis of the economy detected the relevance of the startup scene, on several levels. Namely, startups have a major impact on the development of the ICT sector, since they are high-tech, innovative enterprises focused on global markets, with great growth potential using technological scaling. In the past several years, the Croatian startup[14] ecosystem has recorded a substantial increase in the number of startups and investments, as well as ongoing progress of support mechanisms. Furthermore, Croatia has been recognised as "startup country" in the region. Venture capital, in combination with private equity and the European Investment Fund (EIF)[15], as well as increased availability of EU grants for research and development activities, have additionally contributed to the development of the Croatian startup ecosystem. However, entrepreneurs still lack the necessary support in accessing finance in the earliest stage of incubation (lack of a developed tax system promoting investments of natural persons investments into startups). The startup ecosystem may accelerate a startup's transition into a unicorn (private company valued at or over USD 1 billion). According to the results of the market intelligence platform CB Insights[16], Croatia today has two unicorns, one of the highest numbers of unicorns per capita or national GDP both in the EU and globally.

Currently, the business ecosystem uses the incentives defined in the Investment Promotion Act (IPA)[17] which, inter alia, refers to sustainable investment projects aimed at strengthening the competitiveness of development and innovation activities. In 2021 and 2022, the material investment thresholds for ICT investment eligibility were optimised and the State aid for development and innovation activities enabling the use of grants for job creation and purchase of equipment was regulated. Investment projects in the ICT sector realised in line with the IPA by small, medium, and large enterprises account for approximately HRK 7.5 billion (EUR 1 billion), placing the ICT sector at the forefront of the Croatian economy in the context of IPA use per investment value and number of project applications.

As of May 2021, the e-Citizens portal offers e-services to business entities, which has substantially affected their operations. In 2021, an agile approach to work has been introduced, resulting in the redesign of the e-Citizens system and a shift in the paradigm of thinking about digital public services. All digital solutions should be user-friendly and user-centred. The guidelines prepared by the agile team for the purpose of improving the e-Citizens platform have largely affected the e-Business project activities. Namely, all of the elements concerning business entities have been integrated into the e-Citizens system and adjusted to the new paradigm: one-stop-shop for all citizens' life events. Now Croatian citizens have a central point for accessing all public services they are entitled to based on their personal identification number (OIB). For some citizens, this may entail using services on behalf of their minor children, in addition to using services on their own behalf. For others, this might mean using services on behalf of an elderly parent or for business purposes. Big breakthroughs were made regarding the user's perspective, as well as clarity, simplicity, and usability of accessible information and digital services in order to decrease the administrative burden for natural and legal persons alike. Therefore, public information and access to e-services for business entities have been incorporated into the redesigned e-Citizens portal as the central point for the government's online communication with citizens (G2C, G2B) for all life events. By October 2022, the e-Citizens system offered the following services to business entities: Registry of beneficial owners, Certificate of no ongoing criminal proceedings, e-Authorisations, e-Driving licence, Delivery of electronic documents for registering a vehicle in Croatia, Labour market, and the Schedule of payment of mandatory fees. In addition, the public information system START was launched in 2020, enabling users, based on the "once-only" principle, a simple and quick e-registration of limited liability companies, simple limited liability companies, and trade businesses, ultimately resulting in considerable time and cost reductions when setting up a business.

2.2.5 Current key challenges of digitally transforming the economy / the digital transition of the economy

The current state analysis of the digital transition of the economy has proved that Croatia is facing challenges requiring additional efforts on its side to maintain the above-average score in comparison with the EU average. Some of the challenges need special mentioning:

- Not enough has been done on a national level in terms of further shifting the tax burden away from la-

14 Startup is a legal entity with at least one permanent employee, USD 10 000 in external funding or revenue, as well as exponential growth potential. The EU is yet to define start-ups https://ec.europa.eu/commission/presscorner/detail/en/IP_22_4273

15 EIF, 2019, EIF invests EUR 32.55m into Fil Rouge Capital II under the Croatian Venture Capital Initiative (definition of the Startup Genome organisation)

16 https://www.cbinsights.com/research-unicorn-companies

17 https://www.zakon.hr/z/829/Zakon-o-poticanju-ulaganja

bour and employee income (e.g. remuneration in the form of allocation of shares and stock options using ESOP models) in order to make the ICT sector more competitive in comparison with other Central and Eastern European countries and focused on keeping the necessary ICT workforce in Croatia, key for an accelerated digitalisation of the Croatian society and economy;

- The legislative framework does not allow a fast and simple enough application of new business models that are technology-based nor does it allow Croatia to become a pilot-project leader in a greater number of Industry 5.0 areas. Namely, due to their relevance, new or amended regulatory solutions require systematic and efficient analyses of potential impacts on enterprises. Developing specialised platforms offering an overview of existing legislation for determining the options for streamlining processes and reducing administrative burden (European Commission has developed the “Fit for Future” platform) could substantially contribute to the aforementioned analyses;
- In addition to IT sector, the financial sector is one of the sectors with the largest impact on the digital transformation of society. The digital transformation of the financial sector, in particular the digitalisation of payment systems and instruments, plays an important role in a quicker uptake of digital changes in the economy and society in general, by developing customer trust in the functioning of e-trade and e-services. Therefore, further encouraging the digitalisation of payment systems and instruments should enable an accelerated digital transformation of the Croatian society;
- (Mis)understanding of the “digital transformation of operations” concept: Many key stakeholders in enterprises, including management, believe that digital transformation equals ERP or implementing off-the-shelf software solutions, pointing to a low level of awareness and understanding of fundamental changes in operations, especially in the SMEs segment;
- Lack of investment in the digital transformation of operations, especially in the SMEs segment (lack of EU grants, inadequate EU grant award procedure, etc.);
- Management that is not agile enough as one of the causes of non-existent digital strategies in enterprises – in general, senior management does not have the time to keep track of changes and launch internal digital transformation processes within the enterprise;
- Insufficient training of employees in all economic sectors on the importance of digital changes and their impact on their industry, their organisation/company, their workplace and themselves as labour market stakeholders.

2.2.6 Current financial framework of the digital transformation of the economy

The existing financial framework for the digital transformation of the economy including measures, projects, and investments defined in the strategic planning acts currently in force has been defined with reference to the:

- State budget and all sources of funding combined in the state budget and budgets that are part of the general government budget;
- Multiannual Financial Framework (MFF) of the European Union (for the 2014-2020 period, implementation till 2023, as well as the 2021-2027, 2028-2034 periods) including:
  - programs funded by: European Regional Development Fund (ERDF), European Social Fund Plus (ESF+), Cohesion Fund, Just Transition Fund (JTF) and European Maritime, Fisheries and Aquaculture Fund (EMFAF) (areas defined in the Competitiveness and Cohesion and Efficient Human Resources national programmes);
  - Recovery and Resilience Facility (areas defined in the National Recovery and Resilience Plan 2021-2026).

The National Recovery and Resilience Plan (NPOO) 2021-2026. 20.4% of funds were allocated for the digital transformation of our society, given that all six components of the NPOO emphasize the importance of further digitization. The NPOO component "Economy" defines the following areas:

- C1.1 Resilient, green and digital economy;
- C1.2 Energy transition for a sustainable economy;
- C1.3 Improving water and waste management;
- C1.2 Energy transition for a sustainable economy;
- C1.4 Development of a competitive, energy-sustainable and efficient transport system;
- C1.5 Improving the use of natural resources, and strengthening the food supply chain;
- C1.6 Developing sustainable, innovative and resilient tourism.

A portion of the reforms and initiatives within the cited areas support the green and digital transition.

A portion of the relevant reforms and investments regarding digitalisation of the economy, with accompanying amounts and planned implementation period, are provided in the table below:

Table 2: The table refers to the current period and provides the amounts allocated for reforms and investments in the area of digitalisation of the economy from the National Recovery and Resilience Plan 2021-2026 (Source: NRRP 2021-2026)

Reforms, programmes, and investments		Implementation period	Estimated cost (in HRK)
C1.1.1. R1-I2	Continuing administrative and fiscal burden relief	2021 - 2025	33.000.000
C1.1.1. R4-I2	Financial instrument for micro, small and medium-sized enterprises	2021 - 2026	1.100.000.000
C1.1.1. R6-I1	Transforming and strengthening the competitiveness of cultural and creative industries	2021 - 2026	250.000.000
C1.1.1. R6-I2	Establishment of media fact-checking and public disclosure system	2021 - 2026	50.000.000
C1.1.2. R3-I1	Preparing strategic documents for digitally transforming the economy and artificial intelligence	2021 - 2022	3.000.000
C1.1.2. R3-I2	Digitalization vouchers	2021 - 2026	75.000.000
C1.1.2. R3-I3	Grants for digitalisation	2021 - 2026	206.000.000
C1.1.2. R4-I1	Support for digital innovation hubs	2021 - 2022	56.500.000
C1.2. R1-I1	Revitalising, building and digitalising the energy system and supporting infrastructure to decarbonise the energy sector	January 2021 to June 2026	2.921.889.188
C1.3. R1-I2	Public water supply development programme	February 2020 to June 2026	1.039.000.000
C1.4. R1-I1	Electronic tolling system	June 2022 to December 2025	493.897.054

C1.4. R1-I2	Improving the system of exercising the rights of persons with disabilities in the field of mobility	March 2021 to December 2023	15.431.700
C1.4. R1-I3	National road transport electronic storage and data exchange system (NSCP)	March 2021 to May 2026	57.725.000
C1.4. R1-I4	Reporting control system for road passenger and freight transport	March 2021 to December 2024	14.167.500
C1.4. R1-I5	Monitoring of transport of dangerous goods by road (e-ADR)	March 2021 to December 2024	18.607.500
C1.4. R2-I7	Upgrading of the IT and sales system and modernization of trains with the IT system	January 2022 to December 2024	48.200.000
C1.4. R5-I2	Research, development and production of new mobility vehicles and supporting infrastructure	May 2021 to March 2026	1.485.000.000
C1.4. R5-I3	Co-financing programme for the purchase of new alternative fuel vehicles and the development of alternative fuel infrastructures in road transport	October 2021 to June 2026	277.695.360
C1.5. R4	Improving food donation systems	March 2021 to December 2023	2.000.000
C1.5. R2-I2	Agricultural land monitoring programme	June 2021 to June 2025	13.000.000
C1.5. R3-I1	Deployment of digital public services	February 2020 to September 2025	14.000.000
C1.5. R3-I2	Smart agriculture	February 2020 to December 2025	50.000.000
C1.5. R3-I3	Traceability System	June 2021 to September 2023	13.000.000
C1.6. R1	Enhancing the resilience and sustainability of the tourism sector	February 2020 to June 2026	10.000.000
C1.6. R1-I2	Strengthening the competitiveness of entrepreneurs and fostering the green and digital transition of the tourism sector	February 2020 to June 2026	1.250.000.000

Please note that the NRRP does not entail requirements/projects of the Ministry of Finance, Customs Administration. Namely, the Customs Administration has a particularly important role in the G2B (Government to Business) context, and digitalising G2B services is of utmost importance. The Union Customs Code (UCC) adoption and application as of 1 May 2016 completes the shift by customs to a paperless and fully electronic and interoperable environment with core values of simplicity, service and speed. To achieve this, the Commission and member states need to upgrade the existing e-systems and introduce new applications for completing all customs formalities. In line with this requirement, the Croatian Customs Administration has successfully developed one part of the e-Customs system, and is yet to develop the remaining part of the system. The transition

to the e-Customs system, requiring HRK 560,745,650.00 in allocated funds, is to be completed by 2027. Since the projects of the Customs Administration, on account of different circumstances, have not been incorporated in the NRRP, they will be funded either within the Operational Programme Competitiveness and Cohesion (2021-2027) or by subsequent incorporation in the NRRP, after the interim NRRP performance review.

At the time of writing this document, the Operational Programme Competitiveness and Cohesion 2021-2027 is being finalised, allocating funds necessary to achieve specific objectives concerning the digitalisation of the economy (part of the overall planned assets amounting to HRK 38.6 billion). The Operational Programme Competitiveness and Cohesion 2021-2027 is a continuation of the current financial period and encompasses the experience and knowledge acquired thus far within the Operational Programme Competitiveness and Cohesion 2014-2020, with the territorial aspect strengthened in the new Programme.

2.3 Analysis of strengths, weaknesses, opportunities, and threats of the digital transformation of the economy

Based on our detailed understanding of the digital transformation of the economy completed thus far, we conducted an analysis of internal strengths and weaknesses of the economic sector in the RoC, as well as external opportunities and threats (SWOT analysis) that may affect further digitalisation of the Croatian economy.

The tables below identify key factors for each of the four SWOT categories. Each factor identified has been awarded an impact intensity score within a specific SWOT category (0 – no impact, 10 – very high impact intensity). The intensity score of an individual factor represents the average score attributed to the relevant factor by the representatives of institutions included in the preparation of the Digital Croatia Strategy until 2032. The factors presented in the tables have been ordered based on their final intensity score, from high to low. At the end of every table, the average intensity score was calculated for each of the four SWOT categories.

Table 3: Overview of strengths, weaknesses, opportunities, and threats of the digital transformation of the economy, with an overview of intensity scores per individual factor (source: Deloitte and members of the EWS for the digital transition of the economy)

Strengths		
No.	**Description**	**Intensity (score 1-10)**
1	Croatia is successful in terms of the number of startups and unicorns (per capita) in the EU	8,00
2	Continued increase of the share of the IT sector in the Croatian GDP (2.5% in 2020) and the share in export (a 13% increase in the 2019-2020 period)	7,14
3	Growing interest of the younger Croatian population in STEM careers	7,00
4	Established regional centres of excellence: CEKOM-I, EDIH, ZCI (Centres of Research Excellence)	7,00
5	Regional centres for research and development encouraged by the private sector	7,00
6	Rate of digital literacy of young people (future stakeholders on the labour market) among the highest in the EU (Eurostat, 2020)	7,00
7	Above-average share of enterprises offering their products and services online	6,43
8	Increased access to capital and pricing of capital for developing/acquiring IT companies	6,33

9	Local market has a substantial number of local AI business solutions	6,00
10	Croatia recognised as an attractive digital nomad destination	6,00
11	Free university education of ICT specialists (in comparison with other EU countries with the highest DESI ranking)	5,86
12	Available stable network infrastructure as the basis for digitalising the economy	5,29
13	Croatia is above the EU average in terms of cloud computing	4,86
14	Recognised pupils' interest in AI (Croatia is the first country in the region to offer the course Elements of AI)	4,71
Average intensity score:		**6,33**

Weaknesses

No.	Description	Intensity (score 1-10)
1	Low state efficiency when implementing complex projects (e.g. lack of coordination when making decisions among ministries' stakeholders for interdisciplinary projects)	9,00
2	Insufficient digital literacy of SMEs	8,71
3	Shortage of ICT specialists	8,57
4	High tax charges for highly valuable employees (wording of the Tax Administration: Shifting the tax burden away from digital enterprises)	8,50
5	Disincentives for ESOP models and non-resident operations in the administrative and legal environment	8,00
6	Stakeholders in the economy view financial incentives and other investments as insufficient and inaccessible ("Lack of investments")	8,00
7	Limited capacity to compete on digital products against large international companies	8,00
8	Shortage of experienced professionals for digitally transforming the governing structures in the public and private sector and misunderstanding of the digital transformation concept	7,75

9	Lack of synergy between large enterprises, SMEs, and academic institutions	7,17
10	The (tax) environment does not encourage an accelerated development of the (ICT) startup ecosystem	7,00
11	Absence of cybernetics reference centres	7,00
12	Inefficient management of EU funds on a national level in terms of encouraging projects driving economic growth – fostering digitalisation in the private sector (applications to calls for tender, selection criteria etc.) according to the World Bank's report	6,71
13	Below-average electronic information sharing using the ERP system	6,57
14	Large share of citizens with no basic digital literacy skills	6,00
15	Insufficiently flexible legislative framework fostering business opportunities based on digital technologies (lack of test sandboxes / test centres)	5,40
16	Insufficient use of AI in operations (no automation of road transport in large cities or IoT in agriculture, and lack of a flexible legal framework enabling accelerated, but also low-cost innovation)	5,00
17	Insufficient support in developing / scaling enterprises	4,71
Average intensity score:		**7,18**

Opportunities

No.	Description	Intensity (score 1-10)
1	Establish legal regulations on test environments	9,00
2	Data standardisation framework	8,00
3	Digitalising state-owned enterprises to accelerate the digital transformation of the state and society	8,00
4	Stakeholders' interest in digital transition outside the IT sector	8,00
5	Established funds for fostering green and digital solutions	7,57
6	Large number of EU policies/funds supporting the synergy between the economic and academic community, as well as the digital transition of the economy and green initiatives (applicable for international enterprises)	7,43
7	Relocating production from distant markets in the East to Croatia	7,29

8	Using EU incentives for developing certain advanced technological areas	6,29
9	Croatia's appeal due to its current information security status	5,00
10	EU's regulatory framework in the area of health data sharing – EHDS (secondary use of data) and preparing a regulatory framework for other data sharing	4,57
Average intensity score:		**6,87**

Threats		
No.	**Description**	**Intensity (score 1-10)**
1	Outflow of local ICT specialists and STEM talents	9,86
2	Continued demographic decline adversely affecting employment resources in Croatia's economy	9,29
3	Increased appeal of foreign labour markets on account of better financial terms, but also opportunities to work with very advanced technologies	7,57
4	Introduction of the euro and potential increase in prices of labour and services	7,00
5	System inertia in terms of adjusting tax and parafiscal policies, e.g. local ICT specialists working for foreign enterprises, resulting in no additional economic value in the national GDP.	4,57
Average intensity score:		**7,66**

The following tables detail the calculation of the product of average intensity scores for the four SWOT categories: Strengths x Opportunities; Strengths x Threats; Weaknesses x Opportunities; Weaknesses x Threats

Table 4: Overview of the calculation of the product of average intensity scores for the four SWOT categories: Strengths x Opportunities; Strengths x Threats; Weaknesses x Opportunities; Weaknesses x Threats (source: Deloitte and members of the EWS for the digital transition of the economy)

	Strengths x Opportunities		**Strengths x Threats**
Product	43,49	**Product**	48,47
	Weaknesses x Opportunities		**Weaknesses x Threats**
Product	49,34	**Product**	55,00

Based on the calculations above, we may conclude that the "Weaknesses x Threats" matrix has the highest intensity product (55.00), indicating that the optimum solution would be to focus the strategy for the digital transition of the economy on overcoming weaknesses/deficiencies in order to minimise potential threats. In other words, in Croatia, the digital transition of the economy is characterised by pronounced weaknesses,

while the external environment constitutes a threat, which is why weaknesses need to be mitigated or offset in order to secure a strong defence against potential external threats.

2.4 Vision for the digital transition of the economy

In its National Development Strategy until 2030 (NDS 2030), the Government of the Republic of Croatia defined its vision for the country's development in the following manner:

- In order to realise the objectives detailed in this Strategy and create the Croatia we all want to see in 2030, it is important to put people at the centre and ensure all stakeholders act jointly to achieve the following vision for Croatia in 2030:

In 2030, Croatia is a

competitive, innovative, and secure country of a distinctive identity and culture,

country of preserved resources, high-quality life conditions, and equal opportunities for all.

- *The realisation of set strategic objectives and harmonised implementation of policies in four development areas defined considering the emerging global crisis resulting from the COVID-19 pandemic, which adversely affected the Croatian economy and society, will surely contribute to the achievement of the NSD 2030 vision*

This requires that the citizen-employee be placed at the at the forefront of the digital transition of the economy place, as the driver of innovation and business activities. The goal of the vision for the digital transition of the economy is to increase the level of awareness and understanding of stakeholders in the economy in terms of the fundamental changes in operations driven by digitalisation, especially in the SMEs segment. Consequently, the vision for the digital transition of the economy focuses on creating an "efficient Croatian economy, a leader in digital export", with the following features:

- *The Croatian labour market, science and education sector, and competitive tax policy foster quality* and increase the number of ICT specialists, while retaining talent in Croatia;
- The Croatian public sector provides companies and citizens access all open services and data, so they could use them for creating innovative products and services and offer competitive, verified solutions in Shared Service Centres;
- Croatian enterprises are digitally transformed and competitive;
- Croatia has capitalised on the number of experts with advanced ICT competences and developed innovative ICT products with strong market potential, especially in the export segment;
- Croatia's business, financial, and tax environment has been optimised for developing new (ICT) startups and scaleups;
- Croatia's ICT market is considered competitive in the EU context;
- Croatia has a regulatory, investment, and tax environment that fosters investment of economic operators in key technologies and new industry concepts (e.g. Industry 4.0, Industry 5.0).

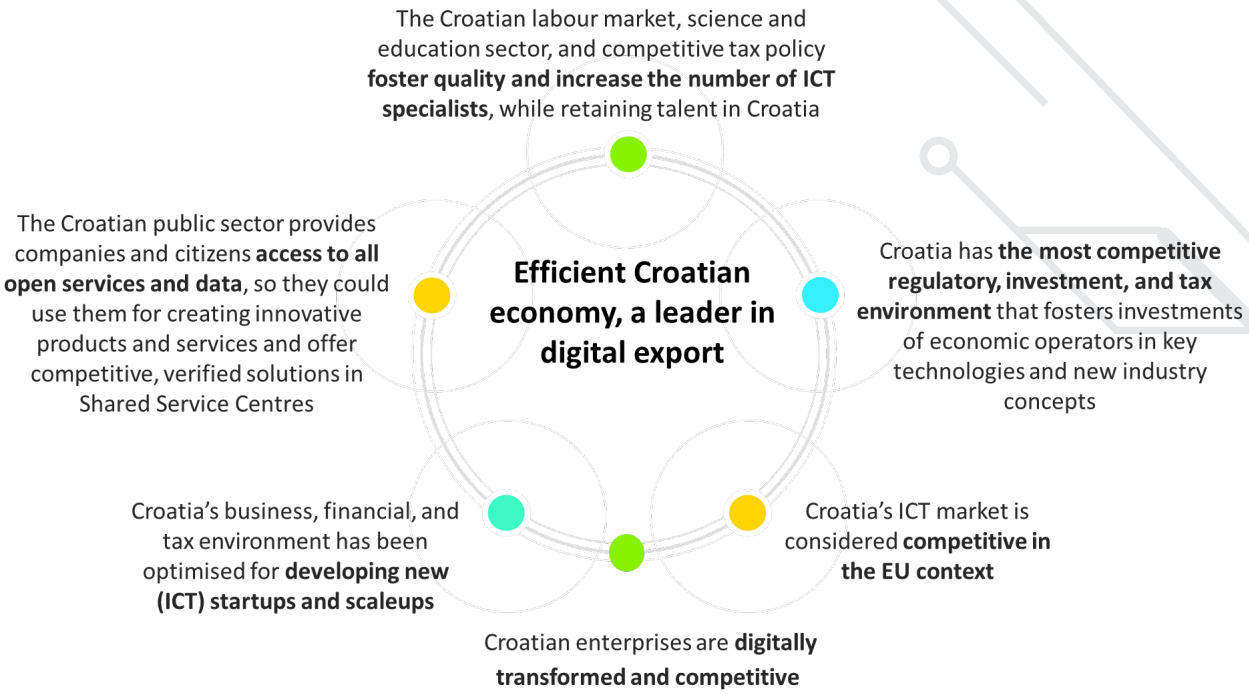


Figure 9: Vision for the further digital transition of the economy with expected outcomes (source: Deloitte)

2.5 Overview of development needs and potential of the digital transition of the economy

When preparing an overview of development needs and potential, it is necessary to understand the national and EU guidelines on digitalisation of the economy.

2.5.1 European Union guidelines

European Commission's Proposal for a Decision of the European Parliament and of the Council establishing the 2030 Policy Programme "Path to the Digital Decade" was adopted on 15 September 2021. The Policy Programme sets out the concrete digital targets which the Union as a whole is expected to achieve by the end of the decade, as first delineated in the 2030 Digital Compass: the European way for the Digital Decade, identifying the digital transition of the economy as one of four cardinal points of EU's digital development. The EU wants to achieve the following digital targets in the context of the digital transition of the economy:

- at least 75% of Union enterprises have taken up cloud computing services, big data, and artificial intelligence;
- doubling the number of unicorns;
- more than 90% of Union Small and Medium Enterprises ('SME') reach at least a basic level of digital intensity.

Furthermore, the EU has outlined its principles for the Digital Decade[18], putting people at the centre of the digital transformation in the European Union. Technology should serve and benefit all Europeans and empower them to pursue their aspirations, in full security and respect of their fundamental rights. Thus the EU commits to:

a) strengthening the democratic framework for a digital transformation that benefits everyone and improves the lives of all Europeans;

b) taking necessary measures to ensure that the values of the Union and the rights of individuals as recognised by Union law are respected online as well as offline;

18 European Declaration on Digital Rights and Principles for the Digital Decade; 26.1.2022

c) fostering responsible and diligent action by all digital actors, public and private, for a safe and secure digital environment;

d) actively promoting this vision of the digital transformation, also in our international relations

2.5.2 Guidelines of the National Development Strategy until 2030

Key development needs have been defined in the National Development Strategy of the RoC until 2030, outlining the following implementation priorities in the area of the digital transition of the economy:

- Encourage digital transformation and application of advanced technologies in both the economy and society;
- Strengthen strategic digital capacities and foster digital maturity of Croatian enterprises to meet the prerequisites for the application of advances technologies;
- Establish standardised networking and business platforms;
- Develop the state information infrastructure;
- Support the creation of new, data-driven digital industries;
- Support the take-up of advanced digital and related technologies, especially in
- small and medium enterprises;
- Secure a widespread use of digital technologies, throughout the economy and society..

