IDEA IO2 COMPOSITE FINAL REPORT

Mapping of digital entrepreneurship dynamics in the IDEA countries, identification of common trends in digital skills application to entrepreneurship, and good practices and tools in digital entrepreneurship

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About the IDEA project

The IDEA – Inspiring Digital Entrepreneurship and Awareness in HE is an Erasmus+ Strategic Partnership project. It is being delivered by nine partners from seven European countries. The IDEA consortium brings together partners with different backgrounds such as business/ICT field, higher education institutions and NGOs and social partners. By pooling their knowledge and talent these partners have designed a project that addresses the gaps and mismatches in the areas of digital and entrepreneurial skills of European students. The project boosts the effectiveness of higher education (HE) curricula and magnifies HE students' chances of success by combining training targeted to above two sets of skills.

The IDEA provides response to the specific needs of European youth in the age of digital economy. Through its activities and outputs IDEA develops an innovative approach of one of the most important factors behind the entrepreneurial success: the use of digital skills applied to entrepreneurship. One of the first crucial traits of successful entrepreneurs is the ability to keep up with the latest social, technological and economic trends. By developing tailored training programme and deploying a full scale multilingual open education resource (OER) platform IDEA will widen its results across the entire European Union's educational space. In this way, IDEA contributes to the ability of European member states to exploit the transformative power of the digital economy in combat against socio-economic lagging and youth unemployment.

This composite report is based on results from a comprehensive mapping and stock taking of digital entrepreneurship dynamics in the countries involved (Croatia, Italy, Romania, Slovakia, Poland, Spain and Belgium), identification of common trends in digital skills application to entrepreneurship, issues, best practices and tools, and consequent extrapolation of "what works" and "what does not work" elements in digital entrepreneurship in HE environment. The mapping and stock taking had been executed by IDEA project partners in their respective countries, as well as at an EU level. Based on this effort, IDEA partners proposed a set of

success and failure factors together with recommendations targeted at digital entrepreneurship dynamics in higher education (HE) context and beyond.

The results of mapping and stock taking of digital entrepreneurship dynamics serve not only as guidelines for formulation of European educational policies in the field of digital skills. Their practical value reflects itself also in their role of pillars for development of IDEA training programmes. These results will be deployed throughout the Europe via its OER platform destined to become a knowledge hub and an open education focal point. IDEA will rise awareness among HE institutions and education authorities about the potential of digital and entrepreneurship skills and their role as business success factors. Through all these activities IDEA will improve professional success chances of HE students with different backgrounds.

Digital entrepreneurship in the European Union

Digital entrepreneurship has been viewed as a critical pillar for economic growth, job creation, and innovation by many countries including the Member States of the European Union. European Commission (2015) defines digital entrepreneurship as creating new ventures or transforming existing businesses by developing novel digital technologies and/or novel usage of such technologies. Digitalization is a very up to date topic and only very traditional businesses have not been affected yet. While it presents enormous opportunities, it is a source of major risks at the same time, therefore researchers and academics pay it increased attention.

The literature on digital entrepreneurship has grown significantly in the last decade, however minimal research has addressed this topic which can be even more applied to digital entrepreneurship education. Research in the area of digital entrepreneurship has been mainly focused on digital business models as digitalization presents many opportunities to modify them, digital entrepreneurship process as necessary steps to be taken to succeed, platform strategies which are important tools enabling businesses to grow, a digital ecosystem which represents enabling environment and processes involving stakeholders, social digital entrepreneurship as a tool to engage low-income people into entrepreneurship, and digital education.

Digital entrepreneurship education has been underdeveloped and there are significant research gaps. While research in entrepreneurship education is quite abundant, describing different methodologies, tools, and concepts, that still has to be done in the specific field of digital entrepreneurship education. So far, most studies focus on boosting digital

entrepreneurship intentions among university and secondary education students and their attitudes towards digital entrepreneurship, identifying key digital entrepreneurship competencies and skill-sets to start a digital venture among students or existing digital entrepreneurs, and enhancing students´ knowledge whether it is about starting a digital venture or ICT such as using digital content, software, digital teaching, learning tools, etc.

