

Support to the CIO Office of the Slovak Republic to implement action plans in the area of digital skills

D5.2: Final report

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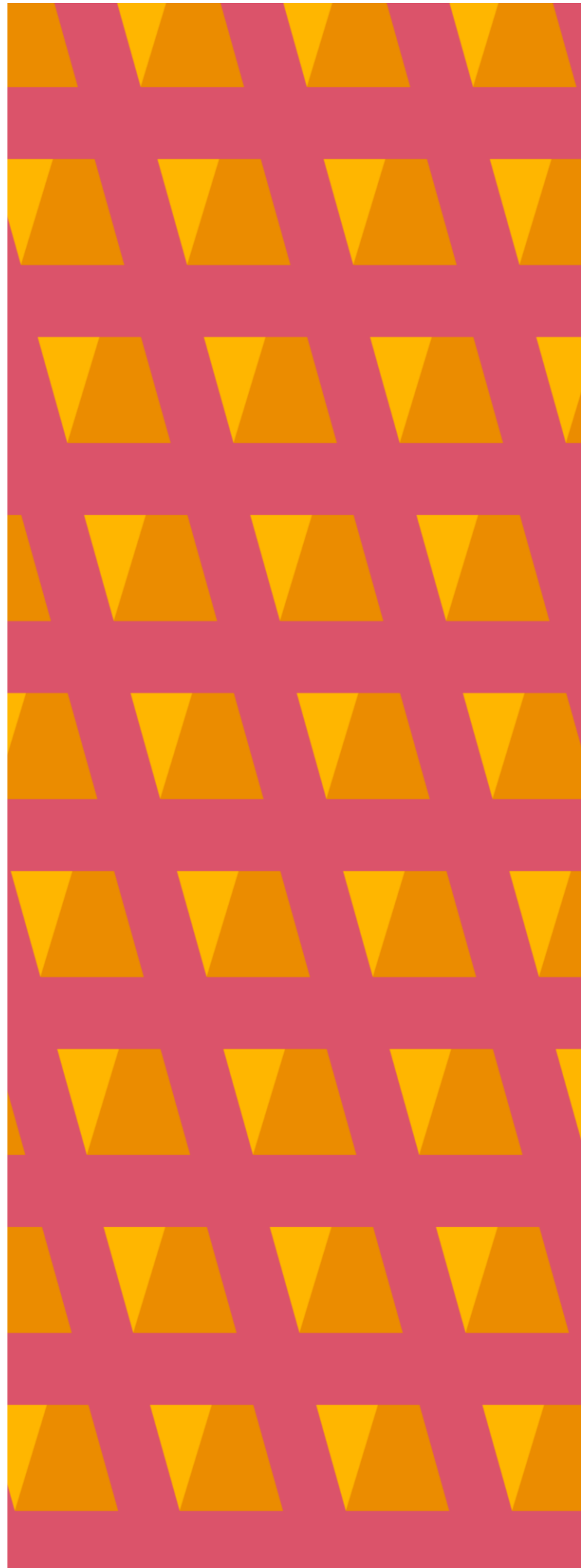


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Report overview



Purpose of the document

The purpose of this document is to support the Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization to implement an **action plan in the area of digital skills**. The objective of this final report is to present review of current level and availability of crucial skills for digital transformation and analyze approach toward skills development activities in Slovakia. Further this report also provides set of good skills development initiatives in European countries identified as the continental digital leaders. Finally, it provides set of recommendations tailored for Slovakia to support and further enhance upskilling activities in Slovakia.

This report is divided into following sections:

1. **Overview of the project** – report introduction and explanation of the main concepts, use of research methods
2. **Selection of European digital leaders** – introduction of selection criteria, their assessment, and presentation of countries identified as digital leaders in the EU
3. **AS-IS assessment of crucial skills** – presentation of findings from our research analyzing level, availability, and development activities of skills crucial in digital transformation
4. **Identification of good EU practices** – presentation of good upskilling practices from European digital leaders
5. **Recommendations for upskilling initiatives** – proposal of action plan for upskilling initiative in Slovakia including implementation plan, presentation of long-term development activities

Executive summary

The world is going through a **radical digital transformation** and Slovakia is not an exception. We are seeing new technologies coming every day and the pace is not slowing down. On the other hand, using **new technologies requires people to increase their skills**. The pace of learning new skills in society is not as

38%

CEOs worried about the availability of key skills

fast as the progress in the technology world. Based on European DESI 2019 index, only 57% Europeans have at least basic digital skills¹. This number is alarming toward the changes that labour market currently faces. According to the latest PwC Network 2018 CEO Survey, 38% CEOs consider speed of technological change the second biggest threat. Same number of business executives are concerned by the availability of key skills². This situation changes the way of doing business and markets must adopt to it. Therefore, many countries including Slovakia are now drafting initiatives to support upskilling of their citizens.

Although this development brings some radical changes, **technology is not a threat in itself, but rather an opportunity** to make our lives easier. Slovakia has a great potential to become a tech savvy country, but its **business owners needs to realize that to attract digital talent, companies themselves need to change too**. According to our findings, companies in Slovakia realize importance and urgency of change brought by digital transformation. They believe they can unlock the potential it brings and so already invest into new technologies. Use of these technologies creates urgency to raise the quality of talent in their workforce. As the availability of a free, high quality talent is currently limited, business leaders across the country are currently looking for effective ways to develop this talent within their existing workforce. They

¹ European Commission: Digital Economy and Society Index 2019, Country Report Slovakia; [link](#)

² PwC: 21st CEO Survey, The Anxious Optimist in the Corner Office; [link](#)

are open to work together with the government in order to find a working solution for the success of the whole country.

Business leaders with the ambition to thrive in the digital era need a positive attitude towards digital transformation. **76% of the Slovak companies believe robotization and automation have a positive impact on their businesses.** This belief is shared across the society as 79% of the Slovaks believe new technologies have a positive impact on their jobs. Yet, this attitude is rather ambivalent as 72% of the citizens also believe robots and AI are stealing their jobs.³ This situation creates a challenge for **78% of companies** that according to our questionnaire **already use or plan to use new technologies**, but they think only 31% of their operations can be automated or robotized. Although companies still need a human workforce, demand for its skills is already changing.

76%

*companies believe
robotization and automation
have a positive impact*

Companies today do not look merely for a technology-specific skills. They are looking for a talent with complex set of skills including digital, technological, and social “soft” skills. In Slovakia **59% of the population in Slovakia have basic or above basic digital skills.**⁴ Slovak workforce has more jobs in technology and knowledge-intensive sectors than the EU average to some extent. However, **85% of companies struggle to hire a technology skilled employee and 74% of them struggled to find an employee with required social skills.** This is a nation-wide problem as according to our findings the struggle-to-hire score is very similar across regions as well as industries. In addition, Companies must also face other hiring barriers like limited availability of skills, high salary expectations, or low workforce mobility.

EUR 730

*average annual investment
into skills development per
1 employee*

Limited availability of people with crucial skills pushes companies to invest into development of their existing labor. Yet, it is not only about providing professional training. Companies must motivate their employees to participate by showing an impact such development activities will have on their jobs. Based on Eurostat data **63% of companies in Slovakia provided a training**⁵ to their employees, and **43% have human capital development plan.** According to our survey, the **companies in Slovakia invest ~ EUR 730 p.a. into skills development**

per 1 employee and 88% of companies interviewed agree these investments help to successfully increase selected skills and competencies. Companies in 3 sectors - ICT, professional services, wholesale and retail tend to invest more than the national average.

Slovak businesses are open to support from the government, but say such programs are not promoted enough. 33% of companies say the support could help their businesses.⁶ In order to increase companies’ involvement in such programs, it is important to minimize barriers companies must face during application like large administrative burden, unclear evaluation criteria, and unrealistic eligibility criteria. Government also needs to improve targeting of such programs and distribution channels they use for their promotion.

Based on these findings, **we recommend the CIO Office to pilot a national digital upskilling program with selected companies.** The main goal of such program is to support all companies whose activity will be radically transformed by a major technological change towards a new function or a job. It offers employees whose jobs are transformed or automatized, tailor-made training and individual personalized

³ European Commission; Special Eurobarometer 460 - Attitudes towards the impact of digitisation and automation on daily life; [link](#)

⁴ European Commission: Digital Economy and Society Index 2019, Country Report Slovakia; [link](#)

⁵ Eurostat; Enterprises providing training by type of training and size class - % of all enterprises; [link](#)

⁶ Slovak Business Agency; Effectiveness Analysis of Supporting Programs for SMEs; [link](#)

support to prepare them for upskilling towards new responsibilities. This preventive approach is interesting for the company, employee, economy, and government. It also underlines the **importance of a proactive and preventive strategy** for the development of the companies and employees' skills in order to secure professional careers in a sustainable way.

In the long run, **a new organization dedicated to the implementation of the Slovak Republic Digital upskilling program needs to be appointed and created**. We strongly recommend establishing this governance along with clear and efficient management mechanisms relying on technology-based tools in order to scale the project from the pilot project to a pluri-annual rolling upskilling program.

Main concepts and definitions

Digital transformation

Fundamental change in organizations caused by technological (digital) progress.

Digital mindset and aspiration

Companies perception of digital transformation and its impact on their way of doing business. Digital mindset is an attitude of key decision makers that enable organizations to predict opportunities deriving from the change. Digital aspiration indicates the level business use or plan to use new technologies use and impact the use will have on improvement of companies' operations effectiveness.

Skills for digital age

Diverse set of skills crucial for thriving in digital transformation. We used H-shaped skills approach during the assessment which allows to look at skills development from a winning perspective and to assess employees' skills from a broader standpoint. This approach allowed us to look at the skills needs from 3 different perspectives:

- Deep knowledge of digital expertise
- Deep knowledge of technical expertise
- Ability to collaborate across disciplines

Upskilling activities

Upskilling is a comprehensive initiative to convert applicable knowledge into productive results — not just to have people meet classroom requirements, but to have them move into new jobs and excel at them. Activities involve identifying the skills that will be most valuable in the future, the businesses that will need them, the people who need work and could plausibly gain those skills, and the training and technology-enabled learning that could help them.

Support programs

Publicly available programs tailored to motivate and support organizations in faster digital transformation including activities focused on development of essential skills

Research methods overview

In order to collect required information defined in the project RfS, we used 3 basic information collection methods:

- 1) Desk research
- 2) Questionnaire of 400 SMEs and 10 Large Organizations
- 3) Focus groups

Selected methods allowed us to determine the current state of SMEs digital readiness with a particular focus on general digital skills.

Desk research

Desk research helped us to find relevant qualitative information from national as well as European sources. It was used for initial research of the assessment in order to define the basic concepts which were later analyzed through the questionnaire. The approach also helped us to clarify key findings or confirm ad hoc hypotheses resulting from different discussions. Desk research was used throughout the whole project.

Questionnaire of 400 SMEs and 10 large organizations

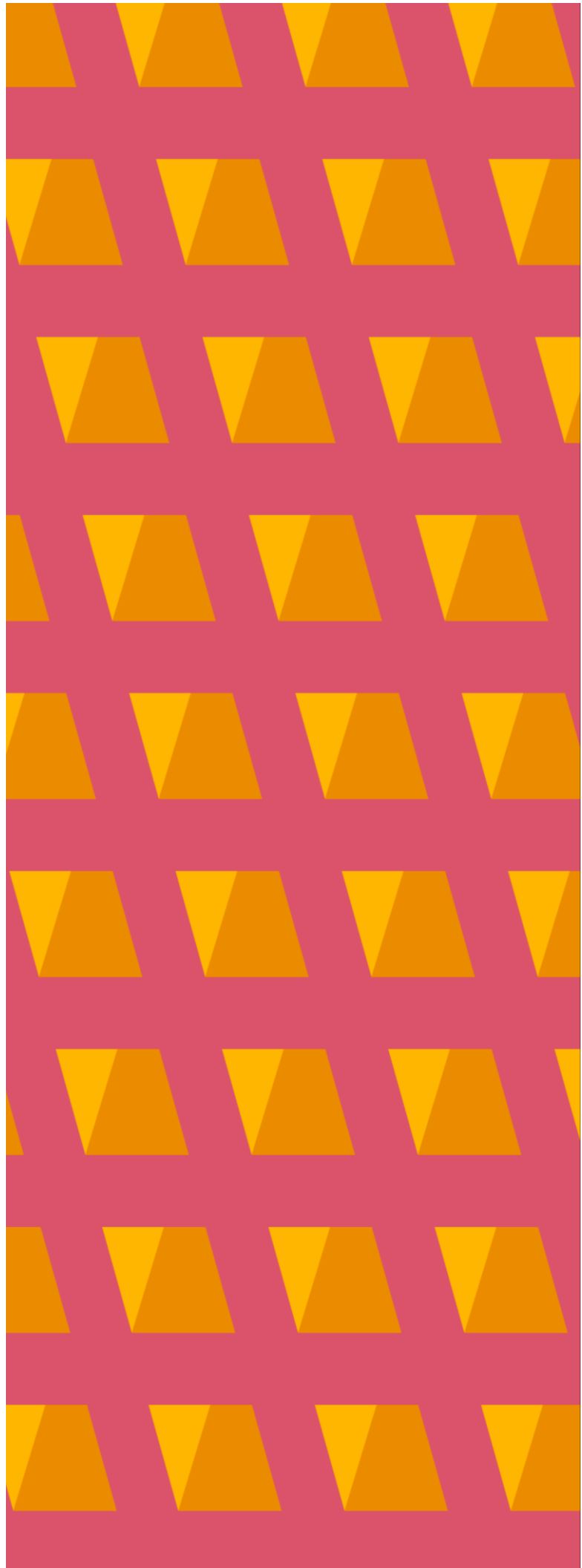
The Questionnaire aimed to collect complex data regarding SMEs approach toward digital transformation with a special focus on skills availability and their further development. It was a corner stone of the whole project. Collected data were the main source of the assessment while focus groups and desk research served for further clarification of the Questionnaire findings.

The questions were not designed for employees' self-assessment but for SMEs CEOs or HC leaders. Although self-assessment is more precise for the assessment of skills availability, project time constraints did not allow to use the approach. In addition, the project also focused on SMEs strategic positions toward skills development which were able to be answered only by positions responsible for further human capital development of employees. All results were analyzed on a sectorial and regional levels.

Focus groups

We assessed the Questionnaire's key findings from a deeper, qualitative perspective with the use of focus groups. Focus groups were organized in 4 Slovak major regions with all relevant stakeholders. The regional aspect was considered for the observation of possible differences that led into more effective aiming of future policy recommendations and actions plans.

***1. Chapter 1:
Selection
of European
digital leaders***

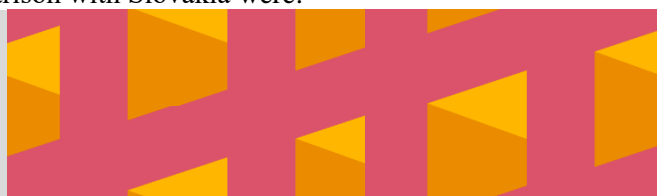


This section introduces our approach to identification of countries that we defined as European digital leaders. We identified 10 countries that were used for further analysis. Our goal was to compare Slovakia not just to the European average, but to the most successful countries in tackling digital transformation. Based on this selection, we were able to compare how is Slovakia ready for digital transformation and how it can learn from these countries in order to succeed.

1.1 Selection criteria

The selection criteria that ensured the countries' adequate comparison with Slovakia were:

- **Criterion 1: High DESI Score**
- **Criterion 2: Level of Trade in Economy**
- **Criterion 3: Similar Population Size**
- **Criterion 4: Higher Value Added for the ICT Sector**



Only the countries which met at least 3 criteria from defined criteria were used for further analysis and identification of good applicable practices which could fit for the needs of Slovakia. When analysing specified criteria, we focused primarily on top performing countries rather than countries with average performance because they set the example for other countries to learn from their success stories. In case Slovakia current ranking is already high (Criterion 2) or a criterion does not measure performance (Criterion 3), we selected countries with similar ranking like Slovakia.

1.1.1 Criterion 1: Higher DESI Score

Digital Economy and Society Index (DESI) is a composite indicator based on the Digital Competence Framework for Citizens, which measures the level of digital transformation of the EU Member States⁷.

The index reports the level of digital development in 4 categories:

1. Access, speed and quality of Internet infrastructure (Connectivity)
2. Digital skills of society (Human Capital and Use of Internet category)
3. Digitalisation of businesses (Integration of Digital Technology category)
4. Public e-services (Digital Public Services category)

We decided to use higher DESI score in human capital as one of our selection criteria. According to OECD, human capital is “the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being.”⁸ DESI score indicates the level of countries' digital development and it tracks the evolution of EU member states in digital competitiveness⁹. Selection of this criterium allows us to identify countries which level of digital skills of their workforce is already higher than in Slovakia.

DESI HC index consists of 2 dimensions- ‘basic skills and usage’ and ‘advanced skills and development’. The first dimension refers to indicators on internet use by individuals and digital skills (individuals with at least basic skills as per the Digital Skills Indicator) while the second dimension includes indicators on ICT specialist employment and graduated in STEM (Science, Technology, Engineering and Mathematics) disciplines. This type of division of digital skills moves from low/ basic skills level to highly specialized and very advanced digital skills level.

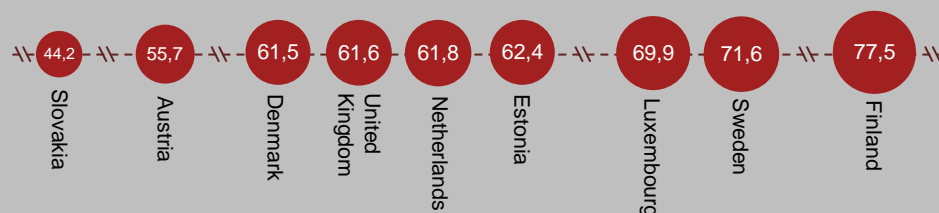
⁷ European Commission; The Digital Economy and Society Index (DESI); [link](#)

⁸ OECD; OECD Insights: Human Capital, The Value of People; [link](#)

⁹ European Commission, Digital Transformation Scoreboard, [link](#)

According to the DESI 2019 index, Slovakia scores 44.2%, ranking 18th out of 28 EU Member States.¹⁰ Countries with higher DESI HC index are: Finland, Sweden, Luxembourg, Estonia, Netherlands, United Kingdom, Denmark, Austria, Malta, Germany, Ireland, Belgium, Croatia, France, Slovenia, Czechia, and Spain. These countries were further considered for the selection of countries with best practices in the digital area.

Graph 1: 2019 DESI HC Index by selected Countries [in %]



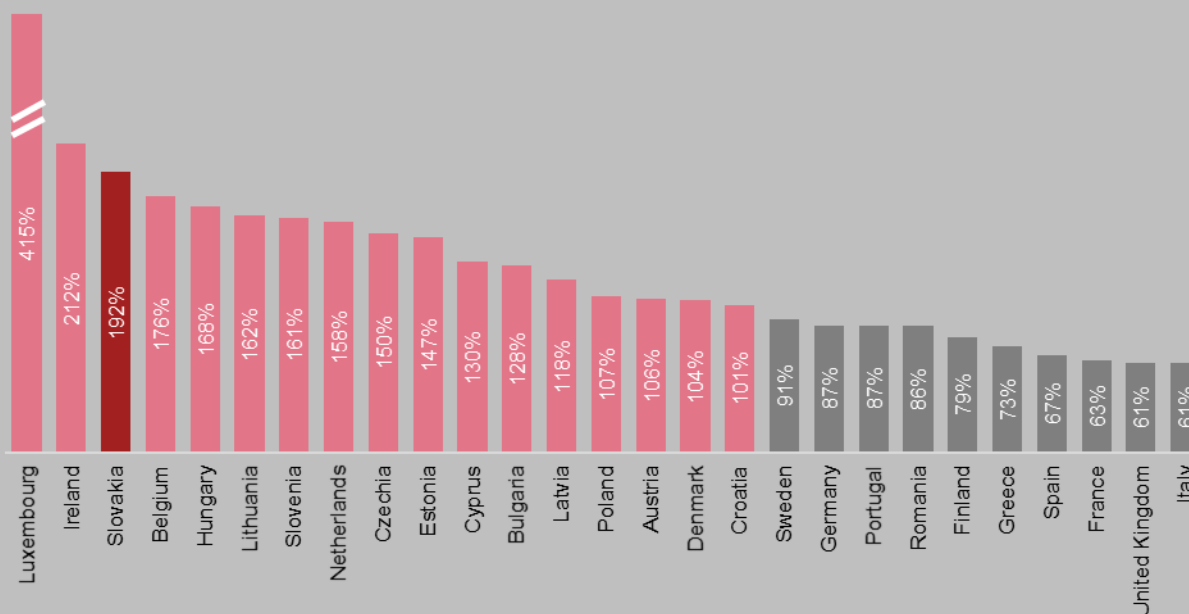
Source: European Commission, Digital Economy and Society Index Report 2019 - Human capital

1.1.2 Criterium 2: Level of Open Economy

We looked at the degree to which the country's economy is open. An open economy is an economy, which engages in the economic activities with the outside world. Countries with higher market openness rely less on their internal markets and more on the external markets and the collaboration/trade with other countries. They have fewer barriers or no barriers that could obstruct trading with other countries.

We decided to consider 'open economy' as a criterium for the countries' selection because market openness is the attribute which relates directly to the economic growth, lower costs, job creation, and poverty reduction.¹¹ Moreover, market openness directly impacts digital transformation through greater international cooperation. An open economy leads to increased digital connectivity on trade. By engaging in digital trade, greater attention is paid to supporting services like logistics and e-payments¹². Digital trade

Graph 2: 2018 Trade-to-GDP Ratio by countries [% of GDP]



Source: World Bank; Data – Trade (% of GDP)

¹⁰ European Commission, The Digital Economy and Society Index (DESI), 2019 Country Report – Slovakia; [link](#)

¹¹ OECD, Understanding the global trading system- Why open markets matter; [link](#)

¹² OECD, Trade Policy Papers- Digital Trade and Market Openness; [link](#)

consists of cross-border transactions which are digitally ordered, platform-enabled, and digitally delivered¹³. Trade provides new market opportunities and supports the innovation and productivity through competition and the information exchange. It gives businesses opportunity to reach larger scope of international markets.