2.5.3 Description of development needs/potential

Based on the in-depth current state analysis, relevant EU and national guidelines, analysis of belonging strategic planning acts, and SWOT analysis, as well as the vision of the digital transition of the economy, we have identified the following development needs and potential:

- **Development need/potential 1:** By adjusting the administrative and legislative framework, make the Croatian economy, especially the ICT sector and accompanying startup/scaleup landscape, more competitive in relation to other countries.
- **Development need/potential 2:** Continue incentivizing the promotion and strengthening of (formal, informal, and lifelong) education/training in ICT competences and reducing the administrative and tax burden to attract and hire foreign ICT specialists.
- **Development need/potential 3:** Increase implementation and use of advanced technologies in Croatian enterprises, especially micro, small, and medium enterprises, through targeted training of the management structure (in the public and private sector) in the digital transformation area, including the analysis of similar digitalisation project experience and focus on understanding the digital transformation concept.
- **Development need/potential 4:** Further shift the tax burden away from work and employee income (e.g. remuneration in the form of allocation of shares and stock options / ESOP models) in order to create a stimulating business environment for young companies, especially to retain national ICT specialist and STEM talents.
- **Development need/potential 5:** Increase the business efficiency of SMEs, accounting for 90% of Croatian economic operators, by raising the level of their digital literacy and encouraging business ideas based on digital disruptive technologies.
- **Development need/potential 6:** Expanding public services for entrepreneurs (NIAS for entrepreneurs, public registers, and other open data) to secure a high-quality basis for developing new business models as well as new products and services.

3 Priority area: Digitalisation of public administration

3.1 Introduction and context

Without good public administration, there is no government transparency and accountability. Moreover, the quality of public administration is an important factor of prosperity of every country and the well-being of its citizens. An insufficiently effective public administration does not have adequate capacities to adjust to a challenging environment, promptly and adequately respond to citizens and economic operators' requests, thus generating an uncertain business environment and hindering business performance. Therefore, public institutions, i.e., their services and administrative procedures, should be able to adjust to the emerging trends in services provision and citizens' changing demands and expectations. Furthermore, by investing in digital technologies, public institutions could automate basic administrative tasks, ensure high-quality public services and increase the level of public authorities' transparency and accountability.

Transforming services provision and administrative procedures has usually been connected with three development levers: (a) upgrading the existing modus operandi; (b) improving business processes; and (c) implementing new technologies supporting the provision of public services / administrative procedures and internal business processes of public authorities. These development levers should be used in synergy to secure a comprehensive and efficient improvement of public services. However, many public administrations, including Croatia's, have had an insufficiently dynamic practice of relieving the administrative burden using business processes optimisation and standardisation methods, in combination with underinvestment in ICT infrastructure and digital applications in the past decade, resulting in a suboptimal development of public services and procedures. Therefore, Croatia's public administration is entering a period of intensive streamlining of administrative procedures, business processes and regulations, decreasing the administrative burden for both the economy and citizens, and systematic development of own administrative capacities. This cycle of activities should be further strengthened precisely by digitally transforming public administration and administrative procedures. Namely, digital transformation promotes efficiency and transparency of services and procedures, thus increasing citizens' trust in public administration. In particular, surveys show that Croatian citizens' trust in public administration is very low: "The level of Croatian citizens' trust in public administration is still among the lowest in the EU. A mere 29% of Croatian citizens trust public administration, compared to 49% of citizens of EU member countries"[19]. Implementing new digital technologies could substantially contribute to improving public administration efficiency, improve citizens' life quality, and ultimately increase their trust in public institutions. As detailed in the figure below, digitalisation of public administration could increase the efficiency of all elements (people, processes, outputs) across the value chain of key public administration procedures, subsequently increasing public administration quality through rationalisation, contributing to public institutions' ethics and integrity, and improving their operations in line with the principles of good governance.

19 Public opinion in the European Union, National Report – Croatia, Standard Eurobarometer 94 – Winter 2020-2021, page 7; Table „Do you trust the following media and institutions?"

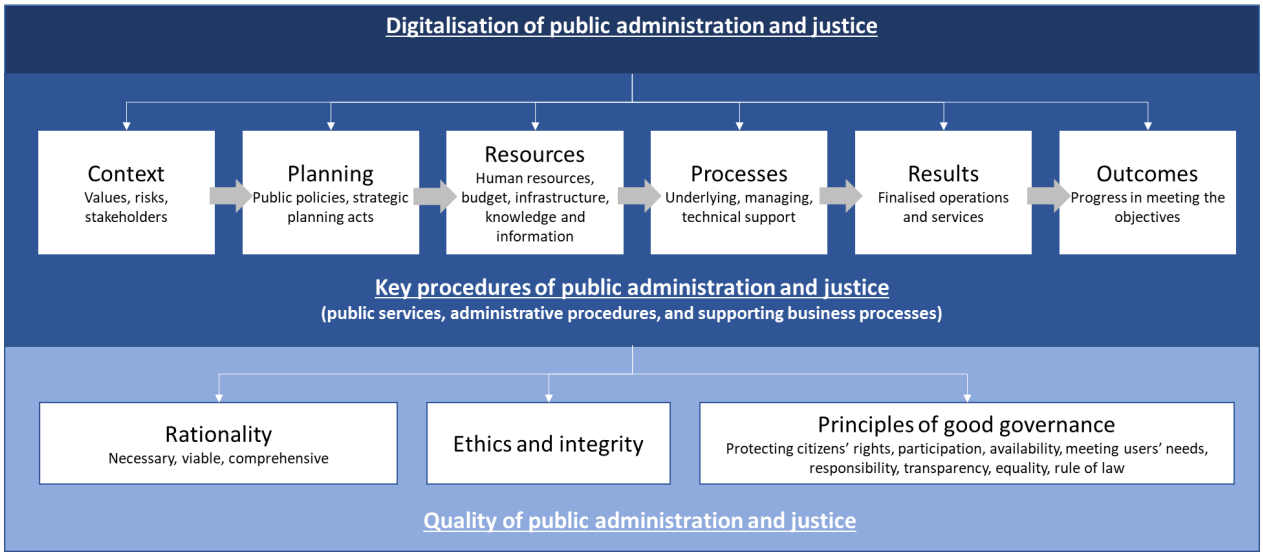


Figure 10: Contribution of digitalisation to increasing efficiency of public administration procedures (source: adapted from the National Plan for Public Administration Development (2022-2027) (Figure 1 on page 8))

A comprehensive digitalisation of public administration should encompass five key areas of its operational model: services / procedures and processes, infrastructure, organisational structure, competences, and coordination and interoperability. Therefore, future development needs regarding digitalisation of public administration should be examined based on the aforementioned operational model areas, as detailed in the following figure:

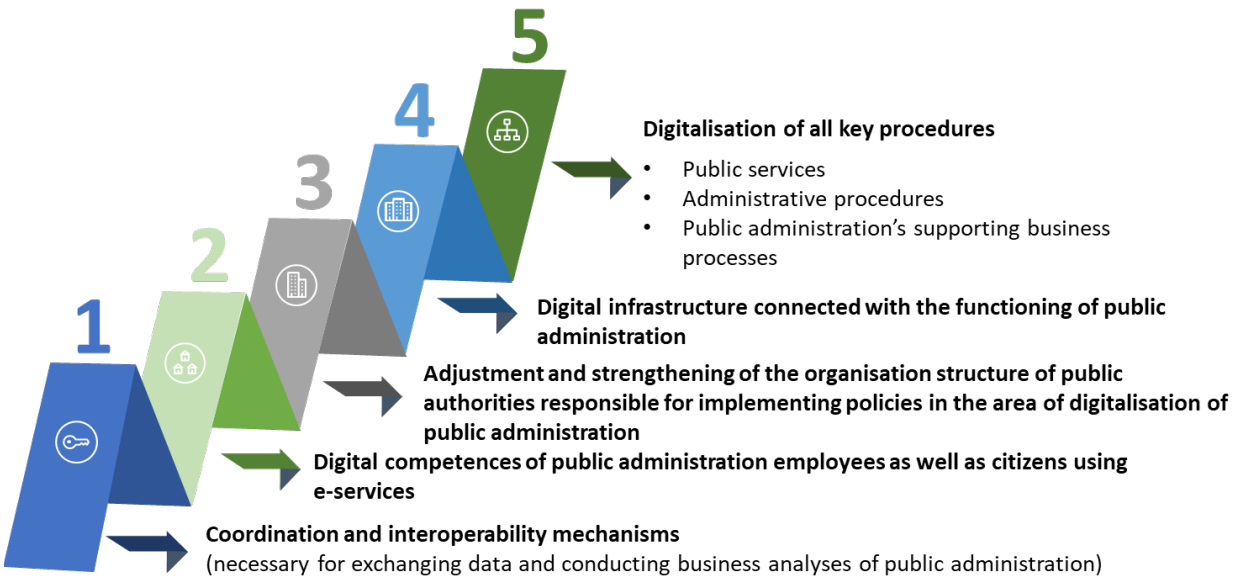


Figure 11: Strategic planning of digitalisation of public administration should involve considering individual needs of the 5 operational model areas (source: Deloitte)

3.2 Current state analysis of the digital transition of the economy

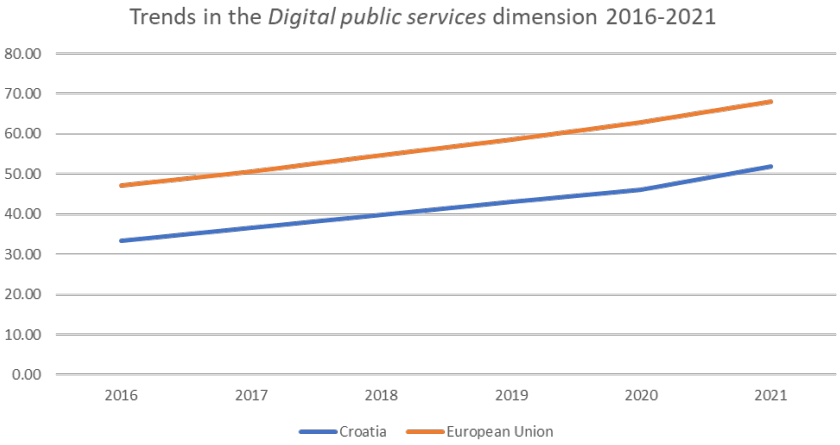
As detailed in the introductory part of this document, the information collected and processed together with discussions held at EWS workshops formed the basis for an in-depth current state analysis using the SWOT method, examining (a) internal strengths and weaknesses, as well as (b) external opportunities and threats

relevant for the digitalisation of public administration. The resulting analysis was later used as the basis for describing development needs/potential detailed in chapter 3.5 *Description of development needs/potential of digitalisation of public administration in the RoC.*

3.2.1 Digitalisation from the perspective of DESI

Since the European Commission uses the Digital Economy and Society Index (DESI) as the main indicator on digital performance and progress made in EU countries in digital competitiveness, DESI is the appropriate starting point for the current state analysis of the digitalisation of public services in Croatia.

According to the last available data, in 2021 the Republic of Croatia performed below the EU average in the Digital public services dimension, i.e., it ranked 24th among 27 EU countries. Moreover, the gap between Croatia and the EU average in this DESI dimension has increased in the 2016-2021 period, as detailed in the figure below.



	2016	2017	2018	2019	2020	2021
Digital public services (HR)	33.40	36.50	39.90	43.10	46.00	52.00
Digital public services (EU)	47.10	50.50	54.80	58.50	62.90	68.10
Gap	-13.7	-14	-14.9	-15.4	-16.9	-16.1

Figure 12: Overview of trends in the Digital public services dimension of the RoC and the EU average in the 2016-2021 period (Source: DESI 2021)

This overview shows that in the observed period Croatia improved its results, i.e., the maturity of its digital public services. However, at the same time, it lags behind most EU member countries. Moreover, of the four DESI key dimensions, Croatia has recorded the weakest results in the Digital public services dimension in the observed period.

In order to better understand the current status of digitalisation of public services in Croatia, this dimension should be further analysed on the level of its 4a e-Government sub-dimension. This sub-dimension entails five indicators:

- **4a1 e-Government users** (% internet users)
- **4a2 Pre-filled forms** (Score (0 to 100))
  - Clarification: The indicator refers to inter-connected registers, i.e., whether users have to resubmit the same data to the public administration.
- **4a3 Digital public services for citizens** (Score (0 to 100))
  - Clarification: The indicator represents the share of steps that can be done online for major life events (e.g. birth of a child, new residence, etc.)

- **4a4 Digital public services for businesses** (Score (0 to 100))
  - Clarification: The indicator assesses to what extent public services for businesses, when starting a business and conducting regular business operations, are available online to local and foreign users. Services provided through a portal receive a higher score, while services that only provide information online (but which require operations to be carried out offline) receive a lower score.
- **4a5 Open data** (% maximum score)
  - Clarification: This composite indicator measures:
    - the presence of an open data policy (including the transposed revised Public Sector Information Directive)
    - the estimated political, social, environmental and economic impact of open data; and
    - features (data functionality, availability, and use) of the national data portal.

The table below provides an overview of the results of all indicators within the 4a e-Government sub-dimension in the 2016-2021 period of the RoC and the EU average. Please note that only the 4a1 e-Government users indicator has remained the same over a longer period of time (as of 2008), while other indicators have been redefined or established in 2021, so it is impossible to compare prior and current scores.

Table 5: Overview of the results of all indicators within thee-Government sub-dimension in the 2016-2021 period of the RoC and the EU average (source: DESI 2021)

	2016	2017	2018	2019	2020	2021
4. Digital public services (HR)	33.40	36.50	39.90	43.10	46.00	52.00
4a e-Government	33.42	36.47	39.92	43.08	46.01	51.95
4a1 e-Government users (% internet users)	49.30	49.20	46.90	48.10	41.20	51.90
4a2 Pre-filled forms (score (0 to 100))	-	-	-	-	-	43.00
4a3 Digital public services for citizens (score (0 to 10(	-	-	-	-	-	60.30
4a4 Digital public services for businesses (score (0 to	-	-	-	-	-	72.70
4a5 Open data (% maximum score)	-	-	-	-	-	82.00
4. Digital public services (EU)	47.10	50.50	54.80	58.50	62.90	68.10
4a e-Government	47.03	50.44	54.69	58.41	62.90	68.02
4a1 e-Government users (% internet users)	57.60	58.20	58.30	60.10	61.10	64.20
4a2 Pre-filled forms (score (0 to 100))	-	-	-	-	-	63.40
4a3 Digital public services for citizens (score (0 to 10(	-	-	-	-	-	74.90
4a4 Digital public services for businesses (score (0 to	-	-	-	-	-	84.40
4a5 Open data (% maximum score)	-	-	-	-	-	0.78

The table shows that the number of e-Government users and the level of online interaction between public authorities and members of the public increase year on year. However, the level of online interaction between public authorities and members of the public is below average, with 51.9% of internet users using e-government services (EU average: 64%). For the indicator measuring the amount of data pre-filled in public service online forms, Croatia scores far below the EU average (score of 43; EU average: 63), recording the largest gap (over 20 points) in relation to the EU average. Croatia is also below the EU average on the availability of digital online services, both on digital services for citizens (score of 60; EU average: 75) and for businesses (score of 73; EU average: 84). In contrast, on open data Croatia performs well, i.e., scores above the EU average

3.2.2 Evaluation of the current state of digitalisation of public services from the eGovernment Benchmark study

In addition to DESI and accompanying indicators, the European Commission uses the *eGovernment Benchmark* study to monitor the progress of digital transformation across Europe. The study tracks the progress of different European countries in transitioning from offline to online public services. In other words, the study looks at how digital platforms for citizens, businesses, tourists and other target groups continue to change and improve. The study places a special focus on reforms and investments of EU member countries under the Recovery and Resilience Facility and monitors their pursuit of the EU Digital Decade ambition. According to the *eGovernment Benchmark*[20], the Croatian e-Government maturity amounts to 61% and the Republic of Croatia ranks 26th of 36 European countries (average of 68 %). The study shows that the Republic of Croatia makes insufficient use of its ICT potential to provide public e-services and other public services. Namely, although some areas in Croatia have been adequately digitalised multiple years ago, the study emphasizes the fact that Croatia is yet to secure important pre-conditions to improve the overall public e-service system, including regularly monitoring technological trends, implementing advanced technological solutions when digitalising services and administrative procedures, as well as upgrading the existing information infrastructure and system, especially in case of central registers systems. According to the same study, quality indicators of digital services provided in Croatia show plenty of room for improvement in the following segments:

a) increase the extent to which services are provided online;

b) use of existing technical and organisational pre-conditions for providing digital services to a larger extent (eID and digital documents – eDocuments);

c) providing more transparent services, informing the user on their expected duration, progress, and legal maximum time limit; and

d) the extent to which information and services are available online, usable, and integrated with eIDs and eDocuments for users from other European countries.

The purpose of improvements in these segments is to secure efficient, streamlined, transparent, and reliable interactions with national and cross-border users. The following figure presents the Croatian e-Government performance across policy priorities of digital transformation, compared with the average of 36 European countries.

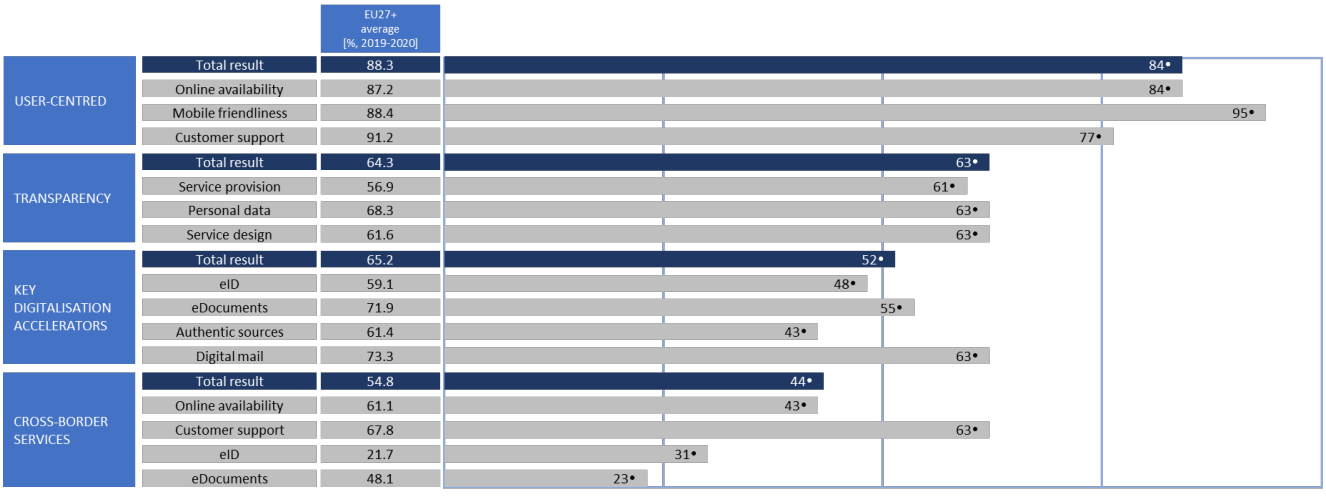


Figure 13: Overview of the Croatian e-Government performance across policy priorities of digital transformation, compared with the average of 36 European countries (source: European Commission, eGovernment benchmark 2021)

We may conclude our analysis of the eGovernment Benchmark report with several examples of digital transformation categories in which Croatia scored a better performance than the EU average, namely:

20 European Commission - eGovernment benchmark 2021: Entering a new digital government era

- tion categories in which Croatia scored a better performance than the EU average, namely:
- Mobile friendliness: indicates if the website provides a service through a mobile-friendly interface; an interface that is 'adopted' to the mobile device;
- Transparency of service delivery: indicates to what extent governments are transparent as regards the process of service delivery;
- eID: indicates if a national eID from country A can be used in country B.

3.2.3 Digital achievements of public administration so far

In addition to the aforementioned indicators and comparative statistics, the current state of digitalisation of public administration may be analysed in absolute terms, i.e., based on specific projects realised and improvements made to direct electronic interactions between public administration and citizens and enterprises.

In April 2022, the e-Citizens system offered 104 active and available e-services. Since its redesign in May 2021, the number of e-Citizens system users sharply increased (+30%) to a total of 1,700,000 users. In the first six months of 2022, the top ten services ranked by the number of users were the following: User inbox, Health Portal, e-Communication, e-Tax Administration, EU Digital COVID Certificate, e-Registry Books, Electronic Record of the Employment and Legal Status, Labour market, e-Register Book for parents, and e-Permit for construction.

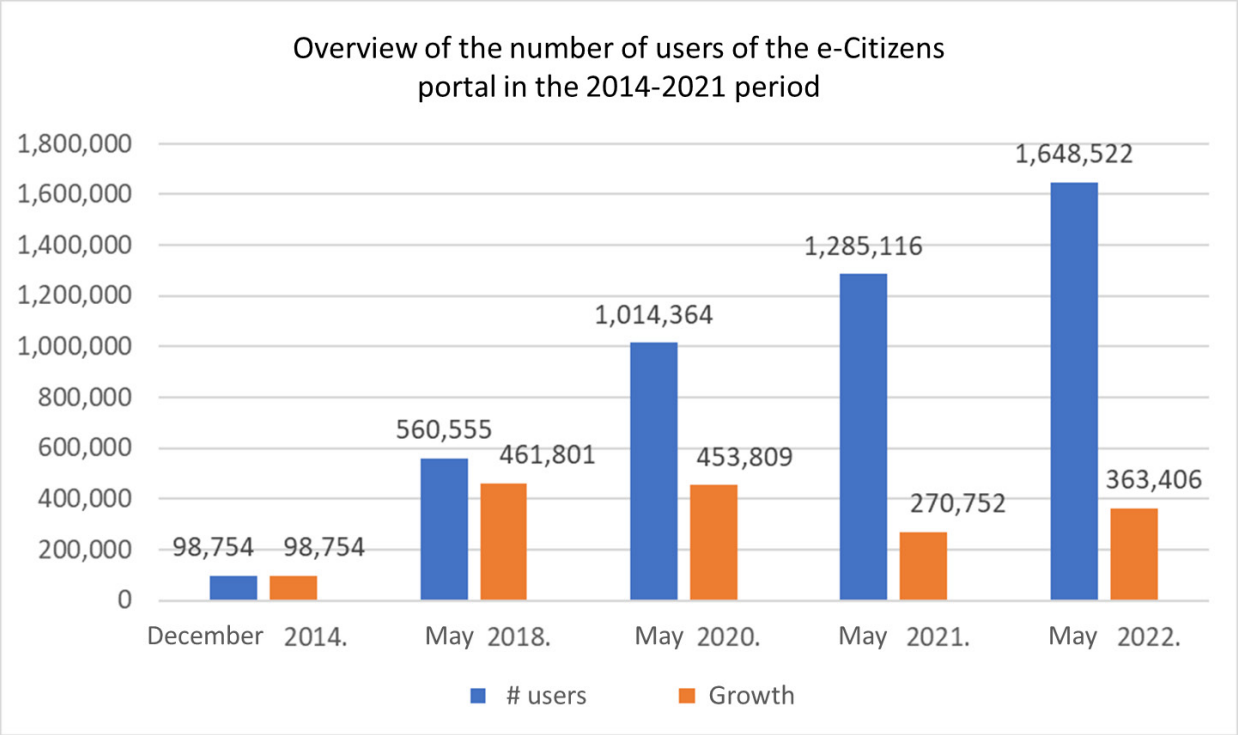


Figure 14: Overview of the number of users of the e-Citizens portal in the 2014-2021 period (source: CSODDS)

In the last two years more than 600.000 new citizens registered on the platform, partly on account of the following events: 1) redesign of the e-Citizens system, making it user-centric, user-friendly, and more intuitive, focused on meeting users' needs; 2) the need to create EU Digital COVID Certificates during the COVID-19 pandemic; and 3) the 2021 Census, enabling citizens to independently (digitally) register themselves and their household members.

Furthermore, development and activation of new e-services substantially contributed to the continuous increase in the number of users. According to the eGovernment Benchmark report, with its 16 new services con-

nected to the system, Croatia is the European leader in terms of new e-services introduced in the 2018-2020 period. It is important to note that the Government of the Republic of Croatia adopted the Standard for Developing Public e-Services in the Republic of Croatia (April 2021), introducing the term user perspective, defining the mandatory e-system components, determining the e-service standards, and standardising the e-service design and management process. In other words, this document sets out rules and guidelines for developing new e-services and managing existing e-services, non-existent thus far.

In the context of administrative procedures, a single information system for supervising the implementation of the General Administrative Procedure Act (GAPA IT system) was established. The GAPA IT system is a unique application system for tracking and monitoring administrative procedures, including data collection and analysis functionalities, thus meeting the main preconditions for increasing the efficiency of administrative procedures, as well as standardising and improving the quality of public services. Currently, functionalities are being developed to enable delivering data to parties' e-Citizens user inbox on the changes to the administrative procedures they are involved in.

As for business entities, the e-Citizens platform, in addition to delivering services to citizens, offers government-to-business (G2B) e-services. Namely, public information and access to e-services for business entities have been incorporated into the e-Citizens portal as the central point for the government's online communication with citizens for all life and business events. Some of the services provided to business entities are the following: Labour market, Registry of beneficial owners, Certificate of no ongoing criminal proceedings, e-Authorisations, e-Driving Licence, Delivery of electronic documents for registering a vehicle in Croatia etc. In addition, the public information system START was launched in 2020, enabling users, citizens of the Republic of Croatia, a simple and quick e-registration of limited liability companies, simple limited liability companies, and trade businesses. START's advantages are the following: single point of contact for communicating and exchanging information, data collection based on the "once-only" principle and automated data exchange between institutions and banks, single e-form securing user independence, with no need to involve an intermediary (public notary), and keeping users informed on the status of their request, ultimately resulting in considerable time and cost reductions when setting up a business.