Today in Europe, there is a shortage of more than 500,000 digital jobs and the demand for digital jobs is overtaking supply. Furthermore, new digital jobs are increasing at an average of around 4% a year. Unemployment rates are at an all-time high, yet industries are unable to find the appropriately skilled people to fill their digital needs. A huge gap between the demand for digital skills and the actual skills of European citizens exists primarily due to low competences levels, since connectivity and access to basic ICT infrastructure is widely available in Europe. The 2020 DESI Ranking[1] in Figure 1 shows substantial differences in human capital across EU member states which consists of basic and advanced digital skills. Eurostat, for example, notes that the share of people with at least basic digital skills ranges from 29 % in Bulgaria and Romania to 85 % in Luxembourg and 79 % in the Netherlands.

Figure 1. DESI 2020 Ranking
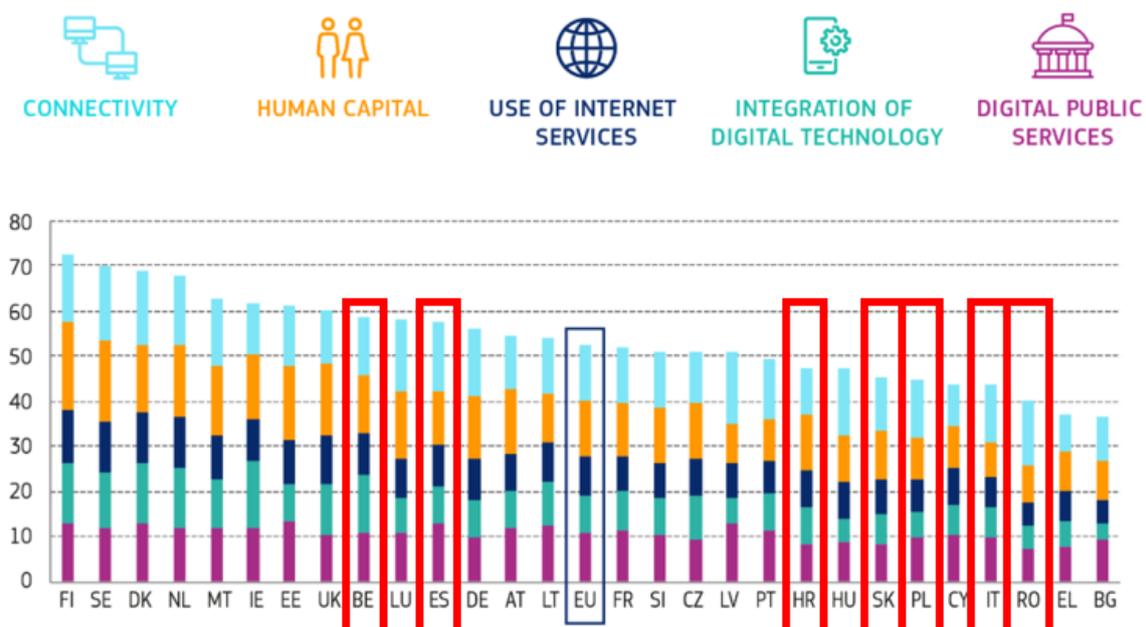
The European Commission's work programme for 2020 "A Union that strives for more"[2], states that investment in digital skills will be essential to address a widening skills gap and changing work patterns, as well as to regain European mastery and ownership of key technologies. Coupled with improving digital literacy, this will be the driver of the updated Digital Education Action Plan[3]. Since 2018 the action aims to foster digital competences and open science skills in higher education with the objective to engage, inform and train higher education students, teachers, researchers and staff.[4] Furthermore, the EU scenario underlines how important are the openness and interactivity of the Internet that enable businesses to harness the co-creative potential of large, uncoordinated audiences for novel forms of value creation, which, combined with novel revenue models, enable businesses to fundamentally re-think how they deliver products and services.