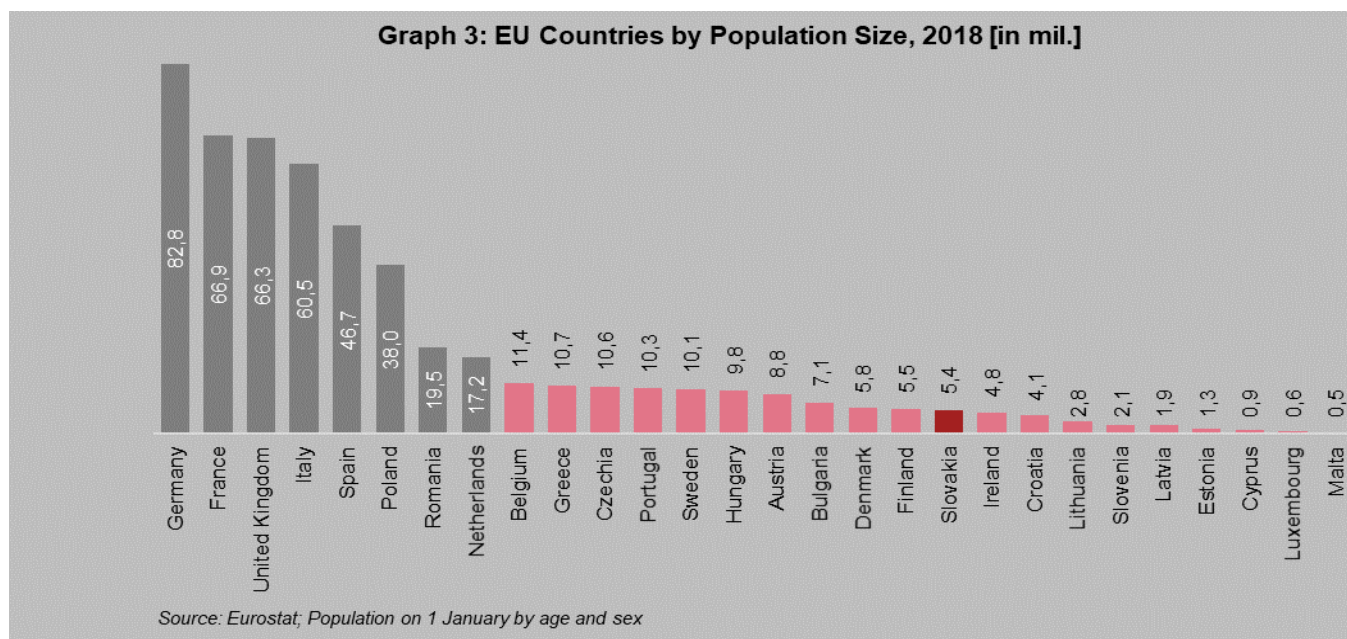
In order to assess openness of Slovak economy, we decided to assess how important international transactions are to domestic wealth. This is usually measured by Trade-to-GDP Ratio. This ratio tends to be higher in smaller countries which wealth is dependent on their export power.¹⁴ Therefore, we selected countries with Trade-to-GDP ratio higher than 100%. This assumes selected countries are more export oriented compared to the countries with the ratio lower than 100%

Slovakia has the third highest Trade-to-GDP ratio in Europe scoring 192%. Only Luxembourg and Ireland have higher ratio than Slovakia.¹⁵ Among other countries with the ratio higher than 100% are Belgium, Hungary, Lithuania, Slovenia, Netherlands, Czechia, Estonia, Cyprus, Bulgaria, Latvia, Poland, Austria, Denmark, and Croatia. These countries were further considered for the selection of countries with best practices in the digital area.

1.1.3 Criterium 3: Similar Population Size

We considered countries' similar population size. It assumes such countries might face similar problems and opportunities during digital transformation. It also correlates to our criterium 2 – as shown above, big countries do not tend to be strongly export oriented as their markets are able to cover the wealth of their businesses. Therefore, we only selected countries with population 1.5 higher or smaller for our selection.

Based on the application of the criteria on data from Eurostat, countries with population of 0 to 13.6 million meet defined condition, specifically: Belgium, Greece, Czechia, Portugal, Sweden, Hungary, Austria, Denmark, Finland, Ireland, Croatia, Lithuania, Slovenia, Latvia, Estonia, Cyprus, Luxembourg, and Malta



¹³ International Monetary Fund, Measuring the Digital Economy; [link](#)

¹⁴ OECD (2010), "Trade as a percentage of GDP", in Measuring Globalisation: OECD Economic Globalisation Indicators 2010, [link](#)

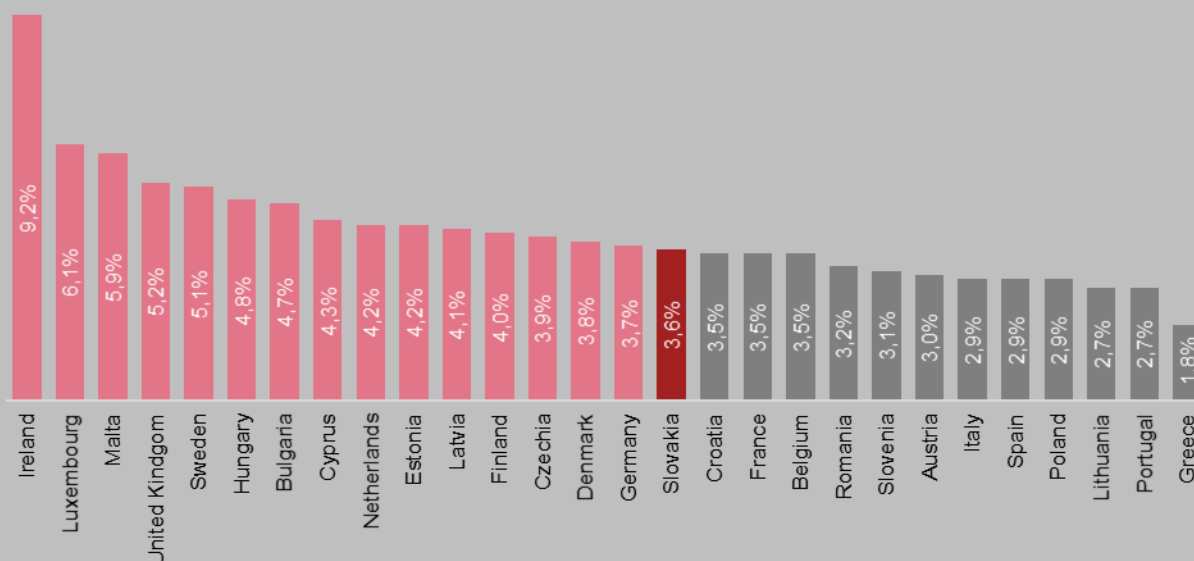
¹⁵ World Bank, Trade (% of GDP); [link](#)

Malta.¹⁶ These countries were further considered for the selection of countries with best practices in the digital area.

1.1.4 Criterium 4: Higher Value Added for the ICT Sector

Last criterium we looked at is the size of the ICT sector as measured by value added to GDP. Share of digital economy on GDP is defined as the value of the ICT sector in the total value of country's economy¹⁷. As country digitally transforms over time, it produces more digitally enabled products and services – ICT sector creates higher value added into a country's economy. Achieving the status of digital economy proves countries successfully undergo digital transformation by enabling their business into a digital world. During our selection process, we identified countries creating higher value added for the ICT sector than Slovakia.

Graph 4: Value Added for the ICT Sector by Country, 2016 [% of GDP]



Source: Eurostat; Value added or the ICT sector

We made the country selection based on the data from Eurostat. ICT value added is calculated as a sum of 2 values – value added from ICT manufacturing and value added from ICT services. In case 1 variable was not available (e.g. Ireland missing ICT manufacturing), total ICT sector value was calculated as single value from the remaining measure.¹⁸ Based on available data Slovakia produced 3.6% of its GDP via ICT sector in 2016. Countries which produced higher value added by ICT sector were Ireland, Luxembourg, Malta, United Kingdom, Sweden, Hungary, Bulgaria, Cyprus, Netherlands, Estonia, Latvia, Finland, Czechia, Denmark, and Germany. These countries were further considered for the selection of countries with best practices in the digital area.

¹⁶ Eurostat; Population on 1 January by age and sex; [link](#)

¹⁷ OECD report; Digital Economy Data Highlights; [link](#)

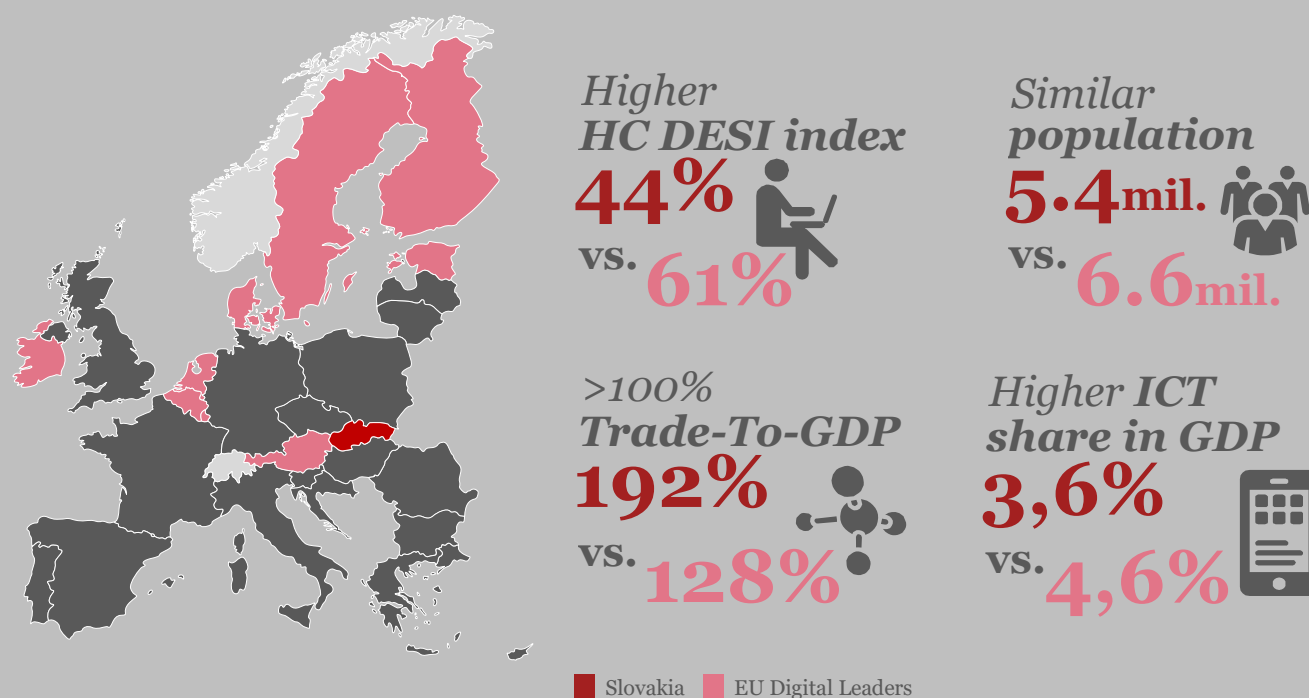
¹⁸ Eurostat; Value added or the ICT sector; [link](#)

1.2 Selected countries

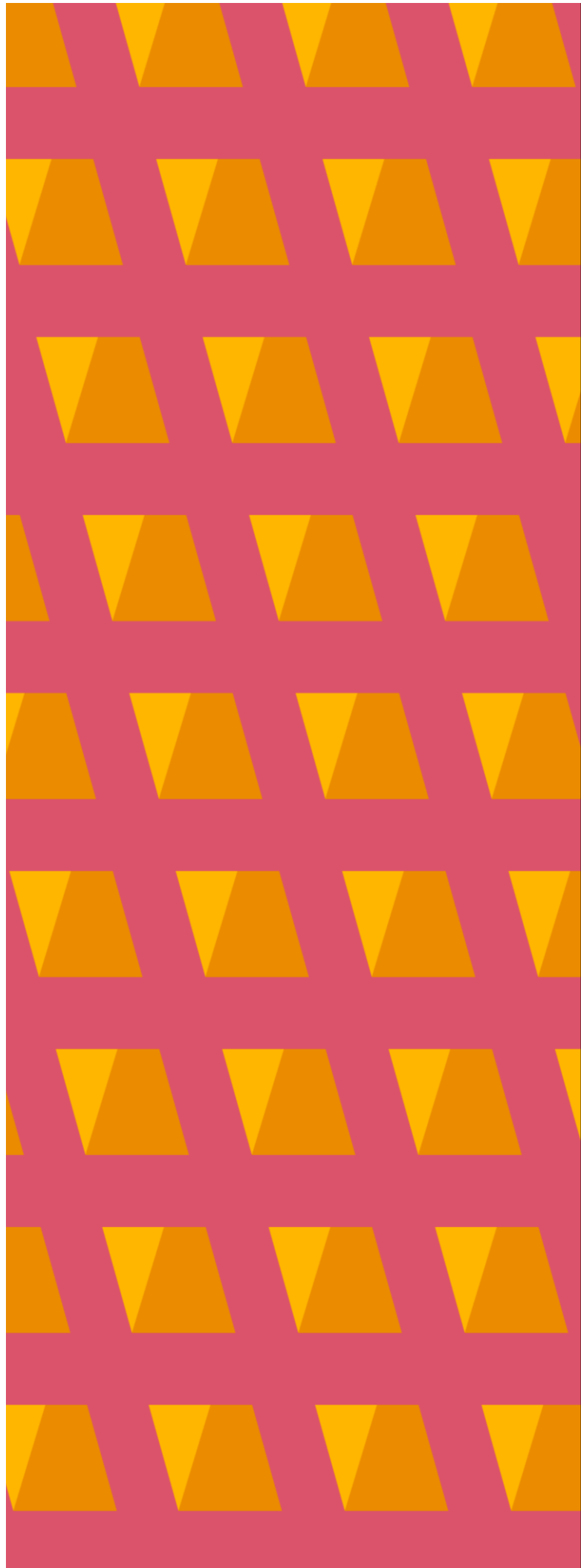
After detailed consideration of all criteria, 16 countries have been identified which met at least 3 of the 4 criteria. The list includes following countries: Austria, Belgium, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Hungary, Ireland, Latvia, Luxembourg, Malta, Netherlands, Slovenia, and Sweden.

We believe aspiration of Slovakia in digital transformation must be learning from the best performers. In order to select only the best performers from the selected countries, we run cluster analysis testing relationship between higher DESI HC index and ICT sector value added to country's GDP. Based on the analysis results, we shortlisted 10 countries clustered together with higher index values than other countries. We call these countries European digital leaders. After careful consideration we conducted research of good EU practices in the following countries: Austria, Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, Malta, the Netherlands, and Sweden.

Graph 5: Slovakia compared to European Digital Leaders



2. Chapter 2: ***“As-is” situation***



2.1 As-is analysis overview

Companies in Slovakia realize importance and urgency of change brought by digital transformation. They believe they can unlock the potential it brings and so already invest into new technologies. Use of these technologies creates urgency to raise the quality of talent in their workforce. As the availability of a free, high quality talent is currently limited, business leaders across the country are currently looking for effective ways to develop this talent within their existing workforce. They are open to work together with the government in order to find a working solution for the success of the whole country.

Business leaders with the ambition to thrive in the digital era need a positive attitude towards digital transformation. **76% of the Slovak companies believe robotization and automation have a positive impact on their businesses.** This belief is shared across the society as 79% of the Slovaks believe new

79%

Slovaks believe new technologies have a positive impact on their job

technologies have a positive impact on their jobs. Yet, this attitude is rather ambivalent as 72% of the citizens also believe robots and AI are stealing their jobs.¹⁹ This situation creates a challenge for **78% of companies** that according to our questionnaire **already use or plan to use new technologies**, but they think only 31% of their operations can be automated or robotized.

Slovak businesses overrate availability of general digital skills of their workforce compared to the professional estimates. According to the opinion of the Slovak business leaders interviewed via our questionnaire, 18% more people can perform daily digital tasks than the estimates by the EU. **According to the EU's Digital, Economy and Society Index, 59% of Slovaks, more than the European average have basic or above basic digital skills.**²⁰

When it comes to job-related skills, businesses frighten. At least **74% of companies struggled to hire an employee with required technological or social skills.** In their opinion, this problem is primarily caused by unavailability of a free talent or by high salary expectations. While latter is more obvious in western part of the country, other regions of Slovakia also need to deal with a low workforce mobility. Since the availability of employees with required skills is currently limited, businesses also support further development of their existing workforce via lifelong learning. **63.6% of companies in Slovakia provided a training to their employees** during the last year²¹ investing ~EUR 730 p.a. per 1 employee. Development activities are primarily focused on **development of technological skills (36% of all training activities).** Although companies offer these trainings, only **45% of the population participated in any non-formal education.**²²

74%

companies struggled to hire employee with required skills

These activities also enable citizens to remain relevant in the job market. Therefore, it is crucial the government will support such activities. **Currently there are number of existing supporting programs, but businesses do not use them** often. One of the causes might be find in weak targeting of the programs as **57% companies do not have sufficient information about these programs.**²³ Large administration burdens, unclear eligibility and selection criteria, or lack of trust do not motivate companies to apply for the programs, although they would do so were there simple, fast, and transparent access.

¹⁹ European Commission; Special Eurobarometer 460 - Attitudes towards the impact of digitisation and automation on daily life; [link](#)

²⁰ European Commission; Digital Economy and Society Index 2019, Country Report Slovakia; [link](#)

²¹ Eurostat; Enterprises providing training by type of training and size class - % of all enterprises; [link](#)

²² Eurostat; Participation rate in education and training by age; [link](#)

²³ Slovak Business Agency; Effectiveness Analysis of Supporting Programs for SMEs; [link](#)

2.2 Digital mindset & aspirations

Businesses that plan to thrive in the new digital era must realize importance and urgency of change brought by digital transformation. They need to get ready for upcoming changes and set up their winning aspirations into their business visions. In order to have such mindset, we believe companies need to have 3 attributes:

1. **Positive attitude towards digital transformation**
2. **Supportive innovation leaders**
3. **Realistic technological understanding**

Positive attitude towards digital transformation

Attitude towards digital transformation is a mindset enabling companies to get prepared for opportunities brought by the transformation. We analysed this mindset via attitude of citizens (employees) as well as attitude of businesses. According to a Eurobarometer *Survey on Attitudes towards the impact of digitalisation and automation on daily life*²⁴, **79% of Slovak citizens believe digital technology has a positive impact on economy**. On the contrary, **72% of them think robots and AI are stealing their jobs**. This ambivalent attitude is a challenge for the Slovak companies where majority (76%) think robotization and automation has a positive impact on their businesses. Companies need to be transparent to their employees and to show what their plans are and how they plan to approach upcoming changes with involvement of their workforce. Keeping employees informed will allow companies to maintain engagement and diminish insecurity they might have.

Supportive innovation leaders

Strong leadership and senior sponsorship of digital initiatives is a key part of successful digital transformation from organizational point of view. Companies need to have an innovation leader – a digital pioneer who brings new ideas into a business, know what they want to achieve in digital transformation and how they want to achieve it. The pioneers do not necessarily need to be from official leadership, but they need to be respected among critical mass of the workforce. In **62% of businesses in Slovakia across all industries, digital pioneers driving new digital visions are typically companies' owners or CEOs**.

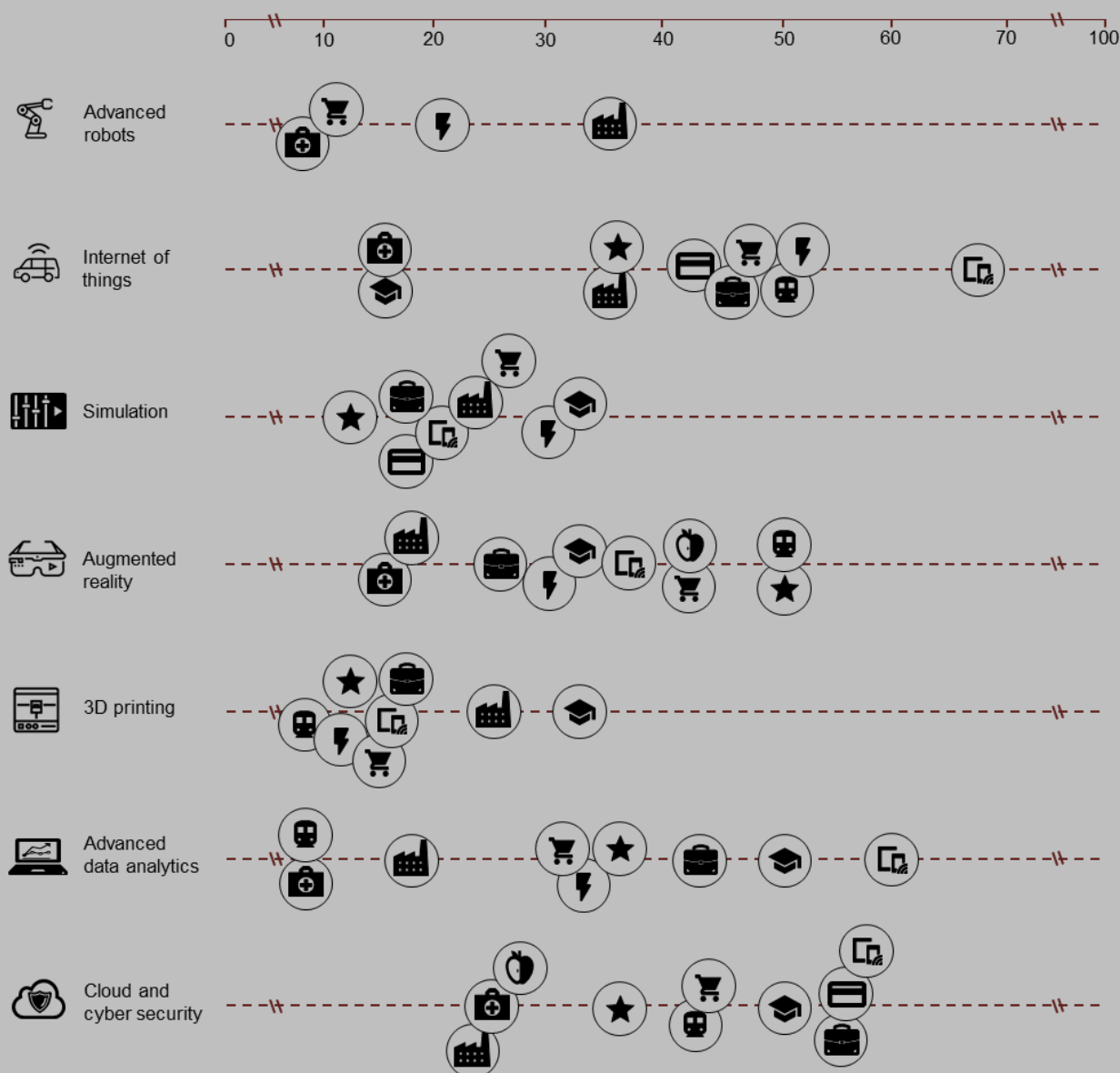
Realistic technological understanding

Companies need to know how robotization and automatization will impact their business and what technologies will enable them to succeed. The fear of citizens from stealing their jobs might result from their perspective on impact of robots and AI on their jobs. In their opinion, **48% of citizens**, 4pp higher than the EU average as well as European digital leaders, **believe their jobs can be automated at some levels**. Businesses see this potential differently. When asked in our questionnaire, they think **31% of their operations can be automated or robotized**. Moreover, while this number is quite stable across regions, it differs across industries. 4 industries – transportation and storage, manufacturing, ICT, and wholesale and retail think more operations can be automatized compared to the average. On the other side, more service-oriented industries – education and healthcare think only 17% (19% respectively) of operations have potential for automation.

Companies with the ambition to thrive in the digital era must invest into new existing technologies that can already be commercially used. In Slovakia, **78% of companies already use new technologies or plan to use them in coming years**. Use of specific technology is dependent on an industry. While manufacturing sector uses mainly advanced robotics or internet of things, financial sector focuses primarily on cloud, cyber security, and advanced data analytics (detailed view can be found on the graph below).

²⁴ European Commission; Special Eurobarometer 460 - Attitudes towards the impact of digitisation and automation on daily life; [link](#)

Graph 6: Planned and actual use of technologies in industries
[in %]



Legend:



Sources: Project questionnaire

2.3 Skills for digital age

Technology development is accelerating, so it is not sufficient to master only one skill as it soon may become obsolete. Today organizations expect their employees to learn new skills required by market needs faster and smarter. They put great emphasis on a complex development of employees with the focus on:

1. **general digital skills,**
2. **technological skills,**
3. **social “soft” skills.**

2.3.1 General digital skills

General digital skills are the skills individuals need in order to stay relevant in a digital world. Since the term is widely used across many institutions, we used the European Digital Competence Framework for Citizens (DigComp)²⁵ developed by JRC for our assessment. The framework covers 5 competence areas:

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

During our assessment, we analysed all competence areas via the questionnaire and followed up the findings with key stakeholders during the focus groups.