The justice system has also continuously invested in developing new services and applications, epitomised, from the citizens' point of view, by the establishment and functioning of the e-Communication system, enabling lawyers and other participants in court proceedings, in line with special requirements and via the e-Citizens platform, to access court files of cases and send submissions and attachments to the court. Furthermore, the e-Case system enables citizens access to data about the progress and dynamics of case resolution in both regular and appellate procedures. In terms of digitalisation of internal processes of the justice system, an integrated system for managing court cases – e-Filing – used by all Croatian courts has been established. Furthermore, the Case Tracking System (CTS) of the State Attorney General of the Republic of Croatia used by all county and municipal state attorney's offices, State Attorney's Office of the Republic of Croatia, and the Office for the Suppression of Corruption and Organised Crime (USKOK), is constantly being upgraded. A single service point for accessing land registry and cadastre data was set up as part of the Joint Information System (JIS). All regular and specialised courts, as well as the Supreme Court of the Republic of Croatia, use a database of case law called "SupraNova". Anti-corruption measures were used to implement the System for electronic management and disclosure of asset declarations of judicial officials. The Prison and Probation Information System (PPIS) was established as a single application system securing a unified approach, central reporting, electronic communication with the PIN node, information system of the Ministry of the Interior, and criminal and offence records for all law enforcement authorities and probation offices.

As for the digital infrastructure of public administration, substantial developments were recorded in the previous period, especially in the context of the Shared Service Centre (SSC), also known as the "state cloud". The purpose of the SSC is to provide all public authorities with a joint, reliable, and scalable ICT, cloud-based infrastructure, aimed at modernising and rationalising the public digital infrastructure, as well as strengthening its security and resilience. By 2022, more than 300 public institutions, including ministries, public authorities, hospitals etc. have successfully migrated their systems to the SSC and use at least one SSC service, thus realising the Government's goal to have integrated 300 institutions into the state cloud by the end of 2030.

Substantial efforts have been made in the previous period in terms of digitalising public administration's supporting business processes. In particular, the Decree on Office Operations stipulating the obligation to adjust, i.e. set up, information systems for office operations was adopted. This Regulation enables comprehensive

administrative operations in electronic format and stipulates a functional obligation to connect and exchange data with other IT systems managed separately for certain administrative areas, as well as the option to connect and exchange data with the GAPA IT system. In order to further digitalise business processes and electronic operations of national and public authorities, a platform with e-services for e/m-Signature and e/m-Stamp was set up in 2022. This platform enables electronic and mobile signing of documents, as well as authorising and examining the validity of electronic signatures and stamps. By June 2022, 33 government and public administration institutions, that is local and regional self-government units, joined the platform.

In the context of coordination and interoperability mechanisms necessary for exchanging data and conducting business analyses of public administration, the development of the Government Service Bus, as the central point for a secure data exchange, has continued. Until now, 17 public authorities have successfully integrated 23 registers and records into the production environment and 28 registers and records into the test environment of GSB to ensure a secure data exchange between public authorities and institutions with the legal right to exchange data with central and public registers. Thirteen authorities/institutions who downloaded data for their business processes have been integrated into the GSB. A total of 39 web-services / Application Programming Interfaces (APIs) were integrated for the purpose of downloading data. The aforementioned results represent steps towards achieving the objective of establishing a central interoperability system in order to consolidate central registers and integrate them into the Government service bus, alongside a central interoperability portal in line with the European Interoperability Framework[21], while preparing interoperability standards and policies.

All of the aforementioned developments in the context of realising digital projects in public administration are aligned with DESI, their score increasing from 33.4 (in 2016) to 52.0 (in 2021), demonstrating an increase in maturity of digital public services and administrative procedures in the last 5 years. However, compared with the average of EU countries whose DESI increased at a faster pace in the equivalent period, Croatia is not being digitalised fast enough, i.e., lags behind the average digital development of most EU countries.

3.2.4 Key challenges of digitalisation of public administration

All dimensions of the public administration operational model (including: key procedures, infrastructure, organisational structure, employees/competences, and coordination and interoperability mechanisms, as detailed in Figure 5 herein) are facing challenges, which is why Croatia is currently lagging behind most EU countries in terms of average digital growth. Some of them need special mentioning, such as: granular approach to digitalisation of services, lack of interconnection and interoperability of central registers.

Namely, in the previous years, digitalisation of public services used a granular approach, i.e., parts of certain procedures or offline public services were digitalised. There was no holistic approach to digitalisation, including an analysis of the public service customer journey, followed by reshaping business processes through procedure streamlining, and ultimately the redesign of the service accompanied by amendments to regulatory and administrative requirements, as key preconditions for digitalising the service as a life event. It was not until 2021 that the Standard for Developing Public e-Services in the Republic of Croatia was adopted, committing government and public authorities to design user-centred services and prioritise holistically resolving citizens' issues.

Furthermore, one of the challenges of the previous period was to make better use of already activated digital functionalities. Many digital functionalities have already been established, but their potential has not yet been tapped, even though they might result in numerous benefits for public authorities, citizens, and business entities. These digital functionalities entail e-Invoices, digital certificates of electronic identity cards, etc.

As for the amount of data pre-filled in public service online forms, Croatia scores far below the EU average, pointing to the insufficient use of the "once-only" principle. Citizens are required to resubmit the same data to different public authorities, partially due to the lack of interconnection and interoperability of central registers of all government sectors. The exchange of digital data among public authorities and the use of data available to public authorities and the general public is not satisfactory. Despite the legal obligation to secure the availability of collected authentic data from all public authorities' central registers, all legal obstacles to their integration and interconnection into a central interoperability system have not yet been removed. The time required by the custodian of the register to provide consent to access data in the register has been recognised

21 https://eur-lex.europa.eu/legal-content/HR/TXT/HTML/?uri=CELEX:52017DC0134&qid=1490707558116&from=EN

as a problem in practice. Namely, no public authority developing an e-service, required to retrieve data from other public authorities' registers, has automated access to individual registers. Instead, the relevant authority is required to fill out forms proving the justification/need to retrieve data from the relevant register. A national interoperability framework, as well as further improving the relevant organisation and managing structure of the central interoperability system, would certainly help resolve this situation.

Another important challenge that needs addressing is the lack of a central data repository supporting data extraction, entry, and transformation, as well as storage of data in appropriate format. Currently, public authorities' digital information (including metadata) is difficult to search, disabling its re-use in machine-readable and open format by citizens, businesses, and the academic and research community. Furthermore, even if data was adequately structured and classified, public authorities should still procure and start using advanced technologies and available big data processing tools in their decision- and policy-making processes.

Life events and public services entail all prescribed interactions between users (citizens and businesses) and public authorities on all levels (state, municipality, county). The aim is to secure efficient service provision to users that meets their expectations. Administrative burden for citizens means costs and time prescribed by laws and regulations in terms of life events, particularly for citizens that lack digital skills and competences. The Croatian public administration still has a predominantly traditional approach to organising its operations, based on separate functions in the relevant hierarchy (function approach). Therefore, public services are to a certain extent siloed, addressing particular parts of procedures, then integrated into a comprehensive service by users. In addition, public authorities are currently facing a large administrative burden caused in part by suboptimal and manual business processes based on repetitive activities and numerous administrative procedures. Such business processes have an adverse effect on efficiency and perceived transparency, user satisfaction, and welfare of public administration employees. Thus, a systematic analysis of supporting business processes, i.e., digitalisation based on established scenarios for process optimisation or re-engineering, is necessary.

Considering the scope and complexity of digitally transforming Croatia, insufficient attention has been paid to strengthening and stabilising the managing and operational implementation structure of authorities responsible for digitalising public administration. Namely, in order to digitalise public administration, a special structure called the Administration for e-Croatia of the Ministry of Public Administration was established, while the Central State Office for the Development of the Digital Society (CSODDS) has been given the coordinating role. After July 2020, the Administration for e-Croatia was merged with CSODDS, which assumed the role of coordinator of digitalisation in all government and public authorities[22]. In addition, the Ministry of Justice and Public Administration also established the Independent Sector for Digitalisation of Justice and Public Administration, which was assigned the responsibility of performing tasks in the area of digitalisation of public administration[23]. Furthermore, Government of the Republic of Croatia founded the national Council for the State Information Infrastructure[24] in order to monitor and coordinate the development of state information infrastructure and digital society, as well as the National Digital Economy Council[25] to establish an active stakeholder partnership for developing the digital economy, defining goals and priorities for the creation of the digital single market. Moreover, the Government of the Republic of Croatia established a team for monitoring and implementing digitalisation policies. Within this team, the Special Adviser to the Prime Minister of the Republic of Croatia, as the driver of agile operations, and the Agile Team Leader play particularly important roles in digitalising public services, aimed at organising, monitoring, and implementing large digitalisation projects in the public sector. Lack of clearly defined responsibilities and cooperation mechanisms among the relevant authorities have posed a challenge for harmonising plans and coordinating operational implementation activities. Even though all of the aforementioned authorities had been established, no single permanent structure or a steering committee could, with the help of the Prime Minister's Office, continuously support a cross-cutting digital reform, coordinate the implementation of different public administration digitalisation projects, while securing interdisciplinary and interinstitutional cooperation.

A key limiting factor to digitalisation thus far has been the low level of digital competences of public administration employees in charge of identifying priority digitalisation areas and implementing e-service development projects. In particular, reforms in the area of digitalisation of public administration have not sufficiently focused

22 The role of the CSODDS has been defined in the Act on the Structure and Scope of State Administration Bodies (OG 085/2020)

23 Regulation on the Internal Organisation of the Ministry of Justice and Public Administration (OG 97/2020)

24 Decision on the Establishment of the Council for the State Information Infrastructure (OG 5/2018)

25 Decision on the Establishment of the National Digital Economy Council (OG 62/15 and 78/17)

on employees' lifelong learning, especially strengthening their digital competences so they would be able to implement strategic guidelines and legal requirements in the area of digitalisation of public administration (e.g., digital accessibility, cybersecurity, etc.). For the purpose of developing modern information infrastructure and digitalisation, in addition to digitally aware state and public officials, public administration has to employ experienced ICT specialists, capable of devising digital projects, successfully implementing them (as implementers or supervisors), and ultimately maintaining the relevant infrastructure. However, the key obstacle to attracting and retaining ICT specialists in public administration is the gap between their income and the income of ICT specialists working in the private sector.

From the user perspective, there is a pronounced lack of adequate informational and training arrangements for citizens and enterprises in the area of existing e-services, resulting in the non-use of many available e-services.

3.2.5 Current financial framework for the digitalisation of public administration

The existing financial framework for the digitalisation of public administration including measures, projects, and investments defined in the strategic planning acts currently in force has been defined with reference to the:

- State budget and all sources of funding combined in the state budget and budgets that are part of the general government budget;
- Multiannual Financial Framework (MFF) of the European Union (for the 2014-2020 period, implementation by 2023, as well as the 2021-2027 period) including:
  - programs funded by: European Regional Development Fund (ERDF), European Social Fund Plus (ESF+), Cohesion Fund, Just Transition Fund (JTF) and European Maritime, Fisheries and Aquaculture Fund (EMFAF) (areas defined in the Competitiveness and Cohesion and Efficient Human Resources national programmes);
  - Recovery and Resilience Facility (areas defined in the National Recovery and Resilience Plan 2021-2026).

The National Recovery and Resilience Plan 2021-2026 (NRRP) allocated 20.4% funds for the digital transformation of our society as a whole, since all six NRRP components emphasize the relevance of further digitalisation of each of them. The NRRP defined the "Public administration, justice, and state property" component and the "C2.3. Digital transformation of society and public administration" sub-component, with HRK 287 billion allocated for implementing 4 reforms and 21 belonging investments. Moreover, according the National Plan for Public Administration Development (2022-2027), HRK 1.287.172.802 have been allocated for digitally transforming public administration.

A portion of the relevant reforms and investments regarding digitalisation of public administration, with accompanying amounts and planned implementation period, are provided in the table below:

Table 6: The following table refers to the current period and provides the amounts allocated for reforms and investments in the area of digitalisation of public administration from the National Recovery and Resilience Plan 2021-2026 (Source: NRRP 2021-2026)

Reforms, programmes, and investments	Estimated cost	Implementation period
C1.1.1. R1-I1 Digitalisation of government and public administration services provided to the business sector (G2B)	HRK 45,000,000	2021-2024
C1.5. R3-I1 Deployment of digital public services	HRK 14,000,000	2020-2025

C2.1. R1-I1 Optimisation, standardisation and digitalisation of processes for strategic planning and impact assessment of public policies	HRK 8,744,000	2021-2022
C2.2. R1-I1 Centralised selection system	HRK 14,513,856	2021-2024
C2.2. R1-I2 E-State exam	HRK 5,524,012	2021-2022
C2.2. R2-I1 Improving the remuneration system in the state administration and public services	HRK 51,170,492	2021-2023
C2.2. R2-I2 Introduction of hybrid workplace access model – smartworking	HRK 74,713,361	2021-2024
C2.2. R3-I1 Deployment of digital infrastructure and public administration services by developing a conservation basis system	HRK 80,999,988	2021-2026
C2.2. R3-I2 Improving digital public sector infrastructure and services by developing the National Archive Information System and strengthening the national archives network	HRK 265,015,717	2021-2026
C2.2. R3-I4 Deployment of digital infrastructure and public administration services by developing a conservation basis system	HRK 265,015,717	2021-2026
C2.3. R1 Digital Croatia Strategy and strengthening interinstitutional cooperation and coordination for a successful digital transition of society and the economy	HRK 690,710	2021-2023
C2.3. R2-I1 Establishment of a central interoperability system	HRK 105,120,548	2021-2026
C2.3. R2-I2 Establishment of a central data repository and business analytics system	HRK 125,091,935	2021-2026
C2.3. R3-I1 Upgrading the Shared Service Centre	HRK 259,951,812	2021-2026
C2.3. R3-I2 Strengthening the capacity of the police to tackle cybercrime	HRK 13,653,976	2021-2024
C2.3. R3-I3 Establishing a one-stop-shop for all e-public helpdesk services	HRK 31,245,508	2021-2024
C2.3. R3-I4 Consolidation of CEZIH health information infrastructure systems	HRK 100,500,049	2021-2025
C2.3. R3-I5 Digital Identity Card Deployment Project	HRK 6,851,252	2020-2022
C2.3. R3-I6 Investment in state information infrastructure networks	HRK 236,303,665	2021-2026
C2.3. R3-I7 Improvement of the system of spatial planning, construction and state assets through digitalisation	HRK 179,990,082	2021-2026
C2.3. R3-I8 Creation of a digital mobile platform	HRK 32,123,876	2021-2024

C2.3. R3-I9 Establishing a new platform for the Electronic Public Procurement Bulletin of the Republic of Croatia	HRK 11,522,505	2021-2024
C2.3. R3-I10 Digitalisation and computerisation of the CES (eHZZ)	HRK 57,462,803	2020-2026
C2.3. R3-I11 ICT support modernisation of HZMO (eHZMO)	HRK 128,700,592	2021-2026
C2.3. R3-I12 Digitalisation of the HZMO archives (eArhiva)	HRK 46,706,984	2021-2026
C2.3. R3-I13 Digital transformation of the Tax Administration	HRK 426,247,478	2021-2026
C2.3. R3-I14 Implementation of the non-cash payment system in the economy through e-Invoices with integrated e-archives and active tax accounting	HRK 106,935,004	2021-2024
C2.3. R3-I15 Setting up tourism application solutions with the aim of administratively relieving entrepreneurs and transforming the tourism model towards sustainability	HRK 39,999,047	2022-2025
C2.3. R3-I16 Digitalisation of processes in sport and recreation at local and regional level	HRK 11,249,009	2022-2026
C2.3. R4 Strengthening connectivity as a cornerstone of the digital transition of society and the economy	HRK 3,013,800	2021-2026
C2.3. R4-I1 Implementation of projects under the National Framework Programme for the Development of Broadband Backhaul Infrastructure in Areas Lacking Sufficient Commercial Interest for Investments	HRK 799,999,997	2021-2026
C2.3. R4-I2 Construction of passive electronic communications infrastructure	HRK 147,338,008	2021-2026
C2.5. R1-I1 Enhancing the Court Case Management System (e-Filing)	HRK 21,930,000	2021-2024
C2.5. R1-I2 Improvement of land register information system and cadastre	HRK 23,435,600	2021-2026
C2.5. R1-I3 Develop a toolkit for the public publication and search of court decisions	HRK 1,700,000	2021-2023
C2.5. R1-I6 Stable and resilient IT infrastructure for the Justice Information System	HRK 97,750,000	2021-2025
C2.6. R2 Increasing the efficiency, coherence and openness of authorities in the fight against corruption through digitalisation, enhancing transparency and improving coordination	HRK 6,000,000	2022-2026
C2.6. R1-I2 Digitalisation of the Ethics System of Civil Servants	HRK 2,400,000	2022-2026
C2.6. R1-I3 Improving the asset declarations IT system of state officials	HRK 400,000	2022-2024

C4.3. R1-I1 Improving the digitalisation of the social benefits system between the national and local levels	HRK 1,000,000	2022-2025
C4.3. R1-I2 Development of a web application on the possibility to receive social benefits at the national level	HRK 5,000,000	2022-2025
C4.3. R3-I2 Improving the digitalisation of social welfare system and connecting social welfare centres with social service providers	HRK 5,000,000	2022-2024
C4.3. R3-I3 Improving the digitalisation of social welfare system and implementing system on methodology to calculate the prices of social services	HRK 5,000,000	2022-2023
C5.1. R4-I2 Introduction of a unit therapy distribution system in 40 Croatian hospitals	HRK 130,000,000	2021-2026
C5.1. R4-I3 Digitalising medicine tracking through healthcare institutions at secondary and tertiary levels of healthcare	HRK 18,900,000	2021-2026
C5.1. R4-I4 Development of a medicines shortages monitoring and prevention system in Croatia	HRK 10,750,000	2021-2026
C5.1. R4-I5 Introducing a treatment outcome monitoring system for outpatient care with a focus on chronic patients in public pharmacies	HRK 4,300,000	2021-2026
C5.1. R5-I2 TELECORDIS	HRK 4,200,000	2021-2026
C5.1. R5-I3 Teletransfusion	HRK 11,984,000	2021-2026
C6.1. R3 3 Increasing efficiency, reduction of administrative burden and digitalisation of the renovation process	HRK 30,000,000	2021-2026

At the time of writing this document, the Operational Programme Competitiveness and Cohesion 2021-2027 is being finalised, allocating funds necessary to achieve specific objectives concerning the digitalisation of public administration. The following table provides an overview of relevant objectives and amounts allocated for funding measures and projects contributing to the following specific objectives: 1. (ii) Reaping the benefits of digitalisation for citizens, companies, research organisations and public authorities and 4. (v) Ensuring equal access to health care and fostering resilience of health systems, including primary care, and promoting the transition from institutional to family-based and community-based care.

Table 7: The following table refers to the current period and provides the amounts allocated for realising specific objectives in the area of digitalisation of public administration from the Operational Programme Competitiveness and Cohesion 2021-2027

Specific objective	Code	Amount
1. (ii) Reaping the benefits of digitalisation for citizens, companies, research organisations and public authorities	016 ICT solutions for public administration, e-services, applications	**EUR 66,000,000**

4. (v) Ensuring equal access to health care and fostering resilience of health systems, including primary care, and promoting the transition from institutional to family-based and community-based care	131 Digitalisation of health care	**EUR 8,500,000**

Furthermore, a portion of funds necessary for further computerizing the health care is to be allocated from the State budget in the 2025-2028 period. The relevant health care computerization projects are provided in the table below.

Table 8 Overview of health care computerization projects funded from the State budget

Project	Estimated cost	Time period
e-Radiology – single system enabling fast and purposeful exchange of medical radiological information (radiology imaging and findings) between BIS and CEZIH information systems	**HRK 22,000,000**	2025-2028
Complete integration of CEZIH/BIS and data exchange (other than oncological data)	**HRK 70,000,000**	2023-2025
Development of tools for tracking treatment outcomes and establishment of a rare disease register	**HRK 5,000,000**	2024-2025
Development of AI solutions for patient triage	**HRK 25,000,000**	2025-2028
Platform for consulting and exchanging data within CEZIH (hospital information and CEZIH data)	**HRK 20,000,000**	2025-2028
Speech2Text – application for helping hospital doctors enter clinical findings into BIS by dictating instead of typing	**HRK 95,167,788**	2026-2027

3.3 Analysis of strengths, weaknesses, opportunities, and threats of the digitalisation of public administration

Based on our detailed understanding of the status of digitalisation of public administration completed thus far, we conducted an analysis of public administration's internal strengths and weaknesses in terms of digitalisation, as well as external opportunities and threats that may affect further digitalisation (SWOT analysis).

The tables below identify key factors for each of the four SWOT categories. Each factor identified has been awarded an impact intensity score within a specific SWOT category (0 – no impact, 10 – very high impact intensity). The intensity score of an individual factor represents the average score attributed to the relevant factor by the representatives of institutions included in the preparation of the Digital Croatia Strategy until 2032. The factors presented in the tables have been ordered based on their final intensity score, from high to low. At the end of every table, the average intensity score was calculated for each of the four SWOT categories.

Table 9: Overview of strengths, weaknesses, opportunities, and threats of the digitalisation of public administration, with an overview of intensity scores per individual factor (source: Deloitte and members of the EWS for the digitalisation of public administration)

Strengths

No.	Description	Intensity (score 1-10)
1	NRRP secured a historically high amount of funds for digitally transforming public administration and society (HRK 2.87 billion)	**8,56**
2	Provided comprehensive legal framework enabling and encouraging electronic communication and digitalisation of administrative and other procedures and business processes of bodies governed by public law (Act Amending the General Administrative Procedure Act and the new Decree on Office Operations)	**7,78**
3	Continued increase in the number of e-service users	**7,56**
4	Established operational model of accelerated digitalisation of public services (Standard for Developing Public e-Services adopted, agile team concept established, framework for introducing a quality system into public administration defined, etc.)	**7,44**
5	Successful development of the e-Citizens system and the START platform aimed at digitalising business services	**7,00**
6	Fast-paced creation and launching of new e-services (European leader in terms of the number of new e-services introduced (+16) in the 2018-2020 period)	**6,89**
7	Existing digitalisation experience from individual sectors (health, education) may be used for increasing digitalisation levels of other systems	**6,44**
8	Systems of 300 institutions migrated to the Shared Service Centre (SSC) (ahead of schedule)	**6,33**
9	Openness of public authorities' data above the EU average (DESI segment 4a5 – Open data: Croatia = 0.82; EU = 0.78)	**6,11**
Average intensity score:		**7,12**

Weaknesses

No.	Description	Intensity (score 1-10)
Digitalisation of key procedures		
1	Lack of streamlining administrative procedures and redesigning public services by placing the citizen at the forefront before digitalising the service itself (excessive digitalisation of traditional, "paper-based" processes instead of life events)	**8,67**
2	No practice of coordinated prioritisation of public services to be digitalised (in line with the Standard for Developing Public e-Services in the Republic of Croatia)	**8,67**

3	Croatia scores far below the EU average for the (DESI) indicator measuring the amount of data pre-filled in public service online forms – insufficient use of the "once-only" principle (citizens are required to resubmit the same data to different public authorities already have in their records)	**8,00**
4	Lack of analysis of the public service customer journey, to be used for decreasing unnecessary service complexity and increasing the use of the developed application	**8,00**
5	Public administration has many digital functionalities whose potential has not yet been tapped, even though they might result in numerous benefits for public authorities, citizens, and business entities (e.g., wider application of e-Invoices and digital certificates of electronic identity cards, etc.)	**7,89**
6	Insufficient use of big data processing tools in decision- and policy-making processes of public administration (including decisions on increasing efficiency)	**7,89**
7	Insufficient transparency regarding the status of a particular administrative procedure – expected duration, progress, and legal maximum time limit	**7,44**
8	Availability of digital public services for citizens and businesses below the EU average (DESI)	**7,22**
9	Lack of a one-stop-shop for all e-public helpdesk services	**7,22**
10	Insufficient level of digitalisation of public administration's supporting business processes	**7,22**
11	Insufficient measuring of public (e-)services customer satisfaction	**6,67**
12	Key administrative procedures for cross-border users (foreign citizens) are not completely available online in Croatia	**6,00**
Digital infrastructure		
13	Limited prospects for further developing services by public authorities on account of their obsolete technological solutions and architecture, accompanied by incompatibility with new advanced technologies	**7,11**
14	Hampered management and limited upgrade and expansion options for the existing SSC infrastructure	**6,22**
Coordination and interoperability mechanisms		
15	Lack of interconnection and interoperability of central registers of all government sectors/authorities.	**7,67**
16	Varying digitalisation levels of different public institutions and administration	**7,22**

17	Lack of a national interoperability framework and a weak organisation and managing structure of the central interoperability system	6,33
18	Limited application of the Open Data Policy	5,89
Digital competences		
19	Application interfaces and accompanying information not easily accessible by certain groups of citizens (such as people with disabilities and senior citizens) and digital contents and e-services not adjusted to the needs of foreign citizens	8,00
20	Lack of adequate informational and training arrangements for citizens and enterprises in the area of available e-services	6,22
Organisation structure necessary for an accelerated digitalisation of public administration		
21	Lack of professionals and inadequate organisation structure of authorities responsible for an accelerated digitalisation of public services	8,67
22	Inadequate management of public administration digitalisation projects portfolio, without a sufficiently harmonised architectural view on adjusting the relevant project results and achieving and maintaining their interoperability	8,00
23	Insufficient sector capacities for quality preparation, application, and implementation of NRRP/EU-funded measures/projects	8
24	Legislative framework still not sufficiently forward-looking – amendments to the legislative framework areas hampering digitalisation should be introduced at a faster pace	8
25	Lacking and delayed exchange of information on a horizontal level regarding digitalisation projects implemented in public authorities (number of institutions involved and their cooperation)	7,56
Average intensity score:		7.43

Opportunities

No.	Description	Intensity (score 1-10)
1	Existence of EU funds for technical assistance and financing the implementation of measures for digitalising public administration	8,78
2	High level of awareness on all government levels (local, regional, and national) about the cooperation necessary for developing and introducing advanced (complex) e-services	8
3	Existence of global, verified business cases for applying advanced technologies (AI, chatbots, blockchain, big data, etc.) to secure higher-quality and more efficient digital public services	7,89
4	Private sector capacities available for providing additional support an accelerated digitalisation of public administration and services	7,50

5	Good practice examples available in the area of strategic planning and implementation measures and projects for digitalising public administrations of other EU countries with high levels of digitalisation	**7,33**
Average intensity score:		**7.90**

Threats		
No.	**Description**	**Intensity (score 1-10)**
1	Ongoing brain drain will result in a lack of resources necessary for an accelerated digitalisation of public administration	**9,33**
2	Increasing risk of computer security incidents and cyberattacks on national public services	**7**
3	Global security threats that may result in redirecting digitalisation resources and efforts from public administration to other public engagement areas	**5,78**
4	Lack of key stakeholders' interest in participating in consultations on digital transformation and advocating fundamental changes	**5,00**
Average intensity score:		**5.93**

The following tables detail the calculation of the product of average intensity scores for the four SWOT categories: Strengths x Opportunities; Strengths x Threats; Weaknesses x Opportunities; Weaknesses x Threats

Table 10: Overview of the calculation of the product of average intensity scores for the four SWOT categories: Strengths x Opportunities; Strengths x Threats; Weaknesses x Opportunities; Weaknesses x Threats (source: Deloitte and members of the EWS for the digitalisation of public administration)

	Strengths x Opportunities
Product	56,28

	Strengths x Threats
Product	42,21

	Weaknesses x Opportunities
Product	58,71

	Weaknesses x Threats
Product	44,04

Based on the calculations above, we may conclude that the "Weaknesses x Opportunities" matrix has the highest intensity product (58.71), indicating that the optimum solution would be to focus the strategy for the digitalisation of public administration on overcoming weaknesses/deficiencies in order to tap new opportunities. In other words, in Croatia, the digitalisation of public administration is characterised by pronounced weaknesses, while the external environment offers favourable opportunities, which is why weaknesses need to be mitigated or offset in order to make a better use of available opportunities.