Digital entrepreneurship has potential of reviving remote regions, advance gender equality on labour market and boost the overall socio-economic development. Yet, businesses - and SMEs in particular - often struggle with digital developments. Barriers to cross-border trade, regulatory and administrative burdens, insufficient access to finance and digital skills in the workforce. Removing intermediaries, matching employers with their future employees, providing online education, adapting the educational material, giving people their first physical address and their first bank account are just a few of the areas that digital entrepreneurs have to address. In European Union, the growth of digital enterprises takes uneven pace across countries as 2019 EIDES ranking shows (Figure 2)[5].

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[2] https://ec.europa.eu/info/sites/info/files/cwp-2020-publication_en.pdf
[3] https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en
[4] https://ec.europa.eu/education/education-in-the-eu/european-education-area/digital-education-action-plan-action-5-open-science-skills_en
[5] https://publications.jrc.ec.europa.eu/repository/bitstream/JRC117495/jrc117495_eides_2019_final_with_identifiers.pdf

Figure 2: EIDES index ranking 2019

EIDES - European Index of Digital Entrepreneurship Systems
Note: IDEA consortium countries in red
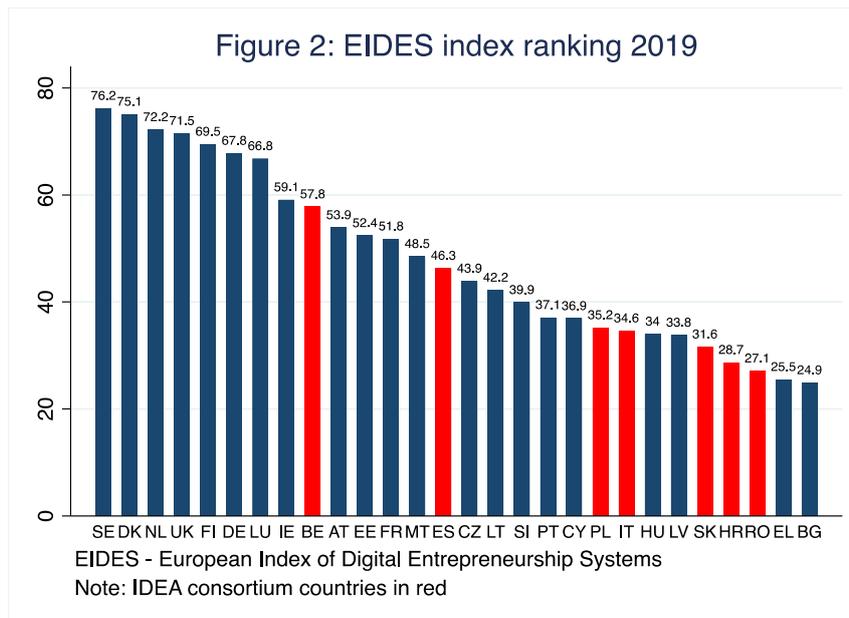
The report states that Sweden, Denmark, Netherlands, United Kingdom, Finland, Germany and Luxembourg lead as for their digitalised General and Systemic Framework Conditions for entrepreneurship. Behind at a notable distance according to the EIDES are the followers made of seven countries: Ireland, **Belgium**, Austria, Estonia, France, Malta and **Spain**. A third cluster is made of catchers-up: Czech Republic, Lithuania, Slovenia, Portugal, Cyprus and **Poland**. Finally, the laggards are the remaining eight countries: **Italy**, Hungary, Latvia, **Slovakia**, **Croatia**, **Romania**, Greece and Bulgaria[6]. It is striking that Italy, in spite being one of the G7 countries, ranks in this group together with former centrally planned economies and Greece.

In order to build digital entrepreneurship ecosystems, a number of measures are necessary. A common framework will require harmonisation at European level in terms of e-government. This will help to define a common platform that will enhance business and interconnection opportunities. This vision should also be replicated at the educational level, especially in universities. The new EU skills agenda[7] recognises the need to support cooperation among education, employment and industry stakeholders to improve the digital skills of the wider population, not just IT professionals. To achieve such objectives, lifelong and non-formal learning play a key role in teaching skills, including digital skills. The European Commission recognises that formal education is not the only player in teaching digital skills and that non-formal education providers can offer efficient and fast ways to acquire and upgrade digital skills.