Availability of skills

Level of general digital skills in Slovakia is similar to the EU average, but it lags behind the level of the EU digital leaders. In addition, the country has one of the smallest shares of citizens with low general digital skills. According to EC's Digital Economy and Society Index (DESI)²⁶, **59% of Slovaks have basic or above basic skills**, e.g. they are able to use the knowledge in at least one competence area as defined by the framework. Although this is 2 percentual points (pp) higher than the EU average, the country loses 9 percentual points to the European digital leaders (68%). In addition, only **33% of Slovaks have above basic general digital skills** in all competence areas, 8pp less than the European digital leaders (41%).

59%

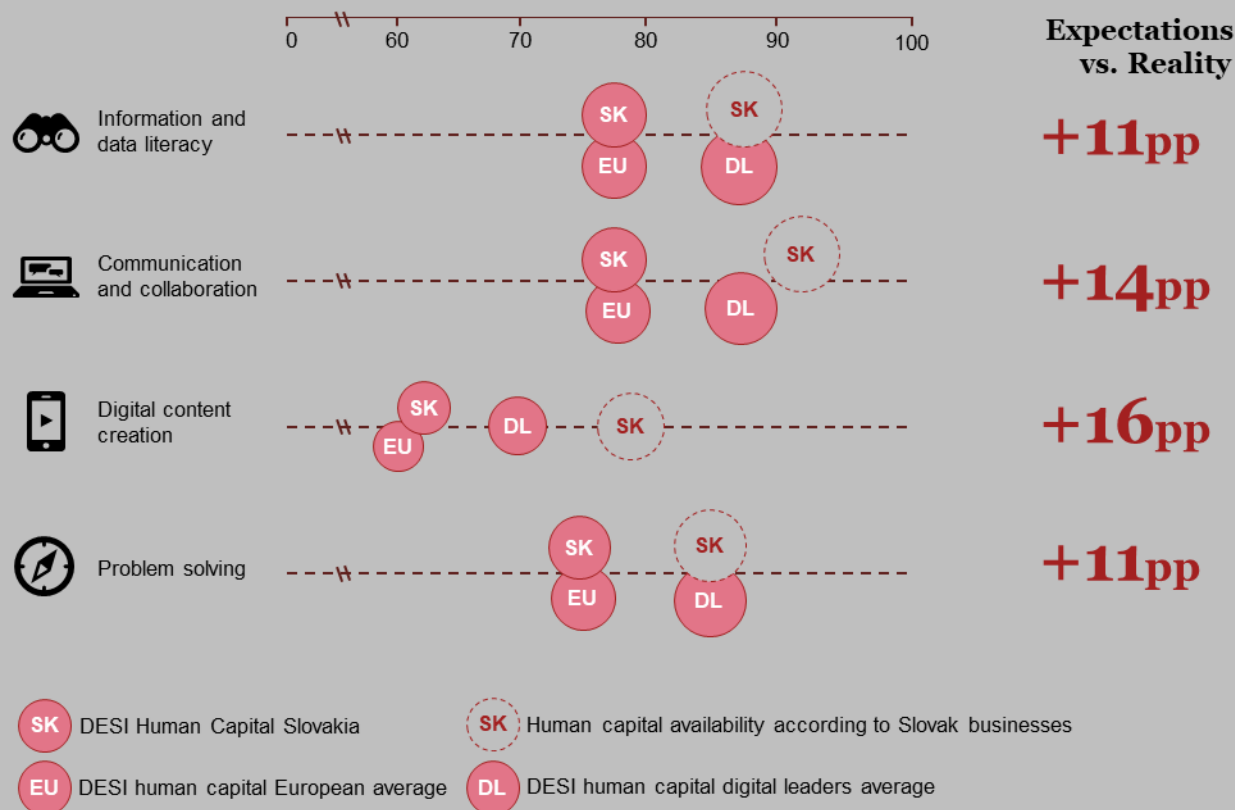
Slovaks have basic or above basic general digital skills

Whilst general digital skills in Slovakia are on the EU average, **Slovak businesses tend to think the country's availability of the skills is comparable to countries identified as European digital leaders.** We asked business owners and managers how they see availability of these skills so that we could confirm increasing trend in development of general digital skills in Slovakia. When asked about the ability of employees to perform some general digital tasks in each competence area, Slovak businesses believe availability of these skills in the country is 18% (13pp) higher than the availability identified by DESI. Comparing the availability of the skills across industries, it is very similar in each competence area. While ICT, professional services and finance always tops in the availability of the skills in their workforce, agriculture and manufacturing has the lowest share of their workforce in each competence.

²⁵ Joint Research Centre; DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use; [link](#)

²⁶ European Commission; Digital Economy and Society Index; [link](#)

Graph 7: At least basic digital skills by competence area
[in %]



Sources: ¹Eurostat; Individuals' level of digital skills; 2019; [link](#); ²Project questionnaire

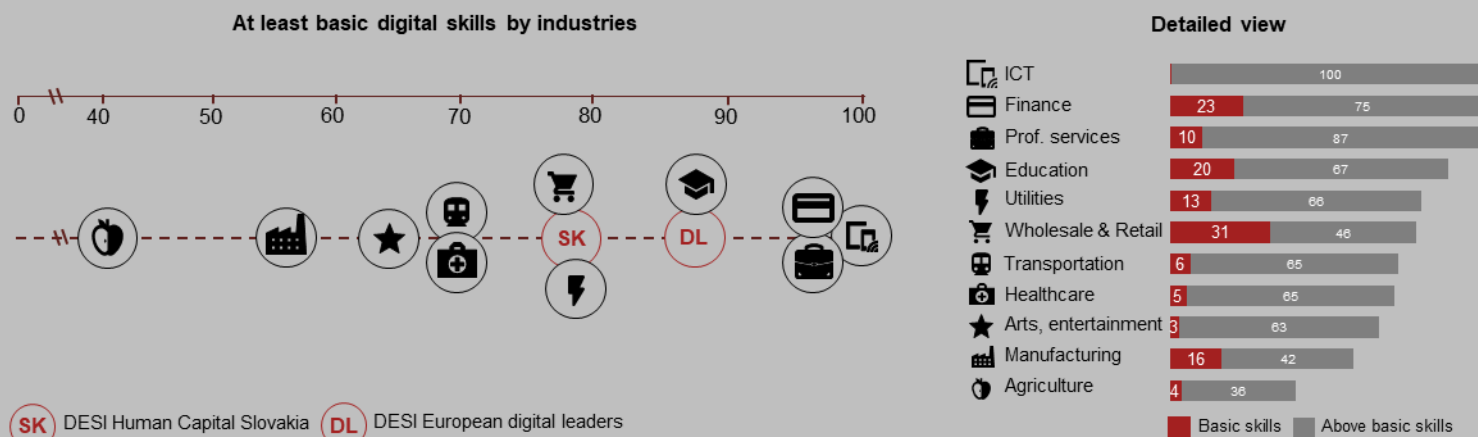
Information and data literacy

Information and data literacy help citizens to get a value from all publicly available data and information. According to DigComp, this competence helps to identify, locate, retrieve, store, organize, and analyse digital information, judging its relevance and purpose. In practice, information and data literacy enable citizens to regularly use the internet for standard needs (e.g. Google or favourite interest groups searching).

Looking at the DESI data, information and data literacy competence follows the trend from the overall general digital score. 78% of the citizens has basic or above basic skills (68% above basic) in the competence, same as the EU average, but lose 9pp less compared to the EU digital leaders where 87% of the population is able to master simple tasks. However, according to the Slovak businesses, 89% of the Slovak workforce can do basic tasks and 73% can do above basic tasks in information and data literacy.

Volume of workforce which is able to perform well in information and data literacy varies across industries in Slovakia. While workforce in industries such as ICT, finance, professional services, or education is able to master defined skills in a volume like the EU digital leaders, **workforce in more traditional industries like agriculture or manufacturing reach their bottom lines**. Nevertheless, above basic skills dominate across all industries.

Graph 8: Information and data literacy skills assessment
[in %]

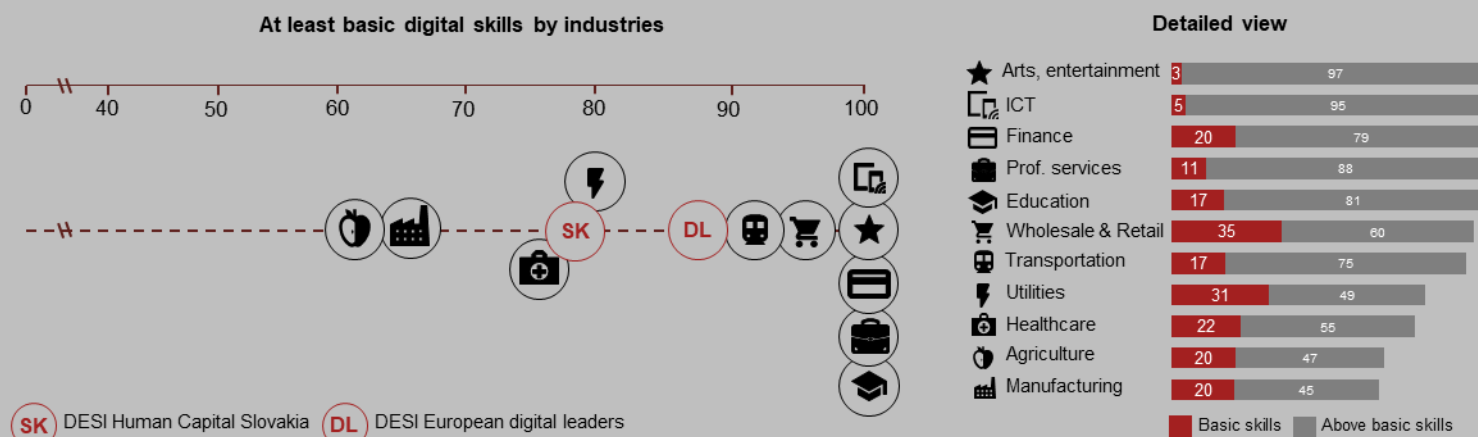


Communication and collaboration

Communication and collaboration competence allow interaction of citizens or working together. As defined in the framework, the competence helps citizens to communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, interact with and participate in communities and networks, and increases cross-cultural awareness. In practice, communication and collaboration allow citizens to interact with others via emails, video chats, or social media.

Based on the findings, **vast majority of Slovaks is able to use new technologies for their communication.** It is the strongest competence group mastered by the highest population shares in Slovakia, EU average as well as EU digital leaders. According to DESI, 78% of Slovaks have at least basic skills (63% above basic skills) in this area, approximately same level as the EU average and ~10pp less than the EU digital leaders. This difference follows 10pp trend identified in the information and data literacy competence area. According to Slovak businesses, 92% of their workforce is able to perform basic or above basic tasks. This share is 4pp higher than the share of the EU digital leaders. Comparing above basic skills only, the share is similar (72 vs. 73%) with the digital leaders but is 11pp higher than the EU average.

Graph 9: Communication and collaboration skills assessment
[in %]



Availability of the skills in communication and collaboration is strong across majority of industry sectors. 7 out of 11 industry sectors think at least 90% of their workforce or more is able to communicate via new technologies. In the top 5 industries – arts and entertainment, ICT, finance, professional services, and education, this level reaches 98% and more of their workforce. **Traditional industries – agriculture and manufacturing have the lowest workforce share mastering basic or above basic skills of 67%, 65% respectively**, but it is their strongest competence of all competences in general digital skills.

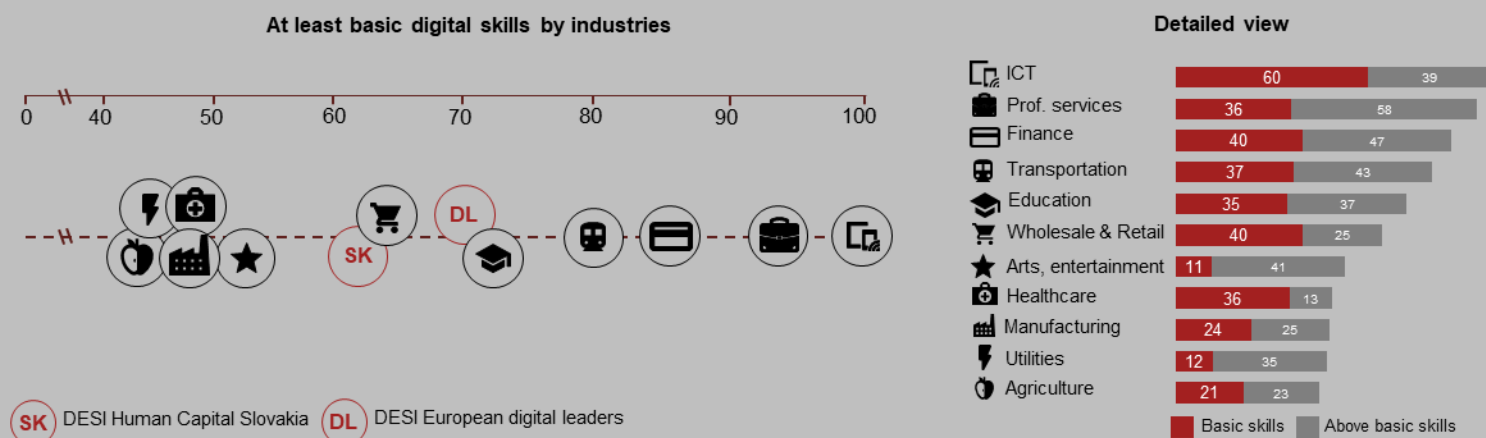
Digital content creation

Digital content creation competence enables citizens to use technology for creation and edit new content (from word processing to images and video), integration and re-elaboration of previous knowledge and content, production of creative expressions, media outputs and programming, dealing with and application of intellectual property rights and licenses. In practice, this competence allows the citizens to use different office tools (e.g. MS Office or Google Suite) in their daily tasks.

According to available data, **creation of digital content is the most problematic competence of general digital skills across Europe**. Only 63% of the Slovak population is able to master at least basic skills (41% to master above basic skills). Although the share is slightly higher than the EU average, it still lags behind EU digital leaders by 7pp. It is the lowest difference from all competence areas. Slovak businesses think the share is significantly higher compared to the DESI score saying 79% of their workforce have basic or above basic skills in digital content creation. When it comes to above basic skills (e.g. working in MS Excel), they think only 41% of their workforce, same volume as identified by DESI, is able to master them. However, in their opinion it is still the most critical part of general digital skills.

Availability of digital content creation skills is limited. There are only 2 sectors – ICT and professional services, which almost full workforce (99%, 94% respectively) is able to master basic or above basic skills. In addition, only professional services businesses think that more than a half of their workforce is able to master above basic skills when it comes to digital content creation. **On the contrary, less than 50% of the workforce from 4 sectors – healthcare, manufacturing, utilities, and agriculture, is not able to master basic or above basic skills.**

Graph 10: Digital content creation skills assessment
[in %]



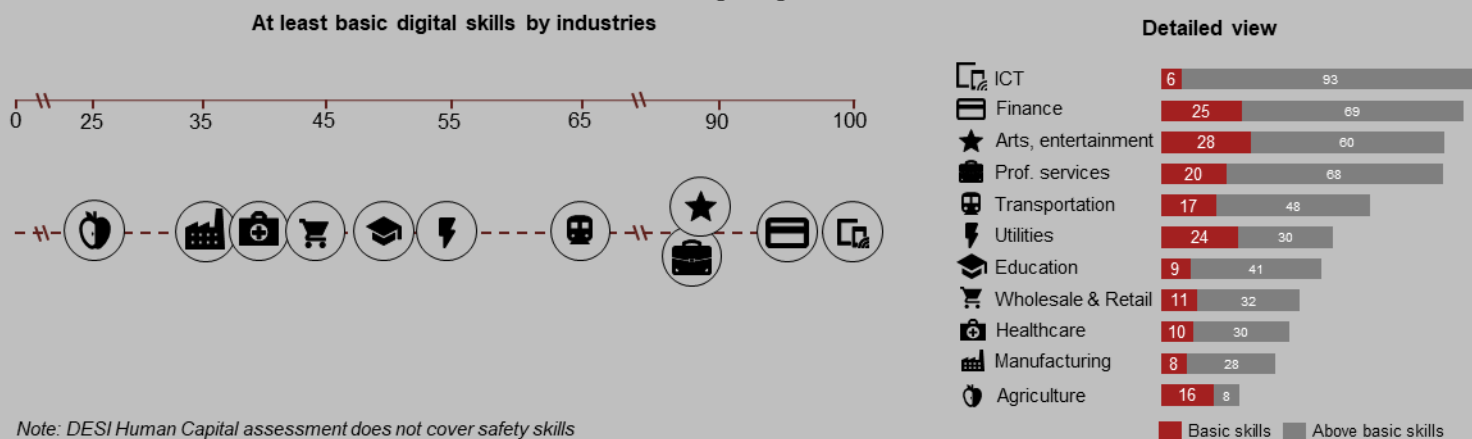
Safety

Technologies also create new type of dangers and risks for users. Safety skills help the citizens to secure protection of personal data, digital identity by providing security measures for a safe and sustainable use of

the technologies. In practical life, citizens use digital safety skills to protect their internet accounts (e.g. on social networks) or to recognize attempts to steal data (e.g. phishing emails). Although DigComp define Safety as a digital general skills competence, it is not measured via DESI so no international comparison can be made.

In the opinion of the Slovak businesses, 83% of their workforce is able to master basic or above basic skills (e.g. change a password on their social media account). This share, however, decreases by 20pp when it comes to protection from more sophisticated types of threats (e.g. phishing emails) as only 63% of the workforce have above basic skills which help to recognize such threats. Ability to protect differs across industries. While the share of workforce in ICT, finance, arts and entertainment, and professional services sectors mastering basic or above basic safety skills is higher than the national average, sectors like healthcare, manufacturing, and agriculture has less than 40% of the population which is able at least basic skills in this competence.

Graph 11: Safety skills assessment
[in %]



Problem solving

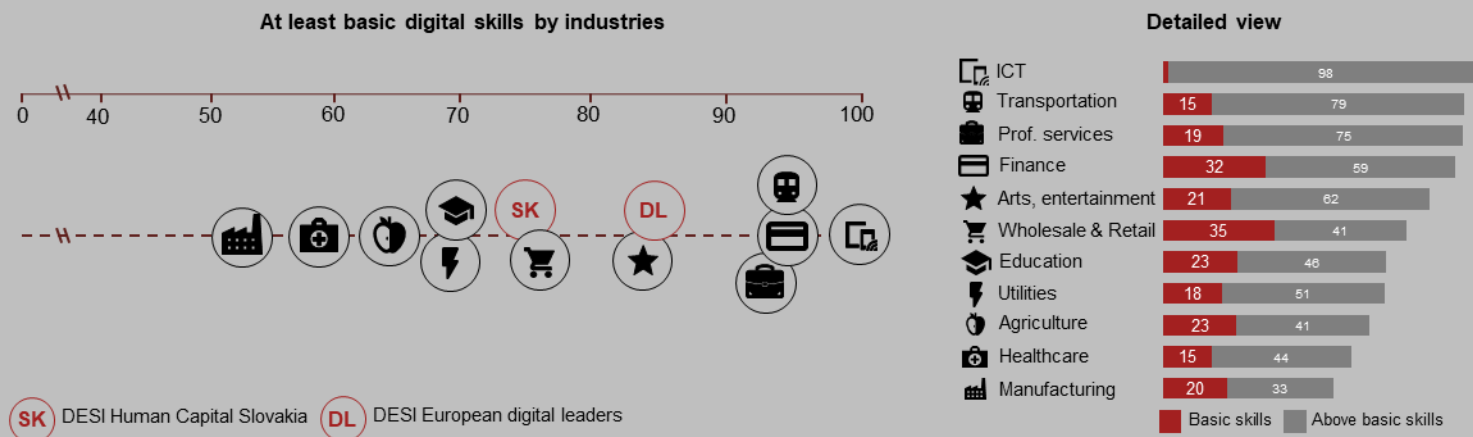
Problem solving enables citizens to deal with their problems with the help of technologies. It helps to identify digital needs and resources, make informed decisions on most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, creatively use technologies, solve technical problems, or update own and other's competence. Since this competence covers broader group of skills, in practical lives it usually ranges from online shopping to downloading, installing, and using an application designed for a specific need (e.g. photo adjusting app).

DESI data shows **74% of the Slovak population**, approximately the same share as the EU average, **have at least basic digital skills** (57% to master above basic skills). Similarly like in the previous competences, this population share is 11pp (10pp respectively) less than the EU digital leaders where 85% of their citizen have at least basic digital skills (66% to have above basic digital skills). **Slovak businesses tend to think 85% of their workforce, same as the share of EU digital leaders, have at least basic problem-solving skills** and 61% are able to master above basic skills. This confirms the trend from the previous competences that the availability of the workforce general digital skills is overrated by the businesses.

Availability of the skills across industries varies from 53% (in manufacturing) to 100% (in ICT). Except ICT, other 3 sectors – transportation and storage, professional services, and finance have the workforce

where more than 90% have at least basic skills. However, it is only ITC which have more than 90% of their workforce that has above basic skills (98%).

Graph 12: Problem solving skills assessment
[in %]



2.3.2 Technological skills

As automation and robotization grow, organizations are seeking for advanced technological skills. We used the skills defined in the Skills for Key Enabling Technologies in Europe report for the purposes of this assessment. The report defines more than 100 different skills essential for development of selected strategic technologies in the EU. As digital transformation decreases the need for repetitive and manual tasks, we reduced the tasks and divided them into 4 categories:

1. Machines and tools design skills
2. Advanced ICT skills
3. Mathematical modelling and simulation
4. Research & development skills

Availability of skills

Availability of technological skills in Slovakia is reaching its critical levels. According to the survey, **85% of companies struggled to hire a technology skilled employee**. This situation is a nation-wide problem as the struggle-to-hire score is very similar across the regions as well as industries. For example, in Trenčín, the region with the best score, 67% of its companies were unable to find an expert last year.

4.3%

Slovaks work in technology or knowledge-intensive sector

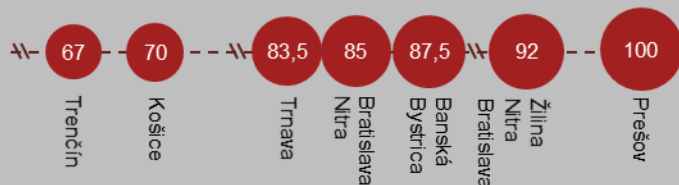
4.1%), but lags behind EU digital leaders (4.9%). Yet, Slovakia lags behind production of future

This problem may arise from the fact that Slovakia produces less technological experts when compared to other countries. Share of the Slovak workforce working in a skill-intensive industry is similar to the EU average. According to Eurostat²⁷, **the Slovak workforce has more jobs in technology and knowledge-intensive sectors than the EU average** to some extent (4.3% to

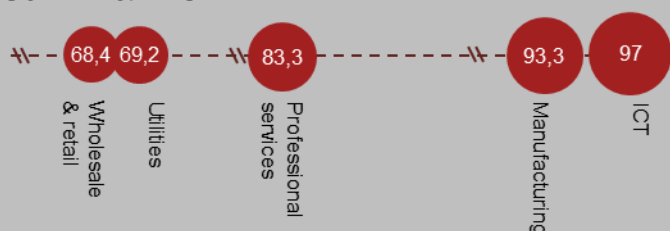
²⁷ Eurostat; Employment in technology and knowledge-intensive sectors at national level, by sex (from 2008 onwards, NACE Rev. 2); [link](#)

Graph 13: Struggle-to-hire score – technological skills

[by regions, in %]



[by industry, in %]



Note: Only sectors with representative sample were selected

technological experts. The country produces 15.8 technological experts per 1,000 citizens, which is 3.5 persons (18%) less than the EU average and 2.4 persons (13.2%) less than EU digital leaders²⁸.