3.4 Development vision

In its National Recovery and Resilience Plan (2021-2026), the Government of the Republic of Croatia defined the mission and vision of digitally transforming society and public administration:

- Vision: By 2026, the digitalised public administration constitutes a basis for further developing a competitive, innovative, and digital society and the economy;
- Mission: By defining a strategic framework, establishing and upgrading the state information infrastructure and central interoperability system, as well as introducing new e-services for citizens, entrepreneurs, and the public sector, foster digital transition of society and the economy.

The realisation of the relevant vision and mission requires government authorities in charge of digitalisation to place the user/citizen, i.e., natural person, in the centre of the public service, as the driver of life events and business activities. This means we should reject the practice of merely transpositioning traditional (offline) services to a virtual environment and focus on digitalising complex life events and reduce the overall number of public services. In order to do so, the digitalisation should be preceded by an analysis of the customer journey, followed by streamlining administrative procedures through a substantial, end-to-end redesign of the services focusing on citizens' life events or legal entities' business events. In other words, digital transformation should encompass examining procedures and processes, their optimisation and interconnection, followed by digitalisation connecting procedures and processes into a comprehensive service that is user-centred[26]. This approach will ultimately result in quality, streamlined, and more accessible public services, encourage ethical behaviour and decrease the risk of corruption for all parties involved, and improve the overall life standard of citizens.

As detailed in the figure below, the vision of further digitalisation...

- places the **citizen in the centre of public services**, based on...
- ...expanded **ICT infrastructure**, advanced technological tools, and interconnected, interoperable databases/registers of all public authorities...
- ...used by **digitally trained** public administration **personnel**...
- ...forming part of **strengthened organisation structures** of authorities responsible for an accelerated digitalisation of public services and their private sector partners...
- ...while digitalising public services and administrative procedures incorporated into citizens' life events / legal entities' business events....
- ...as well as digitalising supporting processes of bodies governed by public law...
- ...resulting in faster, cheaper, and higher-quality public services encouraging ethical behaviour and decreasing the risk of corruption...
- ...and, ultimately, contributing to an overall improvement in the life standard of all citizens.

26 Since the "Implementation of a Quality Management System in Public Administration" project of the Ministry of Justice and Public Administration focuses precisely on this issue, its successful realisation will contribute greatly to future activities in the area of digitalisation of public administration.

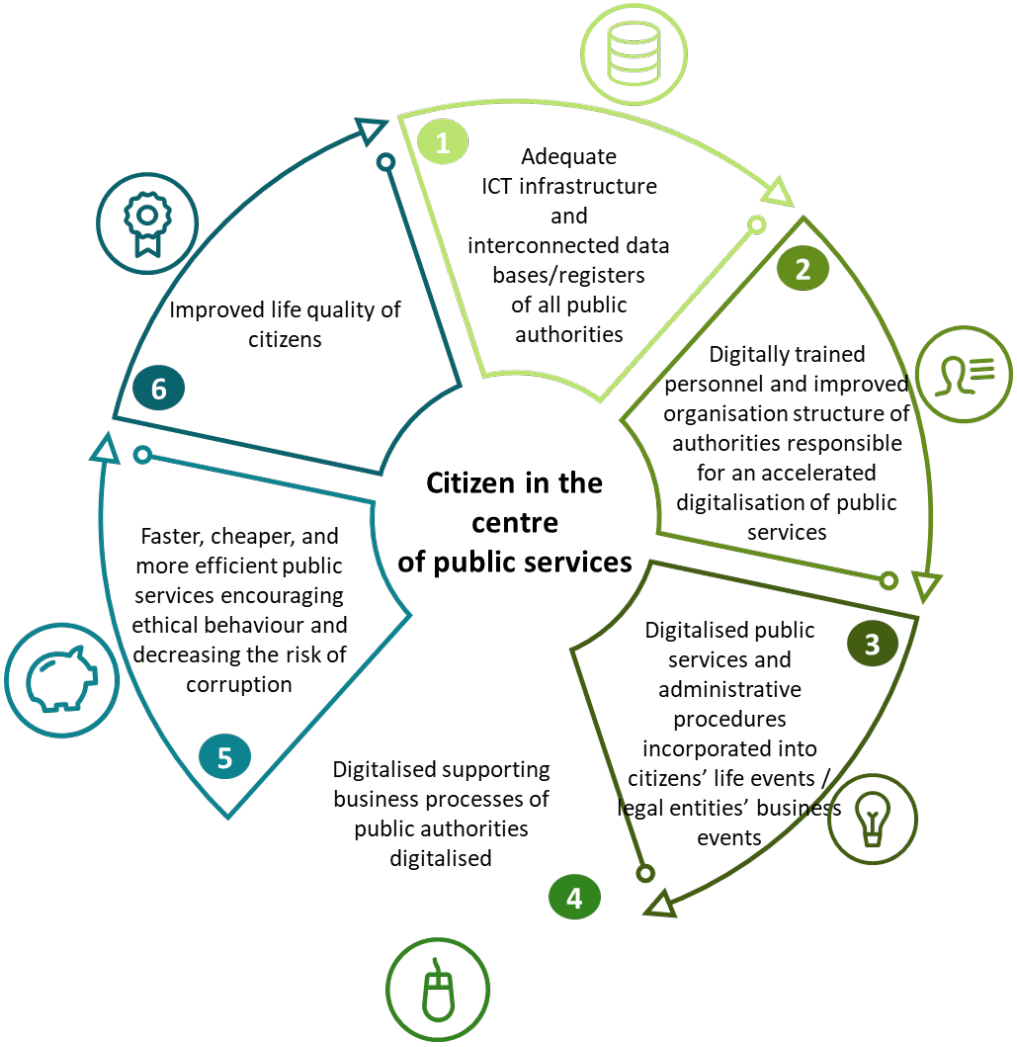


Figure 15: Vision for the further digitalisation of public administration with expected outcomes (source: Deloitte)

3.5 Description of development needs/potential of digitalisation of public administration in Croatia

3.5.1 European Union guidelines

European Commission's Proposal for a Decision of the European Parliament and of the Council establishing the 2030 Policy Programme "Path to the Digital Decade" was adopted on 15 September 2021. The Policy Programme sets out the concrete digital targets which the Union as a whole is expected to achieve by the end of the decade, as first delineated in the 2030 Digital Compass: the European way for the Digital Decade, identifying the digitalisation of public services as one of four cardinal points of EU's digital development. The EU wants to achieve the following digital targets in the context of digitalisation of public services:

- 100% online accessible provision of key public services[27]

27 Key public services refer to life events in the following areas:
- Citizens' and family rights (birth, residence, moving, custody, participating in elections, purchasing and selling of immovable property, etc.);
- Mobility, travel, transport, and vehicles (travel documents, acquiring and renewing a driving licence, mandatory motor vehicle insurance, tolls, etc.);
- Education or traineeship (compulsory education, early childhood education and care, primary and secondary education, higher education and adult learning, volunteering, traineeships, etc.);
- Work and retirement (employment, taxation, mandatory insurance, etc.);
- Healthcare (getting medical treatment, health insurance, buying prescribed pharmaceutical products, etc.);

- 100% of Union citizens have access to their medical records (electronic health records (EHR));
- at least 80% of Union citizens use a digital identification (ID) solution.

Furthermore, the EU has outlined its principles for the Digital Decade[28], putting people at the centre of the digital transformation in the European Union. Technology should serve and benefit all Europeans and empower them to pursue their aspirations, in full security and respect of their fundamental rights. Thus the EU commits to:

e) strengthening the democratic framework for a digital transformation that benefits everyone and improves the lives of all Europeans;

f) taking necessary measures to ensure that the values of the Union and the rights of individuals as recognised by Union law are respected online as well as offline;

g) fostering responsible and diligent action by all digital actors, public and private, for a safe and secure digital;

h) actively promoting this vision of the digital transformation, also in our international relations.

In the context of digitalisation of public services, everyone should have access to all key public services online across the Union. In doing so, in accordance with the 'once-only' principle, nobody is to be asked to provide data more often than necessary when accessing and using digital public services. Thus the EU commits to:

a) ensuring that all Europeans are offered an accessible, secure and trusted digital identity that gives access to a broad range of online services;

b) ensuring wide accessibility and re-use of government information, including the concept of open data;

c) facilitating and supporting seamless, secure and interoperable access across the Union to digital health and care services, including health records, designed to meet people's needs.

3.5.2 **Guidelines of the National Development Strategy until 2030**

The National Development Strategy until 2030 defines key development needs in the area of digitalisation of public administration in the strategic objective 11 outlining, among other things, the following implementation priorities:

- Optimise, digitalise, and modernise public administration as part of the policy on streamlining administrative procedures;
- Increase the number of automated and digitalised public administration and justice processes and services;
- Increase the availability of interoperable digital public services to citizens and economic operators;
- Strengthen the capacity and develop digital competences of public administration and justice employees;
- Protect personal data and ensure public access to all data owned by public authorities in a simple and interoperable manner.

- Consumer rights (holding a bank account, buying goods and digital content, connection to utilities, etc.);
- Starting, running and closing a business (registering, changing the legal form of a business, moving a business, intellectual property rights, funding a business, acquiring licences and authorisations, paying taxes, participating in public procurement procedures, etc.).

28 European Declaration on Digital Rights and Principles for the Digital Decade; 26.1.2022

3.5.3 Description of development needs/potential

Based on the in-depth current state analysis, relevant EU and national guidelines, analysis of belonging strategic planning acts, and SWOT analysis of the digitalisation of public administration, we have identified the following development needs and potential:

- **Development need/potential 1:** By placing citizens at the forefront and applying the Standard for Developing Public e-Services in the Republic of Croatia, continue the coordinated digitalisation of public services, with a special focus on addressing citizens' life events or legal entities' business events.
- **Development need/potential 2:** Continuously optimise and digitalise supporting business processes of public authorities.
- **Development need/potential 3:** Continue developing and modernising the state's information infrastructure and use advanced software solutions as the basis for a secure, flexible, and efficient electronic interaction between public authorities and all relevant stakeholders.
- **Development need/potential 4:** Develop a national interoperability framework, interconnecting central registers of all government sectors with a higher degree of interinstitutional cooperation and coordination.
- **Development need/potential 5:** Continue strengthening the organisational structure of authorities responsible for coordinating and implementing an accelerated digitalisation of public services.
- **Development need/potential 6:** Educate officials on e-service provision and continuously invest in their acquisition of digital competences.
- **Development need/potential 7:** Implement promotional and training arrangements for citizens and enterprises on the use of available e-services to increase the number of their users, with the ultimate goal of increasing the citizens' trust in public institutions and their services.

4 Priority area: Development of broadband electronic communications networks

4.1 Introduction and context

4.1.1 National Development Strategy until 2030

The National Development Strategy until 2030 is the core strategic development document for this decade and as such forms the basis for all other strategic planning acts.

The National Development Strategy inter alia defines strategic objectives, public policies' priority areas, and implementation priorities concerning the development and construction of broadband electronic communications networks, as detailed in Table 6.

Table 11: Strategic objective and priorities of the National Development Strategy until 2030

Strategic objective	Public policy priority area	Implementation priority
(11) Digital transition of society and the economy	Development of broadband electronic communications networks	Development and construction of broadband infrastructure and VHCN enabling gigabit connectivity
(12) Development of assisted areas and areas with development specifics	Development of assisted and mountainous areas	Development and construction of broadband infrastructure and VHCN
	Development of smart and sustainable islands	Development and construction of subsea-terrestrial broadband fibre networks and VHCN

Public policies' priority areas and implementation priorities regarding the development of broadband electronic communications networks directly impact the preparation of the Strategy and will be considered the basis for developing broadband electronic communications networks.

4.1.2 National Recovery and Resilience Plan 2021-2026

The National Recovery and Resilience Plan is based on strategic documents, programmes, recommendations, and obligations. As such, the Plan represents a clear and coherent framework for realising reforms, as well as development, social, environmental, and all other Government objectives in the current decade. The Plan has been aligned with the National Development Strategy Croatia 2030, as well as other key strategic planning acts.

The NRRP framework concerning the development of broadband electronic communications networks has been defined in the C2.3. Digital transformation of society and public administration sub-component. The area of developing broadband electronic communications networks is covered by one reform (C2.3. R4 Strengthening connectivity as a cornerstone of the digital transition of society and the economy) and two investments (C2.3. R4-I1 Implementation of projects under the National Framework Programme for the Development of Broadband Backhaul Infrastructure in Areas Lacking Sufficient Commercial Interest for Investments; C2.3. R4-I2 Construction of passive electronic communications infrastructure).

All objectives, as well as planned activities connected with the relevant reform and the two investments, will be considered during the preparation of the Strategy as the basis for the development of broadband electronic communications networks. The current situation analysis has to take into account that planned activities are being implemented and that a large number of activities defined in the NRRP connected with the C2.3. R4 Strengthening connectivity as a cornerstone of the digital transition of society and the economy reform is also included in the Croatian Roadmap for the Implementation of the Connectivity Toolbox.

4.1.3 National Plan for Broadband Development 2021-2027

The National Plan for Broadband Development in the Republic of Croatia in the period from 2021 to 2027 is a continuation of the policy of the Government of the Republic of Croatia in terms of strategically planning broadband development in the Republic of Croatia, with regard to the broadband development strategies for the 2006-2008, 2009-2012, 2012-2015, and 2016-2020 periods, and has been completely aligned with the National Development Strategy until 2030.

Table 13 details all special objectives with key outcome indicators and targets.

Table 12: Special objectives with key outcome indicators and targets (source: National Plan for Broadband Development (2021-2027))

Special objective	Outcome indicator	Target (end of 2027)
Provide VHCN coverage to households	Share of households in Croatia with broadband access with speeds of at least 100 Mbps, with the possibility to upgrade to 1 Gbps	**100 %**
Provide VHCN coverage for public purposes	Share of government offices and public buildings in Croatia with symmetric connections of at least 1 Gbps	**100 %**
Deployment of 5G networks in urban areas and along major inland transport routes	Share of urban areas with 5G coverage	**100 %**
	Sections of motorways, state roads, and railway lines in Croatia included in the Trans-European Transport Network (TEN-T) with 5G coverage	**100 %**
Deployment of 5G networks in rural areas	Share of rural areas in Croatia with 5G coverage	**50 %**

In line with the objectives, four measures and one project with belonging activities, competent authority, and targets contributing to the realisation of special objectives were defined. Please note that the implementation of most measures and activities is currently under way, while some activities have already been implemented (M4.2 Releasing the 700 MHz frequency band; M4.3 Granting permits for using the radio frequency spectrum in frequency bands for 5G networks). Since the implementation of planned activities has a substantial impact on the preparation of the Strategy, the project team and the Ministry of the Sea, Transport and Infrastructure will monitor the status of activities and consider all activities defined and implemented as part of the National Plan for Broadband Development 2021-2027.

Please note that, according to survey responses from the Ministry of the Sea, Transport and Infrastructure regarding the implementation of Project P1: Programme for supporting digital connectivity with Very High Capacity Networks (VHCN), during financial programming under MFF 2021-2027 as well as the preparation of the Agreement between the European Commission and Croatia and the Operational Programme Competitiveness and Cohesion 2021-2027, the European Commission argued that investments in broadband infrastructure did not constitute priority investments (departing from recommendations from Annex D to the 2019 Country Report – Croatia), which is why the allocation for constructing a broadband network was not granted. Therefore, the Programme for supporting digital connectivity with Very High Capacity Networks (VHCN) will not be adopted (although prepared) and will not be subject to a public consultation and a decision-making procedure of the Government of the Republic of Croatia, nor will a relevant notification be submitted to the EC. Therefore, due to the aforementioned reasons, the relevant activities defined in the National Plan have been suspended.

4.1.4 National Plan for Island Development 2021-2027

The National Plan for Island Development 2021-2027 is a mid-term strategic planning act defining the implementation of development objectives of the Republic of Croatia in the island area. The National Plan forms the basis for future funding of determined island projects, both from the national budget and EU funds from the 2021-2027 financial framework.

The National Plan recognises the programme area and relevance of VHCN and thus defines relevant development needs, public policy priorities, and a special objective regarding the improvement of ICT infrastructure on islands and digitalisation. Among other things, the Plan states that in order for the electronic communications networks to be stable and offer high capacity and other network options, a quality backhaul infrastructure is necessary, thus requiring the implementation of the National Programme for Broadband Backhaul Infrastructure (NP-BBI).

4.1.5 Conclusion

All existing strategic planning acts relevant for developing broadband electronic communications networks, examined in sections 4.1.1. to 4.1.4., with a special focus on ideas and measures developed thus far, will be considered during the preparation of this Strategy.

Although the existing strategic planning acts had been adopted before the Strategy was completed, while defining strategic objectives and belonging measures and activities in the area of developing broadband electronic communications networks, the project team will make all possible efforts to ensure that all reforms, measures, activities, projects, and investments that form part of the already adopted strategic planning acts are properly considered.

4.2 Current state analysis of the development and use of broadband electronic communication networks

4.2.1 Comparative analysis of Croatia and EU in the context of DESI

According to the latest available scores of the 2021 DESI, Croatia ranks 20th (previously 25th) in the connectivity area and remains below the EU average in the overall result for connectivity area. However, in the context of the Strategy preparation, Croatia's overall result improved at a significantly faster pace than the EU average (Croatia: 4.2 pp; EU average: 0.1 pp), indicating a positive trend towards reaching EU average in the connectivity area.

	Croatia			
	DESI 2019.	DESI 2020.	DESI 2021.	EU DESI 2021.
2a1 Overall fixed broadband take-up (% households)	72 % 2018.	70 % 2019.	73 % 2020.	77 % 2020.
2a2 At least 100 Mbps fixed broadband take-up (% households)	5 % 2018.	6 % 2019.	9 % 2020.	34 % 2020.
2a3 At least 1 Gbps take-up (% households)	N/A	< 0,01 % 2019.	< 0,01 % 2020.	1,3 % 2020.
2b1 Fast broadband (NGA) coverage (% households)	83 % 2018.	86 % 2019.	86 % 2020.	87 % 2020.
2b2 Fixed Very High Capacity Network (VHCN) coverage (% households)	23 % 2018.	43 % 2019.	47 % 2020.	59 % 2020.
2c1 4G coverage (% populated areas)	97,6 % 2018.	99,3 % 2019.	99,5 % 2020.	99,7 % 2020.
2c2 5G readiness (assigned spectrum as a % of total harmonised 5G spectrum)	0 % 2019.	0 % 2020.	100 % 2021.	51 % 2021.
2c3 5G coverage	N/A	N/A	0 % 2020.	14 % 2020.
2c4 Mobile broadband take-up (% individuals)	62 % 2018.	71 % 2019.	71 % 2019.	71 % 2019.
2d1 Broadband price index (score (0-100))	N/A	61 2019.	60 2020.	69 2020.

Figure 16: DESI Connectivity – Croatia and the EU (source: DESI 2021)

Although progress has been made in certain areas (e.g. 5G readiness), the comparative figures of EU member countries and the EU average indicate that Croatia still substantially lags behind in the high-speed (100 Mbps and 1 Gbps) fixed broadband take-up and in the broadband price index. As far as the Next generation access

(NGA) broadband coverage, Croatia slightly lags behind the EU average, whereas in terms of Very high capacity network (VHCN) coverage, Croatia substantially lags behind the EU average.

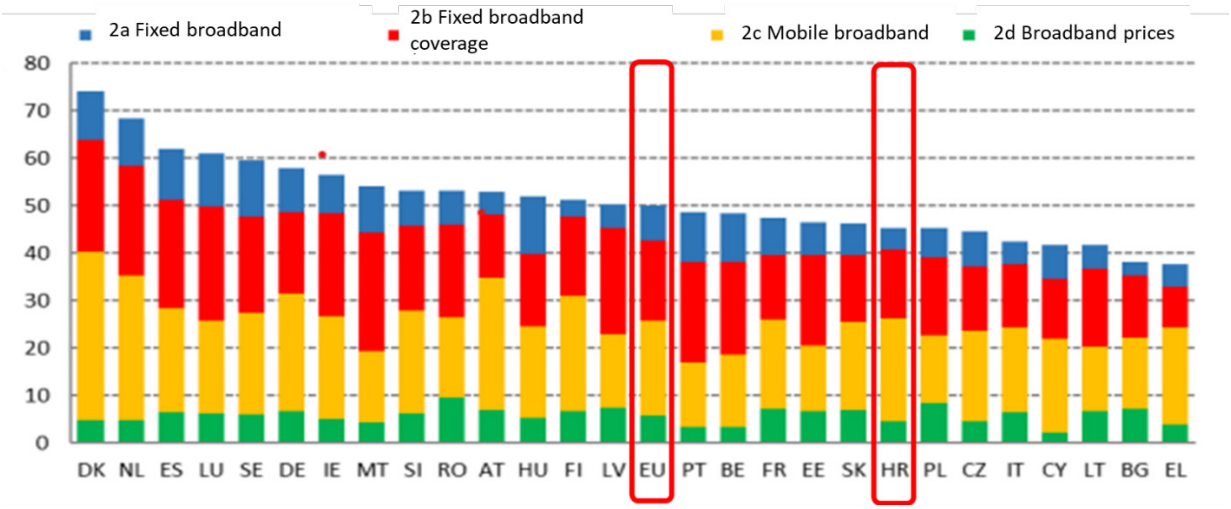


Figure 17: DESI 2021 – Connectivity (source: DESI 2021)

Main connectivity indicators may be grouped into three main wholes:

- fixed broadband (coverage and take-up)
- mobile broadband (coverage, take-up, and 5G)
- broadband price index and competition.

The following chapter will individually address each whole with a special focus on the situation in Croatia, comparison with the EU, and interpretation of the impact of current indicators on the Croatian market.

4.2.1.1 Fixed broadband (coverage and take-up)

Coverage

According to the last available Digital Economy and Society Index (DESI) 2021 Thematic chapters report, Next generation access (NGA) broadband coverage in Croatia is nearly equal to the EU average (Croatia is behind 1 percentage point), meaning that most Croatian households, especially in urban areas, have access to NGA networks and high-speed broadband services, enabled by NGA technology. Although overall coverage in Croatia is nearly equal to the EU average, Croatia lags substantially behind in terms of coverage of the households in rural areas, adversely affecting the digital inclusion of population in rural areas of Croatia. As a result, in order to bridge the gap between urban and rural areas, support schemes are planned to be used for developing NGA networks in areas lacking sufficient commercial interest for investments (NFP and NRRP C2.3. R4-I1), as detailed in chapter 4.2.2.

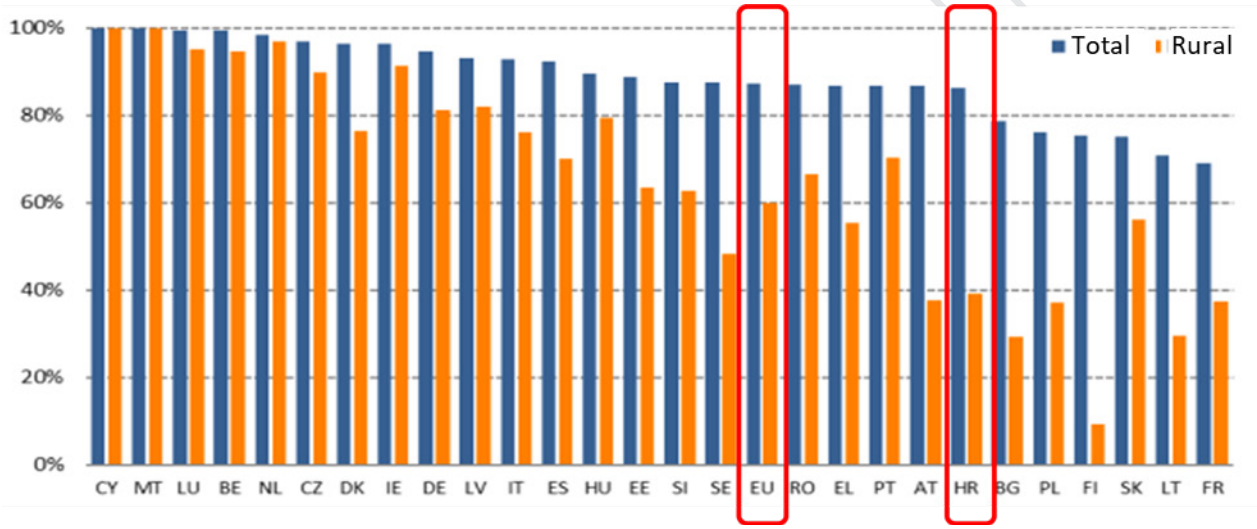


Figure 18: Next generation access (NGA) broadband coverage in the EU (% of households), mid-2020 (DESI 2021)

Both in the EU and in Croatia, NGA coverage exceeds VHCN coverage. However, in addition, Croatia lags behind the EU average in the area of VHCN coverage, even more so in rural areas. As with NGA, this directly affects the digital inclusion of population and business in rural areas. As a result, the National Plan for Broadband Development 2021-2027 defines the Programme for supporting digital connectivity with Very High Capacity Networks (VHCN) as a continuation of the programmes and projects for expanding broadband access from the 2014-2020 financial period (NFP and NP-BBI). As detailed in chapter 4.1.3, during financial programming under MFF 2021-2027 as well as the preparation of the Agreement between the European Commission and Croatia and the Operational Programme Competitiveness and Cohesion 2021-2027, the European Commission argued that investments in broadband infrastructure did not constitute priority investments, which is why the allocation for constructing a broadband network was not granted.