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[6] In bold, countries represented in the IDEA Project
[7] http://ec.europa.eu/social/main.jsp?catId=1223

To explore the drivers behind these processes the IDEA researchers focused their efforts in three interrelated areas: the mapping of state and digital entrepreneurship dynamics and policy initiatives at the EU level, the country level developments and the trends in higher education with respect to the digital entrepreneurship.

Policy, third sector and industry review at EU level

The phenomenon of digital transformation in Europe has fully affected all the Member States which over the past decade have defined a significant infrastructure and systemic adjustment for the reduction of the digital divide and the spread of digital literacy. Nevertheless, the level of development of digital skills and specific training courses on digital entrepreneurship at Higher Education level still follows a worrying trend in EU. Currently there is no common framework of skills that can encourage the proliferation of courses of study geared to digital enterprise. To foster a digital-friendly culture, the EU should encourage its member states to integrate digital skills such as data science and computer science courses into their primary, secondary, and university curricula. The new European Commission's work programme for 2020, "A Union that strives for more" states that investment in digital skills will be essential to address a widening skills gap and changing work patterns, showing renewed interest in increasing digital skills as a basic condition for economic growth.

The reasons why these educational objectives have not yet been achieved in Europe are attributable to: lack of training in synergistic methods; keeping the freshness alive; finding suitable entrepreneurs to take part in HE programmes; finding the right space in academic timetable and curriculum. We have analysed EU sources as the European Index of Digital Entrepreneurship Systems (EIDES), the Digital Economy and Society Index (DESI) and others, with a specific focus on the Countries represented in the IDEA project starting from Digital Entrepreneurship and landing in the context of Higher Education. The snapshot that comes out in EU underlines a general fragmentation in the context of Digital Entrepreneurship and digital skills with high performances by the northern and Baltic countries (size of country doesn't matter) while the states of south-eastern Europe still remain below the European average.

It is universally accepted that digital transformation is happening. What remains uncertain is the way in which it will unfold and whit what effects. Digitalisation in education will continue to grow the coming years. The demand for digital and personalised content, tools and environments will only grow. Schools must adopt digitisation as part of their overall

strategy in order to transform existing structures and processes, enforce digital change, and enable innovation and entrepreneurship. Nevertheless, only a few European member states have been able to cope with digital transformation and this is reflected in the lack at Higher Education level of shared initiatives which allow to educate, stimulate and incubate future digital enterprises. To foster a digital-friendly culture, the EU should encourage its member states to integrate digital skills such as data science and computer science courses into their primary, secondary, and university curricula.

Country-level contexts

The emergence of new trends in digital technologies and innovations has been accelerating at a record pace in recent years. The transition from an industrial society to an information society and industry 4.0 is a revolutionary global change. This implies a whole set of challenges, together with many opportunities. While some IDEA countries already have a digital strategy in place, some other countries still report lack of a comprehensive and systemic strategic architecture promoted at national policy level.

If digital government strategies (whether comprehensive or fragmented) are in place, the priority focuses most often include: providing appropriate technical infrastructure and digital connectivity, digital transformation of businesses, equalizing the digital opportunities, developing and upgrading digital skills, building social infrastructure, implementation of e-government services for both citizens and business entities, sustainable and green investments. Most of IDEA partners report good digital connectivity with fixed broadband and 4G mobile coverage, while the ultrafast broadband coverage is not yet completely developed.

As for the e-government, IDEA partners report that governments in their countries initiated several digital services and portals that make public agenda easy and more efficient. However, still those online services provide mostly online information and to some extent offer interactive feedback. The arrival of technology has brought important changes to the market place, revolutionized the society and with it, the world of work. Practically in all IDEA countries, companies are looking for upper skilled digital profiles. In fact, upgrading digital skills and their application in businesses is a further important pillar in the development of digital entrepreneurship.

