

Digital Innovation Profile Montenegro



Digital Innovation Profile – Montenegro

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Foreword of Minister

Government policies and strategies remain focused on stimulating and enhancing innovations as a key factor for further economic development and overall transformation of Montenegrin economy. Our absolute priority is further improvement of the business environment, through financial and institutional support to the development of entrepreneurship and elimination of business barriers, at the national and local level. Development based on the synergy of innovation and diversity through the concept of smart specialization, as well as the realization of other R&D projects, will create stable preconditions for long-term and sustainable growth and development.

Montenegro has recognized the potential of entrepreneurship and innovation, especially in the ICT sector. We consider ICT sector as a strong potential for growth. In 2016, the government adopted the Strategy of Innovative Activity 2016-2020, its first national innovation strategy, followed by the Strategy for the Information Society Development 2016-2020. Many stakeholders from both, the public and private sectors, are working together in implementing strategic objectives in order to leverage the potential of digital disruption.

Building robust innovation ecosystems is a key component of national development, as innovation – especially in ICT – is a driver of economic competitiveness and growth in modern economies.

Digital Innovation Profile of Montenegro provides insight in our current state when it comes to digital innovation capabilities, as well as a guidance on achieving systematic and synchronized approach among all relevant stakeholders, aimed to create a competitive digital innovation environment and accelerate dynamic transformation of society.

We look forward to continuing working with the ITU and our international partners in creating and implementing sustainable digital ecosystem in the country.

H.E. Dragica Sekulić
Minister of Economy
Republic of Montenegro

Foreword of BDT Director

Digital entrepreneurship and innovation will demand bold new approaches and new business models, if we are to fully realize the transformative potential of ICTs and leverage them to achieve the SDGs. The ITU digital innovation profile series will help countries to make a rigorous evaluation of their digital innovation ecosystem based on internationally-recognized best practice. Produced in collaboration with trained experts, each report looks at policies, practices, challenges and opportunities. By highlighting the elements that drive transformation, identifying key capabilities, and allocating an overall digital ecosystem innovation maturity level, these reports will play a valuable role helping each country pinpoint next steps in further developing a digital innovation ecosystem.

Doreen Bogdan-Martin
Director, Telecommunication Development Bureau

1 Introduction

Digital innovation profiles are an important element in the ITU series of snapshots of information and communication technology (ICT)-centric innovation ecosystems. Each profile assesses and summarizes the opportunities and challenges facing a country’s ICT ecosystem. The at-a-glance format enables international comparisons and meaningful measurement of the capacity to accelerate digital transformation and of innovative ICT capability.

Digital innovation profiles offer a rapid and straightforward means of analysing and optimizing your ICT ecosystem. This analysis then helps navigate through a country’s fast-moving ICT/ telecommunication landscape with a view to building a competitive, sustainable, ICT-enabled economy. Further collaboration with ITU can go on to target specific engagements, including the implementation of appropriate, co-developed, bankable projects that are of high value in the national context.

All digital innovation profiles are developed by experts specially trained to apply the ITU digital innovation framework. This framework features highly structured workshops and facilitated assessments, designed to build national capacity, enhance on-the-ground skills and powerfully accelerate digital transformation. The framework process equips ITU Members States with the tools to assess and monitor their own ICT innovation ecosystems.

The analysis and the positions expressed in this initial high-level assessment, reflect opinions and research of the national expert, working within the ITU digital innovation framework process and with guidance from the ITU-D Digital Innovation Ecosystems cluster.

2 Background and context

Montenegro renewed independence in 2006, and negotiations began in 2012 to secure EU membership by no later than 2025. It is an open economy, with 620 000 inhabitants (Table 1), political, monetary and macroeconomic stability, and a liberal economic regime for foreign trade and a favourable tax policy – one of the lowest corporate and personal tax rates in the Europe region at 9 per cent. Montenegro has a large inflow of foreign direct investment (FDI) per capita (Table 1).

Figure 1: Map of Montenegro



Source: shutterstock

Table 1: Key indicators for Montenegro

Population (2018)	622 345
Population density (2018)	46.271/km ²
GNI per capita (2018)	USD 8 430
Region	Europe

Based mainly on services, and tourism that accounts for roughly 20 per cent of the Montenegro GDP, the average GDP growth of Montenegro over the last six years (from 2013 to 2018) reached 2.81 per

cent. GDP growth in 2018 was driven by construction and tourism, and from 2019-2020 four growth sectors stand out: tourism, energy, agriculture, and the food processing industry (Table 2).

Table 2: Economic data and other relevant indicators

Economic data and other relevant indicators	
Income category:	Upper middle income
GDP	EUR 4.37 billion/USD 4.85 billion (2017) EUR 4.96 billion/USD 5.50 billion (2018)
GDP per capita	EUR 7 016/USD 7 784 (2017) EUR 7 972/USD 8 844 (2018)
GDP growth	4.72% (2017) 5.08% (2018)
GDP by sector	Services: 41.1%; Industry: 3.84%; Agriculture: 6.85% (2017) Services: 42.9%; Industry: 3.98%; Agriculture: 6.73% (2018)
ITU Global ICT Development Index 2017*	Rank 61/175 – Score 6.44/10
Global Innovation Index 2018	Rank 52/126
Innovation efficiency ratio	Rank 56/126 – Ratio 0.63
Global Information Technology Report 2016*	Rank 51/139
World Bank Doing Business Report 2018	Rank 42/190
Global Competitiveness Index 2017-2018	Rank 77/137
Business sophistication and innovation	Rank 101/137 and 91/ 37

* Most recent available reports.

Source: The World Bank for related GDP indicators.

According to the National Statistics Office, the ICT sector in Montenegro accounts for 4.2 per cent of GDP. Nevertheless, Montenegro still has a long way to go to fully use its ICT potential. Core business for most of the 400 ICT companies is based on hardware, and it has the lowest average number of employees in ICT companies across the region – 46 per cent of companies have fewer than six employees.

The overall unemployment rate in Montenegro is 19.92 per cent, while almost one in three young graduates is unemployed. The average salary in Montenegro is EUR 510.

The 2018 Global Innovation Index places Montenegro in 39th position in the category of ICT infrastructure quality. In 2017, the majority of households had Internet access (70.6%), of which ADSL broadband subscription (65%) had the largest share. The current share of fibre-to-the-home connections is 25 per cent and broadband infrastructure competition exists only in urban areas. Mobile communication services in Montenegro are provided by three terrestrial mobile networks, and mobile broadband penetration stands at 67 per cent.

Total expenditure on research and development (GERD) in 2017 was 0.4 per cent of GDP, significantly below the European Union average of 2.03 per cent. The main source for R&D funding is from the

government, which accounts for almost 50 per cent of GERD. There were 673 people occupying full-time R&D jobs in 2015.

In 2018, the Global Innovation Index overall rank for Montenegro was 52 out of 125, which points to an improvement for the country, moving into the group of innovation achievers. The Index identified the country as one of 20 that outperformed on innovation relative to their level of development. However, if analysed along with other relevant indexes, the picture is less favourable: innovation stems mainly from start-ups and enterprises with fewer than 20 employees, while the bigger companies on the whole remain reluctant to adopt innovation policies. These indexes include the Global Competitiveness Index (77 out of 137), the Business Sophistication and Innovation indicator (Rank 101/137 and 91/137).