Hiring barriers

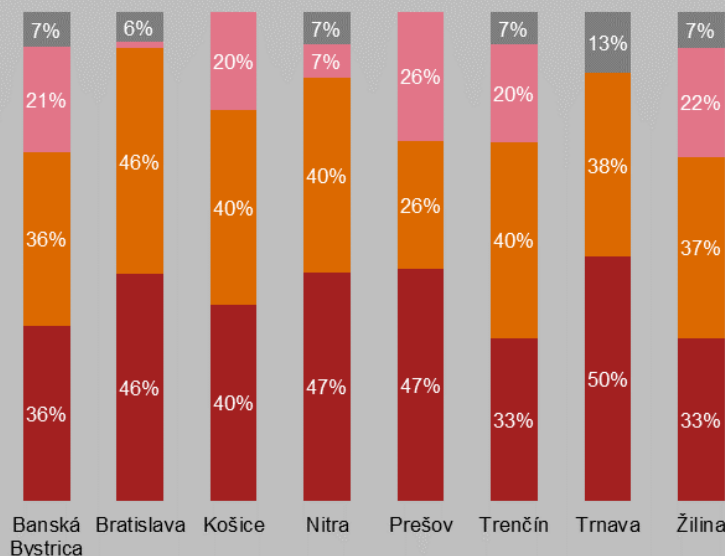
As the country does not produce critical mass of technological specialists, its labor market becomes limited and companies cope with number of barriers when looking for a talent. Companies across all regions and industries cope with 2 main barriers today - **43% of them says availability of skills they are looking is limited**. As there is a limited number of available candidates, it has a direct impact on their salary expectations. **41% of companies thinks these expectations are high**.

Some regions must also tackle with the **unwillingness of candidates to work in their region**. While this is

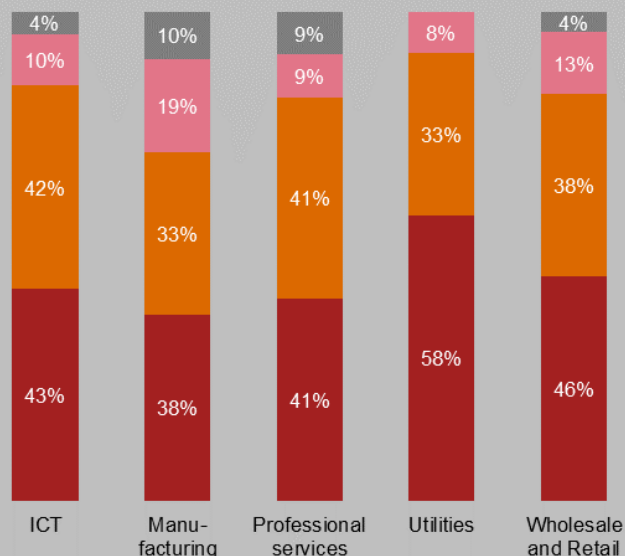
not an issue in western Slovak regions (Nitra 7%, Bratislava 1%, Trnava 0%), it is **more visible in other parts of Slovakia** where this is an issue for more than 20% of companies. Although this is not a general problem across industries, **19% of manufacturing companies, an industry with the second highest automation estimation** (as already described in this report), must face this issue.

Graph 14: Main hiring barriers – technological skills

[by regions, in %]



[by industry, in %]



Legend: Limited availability of specialists (red), High salary expectations (orange), Workforce mobility (pink), Others (grey)

²⁸ Eurostat; Graduates in tertiary education, in science, math., computing, engineering, manufacturing, constructions, by sex – per 1000 of population aged 20-29; [link](#)

Barriers identified in the survey creates additional costs for companies to run their businesses. **Slovak enterprises across the regions as well as industries are not able to find experts or fulfill their salary expectations.** The situation is critical as 65% of companies thinks higher availability of technological skills would have a positive impact on their further growth.

2.3.3 Social skills

Change implied by digital transformation will also have an impact on higher demand for employees with social skills. These are the skills that enable individuals to effectively and interact with others. As defined in the project inception report, the skills are derived primarily from the KET report. The report defines 4 relevant soft skills categories:

1. Communication and negotiation
2. Managerial skills
3. Entrepreneurial and innovation skills
4. Education and life-long learning

Availability of skills

According to the opinion of number of business representatives met during the focus groups, social skills are crucial skills as it allows employees to work together and learn new skills brought by technologies. However, availability of socially skilled employees in Slovakia is comparable to availability of technological skills as **74% of companies in Slovakia struggled to hire an employee with social skills last year.** Unavailability of the skills in some regions or industries is even higher, reaching critical values. This situation strengthens hiring barriers which does not allow companies to find an expert with specific social skills.

Hiring barriers

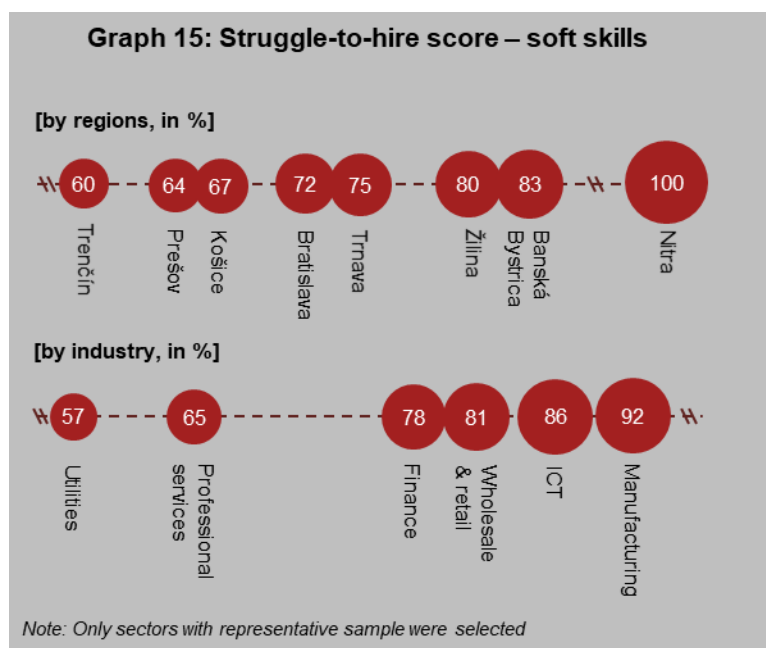
According to data from our survey, companies must often solve 2 main barriers – high salary expectations of candidates and limited availability when hiring an employee with social skills. 42% of companies says candidates have high salary expectations and 41% were not able to find a candidate at all. When companies

67%

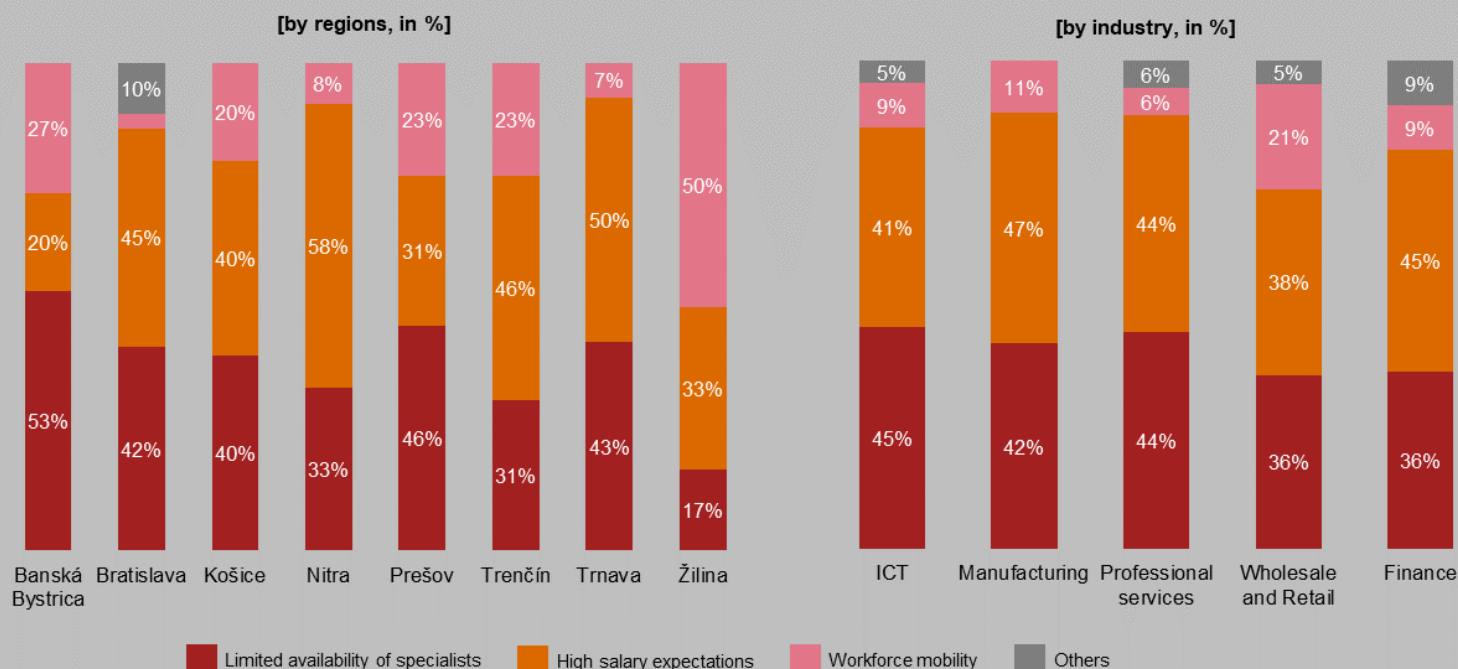
companies think higher availability of skills would positively impact further growth

struggle to find the right talent, their growth potential decreases – 67% thinks higher availability of social skills would positively impact their further growth.

Impact of each barrier differs across regions as well as industries. Whereas middle and eastern regions of Slovakia must struggle with both major barriers as well as with unwillingness to reallocate, regions of western Slovakia cope primarily with high salary expectations. While Žilina copes mainly with relocation issues (50%), this is not a problem in western Slovakia (less than 8%) which copes with the highest salary expectations in the country (~51% of problems).



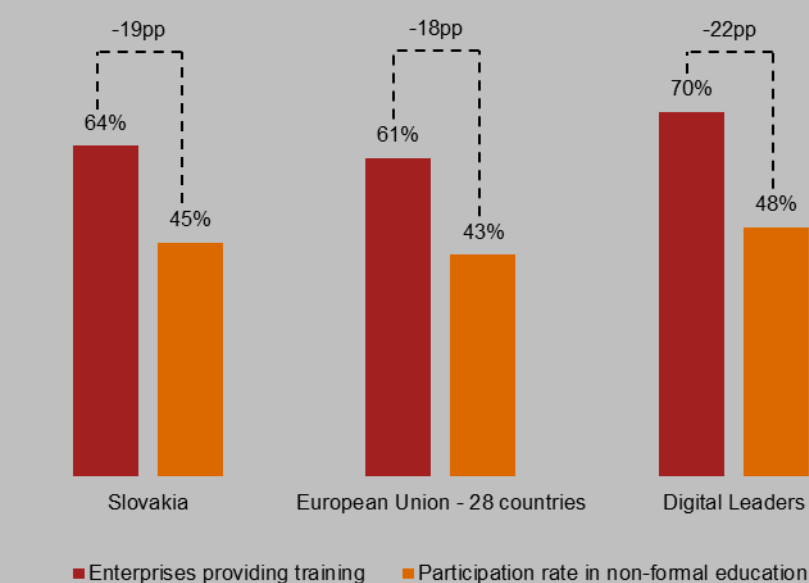
Graph 16: Main hiring barriers – soft skills



2.4 Development of skills for digital age

The pace new technologies change can lead into insufficient coverage of demand for new skills. Therefore, companies that plan to succeed in digital transformation cannot only look for a new talent, but they also

Graph 17: Providing training vs. participation
[in %]



Sources: Eurostat

need to develop skills of their existing workforce. Number of Slovak companies adapt to coming changes and already invest into development of the skills for digital age. Based on the data from Eurostat²⁹, **63. 6% of companies in Slovakia provided a training (internal or external) to their employees.** This share is 3pp higher than the EU average, but it is still 9pp less than the digital leaders. Although companies offer these trainings, employees might be unwilling to participate. In Slovakia, **45% of the population participated in any non-formal education.** However, this trend tends to be similar across the continent including digital leaders countries as only 43% (48% respectively)

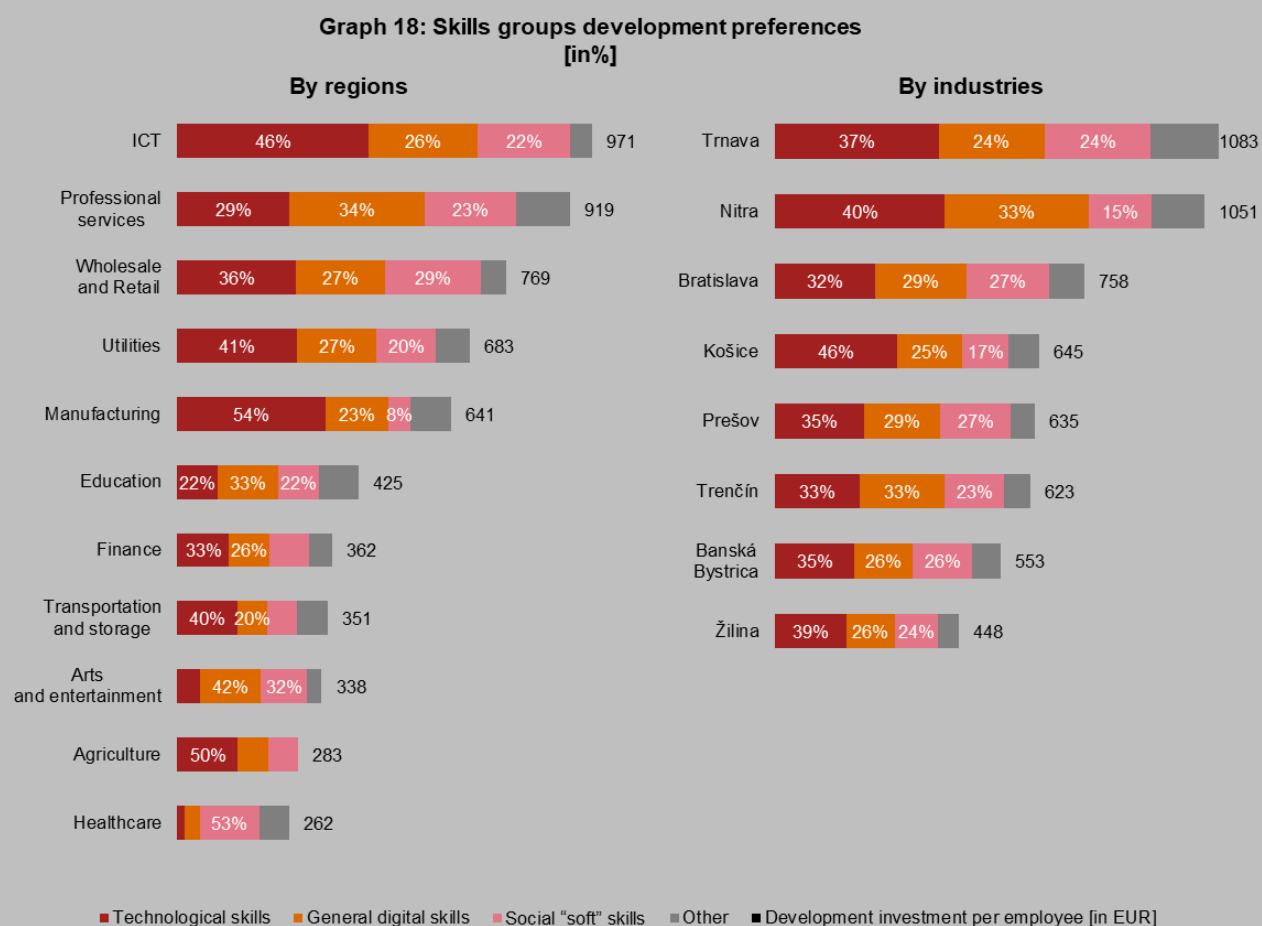
²⁹ Eurostat; Enterprises providing training by type of training and size class - % of all enterprises; [link](#)

participated in such training³⁰. Based on the data available, it is crucial for companies to increase their motivation in further education so that they can all succeed in digital transformation.

EUR 730

*average annual investment
into skills development per
1 employee*

According to our survey, the companies in Slovakia invest ~ EUR 730 p.a. into skills development per 1 employee with the primary focus on development of technological skills (36%), followed by general digital skills (29%), and social “soft skills (24%) of all training activities. 43% companies in Slovakia have human capital development plan – a plan that clearly defines what key skills company and positions will company need and develop in an upcoming period of 5 years. This plan helps companies to better target their development actions. 93% of companies with development plan provided a training platform to their employees, 16pp more compared to 67% of companies without development plan. In addition, 88% of companies agree these investments help to successfully increase selected skills and competencies.



Development areas

Companies in 3 sectors – ICT, professional services, wholesale and retail tend to invest more than the national average. Looking through the regional perspective, western Slovak regions drives the investment with Trnava and Nitra regions investing almost 50% more (EUR 1,050) than the national average. The

³⁰ Eurostat; Participation rate in education and training by age; [link](#)

focus is the same across regions as well as industries except professional services industry investing primarily into general digital skills (34%) and healthcare investing mostly into social “soft” skills (53%).

Development Channels

When businesses consider the most appropriate way for skills development, they most often choose either internal training (e.g. on the job training) or look for external professional support. 35% – 36% of companies select one of these options. **Only 22% of companies consider online as viable option for further development.** This preference is approximately same across all regions and industries except Transportation and storage companies that do not prefer online trainings at all and Arts & entertainment where 45% of companies use online platform for further skills development.

2.5 Support programs – are they really helping?

In the new digital era, it is crucial the Slovak government will help to define actual needs brought by digital transformation and provide support to meeting them. The government as well as the European Union has already provided number of supporting activities. As part of this analysis, we looked at the assessment of existing supporting programs for SMEs prepared by the Slovak Business Agency³¹ and tested the results

57%

companies do not have sufficient information about supporting programs

via our questionnaire on a regional and industry level. It shows existing support instruments are not known to Slovak businesses and their use is limited across all regions as well as industries. The study shows, only 43% of companies have sufficient information about supporting programs in Slovakia. 33% of companies say the support could help their businesses. When asked about the use of the programs, 31% have applied for actual help, but only 16% succeeded. Data from the questionnaire confirm no significant difference across all industries as well as regions.

Mitigation of barriers and targeting improvement

In order to increase popularity and use of supporting programs, it is important to minimize barriers companies must face during application and to improve targeting of specific programs for specific interest groups. The study shows companies do not apply because of 3 main reasons:

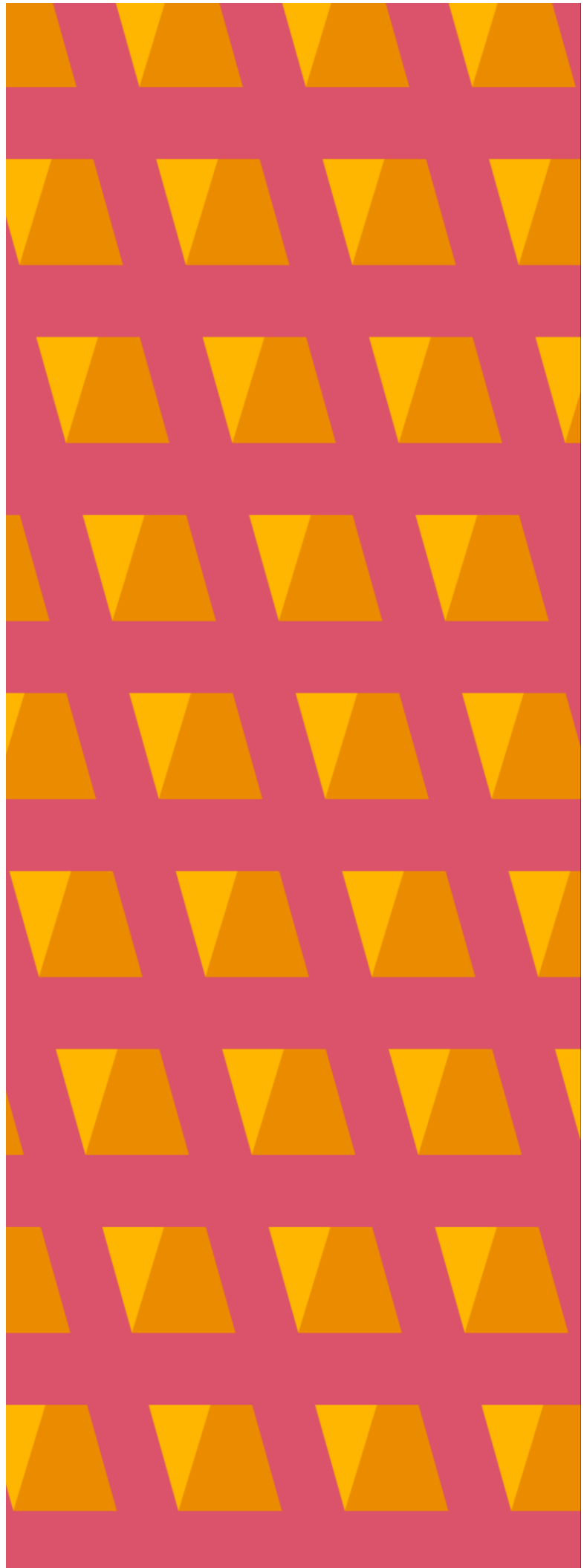
1. **Large administrative burden**
2. **Unclear evaluation criteria**
3. **Unrealistic eligibility criteria**

Same barriers were identified in the questionnaire and confirmed during focus groups. On top of these barriers, focus group participants often stressed out **people do not trust these programs and their use would negatively affect reputation of their businesses.**

To improve targeting of supporting programs, it is important to identify the most common communication channels businesses use when they look for public support. Based on the questionnaire data, **businesses mostly use internet search (34%) followed by information from external suppliers (17%).** Companies do not often communicate with public bodies when more information is needed. The officials should reprioritise their communication channels so that they are able to increase reach of their campaigns.

³¹ Slovak Business Agency; Effectiveness Analysis of Supporting Programs for SMEs; [link](#)

3. Chapter 3: Identification of good EU practices



We conducted a research on governmental programmes and instruments that provided support for development of digital skills and other skills crucial for digital transformation in respective countries. Our goal was to find good examples for tailored recommendations for the CIO Office in Slovakia in order to create support environment for development of digital skills among Slovak workforce.