However, at the same time, all IDEA partners indicate that in their countries, the business sector is currently suffering from a major imbalance between supply and demand for digital

professionals with sufficient digital skills. Despite the efforts in improving digital skills being present in all IDEA countries, the supply of ICT specialists and IT literacy lag behind the market needs. Further, IDEA partners often report gap between women and men in ICT engagement in their countries. Then, engagement in digital activities often varies considerably across age groups, which naturally corresponds to different levels of digital advancement and representation of computer skills.

One of the main reasons of the digital skills mismatch even in case of fresh graduates is that students do not receive specific practical training on digital skills during their educational career. Also, interest in STEM disciplines is often not sufficient to reflect the market needs. Some IDEA countries still report rather outdated educational systems that need transformation into solution-oriented ones, with a special focus on the development of analytical thinking. Multiple voices across IDEA countries call for development of training programs oriented to the digital industry. High-level digital skills for ICT professionals are needed in all industry sectors, as they represent the key to boost the digital transformation of companies.

IDEA partners often indicate, that majority of R&D investments in ICT in their countries is done by large and medium-sized enterprises, whereas small and micro enterprises comprise only a small proportion of total R&D investment. Evidences from most of the IDEA countries show that various above-mentioned gaps are often addressed by initiatives of third sector and private sector representatives. Moreover, these are often more efficiently suited to the concept of digital entrepreneurship development within different target groups. However, they are often isolated and ineffectively supported by public policies.

Finally, IDEA partners did not come across a wide range of reports describing the situation of digital entrepreneurship in their countries. Thus, this finding justifies that the IDEA project as a whole, and this intellectual output in particular, fills this information gap and provides valuable results, which in turn can stimulate specific actions aimed at promoting digital entrepreneurship in IDEA countries and beyond.

Higher education context

All IDEA partners indicate that in their countries, HE institutions (HEIs) play an important role as academic centers in education, stimulation and incubation of digital entrepreneurship, as well as shaping entrepreneurial attitudes among the key part of society – students. All IDEA partners

also argue that cooperation between the academic and research community and private sector is one of the priorities for development of digital entrepreneurship.

However, still, IDEA partners found evidence that not all HEIs are adequately equipped to educate and train on digital skills and IT competences, and that responsiveness of HEIs to the new business paradigms (among them also being the digitalization) is limited. IDEA partners identified a couple of study programs that are specifically designed for digital entrepreneurship, with an aim to develop relevant skills of future digital entrepreneurs. However, despite a couple of such good examples, access to digital skills and knowledge in most HEIs is offered through rather fragmented programs that focus only on certain elements of digital entrepreneurship. Interdisciplinary programs in digital entrepreneurship are generally lacking. Entrepreneurship and digitalization are often still treated separately, rather than being integrated. IDEA partners also report that several HEIs developed student start-up incubators, either general or specifically focused on digital businesses.

As students studying IT and related fields are more likely to engage in digital entrepreneurial activity, universities and educators should include more entrepreneurship-related subjects and courses into their curricula. Role models play a significant role as far as entrepreneurship in general, as well as digital entrepreneurship intentions, go. Therefore, it is important to promote these role models in different contexts. Another interesting finding suggests that role models mediate women´s participation in digital entrepreneurship, while it can help to increasingly involve them in studying ICT related subjects as women representation is comparatively lower than men.

Digital technology and ICT knowledge are important for digital entrepreneurship involvement, but entrepreneurial knowledge is equally important. Therefore, it is recommended to apply experiential and active learning, for example using simulations and training enterprises as well as putting theory in practice. Reportedly, students are mostly taught theory and minority is to apply it or to put it in practice. That should be reversed.In order to have more digitally entrepreneurial students, universities and other educational institutions should transform as well. Hence, use more digital technologies not only for teaching but to be more effective, be more commercial and competitive. Irreplaceable is the role of an educator or teacher who should adopt an encouraging and active role in the educational process.