The main barriers for growth and development of small, medium and micro enterprises (SMEs), which make up 99.9 per cent of all enterprises, include limited access to financing, low awareness of the potential represented by digital transformation, limited investment in R&D, the extent and cost of administrative bureaucracy, and little support from stakeholders. With around 22 600 micro-, 1 300 small-, 200 medium-sized companies, and 30 large companies, contributing around 60 per cent of GDP, Montenegro SMEs need support in each of these areas.

To re-energize the national innovation journey, the government in 2016 adopted the first national Strategy of Innovative Activity 2016-2020¹, and subsequently adopted the Strategy for the Information Society Development 2020.

The Strategy of Innovative Activity 2016-2020 sets out the institutional framework and key challenges for innovation in Montenegro. It identifies three strategic goals:

1. Increase the capacities for innovation and technological development.
2. Strengthen the instruments for networking and cooperation of actors in the innovation system.
3. Strengthen potential for innovation in the business sector.

Figure 2: Digital Montenegro



Source: shutterstock

The 2016-2020 strategy also addresses issues of importance such as the monitoring and financing of innovative programmes and the necessary infrastructure. The Strategy for the Information Society Development 2020 identifies strategic development tools and key performance indicators. Strategic priorities include: broadband infrastructure, cybersecurity, human capital, digital business, e-education, e-health, e-inclusion, e-government, and research, innovation and development.

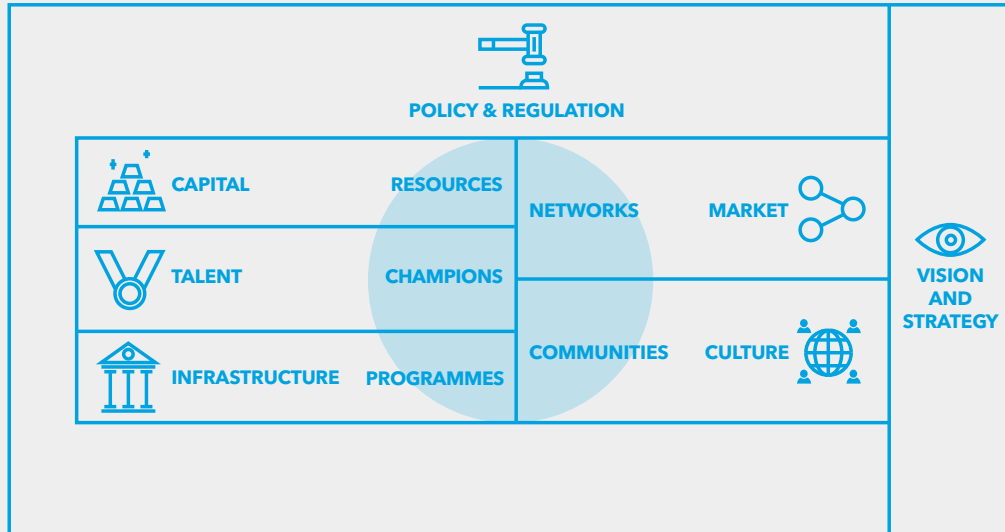
¹ Other documents and actions include The Research activities Strategy 2017-2021; The Smart Specialization Strategy (S3); 2018-2020 Start-up Company Incentive Program; 2018-2020 Start-up Incentive Program; Voucher Scheme for Innovative SMEs; Ministry of Economy: Entrepreneurship Incentive Program; Ministry of Economy: Innovation Program for MSMEs; Ministry of Science: Programme for approving grants for Innovation Projects (2018-2020); Instrument of Pre-Accession Assistance IPA 2014- 2020

3 Current landscape

Understanding both the landscape and stakeholders is critical in assessing digital innovation ecosystem. The following section presents the stakeholder view of the main pillars of the digital innovation ecosystem, and an overview of key challenges and opportunities.

Figure 3: Ecosystem assessment canvas

Info-box



The Ecosystem Assessment Canvas offers at-a-glance an overview of the components that make up the innovation ecosystem. It helps assess both the challenges and opportunities for those components essential to building a digital ecosystem that is vibrant and innovative.

Source: ITU

Vision and strategy

- A strategic vision is present but fragmented in the case of Montenegro.
- Fragmentation is visible at the level of individual government agency, and compromises implementation of the vision.
- Dialogue, collaboration, and consensus among stakeholder groups is absent.
- Stakeholder groups are unable to form a big picture of the overall innovation ecosystem.

Innovation in general and ICT innovation in particular are new centres of focus for Montenegro. In line with strategic direction in the European Union, the country has increasingly recognized the need to build the knowledge and skills for an interconnected system of innovation and an infrastructure that supports it – a system that boosts productivity, production bases, and competitive advantage.

Although strategies exist (as mentioned above), there is a clear need to improve administrative capacity, access to funding, and general coordination. The fragmentation of institutions, duplication, and a lack of coordination across strategy implementation are slowing progress on digital innovation in general.

Fragmentation is visible even within individual institutions, where several departments may be working independently on different aspects of innovation. Other important stakeholder groups such as the private sector, entrepreneurs, entrepreneurial support networks, and academia are also working in

silos, while their engagement with the finance sector – of importance to almost every stakeholder group – could also be improved, as could more generally, collaboration within government, and between government and stakeholders. This would help build consensus for the strategic vision of the country – as would active, continued institutional engagement.

Capital and resources

- Poor access to capital and resources is not encouraging innovation in Montenegro, especially start-ups, and entrepreneurs are looking elsewhere for support.
- For conventional sources of funding, there is a high level of scrutiny on loan applications, and interest rates are high.
- Government funding and some co-financing are available, though limited in volume, impact and synergies.
- Despite the importance of low-level and seed funding, risk capital is difficult to secure – venture capital, equity, and mezzanine and business angels are scarce.
- There are low levels of R&D funding available – in relation to both government and SMEs.
- Foreign direct investment efforts need to be more supportive of ICT and digital innovation.
- Non-financial resources are limited in size and scope.

Accessing finance is a long-standing challenge for companies in Montenegro. In order to develop, the private sector needs a financial framework that supports and responds to the needs of SMEs. Although credit lines and factoring² facilities exist for SMEs, interest rates remain high both in the traditional banking system and in microfinance lending. For the time being, Ministry of Science co-financing grants are the dominant funding mechanism for R&D and innovation in Montenegro.

Although the Montenegro Investment and Development Fund provides loans at favourable interest rates to start-ups, entrepreneurs and SMEs, these loans require significant collateral, which is unsuitable for start-ups. The Montenegro Employment Agency also provides loans to the self-employed and to entrepreneurs that require collateral. Heightened scrutiny of loan applications handicaps SME access to capital from conventional sources. Unfortunately, critically important risk capital, which seeds initial stages for start-ups (business angels, venture capital, revenue-based financing and crowd funding), is mostly absent from the country. While some venture capital funds are active in the region – South Central Ventures (managing the Enterprise Innovation Fund), Superfounders, hub:raum, and Eleven – they have no physical presence in Montenegro. Most of Montenegro entrepreneurs secure early-stage investment in business incubators and accelerators from outside Montenegro where they register the business. Access to capital is difficult, and as a result, start-ups are looking elsewhere for support. As to non-financial support, the limited budgetary resources that exist are dedicated to strengthening SME mentoring and training, for example on financial literacy.