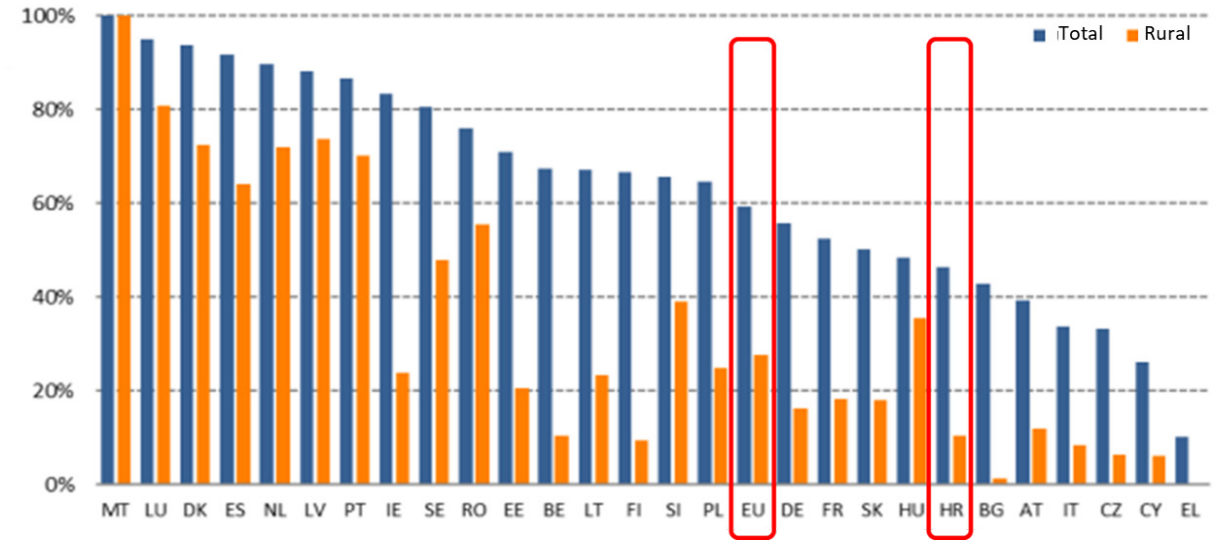


Figure 19: Fixed very high capacity network (VHCN) coverage (% of households), mid-2020 (source: DESI 2021)

Take-up

When calculating fixed broadband take-up, i.e. the total number of households with a fixed broadband subscription, the EU considers the following three main indicators:

- all broadband subscriptions, regardless of the speed;
- broadband subscriptions of at least 100 Mbps;
- broadband subscriptions of at least 1 Gbps.

As for the total number of households with a fixed broadband subscription, regardless of speed, Croatia slightly lags behind the EU average in terms of the number of broadband subscriptions in relation to the total number of households. It is important to calculate this indicator with regard to the number of households, not inhabitants, because fixed broadband is not connected with an individual user, but households and specific locations, and used by all household members. However, this indicator does not reveal the speed of broadband subscriptions nor whether NGA and VHCN are used.

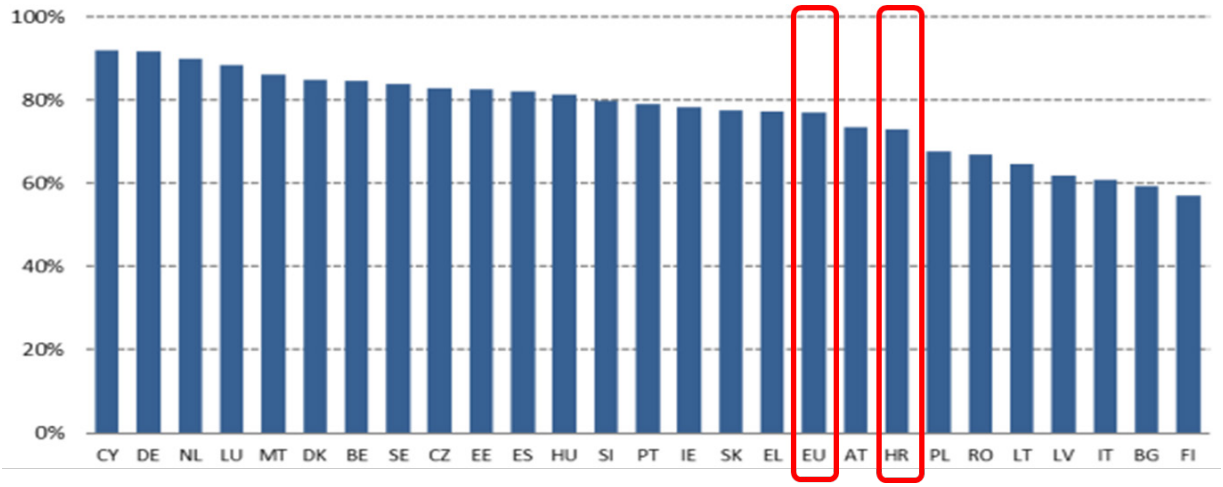


Figure 20: Households with a fixed broadband subscription (% of households), 2020 (source: DESI 2021)

Thus, it is necessary to analyse the indicator referring to households with a fixed broadband subscription of at least 100 Mbps. Comparative figures of EU member countries and the EU average indicate that Croatia still substantially lags behind EU average in terms of the number of fixed broadband subscriptions with at least 100 Mbps, placing it at the bottom of the list as one of the three countries with the lowest take-up. Although its uptake somewhat increased in the last observed period (from 6% to 9%), this had no impact on Croatia's position in relation to other EU member countries. Please note that the relevant indicator should be examined in combination with data on NGA and VHCN coverage, leading to the conclusion that, despite very good coverage (at least in urban areas), the take-up of high-speed broadband services is extremely low, resulting in a substantial gap between the relevant two indicators.

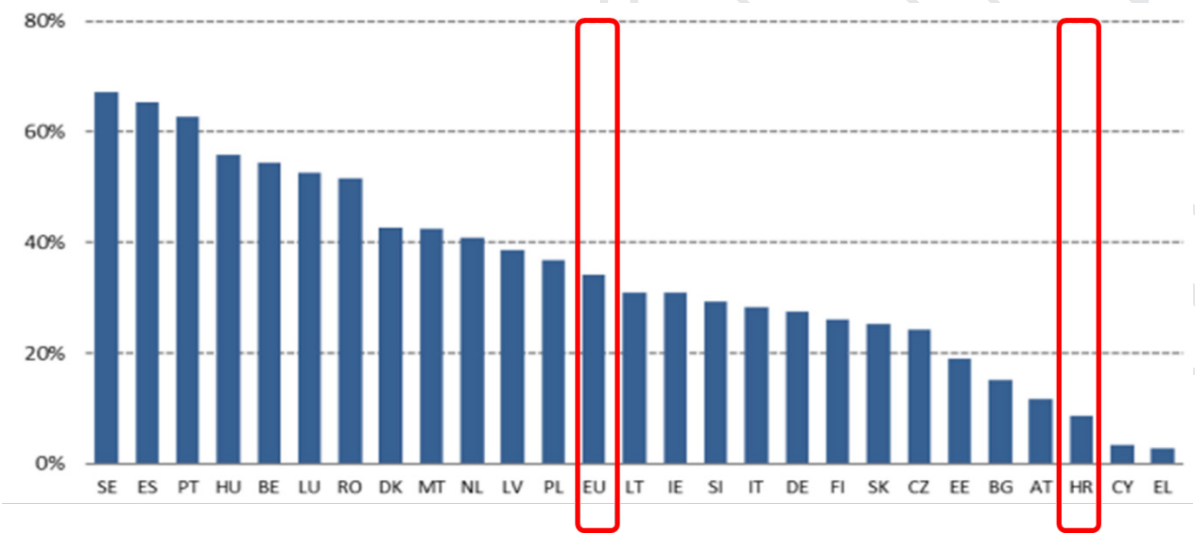


Figure 21: Households with a fixed broadband subscription of at least 100 Mbps (% of households), 2020 (source: DESI 2021)

When analysing the take-up of broadband services and contracted speeds, it is extremely important to consider the shares of different technologies and their relation to the shares of different contracted speeds. Namely, technologies based on the copper access network (xDSL technology) generally does not allow maximum broadband speed, depending on the length of the copper wire. On average, households do not have a copper wire short enough to enable maximum speed.

The market share of technologies varies between different countries. xDSL is particularly prevalent in Croatia (around 70%), as well as in Greece, Italy, Cyprus, and Germany, where the market share of xDSL in the total number of subscriptions exceeds 70%. Furthermore, Croatia lags substantially behind most EU countries and the EU average in terms of its share of fixed broadband subscriptions using fibre networks. As for cable access (coaxial and/or hybrid fibre-coaxial), the situation is slightly better. Although many EU countries have a larger share than Croatia in this regard, Croatia is still close to the EU average. This shows that recently constructed NGA and VHCN mostly are not used in Croatia, substantially impacting service quality for end-users, as well as user experience. Furthermore, if recently constructed networks are not used, operators are not able to monetise the investment, which may adversely affect further investments in the sector.

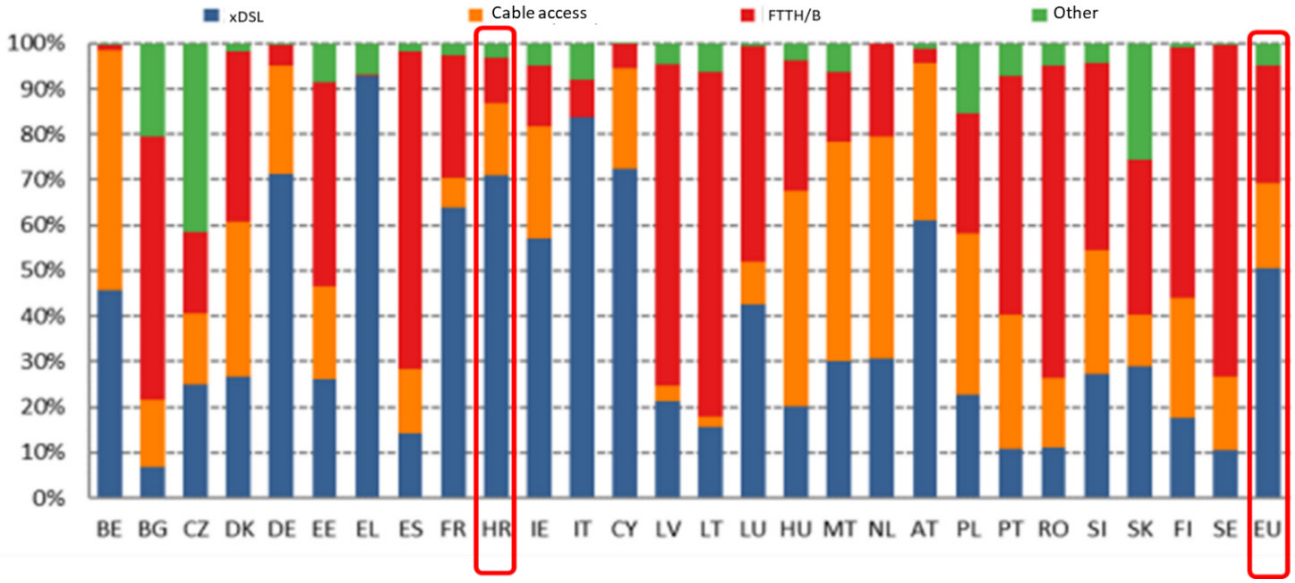


Figure 22: Fixed broadband subscriptions – technology market shares in the EU (% of subscriptions), July 2020 (source: DESI 2021)

We have further analysed HAKOM's historical data on trends in shares of different technologies in subscriptions in Croatia, showing that the share of xDSL technology dropped from around 80% to about 70% in the observed period, whereas the share of FttH/FttB increased by more than 100% in absolute terms. However, this was not enough to substantially redistribute shares of different technologies.

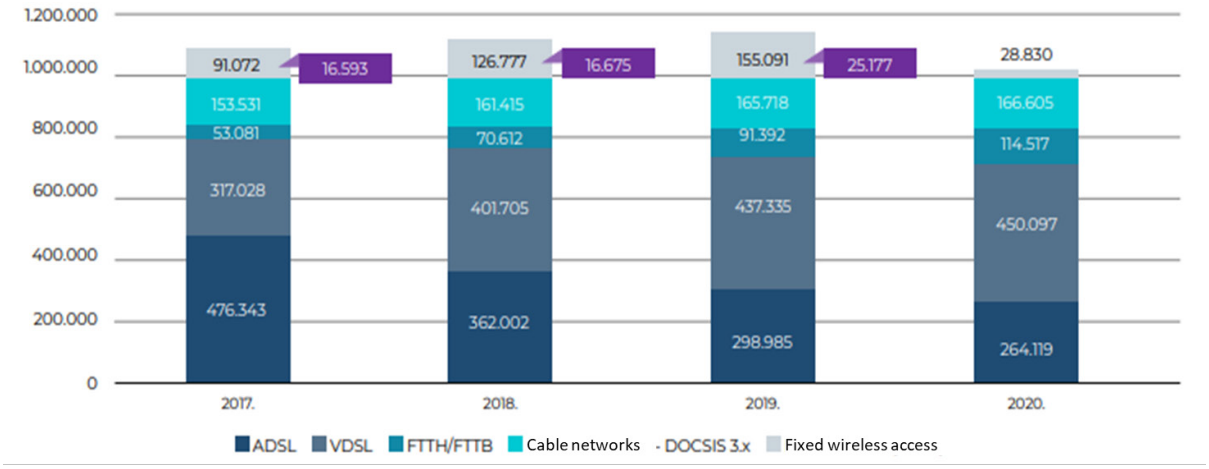


Figure 23: Number of fixed broadband internet access connections (source: HAKOM – Annual Activity Report 2020)

Source: HAKOM – Annual Activity Report 2020

Based on the conclusions concerning the shares of different technologies in the total number of fixed broadband subscriptions, the structure of broadband connections with regard to their speed is completely aligned with the technology distribution trend. The substantial share of speeds from 10 to 30 Mbps is linked to a large share of xDSL technology, whereas the lack of speeds higher than 100 Mbps is due to the low take-up of existing NGA networks.

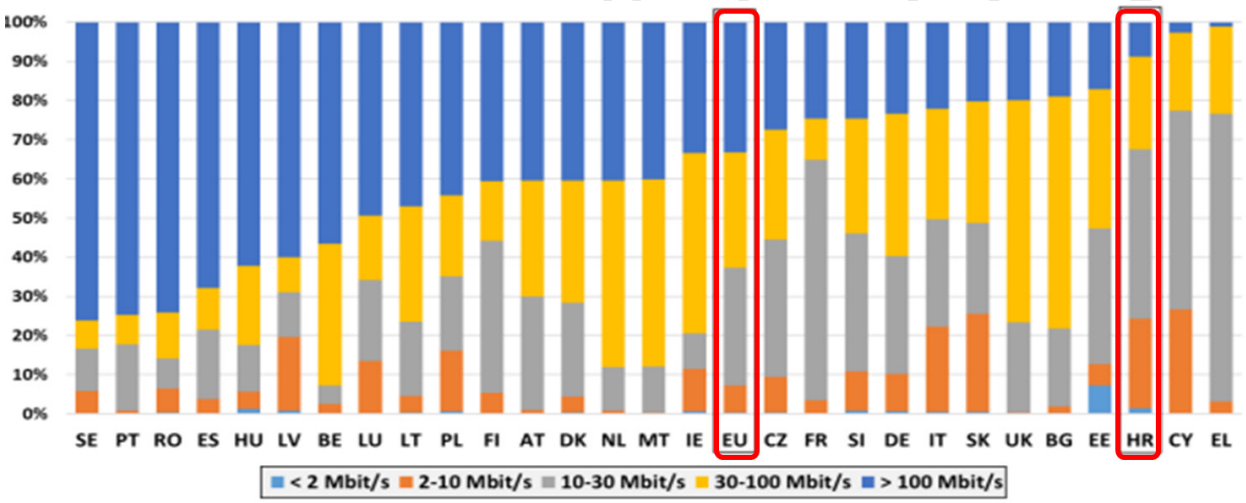


Figure 24: Structure of broadband connections with regard to their speed (source: National Plan for Broadband Development 2021-2027)

Since the data in Figure 18 refers to 2019, we have further analysed data from HAKOM's Annual Activity Report 2020 (published in 2021). According to the relevant data, certain progress was made in 2020, i.e. take-up of speeds higher than 100 Mbps was improved. The distribution of fixed connections by contracted speeds in Croatia has generally remained equal to the 2019 distribution, meaning there were no drastic increases in shares of connections with higher speeds, which would bring the distribution closer to the EU average.

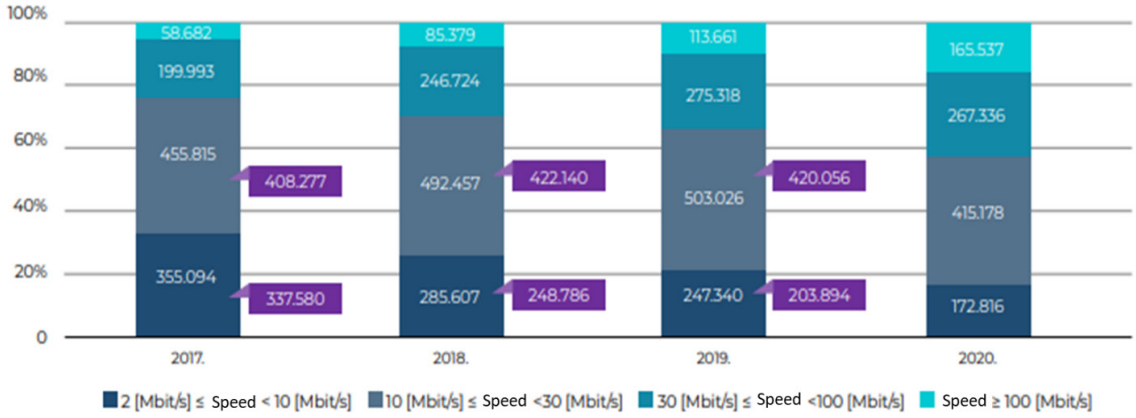


Figure 25: Number of fixed connections by contracted speeds (source: HAKOM – Annual Activity Report 2020)

Based on all of the above, insufficient use of speeds of at least 100 Mbps, combined with the existing distribution of access technologies, still constitute one of the main shortcomings of the Croatian market, in terms of contracted speeds and user experience, but also untapped potential of already constructed networks. This shows that users are not interested in higher speeds, due to a number of reasons, some of them being:

- affordability;
- insufficient availability;
- users' belief that they do not need higher speeds as they can access all the services they want at the existing speeds.

4.2.1.2 Mobile broadband (coverage and take-up)

Coverage and take-up

As far as 4G coverage of populated areas is concerned, in Croatia it stood at 99.5% (EU average: 99.7%) in 2021. This figure indicates that the situation in Croatia is generally similar to that in other EU member countries, since Croatia has met all the prerequisites for the high-speed mobile broadband take-up, based on 4G networks.

In Croatia, these networks are indeed used, as data shows that Croatia stands at the EU level in terms of mobile broadband take-up (% population). Unlike the problems identified in the previous chapter in terms of a very low take-up of high-speed broadband services although NGA and VHCN have been recently constructed, mobile broadband take-up is not an issue, and the take-up of the relevant technologies has a substantial impact on competition and, as a result, market prices.

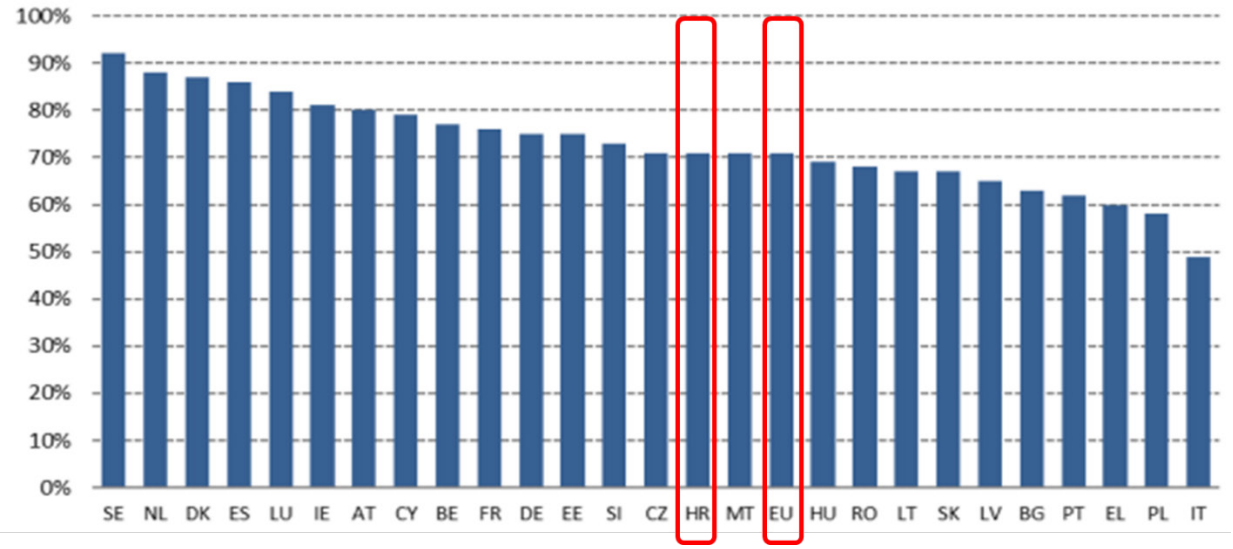


Figure 26: Mobile broadband penetration (% of individuals), 2019 (source: DESI 2021)

5G

In addition to the mobile broadband take-up, now predominantly based on LTE (4G) technology, deployment of 5G networks and services is also very important. Therefore, the European Commission monitors 5G readiness, based on the amount of spectrum assigned in a specific Member State to mobile network operators. Mostly as the result of HAKOM's auction completed in August 2021, assigning radio frequency spectrum in the 700 MHz, 3600 MHz, and 26 GHz frequency bands for the 5th generation mobile communications networks, Croatia's 5G readiness reached 100%, with only Germany matching its score.

Having assigned the spectrum in the relevant bands, Croatia met the main preconditions for a fast deployment of 5G, to be complemented with legal solutions in the field of infrastructure construction, fostering a fast 5G deployment, as detailed in chapters 4.2.3 and 4.2.4.

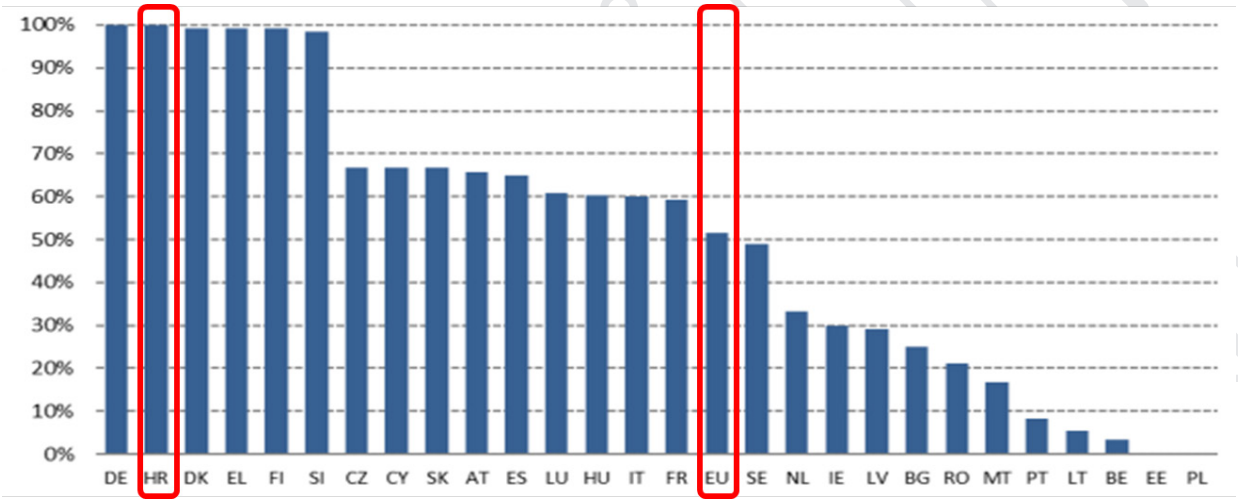


Figure 27: 5G readiness (assigned spectrum as a % of total harmonised 5G spectrum), end of August, 2021 (source: DESI 2021)

4.2.1.3 Prices and competition

Broadband price index and operator market shares (incumbents and new entrants) are the last two indicators monitored on the EU level that should be analysed to completely understand Croatia's current situation and results in the Connectivity dimension of the DESI. These two indicators can show the level of competition on a specific market. Namely, the lack of competition on a specific market may result in higher prices than on other comparable markets. Furthermore, market competition also depends on the number of market operators, and results in a specific distribution of market shares among operators.