During the identification process of the practices, we considered design of the best possible strategy for Slovakia to deal with the growing lack of skilled labour force. We also considered key success factors in defining a smart approach in terms of labour and education policies. The extent of the information we were able to gather about the individual case studies from the selected countries was another crucial factor for our selection. We needed to have substantial amount of information about implemented digital transformation activities that led to successful cases.

After thorough research, we identified 5 unique programs which have demonstrated their success over recent years. Each case is a unique tool in their respective country and help their labour force to develop new crucial skills. The programs are:

- 1) **Sweden: Expertkompetens**
- 2) **Luxembourg: Digital Skills Bridge**
- 3) **Denmark: Manufacturing Academy of Denmark (MADE)**
- 4) **Belgium: Made Different: Factories of the Future**
- 5) **Netherlands: Make IT Work**



One of this report's goals is to help the CIO Office decision makers to easily understand selected cases and their applicability in Slovakia. In order to do so, we specifically looked at the following programs parts:

- General description
- Funding
- Application / selection criteria
- Results

Identified information will be used during designing policy recommendation in the chapter 3 of this report.

3.1 Sweden: Expertkompetens

General description

Expertkompetens (Expertise for Innovation) is an innovation programme in Sweden which aims to enhance the expertise for business development among key employees by developing and offering professional training programmes. The development of this programme requires close collaboration between academic environment and companies³². It is focused on increase of the expertise in intensive research environments in a way that matches the strategic needs of companies. The courses are drafted in a way to match the knowledge/ skills and development needs of businesses with the expertise found in strong academic environments.

Expertkompetens programme operated in 2 steps. First step involved the analysis, planning and the outset of the education activities. The second step referred to the development and the implementation of the training courses/ programmes.

Since the participants of these training programmes are professionals working at the companies, flexibility of these educational programmes was a necessary attribute. Therefore, involved universities focused on development of online courses. As a result, the employees could obtain the relevant knowledge/ expertise

³² Empirica, PwC; Interim Report - High Tech Skills for Europe, [link](#)

at the universities as the professional development courses were part of regular education programme while still working fulltime.

Funding

All projects that meet the requirements of Expertkompetens programme are accepted and receive funding ranging from EUR 2 – 5 million. The courses are financed either by the regular Swedish state higher education finance system or partly by companies participating in the programs. Higher education institutions are eligible to receive funds for their costs incurred during the development process of industry relevant training courses. The costs comprise of the costs related to business needs development analyses, development of digital pedagogic methods, and training of the academic staff in flexible training methods. The participating companies were obliged to fund own contributions in development of the programmes.

Application / selection criteria

Applicants (Higher Education Institutions) must have strong research environment and they must prove they are financially stable on long-term basis.

Results

8 universities, approximately 20 research institutes and trade organisations and over 150 companies (SMEs as well as large companies) participated in the development of the educational courses. Until 2016, over 1,000 students from 300 different companies have attended some of the courses. Moreover, the courses are becoming stable parts of companies' learning development programs. Employees who completed the courses have often advanced within their companies. Moreover, development of the work resulting from the courses' training activities also often lead to development of new products and processes. For example, the project PROMPT, an initiative developing advanced web-based learning programs³³, funded by this programme, won 'European Digital Skills Award' in 2016. Among other programs examples which received the support are:

- Master's education in software development
- Education for remote monitoring and diagnostics of electrical/ mechanical systems or products
- Education to foster innovation in social media and web technologies
- Expertise in production engineering
- Expertise in sustainable wood building technology

Expertkompetens programme strengthens the cooperation between the universities and the companies in order to increase Sweden's competitiveness. Both academic staff and business sector partners benefit greatly from the competence development programmes by becoming more competitive on the international level.

3.2 Luxembourg: Digital Skills Bridge

General description

Digital Skills Bridge is an upskilling programme launched by the Luxembourg Ministry of Labour, Employment and the Social and Solidarity Economy in collaboration with the Ministry of Economy. The goal of the project is to accompany companies and employees in the digital disruption of jobs by identifying jobs & skills of tomorrow and upskilling impacted employees into new jobs. Upskilling toolbox delivers tailored solutions for sector-specific digital skills challenges that differ per industry. The tailored properties

³³ European Commission; Four outstanding projects winners of the European Digital Skills Award 2016; [link](#)

of upskilling toolbox and the accompaniment ensure its effectiveness by responding appropriately to employees' different profiles.

Skills Bridge engages and activates participation of all key stakeholders during all stages of the project. Its stakeholders are mostly business leaders, government, social partners, training partners, or employees. Engagement and accountability of all stakeholders leads to quicker transition of employees to desired level of knowledge and skills for every selected job position.

Different factors such as organization's readiness for digital transformation, impact on jobs, their interest in upskilling initiatives were assessed during the toolbox development. It helped its designers to better understand key success factors of the project which led to tailored made solutions for specific needs³⁴.

Based on the findings, tips and recommendations on ensuring workforce engagement, through various incentives, coaching, CEO's input and personalised approach, were drawn. There are 6 steps which must be followed in order to achieve successful upskilling:

- 1. Analyse and define the upskilling initiative**

Organization needs to identify the whole upskilling ecosystem to engage in the upskilling effort and ensure the traditional project & change management plans are conducted properly. The following workstreams are designed: Workforce planning, Personal advisors, Training, IT – as well as the governance process for the whole project.

- 2. Design of corporate workforce skills plan**

The companies must be careful that human capital development plans are incorporated in their technology and digital investment plans.

- 3. Performing individual assessment and advice**

The assessment measures individual's career achievements, motivation, professional aspirations, suitability towards future job positions.

- 4. Match jobs and engagement workers**

Match jobs and engagement workers using job matching tools, which make recommendations regarding the best match and build a realistic upskilling plan including skills gap analysis towards a targeted group.

- 5. Selection of training providers**

Carefully selected training providers, which would provide to employees training of the highest quality effectively preparing them for the new job position.

- 6. Monitoring process, evaluation of the upskilling initiative and continuous improvement of the policy**

Funding

The programme is funded by the Ministry of Labour, Employment and the Social and Solidarity Economy and covers 80% of the costs for each training. The cost also covers up to 90% salary compensation during the training period of employees. The project was designed with the objective to reduce the administrative part of programme management to let companies focus more on their workforce planning and training activities.

Covering training costs by businesses is a financially-proven approach success fee based. The government supports training costs for IT and high-tech related positions, which have high remuneration potential due

³⁴ PwC; The Lost Workforce – Upskilling for the Future; [link](#)

to operating in demand-driven market. It also makes sense for the companies as it is normally much more interesting financially to upskill/reskill then to let go of people and recruit new (and difficult to find) talents.

Application / selection criteria

Any company with a digital investment plan can apply to the project participation.

Results

Properly implemented upskilling toolbox alongside correct assessment strategy and communication plan leads to upskilled workforce, successful job placement, sustainable growth and employability. The Digital Skills Bridge programme has already helped 10 companies (350 employees) from all represented sectors from big banks to small manufacturers and SMEs³⁵.

According to the programme's analysis, the return on investment (ROI) for each Euro invested in upskilling of employees is equivalent to at least 2 Euro. Therefore, upskilling costs should be considered by companies as investment rather than regular training costs³⁶.

3.3 Denmark: Manufacturing Academy of Denmark (MADE)

General description

MADE is a non-profit association launched with the aim to develop manufacturing industry in Denmark. It is independent national innovation and research platform for Danish companies, universities, research and technology organizations (RTOs), and various other associations. MADE has been also appointed operator of Danish Innovation Network for Advanced Manufacturing co-financed by the Ministry of Higher Education and Science. The main objective of MADE is the facilitation of the development of innovative manufacturing solutions to increase Danish competitiveness and employment. The strategic partnerships between RTOs and industry help to strengthen the manufacturing industry through the implementation of new manufacturing technology as part of applied industrial research projects, a range of innovative activities and educational initiatives³⁷.

One of MADE's key deliverables is the development of 'Industry 4.0' methodology and technology toolbox for Danish manufacturing companies, including both SMEs and large organizations. In addition to the development of digital manufacturing technology, MADE also takes care of the incorporation of this technology in the factories. Its bottom-up approach is very useful for building trust between industrial and research partners.

MADE operates on 2 national platforms where both academic and industrial partners collaborate:

1. MADE Digital

This platform focuses on research and innovation that would develop Danish approach to manufacturing industry. It delivers 3 main activities:

- The methodology for the implementation of digital manufacturing strategy in companies that is in line with the industrial needs.
- Demonstration of digital manufacturing solutions at international platform collaborations.
- Commercialization of its technical and software solutions by its industrial partners.

2. MADE SPIR (Strategic Platform for Innovation and Research)

³⁵ CEDEFOP; Luxembourg: digital skills bridge; [link](#)

³⁶ PwC; The Lost Workforce – Upskilling for the Future; [link](#)

³⁷ MADE official website; [link](#)

The platform works on developing and implementation of advanced manufacturing technologies to the Denmark companies.

MADE is also Digital Innovation Hub (DIH) coordinating activities of regional digital hubs in Denmark. It gives them access to MADE's network of relevant companies. MADE has a structured approach when it comes to innovation and knowledge sharing within the manufacturing industry of Denmark. By building professional networks, it ensures that partners have access to the newest technology and research projects are tested broadly across Danish manufacturing sector.

MADE Cluster Projects refer to group of SMEs which face a common challenge when it comes to upgrading a specific knowledge, use of new technologies, processes, or methods. The group is supervised by one of RTOs in MADE network. Participating companies regularly meet and share their experiences from the implementation of new solutions to tackle their common problem. It has cluster projects in areas such as 3D print, surface optimization technologies and flexible feeding solutions for robots³⁸.

Funding

MADE is funded by national specific innovation funding, partner resources and memberships. It provides equal financing through public and private funds. Its total budget is approximately EUR 24 million. Roughly 50% of the costs is funded by participating companies; 30% from the Innovation Fund (investor type- government office); 12% from the associations and the rest from participating universities.

SMEs can receive the financial support up to EUR 12,250 helping them to develop competences and to implement technological innovation. The maximum duration of these projects is 8 months.

Application / selection criteria

MADE is primarily available to SMEs and various stakeholders from research institutions. MADE Demonstration Projects are available to all SMEs in manufacturing sector in Denmark that need economic or knowledge support to deal with specific digital challenges such as the implementation of new technologies and processes.

Results

MADE helps Danish workforce to become more productive and innovative. As defined on their website, MADE currently has more than 140 members, including 100 SMEs. In the period of 2014-2016, MADE conducted 34 innovation activities with 2,213 participants on the total of 70 different projects, out of which 44 were industrial projects³⁹.

3.4 Belgium: Made Different– Factories of the Future

General description

Made Different is an action plan of the Flemish government, the technology federation Agoria and joint research centre Sirris to strengthen manufacturing industry in Belgium and make it a world leader in the manufacturing sphere by helping to create real factories of future, which would lead the industrial landscape of the 21st century⁴⁰. The regional government supports and coordinates implementation phase of the programme.

The initiative was launched in 2013 with the objective to increase the overall competitiveness of the manufacturing industry through digitization of production processes. Made Different follows a flexible

³⁸ European Commission; Digital Innovation Hubs; [link](#)

³⁹ European Commission; Denmark: Manufacturing Academy of Denmark (MADE); [link](#)

⁴⁰ MADE official website; [link](#)

bottom-up approach collecting feedback and data from participating companies before it implements transformation plan that meets the companies' specific needs. It is a guidance programme for carrying out good practices dedicated primarily to SMEs, since SMEs represent vast majority of all Belgian companies and they face greater challenges in digitising their production processes comparing to large companies. Made Different supports the digitization through 7 necessary transformations that companies need to undergo in order to remain successful in the future:

1. **World Class Manufacturing Technologies**
Implementation of state-of-the-art production devices and facilities embodying high quality standards
2. **End-to-End Engineering**
Optimisation of entire value chain by using integrated design approach to processes like sales and production
3. **Digital Factory**
Operational services are digitized and connected to the internet
4. **Human Centred Production**
Securing employee involvement in the future development of the company, adapting employees' skills to the emergence of new job positions
5. **Production Network**
Establishing flexible collaborative relationships to share the risk and capital across the network
6. **Eco Production**
Implementation of sustainable production system that considers all phases of product's life cycle
7. **Smart Production Systems**
Capability to respond quickly to changing market demands, development of products with higher added value, integration of cyber-physical systems

The program aims to transform manufacturing industry in Belgium by focusing on innovation, design competence, customer orientation, energy and material efficient production, and creative human potential. Sirris and Agoria provide their in-house experts to companies to help them with their transformation efforts. They also organize regular meetings with manufacturing industry organizations, associations, competitive clusters and research centres as well as Factory of the Future Awards and various awareness-raising events.

Funding

Since Made Different initiative is mostly industry-driven programme, no public funding has been dedicated to the scheme. Interested companies cover the cost regarding their participation and implementation of transformations themselves. However, several public regional grants are available to the companies, which can cover as much as 75% of the participation costs. These grants are not tailor made for Made Different initiative, but companies are eligible to receive public support, if they meet grants' criteria.

Application / selection criteria

Belgian manufacturing companies from all economic sectors, mainly SMEs, can participate in the programme. Applying companies are assessed via their tailored made business scanner. In case assessment is positive, they can apply to the program.

Results

Thanks to the awareness raising campaigns across the country, number of manufacturing companies showed a strong interest in the initiative and decided to join the programme. Approximately 265 Belgian companies are active participants of the initiative and have implemented at least 1 of 7 Factories of Future transformations. 65% of the participating companies are SMEs. 16 companies from diverse manufacturing

sectors like automotive, textile, food, received Factory of the Future Award. Thanks to the transformations they implemented, production costs significantly decreased and new jobs were created. In addition, winning the award helped the companies to build new business partnerships and to attract skilled labour⁴¹.

3.5 Netherlands: Make IT Work

General description

Make IT Work is a national digital initiative, which gives opportunity to people with higher education but no IT background to receive IT professional education and to start working in IT job. The program provides participants with an up-to-date professional training and enable them to start working in IT area. It was created as a part of the CA-ICT funding programme of the Dutch government. The program specifically supports universities in their activities to retrain labour for the needs of the ICT sector in the Netherlands.

The programme started in 2015. Originally, the programme was part of the region plan set by the Economic Board of Amsterdam that aims to take proactive steps to educate people for work in sectors that are filled with job opportunities but encounter difficulties when looking for skilled labour force such the ICT sector. The main driver of this initiative is the University of Applied Sciences in Amsterdam which started with Make IT Work programme in April 2017. Re-training courses has been constantly expanding and now it offers several courses helping their participants to become a Software Engineer, Cyber Security Specialist, or Business Analytics Specialist.

The retraining programme consists of an intensive training in a full-time course over the period of 4 months. After the course completion, during the following 6 months participants work at the positions they were re-trained for. The employer offers them an employment contract of 6 months for 32 or 40 hours per week with a pay level reflecting market-based compensation.

Funding

The total cost per 1 participant is approximately EUR 12,000. The funding provided by the government was only available from 2015 until September 2017 when half of the retraining costs were covered by the Ministry of Social Affairs and Employment. The other half of the retraining costs were financed by the employer. The metropole region of Amsterdam also invested in the Make IT Work programme. After the termination of 2-year funding period, the universities run the programme on their own costs without any public financial support. Participating companies still pay their 50% share.

Application / selection criteria

Make IT Work initiative targets primarily universities, students and commercial companies. There are several conditions which applicants must meet. Applicants must have a diploma from a higher professional institute or university. They must possess good analytical skills, good communication and advising skills, ability to work scrupulously and independently as well as in a team. They must be available for the programme for 40 hours a week and they need to have a proactive attitude toward learning and working. At least 10 people must apply and pass the selection process for the programme to be open.

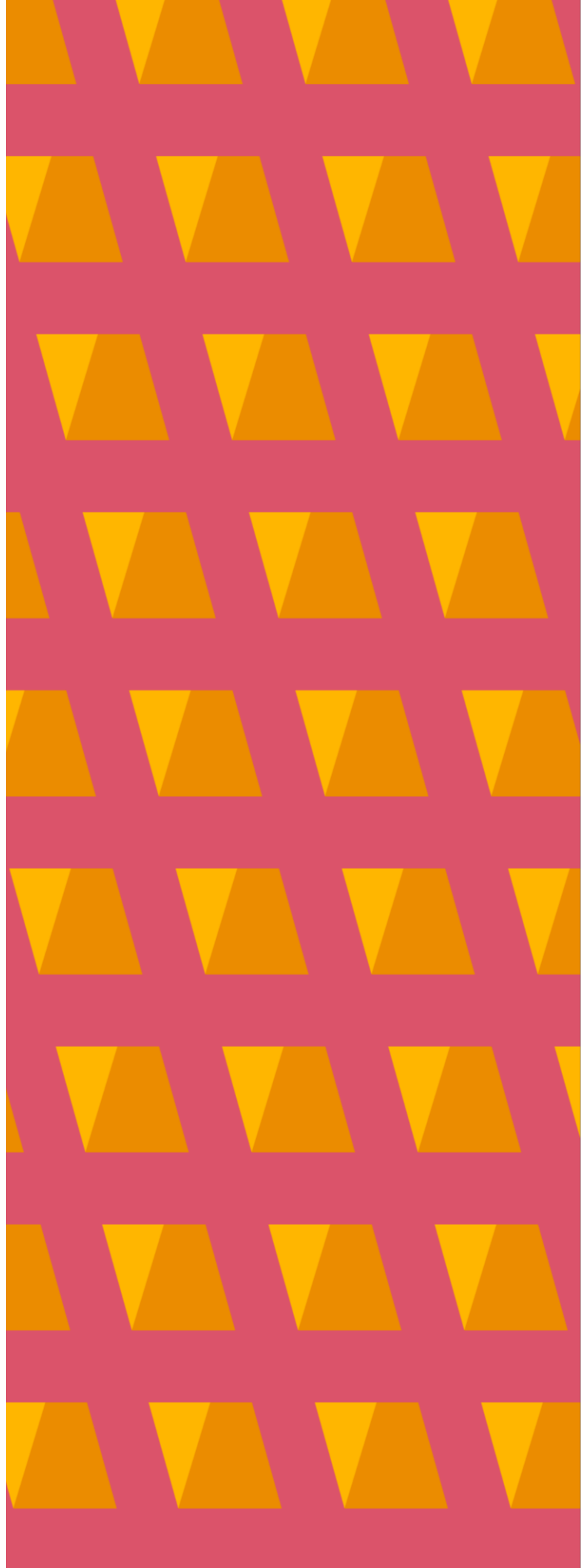
Results

More than 200 students followed the programme and are employed at IT positions in participating companies. 97% of participants of the programme still work at the same company where they started at the beginning of their IT professional re-training programme⁴².

⁴¹ European Commission; Belgium: Made Different; [link](#)

⁴² Empirica, PwC; Interim Report - High Tech Skills for Europe, [link](#)

***4. Chapter 4:
Short-term policy
recommendations
draft***



4.1 Purpose of our recommendation

The purpose of our recommendation is to support the Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization to implement an **action plan in the area of digital skills**. Following the “as-is” analysis in this report, Slovak context appears to be ready to onboard on a National upskilling initiative. Our recommendation offers a guide to pilot and implement **tailor-made national upskilling program** to support companies and their employees whose activity will be radically transformed by major technology changes.

Figure 1 – Visualization from the AS-IS analysis to the action plan in the long run



4.2 The objectives of the Slovak digital upskilling program

The main goal of the Slovak Republic Digital upskilling program is to support **all companies**, with a specific target on **SMEs** and their **employees** whose activity will be radically transformed by a major technological change towards a new function or a job. The program underlines the **importance of a proactive and preventive strategy** for the development of the companies and employees' skills in order to secure professional careers in a sustainable way.

As defined, digital transformation is characterized by the fusion of advanced technologies and the integration of physical and digital systems, the predominance of innovative business models and new processes, and the creation of intelligent products and services.

The Slovak Republic Digital upskilling program aims to **anticipate the impact of these technological developments on employment** by offering employees whose jobs are transformed or automatized, tailor-made training and individual personalized support to prepare them for upskilling towards new responsibilities. This preventive approach is interesting for the company, the employee, the economy and the government. The main objectives of the program are as follows:

- Lead the company to **anticipate changes in work organization and invest more in the development of their employees' skills** in order to reduce social and economic risk;
- **Increase employees' skills** to enable them to secure their career paths facing economic transformation;
- Design and implement **an operational toolbox and a solid regulatory and financial framework** between the various stakeholders to ensure the smooth running of the program;
- Stimulate the Slovak training providers to provide adapted trainings to the workforce transformation

4.3 The ecosystem of the program

4.3.1 Description of stakeholders' roles and responsibilities

Table 1: Description of the roles of the actors of the Slovak Republic Digital Upskilling program

Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization or the Authority	<ul style="list-style-type: none"> • Authority decides to launch a national digital skills strategy and selects an Operator to run the pilot project; • Authority co-designs and validates the project process, budget, ecosystem, timeline, toolbox and KPIs; • Authority governs pilot project, monitors the progression, communicates to the different stakeholders and assesses project results; • Potentially the Authority's role could also be attributed to the National Digital Coalition who could co-lead the upskilling program with the Office of the Deputy Prime Minister of the Slovak Republic for Investments and Information.
Slovak Republic Digital Upskilling Committee	<ul style="list-style-type: none"> • Slovak Republic Digital Upskilling Committee is acting like a Steering Committee. It is informed by the Authority and the Operator of the program's progression and takes decisions on the main lines; • Slovak Republic Digital Upskilling Committee could be composed of representatives from the Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization, the Ministry of Labor, Social Affairs and Family, the Central Office of Labor Social Affairs and Family, the Ministry of Economy, the National Digital Coalition etc.; • Slovak Republic Digital Upskilling Committee reviews the calls for tenders (which would be prepared by the Operator) for companies and validates companies' applications to participate to the upskilling initiative; • Slovak Republic Digital Upskilling Committee reviews the calls for tenders (which would be prepared by the Operator) for training providers to provide job-related, soft and digital skills training courses and validates providers' applications to collaborate on the upskilling initiative; • Slovak Republic Digital Upskilling Committee is regularly informed by the Operator of companies' progression in the program.
Trade Unions	<ul style="list-style-type: none"> • Trade Unions are informed and consulted by the Government on its willingness to launch a national upskilling initiative (meetings, events etc.).
Participating Company	<ul style="list-style-type: none"> • Company decides to participate to the Slovak Republic Digital Upskilling and communicates its intention to its employees; • Company's application is validated or not by the project governance on defined criteria (digital transformation plan, capacity to support an upskilling program internally...); • Company performs, with the support of the Operator, predictive workforce planning analysis in order to identify which departments/jobs will be impacted by emerging technologies in the next 12 to 18 months and what skills will be needed in the future.; • Company management team makes regular communication to its employees during the program.