Networks and markets

- The limited size of the domestic market and industry affects innovation negatively.
- Businesses simply do not recognize the potential of digital transformation to improve competitiveness.
- Businesses tend to stay in their ‘comfort zones’ even if struggling financially.
- ICT companies work mainly for the government – but government procurement is not conducive to innovation.
- The ICT industry is not well represented in business associations.

² Factoring is a line of credit with a factoring company. A factoring company purchases accounts receivable (invoice) at a small discount, and the client gets immediate funds for the receivable, for example due to slow-paying customers.

The small domestic market and the absence of initiatives on innovation-driven public procurement reduce demand for innovation. Since entrepreneurs typically design products/services for domestic industries to pilot with real users, customers, or suppliers, the context for innovation is made even more difficult. In addition, innovative efforts in general address established and strong industry sectors, which are not necessarily best represented in the region.

Companies in Montenegro, as with companies in other countries in the area, are less integrated in global value chains than those in central Europe, and this limits their access to innovation-related knowledge and market opportunity. To access regional and other foreign markets, there is a need to strengthen the potential to export and to support specific clusters to enable this. Some business associations and clusters in Montenegro are now fostering collaboration and geographic inclusion.

Montenegro is well-connected regionally through formal networks at government level and at the private-sector level. However, the majority of SME innovation activities are focused on internal business processes. Few create innovative products or services based on new technologies, and appear reluctant to scale up, or address issues associated with expertise and strategies for growth. There is room for Montenegro to be more competitive in regional markets where there is scope for large return of investment through the development and improved distribution of the capacity to absorb technology. To achieve higher levels of technology absorption, ICT companies in Montenegro need to create stronger synergies – only 12 per cent of ICT companies participate in the ICT association of the Chamber of Economy of Montenegro, while only 8 per cent of ICT companies are members of the IT cluster.

Infrastructure and programmes

- Connectivity: access and affordability can be improved, particularly in rural areas.
- Soft infrastructure: satisfactory, government is leading, and there are new developments in the pipeline.
- Private sector needs to invest more in the soft infrastructure.
- Horizon 2020 project is helping establish the start-up ecosystem.
- The Strategy of Smart Specialization 2018-2022 will identify sectors where innovation-based transformation will accelerate the economy.

Basic infrastructure such as roads, railways, electricity, and gas distribution networks are still under development. Government and private sector investment have helped develop Montenegro ICT infrastructure and connectivity, and broadband and mobile connectivity are available, but access and affordability could be improved, particularly in rural areas. Launched by the European Commission, the *Digital Agenda for Western Balkans* makes provision for technical and financial assistance to Montenegro (together with Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, and Serbia)³ with a view to meeting digital broadband connectivity goals laid down by the European Gigabit Society⁴. In regard to soft infrastructure, new developments are in the pipeline: the government has initiated several projects fostering cooperation between academia, start-ups, incubators and clusters – and to help transform these innovative ideas into products and services. The private sector is sponsoring several initiatives that deliver incubation services (for example Digital Factory) and co-working facilities in Podgorica, Bar, Tivat, and Cetinje. Start-up accelerators do not exist, however, several national programmes support innovation and entrepreneurship in Montenegro.

³ https://ec.europa.eu/commission/presscorner/detail/en/IP_18_4242

⁴ <https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2019/Telecom19/4.%20Je%20Myung%20Ryu.pdf>

Figure 4: Dzhurdzhevich bridge



Source: Shutterstock

Talent and champions

- The education system should be revised to develop future talent.
- Universities need to be strengthened in specialized industry relevant skills and in holistic entrepreneurial skills.
- The absorption of human potential by the ICT industry is low.
- Low investment in education and R&D encourages a brain drain and deters home-grown innovation.
- Champions, role models, and success stories need to be better promoted to inspire innovation.

Figure 5: ICT in children's lives in Montenegro



Source: Shutterstock

Recently there have been improvements: the Montenegro formal education system does contain elements that help develop IT talents. Until 2017, basic IT education began late in the primary school cycle. Limited provision – only one hour per week and with teachers without appropriate qualifications – has been put in place for 10-year olds and above. University ICT faculties do not offer studies for ICT teachers. Likewise, university educational faculties do not offer IT studies or retraining programmes. There are missed opportunities in secondary education where teaching IT is mandatory only in the early years. In regard to higher education, five faculties offer undergraduate ICT studies and more than 1 000 students have graduated in the course of ten years. Nevertheless, employers have found it necessary to train graduates for an additional period before beginning work in a professional environment.

Improvement in academic curricula is necessary in the area of specialized, industry-relevant skills. There is a mismatch between the number of ICT graduates and the number of ICT sector employees (roughly 800), which points to underused potential in the industry, and thus potential for growth. Montenegro invests less in R&D, and has experienced lower productivity growth, compared to other EU countries. Montenegro and many neighbouring countries leak IT talent. Higher levels of investment in education, training, and research and development would be rewarded by more home-grown digital innovation, boosted productivity and greater economic potential.

Soft skills development and STEM education⁵ can also help talent move towards innovation, job creation and digital entrepreneurship. Of 88 patents held by national inventors in 2018, only six are digital. A lack of soft skills and low levels of English proficiency are also holding back entrepreneurs. Several flagship projects, however, are supporting innovation in Montenegro. BIO-ICT is a genuine success story built on a synergy of public and private sectors, academia, and entrepreneurs. There are also several individuals and organizations that are championing the start-up scene. More information about these champions can be seen in the section 8 on good practice.

Culture and communities

- Majority of SMEs focus on their core business only.
- Risk aversion is impacting innovation and entrepreneurship.
- There is a lack of leadership and a lack of ownership within the ecosystem.
- The entrepreneurial community is small – but open and inclusive.
- Several organizations and digital business champions mobilize the start-up community.

⁵ A curriculum of science, technology, engineering and mathematics.

Figure 6: Small businesses in a touristic site



Source: Shutterstock

Even in the ICT sector, SMEs in Montenegro are reluctant to embrace changes in business models and methods that continue to evolve – and their corporate strategies need to change accordingly. Rigid focus on core business only prevents such businesses from seeing new, sustainable, and long-term markets. Drive and ambition are needed to grow beyond their comfort zone and familiar markets. Only innovation will enable SMEs to address the needs of a new generation of consumers, while taking new market opportunities arising at the intersection of technology and risk.

Although risk-taking is an inevitable part of start-up culture, SMEs tend to be risk averse – and this is unattractive to talent, innovation, and entrepreneurship. There is lack of leadership and lack of ownership in the system. Open innovation culture is not recognized by Montenegro companies, and much company potential for pursuing expansion at home and in the region is not exploited. Lack of trust is holding back information-sharing and exchange of knowledge across organizational borders, while the present level of cooperation between enterprises and scientific institutions limits progress in the field of innovation.