Concluding remarks

The mapping and stock taking of digital entrepreneurship dynamics enabled IDEA consortium to extract the success and failure factors. These served to develop recommendations for fostering of digital entrepreneurship dynamics in HE context and beyond.

Success factors

Country context

- Connectivity and high coverage with high-speed internet (combination of fixed line and mobile)
- Comprehensive digital strategies and coordinated implementation efforts
- Cooperation of actors from both public and private sectors (so-called digital coalitions)
- Supportive legislation measure for digital entrepreneurs and IT professionals (e.g. tax reliefs)
- Development of IT capabilities – general, but also specific in order to bridge the skills gap where necessary
- Fostering technological and digital uptake in broad population of SMEs, adoption and implementation of advanced technologies
- Private sector innovation potential and the presence of global ICT companies
- Tailoring of the interventions on the basis of the target population's nature
- Boosting the investment in technology and innovative processes
- Usage of e-government services in interaction with public authorities, obtaining information, downloading and submitting forms, etc.
- High usage of e-commerce in all types of markets
- Development of specialized digital innovation hubs or clusters in different sectors of digital entrepreneurship, such as gaming etc.
- Success stories and role models in digital uptake (e.g. e-commerce adoption in SMEs, adoption of digital solutions in SMEs,

HE context

- Specialized study programmes linked to digital entrepreneurship or, in broader terms, aimed at digital business context in relevant fields (economics, law, IT), as well as interdisciplinary programmes linked to digital entrepreneurship
- Digital entrepreneurship stimulation and incubation initiatives and offerings at universities (startup incubators & accelerators, support services, mentoring, cooperation with business sector, etc.)
- Extra-curricular training programs in specialized fields (e.g. gaming) in connection with local ecosystem and digital business actors
- Networking and community-building with stakeholders from digital entrepreneurship ecosystem (IT sector, technological firms, startups, etc.) and their involvement in common initiatives and partnerships
- Involvement of actors from business and private sector to facilitate access to their practical expertise and experience from business
- Strong cooperation between academia, IT sector and authorities that increases responsiveness to the market needs

Failure factors

<u>Country context</u>

- Lack of a clear digital strategy and flexibility in adapting regulation related to digitalization, problematic and insufficient implementation of strategic documents
- Uncoordinated work of the relevant stakeholders (e.g. institutions, associations, advisory bodies)
- Digital entrepreneurship interventions (from any subjects) are rather isolated actions without a coordinated global scenario, measurable outcome indicators and tracking of long-term and sustainability indicators are often missing
- Barriers for developing infrastructure (high costs, administrative burdens, high charges), especially in rural areas
- Low level of economic digitization and inefficient e-government, procedures that are digitalized only partially and can't be completed 100% online
- Lack of skilled IT specialists and workforce with advanced digital skills
- Outdated educational systems, emphasizing theoretical knowledge instead of their practical adoption,
- Low interest of SMEs to invest into technological and digital uptake, low investment into R&D
- Insufficient outreach of government initiatives to SMEs
- Unnecessary public interventions that disrupt efficient implementation of digitalization
- Lack of continuous support and follow-up activities in training and support programmes
- Various barriers that decrease customers' interest and uptake of digitalized products and services

<u>HE context</u>

- Access to digital skills and knowledge through rather fragmented programs that cover only partial elements of digital entrepreneurship. Lack of holistic approach.
- Few interdisciplinary programmes in digital entrepreneurship, lack of initiatives that would support interdisciplinary teams and synergies between deeply skilled IT students and other students with latent inclination to IT
- Dominant focus of DE initiatives on students with ICT background and low attention to non-IT business related fields of study
- Rather theoretical focus of study programmes and lack of practical orientation
- Low proportion of students and graduates of Science, Information Technology, Engineering and Mathematics (STEM) fields

Strategic and policy level recommendations

- Adopt a strategy for development of digital entrepreneurship and coordinate and align incentives of various government bodies, public entities and business sector towards its implementation;

- Set a straightforward regulative framework for the development of the digital entrepreneurship;