Employees	<ul style="list-style-type: none"> • Employees are identified by their Company to participate to the upskilling program because their job are impacted by emerging technologies (automatized or transformed); • Employees decide whether they accept or not to participate to the upskilling program; • Employees are coached by personal advisors all along during their upskilling journey; • Employees build their skills development and training plans with the support of their personal advisor; • Employees attend tailored-made trainings for a period of 20 to 60 days (full-time or part time depending of the case).
Company key Account Manager	<ul style="list-style-type: none"> • Company Account Managers are trained by the Operator on the program's process; • Company Account Managers make the link between the Operator of the program and the Participating Company; • Company Account Managers support Company all along the program providing guidelines, information and documents.
Personal Advisors	<ul style="list-style-type: none"> • Personal Advisors are HR experts in career accompaniment external to the companies⁴³ and trained on the upskilling process; • Personal Advisors are trained and certified through a two-day workshop by the Operator on the processes of the program; • Personal Advisors are assigned to one or more employees to accompany them through their upskilling journey; • Personal Advisors assess Employees' current job-related, soft and digital skills; • Personal Advisors advice Employees on potential landing jobs and help building employees' skills development plan.
Training Providers	<ul style="list-style-type: none"> • Training providers are selected by the Slovak Republic Digital Upskilling Committee following a call for tender process or a voluntary based application; • Training providers tailor their trainings offer to employees' skills needs in order to be equipped with the right skills for the new job; • Training providers regularly complete the dashboard for the Operator to follow-up the progression of the program.
Operational & Technical Support or Operator	<ul style="list-style-type: none"> • Operator is selected by the Authority to support in designing and implementing a tailored-made national upskilling program. The Authority discusses and validates the Operator's services and deliverables (e.g. design of the process, preparation of the communication and change strategy, preparation of calls for tenders, pre-selection of participating companies, company support, training of personal advisors, selection of participating training providers, monitoring of the program's progression etc.); • Operator reports and requests validation from the Authority and the Slovak Republic Digital Upskilling Committee on the main lines; • Operator's budget to perform the agreed services and deliverables is decided and allocated by the Authority with the approval of the Slovak Republic Digital Upskilling Committee;

⁴³ The purpose to have an external person to the company is to remain neutral and have the trust of the employee.

- Operator prepares and coordinates the calls for tenders for companies and training providers. Calls for tenders are then validated by the Slovak Republic Digital Upskilling Committee.
- Operator analyses the impact of emerging technologies on Company's workforce, Company's future skills needs and supports Company building its future skills strategy;
- Operator identifies the most suitable tools for the upskilling project and manages the project's toolbox and platform.

4.3.2 Recommendations on engaging some stakeholders

The following sections are **recommendations** concerning **five main stakeholders** mentioned above that we believe the Authority who wants to implement a national multi-company upskilling program would need to **communicate and engage**. The Authority would be supported by the Operator to perform the activities mentioned below. The Operator would support the Authority and the Upskilling Committee throughout the upskilling program's implementation.

Government

The important steps and actions to consider when engaging Government in an upskilling journey are as follow:

- Align with the relevant **ministries** (e.g. The Ministry of Labor, Social Affairs and Family, the Ministry of Education, Science, Research and Sport, the Ministry of Economy, etc.) and set-up a **clear governance system** between them;
- Centralize the **budget** and ensure its allocation for the national upskilling program.

Companies

The important steps and actions to consider when engaging Companies in an upskilling journey are as follow:

- Identify the **main sectors** which would be highly impacted by the emergence of technologies on their workforce;
- Organize **events and workshops** to present the Slovak Republic Digital Upskilling pilot project (process, timeline, financing scheme, tools) to eligible companies (multi-national, SMEs etc.) from the different Slovak regions;
- Organize **co-design workshops** (such as design-thinking sessions) to refine the program's process and design. This will also empower potential participants and participate to their recruitment to the program;
- Present the **business case** to Company of an upskilling initiative compared to a traditional method to handle skills transformation;
- Organize **user experience workshops** on upskilling inviting employees (HR representatives, Business representatives...) from different companies to participate to a one-day immersion session.

Professional Associations and Chambers

The important steps and actions to consider when engaging Professional Associations and Chambers in an upskilling journey are as follow:

- Consult **Professional Associations** which have already initiated activities aiming to promote upskilling such as ITAS (IT Association of Slovakia), Slovak Digital Coalition and SAPIE (The Slovak Alliance for Innovation Economy) to understand their expectations for the project and engage them as key sponsors;
- Present Slovak companies AS/IS skills situation and their needs to upskill their workforce in order to remain competitive;
- Present a **business case** to Professional Associations and Chambers between a traditional method to handle skills transformation vs an upskilling initiative targeting several industries;
- Organize **user experience workshops** on upskilling inviting different professional associations and chambers and present how they may intervene from the identification of potential participating companies to the delivery of trainings etc.

Trade Unions

The important steps and actions to consider when engaging Trade Unions in an upskilling journey are as follow:

- Target **major trade unions in Slovak Republic** (e.g. Modern Odbory Union) and organize communication events (e.g. conference, workshop etc.);
- Present the **Slovak Republic Digital upskilling plan** to trade unions explaining the objectives of the project, the scope, the benefits for the employees and the key stages of the program. It is important to highlight the governmental support (financial, legal, etc.) and the fact that the initiative is by no means an alternative to a social plan;
- Involve major trade unions in the governance of the Slovak Republic Digital upskilling program through the Slovak Republic Digital Upskilling Committee;
- Prepare a **communication plan** to give regular updates to trade unions and gather trade unions' inputs through conferences.

Training Providers

The important steps and actions to consider when engaging Training Providers in an upskilling program are as follow:

- Involve the **major actors in the Education and Training field** as facilitator between the government and businesses, for example the State Vocational Education Institute (ŠIOV), to:
 - Define whether training providers should be **local** (such as Aj ty v IT, MiniTech MBA for Women, Nexteria Leadership Academy, etc.), **national** (such as Koompas+ or IT Academia) or **international** entities and if trainings can be provided online through e-learning platforms (see Appendix 2 for a list of international e-learning platforms and training providers). A mix approach is also an option with a global e-learning platform which would complement local training bodies (translation, adaptation to the industry, interaction design...);

- Define the training providers' **accreditation criteria** (in collaboration with the Slovak Accreditation Council - [link](#))
- Support the **identification and selection of training providers** (for e.g. through a Request for Proposal (RFP)⁴⁴, and coming as a learning from our previous experience with the Skills Bridge pilot project ran in Luxembourg, we would suggest asking companies on their needs in terms of competencies and trainings so that we can improve the quality and demand in the RPF for new training offers).
- Present training providers the **AS-IS skills situation** and highlight the current and future skills needs in order to identify the most relevant trainings. Gather training providers input in terms of Skills of tomorrow trainings.
- Involve training providers in designing a competency framework for the elaboration of employees' skills assessment questionnaire:
 - for basic digital skills assessment, as an example, the competency framework could be based on the Digital Competency Framework for citizens (DigComp: <https://ec.europa.eu/jrc/en/digcomp>);
 - for the ICT professions, as an example, the competency framework could be based on the European e-Competences Framework (e-CF: <https://www.ecompetences.eu/>).

4.4 The financial framework of the program⁴⁵

There are different ways to finance the program and combine some of the financing schemes, e.g.:

- **State and Development Bank loans:** 50% would be funded by the government and 50% through international development bank loans (e.g. European Investment Bank loans for a national program in the long run⁴⁶). Through this approach, companies can obtain financing for both upskilling their workers and new machine purchases together.
- **Upskilling Impact Bond:** issue social bonds for upskilling certain segments or categories of workers. The mechanism of the Upskilling Impact Bond is functioning as a Social Impact Bond meaning that companies could buy the bonds financed by the Government and get return on investment depending on achievements of desired upskilling outcomes. The remuneration of the fund is directly linked to the success of the upskilling program. In an upskilling case, it wouldn't be called a Social Impact Bond (SIB) but an Upskilling Impact Bond (UIB).
- **Skills insurance:** establish a regulatory framework that would make an individual skills insurance plan. Financed jointly by the employee and the employer, it allows specific tax benefits and provides a significant pool of funding to enable massive upskilling when needed during the individual's career. This approach would encourage the employee and the employer to share responsibility for employability and to keep the skills portfolio current.

In general, we also recommend involving impact investors as observers to familiarize them with the approach and to accelerate the investment flow.

⁴⁴ See Appendix 3 for the Luxembourg Digital Skills Bridge RFP's example.

⁴⁵ General guidance for action plan. For specific study of the financing scheme for Slovak Republic, refer to step 0 of the program's implementation phase.

⁴⁶ European Investment Bank; Loans for the public sector; [link](#)

Hereunder are **3 main sources of financing** we would recommend:

1. National funding

The costs can be borne by the companies and, **depending on the regulatory framework** on adult and lifelong learning legislation, the government will (partially) reimburse the companies' costs. The financing will vary depending on regulatory frameworks applied (which we will discuss below), distribution and type of activities included in the program. Another national financing source could be found in the different Ministries in Slovak Republic depending of the nature of industries part of the upskilling program.

2. Private funding

We recommend to also seek for **private investments in the program**. As an example, the upskilling program could approach the Alliance A5 which gathers the most important industry unions of the Slovak Republic and includes the following industries: Automotive, Engineering Industry, Metallurgy, Mining and Geology, Building contractors and Electromechanics. When approaching such actors for private funding, one must keep in mind that they will most likely request automatic participation to the program and to gain benefits from it. Though, including those actors is essential as the most important industries will **incentivize the smaller ones** (e.g. SMEs) to follow the upskilling pathway.

3. European and international funding

We have identified specific financing schemes opportunities related to upskilling:

The European Budget for 2021-2027 will be progressively defined during the year 2020. Below, some European initiatives and their funds for 2021-2027 the Slovak Republic Digital upskilling program could leverage on:

- **European Social Fund+:** support digital skills development on basic, medium and advanced levels. Budget: €100 billion
- **European Regional Development Fund:** correcting imbalances between regions, supporting “training, life long learning and education activities”. Budget: > €190 billion
- **Digital Europe Program:** promoting advanced digital skills - computing, big data analytics, cybersecurity, artificial intelligence and others. Budget: €700 million
- **ERASMUS Program:** equipping Europeans with the skills needed in a society that is increasingly mobile, multicultural and digital. Budget: €30 billion

In October 2019, Slovakia signed a program agreement with the **EEA and Norway Grants** for the Business Development, Innovation and SMEs program in Slovakia where the funding amounts up to €20 million⁴⁷. Among other contributions, the program will contribute to support education and employment potential in Slovakia in green industry innovation and welfare and ambient assisted living technologies. The funding in this program will be made available through open calls. The Slovak Republic Digital upskilling pilot project could apply for funding through this program. Whenever funding becomes available, the EEA and Norway Grants announce it through official calls⁴⁸ (spontaneous applications are not accepted) and each call includes information on what kind of activities are funded, who can apply, the application deadline and all application instructions⁴⁹. There is also a possibility to be informed on new funding opportunities by subscribing to their newsletter.

⁴⁷ The EEA and Norway Grants; Program agreement signed for the Business Development, Innovation and SMEs program in Slovakia; [link](#)

⁴⁸ The EEA and Norway Grants; Currently available funding; [link](#)

⁴⁹ The EEA and Norway Grants; Apply for funding; [link](#)

Digital Europe⁵⁰ is a multi-fund program that supports upskilling and reskilling programs in Europe related to the digital disruption current situation. It consists of several grant opportunities: the European Social Fund+, the European Regional Development Fund, the Digital Europe Program and the Erasmus Program that will represent the most significant funding opportunities in **2021-2027** to bridge the digital skills gap. The calls should be made available in the year **2020** (more information on the Digital Europe program is available in Appendix 5).

In general, the Slovak Republic Digital upskilling pilot project program could also leverage on international funds such as IMF, UNDP or World bank skills financing schemes.

4.4.1 A potential financial framework for the Slovak digital upskilling program

To finance the Slovak Republic Digital upskilling program, we recommend leveraging on the three main sources of financing presented in section 2.2 (National funding, Private funding and European and international funding). We could imagine the following financing flow to fund the different activities and costs of the upskilling initiatives⁵¹:

Table 2: Example of a financial framework for the Slovak Republic Digital upskilling program

	Phase: Co-Design of the program	Phase: Implementation of the program
Cost included in the phase:	<p>1. All services and deliverables performed by the Operator</p> <p><i>(e.g. design of the process, preparation of the communication and change strategy, preparation of calls for tenders, pre-selection of participating companies, company support, training of personal advisors, selection of participating training providers, monitoring of the program's progression, reports to the authority and the upskilling Committee etc.)</i></p> <p>2. The Slovak Republic Digital Upskilling website, platform and tools licenses⁵²</p> <p>3. Evaluation of the upskilling pilot project</p>	<p>4. Employee's individual accompaniment</p> <p>5. Training curriculum</p> <p>6. Employee's salary during training period</p>
Financed by:	Slovakia national budget	European Union funding schemes and participating companies' investment budget

⁵⁰ Digital Europe; EU fund for digital transformation; [link](#)

⁵¹ This financial framework is a recommendation of what the Slovak government could decide and implement for the Slovak Republic Digital upskilling program. The decision of the repartition of the program's cost and who should pay what needs to be taken by the Authority and the Slovak Republic Digital upskilling Committee.

⁵² Some tools license cost could be at the charge of the participating companies (e.g. Skills assessment questionnaires). The decision on the tools cost repartition needs to be taken by the Slovak government.

4.5 The legal framework of the program

Regarding the regulatory framework, there are different workers' protection law mechanisms that the upskilling program could leverage on.

As an example, when referring to **article § 154** from the Labor code, which relates to the employer's obligation "to retrain an employee who is to be transferred to a new workplace or to a new type of work or manner of working, if such is necessary, particularly with regard to changes in work organization or to other rationalizing measures". The costs of re-qualification are to be borne by the employer. In an article published on the federation of employers' associations of the Slovak's website⁵³, companies are calling for changes in the Labor Code "to make the labor market more flexible". We would recommend adapting this law with a reimbursement or financial support which would incite companies to participate in the upskilling initiative.

4.6 The communication strategy of the program

To implement a successful upskilling program at a national level involving a diversity of stakeholders⁵⁴, an excellent communication strategy is key. The communication plan should target and be customized to every stakeholder involved in the upskilling program. With a clear communication plan, it will be also easier to engage and motivate participation to the upskilling initiative. Several ways of communication exist. Here are some communication actions we would recommend:

- **A unique visual identity:** Create a visual identity for the Slovak Republic Digital upskilling program (logo, catchphrase, color coding etc.).
- **An informative website and newsletter:** Elaborate a website dedicated to the Slovak Republic Digital upskilling program with all information and documents regarding the upskilling initiative. Frequently feed the website with news and updates of the program's progress. Present the program's governance and process. Share documents on the website such as: general presentation of the program (from a company, employee and training provider point of view), company application template, training provider application template etc. Update the website with participants' stories (from a company, an employee and a training provider point of view).
- **A multilingual program:** Adapt the communication and the tools to the common languages used in Slovakia (Slovak, English etc.).
- **A strong foothold in the press and social media:** Organize a press conference to launch the Slovak Republic Digital upskilling program. Frequently communicate on social media about the program's progress on a regional, national and international level.
- **A roadshow to present the upskilling initiatives in all regions:** Organize a roadshow in all regions of Slovakia to present the Slovak Republic Digital upskilling program to different type of stakeholders.
- **A contact mailbox:** Create a mailbox where people can send their questions which will be replied by a dedicated operational team without undue delay.

⁵³ Federation of employers' associations of the Slovak Republic; Employers: Slovakia's legislation chaos is the worst since 1993; [link](#)

⁵⁴ Stakeholders are described in section 2.1.1 of this report

- **A targeted communication material:** an employee leaflet could be designed and shared to explain the detailed upskilling process and the expected accompaniment
- **Official ceremonies:** certification of coaches, program certificate for participating employees once the training is completed...
- **Communication at the company level:** each company should have its own communication plan with a kick-off meeting, townhalls, HR and employees coaching, sharing feedback on the program etc.

4.7 Description of the program's methodology

In 2018, Nicolas Schmit initiated the first national end-to-end upskilling program. This program was operated by PwC and helped 20 companies through application, selection and end-to-end upskilling of a defined number of their workforce. This pilot covered a wide range of industries and size of companies to gather transversal learnings.

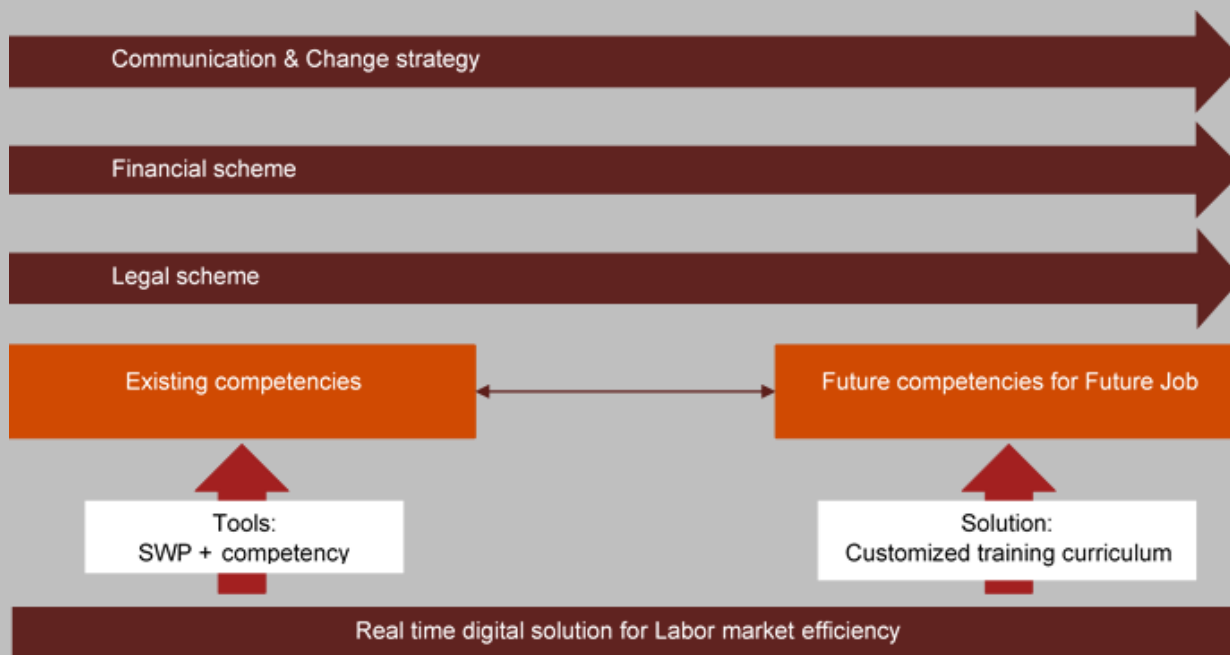
Through this program, an upskilling methodology was co-designed that we are proposing to follow for the Slovak upskilling program. The implementation of a successful upskilling program requires a **holistic methodology** and a new-generation toolbox to quickly transition people (in a few months) to a relevant knowledge and skills portfolio that leads to a concrete profession. Upskilling is about an individual acquiring specific competences for him to properly perform the activities or tasks on his job. The methodology we recommend implementing for an upskilling initiative is based on the following activities and milestones to achieve:

- Perform a **Strategic Workforce Planning** for the next **12 to 18 months** to identify the jobs that will be affected most by new technologies, the employees who are the most at risk and the skills needed for the future;
- Work closely with **Companies key account managers** to ensure the follow-up and correct implementation of the upskilling program;
- Analyze the **skills gap** between employees' current competencies and the competencies required for the job;
- Work closely with **external personal advisors** to motive and understand the individual and their aspiration to ensure longer-term, sustained job outcomes
- Identify **a job to be trained on** the competencies needed before starting the training journey;
- Design **training curriculums** purposely fit for the job including job-related, soft and digital skills;
- Train employees on a customized training curriculum for at least **twenty days**;
- Assess employees' skills readiness for the new job after entering the new job.

To ensure the success of the implementation of the upskilling's program, the upskilling methodology is supported by a **toolbox** composed of a **communication and change strategy (including a standard communication toolkit with templates in order to support companies in defining their communication strategy)**, a financial framework and a legal framework.

With the use of this communication strategy, we will be able to keep high level of transparency and trust among citizens which typically do not trust public support programs in Slovakia.

Figure 2: The Upskilling toolbox key components



4.8 Implementation of the program

4.8.1 Description of the program's key stages

In order to support companies and accelerate job transformation in Slovak Republic, we recommend a solution based on a **six-steps upskilling process** that combines consulting services and AI tools on a platform (Appendix 6) in order to be human-centered, scaled up and avoid biases when measuring results. All tools have been assessed against scalability and absence of biases. The toolbox will be used to support participating companies all along the six steps of the Slovak Republic Digital upskilling process.

Step 0: Analyze and design Slovak Republic Digital upskilling program

- Design the program and define Slovak Republic Digital upskilling pilot project's process, scope, resources, stakeholders, communication plan and governance using a design thinking methodology;
- The Government communicates to the trade unions its intention to implement a national upskilling initiative;
- Organize a roadshow, events (such as press conferences) and workshops to different stakeholders (professional associations, chambers, companies, training providers etc.) to present the Slovak Republic Digital upskilling program;
- Identify the legal and financial mechanism to operate the program.

Step 1: Select participating companies to the Slovak Republic Digital upskilling program

- Communicate about the launch and ask companies to speech to apply to the Slovak Republic Digital upskilling pilot project;
- Government selects companies to participate in the upskilling pilot project;
- Onboarding (communication kit, change etc.) and allocation of an account manager per company with a meeting of participating companies to the program.

Step 2: Perform companies' strategic workforce planning analysis and design companies' skills strategy

- Companies collect and provide data for the strategic workforce analysis;
- Assessment by industry, the impact of emerging technologies on the workforce using participating companies' data;
- Workshop with companies to present the strategic workforce planning analysis to companies and support them in the definition of their skills strategy;
- Companies identify with the analysis the impacted jobs, the concerned employees to be part of the digital upskilling program.

Step 3: Engage concerned employees and perform individual skills assessment

- Employees are informed by their employer that they have been identified to participate to the upskilling program and are onboarded;
- Employees receive and complete job-related, soft and digital skills assessment online questionnaires;
- Employees review their skills assessment with their allocated Personal Advisor and define their comprehensive skills profile.

Step 4: Match employees' skills profile to vacant positions

- Identification of employees' landing position with the support of an AI-based skills/job matching tool;
- Formalization of the target job (safeguard) for each employee;
- Definition of employees' skills development plan.

Step 5: Design employees' training plan

- Definition of employees' training plan based on three axes: job-related, soft and digital with training providers;
- Employees attend their training curriculums from 20 to 60 days in order to be ready for the new job and enter their new function.

Step 6: Assess employees' skills readiness for the new job

- Employees' skills assessment three months after entering the new position.

4.9 Suggestion for the program's pilot in 2020-2021

4.9.1 Description of the pilot project in 2020-2021

In order to assess the feasibility and success of implementing a national digital upskilling program in Slovak Republic, we recommend the Slovak Government to implement a **pilot project of the digital upskilling program for 2020 and 2021**. We recommend the Slovak Government to initiate a pilot with all **eight regions of Slovak Republic targeting only one or two industries** or with **two main regions** (Bratislava and Košice) opened to all industries. We recommend to onboard around 30 to 40 companies with a target of employees to be upskilled of 1000. We also highlight the following: the smaller the company, the bigger the support will need to be to balance the absence of availability of capacities for SMEs management.

The aim of the pilot is to identify a sample of **industries and regional actors who are volunteers to be pioneers** and to test the reception in the Slovak market by different industries, regions and company sizes.