In contrast, the small entrepreneurial community is very open and inclusive. Each year, more than 100 innovation/tech events draw together young developers, innovators, and entrepreneurs. A small number of organizations and digital business champions are active in the mobilization of the start-up community with *Digitalizuj.me* having the biggest reach and impact. Mentorship needs to be developed in a structured way, through the creation of networks.

Policy and regulation

- No central body has responsibility for coordination and oversight of the innovation ecosystem.
- There is no clear responsibility within government for some aspects of the ecosystem.
- Policy and regulation related to innovation needs to be improved in several areas.
- There is a need to embed the innovation principle in policy-making.
- Public-private consultation and statistics are necessary to better design policy and regulation.

Montenegro policies that support innovation touch upon a number of areas, including education, research, the economy and the information society. There is no central body responsible for the coordination and oversight of the innovation ecosystem. The Ministry of Science, the Ministry of Education and the Ministry of Economy and other agencies share responsibility for regulation and implementation laid out in the Action Plan of the Strategy for Innovative Activities⁶. Responsibility for implementing the Strategy for the Information Society Development 2020 falls to the Ministry of Public Administration. Except in relation to e-government, the ministry has no action plan and no organizational unit to address the broader development of the information society.

Figure 7: City administration office (City Hall) in Podgorica, Montenegro



Source: Shutterstock

At the same time, the Strategy for the Information Society Development 2020 has identified research, innovation and development as priority areas – though, as previously mentioned, innovation and R&D are addressed under two separate government strategies. This blurs responsibility for implementing policy. The Council for Scientific-Research Activity, appointed by the government, is responsible only for monitoring policy implementation in the field of R&D.

The Montenegro legal framework in relation to innovation is fragmented. Aspects of innovation fall to a number of different legislative frameworks including the Law on Innovation Activity, the Law on Scientific Research Activities, the Law on Higher Education, Company Law, Patent Law, Copyright Law, the Law on Electronic Communication. Coherent, enabling regulation is key at all stages of innovation if the innovative potential of society, companies, and individuals is to be unleashed – from research and development, to diffusion, commercialization, uptake, and beyond.

There is a need to embed the innovation principle in policy-making to ensure that the impact on innovation is fully assessed. In addition, public-private consultation needs to be strengthened since such policy ultimately aims to develop a competitive private sector. Statistical data and analysis need to be provided to inform and better shape policy. MONSTAT, the Statistical Office of Montenegro, aims to publish results from a pilot innovation survey in 2019.

⁶ [http://www.mna.gov.me/ResourceManager/FileDownload.aspx?rid=314523&rType=2&file=Strategy%20of%20Innovation%20Activity%20\(2016-2020\)%20with%20the%20Action%20Plan.pdf](http://www.mna.gov.me/ResourceManager/FileDownload.aspx?rid=314523&rType=2&file=Strategy%20of%20Innovation%20Activity%20(2016-2020)%20with%20the%20Action%20Plan.pdf)

Figure 8: Understanding digital transformation capabilities

Info-box

PILLARS	Vision & Strategy	Capital	Market	Infrastructure	Talent	Culture	Policy
	Scope and objectives	Appropriate Demand side resources	Integration of economic sectors	Inclusive digital infrastructure	Talent appropriateness	Sustainable culture of entrepreneurship and innovation	Comprehensive and grassroots innovation policies & programs
ISSUES	Aligned Digital strategies	Continuum of Supply side resources	Market access domestic and international	Resilient & secure broadband Infrastructure	Champions	Communities	Legal frameworks
				Soft infrastructure			

Digital transformation is what happens when innovation is applied to solve problems through the use of ICT/Telecommunication. The benefits to a country and its people are immense – significantly increased productivity, economic growth and increased employment opportunity. The degree to which these benefits are within reach depends on the vibrancy of the ICT-centric ecosystem and a corresponding, long-term vision and strategy that supports it.

The figure above sets out the key elements to understanding the digital transformation capability. Key factors and components that enhance, foster and facilitate digital transformation are clearly clustered and helpfully organized into pillars and issues. All stakeholders in the ecosystem need to understand their potential for making a difference, as well as their very real capabilities – as they engage in transformation. The ITU Digital Innovation Framework not only helps transfer this understanding but also clearly sets out what enablers can achieve – as well as identifying the barriers they will encounter along the journey of change.

Source: ITU

4 Key points

Challenges and opportunities in the Montenegro ecosystem

The three main ecosystems fundamental to the Montenegro digital transformation journey are the national innovation ecosystem, the entrepreneur ecosystem, and the technology ecosystem. These three ecosystems interlink closely to form the innovation landscape, from ideation to market. Each ecosystem faces both specific and common challenges, but each also offers opportunity. The following section presents a snapshot of each ecosystem and concludes with an overview of challenges and opportunities relevant to all three ecosystems.

National innovation ecosystem

The national innovation ecosystem is invaluable in the Montenegro innovation journey, particularly in kick-starting innovation. It includes research institutions, academia, and public sector entities such as national innovation agencies and public sector financing.

The Montenegro innovation ecosystem is at an early stage of development. Over the past two years, the government has adopted several strategic plans and new legislation, and has provided subsidies and incentives as well as elements of soft infrastructure. There is progress in the area of R&D capacity, technology transfer and innovation, but it remains slight.

In 2018, the Global Innovation Index noted that Montenegro made a comeback as an innovation achiever and identified it as one of 20 countries that outperformed on innovation relative to their level of development. Since the domestic market is small (population of about 620 000), the government is both the biggest employer and biggest buyer in the country. Public procurement therefore has an opportunity to encourage home-grown innovation as opposed to imported innovation.

The general perception of products and services made in Montenegro, especially in the ICT domain, is often that they are inferior to foreign equivalents. Public sector efforts to effect digital transformation are not coordinated or directed at fostering ICT innovation. Products from research are few and slow to market, applied science is absent, with little technology transfer. Stakeholders across the public sector, academia, entrepreneurs, entrepreneurial support networks and finance entities continue to work in silos and have not woken up to the potential of the ecosystem as a whole. This silo approach is mirrored by the high number of government departments and agencies. The government is not yet addressing the full scope of the ecosystem as reflected in the Strategy of Innovative Activity 2016-2020, which fails to take into account some elements of the ecosystem. Additionally, the absence of structured collaboration within the government and between stakeholders is proving to be a barrier in formulating a strategic vision for the country. Some stakeholders feel they are not involved in the process. The current situation reflects the Global Innovation Index innovation efficiency ratio, rated at 63 per cent. Simulations indicate that unleashing the Montenegro innovative potential can generate important economic gains, improved performance, increased productivity and higher export levels.

Entrepreneur ecosystem

This ecosystem includes entrepreneurs, their support systems and the organizations that initially nurture the formation of enterprises through highly vulnerable early stages, and subsequently nurture their growth as SMEs.