- Establish active partnership and coordinative activities between all relevant government bodies and authorities, institutions and advisory bodies;

- Involve the private sector and the third sector representatives in development of digital entrepreneurship at national levels. Coordinate key stakeholders beyond the government sector without acting as a controller or intervene into the decision making;

- Government facilitation and indirect support of investments in infrastructure (e.g. by simplifying administrative procedures, lowering related fees and charges);

- Support innovation ecosystem by promoting the tighter cooperation between the academic and research community and private sector;

- Target EU funds to promote digital transformation, and foster learning from digital frontrunners in the EU;

- Steer existing instruments to promote technological leap and productivity;

- Prepare education, healthcare, arts and entertainment sectors for evolution, as these sectors exhibit low digitization and low automation potential;

- Develop, implement, and promote e-government solutions in the public sector.

Operational and practitioner level recommendations

- Provide support to digital entrepreneurship start-ups by providing training, access to funding, and facilitating teleworking. Provide shared workspaces with high-speed broadband, business incubators and accelerators;

- Provide support to the small and micro enterprises to increase their investment in R&D; boost digital transformation, and to adopt key enabling infrastructure (e.g. specialised software and hardware, digital tools etc.) in early stages of their businesses;

- Provide free customizable digitalization strategies models/templates to start-ups and SMEs as a highly effective solution to boost their switch towards digitalization;

- Create open-access training programmes for existing business owners (and other people, such as employees, self-employed or liberal professions) without IT background in user-friendly mode (e.g. online, self-paced learning) to increase their uptake of digital entrepreneurship;

- Strengthen entrepreneurship education in combination with digital skills development and ICT literacy throughout the entire school system;

- Promote and increase take-up of internet services by the general population;
- Capture and develop talents, stimulate lifelong learning among employees and grow the pool of ICT specialist population;
- Re-skill the workforce especially in sectors with low current digitization rates and high future automation potential;
- Train employees in SMEs to equip them with the specialized skills needed for implementing digitalization within the company;
- Increase public and private support enabling the population to improve their digital skills and gain work experience – by creating different platforms to get skills by young people or unemployed people who want to get a higher qualification;

HE context recommendations

- Incentivise universities to include knowledge exchange and collaboration in their long-term vision, both for teaching and for research activities. Involve non-academic stakeholders, public and regional authorities in defining this long-term vision;
- Encourage universities to adopt digitisation as part of their overall strategy in order to transform existing structures and processes, enforce digital change, and enable innovation and entrepreneurship;
- Stimulate external engagement in the governance of HEIs;
- Support cooperative paths and knowledge exchange initiatives between HEIs and entrepreneurial ecosystem;
- Establish interdisciplinary programs in digital entrepreneurship on graduate and post-graduate level;
- Increase offerings of ICT-related subjects and courses in HE curricula;
- Establishing strategic and cross-cutting syllabus in digital entrepreneurship, including the review of curricula and the inclusion a significant percentage of practical disciplines on technological and digital innovation from the early years of study;
- Introduce a broad range of digital initiatives, not just online courses. These include for example: digitized pedagogy and supporting learning, monitoring and assessment systems; scalable online education; dynamic accreditation and examination; and developed research using digital tools, digital data access and digital communications;
- Motivate students to increase their enrolment into the STEM areas;

- Mainstream a student-centred teaching paradigm. Involve students, at all levels, in collaboration with external stakeholders;

- Promote digital entrepreneurship role models in different HE contexts, including female role models (to attract women who are currently underrepresented in STEM and/or ICT fields);

- Practice-oriented entrepreneurship education using experiential and active methods;

- Digitization must be built into the physical assets of the university. The expected new features include user-friendly, flexible and integrated work-study environments; digital labs; WiFi everywhere; wireless charging stations; outsourced data centers; and smart and green buildings;

- Support establishment and development of start-up incubators at universities and facilitate the cooperation between universities and the private sector;

- Use university high technology facilities to support digital start-ups;

- Increase digital and technology uptake together with commercial and competitive orientation by educators and HE institutions as well.