As for the broadband price index, Croatia lags behind the EU average, which adversely affects its overall connectivity score. However, please note that the relevant indicator is directly connected with the levels of purchasing power, not with absolute prices, meaning that the price index is connected with factors outside the electronic communications sector, among other things.

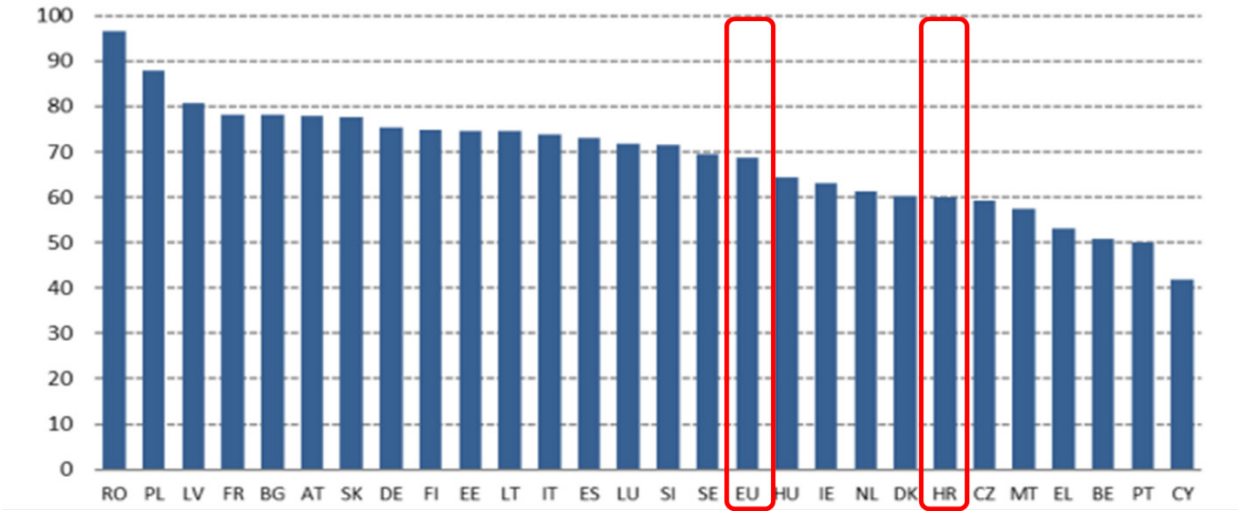


Figure 28: Broadband price index – all baskets (score 0-100, 100 meaning the lowest prices) 2020 (source: DESI 2021)

The last available Digital Economy and Society Index (DESI) 2021 Thematic chapters report provides an overview of market shares for incumbents and new entrants to the fixed broadband market in all EU countries. In

Croatia, the market share of the incumbent is higher than the EU average, potentially as a result of market competition, price levels, and the specifics of the Croatian market.

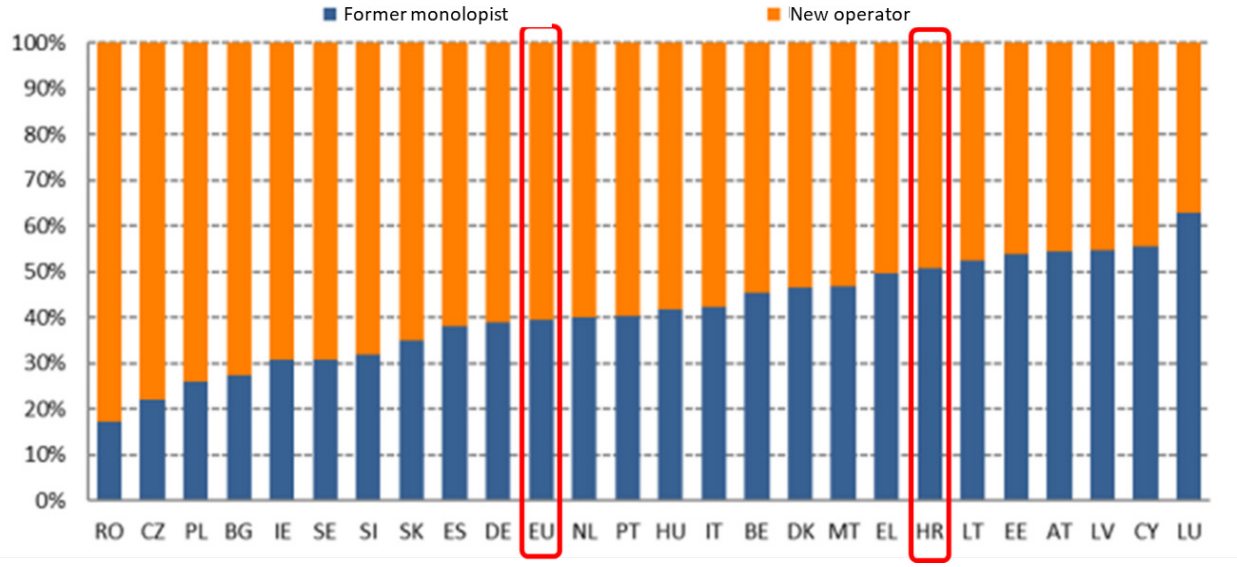


Figure 29: Fixed broadband subscriptions – operator market shares in the EU (% of subscriptions), July 2020 (source: DESI 2021)

4.2.1.4 Conclusion

Based on the information provided in chapter 4.2.1, we may conclude that the greatest challenges Croatia currently faces in terms of development and use of broadband electronic communication networks concern:

- NGA and VHCN coverage of rural areas and overall VHCN coverage;
- use of high-speed (over 100 Mbps) services; and
- affordability.

All of the above will be taken into account for the SWOT analysis and defining development needs.

4.2.2 Support schemes for developing networks in areas lacking sufficient commercial interest for investments

In order to completely understand the current situation in terms of construction and development of broadband electronic communications networks, please bear in mind that many different support schemes are being implemented in Croatia for developing networks in areas lacking sufficient commercial interest for investments (access and backhaul infrastructure).

The National Framework Programme for the Development of Broadband Access Infrastructure in Areas Lacking Sufficient Commercial Interest for Investments (NFP) is a national state aid programme focusing on broadband access infrastructure construction in rural and suburban areas.

During NFP implementation, a total of 72 broadband development plans were prepared, 21 of which are currently being implemented[29], to be completed by the end of 2023.

29 21 grant agreements were signed for projects funded from European structural and investment funds in the 2014-2020 period

In addition to access networks, investments are made into constructing a national NGA broadband backhaul infrastructure (NP-BBI). Based on the Decision of the Government of the Republic of Croatia, the Ministry of the Sea, Transport and Infrastructure was appointed as the competent authority, while the company Odašiljači i veze d.o.o. was appointed as the competent authority for the operational implementation of the Programme. Investments into constructing a national NGA broadband backhaul infrastructure and connecting targeted public users to the NGA broadband infrastructure are made within the eponymous Call as part of which 1 grant agreements was signed for projects funded from European structural and investment funds in the 2014-2020 period.

According to the survey responses from the Ministry of the Sea, Transport and Infrastructure, NP-BBI will probably be funded from the new OPCC 2021-2027, in the amount of EUR 42.5 million.

Moreover, the NRPP foresees the implementation of the C2.3 R4 I1 investment (NFP continuation). According to the survey responses from the Ministry of the Sea, Transport and Infrastructure, a notification was submitted. HAKOM, as the competent authority of the NFP, is constantly working on approving broadband development plans, in cooperation with local self-government units.

As detailed in the chapter 4.1.3, an allocation for Programme for supporting digital connectivity with Very High Capacity Networks (VHCN) (NFP 2) was not granted.

4.2.3 **Electronic Communications Act**

The existing and future regulatory framework plays a major role in the current state analysis for the relevant area. Thus, we should emphasize the fact that the new Electronic Communications Act, adopted on 1 July 2022, harmonises the legislation of the Republic of Croatia with EU legislation, i.e., transposes Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (recast) (hereinafter: Directive (EU) 2018/1972). The Directive details a comprehensive reform of EU's regulatory framework in the area of electronic communications.

Some of the major objectives in the area of developing broadband electronic communications networks defined in the new Act, resulting from the Directive (EU) 2018/1972, are the following:

- provide incentives for investment in high-speed broadband networks;
- create preconditions for the rollout and development of 5G;
- increase competition;
- limit ex-ante regulations to only necessary areas.

The Act stipulates planning electronic communications infrastructure in spatial planning documents in a manner that does not restrict the development of the electronic communications network and infrastructure; establishes the terms of construction, use, and maintenance of the electronic communications network, infrastructure and associated facilities;, provides a detailed geographical overview of the coverage of broadband access networks and regulates the construction of broadband infrastructure using state aid, the use of common goods and property of others based on the right of way for constructing new electronic communications infrastructure, and the status of existing electronic communications infrastructure constructed on common goods or property of others.

The provisions of the new Act should help accelerate the development of fixed and mobile VHCN by improving the conditions of spatial planning and electronic communications networks construction, encouraging joint use of infrastructure, and developing market competition in the area of infrastructure and services provision.

4.2.4 Croatian Roadmap for the Implementation of the Connectivity Toolbox

In order to better understand the current situation in terms of Croatia's alignment with EU's best practices and experience, it is important to note that HAKOM established a Special Group for tracking the implementation of the Connectivity Toolbox and, on behalf of the Republic of Croatia, prepared the Croatian Roadmap towards the implementation of the best practices included in the Connectivity Toolbox, with 39 measures for different areas.

Best practices have been divided into two major areas:

1. Best practices regarding cost reduction of network deployment;

2. Best practices regarding the timely access to 5G radio spectrum.

HAKOM shared the Connectivity Toolbox Implementation report with the EC. Most measures have been implemented as part of the C2.3. R4 measure of the NRRP. The remaining measures have been implemented by assigning 5G frequency ranges, with few measures still being considered.

The implementation of the aforementioned measures will secure better preconditions for developing broadband electronic communications networks by decreasing the administrative burden for spatial planning, introducing guidelines for preparing spatial plans including the conditions and manner of planning electronic communications infrastructure and aligning procedures for obtaining building permits for constructing electronic communications infrastructure.

4.2.5 Current financial framework for developing broadband electronic communications networks

The financial framework for implementing this Strategy as well as already defined measures, projects, and investments defined in other approved strategic planning acts has been defined with reference to the:

- State budget and all sources of funding combined in the state budget and budgets that are part of the general government budget;
- EU funds from the 2021-2027 financial framework;
- Recovery and Resilience Facility.

Table 12 provides an overview of all amounts and sources of funding for measures, projects, and investments defined in the strategic planning acts already adopted.

Table 13: Amounts and sources of funding for measures, projects, and investments defined in the strategic documents already adopted

Reforms, programmes, and investments	Source document	Estimated cost and funding sources	Implementation period
NFP – 21 grant agreements were signed for projects funded from European structural and investment funds in the 2014-2020 period	OPCC 2014-2020	HRK 687,116,550.62 (ESIF)	until 31/12/2023
C2.3 R4 Strengthening connectivity as a cornerstone of the digital transition of society and the economy	NRRP 2021-2026	HRK 3,013,800	September 2021 to June 2026
INVESTMENT C2.3 R4-I1 Implementation of projects under the National Framework Programme for the Development of Broadband Access Infrastructure in Areas Lacking Sufficient Commercial Interest for Investments	NRRP 2021-2026	HRK 999,999,997: HRK 799,999,997 (RRF) HRK 200,000,000 (operators and/or SGUs from own funds)	January 2022 to June 2026
INVESTMENT C2.3 R4-I2 Construction of passive electronic communications infrastructure	NRRP 2021-2026	HRK 147,338,008	September 2021 to June 2026
NP-BBI	OPCC 2014-2020 PCC 2021-2027 * Not yet adopted	EUR 43.69 million EUR 42.5 million* * Amount estimated, but not yet confirmed, since the relevant document has not yet been adopted	Until 31/12/2023 Until 2027

4.3 Analysis of strengths, weaknesses, opportunities, and threats for developing broadband electronic communications networks

A detailed understanding of the current status of developing broadband electronic communications networks, existing regulatory framework, and the measures and activities already undertaken were used for the analysis of internal strengths and weaknesses as well as external opportunities and threats that may affect the further development of broadband electronic communications networks (SWOT analysis).

The tables below identify key factors for each of the four SWOT categories. Each factor identified has been awarded an impact intensity score within a specific SWOT category (0 – no impact, 10 – very high impact intensity). The intensity score of an individual factor represents the average score attributed to the relevant factor by the representatives of institutions included in the preparation of the Strategy. The factors presented in the tables have been ordered based on their final intensity score, from high to low. At the end of every table, the average intensity score was calculated for each of the four SWOT categories.

Table 14: Overview of strengths, weaknesses, opportunities, and threats of the development of broadband electronic communications networks, with an overview of intensity scores per individual factor (source: Deloitte and members of the EWS for the development of broadband electronic communications networks)

Strengths		
No.	**Description**	**Intensity (score 1-10)**
1	Mobile networks developed	8,91
2	5G readiness	8,73
3	Take-up of mobile broadband services	8,09
4	Croatian Roadmap for the Implementation of the Connectivity Toolbox	6,80
5	ECA and EECC compliance	6,70
6	Satisfactory level of competition in the area of mobile networks and affordability	6,64
7	Consistently high profitability of leading operators	6,30
8	Local and regional self-government units understand the importance of constructing NGA networks in the areas they manage, especially in zones for which operators show no commercial interest	6,30
9	5G coverage of population areas	6,00
Average intensity:		**7,16**

Weaknesses		
No.	**Description**	**Intensity (score 1-10)**
1	Parafiscal charges for infrastructure	**9,50**
2	Insufficient overall VHCN coverage and insufficient NGA and VHCN coverage of rural areas (score well-below the EU average)	**9,09**
3	Restrictive construction regulations; non-compliance of electronic communications regulations, construction regulations, and spatial planning regulations; differences in defining, interpreting, and applying spatial plans in local and regional self-government units	**8,91**
4	Insufficient use of high-speed (over 100 Mbps) services and highest-speed (over 1 Gbps) (score well-below the EU average)	**8,82**
5	Unaffordable fixed broadband services with regard to customers' purchasing power, adversely affecting demand	**8,30**
6	Extensive and lengthy permit-granting procedure	**8,30**
7	Low share of FttH in relation to the EU average	**8,09**
8	Professional and organisational weaknesses of the system for supporting investments in developing broadband networks	**7,91**
9	Lower average broadband speeds in relation to the EU average	**7,73**
10	Unsatisfactory level of competition in the fixed broadband services market	**7,50**
11	High share of xDSL in relation to the EU average	**7,00**
12	Insufficient use of state infrastructure/property for installing mobile and fixed electronic communications infrastructure	**5,10**
Average intensity:		**8,02**

Opportunities		
No.	**Description**	**Intensity (score 1-10)**
1	NRRP revision and potentially new funding	**8,27**
2	Continuous increase in content and users of audiovisual services and other advanced services (gaming, smart home, etc.), generating demand for high-speed broadband access	**7,82**
3	Next Multiannual Financial Framework (MFF) of the EU	**7,80**
4	Continuous IT sector growth	**7,55**
5	Increased take-up of high-speed broadband services resulting from the development of digital public services, electronic operations, and transition towards the digital economy	**7,18**
6	Slight overlapping of coverage areas of different operators' fibre networks, unlike in countries with a more developed fibre infrastructure	**6,00**
7	Introducing the euro / joining the eurozone	**5,70**
8	Tourism growth (roaming and FttH in tourist and accommodation facilities)	**5,55**
9	Carve-out and sale of passive infrastructure of mobile network operators, as a means for securing funds for operators' further investments in service development	**5,30**
10	Potential legal solutions on the EU level regarding the participation of global digital enterprises in funding the development of infrastructure in EU member countries	**4,91**
Average intensity:		**6,61**

Threats		
No.	**Description**	**Intensity (score 1-10)**
1	Varying population density resulting in high costs and making construction of networks in rural areas unprofitable	**9,18**
2	Negative demographic trends, especially in rural and distant areas	**8,82**
3	Increased prices of materials and works	**8,27**
4	Allocation of MFO 2021-2017 funds for constructing a broadband access network not granted	**8,18**
5	Increase in energy prices	**7,91**

6	Insufficient professional and operational capacities for implementing the necessary investments in high-speed broadband networks, including the construction thereof, resulting from labour market disruptions caused by brain drain into other EU countries	**7,90**
7	Decrease in the total amount of funds from European structural and investment funds available to Croatia and the largest share of co-funding for the Cohesion Fund member states in the 2021-2027 financial framework.	**7,44**
8	Limited knowledge and distorted view of electromagnetic fields of mobile network operators' base stations, combined with an increased number of demands for eliminating existing base stations and inability to construct new ones	**5,82**
Average intensity:		**7,94**

The following tables detail the calculation of the product of average intensity scores for the four SWOT categories: Strengths x Opportunities; Strengths x Threats; Weaknesses x Opportunities; Weaknesses x Threats

Table 15: Overview of the calculation of the product of average intensity scores for the four SWOT categories: Strengths x Opportunities; Strengths x Threats; Weaknesses x Opportunities; Weaknesses x Threats (source: Deloitte and members of the EWS for the development of broadband electronic communications networks)

	Strengths x Opportunities
Product	47,33

	Strengths x Threats
Product	56,88

	Weaknesses x Opportunities
Product	52,99

	Weaknesses x Threats
Product	63,69

Based on the calculations above, the "Weaknesses x Threats" matrix has the highest intensity product (63.69), indicating that the development of broadband electronic communications networks in Croatia is characterised by pronounced weaknesses and an unfavourable environment. Therefore, it would be best to focus the Strategy on mitigating/offsetting weaknesses in order to minimise adverse effects from the environment in the area of developing broadband electronic communications networks.

4.4 Development vision

The vision of developing broadband electronic communications networks spans two major areas: I) VHCN construction and coverage, and II) increase VHCN take-up through the use of services provided which could be enabled by VHCN infrastructure. In terms of VHCN construction, the target is 100% of households with fixed network coverage and 100% of populated areas with NGA coverage (5G). As for VHCN take-up, the take-up of existing and future infrastructure should be substantially improved.

4.5 Development needs/potential for developing broadband electronic communications networks

4.5.1 European Union guidelines

- European Commission's Proposal for a Decision of the European Parliament and of the Council establishing the 2030 Policy Programme "Path to the Digital Decade" was adopted on 15 September 2021. The Policy Programme sets out the concrete digital targets which the Union as a whole is expected to achieve by the end of the decade, as first delineated in the 2030 Digital Compass: the European way for the Digital Decade, identifying a secure and sustainable digital infrastructure as one of four cardinal points of EU's

digital development. The EU wants to achieve the following digital targets in the context of a secure and sustainable digital infrastructure:

- By 2030, all European households are covered by a Gigabit network;
- By 2030, all populated areas are covered by 5G.

4.5.2 Guidelines of the National Development Strategy until 2030

NDS 2030 outlines the following implementation priorities regarding the development of broadband electronic communications networks

- Development and construction of broadband infrastructure and VHCN enabling gigabit connectivity;
- Development and construction of broadband infrastructure and VHCN in assisted and mountainous areas;
- Development and construction of subsea-terrestrial broadband fibre networks and VHCN for the purpose of developing smart and sustainable islands.

4.5.3 Development needs and potential

Based on the in-depth current state analysis, relevant EU and national guidelines, analysis of belonging strategic planning acts, and SWOT analysis of the development of broadband electronic communications networks, we have identified the following development needs and potential:

- **Development need/potential 1:** Secure very high capacity network (VHCN) coverage for households and public purposes.
- **Development need/potential 2:** Substantially improve VHCN coverage in rural areas and on islands.
- **Development need/potential 3:** Increase 5G coverage in urban areas as well as major transport paths.
- **Development need/potential 4:** Improve and encourage the take-up of high-speed broadband services (at least 100 Mbps).
- **Development need/potential 5:** Improve the construction and spatial planning regulatory framework in a way that promotes VHCN deployment, by cutting costs and streamlining procedures.

5 Priority area: Development of digital competences and digital workplaces

5.1 Introduction and context

As emphasized in the National Development Strategy 2030, the greatest challenge for realising Croatia's potential and its digital transformation lies in the fact that every year not enough digital experts enter the labour market from tertiary and secondary education establishments, adult education institutions, or from abroad. Furthermore, as IT technology is gaining an increasingly important role in our everyday lives, specific digital workplaces are being developed and becoming in high demand. Therefore, before commencing the current situation analysis, we need to define the terms 'digital competences' and 'digital workplaces':

Digital workplaces are created through the application of information and communications technologies (ICT) to a new or existing activity or process. Digital jobs generally include performing information-based tasks that build the individual's capacity for future work. A digital job can be distinguished from other jobs because the core product produced by a digital jobs worker (sometimes called an "information worker" or "knowledge worker") is information or knowledge. The core tools for digital jobs are ICTs, such as computers, databases, smart phones and the internet, which they use to manipulate and manage information. Therefore, in order to develop digital workplaces, the labour force should have the necessary digital competences.

Digital competence is a combination of digital knowledge, digital skills and attitudes with regards to the use of ICT and digital media to perform tasks and communicate efficiently. A competence is, generally speaking, a combination of knowledge + skills + behaviour + attitude. DigComp 2.2 outlines digital competences in 5 areas:

1. Information and data literacy – To articulate information needs, to locate and retrieve digital data, information, and content. To judge the relevance of the source and its content.
2. Communication and collaboration – To interact, communicate and collaborate through digital technologies. To participate in society through public and private digital services and participatory citizenship. To manage one's digital identity.
3. Digital content creation – To create and edit digital content. To understand how copyright and licences are to be applied. To know how to give understandable instructions for a computer system.
4. Problem solving – To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments.
5. Safety – to protect devices, content, personal data and privacy in digital environments. To be aware of the environmental impact of digital technologies and their use.

The comprehensive development of digital competences and digital workplaces should encompass four major development segments:

- **Digitalisation of education** entails developing digital and creative competences in primary, secondary, and tertiary education, as well as developing the curriculum and infrastructure for creative and digitally mature education. Special attention should be paid to developing scientific-research capacities of businesses and education institutions in digital technologies.
- The **Digital Competence Framework for Citizens** includes developing basic and above-basic digital competences, including Information and data literacy, Communication and collaboration, Digital content creation, Problem solving, and Security.
- **Increase the number of ICT specialists** in Croatia, including specialists in Croatian enterprises, organisations, and education institutions, and the availability of experts on the labour market to meet the needs of local businesses. The analysis of this segment should focus on the availability of both local and foreign ICT specialists on the Croatian labour market. Special attention should be paid to Croatia's performance in terms of attracting foreign ICT specialists and students.
- **Digital transformation of traditional (non-ICT) occupations** entails transforming existing workplace activities and processes using digital technologies. Digital competences in traditional occupations are crucial for a successful digital transformation of traditional occupations. This entails developing digital competences of non-ICT professionals.

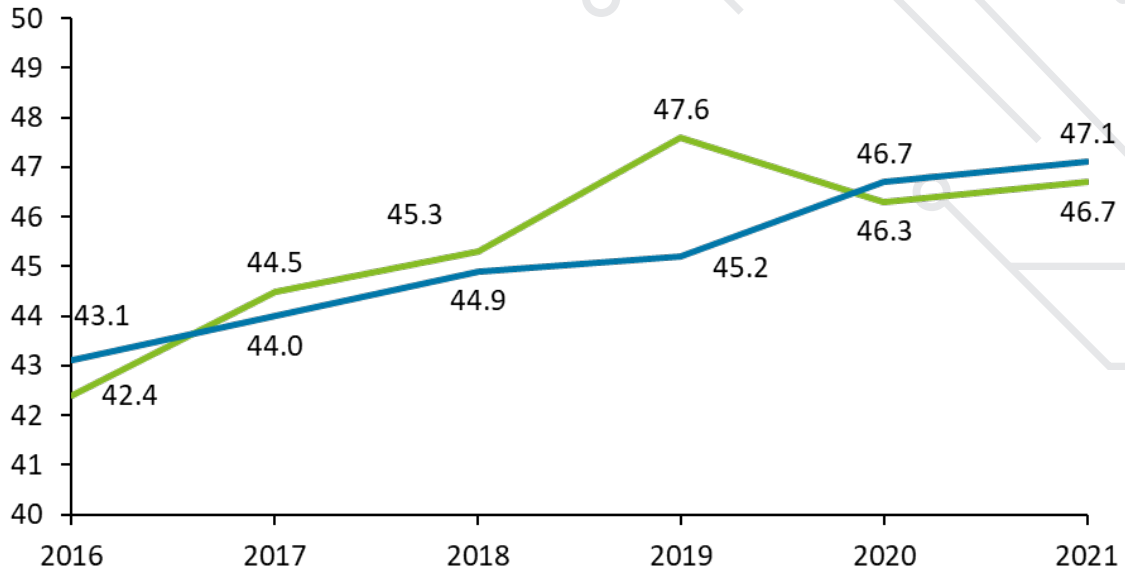
Figure 30: Key areas of development of digital competences and workplaces (source: Deloitte)

5.2 Current state analysis of the development of digital competences and digital workplaces

5.2.1 Digitalisation from the perspective of DESI

The current state analysis is primarily based on the Digital Economy and Society Index (DESI) which monitors Europe's overall digital performance and tracks the progress of EU countries in their digital competitiveness. DESI monitors four key dimensions, one of them being progress in the "digital" human capital.

According to the last available data, in 2021 the Republic of Croatia performed above the EU average in the Human capital dimension, i.e., it ranked 16th among EU countries. The figure below details the trend in the Human capital dimension in the 2016-2021 period for the RoC and the EU average.



	2016	2017	2018	2019	2020	2021
Human capital (HR)	42.40	44.50	45.30	47.60	46.30	46.70
Human capital (EU)	43.10	44.00	44.90	45.20	46.70	47.10
Gap	-0.70	0.50	0.40	2.40	-0.40	-0.40

Figure 31: Human capital dimension of the DESI for Croatia and EU (score 0-100), 2016-2021 (source: DESI 2021)

The figure shows that in the observed period Croatia made progress in terms of its results in the area of digital competences and digital workplaces. In the 2016-2021 period, Croatia improved its score in the Human Capital dimension at a faster pace than the EU average. Moreover, in 2019, scored 2.4 points above the EU average. However, Croatia's score dropped by almost an entire point in the following two years, resulting in a 0.4 point difference in relation to the EU average in 2021.