The entrepreneur ecosystem is the most promising element within the Montenegro innovation ecosystem. ICT entrepreneurs and innovators are talented and motivated, but face difficulties as they seek to develop and flourish. The challenges are significant: a shortage of B2B (business to business) platforms for SMEs; scarce government incentives; limited access to pre-seed, seed funding and commercialization opportunity; regulation that deters registering start-ups; and public-private partnerships that are not adequately regulated. Restricted access to payment platforms such as PayPal prevents Montenegro entrepreneurs from selling on international markets. Nevertheless, there are approximately 15 start-ups at various stages of development and a handful of companies – digital business champions – that have successfully crossed the ‘valley-of death’ (is generating revenue) that so often proves fatal to start-ups. Several incubators, co-working facilities, NGOs and entrepreneurial support networks are providing entrepreneurs and start-ups with resources to help them start their ventures or scale-up. Market opportunity exists for entrepreneurs wishing to bring digital solutions to a range of sectors: tourism, real estate, smart cities, environment and green energy, health and well-being, learning and education, business and commerce, e-government and citizen engagement. These sectors provide opportunity to leverage cloud computing, IoT, AI, sensors, big data as well as the sharing economy (tourism for example). Montenegro is an attractive tourist destination with 200 days of sunshine per year and coastal cities are already attracting foreign tech entrepreneurs and highly skilled international business minded people, a trend supported by the ‘economic ‘passport programme with great potential for attracting foreign investors and further development of the entrepreneurial ecosystem.

Technology ecosystem

The technology ecosystem includes high-growth technology companies and supporting ecosystems that are integrated into local or global value chains. These include high-tech companies, the original equipment manufacturers, system integrators, ICT firms and B2B technology platforms supporting SMEs.

The latest wave of technology is more challenging to SMEs and there is high disparity across industry sectors in terms of digital transformation performance. Only a handful of high-tech companies – mainly suppliers to telecommunications and banking industry – are present on the market. Businesses are not taking full advantage of advanced technologies (cloud, big data, blockchain, AI, IoT, 3D printing, machine learning, robots/drones and so on), while government is slow in designing policies to support innovative and collaborative business models.

The research infrastructure needs to be updated, with very few labs/research institutes meeting European standards while financial investment in research is limited. Private sector companies are not making use of these labs for their research. SMEs are still using medium and low-technology products which results in low demand for tech solutions. Inadequate levels of digital literacy and the immaturity of preconditions to progress (undeveloped digital identity, digital certification, e-government, e-payment, etc.) are slowing any move towards the digital economy. This is compounded by low motivation to invest in technical skills and training, with such investment viewed as merely a compliance requirement. All the challenges described above, combined with low incentive to develop and export IT products/services, and an absence of favourable tax policies, negatively affect potential for technological innovation.

Macro challenges and opportunities

There are challenges and opportunities of relevance to all three individual ecosystems.

Six challenges

1. There is a lack of skills necessary to exploit digital technology, compounded by a failure on the part of public and private sectors to recognize digital technology as an opportunity for growth.
2. The ecosystem is at an under-developed, initial stage, and role models are absent.
3. Public sector purchasing power is not harnessed to drive 'home-grown' innovative solutions.
4. Poor access to capital is chasing start-up innovation out of Montenegro, impeding scale-ups and digital transformation for SMEs.
5. Regulation lacks consistency, dynamism, and flexibility, which creates a barrier for entrepreneurs and investors.
6. Preconditions for the digital economy, such as digital identity, digital signatures, e-government, e-payment, remain immature.

Opportunities

- The mobilization of all stakeholder groups in this all stages of the ecosystem can generate a platform of success stories to model further success.
- New policies such as public procurement of innovative solutions and public-private partnerships can be exploited to co-create the preconditions for digital economy, and to expand soft infrastructure across the country.
- Tourism offers an opportunity to develop innovative, technology-driven business models.
- Using the limited size of the market to become a 'test-bed' for tech solutions would bring benefits from technology and knowledge transfer.
- Improving regional cooperation and trade facilitation policies will significantly expand the market for innovation.

- Support available from the European Union designed to accelerate Montenegro convergence on policies, benchmarks, monitoring mechanisms, programmes and financial resources related to R&D and digital innovation will significantly improve prospects.

In May 2018, the Montenegro Entrepreneurial Discovery Process (EDP) identified sectors with a high potential to improve economic development and competitiveness through innovation-based structural transformation. The Strategy of Smart Specialization 2018-2022 under preparation is based on the EDP findings.

Figure 9: Kotor town in the Bay of Kotor, Montenegro



Source: Shutterstock

5 Relevant practices

The following practices were identified during the assessment process as noteworthy and potentially positive activities for the ecosystem. As a next step in this process and with further engagement, an in-depth collaborative analysis could identify champions and good practices throughout the ecosystem.

Technopolis

The Innovation and Entrepreneurship Centre in Niksic was opened in 2016 as a first phase of the Science and Technology Park project. This will open in Podgorica by 2020 and will include two additional decentralized units – impulse centres in Bar and Pljevlja. Its main goal is to establish greater integration of the scientific community into the economy while fostering entrepreneurship, knowledge-based growth and the commercialization of innovation. The centre provides business consulting services for SMEs, conference space and in the near future, a laboratory for biochemistry and industrial design. As part of its infrastructure support programme, Technopolis provides office and co-working spaces, meeting rooms, a congress centre, and complete ICT infrastructure.

BIO-ICT

The Centre of Excellence in Bioinformatics began as a Ministry of Science project (worth EUR 3.2 million) with the aim of applying science and ICT technology in the areas of sustainable agriculture, monitoring of crops, forest and water/sea ecosystem, the control and reduction of air pollution,

analysis and standardization of food products, control of land quality, and improvement in the public health area. BIO-ICT will continue to work as the Centre of Excellence for Research and Innovation, as a separate unit of the University of Montenegro.

M:tel Digital Factory

M:tel Digital Factory is a centre for the development of technology entrepreneurship and innovation in Podgorica, the capital of Montenegro. The Factory provides entrepreneurs a context for establishing and developing their business through concrete support, a customized workplace, a cloud computing development platform, technical support, a five-month start-up academy programme, administrative and legal advisory assistance, an excellent team and easy networking with other entrepreneurs. M:tel Digital Factory offers three segments:

- Education: mentoring in the development of ideas, master classes and training, mentoring sessions and workshops with international experts, meetups, etc.
- Networking: through various local events, connecting with industry and experts in the field of start-ups.
- Investments: from an initial EUR 500 000 fund, investments have ranged from EUR 30 000 to EUR 50 000.

MEBAN (Montenegro business angels network)

Montenegro business angels network was established in mid-April 2018 and is the first organization designed to connect business angels. MEBAN supported the development of entrepreneurial projects at the VIII Stock Exchange of Entrepreneurial Ideas held on 9 May at the University of Donja Gorica. Awards of EUR 2 000 helped develop business ideas to go forward to company presentations at the Take Invest Summit 2019 in Istanbul.

Business associations that support ICT innovation

The Economic Chamber of Montenegro is part of the Western Balkans Chambers Investment Forum, a platform that serves over 350 000 companies, mostly small and medium-sized enterprises in the region. Its aim is to improve the business investment climate and provide shared platforms for tourism, innovation and start-up ecosystems. AmCham, ICT Committee of the Montenegro Foreign Investors Council (MFIC ICT) and the Association of Montenegro Managers have begun to raise awareness among SMEs of the potential for innovation and the digital transformation of businesses.