This pilot project meets three main objectives:

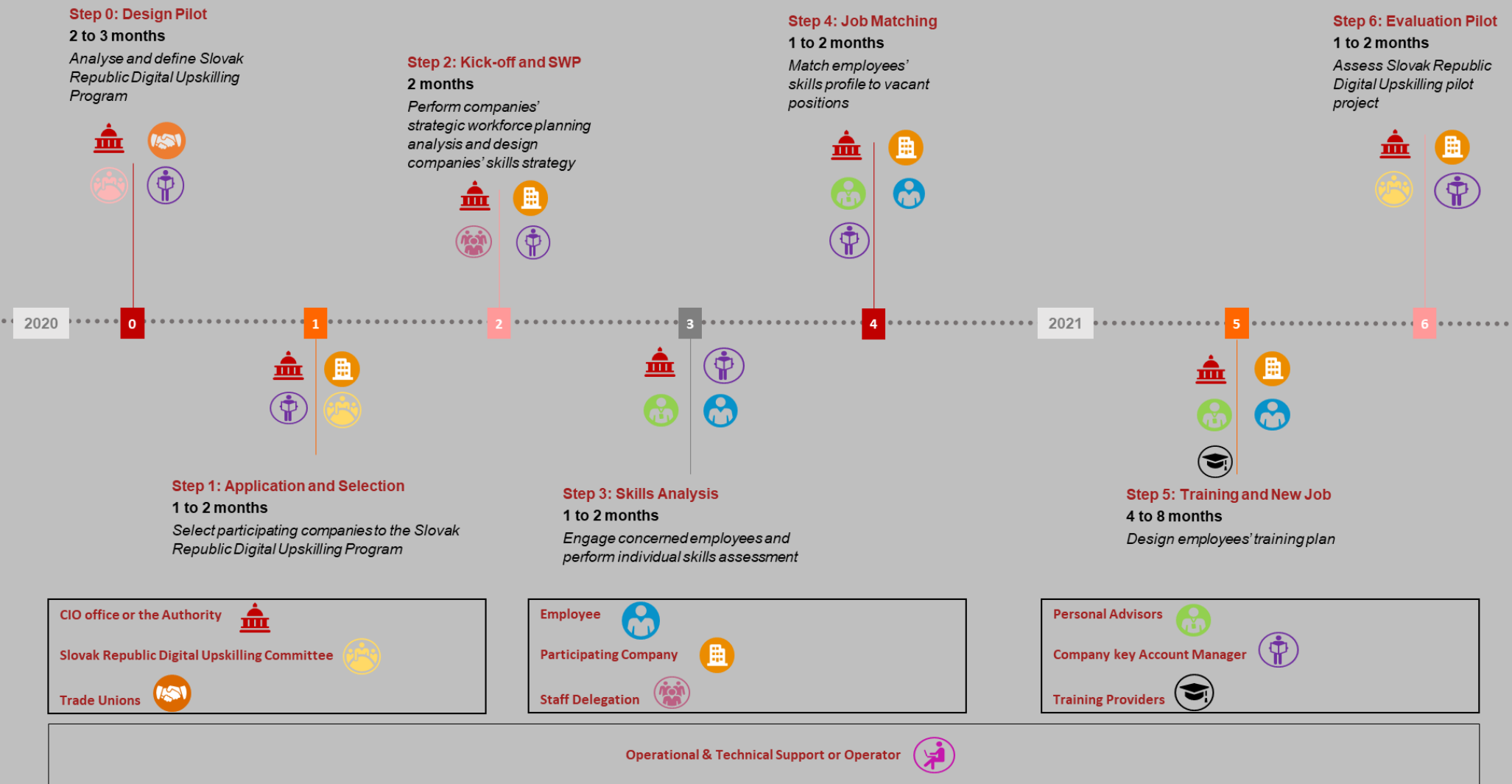
- Measure companies' interest from all industries in participating to this upskilling program;
- Assess concerned employees' degree of motivation and involvement into the program;
- Test the program's features (approach, methodology, process) and toolbox.

An **evaluation** driven by the Slovak Government of the Slovak Republic Digital upskilling program could be performed at the end of the pilot project to assess the success and improve the pilot version before rolling out the program on a larger scale. The specific criteria for the evaluation of the Slovak Republic Digital upskilling program would be co-designed with the Authority in charge of the program during the design phase.

4.9.2 The Slovak Republic Digital upskilling pilot project on the time axis

Given that an upskilling program lies both on the nature of the digital impact of the company and on the number of employees concerned, it is difficult to set a precise timeline. A company which participates in the program and of which only 10 employees are affected, will be able to proceed more quickly to the various stages of the program than a company of which 500 employees are concerned. Hence, we suggest a **12 to 18 months** roll-out. The diagram below shows the provisional timetable for the period for the pilot project. This calendar will have to be adapted for the regular renewal of the program.

Figure 3: The Slovak Republic Digital Upskilling pilot project on the time axis



5. Chapter 5: Scenarios and implementation plans draft

5.1 Recommendation 1: The Slovak digital upskilling program

5.1.1 An iterative program

The objective of the Slovak Republic Digital upskilling program is to act as **a preventive solution for companies to build new skills strategy** and plan for their workforce to be ready on the new activities and skills with the emergence of new technologies.

In order to have the most accurate results, we recommend companies to perform a strategic workforce planning on a predicated timeline of eighteen months maximum. Indeed, **given the increasingly rapid pace of technological change, it is not recommended to perform a predictive analysis beyond two years**. Consequently, companies could participate to the upskilling program on an **iterative basis** to analyze the impact of newly implemented technologies on companies' workforce.

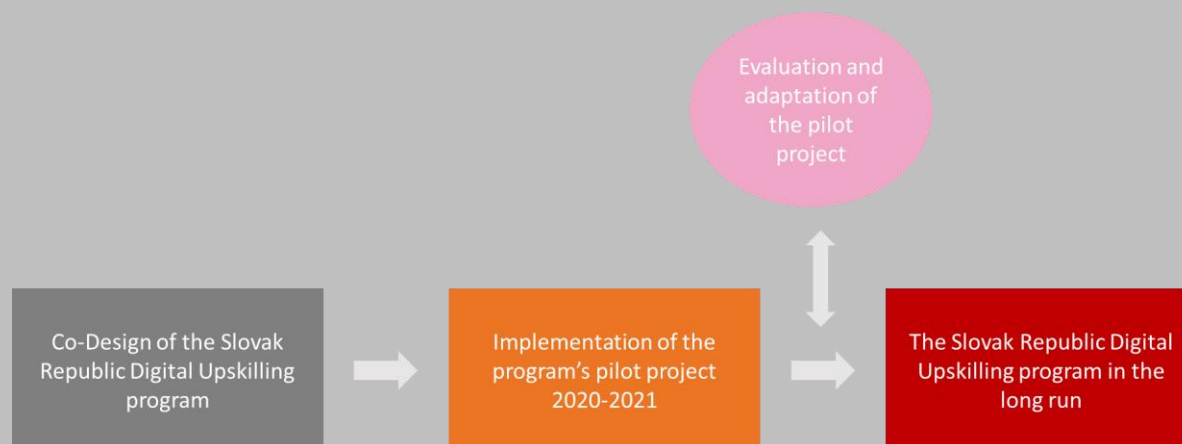
Furthermore, we advise companies to group identified employees to participate to the upskilling program into **several waves**. Indeed, participating employees will attend several meetings with his personal advisor and a training curriculum. Companies will have to organize their workforce in order to keep the business running during the upskilling program (back-up for participants of the upskilling program (5-10% of workforce) during the time of coaching/training).

In the long run, **a new organization dedicated to the implementation of the Slovak Republic Digital upskilling program needs to be appointed and created**. The responsibility can be assigned to a governmental institution such as the Central Office of Labor, Social Affairs and Family in Slovakia, the National Coalition for Digital Skills and Occupations, etc. We strongly recommend establishing this governance along with clear and efficient management mechanisms relying on technology-based tools in order to scale the project from the pilot project to a pluri-annual rolling upskilling program.

Based on the learnings gathered by PwC on the Luxembourg Digital Skills Bridge, we suggest the following recommendations to build an iterative program in the long run:

- **Aligning the national skills strategy and initiatives with the companies' needs;**
- **Mutualizing the tools and methodology** developed during the pilot project to expand its use to multiple audiences (e.g. universities, unemployment agencies, etc.). This could widen the scope of the program to a larger public and substantially decrease the cost per beneficiary;
- **Adapting and complementing the current legal framework** with the limits potentially identified through the pilot project in order to support the program and strengthen incentives for companies to participate (adapting the labor code, adapt and develop further life-long learning financing schemes, etc.);

Figure 4: An iterative program



5.1.2 Indicative budget plan⁵⁵

To define the budget plan, we recommend looking at the upskilling cost in comparison with the cost of not upskilling (e.g. laying off employees because their skills have become obsolete following technological investments in the company and recruiting employees with the required new skills).

When **defining the upskilling cost**, we recommend considering the following:

- **Corporate management costs** which include: the corporate workforce planning and, the individual assessment and report as well as individual coaching of employees;
- **Trainings costs**;
- **Salary costs** during the trainings.

Hereunder is an example of the upskilling cost per employee:

- Corporate management costs (including corporate workforce planning and individual accompaniment) = €2,890
 - Corporate workforce planning⁵⁶ = €250⁵⁷
 - Individual accompaniment (including the individual assessment and report) = €2,640⁵⁸
- Training costs (for 320 hours) = €2,368⁵⁹
- Salary cost during trainings = €2,136⁶⁰
- Total upskilling cost = €7,624.40

When **defining the layoff total cost**, we recommend considering the followings:

⁵⁵ Disclaimer: the budget plan we recommend is indicative. The assumptions we make are based on tools and consulting services that we preconize. The methodology and the toolbox that we recommend can be tailored and the budget adapted accordingly.

⁵⁶ The cost includes two tools' licenses (Strategic Insight and Predictive Workforce Solution) and the consulting costs.

⁵⁷ Assumption of the cost based on a Company of 500 employees. The cost for corporate workforce planning varies depending on variables like company size.

⁵⁸ Based on the average cost of a personal advisor of €165 per hour.

⁵⁹ Based on the average training cost of €8.12 per hour from the "HR Controlling 2019" study conducted by PwC Saratoga.

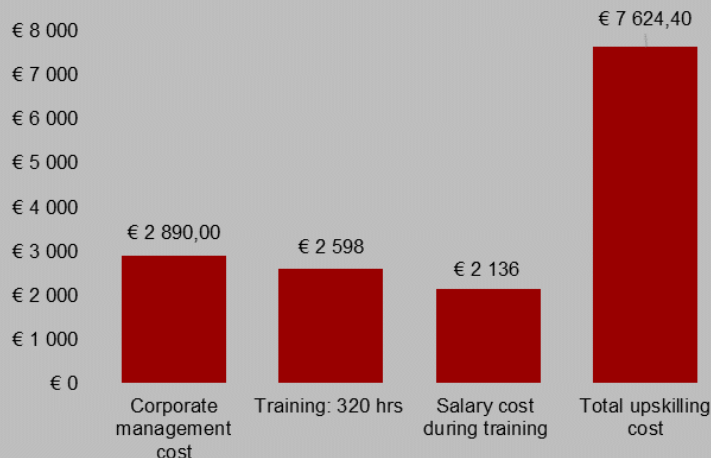
⁶⁰ Based on the average monthly wages of €1,068 reported by the Statistical Office of the Slovak Republic (Q3 – 2019) - [link](#)

- **Indemnity costs;**
- **Additional layoff costs** (legal, outplacement, recruitment, training, etc.);
- **Recruitment costs.**

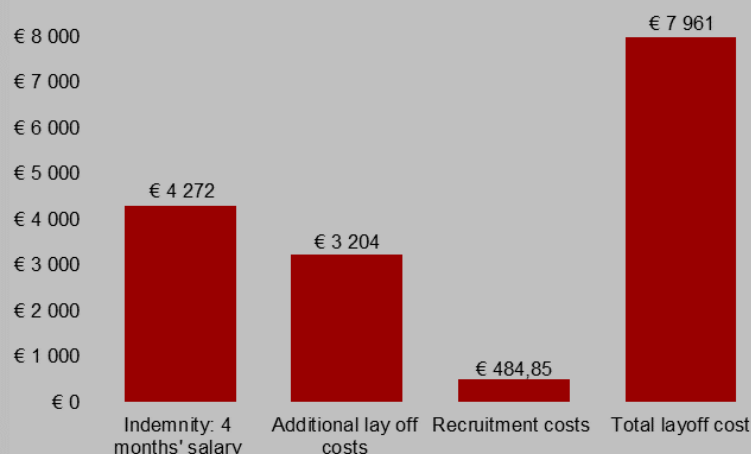
Hereunder is an example of the layoff cost per employee:

- Indemnity costs⁶¹ = €4,272⁶²
- Additional layoff costs = €3,204⁶³
- Recruitment costs = €484.85⁶⁴
- Total layoff cost = €7,961

Graph 19: Total upskilling cost



Graph 20: Total layoff cost



Once this cost is defined, the Authority could agree on what budget is covered by whom (Authority, Participating Companies, Employees and/or international, European, private funding).

Hereunder is an example of how the budget plan could be distributed based on the six steps we recommend in the description of the program's key stages (point 2.6.1. on this report):

- Step 0 and Step 1 funds could be covered by the National Coalition for Skills and Occupations, the Authority;
- Step 2 funds could be covered by the participating companies;
- Step 3, Step 4 and Step 5 funds could be covered by the participating companies and the selected employees individual funding budget;
- Step 6 funds could be covered by the companies.

⁶¹ Based on the maximum severance allowance as stated in article §76 of the Slovak Republic Labor Code - [link](#)

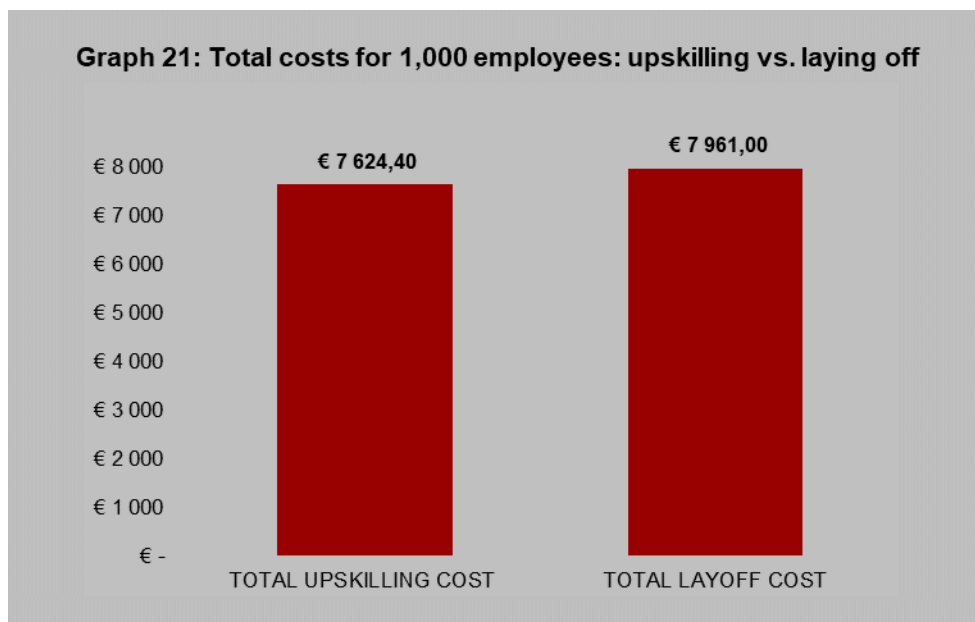
⁶² Based on the average monthly wages of €1,068 reported by the Statistical Office of the Slovak Republic (Q3 – 2019) - [link](#)

⁶³ Based on an estimation of a cost equivalent to a three-month salary based on the average monthly wages reported by the Statistical Office of the Slovak republic (€1,068).

⁶⁴ Based on the "HR Controlling 2019" study conducted by PwC Saratoga. Need to consider the loss of the company's vacant position for x number of months and non-financial costs (e.g. social impact, employer brand etc.).

→ International, European and/or private financing can cover the costs along with another stakeholder (the Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization, Participating Company and/or Employee) in all steps of the process⁶⁵.

→ To conclude, approximately €300,000 can be saved when upskilling 1,000 employees compared to their layoffs. If we use our previous example, an upskilling program involving 1000 employees to be upskilled in the Slovak Republic would cost €7, 624,400⁶⁶ whereas if those 1000 employees were to be laid off and replaced with employees possessing the required new skills, the total cost would amount up to €7,961,000.



Adopting an upskilling strategy is not only financially more attractive, it also helps tackle one of the biggest challenges the workforce is facing today.

5.2 Recommendation 2: Upskilling the workforce of the future: skills for students' employability

As a common belief, academic degrees are considered as the path that leads to employment. However, and with the emergence of new technologies, universities and colleges seem to have difficulties **to offer programs that match the skills needs of the business environment**. Indeed, the educational systems, from primary school to university have remained fixed in a very traditional model, making limited modifications to programs and which lead to shocking statistics. In 2015, for the 70 high and middle-income countries participating in the PISA test, almost 50% of students did not possess basic reading and mathematics skills⁶⁷. With a high number of people without basic reading and mathematics skills, increasing of NEETs (Not in Education, Employment, or Training) and the growing mismatch between the workforce supply and skills demand, the educational system needs to be transformed.

Some educational policy leaders have already started to make changes, enabling students to take full advantages of the technological revolution. A few examples, a university in the UK has designed and implemented a software accessible through the university's website that allows students to match their skills to the career options. It also provides the study scheme to increase the employment chance after the education based on the individual's matching results. One of the largest institutions of higher learning in the United Arab Emirates (UAE) has initiated the implementation of a skills and training matching

⁶⁵ The section "2.2. The financial framework of the program" provides more detailed information on the financial schemes the program can leverage on.

⁶⁶ €7,587.4 (the upskilling cost per employee) multiplied by 1,000 employees.

⁶⁷ Andreas Schleicher; World Class, How to build a 21st Century School System, May 29, 2018; [link](#)

technology solution to identify the gap between the skills required on the market and those demonstrated by the students and graduates.

5.2.1 Slovak context

Supply of the Slovak employees with required skills is already limited. According to our findings, 74% of companies in Slovakia struggled to hire such employee (defined in the AS-IS chapter of this report). Therefore, as part of skills development activities, it is also crucial to start boosting skills of the country's future workforce directly in schools from primary ones to universities. Yet, these activities must be focused on the skills with the highest demand among Slovak businesses. Therefore, we recommend implementation of a future workforce upskilling initiative to **improve pupils, students and graduates' employability by identifying the skills gap between students' competencies and the requirement on the market**. Objectives of the initiative are as follow:

- Strengthen basic habits of pupils so that they are capable to grasp new skills later in life
- Improve graduate employability by developing a solution that identifies the gap between the skills demand in the job market and those of the students;
- Identify the relevant curricula enhancements required to complement the required skills profile for the Slovak job market;
- Manage skills supply according to the needs of businesses by regulation of study programs enrolment;
- Suggest and develop new university programs that would fit the market needs based on the gap analysis between the skills demand in the job market and those of the students.

According to a recent OECD Skills strategy for Slovakia, different initiatives for development of defined objectives has taken a place, but they are independent and miss centralized coordination.⁶⁸ **Our recommendation** takes the study into consideration and **focuses on creation of a centralized environment with advanced technological support** where all objectives are managed by a sole authority and consulted with all stakeholders involved in the process. Yet our recommendation does not substitute any existing skills strategy but propose to develop a detailed design study with the focus on development of the such program as the first step of this initiative.

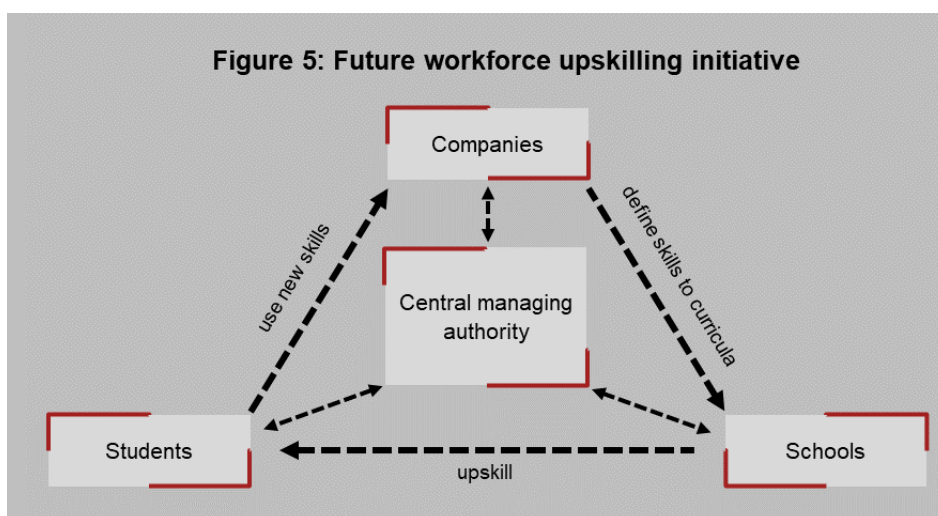
5.2.2 Initiative stakeholders

In order for the initiative to be fully functioning, it requires a functional cooperation between number of stakeholders. These stakeholders should be managed by a centralized authority which will secure clear cooperation between all of them. The main stakeholders are as follows:

Central managing authority

The authority is selected by the government and is responsible for the

Figure 5: Future workforce upskilling initiative



⁶⁸ OECD (2020), OECD Skills Strategy Slovak Republic: Assessment and Recommendations, OECD Skills Studies, OECD Publishing, Paris, [link](#)

overall management of the initiative. We recommend selecting an organization which will also be selected for management of the existing workforce upskilling initiative (e.g. the Central Office of Labor, Social Affairs and Family in Slovakia, the National Digital Coalition, etc.) so that all upskilling initiatives are centralized. Selected organization would also be responsible for collecting all data needed for an effective upskilling platform.

Pupils and students

Pupils and students as the future workforce of Slovakia are able to adapt to new skills requirements during their studies. We recommend collecting data about pupils and students existing competencies (e.g. soft / digital / linguistic / technological skills, experience, sector, interests, etc.) in order to have an aggregated overview of available skills in the country.

Companies

Companies that invest into new technologies must be drivers in demanding new skills. They should regularly discuss changes proposals with schools and the managing authority updating existing curricula.

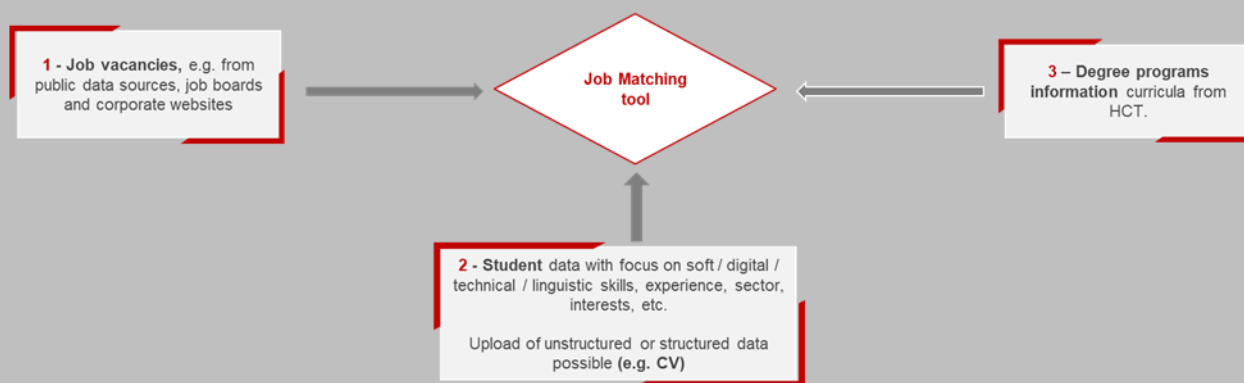
Schools

Schools are the main engine for enhancement of skills among students. Based on discussions with companies and the central authority, they would be responsible for updating curricula and enrolling relevant courses.