In order to better understand the current state of development of digital skills and digital workplaces from the perspective of the Human capital dimension of the DESI, we need to analyse its sub-dimensions covering:

- "1a Internet user skills", including three indicators; and
- "1b advanced skills and development", including four indicators.

A detailed description of the relevant sub-dimensions is provided in the table below.

Table 16: Human capital indicators of the DESI (source: 2021

		Sub-dimension	Description	Measured as
INTERNET USER SKILLS	1	At least basic digital skills	Individuals with at least basic skills across four areas: information, communication, problem solving, and content creation (measured as the number of activities implemented in the previous three months).	% individuals
	2	Above basic digital skills	Individuals with above basic skills across four areas: information, communication, problem solving, and content creation (measured as the number of activities implemented in the previous three months).	% individuals
	3	At least basic software skills	Individuals that have, in addition to using basic software features such as text processing, used advanced spreadsheets, prepared a presentation or a document combining text, images and tables or figures, or written a code in a programming language.	% individuals
ADVANCED SKILLS AND DEVELOPMENT	4	ICT specialists	ICT specialists in employment. A broad definition is based on the ISCO-08 classification and includes the positions of managers, professionals, technicians, clerical support workers, and services and sales workers.	% individuals in employment aged 15-74
	5	Female ICT specialists	Female ICT specialists in employment. A broad definition is based on the ISCO-08 classification and includes the positions of managers, professionals, technicians, clerical support workers, and services and sales workers.	% of ICT specialists
	6	Enterprises providing ICT training	Enterprises that have provided ICT training to their staff	% enterprises
	7	ICT graduates	Individuals graduating from ICT studies	% graduates

The table below provides an overview of the results of all indicators within the Human capital dimension of the DESI in the 2016-2021 period of the RoC and the EU average.

Table 17: Overview of the results of all indicators within the Human capital dimension in the 2016-2021 period of the RoC and the EU average in % (source: DESI 2021

Observed period	2016	2017	2018	2019	2020	2021
1 Human capital (HR)	42,40	44,50	45,30	47,60	46,30	46,70
1a Internet user skills	50,60	54,50	54,30	54,30	54,10	54,10
1a1 At least basic digital skills (% individuals)	50,90	54,60	-	-	53,40	53,40
1a2 Above basic digital skills (% individuals)	30,30	33,30			35,30	35,30
1a3 At least basic digital content creation skills (% individuals)	54,60	58,50			56,00	56,00
1b Advanced skills and development	34,24	34,35	36,23	40,88	38,73	39,37
1b1 ICT specialists (% individuals in employment aged 15-74)	2,70	3,30	3,30	3,50	3,20	3,70
1b2 Female ICT specialists (% ICT specialists)	17,20	13,80	14,50	18,20	20,50	18,10
1b3 Enterprises providing ICT training (% enterprises)	24,70	22,00	23,20	23,70	23,00	22,90
1b4 ICT graduates (% graduates)	3,30	4,10	4,70	5,50	4,00	4,40
1 Human capital (EU)	43,10	44,00	44,90	45,20	46,70	47,10

1a Internet user skills	51,30	51,80	53,10	53,10	54,40	54,40
1a1 At least basic digital skills (% individuals)	53,70	54,30	55,30	55,30	56,10	56,10
1a2 Above basic digital skills (% individuals)	26,70	27,30	29,00	29,00	31,10	31,10
1a3 At least basic digital content creation skills (% individuals)	57,20	57,40	58,10	58,10	58,40	58,40
1b Advanced skills and development	34,94	36,18	36,53	37,28	38,94	39,66
1b1 ICT specialists (% individuals in employment aged 15-74)	3,50	3,60	3,70	3,80	3,90	4,30
1b2 Female ICT specialists (% ICT specialists)	16,50	17,00	17,10	17,20	17,90	18,50
1b3 Enterprises providing ICT training (% enterprises)	20,70	21,10	20,70	21,70	23,10	19,70
1b4 ICT graduates (% graduates)		3,50		3,50	3,80	3,90

Within the *1a Internet user skills* sub-dimension, in the *1a2 Above basic digital skills (% individuals)* category, Croatia comes in above the EU average, as detailed in the table above. As for the other two indicators (*1a1 At least basic digital skills (% individuals)* and *1a3 At least basic digital content creation skills (% individuals)*), Croatia has been constantly lagging behind the EU average in the 2016-2021 period.

As for the *1b Advanced skills and development* sub-dimension, *1b4 ICT graduates (% graduates)* indicator, Croatia comes in above the EU average, same as for the *1b3 Enterprises providing ICT training (% enterprises)* indicator, scoring below the EU average in 2020. As for the *1b2 Female ICT specialists (% ICT specialists)* indicator, Croatia's scores have been oscillating between scores above the EU average (in 2016, 2019, and 2020) and scores below the EU average (in other years, including 2021). Croatia has the worst score for the *1b1 ICT specialists (% individuals in employment aged 15-74)* indicator, generally below the EU average.

In 2021, the EU decided to modify the methodology underlying digital competences now grouped in five areas, as detailed in DigComp 2.2: The Digital Competence Framework for Citizens. As a result, based on the new methodology, Croatia ranks 8th in the EU based on Eurostat's initial indicators on the number of people with at least basic digital skills.

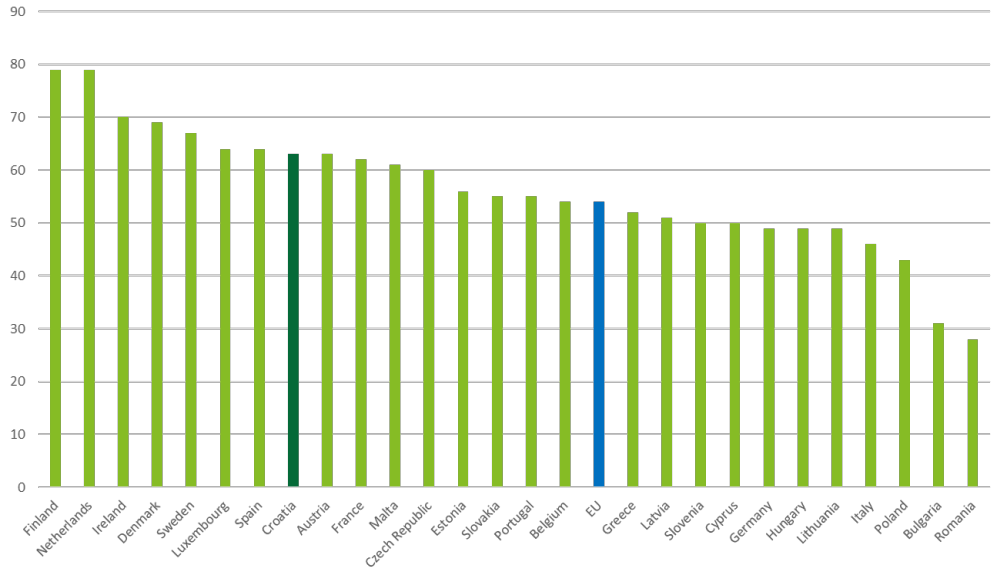


Figure 32: People with at least basic and above basic digital skills (% individuals aged 16-74; source: Eurostat)

5.2.2 The Index of Readiness for Digital Lifelong Learning (IRDLL) – Centre for European Policy Studies (CEPS) (2019)

Another relevant indicator of digital competences is the Index of Readiness for Digital Lifelong Learning (IRDLL). The Index is based on individuals' learning outcomes, institutions and policies, and the availability of digital learning. According to the 2019 results, Croatia is in the European average (rank in EU-27: 13th).

Figure 33: Overall results of digital learning index in EU-27 (source: CEPS – IRDLL)

According to this Index, Croatia has the best results in the Policies and Institutions for Digital Learning category, ranking 3rd of 27 EU member states. In contrast, Croatia is almost at the bottom of the list in the Learning Participation and Outcomes (24th) and Availability of Digital Learning (21st) categories.

Table 18: Results of digital learning index in Croatia (source: CEPS, 2019)

IRDLL category	EU-27 rank
Learning Participation and Outcomes	24th
■ Participation in Lifelong Learning	19th
■ Population with Tertiary Education	21st
■ Learning Outcomes	16th
Institutions and Policies for Digital Learning	3rd
■ Governance & Implementation	23rd
■ Educators & Schools	3rd
■ Regulation & Funding	3rd
■ Institutions & Policies	5th
Availability of Digital Learning	21st
■ Accessibility of Digital Learning	22nd
■ Attitudes Towards Digitalisation	26th

In conclusion, IRDLL shows that Croatia has thus far secured an adequate institutional framework (Educators & Schools, Regulation & Funding) as a prerequisite for digital lifelong learning. However, further investments are needed to encourage citizens to participate in lifelong learning and implement awareness-raising campaigns about the benefits of digitalisation, combined with reforms in the education system pushing for the digitalisation of learning, strengthening the capacity of education to better prepare students for the labour market and lifelong learning.

5.2.3 **Achievements in the area of developing digital competences and digital workplaces so far**

In order to address the deficiencies illustrated by the aforementioned indicators, in order to address its needs and realise its potential in the area of digital competences and digital workplaces, Croatia launched the **e-Schools programme**, as a comprehensive digital transformation of the teaching and educational processes. The purpose of the programme is to create digitally mature schools for the 21st century, by strengthening the capacity of the primary and secondary education system, with the aim of training students for the labour market, further education and lifelong learning. The first phase of the project was implemented in the 2015-2018 period, with a special focus on the organisational, technological, and educational aspects of introducing information and communication technology (ICT) in teaching and business processes of selected schools over the course of two academic years. The experience gained in the first phase served as the basis for the second phase of the project, namely to develop the strategy for a development of digitally mature schools in both primary and secondary educational facilities in the Republic of Croatia, implemented by the end of 2022. The Digital Competence Framework, developed as part of the e-Schools pilot project, proposes 36 competences, and consists of three dimensions, according to the specific requirements of the key tasks of the mentioned groups of users:

1. General digital competences – required from all user groups (teachers and associates, principals, administrative staff);
2. Competences for the application of digital technology in education and training – required from teachers and associates;
3. Digital competences for school management – required from school principals.

As for other achievements in the area of education, the **e-Register Book**, intended for keeping a class register in electronic form, deserves special mentioning. Furthermore, the School e-Mine was established in 2020, providing statistical data on absences, grades, pedagogical measures, and demographic trends in schools. In addition, the Agency for Vocational Training and Education implemented an information system for preparing and organising regional and national contests of vocational schools (**SINAS** – Central information competition system). Digital technologies implemented in the education and training system are constantly upgraded, such as the e-Register Book, School e-Mine, e-Schools project, and systems for tracking the professional training of educational staff. The recently adopted **Curriculum for the subject of informatics for primary schools and gymnasiums in the Republic of Croatia** (2018) and **Curriculum for the cross-curricular topic use of information and communication technology for primary and secondary schools in the Republic of Croatia** (2019) affect the development of human resources in the education system.

Croatia continued implementing reforms in the area of digital education by adopting the **Strategic Framework for the Digital Maturity of Schools and Education System in the Republic of Croatia**, primarily intended for teachers and school principals, as educators and school managers who may use ICT tools to support their everyday activities. In April 2022, Croatia launched a platform for acquiring (green and digital) competences, i.e., education vouchers. A voucher constitutes a financial instrument for the allocation of public funds for adult education, with the user having the right to select an education programme and provider. The programme is financed under the National Recovery and Resilience Plan (2021-2026).

According to the findings of the research ***Teaching Staff and the Pandemic***, presented by the Agency for Science and Higher Education in 2022, although valuable knowledge and experience have been gained in terms of ICT use and e-learning technologies, existing curricula should be upgraded or new ones should be prepared to increase the share of ICT and e-learning in the classroom, enable the application of new teaching methods, and to include a model placing the student at the forefront. Furthermore, this education should enable students to acquire competences necessary for becoming innovative digital citizens and employees, ready for a comprehensive and quality engagement and contribution to the society in a digital age.

As for the lack of an adequate number of ICT specialists, Croatia has launched a number of initiatives in the prior period. In particular, the new **Aliens Act**, entered into force on 1 January 2021, facilitates the employment of aliens in Croatia, including aliens with ICT competences. Pursuant to this Act, the Government of the Republic of Croatia shall no longer set the annual quota for the employment of aliens. Instead, the employer shall request a labour market test from the Croatian Employment Service before applying for a stay and work permit. If the labour market test shows that there are no available persons in the unemployment records who meet the employer's recruitment requirements, which is very common in case of ICT specialists, the employer shall request a stay and work permit from the MoI, which shall then request, ex officio, the opinion of the Croatian Employment Service on employing the relevant person.

In addition, by the end of 2021, the MSE and the Agency for Mobility and EU Programmes launched a new portal called **Study in Croatia**, thus taking steps for attracting foreign students to Croatia, including prospective STEM/ICT students. The portal provides foreign students an overview of relevant information about student programmes and activities in Croatia, as well as general information about living and working in Croatia.

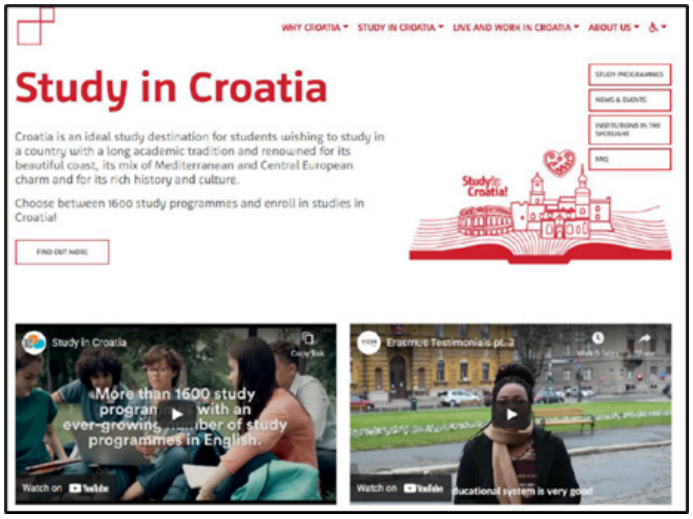


Figure 34: "Study in Croatia" portal

5.2.4 Key challenges for developing digital competences and digital workplaces

In line with the EU's Grand Coalition for Digital Jobs initiative, the National Coalition for Digital Skills and Jobs was established in 2018. The National Coalition stated in the Charter on Digital Jobs that the greatest obstacle to realising Croatia's digitalisation potential lies precisely in the fact that the number of ICT specialists in Croatian enterprises and on the labour market is not sufficient to meet the needs and growth potential of enterprises. Mismatch of the competences of the workforce and the labour market's needs, outflow of ICT (and other) specialists to other EU member countries for work and study purposes, and local ICT specialists working for foreign enterprises all together result in the lack of ICT and other digitally skilled specialists who should be key actors in digitally transforming Croatia.

In its Recommendation on the 2020 National Reform Programme of Croatia and delivering a Council opinion on the 2020 Convergence Programme of Croatia, the European Council recognised labour shortages as a challenge continually affecting some sectors of the economy, mainly because of skills gaps. Furthermore, there is a substantial gap and mismatch between the competences acquired in the formal education system and market business needs. There is also a lack of innovation, entrepreneurial, and technical skills necessary for adjusting to a smart and digital transition of enterprises and, in particular, research skills necessary for implementing new technologies.

The relevant shortage of ICT specialists is a result of the:

- Drop in the number of students in primary, secondary, and tertiary education. As of 2015, the gap between the enrolment quotas and the number of students actually enrolled has been increasing, amounting to 13,780 in 2021, whereas the number of high-school graduates has been decreasing (a total drop of 20.2% in the 2015-2021 period);

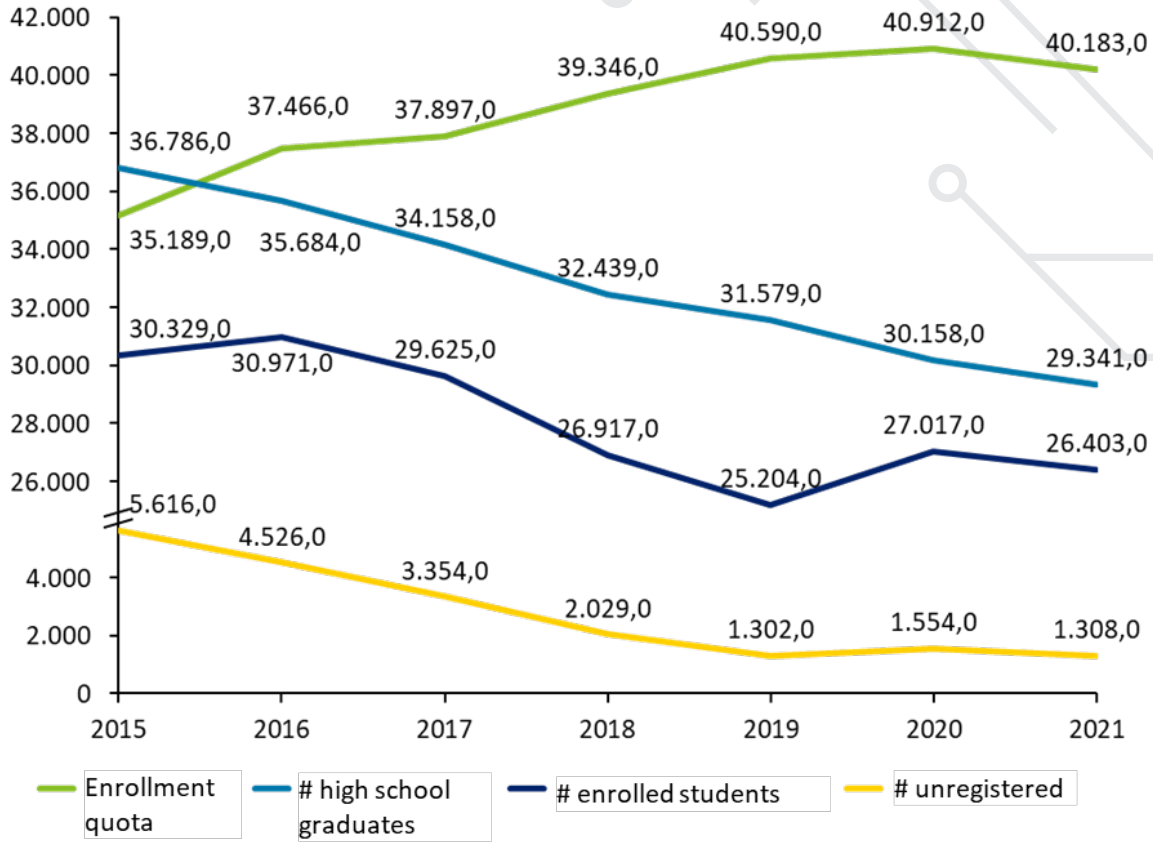


Figure 35: Comparison of university enrolment quotas, number of high-school graduates, students enrolled, and candidates who have not realised the right to enrol

- At the same time, there are not many foreign students in Croatia. In the academic year 2020/2021, there was a total of 155,627 students in Croatia, with only 2,649 foreign students, 1,618 of which were exchange students (61.1% of the total number of foreign students), and the remaining 1,031 students were enrolled in Croatian universities;

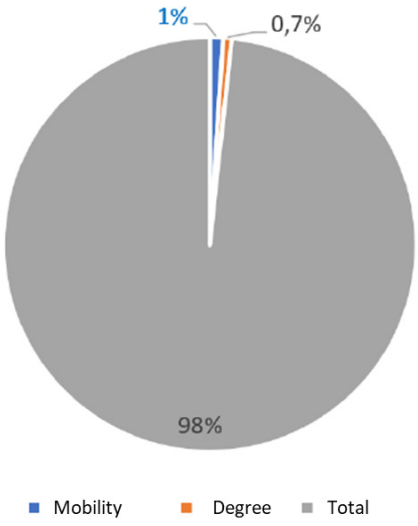


Figure 36: Share of foreign students at Croatian universities, enrolled or in exchange programmes (source: SRCE, 2020/2021)

- In the beginning of 2022, 88 study programmes were available in foreign languages (60 study programmes in 2020), accounting for 5% of the total number of study programmes (1,727) in the Republic of Croatia. Of the 88 study programmes, 81 is taught in English, 5 in Italian, 1 in German, and 1 in Slovene;
- The lengthy enrolment procedure in Croatia is also a problem for foreign students. The procedure can last more than 4 months, since the visa application process has not been completely digitalised.

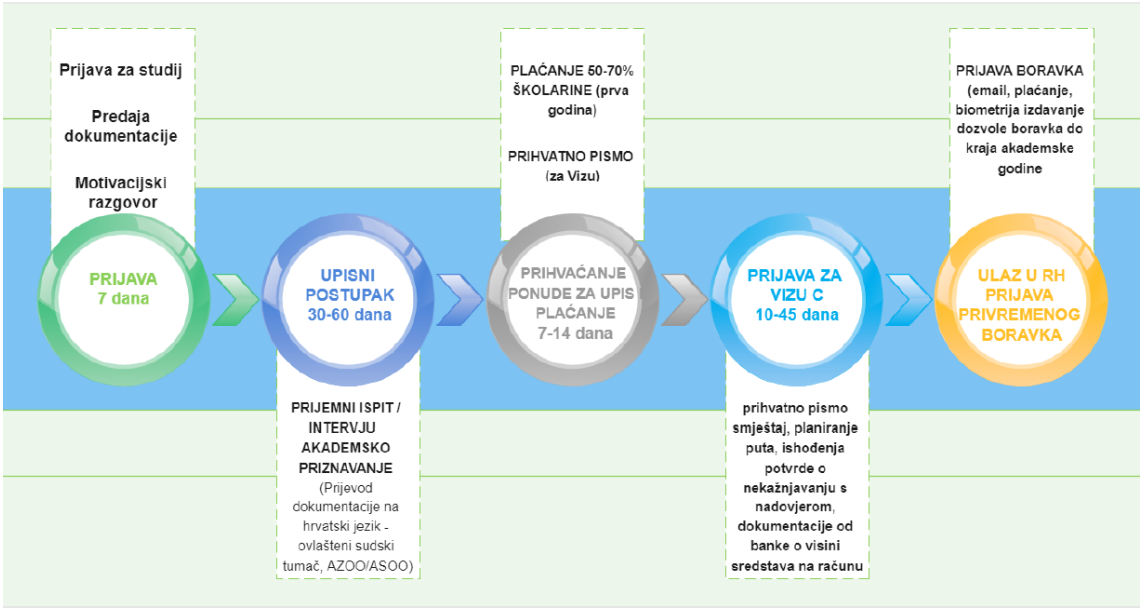


Figure 37: Procedural path of a foreign student coming to Croatia (source: Croatian Employers' Association – Opportunities and challenges in internationalising higher education)

- Lack of capacities for developing a digitally mature education system is another challenge that requires addressing, including the underdeveloped infrastructure and shortage of human resources (e.g., teachers in the STEM area) on all education levels;
- Last but not least, the number of adults in lifelong learning in Croatia is devastating. In particular, according to 2020 data, only 3.2% of adults in Croatia participate in lifelong learning/training (EU average 9.2%). This leads to competence obsolescence, resulting in lower levels of labour market participation and productivity, and a weaker implementation and use of new technologies in new workplaces.

5.2.5 Current financial framework for developing digital competences and digital workplaces

The National Recovery and Resilience Plan (2021-2026) (NRRP) allocates investments in digital competences and digital workplaces through sub-components referring to public administration, education and science, and labour market and social policies. The NRRP measures include the construction, upgrading, reconstruction and equipping of pre-school establishments, as well as primary and secondary schools, including investments in ICT equipment. Furthermore, the NRRP includes the funding of the digital transformation of higher education and further improving the framework for attracting students and researchers in STEM and ICT areas. The planned investments will focus on developing a model encouraging the promotion of researchers as well as securing the conditions for strengthening the competences of students and researchers and conducting cutting-edge research activities in STEM and ICT areas. Finally, as mentioned above, the funding of the voucher-based adult education scheme for both employed and unemployed people will continue in the upcoming period. An overview of the relevant investments defined in the NRRP is provided in the table below.

Tablica 19: Planirane investicije kroz Nacionalni plan oporavka i otpornosti (2021. - 2027.) za razvoj digitalnih kompetencija i digitalnih radnih mjesta

Component	Sub-component	Amount (in HRK million)	Relevant reform	Investment of interest	Amount (in HRK million)
Education, science and research	Reform of the education system	5.100	Structural reform of the education system	Construction, upgrading, reconstruction and equipping of pre-school establishments	1.620
				Construction, upgrading, reconstruction and equipping of primary schools for single-shift, full-day teaching	2.280
				Construction, upgrading, reconstruction and equipping of secondary schools	567
			Modernisation of higher education	Digital transformation of higher education	633
	Develop research and innovation capacities	2.400	Create a framework for attracting students and researchers in STEM and ICT areas	Develop a model encouraging the promotion of researchers and conducting cutting-edge research activities in STEM and ICT areas	388.5
				Investment in research and technological infrastructure in STEM and ICT areas	541.5
Labour market and social protection	Improve employment measures and the legal framework for the modern labour market and the economy of the future	1.435	Develop and implement targeted active employment policies for a green and digital transition of the labour market	N/A	330 (digital activities)
			Establish and implement a voucher-based adult education scheme for employed and unemployed people	N/A	0,1 (digital competences)

The investments defined in the NRRP will largely address the challenges in ESF+ areas. Therefore, the interventions defined in the Operational Programme Efficient Human Resources (2021-2027) are generally a continuation of the activities launched as part of the NRRP.

The investments under the Operational Programme Competitiveness and Cohesion 2021-2027 are focused on education and training programmes for developing competences and competences for smart specialisation and industrial transition (reskilling and upskilling), and strengthening enterprises' competences for smart specialisation and industrial transition. The OPCC 2021-2027 also includes an investment in training and upskilling for the purpose of acquiring special professional competences required for small and medium enterprises (training enterprises and their employees).