Digitalizuj.me

This is an active entrepreneurial support organization with a track record of designing, organizing, and running start-up meetups, workshops and competitions. It is the implementation partner of 'Kreativator' and organizing partner of Spark.me. Since December 2011, Digitalizuj.me has hosted more than 50 free events as part of its Speakers Series. The series featured inspirational, informative and passionate speakers sharing ideas on topics including leadership, social innovation, urban development, managing change, social media, start-ups, environmental monitoring and protection. Together with Logate and since 2012, Digitalizuj.me has organized an annual hackathon. Digitalizuj.me has extensive experience in planning, organizing, and delivering educational programmes: Code School, Social Media Marketing Workshop, Digital Marketing Workshop, Blogging Workshop, Online Community Management School and more.

Spark.Me

It is one of the most carefully curated business/Internet conferences in Southeast Europe, gathering together 580 people from 28 countries. An integral part of the conference is the Spark.me Start-up Competition, which brings successful start-ups from all over Europe to Montenegro. The competition is focused on innovation, the power of ideas, the potential of start-ups to grow, and team diversity.

Participating in the competition enables start-up founders to have access to advisers, mentors, workshops and a network of investors, industry experts and serial entrepreneurs.

6 Relevant stakeholders

	Selected Stakeholders
Public sector	Selected stakeholders: Ministry of Economy – Directorate of Electronic Communications, Postal Service and Radio-Spectrum; Ministry of Economy – Directorate for Investment, Small and Medium Enterprises Development and EU Funds Management; Ministry of Public Administration – Directorate for e-Government and Information; Ministry of Science – Directorate for Innovations and Technological Development; Ministry of Education; Bureau for Education Services; Ministry of Labour and Social Welfare; Montenegro Investment Promotion; Public Procurement Administration of Montenegro; Agency of Electronic Communications and Postal Services; Statistical Office – MONSTAT; Employment Agency; Ministry of Health; Ministry of Finance; Intellectual Property Office; Council for Scientific-Research Activity
Private sector	Digit Montenegro; Čikom; Smart Tech; S&T; SAGA; Crnogorski telekom; M:Tel; Telemach; Ericsson; TELENOR; Huawei; ZZI
Entrepreneurs	Domen; Amplitudo; Marleq; Logate; Fleka; Xiaomi
Finance	Podgorička banka; Lovćen Banka; Erste Bank; Investment and Development Fund of Montenegro; Public Procurement Administration of Montenegro; Employment Agency of Montenegro; Montenegro Business Angels Network; South Central Ventures; Superfounders, hub:raum; Eleven
Academia	Montenegro Academy of Sciences and Arts; University of Montenegro; University of Donja Gorica; University of Mediteran; BIO-ICT – Centre of Excellence
Entrepreneurial support networks	Digitalizuj.me; Innovative Entrepreneurship Center – Technopolis; Digital Factory – M:Tel ICTHub; Foundation Young Innovators MNE; Association of Parents; Beta Bar; Innovation Centre Porto Montenegro, Business Incubator Cetinje; Chamber of Economy of Montenegro; AmCham; Association of Montenegro Managers

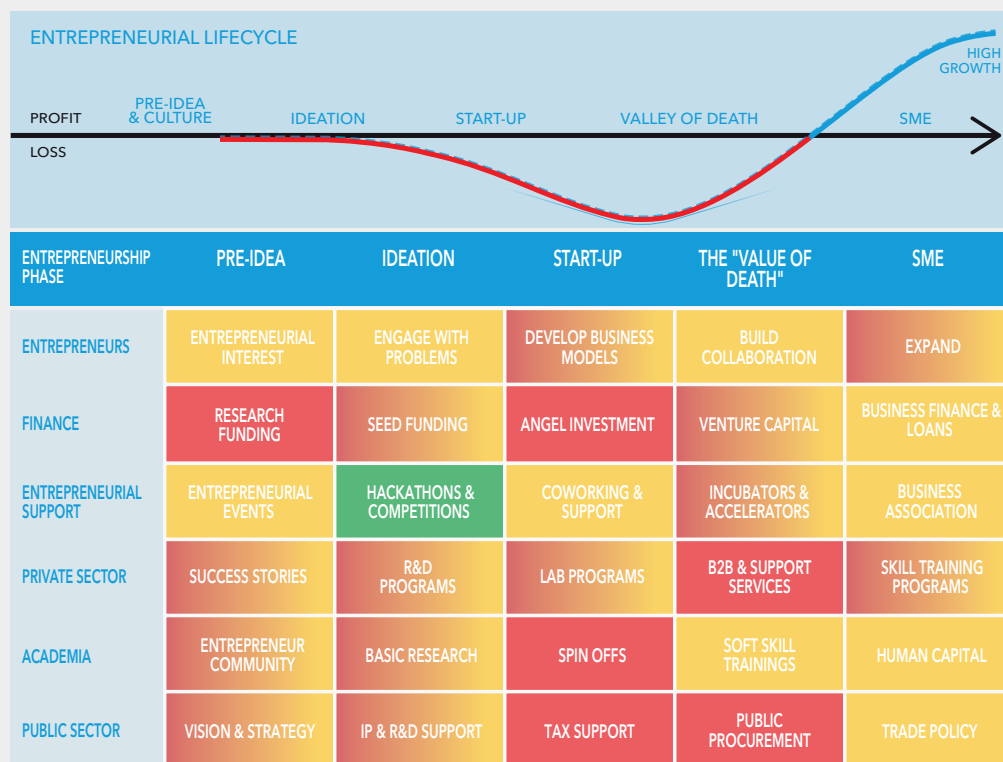
7 Innovation journey map

This section profiles key stakeholder actions needed to accelerate digital transformation.

Digital entrepreneurship is new, though traditional entrepreneurship is not. There is a small but cohesive group of digital entrepreneurs whose collaboration, mutual trust, sharing and learning is important. The group successfully identifies and engages with local challenges. The main obstacle they face is access to funding, and this frequently forces them to move their geographical base to countries with more supportive ecosystems. Entrepreneurs need to further develop business skills that can bring their businesses safely through the ‘valley of death’.

The Ecosystem Maturity Map, also known as the Innovation Journey Map, sets out the work that needs to be done with the ecosystem to harness innovation on a transformative journey from pre-ideation to high growth. It describes each stakeholder role in support of entrepreneurs and innovators at each stage of the lifecycle. The colour-coding identifies areas which are well-supported (green), inadequate (yellow) and missing/weak (red).

Figure 10: Montenegro Ecosystem Maturity Map



The matrix in figure 10 profiles key stakeholder actions needed to accelerate digital transformation from pre-idea, ideation, start up, valley of death, to SME. It is a visualisation of the entrepreneurial lifecycle sets out the flow from loss to profit and high growth and includes a table matrix of the work that needs to be done within the ecosystem to harness innovation on a transformative journey from pre-ideation to high growth. It describes stakeholder roles in support of entrepreneurs and innovators at each stage of the lifecycle. The colour-coding identifies areas that are well-supported (green), inadequate (yellow) and missing / weak (red).