5.2.3 Pillars for successful preparation of the future workforce

While the upskilling of an existing workforce focuses on quick transition of people (few months) to a relevant knowledge and skills portfolio that leads to a concrete profession, upskilling future workforce is a process with focus on prediction of skills development in long-term (e.g. 5 years). It allows schools to develop curricula for students who will be entering the market after graduation. Yet, curricula updates should be discussed regularly in order to cover changes deriving from the transformation of businesses. This process is based on the following activities:

Figure 6: Data inputs for a tailored upskilling



1. Analyze the gap between available skills and the skills required by new technologies.

As one of few countries in Europe, Slovakia already assess proficiency of digital skills among Slovak pupils and students of grammar and other high schools (14 – 19 years of age). IT Association of Slovakia has been analyzing the skills since 2011. More than 11,000 participants went through the assessment in 2019. Preparation of the assessment is consulted with different industry experts

so that the test can focus on the most critical areas.⁶⁹ However, the results are currently not used for further planning of the study programs.

2. Update study programs curricula and their enrolment

Based on the findings from the gap analysis, the central authority will prepare recommendations for the most impacted study programs and identify the ones with the highest demand. Recommendations will be consulted with regional, and schools' representatives. Approved curricula recommendation by the Education ministry official will be implemented and selected study programs' will be updated. Enrolment capacities will be increased according to a decision of local government authorities (as they are today). While a similar process is already implemented in high school system, it is more difficult to implement at universities that possess higher academic independence.

3. Evaluate impact of implemented changes

Although this initiative is focused on long-term perspective, the continuous approach will eventually lead to decrease of the skills gap. Therefore, we recommend evaluating the impact of this initiative on an annual basis.

5.2.4 Implementation plan

Given that the implementation plan of this project is well demonstrated, we propose to follow similar plan in all other upskilling initiatives in Slovakia.

The implementation plan has 3 basic steps:

- **Step 1: Preparation of the initiative design study**

As this is a high-level recommendation, first we recommend preparing a study to fully assess options for application of this initiative. The study will:

- Identify all relevant stakeholders and their role in upskilling of the future workforce
- Analyze initiative ecosystem
- Define activities crucial for implementation
- Define minimum budget and timing of the activities
- Assess legal framework for the implementation of the initiative

Recommendations defined in the study will have to respect all existing skills development strategies approved by the government.

Budget and funding: We recommend defining cost of the study by the market research among reliable and transparent companies with experience in education related design studies that possess trust across the country. We also recommend funding the study from the state budget or to consult option to drive this study with the help of DG Reform instruments.

Proposed length of the study: 6 months

- **Step 2: Pilot of the initiative**

After the initiative is designed in detail, we recommend testing the initiative in a pilot. The pilot should not take less than 1 year. It will:

- establish centralized managing authority of the initiative

⁶⁹ ITAS; IT Fitness Test 2019; [link](#)

- test the recommendations defined in the study
- measure interest of companies to participate in shaping future curricula

Findings from the pilot will enable to initiative's strengths, weaknesses, opportunities, and threats (SWOT) before a full roll out of the initiative

Budget and funding: We recommend analyzing funding options defined in the chapter 2.2 *The financial framework of the program* in detail for funding of this pilot. Detailed assessment identifying exact funding mechanism will be part of the design study (Step 1).

Proposed length of the pilot: 12 months

• Step 3: Implementation of the initiative

Based on the findings from the pilot, established centralized authority will be responsible for implementing of the initiative. The implementation will mainly focus on evaluation of the initiative impact on lowering the skills gap.

Budget and funding: We recommend analyzing funding options defined in the chapter 2.2 *The financial framework of the program* in detail for funding of this pilot. Detailed assessment identifying exact funding mechanism will be part of the design study (Step 1).

Proposed length of the pilot: 5+ years

5.3 Risk identification and mitigations

To ensure risks will be minimized to the maximum extent, we recommend having a risk assurance process in place for both recommendations. This would involve the monitoring and escalation of risks within the project management structure, so these can be dealt with in an effective and timely manner. We also recommend having well-defined mitigation actions to reduce the impact of risks on the program.

Based on the learnings gathered by PwC on the Luxembourg Digital Skills Bridge, hereunder is an example of a risk matrix with different types of risk, their description and the mitigation actions associated. Risks in the table are related to both recommendations.

Table 3: Risk matrix

TYPE OF RISK	DESCRIPTION OF THE RISK	MITIGATION ACTION
<i>Strategic</i>	The company lacks maturity to follow-up the upskilling program (e.g. a company's strategic workforce planning requires deeper analysis of their digital transformation roadmap).	We recommend establishing a preliminary step to assess the companies' maturity in terms of digital strategy (future investments in technology, AS-IS and TO-BE analysis of the workers' skills, etc.) to access the program.
<i>Strategic</i>	Targeted jobs are not available to the employee when the training is over.	We recommend involving the Executive team, HR department and Management in the strategic workforce analysis (Step 2). Also, we recommend contracting with the stakeholders on the defined strategy in order to secure the selected Employees' path to their targeted jobs before any training plan is executed. This will maximize ROI on upskilling and training investment.

<i>Human</i>	Employees do not feel comfortable providing honest and candid information to their personal advisor.	We recommend contracting with external personal advisors to establish a relationship based on trust and objectivity. We also recommend providing assurance on confidentiality of information.
<i>Technical</i>	The ecosystem of tools does not deliver the expected results due to technical issues, lacking languages, quality of data inputted.	We recommend testing the end-to-end platform during the pilot phase and adapting learnings for the multi-year program (additional languages, data sets...).
<i>Reputational</i>	Companies laying off employees during the upskilling program.	We recommend contracting with the company in terms of roles and responsibilities to mitigate those risks. We also recommend giving high visibility to the program through a large-scale communication campaign (through the media and professional associations).
<i>Reputational</i>	Companies and/or participants drop out.	<p>To mitigate the risks of participants dropping out, we recommend contracting with an external personal advisor as his/her role is essential in giving the employee confidence, motivation and to reassure them along the process and support them through their upskilling journey. We also recommend contracting with the employee in terms of commitment, roles and responsibilities.</p> <p>To mitigate the risks of companies dropping out, we recommend establishing a preliminary step to assess the companies' maturity in terms of digital strategy and contracting with the selected companies in terms of commitment, roles and responsibilities.</p> <p>A drop-out/success rate should be included in the budget calculation. For example, in Luxembourg a 70% success rate was planned – results were over 90% success rate (completion of the program).</p>
<i>Operational</i>	Low ROI of Trainings.	We recommend contracting with the training providers in terms of roles and responsibilities and establishing strict selection criteria with a due diligence process when training providers are selected. A request for proposals towards training providers based on the companies' trainings needs after analysis could help increase quality and availability of trainings.
<i>Financial</i>	Fraud – Use of the government subsidies or other funding for other purposes than upskilling.	<p>We recommend implementing a control framework including milestones with deliverables (e.g. proof of training) to be delivered by companies enrolled in the upskilling program.</p> <p>The online digital platform of the program supports monitoring of key indicators.</p>

On top of the risks and their mitigations plans identified above, we identified following risks exclusively related to the future workforce upskilling initiative:

Table 3: Risk matrix for the future workforce upskilling initiative

TYPE OF RISK	DESCRIPTION OF THE RISK	MITIGATION ACTION
<i>Strategic</i>	Initiative is not in compliance with goals from different strategies	The government currently develops more skills-related strategies and misses a profound cooperation. Therefore, the design study will only follow goals from strategies approved by the time of the study composition.
<i>Strategic</i>	Insufficient level of cooperation between ministerial authorities responsible for skill or curricula development. Development of skills in Slovakia is currently driven by 2 ministries: The Ministry of Labor, Social Affairs and Family and The Ministry of Education, Science, Research and Sport. Moreover. In addition, Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization also partly participates in the topic.	As one of the first steps, it is crucial to facilitate the discussion between the bodies about establishment of a centralized authority which will be respected by all of them.

5.4 Monitoring framework

We propose to setup the program monitoring framework which will allow to assess impact of the program on the labor market. It is our recommendation to use the same approach and technology for both recommendations.

We highly recommend the use of technology such as an integrated platform based on AI tools operated by the Authority. Such technology enables the Authority to monitor the progress and advancement of the various initiatives undertaken within the upskilling program. It also enables the various stakeholders (such as the Company Key Account Managers, the Participating Company, the Personal Advisors, the Employees, etc.) to monitor their own progress and advancement.

The role of stakeholders' engagement in defining the Key Performance Indicators (KPIs) to measure and monitor the upskilling program's impact is essential to ensure an effective reporting process. We suggest combining qualitative and quantitative KPIs and defining indicators which are specific, measurable, achievable, relevant and time-bound (SMART). Setting-up partnerships such as with Trade Unions, Professional Associations and Chambers, and Participating Companies is a way to involve and align the different stakeholders on the definition of the KPIs to measure the program's success. As part of the framework, we recommend following KPIs:

KPIs framework 1: Measure and control the upskilling programs' progress

Hereunder is a recommendation on a non-exhaustive list of "Key Performance Indicators (KPIs)", which would be embedded in the platform's reporting and accessible through dashboards, for measuring and controlling the program's progress and advancement.

Proposed list of KPIs for recommendation 1:

- Number of companies accepted in the program;
- Number of employees selected to participate in the program;

- Number of jobs transformed; Number of new jobs;
- Number of budgets spent per company;
- Number of mobility;
- Number of digital trainings / soft-skills training / job-related training.

Proposed list of KPIs for recommendation 2:

- Number of students participating in IT Fitness Test compared in time
- Number of companies participating in skills requirements definition
- Number of study programs updated
- Capacity changes in study programs with the highest demand

KPIs framework 2: Measure the upskilling program's impact

Hereunder is a recommendation on a non-exhaustive list of “Key Performance Indicators (KPIs)” to define when measuring the program's impact.

Proposed list of KPIs for recommendation 1:

- Quality of trainings;
- Number of people in a job one year after fulfilling the program;
- Number of companies re-doing the program (the year after);
- Satisfaction rate of employees;
- Satisfaction rate of companies (HR).

Proposed list of KPIs for recommendation 2:

- Change in the skills gap
- Change in the level of digital skills in Slovakia

In order to track the upskilling program's impact, we highly recommend – and highlight the importance of - collecting anonymized or pseudonymized data during the upskilling programs and after the programs take place in order to track the impact. We recommend conducting an annual survey with the Participating Companies, the employees, and the students who participated in the upskilling program on the following topics: unemployment rates, the impacted jobs' evolution, the companies' competitiveness, etc.

6. Conclusion

While our “as-is” analysis of the digital skills in Slovak Republic sheds light on a rather mixed position with most Slovaks believing in a positive impact of the digital transformation on their jobs and at the same time fearing that AI and robots will steal those same jobs, it also reveals the digital skills gap that Slovak companies struggle to bridge. In order to support Slovak companies bridging this digital skills gap, we recommend an action plan on a national upskilling pilot project with an “end-to-end” process: the Slovak Republic Digital Upskilling program.

Based on the learnings gathered by PwC on the Luxembourg Digital Skills Bridge, we recommend that the action plan includes: strategic measures on how to engage with the ecosystem of the national stakeholders (Government, Companies, Professional Associations and Chambers, Trade Unions and Training Providers); the identification of the program’s financial schemes; a rigorous six-steps methodology (program’s design, companies’ selection process, strategic workforce planning analysis, individuals’ skills assessment, job-matching, training plan); and the program’s evaluation.

In the long run, we believe such a program could be iterative (yearly) in order to create a sustainable dynamic and follow-up with the digital transformation’s fast pace, and thus budgeted as such. We also pinpoint some critical success factors such as monitoring and defining impact measures, for which we suggest some KPIs.

Last but not least, to prepare future generations for the workforce of tomorrow, we must look at the education system and its adaptation to the skills needed in the workplace. Separate upskilling initiative would benefit to minimizing skills gap the country currently has.

There are many reasons as to why we strongly recommend adopting a national upskilling initiative. Not only upskilling improves the individuals’ employability and the companies’ competitiveness, but it also contributes to society at large, reinforcing citizens’ life-long learning and ensuring social inclusion as well as placing the Slovak Republic as one of the European digital pioneers.

7. Appendices

Appendix 1 – Methodology (in English), questionnaire and focus group approach (in Slovak)
(annex to the Study)

Appendix 2 – List of international e-learning platforms and training providers

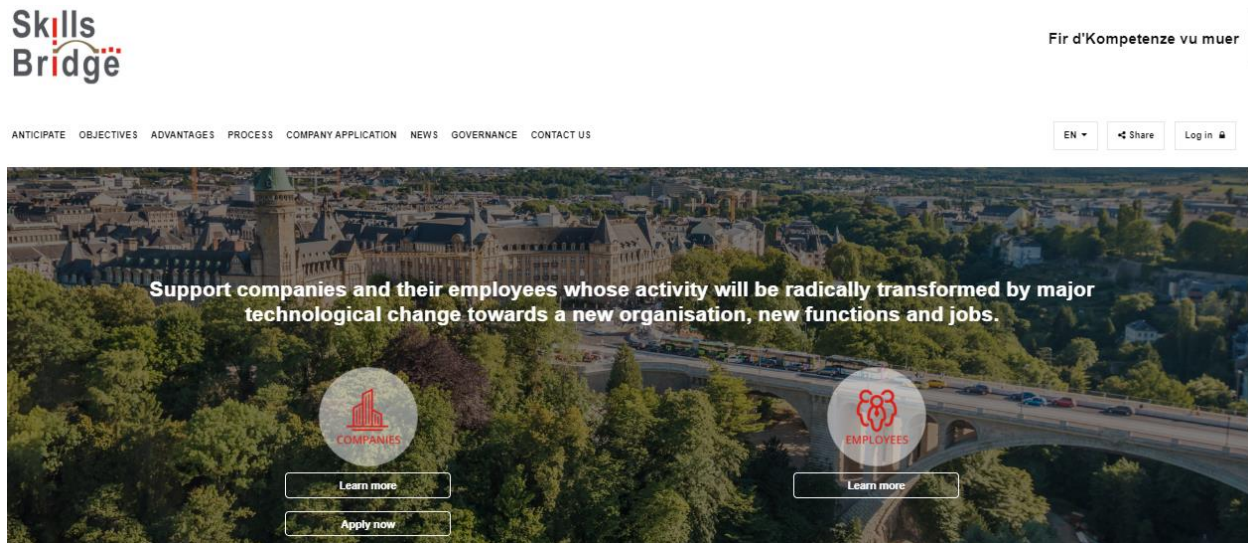
- IBM Skills Gateway – <https://www.ibm.com/services/learning/>
- Invensis Learning – <https://www.invensislearning.com/>
- Cisco Networking Academy – <https://www.netacad.com/partners>
- Network Development Group – <https://www.netdevgroup.com/index.html>
- All Digital – <https://all-digital.org/>
- Coursera – <https://www.coursera.org/>
- MIT Open Course Ware – <https://ocw.mit.edu/index.htm>
- Udemy – <https://www.udemy.com/>

Appendix 3 – Luxembourg Digital Skills Bridge Training RFP



Luxembourg Digital
Skills Bridge RFP.pdf

Appendix 4 – Luxembourg Digital Skills Bridge website – www.skillsbridge.lu



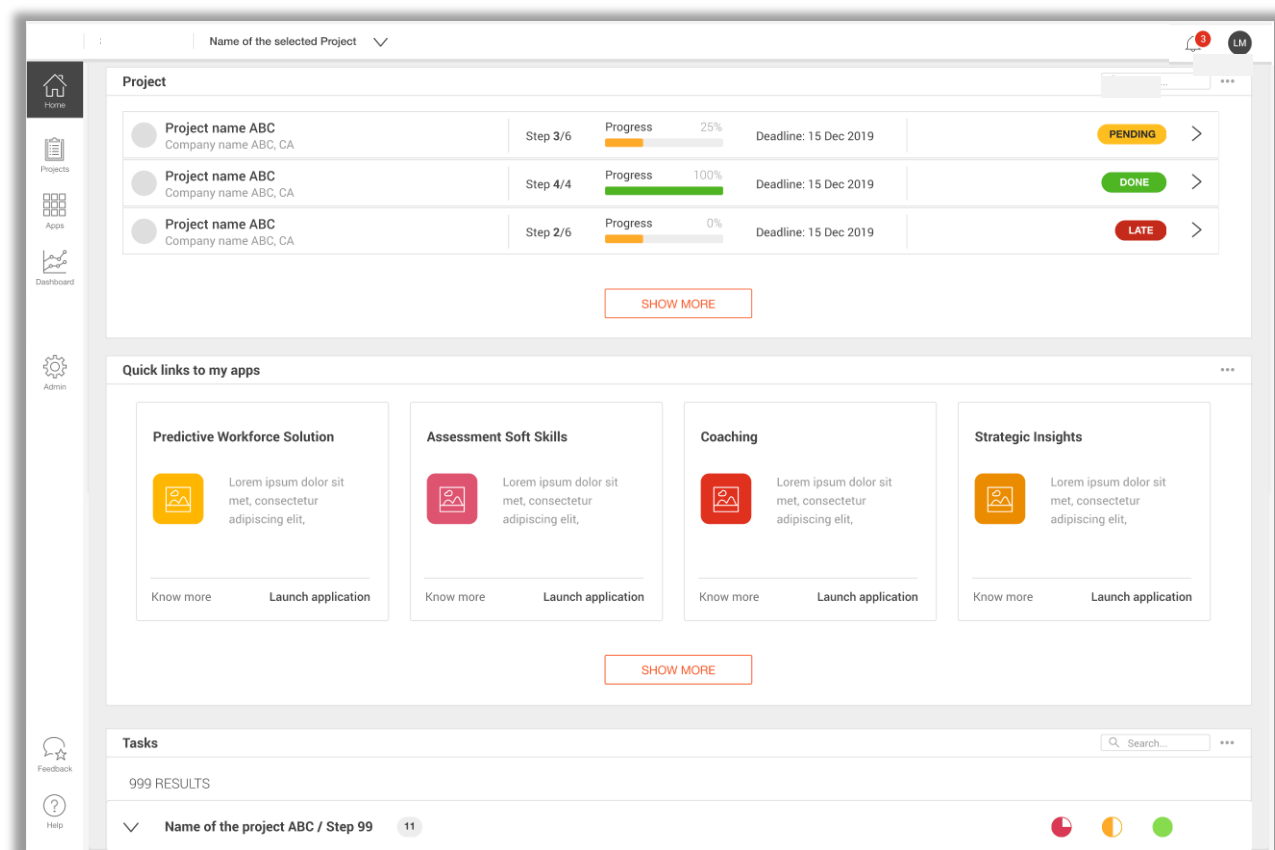
Appendix 5 – Digital Europe

DIGITALEUROPE: multi-fund program that supports up- and reskilling programs in Europe related to the digital disruption current situation. It consists of several grant opportunities: the European Social Fund+, the European Regional Development Fund, the Digital Europe Program and the Erasmus Program that will represent the most significant funding opportunities in 2021-2027 to bridge the digital skills gap.

- a. **European Social Fund+** with a budget of €100 billion (in current prices). The ESF+'s focus is to boost employability and improve the education and training systems. The ESF+ will support digital skills development on basic, medium and advanced levels.
 - i. Supporting the youth, unemployed and any kind of underprivileged with relevant digital skills, including the medium and the advanced digital skills to progress their careers and/or reskill from other professions onto the digital labor market.
 - ii. Particular target audiences will require increased efforts to bring them up to speed with skills sought after by potential employers (i.e. blue-collar workers in restructuring industries, migrants, young NEET's etc.).
 - iii. To encourage more SME's (startups in particular) to invest more into employees' skills development, they strongly recommend state aid exemption for any SME that will receive ESF+ support to train their employees.
- b. **European Regional Development Fund** with a budget of more than €190 billion. The ERDF aims to strengthen economic and social cohesion in the EU by correcting imbalances between its regions' management. The fund can contribute to reducing unemployment by helping people with acquiring job-ready skills and by boosting competitiveness of enterprises and advancing their digital transformation. The ERDF has received an enhancement by adding the support for education, lifelong learning and training into its portfolio of interventions.
- c. **Digital Europe Program** with a budget of nearly €700 million for skills. DIGITALEUROPE supports the first ever program with a clear objective of promoting advanced digital skills, focused on those related to the program's scope, namely high-performance computing, big data analytics, cybersecurity, distributed ledger technologies, robotics and artificial intelligence. Students, IT professionals, the workforce, entrepreneurs, SME leaders and graduates are among the target groups that will be able to benefit from the Program
- d. 's actions for advanced digital skills. DIGITALEUROPE supports the proposal of including in the implementation of the Digital Europe Program co-investments with Member States and, when needed, with the private sector.
- e. **ERASMUS PROGRAMME with a budget of €30 billion** for education, training, youth and sport. The main goal of the program is equipping Europeans with the skills needed in a society that is increasingly mobile, multicultural and digital, ensuring quality and market relevance of above-mentioned actions. Overall, there is a highlight on the need for greater engagement of the private sector as essential for more comprehensive partnership that can ensure market relevance, faster and more efficient technology and know-how transfer from the industry to academia, education institutions and back to the industry, as well as better skills acquisition by the students and educators. Private sector actors should represent both potential employers and private education and training providers. N.B. minimum one private sector actor shall be included in every consortium formed to deliver on projects' objectives

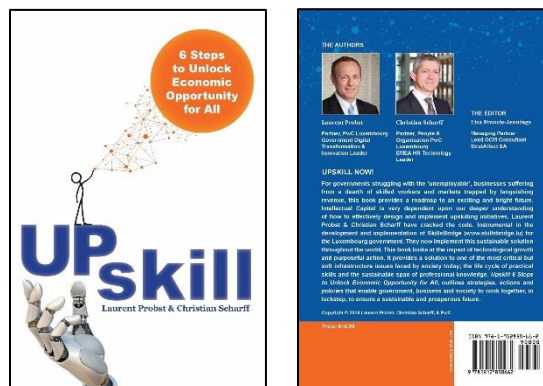
Appendix 6 – Example of the upskilling program platform dashboard

PwC Luxembourg has developed the first operational upskilling solution and supporting platform. It allows for the strategizing, assessing, guiding and training employees of companies of all sizes whose activities are transforming towards a new organization, new functions and new jobs. Our solution is highly innovative, tackling the challenging match of job transformation at company, employee and market level. We support a market-driven approach in which the final objective is to place the right person in the right position, equipped with the right skills. We have developed an integrated platform with a set of flexible modules that can be easily tailored to your specific needs. The modules support the implementation of the Skills Expander process and support each step defined above (e.g. workforce planning, skills assessment, job and training matching, integrated data protection & communication).



Appendix 7 – Useful resources

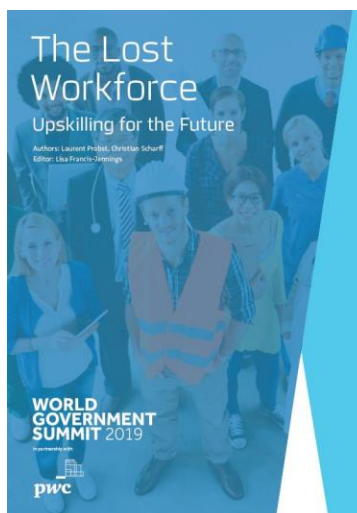
1. Upskill – 6 steps to unlock economic opportunity for all – Laurent Probst & Christian Scharff



2. A strategist's guide to upskilling – <https://www.strategy-business.com>



3. The Lost Workforce - Upskilling for the future – <https://www.worldgovernmentsummit.org>



End of the report

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