Table 20: Planned investments under the specific objective Developing competences for smart specialisation, industrial transition and entrepreneurship of the Operational Programme Competitiveness and Cohesion 2021-2027

Specific objective	Code	Amount (in HRK million)
Develop competences for smart specialisation, industrial transition and entrepreneurship	Research and innovation activities in public research centres, higher education institutions, and centres of competence, including networking (industry research, experimental development, feasibility studies)	112,5
	Developing competences for smart specialisation, industrial transition and entrepreneurship, and adaptability of enterprises to changes	238,5
	Advanced support services for SMEs and groups of SMEs (including management, marketing and design services)	24

Investments in developing and strengthening research and innovation capacities and application of advanced technologies are aimed at building infrastructure for "Strengthening the researchers' competences for smart specialisation and industrial transition." These investments include renovating and furnishing areas for implementing the competence development programme on a single location. Furthermore, the investments will be used to strengthen the European Centre for Innovation, Advanced Technologies and Competence Development (ECINTV), offering a wide range of services fostering innovation, supporting the national innovation centre and cross-sectoral cooperation, i.e., cooperation of all stakeholders of the innovation system and strengthening digital competences in order to digitally transform businesses.

Table 21: Planned investments under the specific objective Developing and enhancing research and innovation capacities and the uptake of advanced technologies of the Operational Programme Competitiveness and Cohesion 2021-2027

Specific objective	Code	Amount (in HRK million)
Developing and enhancing research and innovation capacities and the uptake of advanced technologies	Investment in fixed assets, including research infrastructure, in public research centres and higher education directly linked to research and innovation activities	149,5
	Developing competences for smart specialisation, industrial transition and entrepreneurship, and adaptability of enterprises to changes	73,5

5.3 Analysis of strengths, weaknesses, opportunities, and threats for developing digital competences and digital workplaces

Based on our detailed understanding of the status of development of digital competences, we conducted an analysis of public administration's internal strengths and weaknesses in terms of digitalisation, as well as external opportunities and threats that may affect the digitalisation of public administration (SWOT analysis).

The tables below identify key factors for each of the four SWOT categories. Each factor identified has been awarded an impact intensity score within a specific SWOT category (0 – no impact, 10 – very high impact intensity). The intensity score of an individual factor represents the average score attributed to the relevant factor by the representatives of institutions included in the preparation of the Digital Croatia Strategy until 2032. The factors presented in the tables have been ordered based on their final intensity score, from high to low. At the end of every table, the average intensity score was calculated for each of the four SWOT categories.

Table 22: Overview of strengths, weaknesses, opportunities, and threats of the development of digital competences and digital workplaces, with an overview of intensity scores per individual factor (source: Deloitte and members of the EWS for the development of digital competences and digital workplaces)

Strengths		
No.	**Description**	**Intensity (score 1-10)**
1	As for the At least basic digital skills and the Above basic digital skills indicators, Croatia comes in above the EU average (ranks 8th in the 2021 DESI)	8,0
2	The education sector has demonstrated a high level of preparedness to implement digital technologies and acquire new digital competences through the e-Schools project	8,0
3	Relatively high number of graduating ICT specialists	8,0
4	Regional centres of excellence in vocational education have been established, and these centres in the area of engineering and computing may contribute to the creation of ICT specialists	7,8
5	Croatia is an extremely desirable and safe destination, an important factor for attracting foreign ICT specialists and digital nomads	7,7
6	A voucher-based adult education scheme was established in April 2022 (vauceri.hzz.hr)	7,2
7	An advanced system for monitoring market analytics was established	7,0
8	Introduction of the full-day teaching model into primary schools will enable adding STEM-related extracurricular activities	7,0
9	There are examples of excellent extracurricular projects attracting extraordinary interest of both teachers and students in STEM education from an early age; furthermore, there are quality extracurricular programmes promoting STEM education and careers	7,0
10	National regulatory and financial framework encourages the development of digital education, and teachers have the competences and resources necessary for educating students using digital technologies (Index of Readiness for Digital Lifelong Learning)	6,3
11	Clearly defined methods for aligning education with the labour market by approving programmes in compliance with the adopted professional norms (prepared by employers or associations; approved and entered into the relevant register by the Ministry of Labour, Pension System, Family and Social Policy) and qualification standards (prepared by education institutions; approved and entered into the relevant register by the MSE)	6,3
12	The new Aliens Act (OG 133/2020) facilitates the employment of third-country nationals, with the purpose of finding the needed labour force, such as ICT specialists	6,2

13	The National Coalition for Digital Skills and Jobs has been established and clear goals and measures for strengthening digital competences and digital workplaces have been defined	5,9
Average intensity score:		**7,1**

Weaknesses

No.	Description	Intensity (score 1-10)
1	Shortage of ICT specialists on the labour market considering the needs and potential growth of companies	**9,1**
2	Shortage of STEM (primarily Maths, Physics, and Informatics) teachers in elementary and high schools, as well as higher education institutions, leaving the education sector for better-paid jobs in the private sector.	**8,9**
4	A substantial share of Croatian students does not graduate from STEM study programmes and the higher education enrolment quotas do not meet the needs of the labour market and businesses	**8,7**
8	In relation to EU member countries and beyond, Croatia is losing its potential to attract and retain key digital talents due to a lack of employee share option plans (for unlisted companies); high tax burden for individuals in employee share option plans deter globally competitive professionals from remaining on the Croatian labour market	**8,7**
6	No national plan for internationalising, attracting, and retaining digital professionals and talent, resulting in a lack of a coordinated effort for attracting and integrating foreign ICT specialists	**8,1**
7	Underdeveloped education and training support for talented children and students interested in ICT	**7,6**
8	As for the At least basic digital content creation skills (% individuals) indicator of the DESI, Croatia is below the EU average.	**7,3**
9	High tax burden on labour and employee income of highly valuable employees	**7,2**
10	Current wage model in public administration and government services precludes attracting and retaining quality ICT specialists	**7,0**
11	Obsolete methods for managing public and business systems do not encourage acquiring and evaluating digital competences (e.g. data-based decision making)	**7,0**
12	Insufficient data on the needs of public administration employees for increasing the level of digital competences	**6,4**
13	Insufficient awareness of public authorities on the impact of the common EU labour market and the need for ongoing and constant improvements in the legislative and tax framework that will match those of stronger, Western EU economies in the fight for attracting and retaining digital professionals and talent	**6,4**
14	Passive resistance to the principles of open education and new teaching methods and techniques, as well as disputing or misinterpreting the opportunities new e-learning methods and technologies may bring in the area of improving quality of education and continuous, flexible acquisition of new competences, including digital ones	**6,0**

15	Insufficient involvement of all relevant sector stakeholders in initiatives and associations attempting to improve the development of digital competences (e.g. National Coalition for Digital Skills and Jobs)	5,9
Average intensity score:		**7,4**

Opportunities		
No.	**Description**	**Intensity (score 1-10)**
1	Availability of EU funds for investments in developing digital competences and digital workplaces	9,0
2	Availability of ICT students and ICT specialists from Slavic-speaking and other countries, to whom Croatia may provide a high living standard	8,0
3	Strengthening the accreditation framework, securing quality, and fostering distance learning will secure opportunities for digital education to the entire population, living in developed urban centres or less populous areas	7,1
4	Private sector offers quality solutions for both formal and informal education, thus contributing to the development of digital competences of citizens, but also to the increase in the number of ICT specialists	7,1
Average intensity score:		**7,8**

Threats		
No.	**Description**	**Intensity (score 1-10)**
1	Croatian ICT specialists working remotely for companies not registered in Croatia put an enormous pressure on already insufficient human resources in Croatian enterprises	8,5
2	Continued demographic decline will ultimately result in a drop in the number of university students in Croatia	8,5
3	Competitiveness of other EU countries in terms of providing better working conditions for ICT specialists by constantly improving the working conditions they offer their labour force	8,4
4	Even a slight lack of information and education may result in negligence and computer security incidents	7,0
5	Citizens' resistance to adopting new competences, including digital competences	5,5
Average intensity score:		**7,6**

The following tables detail the calculation of the product of average intensity scores for the four SWOT categories: Strengths x Opportunities; Strengths x Threats; Weaknesses x Opportunities; Weaknesses x Threats

Table 23: Overview of the calculation of the product of average intensity scores for the four SWOT categories: Strengths x Opportunities; Strengths x Threats; Weaknesses x Opportunities; Weaknesses x Threats (source: Deloitte and members of the EWS for the development of digital competences and digital workplaces)

	Strengths x Opportunities
Product	55,45

	Strengths x Threats
Product	53,95

	Weaknesses x Opportunities
Product	58,10

	Weaknesses x Threats
Product	56,53

Based on the calculations above, we may conclude that the "Weaknesses x Opportunities" matrix has the highest intensity product (58.1), indicating that the optimum solution would be to focus the strategy for developing digital competences and digital workplaces on overcoming weaknesses/deficiencies in order to tap new opportunities. In other words, in Croatia, the development of digital competences and digital workplaces is characterised by pronounced weaknesses, while the external environment offers favourable opportunities, which is why weaknesses need to be mitigated or offset in order to make a better use of available opportunities.

5.4 Development vision

The vision for further developing digital competences and digital workplaces is essentially focused on four areas: i) develop citizens' digital competences for working and living in a digital age; ii) increase the number of ICT specialists in Croatia: iii) digital transition of the education sector; and iv) encourage greater representation of women among ICT specialists. As for citizens' digital competences, the number of (un)employed citizens with digital competences should be increased, with a special focus on the safe use of digital technologies and smart specialisation, while encouraging formal and informal lifelong learning. When it comes to increasing the number of ICT specialists, particular attention should be paid to retaining Croatian ICT specialists and attracting foreign ICT specialists. Digital transition of the education sector includes fostering digital maturity in the primary and secondary education system, as well as modernising higher education and research system.

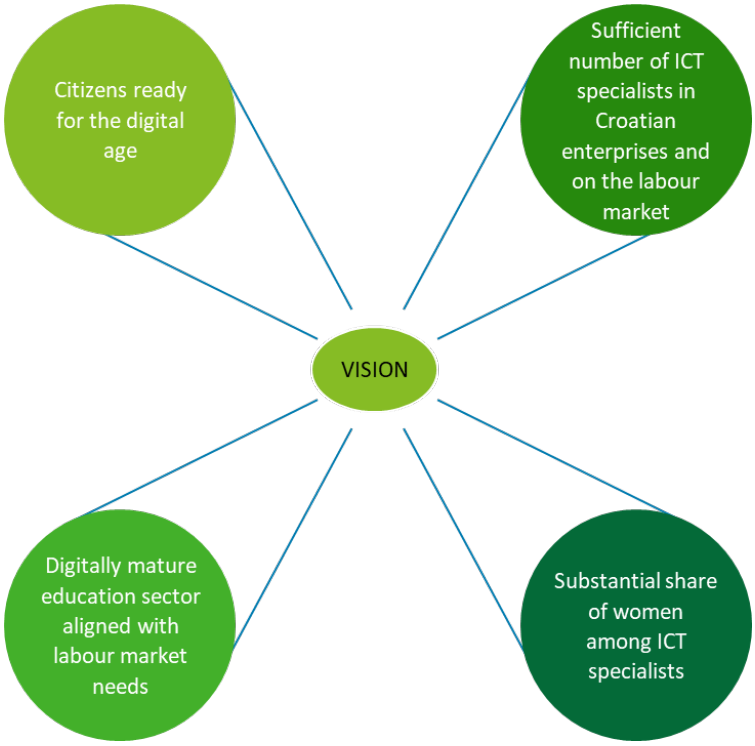


Figure 38: Vision for further developing digital competences and digital workplaces (source: Deloitte)

5.5 Description of development needs/potential of developing digital competences and digital workplaces

5.5.1 European Union guidelines

European Commission's Proposal for a Decision of the European Parliament and of the Council establishing the 2030 Policy Programme "Path to the Digital Decade" was adopted on 15 September 2021. The Policy Programme sets out the concrete digital targets which the Union as a whole is expected to achieve by the end of the decade, as first delineated in the 2030 Digital Compass: the European way for the Digital Decade, identifying digital skills as one of four cardinal points of EU's digital development The EU wants to achieve the following digital targets in the context of digital skills:

- at least 80% of adults have at least basic digital skills;
- at least 20 million employed information and communications technology (ICT) specialists are employed,
- with convergence between women and men.

5.5.2 Guidelines of the National Development Strategy until 2030

The National Development Strategy until 2030 outlines the following implementation priorities in the area of education, training, and working in a digitally transformed society:

- Increase the number of highly-educated ICT specialists entering the job market;
- Raise the digital competences of non-ICT specialists;
- Support secondary schools and higher education institutions for jobs in the digital society;
- Retrain the workforce and support the acquisition of digital competences necessary for jobs in the digital society;
- Increase the level of citizens' basic and advanced digital competences to ensure their active participation in the digital society.

5.5.3 Development needs and potential

Based on the in-depth current state analysis, relevant EU and national guidelines, analysis of belonging strategic planning acts, and SWOT analysis of developing digital competences and digital workplaces, we have identified the following **development needs/potential**:

- **Development need/potential 1:** Increase the number of ICT specialists on the labour market.
- **Development need/potential 2:** Increase the level of digital competences and reskill the labour force with non-ICT professions in line with the labour market needs.
- **Development need/potential 3:** Increase the level of citizens' basic and advanced digital competences to ensure their active participation in the digital society.
- **Development need/potential 4:** Further digital transition of the education system and launch of a programme for pupils interested in ICT topics.
- **Development need/potential 5:** Redefine tertiary education enrolment quotas to increase the number of ICT graduates.
- **Development need/potential 6:** Redefine secondary education enrolment quotas to prepare students for attending and graduating from STEM studies.
- **Development need/potential 7:** Increase the number of teachers and premises of tertiary education establishments in the ICT area.
- **Development need/potential 8:** Attract foreign ICT students and specialists by internationalising higher education.
- **Development need/potential 9:** Encourage the development and use of digital tools in education to ensure equal opportunities for education and acquisition of digital competences for all citizens.
- **Development need/potential 10:** Encourage greater representation of women among ICT specialists.

6 Conclusion of the current state and financial framework analysis

The analysis was conducted in compliance with the previously defined national framework of the comprehensive system for strategic planning and development management which, inter alia, contains Guidance on Preparing Sectoral and Multi-Sectoral Strategies and the Strategic Planning Manual. Thus, while conducting the analysis, we examined in detail all relevant strategic EU and national documentation, together with the accompanying legal framework. In particular, in line with the strategic planning acts system of the RoC, there is a three-tiered hierarchy of acts, namely long-term, mid-term, and short-term strategic planning acts. Therefore, during the preparation of this current state analysis, all information contained in the relevant strategic planning acts in force had to be considered. Some of the key documents considered are the 2030 Digital Compass: the European way for the Digital Decade, defining EU objectives for enhancing digitalisation in EU member countries and the National Development Strategy until 2030, defining the digital ambitions of the Republic of Croatia. The analysis covered the following mid-term strategic documents for the 2021-2027 period: National Recovery and Resilience Plan, National Plan for Broadband Development, National Plan for Public Administration Development, National Plan for Healthcare Development, and many others.

In addition to the relevant strategic planning acts, the analysis also considered the conclusions of prior research, audits, strategic reports, recommendations, plans and other documents, such as: Public Administration Modernization: National Development Strategy Croatia 2030 Policy Note, Strategic Framework for the Digital Maturity of Schools and Education System in the Republic of Croatia, Croatian Roadmap for the Implementation of the Connectivity Toolbox, and Industry 5.0: A Transformative Vision for Europe.

The processing of information collected resulted in in-depth analyses such as PESTLE and SWOT. As for the SWOT analysis, in cooperation with EWS members, we defined and assessed all factors of internal environment strengths and weaknesses, together with external environment opportunities and threats relevant for all four priority areas: digital transition of the economy, digitalisation of public administration and justice, development of broadband electronic communications networks, and development of digital competences and digital workplaces.

The main findings of the analyses conducted are the following:

- As for the **Digital transition of the economy**, the current state analysis suggests actively addressing the shortage of ICT specialists in Croatia, by further shifting the tax burden away from labour and employee income (e.g. remuneration in the form of allocation of shares and stock options) to make Croatia's real sector more competitive than the real sector of other countries in the region. Furthermore, the analysis points to the need for improving the regulatory framework for fostering innovation and investments in the context of digital transformation and the single digital market of the EU. Moreover, further investments in digital literacy and digital competences of entrepreneurs are essential for adopting, introducing and using new technologies, and implementing innovation in the economy.
- The analysis of the **Digitalisation of public administration** indicates the need for placing citizens at the forefront of public e-services, with a special focus on addressing citizens' life events or legal entities' business events. In addition, continued efforts are necessary for digitalising public administration's supporting business processes, as well as modernising the state's information infrastructure and developing a national interoperability framework, including interconnecting all central registers. An accelerated digitalisation of public administration requires further strengthening of the organisational structure of authorities responsible for coordinating and implementing the digitalisation, together with their ICT specialists capable of devising digital projects, and then implementing and maintaining them (as implementers or supervisors). Introducing promotional and training content on the availability of e-services for citizens and enterprises is required to increase the number of e-services users.
- In the **Development of broadband electronic communications networks area**, the analysis detected the need for increasing VHCN coverage for households and public purposes. Furthermore, VHCN coverage should be substantially increased in rural areas, whereas 5G coverage should be increased in populated

areas and along major transport paths. In addition, it is necessary to improve and encourage the take-up of very high-speed broadband services. In order to facilitate the construction of VHCN, it is necessary to make a more efficient use of EU funds and improve the construction and spatial planning regulatory framework, with the purpose of cutting costs and streamlining procedures. Finally, fixed broadband services should become more affordable.

- As for the **Development of digital competences and digital workplaces**, the current state analysis points to the need for increasing the number of ICT specialists in Croatia. In order to do this, higher education enrolment quotas should be restructured, and support should be provided to the education sector to achieve digital maturity and design programmes for talented students interested in ICT. Foreign students and specialists offer an opportunity to increase the number of ICT specialists and internationalise higher education and the labour market. Furthermore, including more women in ICT also offers an opportunity to increase the number of ICT specialists. Moreover, the analysis indicates the need for increasing the level of digital competences and reskilling the labour force with non-ICT professions in line with the labour market needs. Finally, in order for citizens to actively participate in the digital society, the level of their basic and advanced digital competences should be systematically increased. Fostering distance learning will secure opportunities for digital education and acquiring digital competences for everyone, regardless of where they live.

Annex 1: PESTLE analysis

The external environment is a source of many restrictions, but also opportunities. Therefore, using the PESTLE method for identifying and analysing political, economic, social, technological, legal and environmental factors might provide a better understanding of the environment and help develop approaches to managing the factors identified, affecting the realisation of objectives – in this case, digitalisation of the Croatian society and economy. Six PESTLE factors have been detailed below, from the perspective of digitalising Croatia.

Political factors (stability of EU and national policies, government regulations and policies in the area of e-government, public funding, transparency of services and procedures, and commitment of organisational leadership):

- Unequivocal political focus of both the EU and Croatia on a green and digital society, as levers for further development, securing substantial public funding on all public government levels;
- Lack of a national interoperability framework and a weak organisation and managing structure of the central interoperability system;
- Inadequate management of public administration digitalisation projects portfolio, without a sufficiently harmonised architectural view on adjusting the relevant project results and achieving and maintaining their interoperability;
- Insufficient public administration capacities for quality preparation, application, and implementation of NRRP/EU-funded measures/projects.

Economic factors (economic growth, inflation rates, interest rate fluctuations, GDP, revenues, government expenditure, economic stability, and the tax system):

- The strength of the national IT sector represents an important economic factor for further digitalising the Croatian society. Namely, the Croatian IT sector is continuously growing. In 2021, it accounted for 3.4% of the national GDP and accounted for 5.8% of total exports of RoC. Further strengthening of the sector is a key factor for maintaining ICT specialists in Croatia and, thus, for the ability to realise an accelerated digitalisation of society and economy. Furthermore, the growth of the national IT sector resulted in a substantial increase in available (attractive) capital for developing/acquiring IT companies;
- In addition to the ICT sector, the financial sector is one of the sectors with the largest impact on the digital transformation of society. The digital transformation of the financial sector, in particular the digitalisation of payment systems and instruments, plays an important role in a quicker uptake of digital changes in the

economy and society in general, by developing customer trust in the functioning of e-trade and e-services. Therefore, further encouraging the digitalisation of payment systems and instruments should accelerate the digital transformation of the Croatian society;

- Not enough has been done on a national level in terms of further shifting the tax burden away from labour and employee income (e.g. remuneration in the form of allocation of shares and stock options) in order to make the system more competitive in comparison with other Central and Eastern European countries and focused on keeping the necessary ICT workforce in Croatia, key for an accelerated digitalisation of the Croatian society and economy;
- Public companies in Croatia have a low level of digitalisation and since Croatia belongs to the category of European countries with a significant share of state-owned enterprises (companies) in the GDP, this substantially contributes to the low digitalisation score of the Croatian economy;
- For a number of years, not enough investments were made in implementing digital technologies in the public sector due to a lack of budget funds. Despite some excellent examples of digitalisation, such as a part of the health care system, generally speaking, different public institutions and administration have varying digitalisation levels. As for the overall digital maturity of the Croatian public administration, it is below the EU average;
- Supply chain disruptions (increasing costs, shortages, and delays) still constitute limiting factors for the operations of Croatian businesses;
- The double-digit inflation in 2022, the highest inflation rate in Croatia in this millennium, constitutes a mid-term economic challenge. Namely, the already present inflationary pressures resulting from the increase in energy and food prices and geopolitical conflicts with unpredictable duration and outcomes, have been steadily increasing, which may ultimately result in serious economic difficulties and budget limits;
- Furthermore, unaffordable fixed broadband services with regard to customers' purchasing power have an adverse effect on digitalisation of Croatia. Moreover, parafiscal charges for broadband electronic communications infrastructure are substantial.

Social factors (culture, level of education, competences, personal beliefs and behavioural patterns, trust in public administration, customer demographics, etc.):

- One positive social factor is that Croatia is perceived as a desirable and safe place to live, which certainly contributes to attracting foreign ICT specialists and students;
- On the one hand, the level of basic digital competences of Croatian citizens is above the EU average, which favours the digital transition of the society, and on the other hand, citizens have a low level of digital content creation skills. This is why the Government of Croatia established a voucher-based adult education scheme in April 2022;
- The national education sector has demonstrated a high level of preparedness to implement digital technologies and acquire new digital competences through different projects (e.g. e-Schools project);
- Excellent extracurricular STEM projects, combined with quality extracurricular programmes promoting STEM education and careers, point to a growing interest in STEM areas;
- Negative demographic trends in Croatia, ultimately resulting in a shortage of specialists in the labour market, including specialists with developed digital competences, limit future digitalisation of society;
- Citizens' limited knowledge about the availability of e-services and digital literacy necessary for the use thereof constitute negative social factors.

Technological factors (infrastructure, internet access and availability, technological development, automation of public administration's business processes, measures for guaranteeing security and privacy):

- Some technological factors of digitalisation of Croatia refer to network infrastructure availability and stability as the basis for digitalisation. In particular, mobile networks are well-developed, but 5G coverage of population areas should be improved. The share of xDSL is high;
- Low average broadband speeds and insufficient professional and operational capacities for implementing the necessary investments in high-speed broadband networks pose a challenge;
- Creation and launching of new e-services is fast-paced and the insufficient level of digitalisation of public administration's supporting business processes is also problematic;
- Uptake of new technological solutions, such as AI, offers an opportunity for public administration and the economic sector in the area of optimising and digitalising supporting processes;
- Public authorities are facing limited options on account of obsolete technological solutions and architecture, as well as incompatibility.

Legal factors (laws governing the e-government environment, such as cybersecurity and personal data protection acts, legal system, and lack of a legal framework for supporting e-government implementation):

- In the legal domain, digitalisation of society facilitates compliance of the Electronic Communications Act (OG 76/22) with the European Electronic Communications Code. However, amendments to the parts of the legislative framework encouraging digitalisation should be introduced at a faster pace. Namely, we identified the need for improving the regulatory framework for fostering innovation and investments in the context of digital transformation and the single digital market of the EU;
- Restrictive construction regulations in the area of broadband electronic communications infrastructure – non-compliance of electronic communications regulations, construction regulations, and spatial planning regulations; differences in defining, interpreting, and applying spatial plans in local and regional self-government units;
- Unfavourable regulatory conditions for establishing and developing (ICT) startups: the measure from the EU Startup Nations Standard of Excellence should be implemented, containing new legal frameworks for startups.

Environmental factors (Government of the Republic of Croatia's policy on pollution, use of eco-friendly technologies, energy efficiency, climate changes):

- Environmental indicators show that Croatia should carefully approach using IT technologies, considering their potentially adverse impact on the environment and natural resources. On the one hand, using IT technologies may contribute to reducing pollutant emissions (e.g. through remote working, distance learning, etc.) and on the other hand, electronic devices contain heavy metals, flame retardants, antistatic agents or plastic softeners which are environmentally harmful, as well as rare-earth metal whose exploitation has various negative environmental impacts;
- Digital infrastructure, i.e., its energy and cooling systems, is energy-intensive. Therefore, Croatia's digitalisation ambitions should be aligned with the Regulation (EU) 2021/1119 establishing the framework for achieving climate neutrality ("European Climate Law") and accompanied by plans for developing national energy capacities. The prices of energy, including electricity, have reached an all-time high in both Croatia and the EU, increasing the price of using IT technologies. Achieving climate neutrality should require a contribution from all economic sectors. In light of the importance of energy production and consumption for the level of greenhouse gas emissions, it is essential to ensure a transition to a safe, sustainable, affordable and secure energy system relying on a well-functioning internal energy market. Digital transformation, technological innovation, and research and development are also important drivers for achieving the climate-neutrality objective.

Digital Croatia Strategy
for the period until 2032

Republika Hrvatska
Central State Office for the Development of the Digital Society
December 2022