Academia

Academic curricula in technical faculties need to be updated to nurture deep technology and entrepreneurial skills. Learning and teaching mechanisms across universities need to be tuned to address new generations of technology-savvy students. More interdisciplinary programmes are needed. Strategic, long-term partnerships are needed too, in order to drive academia-industry linkages – through internship programmes, research activities or technology transfer. Currently, such linkages are driven by occasional opportunities and short-term objectives. Academic research should be improved in light of recent developments at the state university. University spin-offs still do not exist, even though the majority of ICT patents are registered by academic staff.

Finance

The financial framework has been slow to accommodate needs of the innovation ecosystem. Research funding is provided mainly by government, and the finance sector remains averse to investing in research or in entrepreneurs. Recently, one bank has begun lending to innovative companies, supported by a European investment fund guarantee and backed by Horizon 2020. Risk capital, of such crucial importance to start-ups in the seed and early growth stages – business angels, venture capital, revenue-based financing and crowdfunding – are scarce.

Entrepreneurial support networks

The culture of entrepreneurship in Montenegro is growing, mainly due to efforts of several dedicated individuals who actively engage the community through entrepreneurial support networks and events. There are many events, including hackathons and competitions. Such networks need to design programmes that focus on business skills enabling entrepreneurs to survive the high-risk, early stages of a start-up journey – ‘the valley of death’.

Private sector

The private sector should contribute more to the ecosystem. The lack of ambition to grow beyond the ‘comfort zone’ and familiar markets is inhibiting the sector innovation potential. The IT sector in particular should create more business opportunity within the country’s business community and in regional markets, instead of focusing its efforts on government. Realizing significant domestic potential is limited by the fact that only a handful of SMEs across all industries make use of the latest digital technologies to improve their competitiveness. Programmes and subsidies for digital transformation of SMEs as well as programmes to encourage ‘open innovation’ will help ensure that companies transition from traditional to innovative businesses. Thematic, targeted hackathons will help contribute both to the start-up community and to business, and can even result in corporate venturing. Several stakeholder associations exist for the private sector to leverage.

Public sector

The public sector should adopt a leadership role and a systematic approach in laying the groundwork for innovation. Currently the landscape is fragmented both from a policy standpoint and in terms of responsibilities and implementation. Central and local government need to be better coordinated and should provide larger financial contributions to the innovation ecosystem in general. The regulatory environment in which companies operate should be more consistent and ‘innovation-friendly’. Public procurement of innovative solutions has the power to create a huge market for innovative products and services. The public sector in general should prepare more thoroughly for the digital economy.

8 Perspective on priorities

Priority objectives for the ICT-centric innovation ecosystem for Montenegro and the participants of the workshops held during the reviews.

Several government policies formally recognize ICT as an industry that will enable growth in the four priority sectors of the Montenegro economy (tourism, energy, agriculture and processing industry). Strategy for the Information Society Development 2020 casts Digital Montenegro as a country that has recognized the economic and social potential of ICT. The Montenegro Innovation Strategy predicts that by 2020, Montenegro will have in place a sustainable, efficient innovation system driving the Montenegro economy. But to achieve this vision, Montenegro will have to work hard. The focus should be placed on three key dimensions: guiding innovation dynamics, building innovation capacity, and integrating ICT into key sectors.

A supportive public sector proactively managing development

The pace in establishing a sustainable, efficient ICT-centric innovation ecosystem needs to be accelerated. However, such acceleration cannot be accomplished through a system that is fragmented in terms of policy and implementation. The innovation portfolio is split across several ministries and agencies with no coordinating mechanism. The government must lead on digital element of

the ecosystem, and currently addresses only electronic communications and e-government. More strategic efforts are required to strengthen the Montenegro digital economy and foster ICT-centric innovation and entrepreneurship. The existing strategy for the Information Society Development 2020 should be revised, with an action plan to develop hard, soft and service infrastructure (e-government), as well as the digital economy, digital society and a digital workforce. A strong bridging agency and guiding force should be established to garner support for comprehensive policy and ensure that programmes in general have a high-profile impact. Using digital technology as its engine, the agency should drive the country towards increased productivity and growth across all socio-economic sectors, with a special focus on those with the greatest growth potential.

Foster start-up and technological entrepreneurship

Existing competencies need to be used to support the establishment and growth of new innovative companies in priority growth areas. In this regard, policy, regulatory, financial and cooperation efforts are needed. The legal environment needs to become far more supportive of start-ups and spin-offs, while public-private partnership legislation should be more encouraging of incubators and accelerators. Access to capital needs to be made easier for early-stage financing with the introduction of new financial instruments. Acceleration is needed in developing a vibrant domestic investment market and in supporting the activities of business angels. More support is needed too, to facilitate the fast completion of test products and prototypes and to ensure rapid product launch to the market – not only through financial means but also through fostering cooperation among entrepreneurs, private sector and academia. Learning modules on start-up entrepreneurship need to be provided, facilitated by the private sector and academia. Targeted support should be provided to foster the development of spin-offs from universities and research institutions. The Horizon 2020 Policy Support Facility project, already under way, will provide detailed guidance for establishing the start-up ecosystem.

Foster digital transformation and ICT-centric innovation in focus areas

The development capacity of companies is low for several reasons: insufficient expenditure on R&D, minimal use of ICT and advanced technologies (cloud, big data, blockchain, AI, IoT, 3D printing, machine learning, robots/drones, etc.), and a lack of innovative business models offered by the collaborative economy. Key sectors as identified in the strategy with the strongest potential for innovation include sustainable development and tourism; ICT; agriculture and food; energy; medicine and healthcare. However, other sectors can generally benefit from digitally-enabled solutions for better market access. To ready the environment for digital transformation and company innovation, great cooperative effort is needed in the areas of policy, regulation and finance. A range of support schemes is needed to help companies in mastering digital challenges. These include public procurement that targets innovative solutions, subsidies for digital transformation of SMEs, applied research, incentives supporting ICT-related domestic and foreign investment, training and counselling (including foreign expertise) in digitalization and innovation processes, the sharing of good business practices and encouragement of B2B platforms, the building of long-term partnerships with entrepreneurs and academia based on the 'open innovation' concept and cluster collaboration.

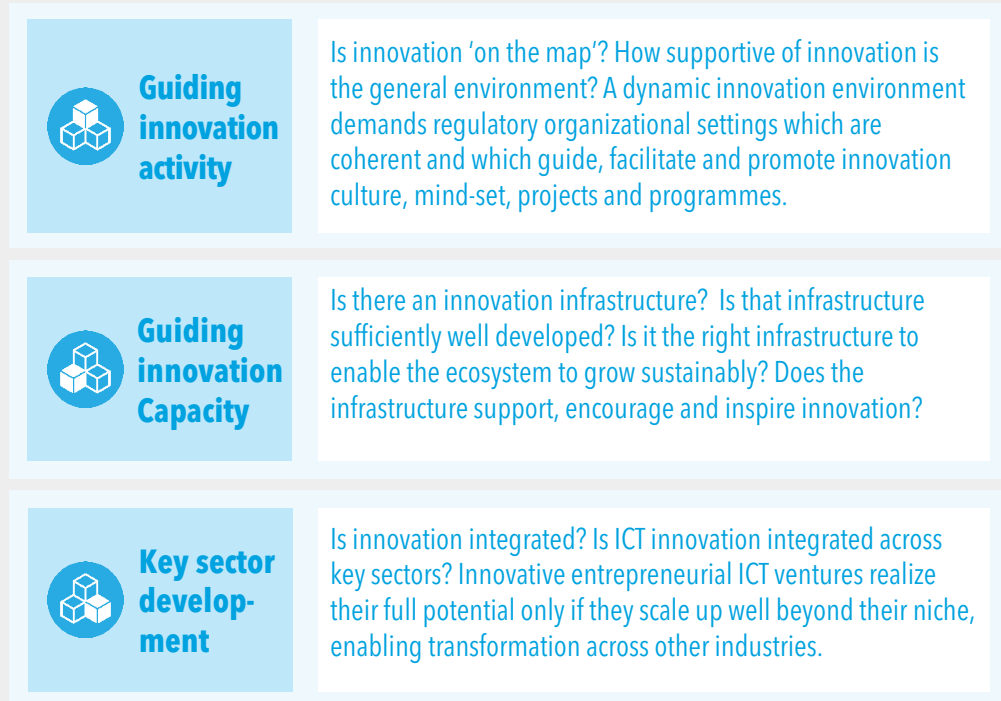
Figure 11: Integrating with technology



Source: shutterstock

Figure 12: Flagship projects

Info-box



Decisive, active intervention can help transform an ICT ecosystem, making it more innovative and a real engine for accelerated digital expansion into every aspect of society – with real gains in public, business and personal life. ITU innovation research has shown that three key pillars are of immense importance in exploring and addressing opportunity for digital transformation. These pillars align with Sustainable Development Goal 9 which calls for the building of resilient infrastructure, the promotion of inclusive, sustainable industrialization and the fostering of innovation. These three pillars are presented in the above figure 11.

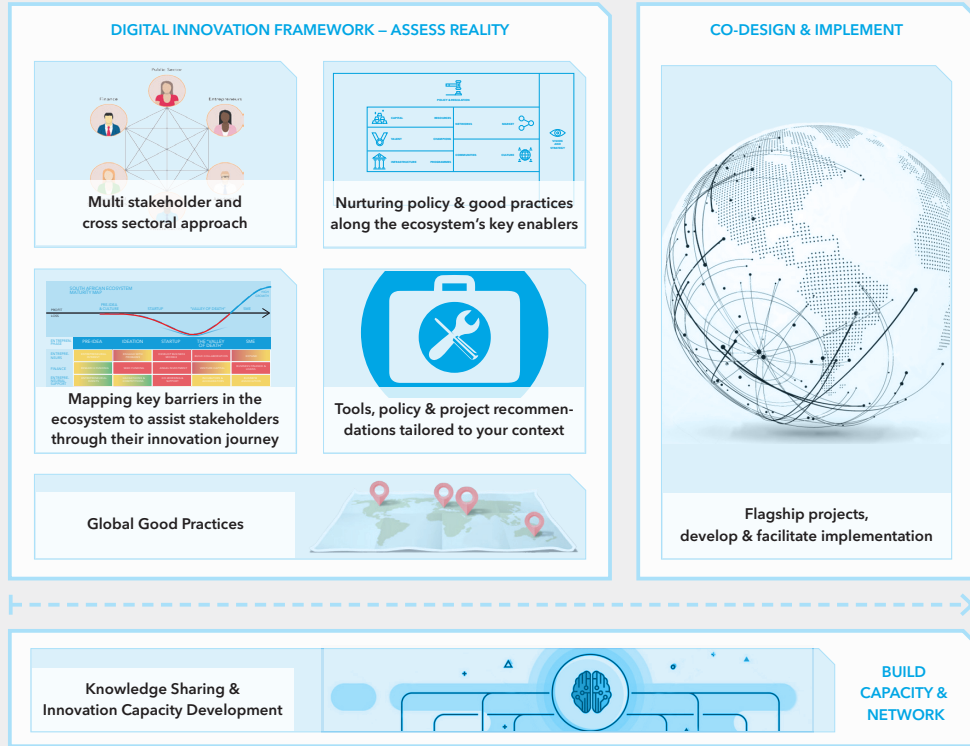
9 Next steps

Next steps for the ecosystem, the process for further engagement and collaboration with ITU to bridge the innovation divide.

This digital innovation profile provides an initial, high-value overview both of the ecosystem and of existing practices. The profile is designed to raise awareness and generate commitment from all stakeholders to implement flagship projects, which in turn will foster an enabling environment for the ICT-centric innovation ecosystem, helping unleash its full potential and ultimately to help bridge the *innovation divide*.

Figure 13: Digital innovation framework

Info-box



The ITU Digital Innovation Framework is a scalable approach. It is based on a multi-stakeholder, cross sectoral, high-value analysis which maps both enablers and blockers in potentially vibrant ICT centric ecosystems. It assesses a country's capabilities in progressing towards an accelerated digital transformation. Through expert assessment, the identification of good practice, capacity-building, tools and knowledge-sharing, ITU enables and empowers stakeholders to transform their own ecosystem. The aim of the Framework is to help countries fully realize their innovation potential and benefit from the enormous advantages this will bring. It first raises awareness of how innovation can address national challenges and subsequently creates sustainable, scalable projects designed to build environments that enable innovative digital ecosystems to flourish.

Source: ITU

The value of this assessment, which clearly identifies key barriers and enablers already existing in the ecosystem, is that it constitutes the perfect platform for the launch and development of high impact flagship projects. Each would help accelerate digital transformation and each would be designed to be of unique relevance to Montenegro.

Building on this platform, and as a next step, further commitment is needed to generate a more in-depth assessment, detailed strategy and thoroughly planned flagship projects designed to help transform the ecosystem, all within the tried and tested ITU Digital Innovation Framework.

10 ITU innovation platform

How do we get started, and how do we know we are heading in the right direction?

These are the questions ITU Member States often ask as they embark on a programme to transform their ICT infrastructure into the innovative powerhouse it could be and indeed should be, one that will drive outstanding economic growth and place them squarely at the centre of the 21st century digital opportunity. While the questions can appear daunting, there is a solution – and a step-by-step process that leads the way.

Through its range of powerful products, services and tools that make up the ITU innovation platform, ITU supports its Member States in fostering vibrant innovation ecosystems and in accelerating digital transformation for sustainable growth in the digital economy. The goal is to place ICT innovation in the front and centre of a national development planning.

The ITU innovation platform offers four powerful elements:

1. Digital Innovation Framework: A scalable approach mapping enablers and blockers in potentially vibrant ICT centric ecosystems and assessing the capabilities of a Member State to progress towards an accelerated digital transformation.
2. Country assessments: Powerful and high-value analyses of the digital ecosystem and its potential for digital transformation – such as country reviews, digital innovation profiles.
3. Co-development of country level bankable projects.
4. Knowledge sharing and capacity building: including dialogues on innovation at regional and global levels, and scaling of work through national and regional capacity building.

For more information: <https://www.itu.int/en/ITU-D/Innovation/Pages/default.aspx> or innovation@itu.int

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